

Project Manual

for

**HARDIN-JEFFERSON HIGH SCHOOL
TRACK AND FIELD REPLACEMENT**

PBK Project No.: P2106300SP

for the

**HARDIN-JEFFERSON INDEPENDENT SCHOOL
DISTRICT
INDEPENDENT SCHOOL DISTRICT**

OCTOBER 21, 2021

ISSUE FOR PROPOSAL



October 21, 2021

Texas Registered Engineering Firm F-3709



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ISSUE FOR PROPOSAL

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**REQUEST FOR COMPETITIVE SEALED PROPOSALS
FOR SELECTION OF A GENERAL CONTRACTOR**

HARDIN-JEFFERSON INDEPENDENT SCHOOL DISTRICT

SOUR LAKE, TEXAS

RFP 2021-P2106300SP

October 21, 2021

INSTRUCTIONS TO PROPOSERS

Article I. GENERAL INFORMATION.

- 1.1 **Request for Proposals.** The Hardin-Jefferson Independent School District, (“District” or “Owner”) will receive Competitive sealed Proposals for: **“Track and Field Package Project”** (hereafter called the "Project"), to be constructed in accordance with the Drawings, Specifications, and other Contract Documents prepared by PBK ARCHITECTS (hereafter called "Architect"), a copy of which is attached hereto at **Appendix A**, and incorporated herein by reference.
- 1.2 This Request for Competitive Sealed Proposals (“RFP”) is the only step for selecting a General Contractor for the Project as provided by Chapter 2269, Subchapter D of the Texas Government Code. The RFP provides the information necessary to prepare and submit Competitive Sealed Proposals for consideration and ranking by the Owner. The Owner may select the Proposal that offers the “best value” for the District based on the published selection criteria and weight of criteria, and on its ranking evaluation. As indicated herein, factors other than price will be considered in making this determination. Following evaluation and ranking of the Proposals by an evaluation committee, and approval of the rankings by the District’s Board of Trustees, the District may first attempt to negotiate a contract with the selected Proposer. As permitted by statute, the District may discuss with the selected Proposer options for a scope or time modification and any price change associated with the modification. If the District is unable to reach a contract with the selected Proposer, the District may formally end negotiations with that Proposer and proceed to the next ranked Proposer in the order of the selection ranking until a contract is reached or all proposals are rejected.
- 1.3 **Proposers are encouraged to examine this Solicitation and the accompanying Contract Forms and Addenda carefully, understand the terms and conditions for providing the services listed herein and respond completely.** FAILURE TO COMPLETE AND PROVIDE ANY OF THE ABOVE ITEMS MAY RESULT IN THE PROPOSER’S PROPOSAL BEING DEEMED NON-RESPONSIVE AND THEREFORE DISQUALIFIED FROM CONSIDERATION.
- 1.4 **Restrictions on Communication and Point-of-Contact.** The Owner designates the following person, as its District representative with regard to this RCSP

District Representative
Kaleb Norris Operations Hardin-Jefferson Independent School District 520 W Herring Street, Sour Lake, Texas 77659 Phone: (409) 981-6400 x 1112 Fax: (409) 287-2283 E-mail: kalebnorris@hjisd.net

Proposers shall restrict its contact with the District and direct all questions regarding this RCSP, including questions regarding terms and conditions, to the District Representative. **Do not contact members of the Board of Trustees or any other employee of the Hardin-Jefferson Independent School District. Contact with any of these prohibited individuals after issuance of the RCSP and before selection is made, may result in disqualification of your proposal.**

1.5 **Pre-Submittal Conference and Walk-Through.**

1.5.1 A Pre-Proposal Conference will be held on **Thursday, November 4, 2021, beginning at 10:00 AM CST, at Hardin-Jefferson ISD Administration Building, 520 W Herring Street, Sour Lake, Texas 77659.** A Walk-through of the Project site or sites will follow the Conference. Respondents are encouraged to prepare and submit any questions in writing in advance of the Pre-Submittal Conference in order to expedite the proceedings. The District’s responses to questions received at or before the Pre-Submittal Conference may be distributed at the Pre-Submittal Conference or distributed via posting on the District’s website to Proposers who have picked up this RCSP and registered as participants. Respondents should notify District if Proposer wishes to receive copies of District’s responses by mail. Attendance at the Pre-Submittal Conference is optional, however, attendance is strongly encouraged.

Estimated contract award date: December 13, 2021

1.5.2 **Accessibility.** The location for the Pre-Submittal Conference is accessible to persons with disabilities. To arrange for special assistance to attend this meeting or if you have questions regarding accessibility, please contact the District in advance of the meeting at (409) 981-6413.

1.6 **Confidentiality and Disclosure Under the Texas Public Information Act (“the Act”).** During the selection process, the District is permitted to protect information contained within the Proposals from disclosure to assure fair competition between the Proposers. The Proposer is cautioned however, that once a Contract is executed in connection with this solicitation, all information in any Proposal, except under very limited circumstances, will become Public Information, subject to disclosure by the District upon receipt of a written request. Any information contained in Proposer’s Proposal, which it deems confidential privileged, proprietary, a trade secret or protected from disclosure by a provision of the Act after the award of the Contract, should be clearly and specifically marked as such in Proposer’s RCSP response. If a request is made under the Act, after the execution of a Contract for all or any part of a Proposal submitted in connection with this RCSP, the District shall be entitled, but not required, to take action to assert its rights, or the protect the Proposer’s rights in response to such request. The District cannot guarantee that it will not be compelled to disclose all or part of any public record under the Act. Proposers including information it considers confidential in its Proposal are encouraged to consult their attorney regarding the handling of information in its Proposal to best maintain a future claim of confidentiality.

1.7 **No Contractual Obligation Prior to Execution.** Owner reserves the right to reject any or all Proposals. There will be no contractual obligation on the part of the Owner to any Proposer, nor will any Proposer have any property interest or other right in the contract or Work being proposed unless and until the contract is unconditionally executed and delivered by all parties, and all conditions to be fulfilled by the Proposer have either been so fulfilled by the Proposer or waived in writing by the Proposer or waived in writing by the Owner.

1.8 **Waiver.** By submitting a Proposal, Proposer agrees to waive any claim it has or may have against the District, any District’s consultants, and their respective trustees, directors, agents and employees, and any reference sources, arising out of or in connection with the administration, evaluation, or recommendation of any Proposal; waiver of any requirements under the Proposal Documents; acceptance or rejection of any Proposal; and award of the Contract.

1.9 **Israel Certification.** By submitting a Proposal, Proposer certifies that it does not and will not refuse to deal with, terminate business activities with, or otherwise take any action that is intended to penalize, inflict economic harm on, or limit commercial relations specifically with Israel, or with a person or entity doing business in Israel or in an Israeli-controlled territory, unless the action taken for ordinary business purposes.

Article II. PROPOSAL PREPARATION AND SUBMISSION.

2.1 **Deadline and Submission.**

2.1.1 Proposals must be submitted in sealed opaque envelopes plainly marked: **Competitive Sealed Proposal: “Hardin-Jefferson ISD Track and Field Package Project (2021)”** and bearing the name and address of the Proposer. Proposals are to be addressed to the Board of Trustees, Hardin-Jefferson Independent School District, and are to be delivered to the Business Office of Hardin-Jefferson ISD, Attn: Mr. Kaleb Norris, Operations, 520 W. Herring Street, Sour Lake, Texas 77659, prior to the deadline included below. At such time and date the Proposals will be publicly opened and the names of each Proposer and the prices stated in each Proposal will be read aloud. Proposals are to include the information requested in this Article II in the sequence and format prescribed. In addition to and separate from the requested information, Proposers may provide supplementary materials further describing their capabilities and experience.

**PROPOSALS MUST BE RECEIVED NO LATER THAN
2:00 P.M. CST on Tuesday, December 7, 2021.**

Hardin-Jefferson ISD will **only** accept print copies of proposals as outlined herein.

2.1.2 **Proposals received after the deadline will not be accepted and will NOT be opened.**

2.2 **Form of Proposal Response.**

2.2.1 Immediately following the expiration of the deadline above, the Request for Competitive Sealed Proposals will be opened and publicly read aloud at the District's Central Office, 520 W. Herring St., Sour Lake, TX 77569. Each proposal which is not signed by the offeror or an authorized representative of the offeror shall be rejected. Within 45 days after the date of opening the proposals, the District shall evaluate and rank each proposal submitted using the District's published selection criteria.

2.2.2 To achieve a uniform review process and obtain the maximum degree of comparability, it is required that proposals be organized in the manner specified and comply with all instructions related to submitting a bid. **FAILURE TO COMPLETE AND PROVIDE ANY OF THE ITEMS REQUIRED HEREIN MAY RESULT IN THE RESPONDENT'S PROPOSAL BEING DEEMED NON-RESPONSIVE AND THEREFORE DISQUALIFIED FROM CONSIDERATION.**

2.2.3 The proposal shall be submitted in the order set forth below:

A. **MONETARY PRICE PROPOSAL.** Provide a Stipulated Sum Price Proposal for all labor, services, materials, tools, equipment, and supervision necessary for final completion of construction of the Project in accordance with the Project Schedule, Contract Documents, Drawings and Specifications, Addenda and any Documents provided in connection with this RCSP. Proposer's Offer shall include no amount for sales or use taxes for which District is exempt. Proposer's Monetary Proposal shall be prepared on the form attached hereto as ***RCSP Attachment A.***

B. **PROPOSER QUALIFICATION GENERAL QUESTIONNAIRE:** Complete and submit the Proposer Qualification General Questionnaire, ***RCSP Attachment A-1.***

C. **FELONY CONVICTION NOTIFICATION:** Complete, sign and submit the Felony Conviction Notification Form, ***RCSP Attachment B.***

D. **NON-COLLUSION AFFIDAVIT:** Complete and submit the Non-Collusive Affidavit of Prime Proposer, ***RCSP Attachment C.***

E. **BID SECURITY.** Submit Bid Security documents as required by Section 2.3 of this Request for Competitive Sealed Proposals.

F. **CONFLICT OF INTEREST QUESTIONNAIRE.** District Policy and Chapter 176 of the Texas Local Government Code requires that persons, or their agents, who seek to contract for the sale or purchase of property, goods, or services with the District, shall file a completed Conflict of Interest Questionnaire with the appropriate District Records Administrator not later than the seventh (7th) business day after the date that the person: (1) begins contract discussions or negotiations with the District; or (2) submits to the District an application, response to a request for proposals or bids, correspondence, or another writing related to a potential agreement with the District, whichever is later. Please consult your own legal advisor if you have questions regarding the statute or form. Complete and submit the Conflict of Interest Questionnaire required by Chapter 176 of the Texas Local Government Code, ***RCSP Attachment D,*** with Proposer's Proposal.

G. **CRIMINAL HISTORY RECORDS CHECK ("CHRI").** Texas Education Code Chapter 22 requires entities that contract with school districts to obtain criminal history record information ("CHRI") on ***Covered Employees.*** Covered Employees with ***Disqualifying Criminal Histories*** are prohibited from serving at a school district. Proposer will be required to certify to the District that it has complied and will be required to obtain similar information from its employees, subcontractors of every tier and independent contractors, to the extent they are, or employ, Covered Employees.

"Covered Employees" are defined as all employees of a vendor, or its subcontractors of any tier, and individuals who are independent contractors, who have or will have continuing duties related to the service to be performed at the District and have, or will have, direct contact with students. The District will be the final arbiter of what constitutes continuing duties and direct contact with students.

A "Disqualifying Criminal History" includes existence of one of the following offenses in the CHRI Report, if at the time of the offense, the victim was under 18 or enrolled in a public school: (a) a felony offense under Title 5, Texas Penal Code; (b) an offense for which a defendant is required to register as a sex offender under Chapter 62, Texas Code of Criminal Procedure; or (c) an equivalent offense to (a) or (b) under federal law or the laws of another state. By submission of a response to this RCSP, Proposer agrees that, prior to commencement of performance under the awarded Contract, it will timely obtain CHRI on its Covered Employees, obtain similar information from its

employees, subcontractors of every tier and independent contractors, to the extent they are, or employ, Covered Employees, at Contractor's sole expense and comply with all requirements of Chapter 22 of the Education Code regarding CHRI.

H. DISCLOSURE OF INTERESTED PARTIES – FORM 1295. Texas Government Code, Section 2252.908 requires the Disclosure of Interested Parties, by a contractor, using the form and procedure established by the Texas Ethics Commission, at the same time it submits the signed Contract with the District, if the Contract award requires action or a vote by the Board of Trustees **or** the value of the Contract awarded as a result of the solicitation is at least One Million Dollars (\$1,000,000.00). The form requires disclosure of any "interested party" to the Contract of which the contracting Proposer is aware, and execution by Proposer's authorized agent acknowledging that the disclosure is made under oath and under penalty of perjury. Proposer by submission of a Response to this RCSP, agrees that upon Contract award and notification by the District of the applicability of this requirement, it will timely comply with the filing requirements set forth by the Commission and required by Section 2252.908 of the Texas Government Code.

I. ACKNOWLEDGEMENT OF RCSP ADDENDA ISSUED. Complete, sign and submit the Acknowledgement of RCSP Addenda, **RCSP Attachment E**. **This form is required ONLY if Addenda were issued in connection with this RCSP.**

J. SIGNATURE PAGE: Complete, sign and submit the Signature Page, **RCSP Attachment F**. The Signature Page must be signed by a person, or persons, authorized to bind the entity, or entities, submitting the proposal. Proposals signed by a person other than an officer of the company or partner of the firm shall be accompanied by evidence of authority.

2.2.4 Proposals must be submitted on the forms promulgated by the District. No Proposal shall be made orally, by telephone, by facsimile ("fax") transmission or by other electronic means.

2.2.5 All blank spaces in the Monetary Proposal Form should be filled out completely, and all numbers set forth both in words and in figures.

2.2.6 A proposal may be withdrawn by hand-delivered written document or electronic communication request received by Owner prior to the time fixed for opening.

2.2.7 All Monetary Proposals shall be computed exclusive of the Texas Sales Tax; that is, such tax shall not be added to the amount offered for the construction of the Project.

2.2.8 Owner reserves the right to request supplemental information of any and all Proposers to aid the Owner in the evaluation process.

2.3 Bid Security

2.3.1 Proposer must submit a certified or cashier's check or proposal bond, made payable to the Hardin-Jefferson Independent School District, executed by a corporate surety acceptable to the District, which is licensed pursuant to the Texas Insurance Code and listed on the United States Department of the Treasury's Listing of Approved Sureties (Dept. Circular 570).

2.3.2 The bond amount or check shall be in the amount of **5% of the largest possible total of the Proposer's Monetary Proposal**. The Proposal Bond must be valid for sixty (60) days following the deadline for submission of proposals; must be conditioned upon the Contractor entering into the Contract in writing with the Owner in accordance with terms of the proposal, and furnishing such bonds and other instruments as may be specified in the Contract Documents with good and sufficient Surety for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof; must be accompanied by an original signed and notarized Power-of-Attorney bearing the seal of the issuing surety company; and reflect that the signatory to the bond is a designated Attorney-in-Fact.

2.3.3 Time is of the essence, and the award of the contract to the successful Proposer is expressly conditioned upon (i) the Proposer's execution and delivery of the contract, and delivery of all required payment and performance bonds and evidence of insurance, within ten (10) calendar days after the successful Proposer is notified of the acceptance of its Proposal, and (ii) the Proposer's timely fulfillment of any and all other preconditions expressly set forth in the Contract Documents. Should the Proposer fail to timely execute and deliver the contract, required bonds, evidence of insurance, or fail to timely fulfill any other such preconditions, the Owner may, at its option and discretion, without releasing, impairing or

affecting its right to receive the security as damages for such failure, rescind the award and thereafter negotiate with and award the contract to the next ranked Proposer, or may reject all Proposals.

2.3.4 The Bid Security deposited by all Proposers will be released/returned at such time as the Construction Contract has been executed by the successful Proposer. However, if Owner fails to accept any proposal within sixty (60) days after the date scheduled for opening of proposal and a Proposer withdraws its proposal, its bid security will be released/returned upon withdrawal.

ARTICLE III. SELECTION CRITERIA.

3.1 Evaluation will be based on the Proposer’s response to the Proposer’s Monetary Proposal, the Proposers Questionnaire and the information obtained from references and other sources. After the deadline time for proposal submissions, the Owner will evaluate the various submitted sealed proposals and then select a Contractor for this Project(s). Criteria for selection of the contractor, by the District, will be based upon the following criteria (weighted against a total amount of 100%). All Proposer’s responses in its proposal may be used to rank Proposers based on these criteria and weight of criteria. The District reserves the right to verify the accuracy and completeness of all responses by utilizing any information available to the District without regard to whether such information appears in the submitted proposal.

50%	The amount of Proposer’s price proposal.
20%	The Proposer’s experience, background and reputation , based upon information provided by the Proposer and on other information obtained by references; past experience with the Owner; experience on similar projects for other school districts; record of on-time completion; record of claims and litigation, and other similar factors reflecting the experience and reputation of the general contractor
15%	The quality of the Proposer’s services and completed projects, including its service scheduling ability on-time and in-budget completion and reputation for consistent on-going support and satisfactory future warranty administration performed by the Proposer
10%	Overall capability of the key personnel on this project, including principals of the firm and the proposed on-site construction superintendent.
5%	Proposer’s resource capability as it relates to Proposer’s ability to appropriately manage and oversee a Project of this size and scope.

3.2 In submitting its proposal, the Proposer agrees and understands that the Owner shall not be obligated to award a construction contract for this project strictly on the basis of the lowest monetary offer proposed.

3.3 By submission of his Proposal, the Proposer also agrees to waive all rights to claims against the District, or persons authorized by the District, including the District’s architect and Program Manager for any damages whatsoever arising from the Owner’s or said person’s evaluation of the Proposer’s proposal and/or qualifications to perform this specific project.

3.4 If required by the Owner after the receipt of competitive sealed proposals, additional project cost modifications may be requested for further negotiation based on a change in the Project Time or Scope.

ARTICLE IV. PROPOSAL OPENING AND RANKING.

4.1 Following the deadline for receipt, the District’s staff will receive, publicly open, and read aloud the names of the Proposers and all fees and prices stated in the proposals. Within forty-five (45) days following the date of the opening, District staff will evaluate and rank each proposal submitted in relation to the selection criteria set forth herein. The District may also request additional information from Proposers at any time prior to final ranking of Proposers. The District may select all, some or none of the Proposers for interviews. The interview, if any, will not be scored separately from the proposal, but may result in an

adjustment in score. A recommendation will be made to the Board of Trustees as to the ranking of the Proposals.

4.2 Following the Board's ranking of the Proposers based on the published selection criteria, the District will attempt to negotiate an agreement with the Proposer that offers the best value to the District. If the District is unable to negotiate an agreement with the selected Proposer, the District shall, formally and in writing, end negotiations with that Proposer and begin the negotiation process with the next ranked Proposer in the order of selection ranking until a contract is reached or negotiations with all ranked Proposers end.

4.3 By submitting a Proposal, each Proposer agrees to waive any claim it has or may have against the District, the Architect/Engineer, and their respective trustees, agents and employees, and any reference sources, arising out of or in connection with the administration, evaluation, or recommendation of any Proposal; waiver of any requirements under the Proposal Documents; acceptance or rejection of any Proposal; and award of a Contract.

4.4 The District shall have no contractual obligation to any Proposer, nor will any Proposer have any property interest or other right in the contract or Work being proposed unless and until the contract is unconditionally executed and delivered by all parties, and all conditions to be fulfilled by the Contractor have either been so fulfilled by the Contractor.

4.5 No Proposal or modification to a Proposal shall be made orally or by electronic means not explicitly authorized in this Request, including telephone, e-mail, or by facsimile transmission ("fax").

4.6 Proposals may be withdrawn by written request received by the District prior to the time fixed for opening. Two (2) signed copies of any such withdrawal should be forwarded immediately to District in a sealed opaque envelope properly marked to identify the contents. Faxed responses or withdrawals are not acceptable.

4.7 The District reserves the right to request supplemental information of any and all Respondents to aid the Owner in the evaluation process.

4.8 Time is of the essence, and the award of the Contract to the successful Proposer is expressly conditioned upon (i) the Proposer's execution and delivery of the contract and evidence of insurance, within ten (10) calendar days after the successful Proposer is notified of its first place ranking, and (ii) the Proposer's timely fulfillment of any and all other preconditions expressly set forth in the Contract. Should the Proposer fail to timely execute and deliver the contract, evidence of insurance, or fail to timely fulfill any other such preconditions, the Owner may, at its option and discretion, terminate negotiations with the first ranked proposer and negotiate with and award the contract to the any later ranked Respondent, or may reject all Proposals.

ARTICLE V. EXAMINATION OF CONTRACT DOCUMENTS & SITE.

5.1 Drawings and Specifications and General Conditions incorporated by reference are on file at Hardin-Jefferson I.S.D. 520 W Herring Street, Sour Lake, Texas 77659, and at the Architect's office at the address listed above, where they may be inspected during regular business hours without charge. Subcontractors and Suppliers purchasing a partial set of proposal documents are responsible for determining the documents it requires and is responsible for costs associated with printing and delivery.

5.2 If any Proposer is in doubt as to the meaning of any part of the Drawings, Specifications, or other Contract Documents, or if he discovers what he considers to be a discrepancy, omission or conflict in such Contract Documents, he shall immediately call the Architect's or District's attention to same by written notice or request for an interpretation of same. If such written notice or request is delivered to the Architect's or District's attention at least SEVEN (7) days before the deadline for receipt of Proposals, the Architect's or District's shall issue a written addendum, forwarded to all persons who, to the knowledge of the Architect's or District's, are prospective Proposers setting out any corrections to such Contract Documents or the Architect's or District's interpretation thereof, as the case may be. Any opinion expressed by the Architect's or District's in interpreting the Contract Documents shall not be binding upon Owner, nor does Architect warrant that the Owner will accept his interpretation of such documents.

5.3 Each Proposer, before submitting his Proposal, shall fully examine and acquaint himself with the Contract Documents and the site of the proposed Project. He shall make such investigations as he or she may deem necessary to fully inform himself or herself of the existing conditions, facilities, difficulties, restrictions and requirements incident to completion of the Project under the terms of the Contract.

5.4 Failure of the Proposer to acquaint itself adequately with the site and such conditions, facilities, difficulties, restrictions and requirements will not relieve Proposer of its obligation to perform the entire Contract at the price set forth in its Proposal.

ARTICLE VI. FORM OF CONTRACT DOCUMENTS

6.1 **Form of Contract.** The form of Contract utilized for this Project shall be the *Standard Form of Agreement Between Owner and Contractor where the basis of payment is a STIPULATED SUM (AIA Document A101-2017)* as amended by Owner and the associated, *General Conditions of the Contract for Construction, AIA Document A201-2017*, as amended by the Owner. A copy of the Form of Agreement is attached hereto as **Appendix A-1 and Appendix A-2**, respectively.

ARTICLE VII. ADDENDA.

7.1 Changes in or official interpretations of the Contract Documents will be made only by written addenda. Receipt of all addenda issued by Architect shall be acknowledged in each Proposer's proposal, and shall constitute a part of the final contract. It is the duty of each Proposer to obtain any and all addenda, and failure of a Proposer to receive any addendum will not release him from any obligation under his Proposal. However, if any Proposer fails to receive any addendum, and his offer is otherwise determined to represent the best value to the Owner, the contract may be awarded to him and the changes in the work set out in the addendum will be incorporated into the contract by a change order, with a corresponding adjustment in the contract price to be made as provided in the Conditions of the Contract.

7.2 Each addenda will include an acknowledgement form which shall be executed by the Proposer and submitted with its Proposal to evidence its consideration of the information included the Addenda in its Proposal.

ARTICLE VIII. PERFORMANCE & PAYMENT BONDS:

8.1 As a political sub-division of the state the District is required to obtain both performance and payment bonds. Performance bonds are required when the entire transaction (both original amount and the total of all changes, updates and additions) total over \$100,000. Payment bonds are required when the entire transaction (both original amount and the total of all charges, updates and additions) total over \$25,000. For this Project both **Performance and Payment Bonds in the full amount of the Contract Sum will be required.** Neither bond is required to be submitted with the original proposal submission; however, the Selected Proposer will be required to furnish a Performance Bond and a Payment Bond on forms acceptable to the Owner, at the time of execution of the Construction Contract and shall include the premiums for such bonds in Proposer's bid.

8.2 Such bonds must be written by a company, or companies, acceptable to and approved by Owner. Owner will not accept a bond written by any company which does not meet all of the following requirements:

8.2.1 The bond must be executed by a corporate surety or corporate sureties duly authorized and admitted to do business in the State of Texas and licensed by the State of Texas to issue surety bonds.

8.2.2 The surety or sureties executing such bond must be listed in the most current issue of the U.S. Department of Treasury Circular 570 (hereinafter called "Circular 570") as an acceptable surety to execute bonds for federal projects.

8.2.3 The amount for which the bond is written shall not exceed the underwriting limitation prescribed by Circular 570 for the surety or sureties executing such bond.

ARTICLE IX. WAGE SCALE.

9.1 The construction of this Project is subject to Chapter 2258 of the Texas Government Code. Among other things, this Chapter provides that it shall be mandatory for a Contractor and upon any subcontractor under him to pay not less than the prevailing rates of per diem wages in the locality at the time of construction to all laborers, workmen, and mechanics employed by them in the execution of the contract.

9.2 In accordance therewith, the Owner has adopted the prevailing wage scale published for this area by the Department of Labor (DOL), except that fringes shall not be required for this project. A copy of the most recent schedule of Prevailing Wages published on the DOL website, for projects of this kind, is attached as **Appendix B**, to this Request for Proposals, and not less than this established scale must be paid on the project. Any workers not included in the schedule shall be properly classified and paid not less

than the rate of wages prevailing in the locality of the work at the time of construction. If compliance with the Davis Bacon Act is not required in connection with the Federal funding mechanism applicable to the Project, the Wage Rates shown there are required to be paid, but not the Fringe Benefits shown thereon.

9.3 If the Contractor or any of its Contractors or Subcontractors violate the provisions of the Prevailing Wage Statute above, by failing to pay the required prevailing wage to worker employed by it in the execution of the contract, the contractor shall be required to the Owner the sum of Sixty Dollars and No/100 (\$60.00) for each worker employed for each calendar day or part of the day that the worker is paid less than the wage rate stipulated in the scale of prevailing wages applicable to this Project, as required by Texas Government Code Section 2258.023(b).

ARTICLE X. INSURANCE AND INDEMNITY:

10.1 If selected, Proposer will be required to comply with the following Insurance and Indemnification Requirements below:

10.1.1 **Insurance:** The Agreement which the successful Proposer will asked to enter into will contain a requirement that it shall provide and maintain certain insurance as required by District, including, but not limited to general liability, automobile liability, and workers' compensation insurance. Such insurance shall be written for not less than the limits set out in Section 3.18 of the *General Conditions of the Contract for Construction, AIA Document A201-2017*, as amended by the Owner, or greater if required by law, and will comply with the requirements stated therein.

10.1.2 **Indemnification.** The Agreement which the successful Proposer will be asked to enter into will contain the following Indemnity provision which will constitute a non-negotiable portion of the agreement:

§____.1 TO THE FULLEST EXTENT PERMITTED BY LAW, CONTRACTOR WAIVES AND RELEASES ALL CLAIMS AGAINST AND SHALL INDEMNIFY, DEFEND AND HOLD HARMLESS THE OWNER, ITS TRUSTEES, AGENTS AND EMPLOYEES, OWNER'S CONSULTANTS, THE ARCHITECT, THE ARCHITECT'S CONSULTANTS, AND THEIR RESPECTIVE AGENTS AND EMPLOYEES FROM AND AGAINST ALL CLAIMS, DAMAGES, LOSSES, AND EXPENSES, INCLUDING ATTORNEY'S FEES, ARISING OUT OF, OR RESULTING FROM THE PERFORMANCE OF THE WORK, PROVIDED THAT ANY SUCH CLAIM, DAMAGE, LOSS OR EXPENSE: (1) IS ATTRIBUTABLE TO BODILY OR PERSONAL INJURY, SICKNESS, DISEASE OR DEATH, OR TO INJURY TO OR DESTRUCTION OF TANGIBLE PROPERTY (OTHER THAN THE WORK ITSELF) INCLUDING THE LOSS OF USE RESULTING THEREFROM, AND (2) IS CAUSED IN WHOLE OR IN PART BY ANY WILLFUL OR NEGLIGENT ACT OR OMISSION OF THE CONTRACTOR, ANY OF ITS SUBCONTRACTORS, ANYONE DIRECTLY OR INDIRECTLY EMPLOYED BY ANY OF THEM OR ANYONE FOR WHOSE ACTS ANY OF THEM MAY BE LIABLE, REGARDLESS OF WHETHER OR NOT CAUSED IN PART BY THE NEGLIGENT ACTS OR OMISSIONS OF OWNER, ITS TRUSTEES, AGENTS AND EMPLOYEES, OWNER'S CONSULTANTS, THE ARCHITECT AND THE ARCHITECT'S CONSULTANTS, WHERE THAT NEGLIGENCE IS A CONCURRING CAUSE OF THE INJURY, DEATH, OR DAMAGE. HOWEVER, THE INDEMNITY PROVIDED FOR IN THIS SECTION SHALL HAVE NO APPLICATION TO ANY CLAIM, LOSS, DAMAGE, CAUSE OF ACTION, SUIT, OR LIABILITY WHERE THE INJURY, DEATH, OR DAMAGE RESULTS FROM THE SOLE NEGLIGENCE OF OWNER ITS TRUSTEES, AGENTS AND EMPLOYEES, OWNER'S CONSULTANTS, ARCHITECT OR ARCHITECT'S CONSULTANTS UNMIXED WITH THE FAULT OF ANY OTHER PERSON OR ENTITY; PROVIDED THAT WHERE THE NEGLIGENCE OF OWNER, OR ARCHITECT IS A CONCURRING CAUSE, CONTRACTOR'S OBLIGATION TO INDEMNIFY IS LIMITED TO THE AMOUNT NECESSARY TO CAUSE THE RELATIVE LIABILITY OF OWNER, ARCHITECT AND CONTRACTOR TO REFLECT THE COMPARATIVE NEGLIGENCE FINDINGS OF THE TRIER OF FACT (JUDGE OR JURY) OR AS AGREED IN A SETTLEMENT AGREEMENT TO WHICH OWNER, ARCHITECT AND CONTRACTOR ARE ALL PARTIES

§____.2 IN CONNECTION WITH CLAIMS AGAINST ANY PERSON OR ENTITY INDEMNIFIED UNDER THIS ARTICLE __ 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 THIS SECTION __.2 SHALL NOT BE LIMITED BY A LIMITATION ON AMOUNT OR TYPE OF DAMAGES, COMPENSATION OR BENEFITS PAYABLE BY OR FOR THE CONTRACTOR OR A SUBCONTRACTOR UNDER INSURANCE POLICIES, WORKERS' COMPENSATION ACT OR INSURANCE , DISABILITY ACTS OR INSURANCE OR OTHER EMPLOYEE BENEFIT ACTS OR RELATED INSURANCE

§____.3 CONTRACTOR SHALL BE RESPONSIBLE FOR AND SHALL HOLD OWNER, ITS TRUSTEES, AGENTS AND EMPLOYEES, OWNER'S CONSULTANTS, ARCHITECT OR ARCHITECT'S CONSULTANTS FREE AND HARMLESS FROM LIABILITY RESULTING FROM LOSS OF OR DAMAGE

TO CONTRACTOR'S OR ITS SUBCONTRACTORS' CONSTRUCTION TOOLS AND EQUIPMENT AND RENTED ITEMS WHICH ARE USED OR INTENDED FOR USE IN PERFORMING THE WORK, REGARDLESS OF WHETHER SUCH LOSS OR DAMAGE IS CAUSED IN WHOLE OR IN PART BY THE NEGLIGENCE OF OWNER, OWNER'S CONSULTANTS, ARCHITECT OR ARCHITECT'S CONSULTANTS. THIS PROVISION SHALL APPLY, WITHOUT LIMITATION, TO LOSS OR DAMAGE OCCURRING AT THE WORK SITE OR WHILE SUCH ITEMS ARE IN TRANSIT TO OR FROM THE WORK SITE AND IS IN ADDITION TO CONTRACTOR'S OBLIGATIONS UNDER SECTION ____.1. IT IS THE EXPRESS INTENTION OF THE PARTIES HERETO, BOTH CONTRACTOR AND OWNER, THAT THE INDEMNITY IS PROVIDED FOR IN THIS SECTION AS TO CONTRACTOR'S OR ITS SUBCONTRACTOR'S TOOLS AND EQUIPMENT AND RENTAL ITEMS, IS AN AGREEMENT BY CONTRACTOR TO INDEMNIFY AND PROTECT OWNER FROM THE CONSEQUENCES OF OWNER'S (ITS TRUSTEES, AGENTS AND EMPLOYEES') OWN NEGLIGENCE, AND THAT OF OWNER'S CONSULTANTS, THE ARCHITECT AND ARCHITECT'S CONSULTANTS WHETHER THAT NEGLIGENCE IS THE SOLE OR CONCURRING CAUSE OF THE LOSS OR DAMAGE. PROVIDED HOWEVER, THAT WHERE THE NEGLIGENCE OF OWNER OR ARCHITECT IS A CONCURRING CAUSE, CONTRACTOR'S OBLIGATION TO INDEMNIFY IS LIMITED TO THE AMOUNT NECESSARY TO CAUSE THE RELATIVE LIABILITY OF OWNER, ARCHITECT AND CONTRACTOR TO REFLECT THE COMPARATIVE NEGLIGENCE FINDINGS OF TRIER OF FACT (JUDGE OR JURY) OR AS AGREED IN A SETTLEMENT AGREEMENT TO WHICH OWNER, ARCHITECT AND CONTRACTOR ARE ALL PARTIES

**ARTICLE XI. CONSIDERATIONS/REQUIREMENTS FOR CONSTRUCTION
ON EDUCATIONAL FACILITY PREMISES.**

11.1 As the General Contractor on the Project(s) Proposer will be responsible for the actions of Contractor's forces, Subcontractor's forces and all tiers of Sub-subcontractor's forces on the Project Site(s). The Proposer recognizes that the Project Site is a public school campus, and will prohibit the possession or use of alcohol, controlled substances, tobacco, and any prohibited weapons on the Project Site and shall require adequate dress of the Contractors' forces consistent with the nature of the work being performed, including wearing shirts at all times. Sexual harassment of employees of the Contractors or employees or students of the Owner by employees of the Contractors is strictly forbidden.

RCSP ATTACHMENT A

PROPOSER'S MONETARY PROPOSAL

TO: BOARD OF TRUSTEES HARDIN-JEFFERSON INDEPENDENT SCHOOL DISTRICT

This Proposal is submitted by _____, whose address is _____, (hereafter called "Proposer"), for the construction of "**HJISD Hardin-Jefferson High School Track & Field Improvements**" (hereafter called "Project").

MONETARY PROPOSAL: Proposer agrees to furnish for the total sum of _____ Dollars (\$ _____), all labor, services, materials, tools, equipment and supervision necessary to the full and final completion of the Project, as defined by the RCSP, and everything incidental thereto, or properly inferable therefrom, all in accordance with the Project Specifications included in this RFP No. 2021-P2106300SP issued by the District.

I. BASE PROPOSALS

A. Base Proposal:

Undersigned agrees to complete the Work for the lump sum amount of:

_____ Dollars \$ _____
(Amount written in words governs) (Amount in figures)

II. ALLOWANCES

Undersigned certifies that the allowances specified in Section 01 21 00 and noted below are included in the appropriate Base Proposal and agrees that unexpended balance of allowance sums will revert to the Owner in the final settlement of the contract.

A. Owner's Contingency Allowance: \$150,000.00

Contractor shall include the amount indicated below in **Base Proposal** as a contingency to cover the cost of hidden, concealed or otherwise unforeseen conditions which develop during completion of the work. Contractor shall be allowed to recover all costs associated with the completion of work under this contingency, however, no overhead or profit will be allowed. Allowance is included and itemized as part of the unit price cost form.

III. ALTERNATES

Should the Owner accept any Alternates, the undersigned agrees to modify the Base Proposal as stipulated below:

A. Alternate Proposal 1A: 2.50" pile height AstroTurf Rhino SF 46 Rubber-Sand Infilled Synthetic Turf System;

Add _____ Dollars \$ _____
(Amount written in words governs) (Amount in figures)

B. Alternate Proposal 1B: 2.00" pile height AstroTurf 3D3 52 Rubber-Sand Infilled Synthetic Turf System;

Add _____ Dollars \$ _____
(Amount written in words governs) (Amount in figures)

C. Alternate Proposal 1C: 2.50" pile height FieldTurf XT Rubber-Sand Infilled Synthetic Turf System;

Add _____ Dollars \$ _____
(Amount written in words governs) (Amount in figures)

D. Alternate Proposal 1D: 2.50" pile height FieldTurf Classic HD Rubber-Sand Infilled Synthetic Turf System;

Add _____ Dollars \$ _____

(Amount written in words governs)

(Amount in figures)

E. Alternate Proposal 1E: 2.50" pile height FieldTurf Vertex Prime Rubber-Sand Infilled Synthetic Turf System;

Add _____ Dollars \$ _____
(Amount written in words governs) (Amount in figures)

F. Alternate Proposal 1F: 2.50" pile height Hellas Velocity Rubber-Sand Infilled Synthetic Turf System;

Add _____ Dollars \$ _____
(Amount written in words governs) (Amount in figures)

G. Alternate Proposal 1G: 2.50" pile height Hellas Fusion Rubber-Sand Infilled Synthetic Turf System;

Add _____ Dollars \$ _____
(Amount written in words governs) (Amount in figures)

H. Alternate Proposal 1H: 2.50" pile height Shaw Momentum Rubber-Sand Infilled Synthetic Turf System;

Add _____ Dollars \$ _____
(Amount written in words governs) (Amount in figures)

I. Alternate Proposal 1I: 2.50" pile height Shaw Legion Pro Rubber-Sand Infilled Synthetic Turf System;

Add _____ Dollars \$ _____
(Amount written in words governs) (Amount in figures)

J. Alternate Proposal No. 2: Provide 5' concrete apron along east perimeter of track.

Add/Deduct _____ Dollars \$ _____
(Amount written in words governs) (Amount in figures)

K. Alternate Proposal No. 3: Remove and replace concrete pavement at existing south bleachers.

Add/Deduct _____ Dollars \$ _____
(Amount written in words governs) (Amount in figures)

Proposer's Monetary Proposal above is based on Substantial Completion dates as set out in RFP No. 2021-P2106300SP and as follows:

Entire Scope of WorkAugust 15, 2022

Proposer represents that, prior to preparing this Proposal, he or she has carefully read the Contract Documents, examined the site of the Project(s) and had made an investigation such that he or she is fully informed of the conditions, facilities, difficulties, restrictions and requirements which he or she will, or may encounter in the completion of the Project in accordance with the terms of the Contract Documents and District Specifications.

Executed on _____, 2021.

Proposer: _____
[Provide full name and business structure of Proposer]

Signature

Printed Name, Title

Note: If Proposer is a Joint Venture, an authorized signature from a representative of each party is required

**RCSP ATTACHMENT A-1
PROPOSER QUESTIONNAIRE**

SECTION A - GENERAL INFORMATION

1. **Company Information:** Provide the following information regarding your company.

Name/Name of Organization/Company: _____

Address _____

State: _____ Zip Code: _____ Telephone: _____ Fax: _____

Please attach the following information regarding business Organization (Corporation, Partnership, Individual, Joint Venture, Other): (1) the state where chartered; (2) names of all principals (officers, directors, partners, general or managing partners etc.); and (3) if your organization was chartered outside of the state of Texas, a statement regarding whether are you registered to do business in Texas.

2. **Contact Information:** List the person who the District may contact concerning your proposal or setting dates for meetings.

Name: _____

Address _____

State: _____ Zip Code: _____ Telephone: _____ Fax: _____

3. Does your Company anticipate any mergers, transfer of organization ownership, management reorganization, or departure of key personnel within the next twelve (12) months that may affect the organization's ability to carry out its proposal?

Yes No

4. Is your Company authorized and/or licensed to do business in Texas?

Yes No

5. Provide any other names under which your business has operated within the last 5 years.

6. **Debarment/Suspension Information:** Has the Company or any of its principals been debarred or suspended from contracting with any public entity?

Yes No

If yes, identify the public entity and the name and current phone number of a representative of the public entity familiar with the debarment or suspension, and state the reason for or circumstances surrounding the debarment or suspension, including but not limited to the period of time for such debarment or suspension.

7. **Surety Information:** Have you or the Company ever had a bond or surety canceled or forfeited?

Yes No

If yes, state the name of the bonding company, date, amount of bond and reason for such cancellation or forfeiture.

8. **Bankruptcy Information:** Have you or the Company ever been declared bankrupt or filed for protection from creditors under state or federal proceedings?

Yes No

If yes, state the date, court, jurisdiction, cause number, amount of liabilities and amount of assets.

9. **Contractor Default.** Have you or the Company defaulted and been removed from any construction Project in the last ten (10) years.

Yes No

If yes, state the name and address of the individual or entity with whom the Project was contracted, the name of the Project, the date of removal and the reason for removal.

SECTION B - EXPERIENCE, BACKGROUND, QUALIFICATIONS

1. **Past Experience on Similar Projects.** Identify the three most significant clients (whether school district or non-school district projects) for which the Proposer has provided services similar to the Scope of Services requested by this RFP, within the past 5 years. Include a brief description of the services provided, the dates of service, and a point of contact with name, address, and current fax, email, and phone number.
2. **Past Experience with the District.** Has the Proposer performed work for the District within the last 5 years? If so, indicate if the work performed was as a prime contractor or as a subcontractor, the Project on which the work was performed, describe the work performed and the date performed.
3. **Recent Experience.** What Projects, if any, of a similar size and nature has Proposer acted as General Contractor or Construction Manager in the last twelve (12) months.
4. **Scheduling Ability/On Time Completion/Proposed Substantial Completion Date For this Project**
What percentage of the Projects on which you have acted as General Contractor in the last five (5) years, have been completed on-time? ____ Percent

Of those not completed on-time, what was the cause of the delay and how did you address it?

SECTION C - FINANCIAL CAPABILITY AND KEY PERSONNEL

1. **Resources and Stability.**

Provide information on available resources, including total number of employees in your organization, number and location of offices, equipment available to support this Project.

Describe the major projects your organization currently has **in progress**, giving the name and location of project, your role on the project (i.e. Contractor, Construction Manager, or Other), the contract amount or GMP, percent complete and scheduled completion date.

Identify two financial references which can verify the financial stability of the firm. One of these references should be your current banking organization. For each, provide a point of contact with name, address, and current fax, email, and phone number.

2. **Key Personnel.** Identify the number and professional qualifications (to include licenses, certifications, associations) of key staff to be assigned to the Project and relevant experience on projects of similar size and scope. Response provided should, at a minimum, include information regarding principals of your organization and proposed on-site project manager and/or construction superintendent.
3. **Additional Information.** Identify additional skills, experiences, qualifications, and/or other relevant information about the Proposer's qualifications you would like the District to consider.

**RCSP ATTACHMENT B
FELONY CONVICTION NOTIFICATION**

Texas Education Code, Section 44.034, Notification of Criminal History, Subsection (a), states “a person or business entity that enters into a contract with a school district must give advance notice to the district if the person or an owner or operator of the business entity has been convicted of a felony. The notice must include a general description of the conduct resulting in the conviction of a felony.”

Subsection (b) states “a school district may terminate a contract with a person or business entity if the district determines that the person or business entity failed to give notice as required by Subsection (a) or misrepresented the conduct resulting in the conviction. The district must compensate the person or business entity for services performed before the termination of the contract.”

This notice is not required of a Publicly-Held Corporation.

I, the undersigned agent for the firm named below, certify that the information concerning notification of felony conviction has been received by me and the following information furnished is true to the best of my knowledge.

Proposer’s Business Name _____

Authorized Company Official’s Name (Printed) _____

A. My firm is a publicly-held, stock-exchange corporation, therefore this requirement is not applicable.

Signature of Company Official: _____

Date Signed: _____

B. My firm is not owned or operated by anyone who has been convicted of a felony.

Signature of Company Official: _____

Date Signed: _____

C. My firm is owned or operated by the following individual(s) who has/have been convicted of a felony (printed name and general description of type of felony or felonies):

1. _____
2. _____
3. _____
4. _____

Signature of Company Official: _____

Date Signed: _____

**RCSP ATTACHMENT C
NON-COLLUSION AFFIDAVIT OF PRIME PROPOSER**

STATE OF TEXAS §

COUNTY OF _____ §

_____, being first duly sworn, deposes and says this:

(1) (S)He is _____ of _____
(a partner or officer) (the firm of, etc.)

the Proposer who has submitted the attached proposal.

(2) (S)He is fully informed respecting the preparation and contents of the attached Proposal and of all pertinent circumstances respecting such Proposal.

(3) That Proposal is genuine and is not a collusive or sham Proposal.

(4) Neither the said Proposer nor any of its officers, partners, owners, agents, representatives, employees or parties in interest, including this affiant, has in any way colluded, conspired, connived or agreed, directly or indirectly, with another Proposer, firm or person, to submit a collusive or sham Proposal in connection with the Contract for which the attached Proposal has been submitted or to refrain from proposing in connection with such Contract, or has in any manner, directly or indirectly, sought by agreement or collusion, or communication or conferences, with any other Proposer, firm or person to fix the price or prices with the attached Proposal or of any other Proposer, or to secure through any collusion, conspiracy, connivance or unlawful agreement any advantage against the Hardin-Jefferson Independent School District of Sour Lake, Texas or any person interested in the proposed contract; and,

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

(Proposer's Business Name): _____

(Proposer's Representative Signature) _____

(Proposer's Representative Title) _____

THIS AFFIDAVIT SHALL BE NOTARIZED

Subscribed and sworn to before me on this _____ day of _____, 2021.

NOTARY PUBLIC, STATE OF TEXAS

My commission expires on _____, 20____.

**RCSP ATTACHMENT D
CONFLICT OF INTEREST QUESTIONNAIRE (CIQ)**

CONFLICT OF INTEREST QUESTIONNAIRE		FORM CIQ
For vendor doing business with local governmental entity		
<p>This questionnaire reflects changes made to the law by H.B. 23, 84th Leg., Regular Session.</p> <p>This questionnaire is being filed in accordance with Chapter 176, Local Government Code, by a vendor who has a business relationship as defined by Section 176.001(1-a) with a local governmental entity and the vendor meets requirements under Section 176.006(a).</p> <p>By law this questionnaire must be filed with the records administrator of the local governmental entity not later than the 7th business day after the date the vendor becomes aware of facts that require the statement to be filed. See Section 176.006(a-1), Local Government Code.</p> <p>A vendor commits an offense if the vendor knowingly violates Section 176.006, Local Government Code. An offense under this section is a misdemeanor.</p>		OFFICE USE ONLY
		Date Received
1	Name of vendor who has a business relationship with local governmental entity.	
2	<input type="checkbox"/> Check this box if you are filing an update to a previously filed questionnaire. (The law requires that you file an updated completed questionnaire with the appropriate filing authority not later than the 7th business day after the date on which you became aware that the originally filed questionnaire was incomplete or inaccurate.)	
3	Name of local government officer about whom the information is being disclosed. <hr style="width: 50%; margin: auto;"/> <p align="center">Name of Officer</p>	
4	Describe each employment or other business relationship with the local government officer, or a family member of the officer, as described by Section 176.003(a)(2)(A). Also describe any family relationship with the local government officer. Complete subparts A and B for each employment or business relationship described. Attach additional pages to this Form CIQ as necessary. <p>A. Is the local government officer or a family member of the officer receiving or likely to receive taxable income, other than investment income, from the vendor?</p> <p align="center"> <input type="checkbox"/> Yes <input type="checkbox"/> No </p> <p>B. Is the vendor receiving or likely to receive taxable income, other than investment income, from or at the direction of the local government officer or a family member of the officer AND the taxable income is not received from the local governmental entity?</p> <p align="center"> <input type="checkbox"/> Yes <input type="checkbox"/> No </p>	
5	Describe each employment or business relationship that the vendor named in Section 1 maintains with a corporation or other business entity with respect to which the local government officer serves as an officer or director, or holds an ownership interest of one percent or more.	
6	<input type="checkbox"/> Check this box if the vendor has given the local government officer or a family member of the officer one or more gifts as described in Section 176.003(a)(2)(B), excluding gifts described in Section 176.003(a-1).	
7	<hr style="width: 50%; margin: auto;"/> <p align="center">Signature of vendor doing business with the governmental entity</p> <hr style="width: 20%; margin: auto; margin-left: 40%;"/> <p align="center">Date</p>	

CONFLICT OF INTEREST QUESTIONNAIRE
For vendor doing business with local governmental entity

A complete copy of Chapter 176 of the Local Government Code may be found at <http://www.statutes.legis.state.tx.us/Docs/LG/htm/LG.176.htm>. For easy reference, below are some of the sections cited on this form.

Local Government Code § 176.001(1-a): "Business relationship" means a connection between two or more parties based on commercial activity of one of the parties. The term does not include a connection based on:

- (A) a transaction that is subject to rate or fee regulation by a federal, state, or local governmental entity or an agency of a federal, state, or local governmental entity;
- (B) a transaction conducted at a price and subject to terms available to the public; or
- (C) a purchase or lease of goods or services from a person that is chartered by a state or federal agency and that is subject to regular examination by, and reporting to, that agency.

Local Government Code § 176.003(a)(2)(A) and (B):

(a) A local government officer shall file a conflicts disclosure statement with respect to a vendor if:

(2) the vendor:

(A) has an employment or other business relationship with the local government officer or a family member of the officer that results in the officer or family member receiving taxable income, other than investment income, that exceeds \$2,500 during the 12-month period preceding the date that the officer becomes aware that

- (i) a contract between the local governmental entity and vendor has been executed; or
- (ii) the local governmental entity is considering entering into a contract with the vendor;

(B) has given to the local government officer or a family member of the officer one or more gifts that have an aggregate value of more than \$100 in the 12-month period preceding the date the officer becomes aware that:

- (i) a contract between the local governmental entity and vendor has been executed; or
- (ii) the local governmental entity is considering entering into a contract with the vendor.

Local Government Code § 176.006(a) and (a-1)

(a) A vendor shall file a completed conflict of interest questionnaire if the vendor has a business relationship with a local governmental entity and:

- (1) has an employment or other business relationship with a local government officer of that local governmental entity, or a family member of the officer, described by Section 176.003(a)(2)(A);
- (2) has given a local government officer of that local governmental entity, or a family member of the officer, one or more gifts with the aggregate value specified by Section 176.003(a)(2)(B), excluding any gift described by Section 176.003(a-1); or
- (3) has a family relationship with a local government officer of that local governmental entity.

(a-1) The completed conflict of interest questionnaire must be filed with the appropriate records administrator not later than the seventh business day after the later of:

(1) the date that the vendor:

- (A) begins discussions or negotiations to enter into a contract with the local governmental entity; or
- (B) submits to the local governmental entity an application, response to a request for proposals or bids, correspondence, or another writing related to a potential contract with the local governmental entity; or

(2) the date the vendor becomes aware:

- (A) of an employment or other business relationship with a local government officer, or a family member of the officer, described by Subsection (a);
- (B) that the vendor has given one or more gifts described by Subsection (a); or
- (C) of a family relationship with a local government officer.

**RCSP ATTACHMENT E
ACKNOWLEDGEMENT OF ADDENDA**

I, _____, acknowledge receipt of the following Addendums to the Request for Proposals for _____ issued by Hardin-Jefferson School District, on behalf of the Vendor listed below:

Addendum No. ____ Dated: _____ Entitled: _____

Addendum No. ____ Dated: _____ Entitled: _____

Addendum No. ____ Dated: _____ Entitled: _____

Vendor's Business Name: _____

Vendor's Representative Signature: _____

Vendor's Representative Title: _____

**RCSP ATTACHMENT F
SIGNATURE PAGE AND DECLARATION OF COMPLIANCE**

Check (✓) the box that indicates business structure of Proposer

Individual/Sole Proprietorship Partnership or Joint Venture Corporation Other Entity (State Type)

The undersigned certifies that (s)he is _____ (title) of the Proposer entity named below; that (s)he is authorized to sign this Proposal Form (if a Corporation then by resolution with Certified Copy of resolution attached) for and on behalf of the entity, if any, named below, and that (s)he is authorized to execute same for and on behalf of and bind said entity to the terms and conditions provided for in the Proposal as required by this RCSP, and has the requisite authority to execute an Agreement on behalf of Respondent, if awarded, and that the 11-digit Comptroller's Taxpayer Number for the entity, if any, is:

11-digit Comptroller's Taxpayer Number

Employer Identification Number

Respondent Organization Name

By: _____

Printed Name: _____

Title: _____

By: _____

(If Respondent is a Joint Venture, an authorized signature from a representative of each party is required)

Printed Name: _____

Title: _____

By signing this Signature Page and Declaration of Compliance, I do hereby declare that I have read the Request for Competitive Sealed Proposals, on which our Proposal is submitted with full knowledge of the requirements, and do hereby agree to furnish all services in full accordance with the requirements outlined in the Request for Competitive Sealed Proposals

By signing and executing this Proposal, I further certify on behalf of my organization and represent to the Hardin-Jefferson Independent School District that Proposer has not offered, conferred or agreed to confer any pecuniary benefit, as defined by **TEXAS PENAL CODE ANN. § 218**, or any other thing of value, as consideration for the receipt of information or any special treatment or advantage relating to this proposal; the Proposer also certifies and represents that Proposer has not offered, conferred or agreed to confer a pecuniary benefit or other things of value as consideration for the recipient's decision, opinion, recommendation, vote or other exercise of discretion concerning this proposal; the Proposer certifies and represents that Proposer has neither coerced nor attempted to influence the exercise of discretion by any officer, trustee, agent or employee of the Hardin-Jefferson Independent School District concerning this proposal on the basis of any consideration not authorized by law; the Proposer also certifies and represents that Proposer has not received any information not available to other Proposer so as to give the undersigned a preferential advantage with respect to this proposal; the Proposer further certifies and represents that Proposer has not violated any state, federal or local law, regulation or ordinance relating to bribery, improper influence, collusion or the like and that Proposer will not in the future offer, confer, or agree to confer a pecuniary benefit or other thing of value to any officer, trustee, agent or employee of the Hardin-Jefferson Independent School District in return for the person having exercised the person's official discretion, power or duty with respect to this proposal; the Proposer certifies and represents that it has not nor and will not in the future offer, confer, or agree to confer a pecuniary benefit or other thing of value to any officer, trustee, agent or employee of the Hardin-Jefferson Independent School District in connection with information regarding this proposal, the submission of this proposal, the award of this proposal or the performance, delivery or sale pursuant to this proposal.

APPENDIX A
Architect's Scope And Specifications

APPENDIX A-1
AIA Document A101- 2017 - Standard Form of Agreement Between Owner and Contractor
where the basis of payment is a STIPULATED SUM, as amended by Owner

APPENDIX A-2
AIA Document A201-2017 - General Conditions
of the Contract for Construction, as amended by Owner

**APPENDIX B
PREVAILING WAGE RATE SCHEDULE**

**** Note: Fringes shall not be required for this project. ****

"General Decision Number: TX20210252 07/09/2021

Superseded General Decision Number: TX20200252

State: Texas

Construction Type: Building

County: Hardin County in Texas.

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

Note: Under Executive Order (EO) 13658, an hourly minimum wage of \$10.95 for calendar year 2021 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least \$10.95 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2021. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate, if it is higher than the conformed wage rate). The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/01/2021
1	03/12/2021
2	06/25/2021
3	07/09/2021

ASBE0022-009 06/01/2019

	Rates	Fringes
ASBESTOS WORKER/HEAT & FROST INSULATOR (Duct, Pipe and Mechanical System Insulation).....	\$ 24.28	14.16

BOIL0074-003 01/01/2017

	Rates	Fringes
BOILERMAKER.....	\$ 28.00	22.35

BRTX0005-006 06/01/2020

	Rates	Fringes
BRICKLAYER.....	\$ 24.58	8.53

ELEC0479-005 09/28/2020

	Rates	Fringes
ELECTRICIAN.....	\$ 30.00	12.94

ENGI0450-002 04/01/2014

	Rates	Fringes
POWER EQUIPMENT OPERATOR Cranes.....	\$ 34.85	9.85

IRON0084-011 06/01/2020

	Rates	Fringes
IRONWORKER, ORNAMENTAL.....	\$ 25.26	7.13

IRON0135-002 09/01/2018

	Rates	Fringes
IRONWORKER, STRUCTURAL.....	\$ 31.85	12.14

PLUM0068-001 10/01/2020

	Rates	Fringes
PLUMBER.....	\$ 32.24	10.95

* PLUM0211-009 04/01/2021

	Rates	Fringes
PIPEFITTER.....	\$ 35.68	12.46

SHEE0054-007 04/01/2020

	Rates	Fringes
SHEET METAL WORKER (Excludes HVAC Duct Installation).....	\$ 28.69	14.13

SUTX2014-028 07/21/2014

	Rates	Fringes
CARPENTER, Excludes Form Work....	\$ 18.57	3.09
CEMENT MASON/CONCRETE FINISHER...	\$ 13.44	0.00
FORM WORKER.....	\$ 13.69	0.00
IRONWORKER, REINFORCING.....	\$ 12.95	0.00
LABORER: Common or General.....	\$ 12.15	0.00
LABORER: Mason Tender - Brick...	\$ 12.87	0.00
LABORER: Mason Tender - Cement/Concrete.....	\$ 10.50	0.00
LABORER: Pipelayer.....	\$ 13.47	0.00
LABORER: Roof Tearoff.....	\$ 11.28	0.00
LABORER: Landscape and Irrigation.....	\$ 11.04	0.36
OPERATOR: Backhoe/Excavator/Trackhoe.....	\$ 19.74	0.00
OPERATOR: Bobcat/Skid Steer/Skid Loader.....	\$ 13.93	0.00
OPERATOR: Bulldozer.....	\$ 19.85	0.07
OPERATOR: Drill.....	\$ 16.22	0.34
OPERATOR: Forklift.....	\$ 17.69	0.00

OPERATOR: Grader/Blade.....	\$ 13.37	0.00
OPERATOR: Loader.....	\$ 13.55	0.94
OPERATOR: Mechanic.....	\$ 17.52	3.33
OPERATOR: Paver (Asphalt, Aggregate, and Concrete).....	\$ 16.03	0.00
OPERATOR: Roller.....	\$ 16.00	0.00
PAINTER (Brush, Roller, and Spray).....	\$ 16.75	4.51
ROOFER.....	\$ 15.40	0.00
SHEET METAL WORKER (HVAC Duct Installation Only).....	\$ 26.89	10.38
TILE FINISHER.....	\$ 12.00	0.00
TILE SETTER.....	\$ 16.17	0.00
TRUCK DRIVER: Dump Truck.....	\$ 12.39	1.18
TRUCK DRIVER: Flatbed Truck.....	\$ 19.65	8.57
TRUCK DRIVER: Semi-Trailer Truck.....	\$ 12.50	0.00
TRUCK DRIVER: Water Truck.....	\$ 12.00	4.11

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

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

health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

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

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

Union Rate Identifiers

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

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

Survey Rate Identifiers

Classifications listed under the "SU" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average

rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted

because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION"

SECTION 01 10 00 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes: Requirements including but not limited to:
 1. Project information.
 2. Work covered by Contract Documents.
 3. Phased construction.
 4. Work by Owner.
 5. Work under separate contracts.
 6. Future Work.
 7. Purchase contracts.
 8. Owner furnished products.
 9. Owner furnished, Contractor installed products.
 10. Access to site.
 11. Coordination with occupants.
 12. Work restrictions.
 13. Specification and drawing conventions.
 14. Miscellaneous provisions.

1.3 PROJECT INFORMATION

- A. Project Identification: HJISD Hardin-Jefferson High School Track & Field Improvements
 1. Project Location: 3025 TX- 326, Sour Lake, TX 77659
- B. Owner: Hardin-Jefferson Independent School District
 1. Owner's Representative: Brad Boullion, Director of Operations
- C. Engineer/Architect: PBK Sports, Houston, Texas.
- D. Consultants: Additional design professionals have been retained who have prepared designated portions of the Documents.
- E. The Work of Project is defined by the Contract Documents and consists of the following:

Construction of an 8-lane Synthetic Running Track and Synthetic Turf Field at Hardin-Jefferson High School. The Synthetic Running Track shall consist of 8 lanes and are to include concrete curbs, 12" lime-flyash stabilized subgrade, 8" stone flexbase, 3" asphalt, and 13mm Porous Structural Spray Synthetic Track Surfacing System. The Synthetic Turf Field shall be a rubber-sand infilled (slit-film or dual monofilament slit-film) synthetic turf system.

The Work also includes concrete pavement, synthetic track surface high jump apron, pole vault pad & box, shot put pad, long/triple jump pit, and perimeter fencing.

Alternate scopes include additional concrete paving along the east track perimeter and removal/replacement of concrete pavement at existing south bleachers.

- F. Type of Contract: Project will be constructed under a competitive sealed proposal (CSP) contract.

1.4 WORK BY OWNER AND UNDER SEPARATE CONTRACTS

- A. Cooperate fully with Owner so Work may be carried out smoothly, without interfering with or delaying the work or work by Owner. Coordinate the Work with Work performed by Owner.
- B. The Owner reserves the right to let separate contract for Work outside of the scope of this Contract. Cooperate fully with separate contractors so Work on those contracts may be carried out smoothly, without interfering with or delaying Work under this Contract or other contracts. Coordinate the Work of this Contract with Work performed under separate contracts.
- C. Purchase Contracts: The Owner reserves the right to negotiate purchase contracts with suppliers of material and equipment that may be incorporated into the Work. The Owner will assign these purchase contracts to Contractor. Include costs for purchasing, receiving, handling, storage if required, and installation of material and equipment in the Contract Sum, unless otherwise indicated.
 - 1. Contractor's responsibilities are same as if Contractor had negotiated purchase contracts, including responsibility to renegotiate purchase and to execute final purchasing agreements.
- D. Owner Furnished, Contractor Installed Products (OFCI): The Owner will furnish products indicated. The Work includes receiving, unloading, handling, storing, protecting, and installing Owner furnished products and making building services connections when applicable.
 - 1. Owner Furnished Products: Coordinate with Owner.

1.5 ACCESS TO SITE

- A. Use of Site: Limit use of Project site to Work in areas and areas within the Contract limits indicated. Do not disturb portions of site beyond areas in which the Work is indicated.
 - 1. Limits: The drawings indicate the limits of the construction operations.
 - 2. Driveways, Walkways, and Entrances: Keep driveways, parking areas, student drop off and pick up points, loading areas, and entrances serving premises clear and available to Owner, Owner's employees, the students, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- B. Condition of Existing Building: Maintain portions of existing building affected by construction operations in weathertight condition throughout construction period. Repair damage caused by construction operations.

1.6 COORDINATION WITH OCCUPANTS

- A. Full Owner Occupancy: Owner will occupy site and adjacent building(s) during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform Work to prevent interference with Owner's day to day operations. Maintain existing exits unless otherwise indicated.
 - 1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and approval of authorities having jurisdiction.

2. Notify Owner not less than 72 hours in advance of activities that will affect Owner's operations.
- B. Owner Limited Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed portions of the Work, prior to Substantial Completion of the Work, provided occupancy does not interfere with completion of the Work. Such placement of equipment and limited occupancy shall not constitute acceptance of the total Work.
1. Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied prior to Owner acceptance of the completed Work.
 2. Obtain a Certificate of Occupancy from authorities having jurisdiction before limited Owner occupancy.
 3. Before limited Owner occupancy, ensure mechanical and electrical systems are fully operational, and required tests and inspections and start up procedures are successfully completed. On occupancy, Owner will operate and maintain mechanical and electrical systems serving occupied portions of Work.
 4. Upon occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of Work.

1.7 WORK RESTRICTIONS

- A. Work Restrictions: Comply with restrictions on construction operations. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.
- B. On Site Work Hours: Limit Work in the existing building to normal working hours, Monday through Friday, unless otherwise indicated. Coordinate with Owner when it is necessary to extend working hours or Work on weekends.
- C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and after providing temporary utility services according to requirements indicated:
1. Notify Owner not less than two weeks in advance of proposed utility interruptions.
 2. Obtain Owner's written permission before proceeding with utility interruptions.
- D. Noise, Vibration, and Odors: Coordinate operations that result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.
1. Notify Owner not less than two weeks in advance of proposed disruptive operations.
 2. Obtain Owner's written permission before proceeding with disruptive operations.
- E. Controlled Substances, Firearms, and Explosive Devices: Use of tobacco products, controlled substances, firearms, and explosive devices on the site is not permitted.
- F. Employee Identification: Provide identification tags for Contractor personnel working on site. Require personnel to use identification tags at all times.
- G. Employee Screening: Comply with Owner's requirements for drug and background screening of Contractor personnel working on site.
1. Maintain list of approved screened personnel with Owner's representative.

1.8 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
 2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- B. Division 1 General Requirements: Requirements of Sections in Division 1 apply to the Work of each specification section.
- C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
 2. Abbreviations: Materials and products are identified by abbreviations.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

3.1 CONSTRUCTION SCHEDULE

- A. The Owner has a critical need for the Work to begin upon Notice to Proceed and shall be Substantially Complete by August, 15, 2022. There will be No Extensions of Time due to weather.

END OF SECTION 01 10 00

SECTION 01 21 00 - ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes: Administrative and procedural requirements governing allowances.
 - 1. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when direction will be provided to Contractor. If necessary, additional requirements will be issued by Change Order.
- B. Types of allowances include
 - 1. Lump sum allowances.
 - 2. Unit cost allowances.
 - 3. Quantity allowances.
 - 4. Contingency allowances.
 - 5. Testing and inspecting allowances.

1.3 COORDINATION

- A. Coordinate allowance items with other portions of the Work.

1.4 LUMP SUM, UNIT COST, AND QUANTITY ALLOWANCES

- A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Architect under allowance and shall include taxes, freight, and delivery to site.
- B. Unless otherwise indicated, Contractor's costs for receiving and handling at site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by Owner or selected by Architect under allowance shall be included as part of the Contract Sum and not part of the allowance.
- C. Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.
 - 1. If requested by Architect, retain and prepare unused material for storage by Owner. Deliver unused material to Owner's storage space as directed.

1.5 CONTINGENCY ALLOWANCES

- A. Use the contingency allowance only as directed by Architect for Owner's purposes and only by Change Orders that indicate amounts to be charged to the allowance.
- B. Contractor's related costs for products and equipment ordered by Owner under the contingency allowance are included in the allowance and are not part of the Contract Sum. These costs include delivery, installation, taxes, insurance, equipment rental, and similar costs.
- C. Change Orders authorizing use of funds from the contingency allowance will include Contractor's related costs and reasonable overhead and profit margins.

- D. At Project closeout, credit unused amounts remaining in the contingency allowance to Owner by Change Order.

1.6 TESTING AND INSPECTING ALLOWANCES

- A. Testing and inspecting allowances include the cost of engaging testing agencies, actual tests and inspections, and reporting results.
- B. The allowance does not include incidental labor required to assist the testing agency or costs for retesting if previous tests and inspections result in failure. The cost for incidental labor to assist the testing agency shall be included in the Contract Sum.
- C. Costs of services not required by the Contract Documents are not included in the allowance.
- D. At Project closeout, credit unused amounts remaining in the testing and inspecting allowance to Owner by Change Order.

1.7 ADJUSTMENT OF ALLOWANCES

- A. Allowance Adjustment: To adjust allowance amounts, prepare a Change proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.
 - 1. Include installation costs in purchase amount only where indicated as part of the allowance.
 - 2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other margins claimed.
 - 3. Submit substantiation of a change in scope of Work, if any, claimed in Change Orders related to unit cost allowances.
 - 4. Owner reserves the right to establish the quantity of Work in place by independent quantity survey, measure, or count.
- B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit.
 - 1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of Work has changed from what could have been foreseen from information in the Contract Documents.
 - 2. No change to Contractor's indirect expense is permitted for selection of higher or lower priced materials or systems of the same scope and nature as originally indicated.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

- A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related Work.

3.3 SCHEDULE OF ALLOWANCES

- A. Allowance Owner's Contingency Allowances: **\$150,000.00****
1. Contractor shall include the amount indicated below in his Base Proposal as a contingency to cover the cost of hidden, concealed or otherwise unforeseen conditions which develop during completion of the work. Contractor shall be allowed to recover all costs associated with the completion of work under this contingency, however, no overhead or profit will be allowed.

END OF SECTION 01 21 00

SECTION 01 23 00 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes: Administrative and procedural requirements for alternates.

1.3 DEFINITIONS

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain Work defined in the bidding requirements that may be added to or deducted from the base bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
 - 1. Alternates described are part of the Work when enumerated in the Agreement.
 - 2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

- A. Coordination: Revise or adjust affected adjacent Work as necessary to completely integrate Work of the alternate into Project.
 - 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 indicated as part of alternate.
- B. Notification: Forty-eight (48) hours following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated revisions to alternates.
- C. Execute accepted alternates under the same conditions as other Work of the Contract.
- D. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the Work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

- A. Alternate No. 1A: AstroTurf Rhino SF 46 Rubber-Sand Infilled Synthetic Turf System
This Alternate shall establish the amount to add to the Base Proposal for the cost of 2.50" pile height AstroTurf Rhino SF 46 rubber sand infilled synthetic turf system.

- B. Alternate No. 1B: AstroTurf 3D3 52 Rubber-Sand Infilled Synthetic Turf System
This Alternate shall establish the amount to add to the Base Proposal for the cost of 2.00" pile height AstroTurf Rhino 3D3 52 rubber sand infilled synthetic turf system.
- C. Alternate No. 1C: FieldTurf XT Rubber-Sand Infilled Synthetic Turf System
This Alternate shall establish the amount to add to the Base Proposal for the cost of 2.50" pile height FieldTurf XF rubber sand infilled synthetic turf system.
- D. Alternate No. 1D: FieldTurf Classic HD Rubber-Sand Infilled Synthetic Turf System
This Alternate shall establish the amount to add to the Base Proposal for the cost of 2.50" pile height Classic HD rubber sand infilled synthetic turf system.
- E. Alternate No. 1E: FieldTurf Vertex Prime Rubber-Sand Infilled Synthetic Turf System
This Alternate shall establish the amount to add to the Base Proposal for the cost of 2.50" pile height FieldTurf Vertex Prime rubber sand infilled synthetic turf system.
- F. Alternate No. 1F: Hellas Velocity Rubber-Sand Infilled Synthetic Turf System
This Alternate shall establish the amount to add to the Base Proposal for the cost of 2.50" pile height Hellas Velocity rubber sand infilled synthetic turf system.
- G. Alternate No. 1G: Hellas Fusion Rubber-Sand Infilled Synthetic Turf System
This Alternate shall establish the amount to add to the Base Proposal for the cost of 2.50" pile height Hellas Fusion rubber sand infilled synthetic turf system.
- H. Alternate No. 1H: Shaw Momentum Rubber-Sand Infilled Synthetic Turf System
This Alternate shall establish the amount to add to the Base Proposal for the cost of 2.50" pile height Shaw Momentum rubber sand infilled synthetic turf system.
- I. Alternate No. 1I: Shaw Legion Pro Rubber-Sand Infilled Synthetic Turf System
This Alternate shall establish the amount to add to the Base Proposal for the cost of 2.50" pile height Shaw Legion Pro rubber sand infilled synthetic turf system.
- J. Alternate No. 2: Provide 5' concrete apron along east perimeter of track
This Alternate shall establish the amount to add to the Base Proposal for the cost of providing a 5' concrete apron along the east perimeter of the track.
- K. Alternate No. 3: Remove and replace concrete pavement at existing south bleachers.
This Alternate shall establish the amount to add to the Base Proposal for the cost for removing and replacing the concrete pavement at the existing south bleachers.

END OF SECTION 01 23 00

SECTION 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes: Administrative and procedural requirements for substitutions.

1.3 DEFINITIONS

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
 - 1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
 - 2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.
- B. Products: Items purchased for incorporation in the Work, regardless if specifically purchased for the project or taken from the Contractor's previously purchased stock. The term *product* is inclusive for "*material, equipment, assembly, system*" and other terms of similar intent.

1.4 SUBMITTALS

- A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Substitution Request Form: Use facsimile of form provided in Project Manual.
 - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
 - b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors, which are necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
 - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. Certificates and qualification data, where applicable or requested.
 - g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.

- h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
 - j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
 - k. Cost information, including a proposal of change, if any, in the Contract Sum.
 - l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
 - m. 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 will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within fifteen days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
- a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
 - b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

- A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

1.6 PROCEDURES

- A. Coordination: Revise or adjust affected Work as necessary to integrate Work of the approved substitutions.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 30 days prior to time required for preparation and review of related submittals.
 - 1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - b. Substitution request is fully documented and properly submitted.
 - c. Requested substitution will not adversely affect Contractor's construction schedule.
 - d. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - e. Requested substitution is compatible with other portions of the Work.
 - f. Requested substitution has been coordinated with other portions of the Work.

- g. Requested substitution provides specified warranty.
 - h. 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.
- B. Substitutions for Convenience: Architect will consider requests for substitution if received prior to the Award of the Contract. Requests received after that time may be considered or rejected at discretion of Architect.
- 1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 - a. 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 Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
 - b. Requested substitution does not require extensive revisions to the Contract Documents.
 - c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - d. Substitution request is fully documented and properly submitted.
 - e. Requested substitution will not adversely affect Contractor's construction schedule.
 - f. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - g. Requested substitution is compatible with other portions of the Work.
 - h. Requested substitution has been coordinated with other portions of the Work.
 - i. Requested substitution provides specified warranty.
 - j. 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 25 00

REQUEST FOR SUBSTITUTION

Contract Award Date: _____

To: _____

Substitution Requested By: _____

Project Name and Number: _____

We submit for consideration the following product in lieu of the specified item for the above project:

Drawing No.	Specification Section	Paragraph	Specified Item
_____	_____	_____	_____

Proposed Substitution: _____

Request is made during ____ bidding ____ construction period.

Submit in accordance with Section 01 33 00.

1. Technical data, cost, and time information relating to changes to Construction Documents required by proposed substitution.
2. Detailed comparison of proposed substitution and specified product including but not limited to warranty, significant variations, qualifications of manufacturers, and maintenance.
3. Complete technical data, detailed shop drawings, samples, installation procedures, warranty, and substantiating data marked to indicate equivalent quality and performance to that specified. Manufacturer sell sheets are not acceptable submittals.

Cause for Request: _____

Cost saving realized by Owner: _____

Does substitution affect adjacent Work, Construction Documents, cost, schedule, quality, and related submittals? Yes ____ No ____

On separate sheet, explain affects to the Work, documents, schedule, and submittals.

The Contractor is responsible for associated costs and additional time of the proposed substitution including costs incurred by the Architect for evaluation of substitution and changes to the documents. Describe costs for changes to design, including engineering and detailing costs caused by the requested substitution.

Warranty: Is the warranty for the requested substitution the same or different? Same: ____ Different: ____

Explain Differences: _____

Contractor Certification:

In making a request for substitution, the Contractor certifies that:

1. The proposed substitution has been thoroughly researched and evaluated and determined as equivalent or superior to specified product or material, will fit into space provided, and is compatible with adjacent materials.
2. It will provide the same or better warranty for the proposed substitution at no additional cost to the Owner.
3. Cost data is complete and includes related costs under the Contract. Claims for additional costs related to the proposed substitution that may subsequently become apparent are waived.
4. It will assume the responsibility for delays and costs caused by the proposed substitution, if approved, are accepted by the Contractor unless delays are and costs are specifically mentioned and approved in writing by the Owner and the Architect.
5. It will assume the liability for the performance of the substitution and its performance.
6. The installation of the proposed substitution is coordinated with the Work and with changes required for the Work.
7. It will reimburse the Owner and Architect for evaluation and redesign services associated with the substitution request and, when required, by approval by authorities having jurisdiction.

Submitted by:

Signature of Contractor _____ Title _____

Firm _____ Telephone _____ Date _____

Signature shall be by the individual authorized to legally bind the Contractor to the above terms. Failure to provide legally binding signature will result in retraction of approval.

FOR USE BY ARCHITECT:

Accepted Accepted as Noted
 Not Accepted Received Too Late

FOR USE BY OWNER:

Accepted Not Accepted

By: _____

By: _____

Date: _____

Date: _____

Remarks: _____

Remarks: _____

END OF SECTION 01 25 00

SECTION 01 26 00 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes: Administrative and procedural requirements for handling and processing Contract modifications.
- B. Related Work:
 - 1. Section 01 25 00 - Substitution Procedures.

1.3 MINOR CHANGES IN THE WORK

- A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710 *Architect's Supplemental Instructions*.

1.4 PROPOSAL REQUESTS

- A. Owner Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
 - 1. Work Change Proposal Requests issued by Architect are not instructions either to stop Work in progress or to execute the proposed change.
 - 2. Within time specified in Proposal Request after receipt of Proposal Request, submit quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
 - a. Include list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include costs of labor and supervision directly attributable to the change.
 - d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
- B. Contractor Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.
 - 1. Include statement outlining reasons for the change and the effect of the change on the Work. Provide complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
 - 2. Include list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.

3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Section 01 25 00 if the proposed change requires substitution of one product or system for product or system specified.
7. Proposal Request Form: Use AIA Document G709.

1.5 ADMINISTRATIVE CHANGE ORDERS

- A. Allowance Adjustment: When an allowance is specified, refer to Section 01 21 00 for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect actual costs of allowances.
1. Allowance Adjustment: To adjust allowance amounts, base each Change Proposal Request (CPR) on the difference between purchase amount and the allowance, multiplied by final measurement of Work in place. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.
 - a. Include installation costs in purchase amount only where indicated as part of the allowance.
 - b. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other margins claimed.
 - c. Submit substantiation of a change in scope of Work, if any, claimed in Change Orders related to unit cost allowances.
 - d. Owner reserves the right to establish the quantity of Work in place by independent quantity survey, measure, or count.
 2. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the Purchase Order amount or Contractor's handling, labor, installation, overhead, and profit. Submit claims within 7 days of receipt of the Change Order authorizing work to proceed. Owner will reject claims submitted later than 7 days after authorization.

1.6 CHANGE ORDER PROCEDURES

- A. On Owner's approval of a Work Changes Proposal Request, Architect will execute a Change Order also requiring signatures of Owner and Contractor on AIA Document G701.

1.7 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
1. Construction Change Directive contains a complete description of change in the Work and designates the method to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of Work required by the Construction Change Directive. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS

Not Used

PBK Sports
Project No. P2106300SP

HJISD Hardin-Jefferson High School Track & Field Improvements
Hardin-Jefferson Independent School District

PART 3 - EXECUTION
Not Used

END OF SECTION 01 26 00

SECTION 01 29 00 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes: Administrative and procedural requirements necessary to prepare and process Applications for Payment.

1.3 DEFINITIONS

- A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.
- B. Pencil Copy: A preliminary review copy of the application for payment for review by Architect and Owner prior to submission of final copy.

1.4 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.
 - 1. Coordinate line items in the schedule of values with administrative forms and schedules, including the following:
 - a. Application for Payment forms with continuation sheets.
 - b. Updated Submittal schedule.
 - c. Items required to be indicated as separate activities in updated Contractor's construction schedule.
 - 2. Submit the schedule of values to Architect at earliest possible date, but no later than seven days before the date scheduled for submittal of initial Applications for Payment. Contractor's standard form or electronic media printout will be considered but must be approved by the Owner.
- B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.
 - 1. Identification: Include the following Project identification on the schedule of values:
 - a. Project name and location.
 - b. Name of Architect.
 - c. Architect's project number.
 - d. Contractor's name and address.
 - e. Date of submittal.
 - 2. Arrange schedule of values consistent with format of AIA Document G703.
 - 3. Arrange the schedule of values in tabular form with separate columns to indicate the following for each item listed:
 - a. Related Specification Section or Division.
 - b. Description of the Work.
 - c. Name of subcontractor.
 - d. Name of manufacturer or fabricator.
 - e. Name of supplier.

- f. Change Orders (numbers) that affect value.
- g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
 - 1) Labor.
 - 2) Materials.
 - 3) Equipment rentals.
 - 4) General Conditions.
 - a. Supervisor.
 - b. Submittals.
 - c. Close-out.
 - d. Field Engineering.
 - e. Daily Clean-up.
 - f. Final Clean-up.
4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
5. Provide separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
 - a. Differentiate between items stored on site and items stored off site. Include evidence of insurance.
6. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line item value of unit cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
7. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
 - a. Temporary facilities and other major cost items that are not direct cost of actual Work in place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.
8. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

- A. Submit preliminary (pencil) copy of proposed values to Architect or Architects field representative and Owner for review by 20th of month. Allow 96 hours for comments.
- B. Once preliminary (pencil) approved, submit electronic copy of notarized originals of each application on AIA Form G702 - Application and Certificate for Payment and AIA G703 - Continuation Sheet for G702 or other similar form approved by the Owner.
- C. Content and Format: Utilize Schedule of Values for listing items in Application for Payment.
- D. Submit updated construction or recovery schedule with each Application for Payment.
- E. Payment Period: Submit at intervals stipulated in the Agreement in accordance with Document 00 73 00, Supplementary Conditions of the Contract.
- F. Only materials stored on the project site shall be paid for unless the materials are stored in a bonded warehouse.
- G. Substantiating Data: When Architect/Engineer requires substantiating information, submit data justifying dollar amounts in question. Items which may be requested by the Architect or Owner to substantiate costs include, but are not limited to the following:
 1. Current Record Documents as specified in Section 01 77 00, Closeout Procedures maintained.

2. Labor time sheets, purchase orders, or similar documentation.
3. Affidavits attesting to off-site stored products.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION 01 29 00

Item No.	Description of Work	Scheduled Value	Work Completed		Stored Materials	Total Completed	%	Balance To Finish	Retainage
			Previous App.	This App.					
	Div. 1 - General Reqs.								
	Site Work General Conditions								
	Supervision								
	Mobilization								
	Bonds & Insurance								
	Permits								
	Contractor's Fee								
	Close-Out Documents								
	Div. 1 - Total								
	Div. 2 - Existing Conditions								
	Demolition (As applicable)								
	Erosion Control								
	Div. 2 - Total								
	Divs. 31, 32 and 33 - Earthwork, Exterior Improvements and Utilities								
	Site Clearing & Grubbing								
	Building Pad - Materials								
	Building Pad - Labor								
	Paving Subgrade								
	Signage / Striping								
	Bike Racks								
	Landscaping - Materials								
	Landscaping - Labor								
	Hydro Mulch - Materials								
	Hydro Mulch - Labor								
	Irrigation - Materials								
	Irrigation - Labor								
	Earthwork								
	Finish Grading								
	Stabilization - Materials								
	Stabilization - Labor								
	Site Drainage - Materials								
	Site Drainage - Labor								
	Chain Link Fence-Materials								
	Chain Link Fence-Labor								
	Paving - Labor								
	Paving - Materials								
	Sidewalks								
	Close-Out Documents								
	Div. 31, 32 and 33 - Total								
	General Conditions								
	Mobilization								
	Temp. Facilities								
	Final Cleaning								
	Record Documents/Close-out/ O&M Manuals								
	Supervision								
	Permits								
	Bonds								
	Insurance								
	Allowances								
	Alternates (list)								
	Change Orders								
	A. PR#								
	B. PR#								
	C. PR#								

END OF SECTION SAMPLE 01 29 73

SECTION 01 29 73 - SCHEDULE OF VALUES

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Provide a detailed breakdown of the agreed Contract Sum showing values allocated to each of the various parts of the work, as specified herein and in other provisions of the Contract Documents.
- B. Coordinate requirements of this Section with the requirements of the General and Supplementary Conditions of the Contract concerning Schedule of Values.

1.2 QUALITY ASSURANCE

- A. Use required means to assure arithmetical accuracy of the sums described.
- B. When so required by the Owner, provide copies of the subcontracts or other data acceptable to the Owner, substantiating the sums described.

1.3 SUBMITTALS

- A. Prior to the first Application for Payment, submit a proposed schedule of values to the Owner, as outlined below:
 - 1. Meet with the Owner and determine additional data, if any, required to be submitted.
 - 2. Secure the Owner's approval of the schedule of values prior to submitting first Application for Payment.

1.4 SCHEDULE OF VALUES

- A. The Schedule of Values shall be broken down into item costs for each specification section as a minimum. After review by the Owner, the Schedule of Values shall be broken down into further items as required. (See following list and refer to the enclosed sample.) In addition, total each Specification Division separately.
- B. Schedule of Values - Items in addition to Specification Sections.
 - 1. Mobilization
 - 2. Clean Up
 - 3. Building Permit
 - 4. Bonds, Insurance
 - 5. Misc. Mechanical Accessories
 - 6. Demolition
 - 7. Rough-In Labor - (Electrical)
 - 8. Rough-In Material - (Electrical)
 - 9. Finish Labor - (Electrical)
 - 10. Finish Material - (Electrical)
 - 11. Allowances (listed separately)
 - 12. Record drawings and close-out documents
 - 13. Submittals listed separately per mechanical, electrical and plumbing
 - 14. Roof warranty as a line item
 - 15. Donated items individually itemized at \$0.00 (zero dollars).

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

3.1 SCHEDULE OF VALUES

- A. Refer to following sample.

END OF SECTION 01 29 73

SECTION 01 31 13 – PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes: Administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. General coordination procedures.
 - 2. Coordination drawings.
 - 3. Pre-install meetings.
- B. Each Contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific Contractor.
- C. Contractor shall make a reasonable attempt to interpret the Contract Documents before asking the Architect for assistance in interpretation. Requests for Information (RFI's) will not be allowed from the Contractor. The Contractor shall arrange the necessary meeting in the field with appropriate Architect's field representative(s) to obtain clarification as needed on items that may need interpretation.

1.3 SUBMITTALS

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
 - 1. Name, address, and telephone number of entity performing subcontract or supplying products.
 - 2. Number and title of related Specification Section(s) covered by subcontract.
 - 3. Drawing number and detail references, as appropriate, covered by subcontract.
- B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and email addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.
 - 1. Post copies of list in project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

1.4 COORDINATION PROCEDURES

- A. Coordination: Coordinate construction operations to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations that depend on each other for proper installation, connection, and operation.
 - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.

2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Coordination: Each Contractor shall coordinate its construction operations with those of other Contractors and entities to ensure efficient and orderly installation of each part of the Work. Each Contractor shall coordinate its operations with operations, included in different Sections, which depend on each other for proper installation, connection, and operation.
1. Schedule construction operations in sequence required to obtain best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 2. Coordinate installation of different components with other Contractors to ensure maximum performance and accessibility for required maintenance, service, and repair.
 3. Make adequate provisions to accommodate items scheduled for later installation.
- C. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include items as required notices, reports, and list of attendees at meetings.
1. Prepare similar memoranda for Owner and separate Contractors if coordination of the Work is required.
- D. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Administrative activities include, but are not limited to, the following:
1. Preparation of Contractor's construction schedule.
 2. Preparation of the schedule of values.
 3. Installation and removal of temporary facilities and controls.
 4. Delivery and processing of submittals.
 5. Progress meetings.
 6. Preinstallation conferences.
 7. Project closeout activities.
 8. Startup and adjustment of systems.
 9. Coordinating inspections and other jurisdictional requirements.
 10. Coordinate OFCI equipment.
 11. Action items and issue logs.
- E. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. Refer to the Specifications Sections for disposition of salvaged materials that are designated as Owner's property.

1.5 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
 - a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.

- b. Coordinate the addition of trade specific information to the coordination drawings by multiple Contractors in sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
 - c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
 - e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
 - f. Indicate required installation sequences.
 - g. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
- B. Coordination Drawing Organization: Organize coordination drawings:
1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
 2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings. Indicate areas of conflict between light fixtures, ductwork, piping, and other components.
 3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire protection, fire-alarm, and electrical equipment.
 4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
 5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
 6. Mechanical and Plumbing Work: Show the following:
 - a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
 - b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
 - c. Fire-rated enclosures around ductwork.
 7. Electrical Work: Show the following:
 - a. Runs of vertical and horizontal conduit 1-1/4 inches (32 mm) in diameter and larger.
 - b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire alarm locations.
 - c. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
 - d. Location of pull boxes and junction boxes, dimensioned from column center lines.
 - e. Floor boxes.
 8. Fire Protection System: Show the following:
 - a. Locations of standpipes, mains piping, branch lines, pipe drops, sprinkler heads, and inspector test locations.
 9. IDF/MDF Rooms: Communications and low voltage (security, data, phone, etc.) audio

10. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make changes as directed and resubmit.
 11. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Section 01 33 00.
- C. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:
1. File Preparation Format: Same digital data software program, version, and operating system as original Drawings.
 2. File Submittal Format: Submit or post coordination drawing files using format same as file preparation format.
 3. BIM File Incorporation: Develop and incorporate coordination drawing files into Building Information Model established for Project.
 - a. Perform three dimensional component conflict analysis as part of preparation of coordination drawings. Resolve component conflicts prior to submittal. Indicate where conflict resolution requires modification of design requirements by Architect.
 4. Architect will furnish Contractor one set of digital data files of Drawings for use in preparing coordination digital data files.
 - a. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
 - b. Digital Data Software Program: Drawings are available in Revit.
 - c. Contractor shall execute a data licensing agreement in the form of AIA Document C106.

1.6 PROJECT MEETINGS

- A. Schedule and conduct meetings and conferences at Project site unless otherwise indicated.
1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
 2. Agenda: Architect to prepare the meeting agenda and distribute the agenda to all invited attendees.
 3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.
 4. Action Items: An element of work, design, research, or other task to be completed before a specific date or time, such as before a subsequent meeting of involved parties.
 5. Issue logs: Documentation element of software project management and contains a list of ongoing and closed issues of the project.
- B. Kick-off & Preconstruction Conference: Architect will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect.
1. Conduct the conference to review responsibilities and personnel assignments.
 2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 3. Agenda: Discuss items of significance that affect progress.
 4. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

5. Action Items: An element of work, design, research, or other task to be completed before a specific date or time, such as before a subsequent meeting of involved parties.
- C. Preinstallation Conferences: Conduct a preinstallation trade conference at site before each construction activity that requires coordination with other construction trades.
1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect and Engineer of Record of scheduled meeting dates.
 2. Agenda: Contractor to review progress of other construction activities and preparations for the particular activity under consideration.
 3. Contractor to record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
 4. Reporting: Contractor to distribute minutes of the meeting to each party present and to other parties requiring information.
 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
 6. Action Items: An element of work, design, research, or other task to be completed before a specific date or time, such as before a subsequent meeting of involved parties.
- D. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 90 days prior to the scheduled date of Substantial Completion.
1. Conduct the conference to review requirements and responsibilities related to Substantial Completion.
 2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 3. Agenda: Discuss items of significance that could affect or delay Project closeout.
 4. Minutes: Entity conducting meeting will record and distribute meeting minutes.
 5. Action Items: An element of work, design, research, or other task to be completed before a specific date or time, such as before a subsequent meeting of involved parties.
- E. Progress Meetings: Conduct progress meetings at weekly intervals.
1. Coordinate dates of meetings with preparation of payment requests.
 2. Attendees: In addition to representatives of Owner and Architect, each Contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.

- a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.
 - b. Six (6) week look-ahead schedules.
5. Action Items: An element of work, design, research, or other task to be completed before a specific date or time, such as before a subsequent meeting of involved parties.
- F. Coordination Meetings: Conduct coordination meetings at weekly intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.
1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meetings shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - b. Schedule Updating: Revise combined Contractor's construction schedule after each coordination meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
 - c. Review present and future needs of each Contractor present.
 3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.
 4. Action Items: An element of work, design, research, or other task to be completed before a specific date or time, such as before a subsequent meeting of involved parties.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION 01 31 00

SECTION 01 31 19 - PROJECT MEETINGS

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 - GENERAL

1.1 REQUIREMENTS INCLUDE

- A. The Architect's:
 - 1. Scheduling of each meeting (pre-construction meeting, periodic project meetings, and specialty called meetings throughout the progress of the Work).
 - 2. Preparation of agenda for meetings.
 - 3. Presiding at minutes, including all significant proceedings and decisions.
 - 4. Recording, reproducing, and distributing copies of meeting minutes within two (2) working days, excluding weekends and holidays, after each meeting to:
 - a. All participants in the meeting.
 - b. All parties affected by decisions made at the meeting.
 - 5. Providing status report of allowance funds.

- B. The Contractor's:
 - 1. Making physical arrangement for meetings.
 - 2. Participation in all meetings and conferences.
 - 3. Scheduling attendance of Job Superintendent, Project Coordinator, and other parties affecting or affected by decisions made at meetings and conferences as their interests require.
 - 4. Scheduling Pre-installation conferences.
 - 5. Scheduling Pre-Closeout Meeting
 - 6. Providing updated schedules.
 - 7. Providing status reports/logs of CPRs, MCs, and shop drawings/submittals.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

3.1 PRE-CONSTRUCTION CONFERENCE

- A. Contractor shall contact Architect at least ten (10) days prior to commencing construction in order for Architect to schedule a pre-construction meeting with Contractor, Architect, and Owner. This meeting must occur prior to commencement of any construction.

- B. Architect will:
 - 1. Administer pre-construction conference for the establishment of communication methods, procedures and Owner requirements.
 - 2. Administer site mobilization conference for clarification of Owner and Contractor.

- C. Location: At Project site as designated by the Architect.

- D. Attendance:
 - 1. Contractor or Contractor's Representatives
 - 2. Job Superintendent
 - 3. Project Coordinator (Manager)

4. Owner or Owner's Representative
 5. Major subcontractors
 6. Major suppliers
 7. Architect's Representative
 8. Others as appropriate
- E. Meeting Agenda, may include, but is not limited to:
1. Discussion on major subcontracts and suppliers and projected construction schedules.
 2. Critical work sequencing.
 3. Major equipment deliveries and priorities. Discussion of long lead time items.
 4. Project coordination and designation of responsible personnel.
 5. Procedures and processing of field decisions, proposal requests, submittals, minor changes, change orders and applications for payment.
 6. Method of distribution of Contract Documents.
 7. Procedures for maintaining Record Documents.
 8. Use of premises, office work and storage areas, on-site parking, and Owner's requirements.
 9. Construction facilities and temporary utilities.
 10. Housekeeping procedures.

3.2 PROGRESS MEETINGS

- A. Architect will:
1. Schedule project meetings throughout progress of the work at weekly intervals, and specially called meetings.
 2. Set agenda and administer said meetings.
 3. Preside at meetings.
 4. Record meeting minutes, including all significant proceedings and decisions.
 5. Reproduce and distribute copies of meeting minutes within two (2) working days, excluding weekends and holidays, after each meeting to:
 - a. All participants in the meeting.
 - b. All parties affected by decisions made at the meeting.
- B. Architect shall:
1. Make physical arrangements for meetings.
- C. Attendance:
1. Contractor or Contractor's Representative
 2. Job Superintendent
 3. Project Coordinator (Manager)
 4. Owner or Owner's Representative
 5. Major subcontractors
 6. Major suppliers
 7. Architect's Field Representative
 8. Consultants as needed
 9. Others as appropriate
- D. Meeting Agenda, may include, but is not limited to:
1. Review and approval of minutes of previous meeting.
 2. Review of Work progress since previous meeting.
 3. Field observations, problems, and conflicts.
 4. Review of off-site fabrication and delivery schedules.
 5. Corrective measures and procedures to regain projected schedule.
 6. Revisions to Construction Schedule.
 7. Plan progress and schedule during succeeding work period.

8. Coordination of schedules.
9. Review submittal schedules and expedite as required.
10. Maintenance of quality standards.
11. Allowance balances.
12. Review of proposed changes and substitutions for:
 - a. Effect on Construction Schedule and on completion date.
 - b. Effect on other contracts of the Project.
13. Status of Allowance Expenditure Authorizations (AEAs).
14. Status of Change Proposal Requests (CPRs).
15. Status of Minor Changes (MCs).
16. Status of submittals, review of submittal log.
17. Other items and critical issues affecting Work.

3.3 PRE-INSTALLATION CONFERENCES

- A. In accordance with the requirements of Section 01 11 00, Notification of Architect Requirements, the Contractor will convene pre-installation conferences when required by individual specification Sections or as required by the Architect, prior to the Contractor commencing Work of the Section.
- B. Attendance, optional:
 1. General Contractor or Contractor's Representative
 2. Project Coordinator (Manager)
 3. Owner or Owner's Representative
 4. Architect's Project Manager (Project Executive)
- C. Attendance, required:
 1. Project Superintendent
 2. Architect's Field Representative
 3. Sub-contractor's Project Manager
 4. Sub-contractor's Foreman
 5. Engineer's Representative, as needed.
 6. Manufacturer's Representative, as needed.
 7. Governing Agency Official, as required
 8. Inspection Agency Representative, as required.
 9. Others affecting or affected by Work.
- D. Meeting Agenda, may include, but is not limited to:
 1. Review of conditions of installation.
 2. Preparation and installation procedures.
 3. Coordination with related work
 4. Review of the contract document requirements.
 5. Review of code enforcement or testing requirements.
 6. Questions related to work required.

3.4 PRE-CLOSEOUT MEETING

- A. In accordance with the requirements of Section 01 77 00, Closeout Procedures, the Contractor will convene a pre-closeout meeting when he considers the Work or designated portion of the Work is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the work for its intended use.
- B. Attendance, required:
 1. Owner or Owner's Representative
 2. Project Coordinator (Manager)

3. General Contractor or Contractor's Representative
 4. Project Superintendent
 5. Architect's Project Manager (Project Executive)
 6. Architect's Field Representative
 7. Engineer's Representative, as needed.
- C. Meeting Agenda, may include, but is not limited to:
1. Review of the contract document requirements for Substantial Completion and Project Closeout
 2. Review of Work which remains to be completed or corrected.
 3. Closeout Document review schedule and log
 4. Review of closeout procedures including, but not limited to Record Drawings, Warrantees, Operation and Maintenance Manuals, and Owner Demonstrations and Start-up.
 5. Review of code enforcement or testing requirements.
 6. Questions related to work required.

END OF SECTION 01 31 19

SECTION 01 32 16 - CONSTRUCTION PROGRESS SCHEDULE

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 GENERAL

1.1 SUBMITTALS

- A. Schedules:
 - 1. Preliminary Analysis: Within 10 (ten) days after receipt of Award of Contract, submit a preliminary construction schedule for review by Owner and Architect.
 - 2. Construction Schedule: Within 14 (fourteen) days after receipt of Notice to Proceed, submit one (1) reproducible and four (4) prints of the approved construction schedule.

1.2 RELIANCE UPON SCHEDULE

- A. The construction schedule as approved by the Architect will be an integral part of the contract and will establish conditions for various activities and phases of constructions.

1.3 CONSTRUCTION SCHEDULE

- A. Diagram: Graphically show the order of all activities necessary to complete the work and the sequence in which each activity is to be accomplished.
- B. Activities shown on the diagram shall include but not necessarily be limited to:
 - 1. Project mobilization
 - 2. Submittals and approvals of shop drawings and samples
 - 3. Phasing of construction
 - 4. Procurement of equipment and critical materials
 - 5. Fabrication and installation of special material and equipment
 - 6. Final clean-up
 - 7. Final inspection and testing
- C. The construction schedule shall be updated and submitted with each Application for Payment.

1.4 CONSTRUCTION SCHEDULE LIMITATIONS

- A. Work performed under this Contract shall be done in accordance with the following paragraphs:
 - 1. All work may proceed immediately upon Notice to Proceed and continue uninterrupted.
 - 2. The Owner has a critical need for the work to begin upon Notice to Proceed and be Substantially Complete December 12, 2017.
 - 3. Under the Base Proposal only, the successful Offeror will be 1) entitled to certain extensions of time and 2) subject to liquidated damages for work not completed beyond the agreed date which the Contractor shall require for Substantial Completion of the work included in this contract. Refer to Supplementary Conditions for additional requirements and liquidated damages.
 - 4. Failure to complete and close-out project after substantial completion may result in liquidated damages. Refer to Supplementary Conditions for additional requirements and liquidated damages.
 - 5. The Owner may at his discretion approve changes recommended by the successful Offeror to the above-mentioned schedule provided that the Owner's use of newly completed areas are not disrupted.

END OF SECTION 01 32 16

SECTION 01 32 30 - PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Preconstruction photographs.
 - 2. Periodic construction photographs.
 - 3. Aerial photographs by drone.
 - 4. Final completion construction photographs.

1.2 SUBMITTALS

- A. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph or video recording. Indicate elevation or story of construction. Include same information as corresponding photographic documentation.
- B. Equipment Registration: Submit federal registration for drone.
- C. Digital Photographs: Submit image files within three days of taking photographs.
 - 1. Digital Camera: Minimum sensor resolution of 8 megapixels.
 - 2. Format: Minimum 3200 by 2400 pixels, in unaltered original files, with same aspect ratio as the sensor, uncropped, date and time stamped, in folder named by date of photograph, accompanied by key plan file.
 - 3. Identification: Provide the following information with each image description in file metadata tag:
 - a. Name of Project.
 - b. Name and contact information for photographer.
 - c. Name of Architect.
 - d. Name of Contractor.
 - e. Date photograph was taken.
 - f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
 - g. Unique sequential identifier keyed to accompanying key plan.
- D. Construction Photographs: Submit two prints of each photographic view within seven days of taking photographs.
 - 1. Format: 8 inch by 10 inch (203 mm by 254 mm) smooth surface matte prints on single weight, commercial grade photographic paper; mounted on card stock to allow a 1 inch (25 mm) wide margin punched for standard three-ring binder.
 - 2. Identification: On back of each print, provide an applied label or rubber-stamped impression with the following information:
 - a. Name of Project.
 - b. Name and contact information for photographer.
 - c. Name of Architect.
 - d. Name of Contractor.
 - e. Date photograph was taken if not date stamped by camera.
 - f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
 - g. Unique sequential identifier keyed to accompanying key plan.
- E. Video Recordings: Submit video recordings within seven days of recording.
 - 1. Submit video recordings in digital video disc format acceptable to Architect.
 - 2. Identification: With each submittal, provide the following information:

- a. Name of Project.
 - b. Name and address of photographer.
 - c. Name of Architect and Construction Manager.
 - d. Name of Contractor.
 - e. Date video recording was recorded.
 - f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
 - g. Weather conditions at time of recording.
3. Transcript: Prepared on 8-1/2 inch by 11 inch (215 mm by 280 mm) paper, punched and bound in heavy duty, three ring, vinyl covered binders. Mark appropriate identification on front and spine of each binder. Include a cover sheet with same label information as corresponding video recording. Include name of Project and date of video recording on each page.

1.3 QUALITY ASSURANCE

- A. Regulatory Requirements:
1. Drone Registration: Federal required quadcopter drone registration, registered in the name of the School and School District. Owner will take possession of drone at substantial completion.
- B. Photographer Qualifications: An individual who has been regularly engaged as a professional photographer of construction projects for a minimum of 3 years.

1.4 USAGE RIGHTS

- A. Obtain and transfer copyright usage rights from photographer to Owner for unlimited reproduction of photographic documentation.

PART 2 - PRODUCTS

2.1 PHOTOGRAPHIC MEDIA

- A. Digital Images: Provide images in JPG format, produced by a digital camera with minimum sensor size of 8 megapixels, and at an image resolution of not less than 3200 by 2400 pixels.
- B. Digital Video Recordings: Provide high resolution, digital video disc in format acceptable to Architect and Construction Manager.
1. Drone with HD Camera: Provide quadcopter drone with portable camera system including minimum 4 GB Micro SD card capable of producing images complying with requirements.
 - a. Drone: Provide quadcopter drone with HD camera, return home function, and intelligent orientation control (IOC).
 - b. Camera: HD video camper with 2 MP HP video camera with 1280 x 720 resolution, 30 FPS frame rate,
 - c. Control System: 6 axis flight control system (3 gyroscopes and 3 accelerometers) for positioning and control of aircraft.
 - d. Backup Battery: Provide two back up batteries with charger unit.
 - e. Rotor Spare Parts: Provide 2 sets of replacement rotors.

PART 3 - EXECUTION

3.1 PHOTOGRAPHIC EQUIPMENT

- A. Quadcopter with HD Camera Drone: Provide aerial video using a drone. At substantial completion, refurbish drone to like new condition and turn drone over to Owner with federal registration and licenses.

3.2 CONSTRUCTION PHOTOGRAPHS

- A. Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the work. Photographs with blurry or out-of-focus areas will not be accepted.
 - 1. Maintain key plan with each set of construction photographs that identifies each photographic location.

- B. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image editing software.
 - 1. Date and Time: Include date and time in file name for each image.
 - 2. Field Office Images: Maintain one set of images accessible in the field office at Project site, available at all times for reference. Identify images in the same manner as those submitted to Architect.

- C. Preconstruction Photographs: Before commencement of the work, take photographs of site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Architect.
 - 1. Flag construction limits before taking construction photographs.
 - 2. Take minimum of 20 photographs to show existing conditions adjacent to property before starting the work.
 - 3. Take minimum of 20 photographs of existing buildings either on or adjoining property to accurately record physical conditions at start of construction.
 - 4. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.

- D. Periodic Construction Photographs: Take minimum of 20 photographs monthly, coinciding with cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.

- E. Architect Directed Construction Photographs: From time to time, Architect will instruct photographer about number and frequency of photographs and general directions on vantage points. Select actual vantage points and take photographs to show the status of construction and progress since last photographs were taken.

- F. Final Completion Construction Photographs: Take minimum of 20 color photographs after date of Substantial Completion for submission as project record documents. Architect will inform photographer of desired vantage points.
 - 1. Do not include date stamp.

- G. Additional Photographs: Architect may request photographs in addition to periodic photographs specified. Additional photographs will be paid for by Change Order and are not included in the Contract Sum.
 - 1. Three days' notice will be given, where feasible.
 - 2. In emergency situations, take additional photographs within 24 hours of request.
 - 3. Circumstances that could require additional photographs include, but are not limited to, the following:
 - a. Special events planned at Project site.
 - b. Immediate follow up when on site events result in construction damage or losses.
 - c. Take photographs at fabrication locations away from site.
 - d. Substantial Completion of a major phase or component of the work.
 - e. Extra record photographs at time of final acceptance.
 - f. Owner's request for special publicity photographs.

3.3 CONSTRUCTION VIDEO RECORDINGS

- A. Recording: Drone mounted camera to show area and progress of construction. Display continuous running time and date. At start of each video recording, record weather conditions from local newspaper or television and the actual temperature reading at site.
- B. Narration: Describe scenes on video recording by audio narration by microphone while or by dubbing audio narration off site after video recording is recorded. Include description of items being viewed, recent events, and planned activities. At each change in location, describe vantage point, location, direction (by compass point), and elevation or story of construction.
 - 1. Confirm date and time at beginning and end of recording.
 - 2. Begin each video recording with name of Project, Contractor's name, videographer's name, and Project location.
- C. Transcript: Provide a typewritten transcript of the narration. Display images and running time captured from video recording opposite the corresponding narration segment.
- D. Preconstruction Video Recording: Before starting excavation, record video recording of Project site and surrounding properties from different vantage points, as directed by Architect.
 - 1. Flag construction limits before recording construction video recordings.
 - 2. Show existing conditions adjacent to site before starting the work.
 - 3. Show existing buildings either on or adjoining site to accurately record physical conditions at the start of construction.
 - 4. Show protection efforts by Contractor.
- E. Periodic Construction Video Recordings: Record video recording weekly, with timing each month adjusted to coincide with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last video recordings were recorded.

End of Section

SECTION 01 33 00 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes: Requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

1.3 DEFINITIONS

- A. Submittals: Written and graphic information and physical samples that require Architect's responsive action or are for information and do not require the architect's action.
- B. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.
- C. Portable Document Format (PDF): An open standard file format used for representing documents in a device independent and display resolution independent fixed layout document format.

1.4 SUBMITTALS

- A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.
 - 1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
 - 2. Initial Submittal: Submit concurrently with construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
 - 3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule. Submit revised submittal schedule to reflect changes in current status and timing for submittals.

1.5 PRE-SHIPMENT SUBMITTALS

- A. Prior to shipment of the synthetic turf materials to the job site, synthetic turf material from every sixth roll shall be randomly sampled and the tested by an independent testing laboratory experienced with testing synthetic turf materials. The testing laboratory shall be completely independent with no legal connections to the turf manufacturer. The testing shall include the following:

Item ASTM Property:

- 1. FTIR SPECTROGRAPH PILE COMPOSITION**
- 2. D418 PILE WEIGHT**
- 3. D418 TOTAL WEIGHT**
- 4. D418 PILE HEIGHT**
- 5. D418 BACKING PERFORATION DIAMETER AND SPACING**
- 6. D1335 TUFT BIND (WITHOUT INFILL)**
- 7. D1682 GRAB/TEAR STRENGTH.**

- B** Copies of the test results shall be transmitted to the Owner and Engineer directly from the testing laboratory. The synthetic turf materials shall not be shipped to the site without written authorization from the Engineer after the Owner and Engineer have approved the test results. Samples of the synthetic turf material tested from every sixth roll shall also be transmitted to the Engineer for approval by the independent testing laboratory prior to shipment of the synthetic turf materials to the job site. Sample size shall be minimum 12" x 12".
- C. ALL FEES AND COSTS ASSOCIATED WITH THE PRE-SHIPMENT SAMPLING AND TESTING SHALL BE PAID BY THE CONTRACTOR.**

1.6 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Architect's Digital Data Files: Electronic digital data files of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals.
1. Upon request, Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings and Project record drawings.
 - a. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
 - b. Digital Drawing Software Program: The Contract Drawings are available in Revit.
 - c. Contractor shall execute a data licensing agreement in the form of AIA Document C106, Digital Data Licensing Agreement.
 - d. The following digital data files will be furnished for each appropriate discipline:
 - 1) Floor plans.
 - 2) Reflected ceiling plans.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 2. Submit submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

- C. Processing Time: Allow time for submittal review, including time for resubmittals. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
 2. Intermediate Review: If intermediate submittal is necessary, process in same manner as initial submittal.
 3. Resubmittal Review: Allow 15 days for review of each resubmittal.
 4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.
 5. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow 15 days for review of each submittal. Submittal will be returned to Architect before being returned to Contractor.
- D. Electronic Submittals: Identify and incorporate information in each electronic submittal file:
1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
 2. Name file with submittal number or other unique identifier, including revision identifier.
 - a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-061000.01.A).
 3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.
 4. Transmittal Form for Electronic Submittals: Use software generated form from electronic project management software acceptable to Owner, containing the following information:
 - a. Project name.
 - b. Date.
 - c. Name and address of Architect.
 - d. Name of Construction Manager.
 - e. Name of Contractor.
 - f. Name of firm or entity that prepared submittal.
 - g. Names of subcontractor, manufacturer, and supplier.
 - h. Category and type of submittal.
 - i. Submittal purpose and description.
 - j. Specification Section number and title.
 - k. Specification paragraph number or drawing designation and generic name for each of multiple items.
 - l. Drawing number and detail references, as appropriate.
 - m. Location(s) where product is to be installed, as appropriate.
 - n. Related physical samples submitted directly.
 - o. Indication of full or partial submittal.
 - p. Transmittal number, numbered consecutively.
 - q. Submittal and transmittal distribution record.
 - r. Other necessary identification.
 - s. Remarks.
 5. Metadata: Include the following information as keywords in the electronic submittal file metadata:
 - a. Project name.
 - b. Number and title of appropriate Specification Section.

- c. Manufacturer name.
- d. Product name.

- E. Options: Identify options requiring selection by Architect.

- F. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.

- G. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
 - 1. Note date and content of previous submittal.
 - 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
 - 3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.

- H. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

- I. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

- A. Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
 - 1. Submit electronic submittals via email as PDF electronic files.
 - a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
 - OR**
 - 2. Submittals: Submit three paper copies of each submittal unless otherwise indicated. Architect will return two copies.
 - 3. Certificates and Certifications Submittals: Provide statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
 - a. Provide a digital signature with digital certificate on electronically submitted certificates and certifications where indicated.
 - b. Provide a notarized statement on original paper copy certificates and certifications where indicated.

- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
 - 1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
 - 2. Mark each copy of each submittal to show which products and options are applicable.
 - 3. Include the following information, as applicable:
 - a. Manufacturer's catalog cuts.
 - b. Manufacturer's product specifications.
 - c. Standard color charts.
 - d. Statement of compliance with specified referenced standards.
 - e. Testing by recognized testing agency.

- f. Application of testing agency labels and seals.
 - g. Notation of coordination requirements.
 - h. Availability and delivery time information.
 4. For equipment, include the following in addition to the above, as applicable:
 - a. Wiring diagrams showing factory installed wiring.
 - b. Printed performance curves.
 - c. Operational range diagrams.
 - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
 5. Submit Product Data before or concurrent with Samples.
 6. Submit Product Data in PDF electronic file.
- C. Shop Drawings: Prepare Project specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
 1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Identification of products.
 - b. Schedules.
 - c. Compliance with specified standards.
 - d. Notation of coordination requirements.
 - e. Notation of dimensions established by field measurement.
 - f. Relationship and attachment to adjoining construction clearly indicated.
 - g. Seal and signature of professional engineer if specified.
 2. Sheet Size: Except for templates, patterns, and similar full size drawings, submit Shop Drawings on sheet size indicated in specification section.
 3. Submit Shop Drawings in PDF electronic file.
 4. BIM File Incorporation: Develop and incorporate Shop Drawing files into Building Information Model established for Project.
 - a. Prepare Shop Drawings in same digital data software program, version, and operating system as the original Drawings.
 - b. Refer to Section 01 31 00 for requirements for coordination drawings.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
 1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 2. Identification: Attach label on unexposed side of Samples that includes the following:
 - a. Generic description of Sample.
 - b. Product name and name of manufacturer.
 - c. Sample source.
 - d. Number and title of applicable Specification Section.
 - e. Specification paragraph number and generic name of each item.
 3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
 4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.

- b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
5. Samples: Submit full size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
- a. Key Items Review Time: Submit samples to the Architect at least 30 days prior to the date the Contractor needs the reviewed submittals returned. The Contractor shall be prepared to submit color samples on any key items in Division 09 finishes within 30 days of the award of Contract. Once samples of all key items are received, the Architect will finalize color selections.
 - b. Number of Samples: Submit three sets of Samples. Architect will retain two Sample sets; remainder will be returned.
 - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.
- E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
- 1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
 - 2. Manufacturer and product name, and model number if applicable.
 - 3. Number and name of room or space.
 - 4. Location within room or space.
 - 5. Submit product schedule in PDF electronic file.
- F. Coordination Drawing Submittals: Comply with requirements specified in Section 01 31 00.
- G. Contractor's Construction Schedule: Comply with requirements specified in Section 01 32 00.
- H. Application for Payment and Schedule of Values: Comply with requirements specified in Section 01 29 00.
- I. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 014000.
- J. Closeout Submittals required for Substantial Completion: Comply with requirements specified in Section 01 77 00.
- K. Maintenance Data: Comply with requirements specified in Section 01 78 23.
- L. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- M. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification

and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.

- N. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- O. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- P. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- Q. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- R. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- S. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- T. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
 - 1. Name of evaluation organization.
 - 2. Date of evaluation.
 - 3. Time period when report is in effect.
 - 4. Product and manufacturers' names.
 - 5. Description of product.
 - 6. Test procedures and results.
 - 7. Limitations of use.
- U. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- V. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- W. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- X. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

2.2 DELEGATED DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

- B. Delegated Design Services Certification: In addition to Shop Drawings, Product Data, and required submittals, submit digitally signed PDF electronic file and three paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

- C. BIM File Incorporation: Incorporate delegated design drawing and data files into Building Information Model established for Project.
 - 1. Prepare delegated design drawings in the same digital data software program, version, and operating system as the original Drawings.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

- B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

- A. Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.

- B. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.

- C. Incomplete submittals are not permitted, will be considered nonresponsive, and will be returned for resubmittal without review.

- D. Submittals not required by the Contract Documents will be returned by the Architect without action.

END OF SECTION 01 33 00

SECTION 01 33 00 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes: Requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

1.3 DEFINITIONS

- A. Submittals: Written and graphic information and physical samples that require Architect's responsive action or are for information and do not require the architect's action.
- B. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.
- C. Portable Document Format (PDF): An open standard file format used for representing documents in a device independent and display resolution independent fixed layout document format.

1.4 SUBMITTALS

- A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.
 - 1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
 - 2. Initial Submittal: Submit concurrently with construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
 - 3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule. Submit revised submittal schedule to reflect changes in current status and timing for submittals.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Architect's Digital Data Files: Electronic digital data files of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals.
 - 1. Upon request, Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings and Project record drawings.
 - a. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
 - b. Digital Drawing Software Program: The Contract Drawings are available in Revit.

- c. Contractor shall execute a data licensing agreement in the form of AIA Document C106, Digital Data Licensing Agreement.
 - d. The following digital data files will be furnished for each appropriate discipline:
 - 1) Floor plans.
 - 2) Reflected ceiling plans.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 2. Submit submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow time for submittal review, including time for resubmittals. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
 2. Intermediate Review: If intermediate submittal is necessary, process in same manner as initial submittal.
 3. Resubmittal Review: Allow 15 days for review of each resubmittal.
 4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.
 5. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow 15 days for review of each submittal. Submittal will be returned to Architect before being returned to Contractor.
- D. Electronic Submittals: Identify and incorporate information in each electronic submittal file:
1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
 2. Name file with submittal number or other unique identifier, including revision identifier.
 - a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-061000.01.A).
 3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.
 4. Transmittal Form for Electronic Submittals: Use software generated form from electronic project management software acceptable to Owner, containing the following information:
 - a. Project name.
 - b. Date.
 - c. Name and address of Architect.
 - d. Name of Construction Manager.
 - e. Name of Contractor.

- f. Name of firm or entity that prepared submittal.
 - g. Names of subcontractor, manufacturer, and supplier.
 - h. Category and type of submittal.
 - i. Submittal purpose and description.
 - j. Specification Section number and title.
 - k. Specification paragraph number or drawing designation and generic name for each of multiple items.
 - l. Drawing number and detail references, as appropriate.
 - m. Location(s) where product is to be installed, as appropriate.
 - n. Related physical samples submitted directly.
 - o. Indication of full or partial submittal.
 - p. Transmittal number, numbered consecutively.
 - q. Submittal and transmittal distribution record.
 - r. Other necessary identification.
 - s. Remarks.
5. Metadata: Include the following information as keywords in the electronic submittal file metadata:
- a. Project name.
 - b. Number and title of appropriate Specification Section.
 - c. Manufacturer name.
 - d. Product name.
- E. Options: Identify options requiring selection by Architect.
- F. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.
- G. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
1. Note date and content of previous submittal.
 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
 3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.
- H. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- I. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

- A. Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
1. Submit electronic submittals via email as PDF electronic files.
 - a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.

OR

2. Submittals: Submit three paper copies of each submittal unless otherwise indicated. Architect will return two copies.
 3. Certificates and Certifications Submittals: Provide statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
 - a. Provide a digital signature with digital certificate on electronically submitted certificates and certifications where indicated.
 - b. Provide a notarized statement on original paper copy certificates and certifications where indicated.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
 2. Mark each copy of each submittal to show which products and options are applicable.
 3. Include the following information, as applicable:
 - a. Manufacturer's catalog cuts.
 - b. Manufacturer's product specifications.
 - c. Standard color charts.
 - d. Statement of compliance with specified referenced standards.
 - e. Testing by recognized testing agency.
 - f. Application of testing agency labels and seals.
 - g. Notation of coordination requirements.
 - h. Availability and delivery time information.
 4. For equipment, include the following in addition to the above, as applicable:
 - a. Wiring diagrams showing factory installed wiring.
 - b. Printed performance curves.
 - c. Operational range diagrams.
 - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
 5. Submit Product Data before or concurrent with Samples.
 6. Submit Product Data in PDF electronic file.
- C. Shop Drawings: Prepare Project specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Identification of products.
 - b. Schedules.
 - c. Compliance with specified standards.
 - d. Notation of coordination requirements.
 - e. Notation of dimensions established by field measurement.
 - f. Relationship and attachment to adjoining construction clearly indicated.
 - g. Seal and signature of professional engineer if specified.
 2. Sheet Size: Except for templates, patterns, and similar full size drawings, submit Shop Drawings on sheet size indicated in specification section.
 3. Submit Shop Drawings in PDF electronic file.
 4. BIM File Incorporation: Develop and incorporate Shop Drawing files into Building Information Model established for Project.
 - a. Prepare Shop Drawings in same digital data software program, version, and operating system as the original Drawings.
 - b. Refer to Section 01 31 00 for requirements for coordination drawings.

- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 2. Identification: Attach label on unexposed side of Samples that includes the following:
 - a. Generic description of Sample.
 - b. Product name and name of manufacturer.
 - c. Sample source.
 - d. Number and title of applicable Specification Section.
 - e. Specification paragraph number and generic name of each item.
 3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
 4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
 5. Samples: Submit full size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. Key Items Review Time: Submit samples to the Architect at least 30 days prior to the date the Contractor needs the reviewed submittals returned. The Contractor shall be prepared to submit color samples on any key items in Division 09 finishes within 30 days of the award of Contract. Once samples of all key items are received, the Architect will finalize color selections.
 - b. Number of Samples: Submit three sets of Samples. Architect will retain two Sample sets; remainder will be returned.
 - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.
- E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
 2. Manufacturer and product name, and model number if applicable.
 3. Number and name of room or space.
 4. Location within room or space.
 5. Submit product schedule in PDF electronic file.
- F. Coordination Drawing Submittals: Comply with requirements specified in Section 01 31 00.

- G. Contractor's Construction Schedule: Comply with requirements specified in Section 01 32 00.
- H. Application for Payment and Schedule of Values: Comply with requirements specified in Section 01 29 00.
- I. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 014000.
- J. Closeout Submittals required for Substantial Completion: Comply with requirements specified in Section 01 77 00.
- K. Maintenance Data: Comply with requirements specified in Section 01 78 23.
- L. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- M. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.
- N. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- O. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- P. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- Q. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- R. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- S. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- T. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
 - 1. Name of evaluation organization.
 - 2. Date of evaluation.
 - 3. Time period when report is in effect.
 - 4. Product and manufacturers' names.
 - 5. Description of product.
 - 6. Test procedures and results.
 - 7. Limitations of use.

- U. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- V. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- W. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- X. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

2.2 DELEGATED DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated Design Services Certification: In addition to Shop Drawings, Product Data, and required submittals, submit digitally signed PDF electronic file and three paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.
- C. BIM File Incorporation: Incorporate delegated design drawing and data files into Building Information Model established for Project.
 - 1. Prepare delegated design drawings in the same digital data software program, version, and operating system as the original Drawings.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

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

3.2 ARCHITECT'S ACTION

- A. Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.
- B. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- C. Incomplete submittals are not permitted, will be considered nonresponsive, and will be returned for resubmittal without review.
- D. Submittals not required by the Contract Documents will be returned by the Architect without action.

END OF SECTION 01 33 00

SECTION 01 41 00 - REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Quality Assurance.
- B. References Standards.
- C. Definitions.
- D. Abbreviations.
- E. Format and Specification Context Explanations.
- F. Drawing Symbols.
- G. General Requirements.

1.2 QUALITY ASSURANCE

- A. General:
 - 1. For products or workmanship specified by a standard of an association, trade, or Federal standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable code authorities having jurisdiction.
 - 2. The contractual relationship of the parties to the Purchase Order should not be altered from the Purchase Order Documents by mention or inference otherwise in any reference standard.
 - 3. Obtain copies of standards when required by Purchase Order Documents.
 - 4. Maintain copy of standards at jobsite during submittals, planning, and progress of the specific work for which the standards pertain, until the date of Substantial Completion.
 - 5. In the absence of specific instructions in the specifications, materials, products, equipment and their installation shall conform to the applicable codes, regulations and standards specified therein. When a conflict exists between the applicable code, regulation and standard and that specified, the more stringent code regulation or standard shall prevail, except as authorized by applicable authorities having jurisdiction.
- B. Specifications and Drawings: The Drawings and Specifications are correlative and have equal authority and priority. Base disagreements in themselves or in each other on the most expensive combination of quantity and quality of work indicated. In the event of such disagreement bring it to the attention of the Owner (or Owner's Representative), who will determine the appropriate method to perform the work.
- C. Industry Standards: Where compliance with two (2) or more industry standards or sets of requirements are specified, and overlapping of those different standards or requirements establishes different or conflicting minimums or levels of quality, the most stringent requirement is intended and will be enforced, unless specifically detailed language written into Purchase Order Documents clearly indicates that a less stringent requirement is to be fulfilled. Refer apparently equal-but-different requirements, and uncertainties as to which level of quality is more stringent, to the Owner for a decision before proceeding.
- D. Minimum Quality/Quantity: In every instance, the quality level or quantity shown or specified is intended to be the minimum for the work to be performed or provided. Except as otherwise specifically indicated, the actual work may either comply exactly with the minimum (within specified tolerances),

or may exceed that minimum within reasonable limits. In complying with requirements, indicated numeric values are either minimums or maximums as noted or as appropriate for context of requirements. Refer instances of uncertainty to Owner for decision before proceeding.

- E. Specialists' Assignments: In certain instances, specification text requires (or implies) that specific work is to be assigned to specialists, who are engaged for performance of work. Such assignments shall be recognized as special requirements over which the Contractor has no choice or option. These requirements should not be interpreted so as to conflict with applicable regulations, union jurisdiction settlements and similar conventions. Such assignments are intended to establish which party or entity involved in a specific unit of work is recognized as "expert" for the indicated construction processes or operations. Nevertheless, the final responsibility for fulfillment of the entire set of requirements remains with the Contractor.

1.3 REFERENCE STANDARDS

- A. Dates of codes, regulations and standards specified shall be the latest date of issue of that code, regulation or standard prior to the date of issue of this Project Manual or Document, except as modified or otherwise directed by the applicable codes and their supplements and amendments adopted by the code authorities having jurisdiction.
 - 1. Date of Issue - The "date of issue" as it appears in the statement above, means the date which appears on the cover of the Project Manual or Document corresponding to the date of issue of the Purchase Order Documents.
 - 2. Code Authorities: The "code authorities" as it appears in the statement above, means the authorities responsible for code enforcement.

1.4 DEFINITIONS

- A. General Explanation: Drawings must be recognized as being diagrammatic in nature and not completely descriptive of requirements indicated thereon. Certain terms used in the Purchase Order Documents are defined in the General Conditions, Supplementary Conditions, and in this Section. Definitions and explanations contained in this Section are not necessarily either complete or exclusive, but are general for this Work to the extent that they are not stated more explicitly in another element of the Purchase Order Documents. In the event of a conflict in definitions or explanations within the Purchase Order Documents or whenever there is need of clarification or interpretation of definitions within or between the Purchase Order Documents, notify the Owner immediately and proceed as directed. Except in cases where definitions are determined by code authorities having jurisdiction, the Owner's interpretation of all definitions will take precedence.
- B. General Requirements: The provisions or requirements of Division 1 - Sections apply to entire Scope of Work and, where indicated, to other elements which are included in the Project.
- C. Owner (or Owner's Representative): Wherever the term "Owner (or Owner's Representative)" or any derivative thereof appears in the Purchase Order Documents, it means PBK, 11 Greenway Plaza, 22nd Floor, Houston, Texas 77046, (713) 965-0608, or their authorized representative(s).
- D. Bid, Competitive Sealed Proposal (CSP), Response, Offer, etc.: Wherever the term "Bid", "Competitive Sealed Proposal (CSP)", "Response", "Offer", "Proposal", or any derivative thereof, or similar term appears in the Purchase Order Documents, they mean one and the same, and shall mean Competitive Sealed Proposal, which by definition allows the Owner to accept the "best value" for the school district based on factors other than cost in selecting the Contractor.
- E. Contractor, General Contractor, Construction Manager, etc: Wherever the term "Contractor", "General Contractor", "Construction Manager" or any derivative thereof, or similar term appear in the Purchase Order Documents, they mean one and the same.

- F. Subcontractor, Sub-subcontractor, Bidder, etc.: Wherever the term "Subcontractor", Sub-subcontractor", "Bidder", "Bidder/Vendor", "Vendor", "Installer", "Integrator", "Respondent", "Offeror", or any derivative thereof, or similar term appears in the Purchase Order Documents, they mean one and the same, and shall refer to the entity (person or firm) licensed and meeting all applicable regulations of the State of Michigan and Department of Labor to perform the Work, or their authorized representative(s).
1. Responsibilities: To avoid any misunderstanding or lack of interpretation, the responsibility for performing the Work is totally that of the entity defined above, and the resolutions proposed in his shop drawings and related documentation shall be demonstrated throughout the Work and specified warranty period.
 2. In the event of a controversy involving the Purchase Order Documents or interpretation of Project requirements, the decision of the Owner will take precedence.
- G. Huffman Independent School District, Owner.
- H. Consultants: Wherever the term "Consultant", or any derivative thereof appears in the Purchase Order Documents, it means the following to whom that portion of the work applies.
1. Owner's Consultants:
 - a. Geotechnical Consultant: Terracon
 - b. Surveyors: Gruller Surveying, LLC
- J. Indicated: Wherever the term "indicated", or any derivative thereof appears in the Purchase Order Documents, it means a cross-reference to graphic representations, notes, or schedules on Drawings, to other paragraphs or schedules in the Specifications, and to similar means of recording requirements in the Purchase Order Documents. Where terms such as "shown", "noted", "scheduled", and "specified" are used in lieu of "indicated", it is for the purpose of helping reader locate cross-reference, and no limitation of location is intended except as specifically noted.
- K. Directed, Requested, Etc: Where not otherwise explained, terms such as "directed", "requested", "authorized", "selected", "approved", "required", "accepted", and "permitted" or any derivative thereof appears in the Purchase Order Documents, it means as "directed by the Owner", "requested by the Owner", and similar phrases with actions taken by the Owner. However, no meaning or otherwise shall be interpreted to extend the Owner's responsibility into Contractor's area of construction supervision.
- L. Approve: Wherever the term "Approve", or any derivative thereof appears in the Purchase Order Documents, it means only the Owner, or an individual designated by him as his representative, can approve or disapprove Purchase Order actions. Even if the specifications indicate that an individual other than the Owner, such as the "Engineer" or "Consultant" will approve or disapprove an action, it is understood that only the Owner has this authority unless the individual is so designated by him in writing. Even when an individual is so designated, the Contractor may appeal the action to the Owner and the Owner's decision will be final. In no case will "approval" by the Owner be interpreted as a release of the Contractor from responsibility to fulfill requirements of the Purchase Order Documents.
- M. Furnish: Wherever the term "Furnish", or any derivative thereof appears in the Purchase Order Documents, it means supply or deliver to Project site, ready for unloading, unpacking, assembly, erection, placing, installing, anchoring, applying, curing, finishing, protecting, cleaning and similar operations, as applicable in each instance.
- N. Install: Wherever the term "Install", or any derivative thereof appears in the Purchase Order Documents, it means performing the operations at the Project site, of unloading, unpacking, assembly, erection, placing, installing, anchoring, applying, curing, finishing, protecting, cleaning and similar operations, as applicable in each instance.

- O. Provide: Wherever the term "Provide", or any derivative thereof appears in the Purchase Order Documents, it means furnish and install at the Project site, complete and ready for intended use, as applicable in each instance.
- P. Project, Site: Wherever the term "Project", "Site", or similar such term appears in the Purchase Order Documents, it means the space available to the Contractor for performance of the Work, either exclusively or in conjunction with others performing work as part of the Project. The extent of project or site is shown on the Drawings, and may or may not be identical with description of land upon which Project is to be built.
- Q. Installer: Wherever the term "Installer", or any derivative thereof appears in the Purchase Order Documents, it means the entity (person or firm) engaged by the Contractor or its subcontractor or sub-subcontractor for performance of a particular unit of work at the Project, including installation, erection, application and similar required operations. It is a general requirement that such entities (Installers) be expert in operations they are engaged to perform.
- R. Specialist: Wherever the term "Specialist", or any derivative thereof appears in the Purchase Order Documents, it means an individual or firm of established reputation (or if newly organized, whose personnel have previously established a reputation in the same field), which is regularly engaged in, and which maintains a regular force of workmen skilled in either (as applicable) manufacturing or fabricating items required by the Purchase Order, installing items required by the Purchase Order, or otherwise performing work required by the Purchase Order. Where the Purchase Order Specification requires installation by a specialist, that term shall also be deemed to mean either the manufacturer of the item or firm who will perform the work under the manufacturer's direct supervision.
- S. Testing Laboratory: Wherever the term "Testing Laboratory", or any derivative thereof appears in the Purchase Order Documents, it means an independent entity engaged to perform specific inspections or tests of the work, either at the Project site or elsewhere; and to report and (if required) interpret results of those inspections or tests.

1.5 FORMAT AND SPECIFICATION CONTEXT EXPLANATIONS

- A. Underscoring: Is used strictly to assist reader of specification text in scanning text for key words (for quick recall). No emphasis on or relative importance is intended where underscoring is used.
- B. Capitalization: Except for manufacturer, product, or trademark names, capitalization is used strictly to assist reader of specification text in scanning text for key words (for quick recall). No emphasis on or relative importance is intended where capitalization is used.
- C. Imperative language: Is used generally in specifications. Except as otherwise indicated, requirements expressed imperatively are to be performed by Contractor. For clarity of reading at certain locations, contrasting subjective language is used to describe responsibilities which must be fulfilled indirectly by the Contractor, or when so noted, by others.
- D. Section Numbering: Is used to facilitate cross-reference in Purchase Order Documents. Sections are placed in Project Manual in numeric sequence; however, numbering sequence is not complete, and listing of sections at beginning of Project Manual must be consulted to determine numbers and names of specification sections in Purchase Order Documents.
- E. Page Numbering: Pages are numbered independently for each section. The section number is shown preceded by the project number and followed by the page number at the bottom of each page, to facilitate the location of text. The project number is given to identify the project, for which specification was written, should the section become separated from the Project Manual.

- F. Specifying Methods: The techniques or methods of specifying to record requirements varies throughout text, and may include “prescriptive, “open-generic descriptive”, “compliance with standards”, “performance”, or a combination of these. The method used for specifying one unit of work has no bearing on requirements for another unit of work.
- G. Abbreviations: The language of Specifications and other Purchase Order Documents is of the abbreviated type in certain instances, and implies words and meanings which will be appropriately interpreted. Actual work abbreviations of a self-explanatory nature have been included in texts. Specific abbreviations have been established, principally for lengthy technical terminology and primarily in conjunction with coordination of specification requirements with notations on drawings and in schedules. These are frequently defined in section at first instance of use. Trade association names and titles of general standards are frequently abbreviated. Singular words will be interpreted as plural and plural words will be interpreted as singular where applicable and where full context of the Purchase Order Documents so indicates. A list of typical abbreviations, includes, but is not limited to the following trade associations and organizations. Refer to Drawings and other Purchase Order Documents for other abbreviations.

AA	Aluminum Association
AAMA	Architectural Aluminum Manufacturer's Assn.
AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
ACIL	American Council of Independent Laboratories
AGA	American Gas Association
AGC	Associated General Contractors of America
AHA	American Hardboard Association
AHGA	American Hotdip Galvanizers Association
AI	Asphalt Institute
AIA	American Institute of Architects
AISC	American Institute of Steel Construction
AISI	American Iron & Steel Institute
AITC	American Institute of Timber Construction
ANSI	American National Standards Institute
APA	American Plywood Association
ARI	Air Conditioning & Refrigeration Institute
ASA	Acoustical Society of America
ASA	American Subcontractors Association
ASAHC	American Society of Architectural Hardware Consultants
ASC	Adhesive & Sealant Council, Inc.
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigeration, and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASPE	American Society of Professional Engineers
ASPI	American Wood Preserver's Institute
ASTM	ASTM International
AWI	Architectural Woodwork Institute
AWS	American Welding Society
BIA	Brick Institute of America
BRI	Building Research Institute
CRA	California Redwood Association
CLFMI	Chain Link Fence Manufacturers Institute
CRSI	Concrete Reinforcing Steel Institute
CSI	Construction Specifications Institute
DHI	Door and Hardware Institute
EPA	Environmental Protection Agency
FTI	Facing Tile Institute
FGMA	Flat Glass Marketing Association

GA	Gypsum Association
HPMA	Hardwood Plywood Manufacturers Association
IBC	International Building Code
ICBO	International Conference of Building Officials
ICC	International Code Council
IEEE	Institute of Electrical and Electronic Engineers
JSMA	Joint Sealer Manufacturers Association
MFMA	Maple Flooring Manufacturers Association
ML/SFA	Metal Lath/Steel Framing Association
NAAMM	National Association of Architectural Metal Manufacturers
NAMM	National Association of Mirror Manufacturers
NBLP	National Bureau of Lathing & Plastering
NCPI	National Clay Pipe Institute
NCMA	National Concrete Masonry Association
NEMA	National Electrical Manufacturers Assn.
NESC	National Environmental Systems Contractors
NFPA	National Fire Protection Association
NFPA	National Forest Products Association
NHLA	National Hardwood Lumber Association
NOMMA	National Ornamental Metal Manufacturers Assn
NPVLA	National Paint, Varnish and Lacquer Assn.
NRMCA	National Ready Mixed Concrete Assn.
NRCA	National Roofing Contractors Association
NSPE	National Society of Professional Engineers
NWMA	National Woodwork Manufacturers Assn., Inc.
OSHA	Occupational Safety and Health Administration
PDCA	Painting and Decorating Contractors of America
PI	Perlite Institute, Inc.
PCA	Portland Cement Association
RFCI	Resilient Floor Covering Institute
RVFC	Rubber and Vinyl Floor Council
SBCCI	Southern Building Code Congress International, Inc.
SFPA	Southern Forest Products Association
SHLMA	Southern Hardwood Lumber Manufacturing Assn.
SDI	Steel Deck Institute
SDI	Steel Door Institute
SJI	Steel Joist Institute
SSPC	Steel Structures Painting Council
TCA	Tile Council of America, Inc.
UBC	Uniform Building Code
UL	Underwriter's Laboratories, Inc.
VBI	Venetian Blind Institute
VFI	Vinyl Fabrics Institute
WCLIB	West Coast Lumber Inspection Bureau
WRCLA	Western Red Cedar Lumber Association
WWPA	Western Wood Products Association

1.6 DRAWING SYMBOLS

- A. General: Except as otherwise indicated, graphic symbols used on drawings are those symbols recognized in the construction industry for purposes indicated. Where not otherwise noted, symbols defined by "Architectural Graphic Standards", published by the American Institute of Architects (AIA) and John Wiley & Sons, Inc., latest edition. Refer instances of uncertainty to Owner (or Owner's Representative) for clarification before proceeding.

- B. Mechanical/Electrical Drawings: Graphic symbols used in Mechanical/Electrical Drawings are generally aligned with symbols recommended by American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE). Where appropriate, those symbols are supplemented by more specific symbols as recommended by other recognized technical organizations, including, but not limited to American Society of Mechanical Engineers (ASME), American Society of Professional Engineers (ASPE), Institute of Electrical and Electronic Engineers (IEEE) and similar organizations. Refer instances of uncertainty to Owner (or Owner's Representative) for clarification before proceeding.

1.7 GENERAL REQUIREMENTS

- A. Color, Texture, or Pattern Requirements:
1. When color, texture, or pattern is specified, the item, product, or material shall be furnished in the specified color, texture, or pattern, as applicable.
 2. When more than one (1) approved manufacturer is named in the Specifications, Contractor may select any of the approved manufacturers and submit the full range of colors, textures, and patterns (standard and special) available of that manufacturer for the Owner's review and selection.
 3. When the term "match existing", or any derivative thereof appears in the Purchase Order Documents, it means that the sample must match the Owner's existing work in every respect as to color, texture, and pattern, as applicable.
 4. When the term "match Owner's approved sample", or any derivative thereof appears in the Purchase Order Documents, it means that the Owner (or Owner's Representative) has selected a sample which must be matched in every respect as to color, texture, and pattern, as applicable.
 5. When an item or product is specified of a manufacturer for which only one (1) color, texture, or pattern is available, and a color, texture, or pattern other than that one is specified, Contractor shall bring it to the attention of the Owner (or Owner's Representative) for a decision prior to proceeding with the work. Do not proceed with the work until Owner has approved the color, texture, and pattern, as applicable.
 6. When an item or product is specified of a manufacturer for which no color, texture, or pattern is specified, and colors, textures, and patterns are available, Contractor shall bring it to the attention of the Owner and submit the full range of colors, textures, and patterns (standard and special) available of that manufacturer for the Owner's review and selection. Do not proceed with the work until Owner has selected and approved the color, texture, and pattern, as applicable.
 7. When due to the nature of the item, product, or material, i.e. face brick, tile pavers, natural stone, etc, Contractor shall submit sample or samples which exhibits the full range of characteristics (colors, i.e. lights and darks, as well as textures, and patterns) for which the item, product, or material is available. The Owner will select the color, texture, and pattern, as applicable, from those available and request a sample panel exhibiting the approved characteristics. The approved color range, texture, and pattern, as applicable will then become the standard for which all work on the project will be judged. Owner will be final judge as to having performed work in conformance with approved characteristics.
 8. Under no circumstances are colors, textures, patterns, or any other characteristics for which an item, product, or material are available to be selected by anyone other than the Owner or his authorized representative.
 9. Non-conforming work shall be removed from the site and replaced with new conforming work at no additional expense to Owner.
- C. Plumbing Line Protection:
1. Placing or washing materials, including, but not limited to the following, down any plumbing line or fixture is strictly forbidden.
 - a. Concrete, cement, sludge, mortar, grout, plaster, or any other cementitious material
 - b. Paint, paint thinner, turpentine, kerosene, gasoline, oil, or any other petroleum or hazardous products.

2. Cleaning painting equipment, including brushes in new or existing plumbing fixtures is strictly prohibited.
 3. If requested, Contractor shall certify that all affected plumbing lines and fixtures are clean , free flowing and running. Plumbing lines and fixtures damaged as a result of any of the above shall be repaired or replaced at no expense to Owner. Contractor shall bear responsibility and all costs of fines, penalties, and legal fees attributed to violations as levied by authorities having jurisdiction.
- D. Fasteners:
1. Unless specifically indicated or directed otherwise, all fasteners in work exposed to view, shall be concealed in the finished work.
 2. No fasteners shall show through or telegraph through exposed face of finished work and all finished surfaces shall be free of all evidence of the existence of fasteners.
 3. Fasteners shall be spaced to accurately and rigidly secure work in place.
 4. If not shown or otherwise required or recommended by manufacturer, standard, or code authorities having jurisdiction, fastener spacing shall not exceed 12 inches on center.
 5. Non-conforming work shall be removed from the site and replaced with new conforming work at no additional expense to Owner.
- E. Exposed Metal Work:
1. Unless specifically indicated or directed otherwise, all exposed metal work shall be flat with all surfaces free of distortions, oil canning, waves, dents, scratches, weld marks, and other surface defects detrimental to good appearance or function.
 2. All steel exposed to exterior weather or moisture, either exposed or concealed in work, shall be hot-dip galvanized, phosphate treated for paint retention and shop prime painted.
 3. Non-conforming work shall be removed from the site and replaced with new conforming work at no additional expense to Owner.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION 01 41 00

SECTION 01 45 00 - QUALITY CONTROL

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Quality Assurance: Requirements for material and product quality and control of installation.
- B. Tolerances
- C. References and Standards
- D. Testing Laboratory Services
- E. Inspection Services
- F. Manufacturers' field services

1.2 RELATED SECTIONS

- A. Section 01 45 23 – Testing and Inspecting Services
- B. Section 01 33 00 - Submittal Procedures
- C. The Work of this Section shall be included as a part of all Sections of Work, whether referenced therein or not.

1.3 DESCRIPTION OF REQUIREMENTS

- A. Unless specifically noted otherwise, perform all Work shown, mentioned, or reasonably inferred and comply with all work restrictions.
- B. Many of the requirements specified elsewhere are included herein for reference and convenience. Where a conflict occurs between the Contract Documents, either within themselves or each other, the more stringent requirement or the most expensive combination of materials and workmanship shall prevail.
- C. Contractor shall:
 - 1. perform Work in accordance with the General Conditions, as specified herein, and with the quality control requirements of each Specification Section;
 - 2. perform Work in the highest quality workmanship, unless specified otherwise;
 - 3. join materials with a uniform and accurate fit so they meet with neat straight lines, free of smears, overlaps or irregularities, as applicable to the work;
 - 4. install all exposed materials appropriately level, plumb, and at accurate angles as shown and flush with adjoining materials;
 - 5. attach materials with sufficient strength, and with number and spacing of fasteners and attachments that will not fail until materials joined are broken or permanently deformed;
 - 6. use concealed fasteners, unless shown or directed otherwise.

1.4 QUALITY ASSURANCE AND CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, Products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. Should manufacturer's instructions conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.
- D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Perform Work by persons qualified to produce required and specified quality.
- F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- G. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

1.5 TOLERANCES

- A. Monitor fabrication and installation tolerance control of Products to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.
- C. Adjust Products to appropriate dimensions; position before securing Products in place.

1.6 REFERENCES AND STANDARDS

- 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 Owner-Contractor Agreement except where specific date is established by code.
- C. Obtain copies of standards where required by product specification sections.
- D. When specified reference standards conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.
- E. Neither contractual relationships, duties, responsibilities of parties in Contract nor those of Architect/Engineer shall be altered from Contract Documents by mention or inference otherwise in reference documents.
- F. Refer to Section 01 41 00, Codes, Regulations and Standards, for additional information concerning applicable reference and standards requirements.

1.7 TESTING SERVICES

- A. Owner will appoint, employ, and pay for specified services of an independent firm to perform testing.
- B. The independent firm will perform tests and other services specified in individual specification sections and as required by the Architect/Engineer, Owner, or authority having jurisdiction.
- C. Testing and source quality control may occur on or off the project site. Perform off-site testing as required by the Architect/Engineer or the Owner.
- D. Reports will be submitted by the independent firm to the Owner, Architect/Engineer, and Contractor, indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents.
- E. Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.
 - 1. Notify Architect/Engineer and independent firm 48 hours prior to expected time for operations requiring services, or as specified in individual specification sections.
 - 2. Make arrangements with independent firm and pay for additional samples and tests required.
- F. Testing does not relieve Contractor to perform Work to contract requirements.
- G. Re-testing required because of non-conformance to specified requirements shall be performed by the same independent firm on instructions by the Architect/Engineer. Payment for re-testing will be charged to the Contractor by deducting testing charges from the Contract Sum/Price.
- H. Refer to Section 01 45 23, Inspection and Testing Laboratory Services, for additional information concerning testing, and submittal procedures and requirements for Testing Reports.

1.8 INSPECTION SERVICES

- A. Owner will appoint, employ, and pay for specified services of an independent firm to perform inspection.
- B. The independent firm will perform inspections and other services specified in individual specification sections and as required by the Architect/Engineer, Owner, or authority having jurisdiction.
- C. Inspecting may occur on or off the project site. Perform off-site inspecting as required by the Architect/Engineer or the Owner.
- D. Reports will be submitted by the independent firm to the Owner, Architect/Engineer, and Contractor, indicating inspection observations and indicating compliance or non-compliance with Contract Documents.
- E. Cooperate with independent firm; furnish safe access and assistance by incidental labor as requested.
 - 1. Notify Architect/Engineer and independent firm 48 hours prior to expected time for operations requiring services, or as specified in individual specification sections.
- F. Inspecting does not relieve Contractor to perform Work to contract requirements.
- G. Refer to Section 01 45 23, Inspection and Testing Laboratory Services, for additional information concerning inspections, and submittal procedures and requirements for Inspection Reports.

1.9 MANUFACTURERS' FIELD SERVICES

- A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces

and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as required, and to initiate instructions when necessary.

- B. Submit qualifications of observer to Architect/Engineer within ten (10) days after receipt of Notice to Proceed, in advance of required observations. Observer subject to approval of Architect/Engineer and Owner.
- C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.
- D. Refer to Section 01 33 00, Submittal Procedures, for additional information concerning submittal procedures and requirements for Manufacturers Field Reports.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.
- B. Verify existing substrate is capable of structural support or attachment of new Work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.
- D. Verify utility services are available, of correct characteristics, and in correct locations.

3.2 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 manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying new material or substance in contact or bond.

END OF SECTION 01 45 00

SECTION 01 45 23 - TESTING AND INSPECTING SERVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes: Requirements and qualifications including but not limited to:
 - 1. Professional testing and laboratory services.
 - 2. Accessories necessary for the completion of testing and laboratory services.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specific quality assurance and quality control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality assurance and quality control procedures that facilitate compliance with Contract Document requirements.
 - 3. Requirements for Contractor to provide quality assurance and quality control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions.
 - 4. Specific test and inspection requirements are not specified in this Section.
- C. A qualified independent testing laboratory and/or geotechnical engineering service selected and paid by Owner.
 - 1. The Owner will pay for the initial laboratory services of materials that comply with the requirements of the Contract Documents. The Contractor shall pay for testing and retesting of materials that do not comply with the requirements of the Contract Documents.
- D. Inspecting agency shall perform inspections and tests in accordance with the rules and regulations of the building code, local authorities, Specifications of ASTM, and the Contract Documents.
- E. Materials and workmanship found not in compliance with required standards or performance obligations shall be removed and replaced. Replacement and subsequent testing shall be at Contractor's expense.
- F. Where terms "Inspector" and "Laboratory" are used, it is meant and in reference to an officially designated and accredited inspector of the testing laboratory or geotechnical service engaged by Owner.
- G. Laboratory inspections shall not relieve the Contractor or Fabricator of his responsibility to furnish materials and workmanship in accordance with the Contract Documents.
- H. Contractor or Fabricator shall cooperate with the testing laboratory in matters pertaining to the Work.

- I. Contractor to address deficiency and failed reports.

1.3 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, documented according to ASTM E 329 and ASTM E534; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
 1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
 3. Testing agencies shall be insured against errors and omissions by a professional liability insurance policy having a minimum limit of liability of \$500,000.00.
- B. Inspection and testing services the of testing agency shall be under the direction of a Registered Engineer licensed in the State of Texas, charged with engineering managerial responsibility, and having a minimum of five (5) years engineering experience in inspection and testing of construction materials.
- C. Concrete Inspectors: Inspecting personnel monitoring concrete Work shall be ACI certified inspectors.
- D. Structural Steel: Primary inspectors performing structural steel inspection shall be currently certified AWS Certified Welding Inspectors (CWI), in accordance with the provisions of AWS QCI, *Standard and Guide for Qualification and Certification of Welding Inspectors*.
 1. Inspector may be supported by assistant inspectors who perform specific inspection functions under the direct supervision of the Primary Inspector. Assistant inspectors shall be currently certified AWS Certified Associate Welding Inspectors (CAWI). Work of assistant inspectors shall be monitored daily by the inspector.
- E. Testing Equipment: Equipment shall be calibrated at intervals not exceeding 12 months by devices of accuracy traceable to the National Bureau of Standards.
- F. Referenced Standards: Latest adopted edition of standards referenced apply to the Work. In the event of conflict between the Contract Documents and referenced standards, the Contract Documents shall govern. In case of conflict between Contract Documents and the Building Code, the more stringent shall govern.

1.4 QUALITY CONTROL

- A. Owner Responsibilities: Where quality control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform the services.
 1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
 2. Costs for retesting and reinspecting construction that replaces or is necessitated by Work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality control activities required to verify that the Work complies with requirements, whether specified or not.
 1. Refer to the individual specification sections for specific requirements.

2. Unless otherwise indicated, provide quality control services specified and those required by authorities having jurisdiction. Perform quality control services required of Contractor by authorities having jurisdiction, whether specified or not.
 3. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform the quality control services. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 4. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
 5. Where quality control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality control service.
 6. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 7. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
 8. Associated Responsibilities and Services: Cooperate with agencies performing required tests, inspections, and similar quality control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
 - a. Provide access to the Work.
 - b. Deliver of samples to testing laboratory, without cost to Owner, in adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 - c. Advise laboratory and Architect sufficiently in advance of construction operations to allow laboratory to complete required inspections or tests and to assign personnel for field inspection and testing as specified.
 - d. Provide facilities for storage and curing of concrete test samples on site for the first 24 hours and for subsequent field curing required by ASTM C31.
 - e. Incidental labor, facilities, and equipment necessary to assist laboratory personnel in obtaining and handling samples at the site.
 - f. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 - g. Provide concrete mix designs in accordance with ACI 301 Section 3.9 made by an independent testing laboratory or qualified concrete supplier. Where mix designs by an independent testing laboratory are required, select and pay for laboratory.
 - h. Obtain required inspections or approvals of the building official. Inspection requests and notifications required by building code are responsibility of the Contractor.
 - i. Provide current welder certificates for each welder employed.
 - j. Provide fabrication and erection inspection and testing of welds in accordance with AWS D1.1, Chapter 6.
 - 1) Use prequalification of welding procedures in executing the Work.
 - k. Security and protection for samples and for testing and inspecting equipment at Project site.
 9. Retesting/Reinspecting: Regardless of payment responsibility of the original tests or inspections, provide quality control services, including retesting and reinspecting, for construction that replaced Work failing to comply with the Contract Documents or Code requirements.
- C. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.

3. Conduct and interpret tests and inspections and state in each report whether tested and inspected Work complies with or deviates from requirements.
 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 6. Do not perform any duties of Contractor.
- D. Coordination: Coordinate sequence of activities to accommodate required quality assurance and quality control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.

1.5 AUTHORITY AND DUTIES OF LABORATORY PERSONNEL

- A. A representative of the testing laboratory, who has reviewed and is familiar with the project and specifications, shall participate in preconstruction conferences. The representative shall coordinate material testing and inspection requirements with the Contractor and its subcontractors consistent with the planned construction schedule. The laboratory representative shall attend conferences required or requested to address quality control issues.
- B. Laboratory personnel shall inspect and test materials, assemblies, specimens, and Work performed, including design mixes, methods and techniques and report the progress to the Architect.
- C. If material or Work fails to meet requirements of Contract Documents, laboratory inspector shall notify the Construction Manager, Architect, Engineers, supplier or subcontractor providing or preparing the materials or Work being tested of such failure.
- D. Laboratory personnel shall not perform the Work of the Contractor or act as foremen or superintendents. Work will be inspected as it progresses, but failure to detect defective Work or materials shall not prevent later rejection when a defect is discovered.
- E. Laboratory personnel are not authorized to revoke, alter, relax, enlarge, or release the requirements of the Contract Documents or approve or accept portions of Work, except where approval is specifically specified in the Specifications.
- F. Comply with building code requirements for Special Inspections.

1.6 SUBMITTALS

- A. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality control services required by the Contract Documents. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses.
- B. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
1. Specification Section number and title.
 2. Entity responsible for performing tests and inspections.
 3. Description of test and inspection.
 4. Identification of applicable standards.
 5. Identification of test and inspection methods.
 6. Number of tests and inspections required.
 7. Time schedule or time span for tests and inspections.
 8. Requirements for obtaining samples.
 9. Unique characteristics of each quality control service.

- C. Test and Inspection Reports: Prepare and submit certified written reports specified. Include the following:
 - 1. Date of issue.
 - 2. Project title and number.
 - 3. Name, address, and telephone number of testing agency.
 - 4. Dates and locations of samples and tests or inspections.
 - 5. Names of individuals making tests and inspections.
 - 6. Description of the Work and test and inspection method.
 - 7. Identification of product and Specification Section.
 - 8. Complete test or inspection data.
 - 9. Test and inspection results and an interpretation of test results.
 - 10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
 - 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 - 12. Name and signature of laboratory inspector.
 - 13. Recommendations on retesting and reinspecting.
- D. Submit copies of reports of each inspection and test:
 - 1. Owner, Program or Project Manager, Architect, and each Engineer or outside consultants regarding their particular phase of the project: One copy each.
 - 2. Construction Manager and Contractor: Two copies each.
- E. In addition to furnishing a written report, notify Construction Manager and Contractor verbally of uncorrected conditions or failures to comply with requirements of the Contract Documents, and immediately fax and email corresponding report to the Architect and Engineer.
- F. At completion of each trade or branch of Work requiring inspecting and testing, submit a final certificate attesting to satisfactory completion of Work and full compliance with requirements of Contract Documents.
- G. Submit copies of test results sealed by a Registered Engineer to municipal authorities having jurisdiction, as required.

1.7 TESTING LABORATORY GUIDELINES AND PROCEDURES

- A. Technicians scheduled to perform specific testing services must be qualified to review and perform other services that overlap, i.e. earthwork, foundation inspections, rebar inspection, and concrete when scheduled concurrently at the site.
- B. Technician time for services performed will be reimbursed at a regular time rate. Compensation at the overtime rate will be considered for hours over eight hours spent at the site on a single day, field testing services performed on a Saturday or Sunday, and field services performed on a recognized holiday.
- C. There shall be a three hour minimum for each scheduled testing service. Vehicle charges will be included on a \$25.00 per trip basis.
- D. Cylinder pick up will be controlled by the technician performing test on a scheduled pick up day. If there are no testing services scheduled, the cylinder pick up fee is \$40.00 on week days and \$50.00 on weekends and holidays with no technician or vehicle charge.
- E. The Contractor shall bear the responsibility of scheduling the testing services. The Contractor and the testing laboratory shall assume full responsibility to coordinate the testing services.

Cancellations or failed test shall be reimbursable to the Owner by the responsible party for the cancellations or failure of a test or service.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

- A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:
 - 1. Date test or inspection was conducted.
 - 2. Description of the Work tested or inspected.
 - 3. Date test or inspection results were transmitted to Architect.
 - 4. Identification of testing agency or special inspector conducting test or inspection.
 - 5. Deficiency log.
- B. Maintain log at site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

3.2 TESTING AND INSPECTION SERVICES

- A. Testing services shall include, but not be limited to those specified below or which are necessary or required during course of construction to ascertain specification compliance and which may be deemed necessary by Architect, Engineer, or Owner to ensure the quality of the Work.
- B. The Owner reserves the right to add to or delete any or all inspection and testing specified, excluding testing required by the applicable building codes.
- C. If conflicts arise between Drawings and Specifications, notify Architect immediately. The most stringent requirements shall dictate procedure.

3.3 TESTING OF EARTHWORK

- A. Testing Services (As specified or required):
 - 1. References (As applicable for tests required):
 - a. American Society for Testing and Materials (ASTM)
 - 1) D698, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lb/ft³ (600 kN-m/m³))
 - 2) D2922, Standard Test Method for Density of Soil and Soil-Aggregate In Place By Nuclear Methods (Shallow Depth)
 - 3) D4318, Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
 - b. American Association of State Highway and Transportation Officials (AASHTO)
 - 1) T89, Determining the Liquid Limit of Soils
 - 2) T90, Determining the Plastic Limit and Plasticity Index of Soils
 - 3) T99, Moisture-Density Relations of Soils Using a 2.5 kg (5.5 lb) Rammer and a 305-mm (12-in) Drop
 - 4) T238, Density of Soil and Soil Aggregates In Place By Nuclear Methods (Shallow Depth)
 - 2. Perform sieve analysis to develop grain size distribution curves for materials to be used for subgrade, fill under slab on grade, and backfills.
 - 3. Establish the moisture density relation of soils to be used as fill using the method best suited to the type of fill material.

4. Determine moisture content of all fill materials before placement and advise Contractor when it is or is not suitable to achieve required compaction.
5. Determine Liquid Limit in accordance with ASTM D4318 or AASHTO T89, Plastic Limit in accordance with ASTM D4318, and Plasticity Index in accordance with ASTM D4318 of all fill material,
6. Perform one in place density test for each 4,000 square feet (445 square yards) of existing subgrade material.
7. Perform Moisture-Density curve in accordance with ASTM D698 or AASHTO T99 for one type of fill material. If the original choice of material does not meet the specifications, the Contractor shall pay for additional testing.
8. Perform in place density tests of each lift of compacted fill at locations adequate to evaluate the degree of compaction of all fill areas. Conduct one test for each 4,000 square feet (445 square yards) of each lift of compacted fill.
9. Perform testing at a frequency of one in-place density and moisture test for each 75 lineal feet or less of utility trench, with a minimum of three tests per lift

B. Reports: Submit reports with the following information:

1. Type and condition of soil at footing bottoms.
2. Level of water table in the excavated areas.
3. Grain size distribution of fill materials (average of three tests).
4. Moisture density test results.
5. In place density test results with moisture content and relative density of each layer of compacted fill. Include with in place density test results, a plan showing location of each test.
6. Notify Architect by telephone within one hour of the discovery of the following conditions and follow up telephone notification with written report.
 - a. Materials used, or degree of soil compaction not meeting specified requirements.
 - b. Frost and freeze protection requirements for excavation bottoms not being complied with.
 - c. Water in excavations which is not being removed prior to Work being performed in excavation.

3.4 INSPECTION OF PIPED SITE UTILITIES

A. Laboratory representative shall observe and report on the following:

1. Proper alignment and grade of trenches.
2. Pipe bedding and supports.
3. Pipe, joints, jointing material, and thrust blocks prior to installation of pipe.
4. Installation of pipe and joints.
5. Testing of piped utilities performed by Contractor.

3.5 PAVING

A. Testing Services: Perform field tests for moisture density properties:

1. Provide field testing of the subgrade as specified.
2. Paving Subbase: Provide one field test for every 7,500 square feet of area of crushed limestone or caliche subbase.
3. Lime Treated Subgrade: Provide one field test for every 7,500 square feet of area of lime treated subgrade for content of lime and subgrade compaction.
4. Cement Soil Stabilization: Provide one field test for every 7,500 square feet of area of cement stabilized subgrade for content of cement and subgrade compaction.

3.6 PIER DRILLING OPERATION

- A. A representative of a qualified geotechnical laboratory shall provide services specified.

- B. Laboratory representative shall make continuous inspections to determine that proper bearing stratum is obtained and utilized for bearing and that shafts are properly clean and dry before placing concrete.
- C. Laboratory shall furnish complete pier log showing the diameter, top and bottom elevations of each pier, casing required or not required, actual penetration into bearing stratum, elevation of top of bearing stratum, volume of concrete used, and deviations from specified tolerances.
- D. Laboratory representative shall make continuous inspections of drilled pier construction to check the following:
 - 1. Verify soundness of bearing stratum and desired penetration.
 - 2. Verify pier dimensions and reinforcing used.
 - 3. Monitor condition of hole and removal of water and loose material from bottom.
 - 4. Monitor placement of concrete and use of tremie or pumps.
 - 5. Monitor the extraction of casing, if used.
- E. Request probe holes when deemed necessary to confirm safe bearing capacity.

3.7 CONCRETE REINFORCING STEEL AND EMBEDDED METAL ASSEMBLIES

- A. Inspect concrete reinforcing steel prior to placing concrete for compliance with Contract Documents and approved shop drawings. Noncompliance with Contract Documents and approved shop drawings shall be immediately brought to the attention of the Contractor for correction and, if left uncorrected, reported to the Architect.
- B. Laboratory representative shall observe and report on the following:
 - 1. Number and size of bars.
 - 2. Bending and lengths of bars.
 - 3. Splicing.
 - 4. Clearance to forms, including chair heights.
 - 5. Clearance to sides and bottom of trench if soil formed.
 - 6. Clearance between bars or spacing.
 - 7. Rust, form oil, and other contamination.
 - 8. Grade of steel.
 - 9. Securing, tying, and chairing of bars.
 - 10. Excessive congestion of reinforcing steel.
 - 11. Installation of anchor bolts and placement of concrete around such bolts.
 - 12. Fabrication and installation of embedded metal assemblies, including visual inspection of all welds.
 - 13. Visually inspect studs and deformed bar anchors on embedded assemblies for compliance with Contract Documents. Check number, spacing and weld quality. If, after welding, visual inspection reveals that a sound weld or a full 360 degree fillet has not been obtained for a particular stud or bar, such stud or bar shall be struck with a hammer and bent 15 degrees off perpendicular and then bent back into position. Anchors failing this test shall be replaced.
- C. Provide a qualified, experienced inspector to inspect reinforcing steel. Inspector shall have a minimum of three years experience inspecting reinforcing steel in projects of similar size.

3.8 CONCRETE INSPECTION AND TESTING

- A. Receive and evaluate proposed concrete mix designs submitted by Contractor. If mix designs comply with Drawings and Specifications, the laboratory shall submit a letter to the Architect certifying compliance. Mix designs not complying with Drawings and Specifications shall be

returned by the laboratory as being unacceptable. Check the proposed mixes for proportions, water cement ratio and slump in accordance with ACI 613 and 318.

- B. Comply with ACI 311 *Guide For Concrete Inspection* and ACI *Manual of Concrete Inspection (SP-2)*.
- C. Sample and test concrete placed at the site in accordance with ASTM C172. Each sample shall be obtained from a different batch of concrete on a random basis.
- D. Test concrete:
 - 1. Mold and cure five specimens from each sample.
 - a. For each 50 cubic yards or fraction thereof of structural building concrete; and
 - b. For each 100 cubic yards or fraction thereof of nonstructural concrete and site Work paving and sidewalks.
 - c. Laboratory cure two cylinders in accordance with ASTM C192.
 - d. Field cure remaining cylinders in accordance with ASTM C31.
 - 2. Two specimens shall be tested at seven days for information, two shall be tested at 28 days for acceptance.
- E. Deviations from the requirements of ASTM Specifications shall be recorded in the test report. Test concrete specimens in accordance with ASTM C39.
- F. Specimens for pumped concrete shall be taken at the discharge end of pumping equipment.
- G. Supervise curing and protection provided for test specimens in field, and transportation from the field to laboratory. Test cylinders shall be stored in the field 24 hours and then carefully transported to laboratory and cured in accordance with ASTM C31.
- H. Make one strength test (four cylinders) of each mix design of concrete placed in any one day.
- I. Make one slump test for each set of cylinders following procedural requirements of ASTM C143 and ASTM C172. Make additional slump tests whenever consistency of concrete appears to vary. Slump tests corresponding to samples from which strength tests are made shall be reported with strength test results. Other slump tests need not be reported.
- J. Determine total air content of air entrained normal weight concrete sample for each strength test in accordance with ASTM C231.
- K. Determine air content and unit weight of lightweight concrete sample for each strength test in accordance with ASTM C173 and ASTM C567.
- L. Determine temperature of concrete sample for each strength test.
- M. Inspect each batch of concrete, monitor addition of mixing water to assure uniform consistency from truck to truck. Check mixing form mixers before mix begins to set and within time limits set forth in ASTM C94.
 - 1. Monitor addition of water and high range water reducer to concrete at job site and length of time concrete is allowed to remain in truck during placement.
- N. Testing agency shall furnish and maintain a competent inspector at the mixing plant at the start of each day's mixing. Inspector shall examine concrete materials for compliance with Specifications and approved mix design, weighing and measuring devices, proportioning and mixing of materials, water and cement content of each batch, general operation of the plant, and transportation of concrete to jobsite. Inspector shall verify that amount of free surface moisture

contained in fine and course aggregate has been properly accounted for in the concrete mixing to achieve required consistency and water cement ratio.

- O. Testing laboratory shall monitor addition of water to concrete at the jobsite and the length of time concrete is allowed to remain in the truck before placement. Inspector shall compare mixture with criteria on the approved mix design and report any significant deviation to the Architect, Contractor and concrete supplier. Do not permit addition of water which will exceed maximum water/cement ratio for the mix as given on the approved mix design.
- P. Observe placing of concrete, except nonstructural slabs on grade and site Work. Observe and report on placing method, consolidation, cold joints, length of drop, and displacement of reinforcement. Report deficiencies to Contractor immediately for corrective action. Inspections may be reduced to a periodic basis when all procedures have been deemed satisfactory by the laboratory.
- Q. Test reports shall include but no be limited to the following information: date of concrete placement, concrete mix identification number or proportion of ingredients, truck ticket number, time test was made, time of batching, location of each placement, slump, unit weight, water content (microwave test) and air content of concrete sampled and date and results of strength test.
- R. Report promptly to Architect all details of reasons for rejection of any and all quantities of concrete. Give all information concerning locations of the concrete pours, quantities, date of pours, and other pertinent facts concerning concrete represented by the specimens.
- S. Testing laboratory shall certify each delivery ticket indicating class of concrete delivered (or placed), amount of water added and time at which cement and aggregate were dispensed into the truck, and time at which concrete was discharged from the truck.
- T. Evaluation and Acceptance:
 - 1. If measured slump, or air content of air entrained concrete, falls outside specified limits, a check test shall be made immediately on another portion of the same sample. In the event of a second failure, concrete shall be considered to have failed to meet the requirements of the specifications, and shall not be used in the structure.
 - 2. Strength level of concrete will be considered satisfactory if the averages of sets of three consecutive strength tests results are equal to, or exceed, specified strength and no individual test result (average of two cylinders) is below specified strength by more than 500 psi.
 - 3. Completed concrete Work will be accepted when requirements of ACI 301 Chapter 18 *Specifications for Structural Concrete for Buildings* have been met.
- U. Concrete Test Reports: Reports shall be made and distributed immediately after respective tests or inspections are made.
 - 1. Where reports indicate deviations from Contract Documents, they shall also include a determination of the probable cause of deviation and where applicable, a recommendation for corrective action.
- V. Furnish a statistical analysis for each class of concrete placed on the project in accordance with ACI 214 and ACI 318. Information shall be updated and distributed once a month as directed by the Architect. Information shall include, but not be limited to, the following:
 - 1. Strength tests at 7 days of one cylinder.
 - 2. Strength tests at 28 days of two cylinder averages.
 - 3. 28 day moving average strength tests of last three test groups.
 - 4. Standard deviation and coefficient of variation based on 28 day strength tests.
 - 5. Average strength and number of 28 days tests for most recent month.

- W. Test Footings (Shafts) (Piers) (Caissons): Same diameter and type specified for footings, placed in same manner. Accepted test footings may be used in the Work.
- X. Noncompliant Test Reports: Fax test reports indicating noncompliance immediately to each party on the test report distribution list. Copies shall be on different colored paper.
- Y. Inspect application of curing compound and monitor curing conditions to assure compliance with specification requirements. Report curing deficiencies to the Contractor immediately and submit a written report to the Architect.

3.9 TESTING OF NONSHRINK GROUT

- A. Make one strength test for all plates grouted and for all grout used in joints between members.
- B. Each test shall consist of four cubes, two tested at 7 days and two at 28 days, made and tested in accordance with ASTM C109, with the exception that grout shall be restrained from expansion by a top plate.

3.10 STRUCTURAL STEEL

- A. Inspect structural steel during and after erection for compliance with Contract Documents and shop drawings. Review and report on fabricator's quality control procedures and capabilities.
- B. Field Inspection:
 - 1. Proper erection of pieces.
 - 2. Proper touch up painting of shop primed structural steel exposed to view or in crawl space.
 - 3. Proper installation of bolts.
 - 4. Plumbness of structure and proper bracing.
 - 5. Proper field painting.
 - 6. Initial inspection of welding process and periodically thereafter as necessary.
 - 7. Visual examination of completed welds.
 - 8. Ultrasonic testing of penetration field welds.
 - 9. Installation of field welded shear studs.
 - 10. Inspect shop fabricated members, upon arrival at the site, for defects incurred during transit and handling.
 - 11. Measure and record camber of beams upon arrival and before erection for compliance with specified camber. Measure lying flat with web horizontal. Return members outside specified camber tolerance to shop for correction.
- C. Qualifications of Welders: Fabricator and erector shall provide the testing laboratory with names of welders employed on Work, along with certification that each welder has passed qualification tests within the past 12 months, using procedures covered in AWS D1.1 *Structural Welding Code - Steel*. Verify welder qualifications.
- D. Inspection of field welding shall include:
 - 1. Visually inspect fillet welds for size, soundness, and proper return around ends. Inspect seams, folds, and delaminations.
 - 2. Visually inspect welds for proper repair of painting.
 - 3. Ultrasonically test penetration welds in accordance with ASTM E164.
 - 4. Inspect surfaces to be welded. Note surface preparations, fit up, and cleanliness of surface. Verify electrodes for size, type, and condition.
 - 5. Welding inspector shall be present during alignment and fit up of members being welded, and shall verify for correct surface preparation of root openings, sound weld metal, and proper penetration in the root pass. Where weld has not penetrated completely,

- inspector shall order the joint to be chipped down to sound metal, or gouged out, and rewelded. Thoroughly inspect root passes for cracks. Gouge out cracks and rewelded to 2 inches beyond each end of crack.
6. Inspector shall verify that welds have been marked with welder's symbol and shall mark welds requiring repairs and reinspection. Inspector shall maintain a written record of welds. Work completed and inspected shall receive an identification mark by the inspector. Identify unacceptable material and Work identified by word *reject* or *repair* marked directly on the material.
 7. Testing agency shall advise the Owner and Architect of any shop and/or field conditions which may require further tests and examination by means other than those specified. Additional tests and examinations shall be performed as authorized by the Owner and Architect.
 8. Owner reserves the right to use ultrasonic or radiographic inspection to verify adequacy of welds. Testing procedures and acceptance criteria shall be as specified in AWS D1.1.
 9. Weld quality to comply with the American Institute of Steel Construction (AISC) Manual of Steel Construction.
 10. Determine percentage of weld tested by the number of welds that fail the initial testing.
 11. Reweld and retest welds that fail until the welds pass. Test two additional welds for every weld failure.
- E. Inspect bolted construction in accordance with AISC *Specification for Structural Steel Buildings*:
1. Visually inspect bolts ensuring that plies have been brought into snug contact.
 2. Inspect high strength bolt in accordance with Section 9 of the *Specifications for Structural Joints Using ASTM A325 or A490 Bolts*.
- F. Inspect stud welding in accordance with Section 7.8, of AWS D1.1 *Structural Welding Code*:
1. Weld at least two shear studs at the start of each production period to determine correct generator, control unit, and stud welder setting. The studs shall be capable of being bent 45 degrees from vertical without weld failure.
 2. When the temperature is below 32 degrees F (0 degrees C), test one stud in each 100 after cooling. Do not weld studs at temperatures below 0 degrees F or when surface is wet with rain or snow. If stud fails in the weld, two new studs shall pass the test before resumption of welding.
 3. Visually inspect studs for compliance with the requirements of the Contract Documents. Verify number, spacing, and weld quality. If, after welding, visual inspection reveals that a sound weld or a full 360 degree fillet has not been obtained for a particular stud, that stud shall be struck with a hammer and bent 15 degrees off perpendicular in the direction away from the missing weld. Studs failing test shall be replaced.

3.11 REINFORCING STEEL MECHANICAL SPLICES

- A. Inspection and Observation Services:
1. Visually inspect and report on completed condition of each mechanical splice of reinforcing steel.
 2. Visually inspect each mechanical splice to ensure compliance with the ICC-ES Reports and the manufacturer's published criteria for acceptable completed splices.
 3. Place special emphasis on the inspection of the end preparation of each bar to be spliced required by the ICC-ES Report.
- B. Reports: Submit reports to Architect:
1. Submit copies of manufacturer's published criteria for acceptable completed splices prior to observing mechanical splices.
 2. Reports on each mechanical splice shall indicate location of the splice, size of bars spliced, and acceptability or rejection of splice. Indicate reasons for rejection on each report.

3.12 OPEN WEB JOISTS AND JOIST GIRDERS

- A. Inspect joists at jobsite for compliance with specified fabrication requirements. Verify welded connections between web and chord, splices, and straightness of members.
- B. Inspect installation of joists at jobsite. Check connections to supporting members, chord extensions, number of rows of bridging, and bridging connections for compliance with Contract Documents and referenced standards.
- C. Verify welder qualification certificates for both shop and field welding operators.

3.13 METAL FLOOR DECK

- A. Field inspection shall consist of:
 - 1. Verifying types, gauges and finishes for compliance with Contract Documents and shop drawings.
 - 2. Examine composite floor deck exposed to crawl space for damage to galvanizing due to welding or construction activities. Repair galvanized composite floor deck in accordance with the specifications.
 - 3. Examine the erection of metal deck, fastenings, reinforcing of holes, deck reinforcing, miscellaneous deck supports, hanger tabs, shear studs, deck closures, painting or other coating.
 - 4. Certification of welders.
 - 5. Inspect and test field welded shear studs used to fasten metal floor decking to supporting steel as specified for structural steel.

3.14 METAL ROOF DECK

- A. Field inspection shall consist of:
 - 1. Verify types, gauges and finishes for compliance with Contract Documents and shop drawings.
 - 2. Examine the erection of the metal deck, including fastenings at supports and side laps, reinforcing of holes, and miscellaneous deck supports.
 - 3. Certification of welders.
 - 4. Visual inspection of at least 25 percent of welds.

3.15 SPRAYED FIREPROOFING

- A. Verify applied thickness, density, and bond strength of sprayed fireproofing meets fire rating requirements of approved design.
- B. Verify installation complies with fire rating requirements of approved design.
- C. Inspect and test for thickness:
 - 1. Test 25 percent of structural frame columns and beams in each building level.
 - 2. Test 10 percent of beams other than structural frame in each building level.
 - 3. Test one slab per 5,000 square feet of building area.
- D. Inspect and test in accordance procedures of ASTM E605 and ASTM E736.

3.16 EXPANSION BOLT INSTALLATION

- A. Inspect drilling of each hole and installation of each expansion bolt for compliance with Contract Documents and shop drawings.

- B. Verify installation torque for each expansion bolt for compliance with manufacturer's installation instructions.

3.17 LIGHTWEIGHT INSULATING CONCRETE FILL

- A. Inspection and Observation Services (As required):
 - 1. Inspection of roof deck prior to start of Work.
 - 2. Inspection during installation of insulation and lightweight insulating concrete fill Work to ascertain compliance with Contract Documents.
 - 3. Observation of base ply fastener pull tests performed by Contractor to ascertain minimum withdrawal resistance of 40 pounds per fastener.
- B. Testing Services (As required):
 - 1. References (As applicable for tests required):
 - a. American Society for Testing and Materials (ASTM)
 - 1) C177, Standard Test Method for Steady State Heat Flux Measurements and Thermal Transmission Properties By Means of the Guarded Hot Plate Apparatus
 - 2) C495, Test Method for Compressive Strength of Lightweight Insulating Concrete
 - 3) C578, Specification for Rigid, Cellular Polystyrene Thermal Insulation.
 - 2. Test EPS insulation board for thermal insulation value in accordance with ASTM C177.
 - 3. Test lightweight insulating concrete fill in accordance with ASTM C495 for:
 - a. Mix design compressive strength.
 - b. Mix design wet and dry density range.
 - c. Number of Tests:
 - 1) One per 5,000 square feet.
 - 2) Not less than one for each day's Work.
 - 4. Test EPS insulation board for density in accordance with ASTM C578.

3.18 TESTING OF ROOFING

- A. Inspection and Observation Services (As required):
 - 1. Inspection of roof deck prior to start of Work.
 - 2. Inspect on site condition of stored roofing materials.
 - 3. Inspection during roofing, roof insulation, and sheet metal Work to ascertain compliance with Contract Documents.
 - 4. Observation of roof test cuts performed by Contractor to ascertain that they are properly made.
 - 5. Observation of patching of roof test cuts to ascertain that they are properly made.
- B. Testing Services (As required):
 - 1. Perform dissection and analysis on cuts provided by Contractor to confirm number of plies, bonding of plies, weight of bitumen and softening temperature to ascertain compliance with specifications.

3.19 MASONRY

- A. Inspection and Observation Services:
 - 1. Inspection of placement of reinforcement including condition, grade, size, location, spacing, and lap splices.
 - 2. Review mortar design mixes.
 - 3. Inspection of laying, mortaring, and grouting of concrete masonry units and elements.

- B. Testing Services:
1. References (As applicable for tests required):
 - a. ASTM International (ASTM)
 - 1) C140, Standard Test Methods of Sampling and Testing Concrete Masonry Units
 - 2) C780, Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry
 - 3) C1019, Standard Test Method for Sampling and Testing Grout
 - 4) E447-97, Standard Test Methods for Compressive Strength of Laboratory Constructed Masonry Prisms.
 2. Testing of Concrete Masonry Units (CMU):
 - a. Preconstruction: Perform the following tests in accordance with ASTM C140.
 - 1) Compressive Strength
 - 2) Absorption
 - 3) Weight
 - 4) Moisture Content
 - 5) Dimensions.
 3. Mortar Tests:
 - a. Preconstruction: Perform the following tests in accordance with ASTM C780 on each type of mortar mix used on the Project.
 - b. 28 Day Compressive Strength
 - c. Water Retention
 - d. Construction: Perform 28 day compressive strength test in accordance with ASTM C780 on each type of mortar mix used on the Project at the rate of one test per 2,000 square feet of masonry.
 4. Refer to and include Work for reinforcing steel specified.
 5. Grout Tests:
 - a. Preconstruction: Perform the following tests in accordance with ASTM C1019 on each type of grout mix used on the Project.
 - 1) 28 Day Compressive Strength
 - 2) Construction: Perform 28 day compressive strength test in accordance with ASTM C1019 on each type of grout mix used on the Project at the rate of one (1) test per 2,000 square feet of masonry.
 - 3) Prism Test: Perform preconstruction 28 day compressive strength test on concrete masonry walls in accordance with ASTM E447-97, Method B.

3.20 REPAIR AND PROTECTION

- A. On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
 1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 01 73 30.
- B. Protect construction exposed by or for quality control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality control services.

END OF SECTION 01 45 20

PBK Sports
Project No. P2106300SP

HJISD Hardin-Jefferson High School Track & Field Improvements
Hardin-Jefferson Independent School District

SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED SECTIONS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes: Requirements for temporary utilities, support facilities, and security and protection facilities, including but not limited to:
 1. Water service and distribution.
 2. Sanitary facilities, including toilets, wash facilities, and drinking water facilities.
 3. Heating and cooling facilities.
 4. Ventilation.
 5. Electric power service.
 6. Lighting.
 7. Telephone service.
 8. Waste disposal facilities.
 9. Field office.
 10. Storage and fabrication sheds.
 11. Lifts and hoists.
 12. Construction aids and miscellaneous services and facilities.
 13. Environmental protection.
 14. Pest control.
 15. Enclosure fence.
 16. Security enclosure and lockup.
 17. Barricades, warning signs, and lights.
 18. Temporary partitions.
 19. Fire protection.
 20. Accessories necessary for a complete installation.

1.3 USE CHARGES

- A. Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, occupants of Project, testing agencies, and authorities having jurisdiction.
- B. Water and Sewer Service: Pay sewer service use charges for water used and sewer usage by all entities for construction operations.
- C. Electric Power Service: Pay electric power service use charges for electricity used by all entities for construction operations.

1.4 SUBMITTALS

- A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.
- B. Moisture Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage.

1. Describe delivery, handling, and storage provisions for materials subject to water absorption or water damage.
 2. Indicate procedures for discarding water damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water damaged work.
 3. Indicate sequencing of Work that requires water, such as sprayed fire resistive materials, plastering, and tile grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
- C. Dust and HVAC Control Plan: Submit coordination drawing and narrative that indicates the dust and HVAC control measures proposed for use, proposed locations, and proposed time frame for their operation. Identify further options if proposed measures are later determined to be inadequate. Include the following:
1. HVAC system isolation schematic drawing.
 2. Location of proposed air-filtration system discharge.
 3. Waste handling procedures.
 4. Other dust control measures.

1.5 QUALITY ASSURANCE

- A. Regulatory Requirements:
1. Accessible Temporary Egress: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board ADA-ABA Accessibility Guidelines (ADAAG), ICC/ANSI A117.1, and Texas Accessibility Standards (TAS) 2012.
- B. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- C. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.6 PROJECT CONDITIONS

- A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Provide new materials. Undamaged, previously used materials in serviceable condition may be used if approved by Architect. Provide materials suitable for use intended.
- B. Chain Link Fencing: Minimum 2 inch (50 mm), 0.148 inch (3.8 mm) thick, galvanized steel, chain link fabric fencing; minimum 6 feet (1.8 m) high with galvanized steel pipe posts; minimum 2-3/8 inch (60 mm) OD line posts and 2-7/8 inch (73 mm) OD corner and pull posts.
- C. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10 mils (0.25 mm) minimum thickness, with flame spread rating of 15 or less per ASTM E 84.
- D. Dust Control Adhesive Surface Walk off Mats: Provide mats minimum 36 inches by 60 inches (914 mm by 1624 mm).

- E. Insulation: Unfaced mineral fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame spread and smoke developed indexes of 25 and 50, respectively.
- F. Lumber and Plywood: Comply with requirements in Section 06 10 53.
- G. Gypsum Board: Minimum 1/2 inch (12.7 mm) thick by 48 inches (1219 mm) wide by maximum available lengths; Type X or Type C panels with tapered edges. Comply with Section 09 29 00.
- H. Paint: Comply with requirements in Section 09 90 00.
- I. Tarpaulins: Fire resistive labeled with flame-spread rating of 15 or less.
- J. Water: Potable.

2.2 TEMPORARY FACILITIES

- A. Contractor's Field Offices: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading. Provide elevated, stabilized concrete walkway from parking area to field offices.
- B. Architect's Field Offices: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading. Provide elevated, stabilized concrete walkway from parking area to field offices.
- C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations. Store combustible materials apart from building.

2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. Air Filtration Units: HEPA primary and secondary filter equipped portable units with four stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.
- C. Drinking Water: Containerized, tap dispenser, bottled water drinking water units, including paper cup supply. Where power is accessible, provide electric water coolers to maintain dispensed water temperature at 45 degrees F to 55 degrees F (7.2 degrees C to 12.7 degrees C).
- D. Electrical Outlets: Properly configured, NEMA polarized outlets to prevent insertion of 110V to 120V plugs into higher voltage outlets; equipped with ground-fault circuit interrupters, reset button, and pilot light.
- E. Power Distribution System Circuits: Where permitted and overhead and exposed for surveillance, wiring circuits, not exceeding 125-V ac, 20-A rating, and lighting circuits may be nonmetallic sheathed cable.
- F. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid propane gas or fuel oil heaters with individual space thermostatic control.
 - 1. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.

2. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of **8** at each return air grille in system and remove at end of construction. Clean HVAC system as required in Section 01 77 00 and install new filter with MERV 11 or greater.
- G. Air Filtration Units: Primary and secondary HEPA filter equipped portable units with four stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Locate facilities where they will serve project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
1. Locate facilities to limit site disturbance as specified in Section 01 10 00.
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

- A. Install temporary service. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.
- C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.
- D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
1. Disposable Supplies: Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Maintain adequate supply. Provide covered waste containers for disposal of used material.
 2. Wash Facilities: Install wash facilities supplied with potable water at convenient locations for personnel who handle materials that require wash up. Dispose of drainage properly. Supply cleaning compounds appropriate for each type of material handled. Provide safety showers, eyewash fountains, and similar facilities for convenience, safety, and sanitation of personnel.
- E. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
- F. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.
1. Prior to commencing Work, isolate the HVAC system in area where Work is to be performed according to coordination drawings.
 - a. Disconnect supply and return ductwork in Work area from HVAC systems servicing occupied areas.

- b. Maintain negative air pressure within Work area using HEPA equipped air filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.
 2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust producing equipment. Isolate limited Work within occupied areas using portable dust containment devices.
 3. Perform daily construction cleanup and final cleanup using approved, HEPA filter equipped vacuum equipment.
- G. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
 1. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.
- H. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations. Install electric power service underground unless otherwise indicated.
 1. Electric Distribution: Provide receptacle outlets adequate for connection of power tools and equipment.
 - a. Provide waterproof connectors to connect separate lengths of electrical power cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length voltage ratio.
 - b. Provide warning signs at power outlets other than 110 to 120 V.
 - c. Provide metal conduit, tubing, or metallic cable for wiring exposed to possible damage. Provide rigid steel conduits for wiring exposed on grades, floors, decks, or traffic areas.
 - d. Provide metal conduit enclosures or boxes for wiring devices.
 - e. Provide 4 gang outlets, spaced so 100 foot (30 m) extension cord can reach each area for power hand tools and task lighting. Provide a separate 125-V ac, 20-A circuit for each outlet.
- I. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
 2. Install lighting for Project identification sign.
- J. Telephone Service: Provide temporary telephone service in common use facilities for use by construction personnel. Install one telephone line(s) for each field office.
 1. Provide dedicated telephone line for each facsimile machine in each field office.
 2. At each telephone, post a list of important telephone numbers.
 - a. Police and fire departments.
 - b. Ambulance service.
 - c. Contractor's home office.
 - d. Contractor's emergency after-hours telephone number.
 - e. Architect's office.
 - f. Engineers' offices.
 - g. Owner's office.
 - h. Principal subcontractors' field and home offices.
 3. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.

- K. Electronic Communication Service: Provide a desktop computer and printer/scanner in the primary field office adequate for use by Architect and Owner to access Project electronic documents and maintain electronic communications.
 - 1. Internet Service: Broadband modem, router and ISP, equipped with hardware firewall.
 - 2. Internet Security: Integrated software, providing software firewall, virus, spyware, phishing, and spam protection in a combined application.
 - 3. Backup: External hard drive, minimum 1 terabyte, with automated backup software providing daily backups.

3.3 SUPPORT FACILITIES INSTALLATION

- A. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet (9 m) of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
 - 1. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
- B. Temporary Use of Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.
 - 1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
 - 2. Prepare subgrade and install subbase and base for temporary roads and paved areas according to Section 31 20 00.
 - 3. Recondition base after temporary use, including removing contaminated material, regrading, proof rolling, compacting, and testing.
 - 4. Delay installation of final course of permanent pavement until immediately before Substantial Completion.
- C. Traffic Controls: Comply with requirements of authorities having jurisdiction.
 - 1. Protect existing site improvements to remain including curbs, pavement, and utilities.
 - 2. Maintain access for fire-fighting equipment and access to fire hydrants.
- D. Parking: Provide temporary parking areas for construction personnel.
- E. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
 - 1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
 - 2. Remove snow and ice as required to minimize accumulations.
- F. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
 - 1. Identification Signs: Provide Project identification signs as indicated on Drawings.
 - 2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
 - a. Provide temporary, directional signs for construction personnel and visitors.
 - 3. Maintain and touchup signs so they are legible at all times.
- G. Waste Disposal Facilities: Provide waste collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 017300.

- H. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
 - 1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
- I. Temporary Elevator Use: Use of elevators is not permitted.
- J. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.
- K. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities to the satisfaction of Owner and Architect.
- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
- C. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to requirements of authorities having jurisdiction.
 - 1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree or plant protection zones.
 - 2. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
 - 3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
 - 4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.
- D. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- E. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
- F. Pest Control: Engage pest control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.
- G. Site Enclosure Fence: Before construction operations begin, provide site enclosure fence to prevent people and animals from easily entering site except by entrance gates.
 - 1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.

- H. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each Work day.
- I. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- J. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.
- K. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
 - 1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.
- L. Temporary Partitions: Provide floor to ceiling dustproof partitions to limit dust and dirt migration and to separate occupied areas occupied from fumes and noise.
 - 1. Construct dustproof partitions with gypsum wallboard with joints taped on occupied side, and fire retardant treated plywood on construction operations side.
 - 2. Construct dustproof partitions with two layers of 6 mil (0.14 mm) polyethylene sheet on each side. Cover floor with two layers of 6 mil (0.14 mm) polyethylene sheet, extending sheets 18 inches (460 mm) up the sidewalls. Overlap and tape full length of joints. Cover floor with fire retardant treated plywood. Do not apply tape to finish floor surfaces.
 - a. Construct vestibule and airlock at each entrance through temporary partition with not less than 48 inches (1219 mm) between doors. Maintain water dampened foot mats in vestibule.
 - 3. Where fire resistance rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
 - 4. Insulate partitions to control noise transmission to occupied areas.
 - 5. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
 - 6. Protect air handling equipment.
 - 7. Provide walk off mats at each entrance through temporary partition.
- M. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.
 - 1. Prohibit smoking in construction areas.
 - 2. Supervise welding operations, combustion type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
 - 3. Develop and supervise an overall fire prevention and protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
 - 4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.5 MOISTURE AND MOLD CONTROL

- A. Contractor's Moisture Protection Plan: Avoid trapping water in finished Work. Document visible signs of mold that may appear during construction.
- B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:
 - 1. Protect porous materials from water damage.

2. Protect stored and installed material from flowing or standing water.
 3. Keep porous and organic materials from coming into prolonged contact with concrete.
 4. Remove standing water from decks.
 5. Keep deck openings covered or dammed.
- C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
 2. Keep interior spaces reasonably clean and protected from water damage.
 3. Periodically collect and remove waste containing cellulose or other organic matter.
 4. Discard or replace water-damaged material.
 5. Do not install material that is wet.
 6. Discard, replace, or clean stored or installed material that begins to grow mold.
 7. Perform Work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.
- D. Controlled Condition Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
 2. Use permanent HVAC system to control humidity.
 3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits and moisture control.
 - a. Hygroscopic materials that may support mold growth, including wood and gypsum based products, which become wet during the course of construction and remain wet for 48 hours are considered defective and are to be removed and replaced.
 - b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for 48 hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.
 - c. Remove materials that cannot be completely restored to their manufactured moisture level within 48 hours.

3.6 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24 hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion unless otherwise required and approved by Owner and Architect.
- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.

2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 01 77 00".

END OF SECTION 01 50 00

SECTION 01 57 13 - GENERAL SOURCE CONTROLS

PART 1 - GENERAL

1.1 SCOPE

- A. This Section describes erosion and sedimentation control and other control related practices, which shall be utilized during construction activities.

1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General Conditions, Special Conditions, and Division 1 Specification Sections, apply to this Section.

PART 2 – PRODUCTS

Not Used

PART 3 - EXECUTION

3.1 GENERAL

- A. No clearing and grubbing or rough cutting shall be permitted until erosion and sedimentation control systems are in place.
- B. Equipment and vehicles shall be prohibited by the Contractor from maneuvering on areas outside of dedicated construction area. Damages caused by construction traffic or others to erosion and sedimentation control systems shall be repaired immediately by the Contractor.
- C. The Contractor shall be responsible for collecting, storing, hauling, and disposing of spoils, silt, and waste materials as specified on the Drawings and in this or other Technical Specifications and in compliance with applicable federal, state, and local rules and regulations.
- D. Contractor shall conduct all construction operation under this Contract in conformance with the erosion control practices described on the Drawings, the Storm Water Pollution Prevention Plan and this Section.
- E. The Contractor shall install, maintain, and inspect erosion and sediment control measures and practices as specified on the Drawings and in this and other Technical Specifications.
- F. Contractor shall employ protective measures to avoid damage to existing trees to be retained on the project site.

3.2 TOPSOIL PLACEMENT FOR EROSION AND SEDIMENTATION CONTROL SYSTEMS

- A. When topsoil is called for as a component of another Section, the Contractor shall conduct erosion control practices described in this Section during topsoil placement operation.
- B. When placing topsoil, maintain erosion and sedimentation control systems.
- C. Maintain grades, which have been previously established on areas to receive topsoil.
- D. After the areas to receive topsoil have been brought to grade, and immediately prior to dumping and spreading the topsoil, the subgrade shall be loosened by discing or by scarifying to a depth of at least two (2) inches to permit bonding of the topsoil to the subsoil.

- E. No sod or seed shall be placed on soil, which has been treated with soil sterilants until sufficient time has elapsed to permit dissipation of toxic materials.

3.3 DUST CONTROL

- A. Dust control methods shall be implemented to control dust creation and movement on construction sites and roads and to prevent airborne sediment from reaching receiving stream or storm water conveyance system, to reduce on and offsite damage, to prevent health hazards, and to improve traffic safety.
- B. Contractor shall control dust blowing by utilizing one or more of the following methods:
 1. Mulches bound with chemical binders.
 2. Temporary vegetative cover.
 3. Spray-on adhesives on mineral soils when not used by traffic.
 4. Tillage to roughen surface and bring clods to the surface.
 5. Irrigation by water sprinkling.
 6. Barriers using solid board fences, snow fences, burlap fences, crate walls, bales of hay, or similar materials.
- C. Dust control methods shall be implemented immediately whenever dust can be observed blowing on the project site.

3.4 KEEPING STREETS CLEAN

- A. Contractor shall keep the streets clean of construction debris, dirt, and mud generated by construction vehicles and equipment. If necessary, to keep the streets clean, Contractor shall provide stabilized construction exits at construction, staging, storage, and disposal areas. A vehicle/equipment wash area (stabilized with coarse aggregate) may be installed adjacent to the location of stabilized construction exit, as needed. Wash water shall be released into a drainage swale or inlet protected by erosion and sediment control measures.
- B. In lieu of or in addition to stabilized construction exits, Contractor shall shovel and/or sweep the pavement to the extent necessary to keep the street clean. Water hosing or sweeping of debris and mud off the street into adjacent areas is not allowed.

3.5 EQUIPMENT MAINTENANCE AND REPAIR

- A. Maintenance and repair of construction machinery and equipment shall be confined to areas specifically designated for that purpose. Such designated areas shall be located and designed so that oils, gasoline, grease, solvents, and other potential pollutants cannot be washed into receiving streams or storm water conveyance systems. These areas shall be provided with adequate waste disposal receptacles for liquid as well as solid waste. Maintenance areas shall be inspected and cleaned daily.
- B. On the construction site where designated equipment maintenance areas are not feasible, care shall be taken during each individual repair or maintenance operation to prevent potential pollutants from becoming available to be washed into streams or conveyance systems. Temporary waste disposal receptacles shall be provided.

3.6 WASTE COLLECTION AND DISPOSAL

- A. Contractor shall formulate and implement a plan for the collection and disposal of waste materials on the construction site. The plan must designate locations for trash and waste receptacles and establish a collection schedule. Methods for ultimate disposal of waste shall be specified and carried out in accordance with applicable local, state, and federal health and safety regulations. Special provisions shall be made for the collection and disposal of liquid wastes and toxic or

hazardous materials.

- B. Receptacles and other waste collection areas shall be kept neat and orderly to the extent possible. Waste shall not be allowed to overflow its container or accumulate for excessively long periods of time. Trash collection points shall be located where they will least likely be affected by concentrated storm water runoff.

3.7 WASHING AREAS

- A. Vehicles such as concrete or dump trucks and other construction equipment shall not be washed at locations where the runoff will flow into a watercourse or storm water conveyance system. Special areas shall be designated for washing vehicles. These areas should be located where the wash water will spread out and evaporate or infiltrate directly into the ground, or where the runoff can be collected in a temporary holding or seepage basin. Wash areas shall have gravel or rock bases to minimize mud generation. These areas shall be completely cleaned up, have waste remains hauled off, and be stabilized and seeded after the area is no longer required.

3.8 STORAGE OF CONSTRUCTION MATERIALS, CHEMICALS, ETC.

- A. Sites where chemicals, cements, solvents, paints, or other potential water pollutants are to be stored, shall be isolated in areas where they will not cause runoff pollution.
- B. Toxic chemicals and materials, such as pesticides, paints, and acids shall be stored in accordance with manufacturers' guidelines. Groundwater resources shall be protected from leaching by placing a plastic mat, packed clay or other impervious materials on any areas where toxic liquids are to be opened and stored.

3.9 DEMOLITION AREAS

- A. Demolition work, which generates large amounts of dust, shall be provided with dust control techniques to limit the transport of the airborne pollutants. However, water or slurry used to control dust shall not be allowed to run directly into watercourses or storm water conveyance systems. Methods of ultimate disposal of these materials shall be carried out in accordance with applicable local, state and federal health and safety regulations.

3.10 SANITARY FACILITIES

- A. The construction site must be provided with adequate sanitary facilities for workers in accordance with Division 1 and applicable health regulations.

3.11 PESTICIDES

- A. The use of pesticides shall be approved by the Owner prior to application. A one-week notice will be required of the Contractor.
- B. Pesticides used during construction shall be stored and used in accordance with manufacturers' guidelines and with local, state and federal regulations. Overuse of pesticides, which could generate contaminated runoff, shall be avoided and great care shall be taken to prevent accidental spillage. Pesticide containers shall never be washed in or near flowing streams or storm water conveyance systems.

3.12 PROTECTION OF TREES IN CONSTRUCTION AREAS

- A. Heavy equipment, vehicular traffic, and stockpiles of construction materials, including topsoil, are not permitted within the dripline of any tree to be retained. Contractor shall avoid all contact with trees to be retained unless otherwise directed by the Owner or required by the work under this

Contract.

- B. Specimen trees shown on the Drawings shall be boxed or fenced. When called for in the Drawings, tunnel under the root system for the installation of utility lines.
- C. Tree trunks, exposed roots, and limbs of the trees designated to be retained, which are damaged during construction operations, will be cared for as prescribed by a forester or licensed tree expert at the expense of the Contractor.

3.13 MEASUREMENT AND PAYMENT

- A. No separate measurement or payment will be made for materials and labor performed under this section. Include all costs in the lump sum price, or in the unit price for Storm Water Pollution Prevention Plan.

END OF SECTION 01 57 13

SECTION 01 57 13.13 - FILTER FABRIC FENCE

PART 1 - GENERAL

1.1 SCOPE

- A. This Section describes the installation of erosion and sedimentation control filter fabric fences (FFF) utilized during construction. The filter fabric fences are to be used to contain pollutants from overland flow. This practice shall not be used in channelized flow areas.

1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General Conditions, Special Conditions, and Division 1 Specification Sections, apply to this Section.

1.3 REFERENCE STANDARDS

- A. The publications listed below forms a part of this Specification to the extent referenced. The publications are referred to in the text by basic designation only.
- B. American Society for Testing and Materials (ASTM).
- C. ASTM D-3786 - Standard Test Method for Hydraulic Bursting Strength of Knitted Goods and Nonwoven Fabrics - Diaphragm Bursting Strength Tester Method.
- D. ASTM D-4632 - Standard Test Method for Breaking Load and Elongation of Geotextile (Grab Method).

1.4 SUBMITTALS

- A. Manufacturer's catalogue sheets and other pertinent information on geotextile fabric.

PART 2 - PRODUCTS

2.1 FILTER FABRIC

- A. Provide woven or nonwoven geotextile filter fabric made of either polypropylene, polyethylene, ethylene, or polyamide material. Geotextile fabric shall have a grab strength of 100 psi in any principal direction (ASTM D-4632), Mullen burst strength exceeding 200 psi (ASTM D-3786), and the equivalent opening size between 50 and 140, with the appropriate opening size to be selected based on the grain size characteristics of the disturbed soil. Filter fabric material shall contain ultraviolet ray inhibitors and stabilizers to provide a minimum of six (6) months of expected usable construction life at a temperature range of 0 degrees F to 120 degrees F.
Representative Manufacturers: TenCrate Mirafi or preapproved equivalent.

PART 3 - EXECUTION

3.1 GENERAL

- A. Provide erosion and sedimentation control systems at the locations shown on the Drawings. Such systems shall be of the type indicated and shall be constructed in accordance with the requirements shown on the Drawings and set out in this Section.
- B. No clearing and grubbing or rough cutting shall be permitted until erosion and sedimentation control systems are in place.

- C. Regularly inspect and repair or replace components of all erosion and sedimentation control systems as specified for each type of system. Unless otherwise directed, maintain the erosion and sedimentation control systems until the project area stabilization is accepted by the Owner. Remove erosion and sedimentation control systems promptly when directed by the Owner. Discard removed materials as required by these Specifications.
- D. Remove and dispose sediment deposits at the project designated spoil site. Sediment shall not be allowed to flush into stream or drainage way. If sediment has been contaminated, it shall be disposed of in accordance with existing federal, state and local regulations.
- E. Equipment and vehicles shall be prohibited by the Contractor from maneuvering on areas outside of construction limits. Damages caused by construction traffic to erosion and sedimentation control systems shall be repaired immediately.
- F. Contractor shall employ protective measures described in Section 01 57 19 - General Source Controls to avoid damage to existing trees to be retained on the project site. Conduct all construction operations under this Contract in conformance with the erosion control practices described in that Section.

3.2 CONSTRUCTION METHODS

- A. Provide filter fabric fence systems at locations shown on the Drawings in accordance with the Detail at the end of this Section or on the Drawings, entitled "Filter Fabric Fence". Filter fabric fence systems shall be installed in such a manner that surface runoff will percolate through the system in sheet flow fashion and allow sediment to be retained and accumulated.
- B. Attach the filter fabric to 1-inch by 2-inch wooden stakes spaced a maximum of 3 feet apart and embedded in the ground a minimum of 1 foot. If factory preassembled fence with support netting is used, spacing of the post may be increased to 8 feet maximum. The wooden stakes shall be installed at a slight angle toward the source of anticipated runoff.
- C. Trench in the toe of the filter fabric fence with a spade or mechanical trencher so that the downward face of the trench is flat and perpendicular to the direction of flow or for V-trench configuration as shown on the Detail. Lay filter fabric along the edges of the trench. Backfill and compact trench.
- D. Filter fabric shall have a minimum height of 18 inches and a maximum height of 36 inches above the natural ground.
- E. The filter fabric should be provided in continuous rolls and cut to the length of the Silt Fence to minimize the use of joints. When joints are necessary, the fabric should be spliced together only at a support post with a minimum 6-inch overlap and sealed securely.
- F. Inspect sediment filter fabric fence systems after each rainfall, daily during periods of prolonged rainfall, and at a minimum once a week. Repair or replace damaged section immediately to restore the requirements of this Section. Remove sediment deposits when silt reaches one-third of the height of the fence in depth or 6 inches, whichever is less.

3.3 MEASUREMENT AND PAYMENT

- A. No separate measurement or payment will be made for materials and labor performed under this section. Include all costs in the lump sum price, or in the unit price for Storm Water Pollution Prevention Plan.

END SECTION 01 57 13.13

SECTION 01 57 13.14 - REINFORCED FILTER FABRIC BARRIER

PART 1 - GENERAL

1.1 SCOPE

- A. This Section describes the installation of erosion and sedimentation control of reinforced filter fabric barriers (RFB) which must be utilized during construction. Reinforced filter fabric barrier is to be utilized to retain pollutants from passing downstream in channelized flow areas.

1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General Conditions, Special Conditions, and Division 1 Specification Sections, apply to this Section.

1.3 REFERENCE STANDARDS

- A. The publications listed below forms a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only.
- B. American Society for Testing and Materials (ASTM).
- C. ASTM D-3786 - Standard Test Method for Hydraulic Bursting Strength of Knitted Goods and Nonwoven Fabrics - Diaphragm Bursting Strength Tester Method.
- D. ASTM D-4632 - Standard Test Method for Breaking Load and Elongation of Geotextile (Grab Method).

1.4 SUBMITTALS

- A. Manufacturer's catalogue sheets and other pertinent information on geotextile fabrics.

PART 2 - PRODUCTS

2.1 FILTER FABRIC

- A. Provide woven or nonwoven geotextile filter fabric made of either polypropylene, polyethylene, ethylene, or polyamide material. Geotextile fabric shall have a minimum grab strength of 100 psi in any principal direction (ASTM D-4632), Mullen burst strength exceeding 200 psi (ASTM D-3786), and the equivalent opening size between 50 and 140, with the appropriate opening size to be selected based on the grain size characteristics of upstream disturbed soils. Filter fabric material shall contain ultraviolet inhibitors and stabilizers to provide a minimum of six (6) months of expected usable construction life at a temperature range of 0 degrees F to 120 degrees F. Representative Manufacturers: Mirafi, Inc. or preapproved equivalent.
- B. Provide woven galvanized steel wire fence with minimum thickness of 14 gauge and a maximum mesh spacing of 6 inches.

PART 3 - EXECUTION

3.1 GENERAL

- A. Provide erosion and sedimentation control systems at the locations shown on the Drawings. Such systems shall be of the type indicated and shall be constructed in accordance with the requirements shown on the Drawings and specified in this Section. No clearing and grubbing or rough cutting shall be permitted until erosion and sedimentation control systems are in place.

- B. Regularly inspect and repair or replace components of all erosion and sedimentation control systems as specified for each type of system. Unless otherwise directed, maintain the erosion and sedimentation control systems until the project area stabilization is accepted by the Owner. Remove erosion and sedimentation control systems promptly when directed by the Owner. Discard removed materials as required by these Specifications.
- C. Remove and dispose sediment deposits at the project designated spoil site. Sediment shall not be allowed to flush into stream or drainage way. If sediment has been contaminated, it shall be disposed of in accordance with existing federal, state and local regulations.
- D. Equipment and vehicles shall be prohibited by the Contractor from maneuvering on areas outside of construction limits. Damages caused by construction traffic to erosion and sedimentation control systems shall be repaired immediately. Contractor shall employ protective measures described in Section 01560 - General Source Controls to avoid damage to existing trees to be retained on the project site. Conduct all construction operations under this Contract in conformance with the erosion control practices described in that Section.

3.2 CONSTRUCTION METHODS

- A. Provide reinforced filter fabric barrier systems at locations specified on the Drawings in accordance with the Detail, found at the end of this Section or on the Drawings, entitled "Reinforced Filter Fabric Barrier". Filter fabric barrier systems shall be installed in such a manner that surface runoff will percolate through the system in sheet flow fashion and allow sediment to be retained and accumulated.
- B. Attach the woven wire support to steel fence posts (min. of 1.25 lbs. per linear foot & Brinell Hardness greater the 140) or 1-inch by 2-inch wooden stakes spaced a maximum of 6 feet apart and embedded a minimum of 8 inches. Steel post shall be made of hot rolled steel, at least 4 feet long with Tee or Y-bar sections with the surface painted or galvanized. Provide safety caps on top of metal posts. The posts shall be installed at a slight angle toward the source of the anticipated runoff.
- C. Trench in the toe of the reinforced filter fabric barrier with a spade or mechanical trencher so that the downward face of the trench is flat and perpendicular to the direction of flow as shown on the Detail. Lay filter fabric along the edges of the trench. Backfill and compact trench.
- D. Reinforced filter fabric shall have a minimum height of 18 inches and a maximum height of 36 inches above the natural ground.
- E. The filter fabric should be provided in continuous rolls and cut to the length of the fence to minimize the use of joints. When joints are necessary, the fabric should be spliced together only at a support post with a minimum 6-inch overlap and sealed securely.
- F. Inspect sediment filter barrier systems after each rainfall, daily during periods of prolonged rainfall, and at a minimum once a week. Repair or replace damaged section immediately to restore the requirements of this Section. Remove sediment deposits when silt reaches one-third of the height of the barrier in depth or 6 inches, whichever is less.

3.3 MEASUREMENT AND PAYMENT

- A. No separate measurement or payment will be made for materials and labor performed under this section. Include all costs in the lump sum price, or in the unit price for Storm Water Pollution Prevention Plan.

END OF SECTION 01 57 13.14

SECTION 01 57 13.15 - STABILIZED CONSTRUCTION EXIT

PART 1 - GENERAL

1.1 SCOPE

- A. This Section describes the installation of erosion and sedimentation control for stabilized construction exits utilized during construction and prior to the final development of the site.

1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General Conditions, Special Conditions, and Division 1 Specification Sections, apply to this Section.

1.3 REFERENCE STANDARDS

- A. The publications listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only.
- B. American Society for Testing and Materials (ASTM).
- C. ASTM D 4632 - Standard Test Method for Breaking Load and Elongation of Geotextile (Grab Method).

1.4 SUBMITTALS

- A. Manufacturer's catalog sheets and other pertinent information on geotextile fabric.
- B. Sieve analysis of aggregates conforming to requirements of this Section.

PART 2 - PRODUCTS

2.1 SEPARATION GEOTEXTILE

- A. Provide woven or nonwoven geotextile fabric made of either polypropylene, polyethylene, ethylene, or polyamide material. Geotextile fabric shall have a minimum grab strength of 270 psi in any principal direction (ASTM D-4632) and the equivalent opening size between 50 and 140, with the appropriate opening size to be approved in the review process based on the characteristics of the disturbed material. Both the geotextile and threads shall be resistant to chemical attack, mildew and rot and shall contain ultraviolet ray inhibitors and stabilizers to provide a minimum of six months of expected usable construction life at a temperature range of 0 degrees F to 120 degrees F. Representative Manufacturers: TenCrate Mirafi or preapproved equivalent.

2.2 COARSE AGGREGATES

- A. Coarse aggregates shall consist of crushed stone, gravel, crushed blast furnace slag, or combinations thereof. Aggregate shall be composed of clean, hard, durable materials free from adherent coatings, salt, alkali, dirt, clay, loam, shale, soft or flaky materials, or organic and injurious matter.

- B. Coarse aggregates shall conform to the following gradation requirements.

<u>Sieve Size</u> <u>(Square Mesh)</u>	<u>Percent Retained</u> <u>(By Weight)</u>
2-1/2"	0
2"	0 - 20
1-1/2"	15 - 50
3/4"	60 - 80
No. 4	95 - 100

PART 3 - EXECUTION

3.1 GENERAL

- A. To keep the street clean of mud generated by construction vehicles and equipment, Contractor shall provide stabilized construction exits at the construction site, staging, parking, storage, and/or disposal areas. Such erosion and sediment control system shall be constructed in accordance with the Detail - Stabilized Construction Exit attached hereto or shown on the Drawings, and any additional requirements shown on the Drawings and set out in this Section.
- B. No clearing and grubbing or rough cutting, other than as specifically directed by the Owner to allow soil testing and surveying, shall be permitted until erosion and sedimentation control systems are in place.
- C. Maintain existing erosion and sedimentation control systems located within the project site until acceptance of the project or until directed by the Owner to remove and discard the existing system.
- D. Regularly inspect and repair or replace components of stabilized construction exists. Unless otherwise directed, maintain the erosion and sedimentation control systems until the project is accepted by the Owner. Remove erosion and sedimentation control systems promptly when directed by the Owner. Discard removed materials offsite.
- E. Remove and dispose sediment deposits at the project designated spoil site. If a project spoil site is not designated on the Drawings, dispose of sediment offsite at location not in or adjacent to stream or floodplain. Off-site disposal will be the responsibility of the Contractor. Sediment to be placed at the project site should be spread evenly throughout the site, compacted and stabilized. Sediment shall not be allowed to flush into stream or drainage way. If sediment has been contaminated, it shall be disposed of in accordance with existing federal, state and local rules and regulations.
- F. Equipment and vehicles of the Contractor, or on-site for his use, shall be prohibited from maneuvering on areas outside of the construction limits. Damages caused by construction traffic to erosion and sedimentation control systems shall be repaired immediately.
- G. Conduct all construction operations under this Contract in conformance with the erosion control practices described in the Section 01 57 13 - General Source Controls.

3.2 CONSTRUCTION METHODS

- A. Provide stabilized exits, entrances, access roads, parking areas, and other on-site vehicle transportation routes where shown on the Drawings.

- B. Vehicles leaving construction areas shall have their tires cleaned to remove sediment prior to entrance onto area roadways. When washing is needed to remove sediment, Contractor shall construct a truck washing area. Truck washing shall be done on stabilized areas, which drain into a drainage system protected by erosion and sediment control measures.
- C. Details for stabilized construction exit are shown on the Detail herein or as shown on the Drawings. Construction of other stabilized areas shall be to the same requirements. Roadway width shall be at least 30 feet and shall be sufficient for all ingress and egress to the site. Furnish and place geotextile fabric as a permeable separator to prevent mixing of coarse aggregate with underlying soil. Exposure of geotextile fabric to the elements between laydown and cover shall be a maximum of fourteen days to minimize damage potential.
- D. Roads and parking areas shall be graded to provide sufficient drainage away from stabilized areas. Use sandbags, gravel, boards, or similar methods to prevent sediment from entering area roadways, receiving stream or storm water conveyance system.
- E. The stabilized areas shall be inspected and maintained daily. Provide periodic top dressing with additional coarse aggregates to maintain the required depth. Repair and clean out damaged measures used to trap sediment. All sediment spilled, dropped, washed, or tracked onto area roadways shall be remove immediately.
- F. The length of the stabilized area shall be as shown on the Detail or as shown on the Drawings, but not less than 50 feet in length. The thickness shall not be less than 8 inches. The width shall not be less than full width of all points of ingress or egress.
- G. Stabilization for other areas shall have the same thickness, and width requirements as the stabilized construction exit, except where specified otherwise on the Drawings. The aggregate shall be a compacted limestone base material, 8 inches in thickness, with an application of emulsified asphalt. The emulsified asphalt material shall be reapplied periodically following any regrading of the limestone surface.
- H. Stabilized area may be widened or lengthened to accommodate truck-washing area as required by the Contractor and approved by the Owner.
- I. Alternative methods of construction, when preapproved by the Owner, may include the following.
 - 1. Cement Stabilized Soil - Compacted cement stabilized soil or other fill material in an application thickness of at least 8 inches.
 - 2. Wood Mats/Mud Mats - Oak or other hardwood timbers placed edge to edge and across support wooden beams which are placed on top of existing soil in an application thickness of at least 6 inches.
 - 3. Steel Mats - Perforated mats placed across perpendicular support members.

3.3 MEASUREMENT AND PAYMENT

- A. No separate measurement or payment will be made for materials and labor performed under this Section. Include all costs in the lump sum price, or in the unit price for Storm Water Pollution Prevention Plan.

END OF SECTION 01 57 13.15

SECTION 01 57 26 - TEXAS POLLUTION DISCHARGE ELIMINATION SYSTEM (TPDES)

PART 1 - GENERAL

1.1 SCOPE

- A. This project is subject to the Texas Commission on Environmental Quality (TCEQ) Texas Pollution Discharge Elimination System (TPDES) Construction Storm Water Discharge Regulations and Requirements. The Contractor will be required to execute a Notice of Intent (NOI) and implement the Pollution Prevention Plan included in the Contract Documents and comply with all reporting and inspection requirements set forth in the TPDES regulations.

1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General Conditions, Supplementary Conditions, and relevant Division 2 Specification Sections, apply to this Section.

1.3 SUMMARY

- A. The Contractor shall be responsible for the preparation, implementation, maintenance, and inspection of storm water pollution prevention control measures including, but not limited to, erosion and sediment controls, storm water management plans, waste collection and disposal, off-site vehicle tracking and other practices described in the Storm Water Pollution Prevention Plan (SWPPP) Drawing, and as specified elsewhere in this or other Technical Specifications.
- B. Contractor shall present his plan for implementation of the SWPPP in a meeting with the Owner/Architect/Engineer prior to start of construction.

1.4 MEASUREMENT AND PAYMENT

- A. No separate measurement or payment will be made for materials and labor performed under this section. Include all costs in the lump sum price.

PART 2 - PRODUCTS

2.1 COMPONENTS

- A. The components shall consist of the control measures necessary to comply with the NPDES and The Clean Water Act. Example erosion and sediment control measure components are found on the Storm Water Pollution Prevention Plan Drawing, and this or other Technical Specifications.

PART 3 - EXECUTION

3.1 NOTICE OF INTENT / CERTIFICATION REQUIREMENTS

- A. The Contractor shall execute, along with the Contract Documents, a Contractor/Subcontractor Certification, which shall identify the responsibilities for construction activity during the contract. Each Subcontractor's responsibility with regard to the SWPPP shall be identified.
- B. The Contractor shall be responsible for signing the certification statement of the NOI.
- C. A copy of the NOI shall be posted in a prominent place for public viewing at the project site. The Contractor shall be responsible for execution of all documents and providing all inspections and certifications outlined in the SWPPP as necessary for compliance with federal, state and local guidelines.

- D. The executed Notice of Intent shall be sent to:

BY REGULAR U.S. MAIL

Texas Commission on Environmental Quality
Storm Water & General Permits Team; MC-228
P.O. Box 13087
Austin, Texas 78711-3087

3.2 RETENTION OF RECORDS

- A. The Contractor shall retain a copy of the SWPPP from the date that it became effective to the date of project completion.
- B. Contractor shall retain copies of all inspection and maintenance reports, as well as copies of all modifications and adjustments to the SWPPP until the date of project completion.
- C. Contractor shall return to the Owner, all records stated above at the completion of the project. Owner will retain all SWPPP records and data for a period of three (3) years from the date project completion.

3.3 REQUIREMENTS

- A. The following notices are to be posted from the date that the SWPPP goes into effect until the date of final stabilization:
1. Copies of the Notice of Intent, submitted by the Owner and General Contractor, along with the Project Description Form of the SWPPP, are to be posted at the construction site or at the Contractor's office in a prominent place for public viewing.
 2. Notice to drivers of equipment/vehicles to stop, check, and clean tires for debris and mud before equipment/vehicles can enter traffic lanes are to be posted at every stabilized construction exit area.
 3. Notice of waste disposal procedures are to be posted at a location onsite.
 4. Notice of hazardous material handling and emergency procedures are to be posted with the NOI on site. Copies of Material Safety Data sheets are to be kept at a location onsite that is clearly made known to all personnel.
 5. A copy of the signed Certification forms included in this Section shall be kept at the construction site or at the Contractor's office.
- B. Construction may not begin until 60 days after the NOI is filed.
- C. Construction sites that will disturb 10 acres or more shall meet current numeric discharge limit requirements.
- D. If earth disturbance will be stopped for 14 days or more, the contractor must immediately stabilize the area using straw or hydraulic mulch, soil binders, erosion control blankets, or hydroseeding.

3.4 NOTICE OF TERMINATION

- A. A Notice of Termination (NOT) of Coverage under the TPDES General Permit for Storm Water Discharges Associated with Industrial Activity and storm water run-off from the construction activities does not cause sediment transport or erosion from the site. The A/E and inspector will make final determination of the final stabilization. Final stabilization is when all soil-disturbing activities at the site have been completed and when a uniform perennial vegetative cover with a density of 85% of the cover for unpaved areas has been established. The Contractor will be required to maintain structural controls until this vegetative cover meets the above requirement.

3.5 ATTACHMENTS

For the current forms, visit the TCEQ's website at:

<https://www.tceq.texas.gov/assistance/water/stormwater/sw-construction.html#tpdes>.

END OF SECTION 01 57 13.15

SECTION 01 73 29 - CUTTING AND PATCHING

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 - GENERAL

1.1 DESCRIPTION OF REQUIREMENTS

- A. Definition: "Cutting and Patching" includes cutting into existing construction to provide for the installation or performance of other work and subsequent fitting and patching required to restore surfaces to their original undamaged condition, including original fire rating of fire rated construction.
 - 1. Cutting and patching is performed for coordination of the work for access or inspection, to obtain samples for testing, as indicated or required, to remove/replace defective work or work not conforming to the contract documents, to permit alterations to be performed, or for other similar purposes.
 - 2. Cutting and patching performed during the manufacture of products or during the initial fabrication, erection, or installation processes is not considered to be "cutting and patching" under this definition. Drilling of holes to install fasteners and similar operations are also not considered to be "cutting and patching".
- B. Refer to other Sections of these Specifications for specific cutting and patching requirements and limitations applicable to individual units of work.
 - 1. Unless otherwise specified, requirements of this Section also apply to mechanical and electrical work.

1.2 QUALITY ASSURANCE

- A. Visual requirements - Do not cut and patch work exposed on the building's exterior or in its occupied spaces, in a manner that would, in the Architect's opinion, result in lessening the building's aesthetic qualities. Do not cut and patch work in a manner that would result in substantial visual evidence of cut and patchwork. Remove and repair or replace work judged by the Architect to be cut and patched in a visually unsatisfactory manner

1.3 RELATED WORK

- A. All Sections of Work requiring cutting and patching, including electrical requirements.

1.4 SUBMITTALS

- A. Procedural Proposal for Cutting and Patching - Where prior approval of cutting and patching is required, submit proposed procedures for this work well in advance of the time work will be performed and request approval to proceed. Include the following information, as applicable, in the submittal.
 - 1. Describe nature of the work and how it is to be performed, indicating why cutting and patching cannot be avoided. Describe anticipated results of the work in terms of changes to existing work, including structural, operational, and visual changes as well as other significant elements.
 - 2. List products to be used and firms including their qualifications that will perform the work. Also, provide cost proposals when applicable.
 - 3. Give dates when work is expected to be performed.
 - 4. List utilities that will be disturbed or otherwise be affected by work, including those that will be relocated and those that will be disconnected or out-of service temporarily. Indicate how long utility service will be disrupted.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General - Except as otherwise indicated or as directed by Architect, use materials for cutting and patching that are identical to materials being cut and patched. If identical materials are not available, or cannot be used, use materials that match existing adjacent surfaces to the fullest extent possible with regard to visual effect. Use materials for cutting and patching that will result in equal or better performance characteristics.
 - 1. The use of trade name and supplier's name and address is to indicate a possible source of the material or product. Product of the same type from other sources shall not be excluded provided they possess like physical and functional characteristics, except where specified as no substitutions allowed or where a material or product is specified as the basis of specification and no other approved manufacturers are listed.
 - 2. Use materials, products, and devices to maintain integrity of fire rating of existing fire rated construction which comply with the requirements of authorities having jurisdiction.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Before starting work, examine the surfaces to be cut and patched and the conditions under which the work is to be performed. If unsafe or otherwise unsatisfactory conditions are encountered, take corrective action before proceeding with the work.
 - 1. Before the start of cutting work, meet at the work site with all parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict between the various trades. Coordinate layout of the work and resolve potential conflicts before proceeding with the work.
 - 2. After uncovering work, examine conditions affecting installation of product or performance of work.
 - 3. Report unsatisfactory or questionable conditions to Architect in writing; do not proceed with work until Architect has provided further instructions.

3.2 PREPARATION

- A. Provide temporary support to prevent failure of the work to be cut.
- B. Protect other work during cutting and patching to prevent damage. Provide protection from adverse weather conditions of that part of the Project that may be exposed during cutting and patching operations.
- C. Take precautions not to cut existing pipe, conduit, ducts, or wires serving the building, but scheduled to be removed or relocated until provisions have been made to bypass them.

3.3 PERFORMANCE

- A. General - Employ only skilled workmen to perform the cutting and patching work. Except as otherwise indicated or as approved by Architect, proceed with cutting and patching at the earliest feasible time and complete the work without delay.
- B. Cut the work using methods that are least likely to damage work to be retained or adjoining work. Where possible, review proposed cutting and patching procedures with the original installer and comply with original installer's recommendations.
 - 1. In general, where cutting is required, use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut through concrete and masonry using a cutting machine such as a Carborundum saw or core drill to insure a neat hole. Cut holes

- and slots neatly to size required with minimum disturbance of adjacent work. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces. Temporarily cover openings when not in use.
2. Comply with requirements of other applicable sections where cutting and patching requires excavating and backfilling.
 3. By-pass utility services such as pipe and conduit, before cutting, where such utility services are shown or required to be removed, relocated, or abandoned. Cut-off conduit and pipe in walls or partitions to be removed. After by-passing and cutting, cap, valve, or plug and seal tight remaining portion of conduit and pipe to prevent entrance of moisture, vermin, or other foreign matter.
- C. Patching - Patch with seams which are durable and as invisible as possible. Comply with specified tolerance, if any, for the work.
1. Where feasible, inspect and test patched areas to demonstrate integrity of work.
 2. Restore exposed finishes of patched areas and where necessary extend finish restoration into retained adjoining work in a manner which will eliminate evidence of patching and refinishing.
 3. Where removal of walls or partitions extends one finished area into another finished area, patch and repair floor, wall, and ceiling surfaces in the new space to provide an even surface of uniform color and appearance. If necessary, to achieve uniform color and appearance, remove existing floor and wall coverings or materials, and ceiling finish materials and replace with new materials.
 - a. Where patch occurs in a smooth painted surface, extend final paint coat over entire unbroken surface containing patch, after patched area has received prime and base coats.
 4. Patch, repair, or re-hang existing ceilings as necessary to provide an even plane surface of uniform appearance.
 5. Fit work airtight to pipes, sleeves, ducts, conduit and other penetrations through non-fire-rated floors and walls, and through finished surfaces.
- D. Fire Rated Construction - Where cutting and patching is necessary in existing fire rated construction, use sealant and other fire resistive materials, products, and devices as required and acceptable by the authorities having jurisdiction to repair, patch, and otherwise restore original fire rating and integrity of construction.

3.4 CLEANING

- A. Thoroughly clean area and spaces where work is performed or used as access to work. Remove completely: paint, mortar, cement, oils, putty, sealant, and items of similar nature. Thoroughly clean piping, conduit, and similar features before painting or other finishes are applied. Restore damaged pipe covering to its original undamaged condition.

END OF SECTION 01 73 29

SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Salvaging nonhazardous demolition and construction waste.
 - 2. Recycling nonhazardous demolition and construction waste.
 - 3. Disposing of nonhazardous demolition and construction waste.

- B. Related Sections include the following:
 - 1. Division 01 Section "Temporary Facilities and Controls" for environmental-protection measures during construction.
 - 2. Division 02 Section "Structure Demolition" for disposition of waste resulting from demolition of buildings, structures, and site improvements.
 - 3. Division 02 Section "Selective Structure Demolition" for disposition of waste resulting from partial demolition of buildings, structures, and site improvements.
 - 4. Division 04 Section "Unit Masonry" for disposal requirements for masonry waste.
Division 04 Section "Unit Masonry" for disposal requirements for excess stone and stone waste.
 - 5. Division 31 Section "Site Clearing" for disposition of waste resulting from site clearing and removal of above- and below-grade improvements.

1.2 DEFINITIONS

- A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

- B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.

- C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

- D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

- E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

- F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.3 PERFORMANCE REQUIREMENTS

- A. Salvage/Recycle Requirements: Owner's goal is to salvage and recycle as much nonhazardous demolition and construction waste as possible including the following materials:
 - 1. Demolition Waste:
 - a. Asphaltic concrete paving.
 - b. Concrete.
 - c. Concrete reinforcing steel.

- d. Brick.
 - e. Concrete masonry units.
 - f. Wood studs.
 - g. Wood joists.
 - h. Plywood and oriented strand board.
 - i. Wood paneling.
 - j. Wood trim.
 - k. Structural and miscellaneous steel.
 - l. Rough hardware.
 - m. Roofing.
 - n. Insulation.
 - o. Doors and frames.
 - p. Door hardware.
 - q. Windows.
 - r. Glazing.
 - s. Metal studs.
 - t. Gypsum board.
 - u. Acoustical tile and panels.
 - v. Carpet.
 - w. Carpet pad.
 - x. Demountable partitions.
 - y. Equipment.
 - z. Cabinets.
 - aa. Plumbing fixtures.
 - bb. Piping.
 - cc. Supports and hangers.
 - dd. Valves.
 - ee. Sprinklers.
 - ff. Mechanical equipment.
 - gg. Refrigerants.
 - hh. Electrical conduit.
 - ii. Copper wiring.
 - jj. Lighting fixtures.
 - kk. Lamps.
 - ll. Ballasts.
 - mm. Electrical devices.
 - nn. Switchgear and panelboards.
 - oo. Transformers.
2. Construction Waste:
- a. Site-clearing waste.
 - b. Masonry and CMU.
 - c. Lumber.
 - d. Wood sheet materials.
 - e. Wood trim.
 - f. Metals.
 - g. Roofing.
 - h. Insulation.
 - i. Carpet and pad.
 - j. Gypsum board.
 - k. Piping.
 - l. Electrical conduit.
3. Packaging: Regardless of salvage/recycle goal indicated above, salvage or recycle 100 percent of the following uncontaminated packaging materials:
- a. Paper.
 - b. Cardboard.
 - c. Boxes.

- d. Plastic sheet and film.
- e. Polystyrene packaging.
- f. Wood crates.
- g. Plastic pails.

1.4 SUBMITTALS

- A. Waste Management Plan: Submit 3 copies of plan within 7 days of date established for commencement of the Work.
- B. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit three copies of report. Include the following information:
 - 1. Material category.
 - 2. Generation point of waste.
 - 3. Total quantity of waste in tons.
 - 4. Quantity of waste salvaged, both estimated and actual in tons.
 - 5. Quantity of waste recycled, both estimated and actual in tons.
 - 6. Total quantity of waste recovered (salvaged plus recycled) in tons.
 - 7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.
- C. Waste Reduction Calculations: Before request for Substantial Completion, submit three copies of calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.
- D. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.
- E. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
- F. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- G. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts and invoices.
- H. Qualification Data: For Waste Management Coordinator.
- I. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.5 QUALITY ASSURANCE

- A. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.
- B. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

- C. Waste Management Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project management and Coordination." Review methods and procedures related to waste management including but not limited to the following:
1. Delete subparagraphs below if not required. If retaining, insert additional requirements to suit Project.
 2. Review and discuss waste management plan including responsibilities of Waste Management Coordinator.
 3. Review requirements for documenting quantities of each type of waste and its disposition.
 4. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
 5. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
 6. Review waste management requirements for each trade.

1.6 WASTE MANAGEMENT PLAN

- A. General: Develop plan consisting of waste identification, waste reduction work plan, and cost/revenue analysis. Indicate quantities by weight or volume but use same units of measure throughout waste management plan.
- B. Waste Identification: Indicate anticipated types and quantities of site-clearing and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.
- C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
 2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
 3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
 4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
 5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
 6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.
- D. Cost/Revenue Analysis: Indicate total cost of waste disposal as if there was no waste management plan and net additional cost or net savings resulting from implementing waste management plan. Include the following:
1. Total quantity of waste.
 2. Estimated cost of disposal (cost per unit). Include hauling and tipping fees and cost of collection containers for each type of waste.
 3. Total cost of disposal (with no waste management).

4. Revenue from salvaged materials.
 5. Revenue from recycled materials.
 6. Savings in hauling and tipping fees by donating materials.
 7. Savings in hauling and tipping fees that are avoided.
 8. Handling and transportation costs. Include cost of collection containers for each type of waste.
 9. Net additional cost or net savings from waste management plan.
- E. Forms: Prepare waste management plan on forms included at end of Part 3.

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

3.1 PLAN IMPLEMENTATION

- A. General: Implement waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
1. Comply with Division 01 Section “Temporary Facilities and Controls” for operation, termination, and removal requirements.
- B. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.
- C. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
 2. Comply with Division 01 Section “Temporary Facilities and Controls” for controlling dust and dirt, environmental protection, and noise control.

3.2 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

- A. General: Recycle paper and beverage containers used by on-site workers.
- B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Contractor.
- C. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical.
1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
 - a. Inspect containers and bins for contamination and remove contaminated materials if found.
 2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
 4. Store components off the ground and protect from the weather.

5. Remove recyclable waste off Owner's property and transport to recycling receiver or processor.

3.3 RECYCLING CONSTRUCTION WASTE

- A. Packaging:
 1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
 2. Polystyrene Packaging: Separate and bag materials.
 3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
 4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.
- B. Site-Clearing Wastes: Chip brush, branches, and trees at landfill facility.
- C. Wood Materials:
 1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
 2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.
- D. Gypsum Board: Stack large clean pieces on wood pallets and store in a dry location.
 1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.

3.4 DISPOSAL OF WASTE

- A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
 1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning: Do not burn waste materials.
- C. Disposal: Transport waste materials off Owner's property and legally dispose of them.

END OF SECTION

SECTION 01 77 00 - CLOSEOUT PROCEDURES

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 - GENERAL

1.1 PRE-CLOSEOUT MEETING

- A. Pre-Closeout Meeting: Schedule and convene Pre-Closeout Meeting with Owner and Architect in accordance with Section 01 31 19, Project Meetings.

1.2 SUBSTANTIAL COMPLETION

- A. The items listed in Document CB, Supplementary Conditions, Paragraph 9.8 and the following items shall be completed before Substantial Completion will be granted:
 - 1. Contractor's Completion List (Punch List): Submit a thorough list of items to be completed or corrected, along with a written request for Substantial Completion and for review of the Work or portion of the Work. The Architect/Engineer's Project Representative, at their discretion, may attend and assist in the preparation of the Contractor's Punch List.
 - 2. Architect's Supplemental Punch List: The Architect/Engineer, along with the Owner at the Owner's discretion, will inspect the Work utilizing the Contractor's prepared Punch List, noting completed items and incomplete items, and will prepare a supplemental list of items that have been omitted or incomplete items that were not previously noted.
 - 3. Operations and Maintenance Manuals: Submit as described in paragraph 1.3.
 - 4. Final Cleaning: Provide final cleaning and adequate protection of installed construction as described in paragraph 1.6 and 1.7.
 - 5. Starting of systems: Start up equipment and systems as described in paragraph 1.8.
 - 6. Testing and balancing: Testing and balancing of systems must be performed and completed by Owner's forces, and the report submitted and accepted by Architect/Engineer and Owner, as described in the Contract Documents. Make adjustments to equipment as required to achieve acceptance.
 - 7. Demonstrations: If required by individual specification sections or by Owner, provide demonstrations and instructions for use of equipment as described in paragraph 1.9.
- B. Date of Substantial Completion: Complete or correct items identified on Punch List and confirm that all items have been corrected prior to Architects re-inspection. Architect/Engineer, along with the Owner, will re-inspect the corrected work to establish the Date of Substantial Completion. Incomplete items remaining will be appended to the Certificate of Substantial Completion (AIA G704). The Date of Substantial Completion represents day one (1) of the closeout period, and represents the date of commencement of the Contractors correctional period and all warranty periods as described and required by the Contract Documents, except as amended in the Certificate of Substantial Completion and elsewhere in the Contract Documents.
- C. Certificate of Substantial Completion: When the Work or designated portion thereof is substantially complete, Architect will prepare the Certificate of Substantial Completion to be executed by the Owner and Contractor. Items on the appended Punch List shall be completed or corrected within the time limits established in the Certificate.

1.3 OPERATIONS AND MAINTENANCE MANUAL

- A. As a requirement for Substantial Completion, the final Operation and Maintenance Manual shall be submitted to, and reviewed and accepted by the Architect prior to issuance of the Certificate.

- B. Prepare 3-ring D-slant binder cover and spline with printed title "OPERATIONS AND MAINTENANCE MANUAL", title of project, and subject matter of binder when multiple binders are required.
- C. Submit one (1) copy of preliminary Operations and Maintenance Manuals to respective consultants (Civil, MEP, Structural, etc.) for review of conformance with contract requirements prior to submitting final to Architect. Allow time for proper review.
- D. Internally subdivide binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.
- E. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- F. Contents: Prepare Table of Contents for each volume, with each product or system description identified, typed on white paper, in three parts as follows:
 - 1. Part 1: Directory, listing names, addresses, and telephone numbers of Architect/Engineer, Contractor, Subcontractors, and major equipment suppliers.
 - 2. Part 2: Operation and Maintenance, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
 - a. Significant design criteria.
 - b. List of equipment.
 - c. Parts list for each component.
 - d. Equipment start-up instructions
 - e. Operating instructions.
 - f. Maintenance instructions for equipment and systems.
 - g. Maintenance instructions for finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
 - 3. Part 3: Project documents and certificates, including the following:
 - a. Product data.
 - b. Air and water balance reports.
 - c. Photocopies of warranties, certificates and bonds. Submit originals with Closeout Documents as specified below.
- G. Submit one (1) final original and two (2) copies to Architect.

1.4 PROJECT CLOSEOUT

- A. Final Payment will not be authorized by the Architect until the Architect finds the Work acceptable under the Contract Documents, subject to the completion and acceptance of the following requirements and other applicable Contract requirements:
 - 1. Close-out Documents: Provide bound closeout documents as described in paragraph 1.5. Refer to Document CB, Supplementary Conditions, Paragraph 9.10 for additional information.
 - 2. Record Documents: Submit as described in paragraph 1.10.
 - 3. Extra materials: Provide extra stock, materials, and products as described in paragraph 1.11 when required by individual specification sections.
 - 4. Locks: Make final changeover of permanent locks and transmit keys to the Owner. Advise the Owner's personnel of changeover in security provisions.
 - 5. Temporary Facilities: Discontinue and remove temporary facilities from the site, along with mockups, construction aids, and similar elements.
 - 6. Warranties, Certificates and Bonds: Execute and assemble transferable warranty documents, certificates, and bonds from subcontractors, suppliers, and manufacturers as described in paragraph 1.12.
 - 7. Final Inspection and Acceptance by Architect is achieved as described in paragraph 1.13.

1.5 CLOSEOUT DOCUMENTS

- A. Coordinate the following items with the requirements of Document CB, Supplementary Conditions of the Contract.
- B. Prepare 3-ring D-slant binder cover and spline with printed title "CLOSEOUT DOCUMENTS", title of project, and subject matter of binder when multiple binders are required. Submit one (1) original and two (2) copies.
- C. Internally subdivide binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.
- D. The close-out documents shall be neatly organized and easily useable as determined by the Architect and Owner. Separate Close-out Documents binders from Operations and Maintenance Manuals. Documents identified as "affidavit" shall be notarized.
- E. Contents: Prepare Table of Contents for each volume, with each item description identified, typed on white paper, in five (5) parts as follows:
 1. Part 1: Directory, listing names, addresses, and telephone numbers of Architect/Engineer, Contractor, Subcontractors, and major equipment suppliers. All General Contractor's vendors/suppliers and subcontractors that provided materials or performed any work related to this project must be listed on this form. Submit Final List of Subcontractors on Document AG.
 2. Part 2: Closeout Documents and Affidavits, include the following:
 - a. AIA G707 - Consent of Surety to Final Payment;
 - b. AIA G706 - Contractor's Affidavit of Payment of Debts and Claims;
 - c. AIA G706A - Contractor's Affidavit of Release of Liens;
 - d. Subcontractor's Release of Lien: Include contractor's, subcontractor's and direct material and equipment supplier's separate final releases. Submit on attached **Close-out Form "A"** - Affidavit of Subcontractor's Release of Lien.
 3. Part 3: Project documents and certificates, including the following:
 - a. Copy of Certificate of Substantial Completion (AIA G704);
 - b. Copy of All Permits;
 - c. Copy of Final Utility Bill or letter of transfer;
 - d. Copy of Certificate of Occupancy;
 - e. Certification of Project Compliance: Submit on attached Close-out Form "B". Owner and Architect will initiate form and forward to Contractor for signature once Substantial Completion is established;
 - f. Hazardous Material Certificate: Submit on attached Close-out Form "C". Affidavits from Contractor, Subcontractors and General Contractor's vendors or suppliers stating that no hazardous materials/products have been used or installed in this project.
 4. Part 4: Warranties, compile sequentially based on specification sections:
 - a. General Contractor's Warranty: Submit on company letterhead as described below. This Warranty shall state all sections of Work performed by General Contractor's own forces, and warranty period for each section of Work;
 - b. Subcontractor's Warranty: notarized, and submitted on attached **Close-out Form "D"**. This Warranty shall state all sections of Work performed by the subcontractor and warranty period;
 5. Part 5: Receipts:
 - a. Extra Stock: Provide original receipts for delivery of "Extra Stock" items as described below, (if applicable). Receipts must be signed by an authorized Owner's representative;
 - b. Keys: Provide original receipts for delivery of "Keys", (if applicable). Receipts must be signed by an authorized Owner's representative.

- F. In addition to the three (3) required close-out binders listed above, provide Architect with one (1) separate binder for their records containing the following:
 - 1. Directory, listing names, addresses, and telephone numbers of Architect/Engineer, Contractor, Subcontractors, and major equipment suppliers;
 - 2. all MSDS sheets for the project;
 - 3. all warranties from Contractor, subcontractors, direct suppliers, and manufacturers.
- G. Failure to complete and close-out project after substantial completion may result in liquidated damages being assessed to the Contractor. Refer to Conditions of the Contract for additional requirements and liquidated damages.

1.6 FINAL CLEANING

- A. Execute final cleaning prior to final project inspection and acceptance.
- B. Clean interior and exterior glass, and surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces, mop hard floor surfaces.
- C. Remove smudges, marks, stains, fingerprints, soil, dirt, spots, dust, lint, and other foreign materials from finished and exposed surfaces
- D. Clean equipment and fixtures to sanitary condition with cleaning materials appropriate to surface and material being cleaned.
- E. Clean and replace filters of operating equipment as required by Contract Documents
- F. Clean debris from roofs, gutters, downspouts, and drainage systems.
- G. Clean site; sweep paved areas, rake clean landscaped surfaces.
- H. Remove waste and surplus materials, rubbish, and temporary construction facilities from site.

1.7 PROTECTING INSTALLED CONSTRUCTION

- A. Protect installed Work and provide special protection where specified in individual specification sections until Work is accepted by Architect and Owner.
- B. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent 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.
- E. Prohibit traffic or storage upon waterproofed or roofed surfaces. When traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- F. Prohibit traffic from landscaped areas.

1.8 STARTING OF SYSTEMS

- A. Coordinate schedule for start-up of various equipment and systems.

- B. Notify Architect/Engineer and Owner 48 hours prior to start-up of each item.
- C. Verify each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions which may cause damage.
- D. Verify tests, meter readings, and specified electrical characteristics agree with those required by equipment or system manufacturer.
- E. Verify wiring and support components for equipment are complete and tested.
- F. Execute start-up under supervision of Contractors' personnel, and installer in accordance with manufacturers' instructions.
- G. When specified in individual specification sections or required by manufacturer, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.
- H. When specified in individual specification sections or required by Owner or Architect/Engineer, submit a written report in accordance with Section 01300, Submittal Procedures, that equipment or system has been properly installed and is functioning correctly.

1.9 DEMONSTRATION AND INSTRUCTIONS

- A. Demonstrate operation and maintenance of products to Owner's personnel a minimum of 48 hours prior to date of Final Completion in accordance with Owner's requirements.
- B. Demonstrate Project equipment instructed by qualified manufacturer's representative who is knowledgeable about the Project and equipment.
- C. For equipment or systems requiring seasonal operation, perform demonstration for other season within six (6) months.
- D. Utilize maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel to explain all aspects of operation and maintenance.
- E. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment.
- F. Prepare and insert additional data in maintenance manuals when need for additional data becomes apparent during instruction.
- G. Review and verify proper start-up and operation of equipment prior to scheduling demonstrations with Owner.

1.10 PROJECT RECORD DOCUMENTS

- A. Record Documents, as described in Section 01 78 39, shall be submitted at Project Closeout. Final Payment will not be authorized by the Architect until final review and acceptance by Architect and Engineers is achieved in accordance with the Owners requirements.
- B. At the Contractors request, and with associated fee, Architect may provide electronic versions of the construction drawing and specification files for Contractors use, subject to the terms and conditions of Architects standard electronic document transfer agreement.

- C. Submit reproducible to respective consultants (Civil, Structural, MEP, etc.) for review. Consultant will mark-up corrections and return to Contractor for final revisions. Make final revisions prior to submitting to Architect.
 - 1. Format: One (1) set blackline reproducibles and two (2) sets bluelines of approved reproducibles.
 - 2. In addition, provide the Owner with one (1) set of Record Drawings on a non-rewritable CD in AutoCAD® latest release.
 - 3. In PDF format on DVD media.

1.11 EXTRA STOCK, MATERIALS AND MAINTENANCE PRODUCTS

- A. Furnish extra stock, maintenance, and extra products in quantities specified in individual specification sections.
- B. Deliver to Project site and place in location as directed by Owner; obtain signed receipt from Owner's authorized representative prior to final application for payment. Delivery of materials to, or obtaining receipt from anyone other than Owner's authorized representative may constitute breach of this requirement and may require delivery of additional materials at no cost to the Owner if original materials are misplaced.
- C. Include signed receipts for delivery of extra stock and materials, including keys, with Closeout Documents.

1.12 WARRANTIES, CERTIFICATES AND BONDS

- A. Definitions:
 - 1. Standard Product Warranties: preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.
 - 2. Special Warranties: written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide coverage of specific defects, or both.
- B. In accordance with the general warranty obligations under Paragraph 3.5 of the General Conditions as amended by the Supplementary Conditions, the General Contractor's warranty shall be for a period of one (1) year following the date of Substantial Completion, hereinafter called the one-year warranty period. The Contractor's one-year general warranty shall include all labor, material and delivery costs required to correct defective material and installation. This warranty shall not limit the Owner's rights with respect to latent defects, gross mistakes, or fraud.
- C. The Contractor's one-year warranty shall run concurrently with the one (1) year period for correction of Work required under Paragraph 12.2 of the General Conditions.
- D. In addition to the Contractor's one-year warranty, Special Warranties as described in individual specifications sections, shall extend the warranty period for the period specified without limitation in respect to other obligations which the Contractor has under the Contract Documents.
- E. Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products, nor does it relieve the suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.
- F. Warranty Requirements:
 - 1. When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.

2. When Work covered by a warranty has failed and been corrected by replacement or reconstruction, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.
 3. Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. The Contractor is responsible for the cost of replacing defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.
 4. Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, rights and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.
 5. The Owner reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required on such Work or designated portion of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.
- G. Compile copies of each required warranty properly executed by the Contractor and the subcontractor, supplier, or manufacturer. Verify documents are in proper form, contain full information, and are notarized. Co-execute warranties, certificates and bonds when required and include signed warrantees with Closeout Documents submitted to the Architect.
- H. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

1.13 FINAL COMPLETION AND FINAL PAYMENT

- A. Final Notice and Inspection:
1. When all items on the Punch List have been corrected, final cleaning has been completed, and installed work has been protected, submit written notice to the Architect that the Work is ready for final inspection and acceptance.
 2. Upon receipt of written notice that the Work is ready for final inspection and acceptance, the Architect and Engineer will make final inspection.
- B. Final Change Order: When the Project Closeout items described above are successfully completed and the Work is found acceptable to Architect/Engineer and Owner, a Final Change Order will be executed. This Change Order will include any Allowance adjustments as required by the Contract Documents.
- C. Final Application for Payment: When all of the above items are successfully complete, submit to the Architect a final Application for Payment and request for release of retainage.
- D. Release of Retainage: Release of retainage will not be authorized by the Architect until Contractor completes all requirements for close-out to the satisfaction of the Owner and Architect as described herein.

1.14 TERMINAL INSPECTION

- A. Immediately prior to expiration of the one (1) year period for correction of the Work, the Contractor shall make an inspection of the work in the company of the Architect and the Owner. The Architect and the Owner shall be given not less than ten (10) days notice prior to the anticipated date of terminal inspection.

- B. Where any portion of the work has proven to be defective and requires replacement, repair or adjustment, the Contractor shall immediately provide materials and labor necessary to remedy such defective work and shall execute such work without delay until completed to the satisfaction of the Architect and the Owner, even if the date of completion of the corrective work may extend beyond the expiration date of the correction period.

- C. The Contractor shall not be responsible for correction of work which has been damaged because of neglect or abuse by the Owner nor the replacement of parts necessitated by normal wear in use.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION 01 77 00

(CLOSEOUT FORMS TO FOLLOW)

CLOSE-OUT FORM "A"

SUBCONTRACTOR'S AFFIDAVIT OF RELEASE OF LIEN

STATE OF TEXAS

COUNTY OF HARDIN

KNOW ALL MEN BY THESE PRESENTS:

_____, being first duly sworn, deposes and says:

1. That he / she is the _____ of _____, the subcontractor who supplied, installed, and /or erected the work described below, and that, he /she is duly authorized to make this Affidavit and Subcontractor Release:

Project: HARDIN-JEFFERSON HIGH SCHOOL TRACK & FIELD IMPROVEMENTS
 Owner: HARDIN-JFFERSON Independent School District Architect: PBK Sports
 Work Performed: _____ Specification Section(s): _____

2. That all work required under the subject subcontractor of the subject construction project has been performed in accordance with the terms thereof, that all material men, sub-subcontractors, mechanics, and laborers have been paid and satisfied in full and that there are no outstanding claims of any character arising out of the performance of said subcontractor which have not been paid and satisfied in full.
3. That to the best of his / her knowledge and belief, there are no unsatisfied claims for damages resulting from injury or death to any employees, sub-subcontractors, or the public at large arising out of the performance of said subcontract, or any suits or claims for any other damages of any kind, nature, or description which might constitute a lien upon the property of the Owner.
4. That he / she has received full payment of all sums due him / her for materials furnished and services rendered by the undersigned in connection with the performance of said subcontract and has and does hereby release the Owner and the Architect and his consultants and the Contractor from any and all claims of any character arising out of or in any way connected with performance of said subcontract.

ATTEST (If Corporation)

Name of Subcontractor

Secretary

(By) (Title)

JURAT

STATE OF _____

COUNTY OF _____

Sworn to and subscribed before me on this _____ day of _____, 20_____.

(Seal)

(Notary Public Signature)

CLOSE OUT FORM "B"

**CERTIFICATION
OF PROJECT
COMPLIANCE**

Completion of this form is required under the provisions of §61.1036(c)(3)(F) TAC for all public school district construction projects. Instructions for completion of this form can be found on page 2.

1. PROJECT INFORMATION

Facility:

Address:

City:

DISTRICT:

ARCHITECT/ENGINEER:

CONTRACTOR/CM:

CONTRACT DATE:

DATE DISTRICT AUTHORIZED PROJECT:

BRIEF DESCRIPTION OF PROJECT:

2. CERTIFICATION OF DESIGN AND CONSTRUCTION

The intent of this document is to assure that the school district has provided to the architect/engineer the required information and the architect/engineer has reviewed the School Facilities Standards as required by the State of Texas, and used his/her reasonable professional judgment and care in the architectural/engineering design and that the contractor has constructed the project in a quality manner in general conformance with the design requirements and that the school district certifies to project completion.

3. The District certifies that the educational program and the educational specifications of this facility along with the identified building code to be used have been provided to the architect/engineer.

DISTRICT:

BY:

DATE:

4. The Architect/Engineer certifies the above information was received from the school district, and that the building(s) were designed in accordance with the applicable building codes. Further, the facility has been designed to meet or exceed the design criteria relating to space (minimum square footage), educational adequacy, and construction quality as contained in the School Facilities Standards as adopted by the Commissioner of Education, June 9, 2003, and as provided by the district.

ARCHITECT/ENGINEER:

BY:

DATE:

5. The Contractor/CM certifies that this project has been constructed in general conformance with the construction documents as prepared by the architect/engineer listed above.

CONTRACTOR/CM:

BY:

DATE:

6. The District certifies completion of the project (as defined by the architect/engineer and contractor).

DISTRICT:

BY:

DATE:

INSTRUCTIONS FOR COMPLETION OF "CERTIFICATION OF PROJECT COMPLIANCE" FORM

Section 1. Identify the following:

- name and address of the school facility
 - name of the school district
 - the Architect/Engineer and Contractor
 - the date of execution of the construction contract
 - the date that the school district authorized the superintendent to hire an architect/engineer
 - scope of the project.
-

Section 2. This section outlines the intent of the document. No action required.

Section 3. This section is to be executed by the school district upon transmittal of the information (as listed) to the architect/engineer and is to remain in the custody of the school district throughout the entire project.

Section 4. This section is to be executed by the architect/engineer upon completion of the plans and specifications and in conjunction with the completion of the plan review for code compliance (ref. 19 TAC §61.1033 or §61.1036, School Facilities Standards) and returned to the school district's files.

Section 5. This section is to be executed by the contractor upon substantial completion of the project and retained in the school district's files.

Section 6. This section is to be executed by the school district upon acceptance and occupancy of the project.

NOTE: DO NOT SUBMIT THIS DOCUMENT TO THE TEXAS EDUCATION AGENCY. The school district will retain this document in their files indefinitely until review and/or submittal is required by representatives of the Texas Education Agency.

CLOSE-OUT FORM "C"

SUBCONTRACTOR HAZARDOUS MATERIAL CERTIFICATE

THE STATE OF TEXAS

PROJECT: HARDIN-JEFFERSON HIGH SCHOOL TRACK & FIELD IMPROVEMENTS

COUNTY OF HARDIN

OWNER: HARDIN-JEFFERSON Independent School District

ARCHITECT: PBK Sports

SPECIFICATION SECTION(S):

KNOW ALL MEN BY THESE PRESENTS:

_____, being first duly sworn, deposes and says that he / she is the _____ of _____, the subcontractor / supplier who constructed or provided the section(s) of work referenced above, and that he / she is duly authorized to certify to the best of his / her information, knowledge, and belief no asbestos, lead or PCB containing products have been incorporated into the project.

ATTEST (If Corporation)

Name of Subcontractor / Supplier

(Title)

Secretary (By)

JURAT

THE STATE OF _____

COUNTY OF _____

Sworn to and subscribed before me on this _____ day of _____, 20____.

(Seal)

(Notary Public Signature)

CLOSE-OUT FORM "D"

SUBCONTRACTOR WARRANTY

STATE OF TEXAS

COUNTY OF HARDIN

KNOW ALL MEN BY THESE PRESENTS:

_____, being first duly sworn, deposes and says:

1. That he / she is the Subcontractor (or the _____ of _____ the subcontractor) who supplied, installed, and / or erected the work described below, and that, he / she is duly authorized to make this Subcontractor Warranty:

Project: HARDIN-JEFFERSON HIGH SCHOOL TRACK & FIELD IMPROVEMENTS
 Owner: HARDIN-JEFFERSON Independent School District Architect: PBK Sports
 Work Performed: _____ Specification Section(s): _____

2. The undersigned Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract are of good quality and new except where otherwise required or permitted by the Contract Documents, that the Work is free from defects not inherent in the quality required or permitted, and that the Work conforms with the requirements of the Contract Documents. Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. The Subcontractor's warranty excludes remedy for damage or defect caused by abuse, modifications not executed by the Subcontractor, improper or insufficient maintenance, improper operation, or normal wear and tear under normal usage.
3. In the event of failure of materials, products, or workmanship, during the specified warranty periods, the Subcontractor shall take appropriate measures to assure correction or replacement of the defective items, whether notified by the Contractor, Owner or Architect.
4. The Subcontractor warrants the work performed for a period of _____ months from the date of Substantial Completion, except as follows: _____

ATTEST (If Corporation)

Name of Subcontractor

 Secretary (By) (Title)

JURAT

STATE OF _____

COUNTY OF _____

Sworn to and subscribed before me on this _____ day of _____, 20____.

(Seal)

(Notary Public Signature)

PBK Sports
Project No. P2106300SP

HJISD Hardin-Jefferson High School Track & Field Improvements
Hardin-Jefferson Independent School District

END OF CLOSEOUT FORM

SECTION 01 78 39 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes: Administrative and procedural requirements for project record documents, including but not limited to:
 1. Record Drawings.
 2. Record Specifications.
 3. Record Product Data.
 4. Miscellaneous record submittals.

1.3 CLOSEOUT SUBMITTALS

- A. Record Drawings:
 1. Number of Copies: Submit one set of marked up record prints.
 2. Number of Copies: Submit copies of record Drawings:
 - a. Initial Submittal:
 - 1) Submit PDF electronic files of scanned record prints and one of file prints.
 - 2) Submit record digital data files and one sets of plots.
 - 3) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
 - b. Final Submittal:
 - 1) Submit PDF electronic files of scanned record prints and three sets of prints.
 - 2) Submit record digital data files and three sets of record digital data file plots.
 - 3) Plot each drawing file, whether or not changes and additional information were recorded.
- B. Record Specifications: Submit one paper copy and one annotated PDF electronic file of the Project Specifications, including addenda and contract modifications.
- C. Record Product Data: Submit one paper copy and one annotated PDF electronic file and directory of each submittal.
 1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked up Product Data as a component of manual.
- D. Miscellaneous Record Submittals: Refer to the individual Specification Sections for miscellaneous record keeping requirements and submittals in connection with various construction activities. Submit one paper copy and annotated PDF electronic files and directories of each submittal.
- E. Reports: Submit written report monthly indicating items incorporated into project record documents concurrent with progress of the Work, including revisions, concealed conditions, field changes, product selections, and other notations incorporated.

1.4 PROJECT RECORD DOCUMENT PROCEDURES

- A. Do not use Project Record Documents for construction purposes. Protect Project Record Documents from deterioration and loss. Provide access to Project Record Documents for Architect's reference.
 - 1. Do not use As Built Drawings and Specifications for Record Drawings and Specifications.
- B. Recording Procedures: Update drawings and specifications on daily bases to record actual conditions. Record information concurrently with construction progress. Do not conceal Work until required information is accurately recorded.
- C. Store Record Documents and samples apart from as built documents used for construction.
 - 1. Label and file Record Documents and samples in accordance with section number listings in Table of Contents. Label each document *PROJECT RECORD* in neat, large, printed letters.
 - 2. Maintain Record Documents in clean, dry and legible condition.
 - 3. Make Record Documents and samples available for inspection upon request of Architect.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one set of marked up paper copies of the Contract Drawings and Shop Drawings.
 - 1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked up record prints. Show actual installation conditions where installation varies from that shown originally.
 - a. Give attention to information on concealed elements difficult to identify or measure and record later.
 - b. Accurately record information in an acceptable drawing technique.
 - c. Record data as soon as possible after obtaining it.
 - d. Record and check the markup before enclosing concealed installations.
 - e. Cross reference record prints to corresponding shop drawings or archive photographic documentation.
 - 2. Content: Types of items requiring marking include, but are not limited to, the following:
 - a. Dimensional changes to Drawings.
 - b. Revisions to details shown on Drawings.
 - c. Depths of foundations below first floor.
 - d. Locations and depths of underground utilities.
 - e. Revisions to routing of piping and conduits.
 - f. Revisions to electrical circuitry.
 - g. Actual equipment locations.
 - h. Duct size and routing.
 - i. Locations of concealed internal utilities.
 - j. Changes made by Change Order or Construction Change Directive.
 - k. Changes made following Architect's written orders.
 - l. Details not on the original Contract Drawings.
 - m. Field records for variable and concealed conditions.
 - n. Record information on the Work that is shown only schematically.
 - 3. Mark the Contract Drawings and Shop Drawings completely and accurately. Utilize personnel proficient at recording graphic information in production of marked up record prints.

4. Mark record sets with erasable, red colored pencil. Use colors to distinguish between changes for different categories of the Work at same location.
 5. Mark important additional information that was either shown schematically or omitted from original Drawings.
 6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked up record prints with Architect. When authorized, prepare full set of corrected digital data files of the Contract Drawings:
1. Format: Same digital data software program, version, and operating system as the original Contract Drawings and annotated PDF electronic file with comment function enabled.
 2. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
 3. Refer instances of uncertainty to Architect for resolution.
 4. Architect will furnish Contractor one set of digital data files of the Contract Drawings for use in recording information.
 - a. Refer to Section 01 33 00 for requirements related to use of Architect's digital data files.
 - b. Architect will provide data file layer information. Record markups in separate layers.
- C. Newly Prepared Record Drawings: Prepare new Drawings instead of preparing record Drawings where Architect determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.
1. New Drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution, or modification.
 2. Consult Architect for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. Integrate newly prepared record Drawings into record Drawing sets; comply with procedures for formatting, organizing, copying, binding, and submitting.
- D. Format: Identify and date each record Drawing; include the designation *PROJECT RECORD DRAWING* in a prominent location.
1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
 2. Format: Annotated PDF electronic file with comment function enabled.
 3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
 4. Identification: As follows:
 - a. Project name.
 - b. Date.
 - c. Designation PROJECT RECORD DRAWINGS.
 - d. Name of Architect.
 - e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications. Indicate actual product installation where installation varies from that indicated in Specifications.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.

2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
 4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
 5. Note related Change Orders, record Product Data, and record Drawings where applicable.
- B. Format: Submit record Specifications as annotated PDF electronic file and marked up paper copy of Specifications.

2.3 RECORD PRODUCT DATA

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 3. Note related Change Orders, record Specifications, and record Drawings where applicable.
- B. Format: Submit record Product Data as annotated PDF electronic file. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

2.4 RECORD SAMPLES

- A. Record Samples: Determine with Architect and Owner which submitted Samples are to be maintained as Record Samples. Maintain and mark one set to indicate date of review and approval by Architect; note any deviations or variations between reviewed sample and installed product or material.

2.5 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by the individual Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference. Include the following:
1. Reviewed shop drawings, product data, and samples.
 2. Field test reports.
 3. Inspection certificates and manufacturer's certificates.
 4. Inspections by authorities having jurisdiction (AHJ).
 5. Documentation of foundation depths.
 6. Special measurements or adjustments.
 7. Tests and inspections.
 8. Surveys.
 9. Design mixes.
- B. Format: Submit miscellaneous record submittals as scanned PDF electronic file(s) of marked up miscellaneous record submittals. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

- A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.

- B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.

END OF SECTION 01 78 39

SECTION 02 32 00 - GEOTECHNICAL REPORT

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 - GENERAL

1.1 THE FOUNDATION INVESTIGATION REPORT

- A. The geotechnical report is as follows:
 - 1. Subsurface Investigation:
 - a. Entitled: Geotechnical Engineering Report, Henderson Middle School Renovations
 - b. Prepared for: Hardin-Jefferson Independent School District
 - c. Prepared by: Terracon Consultants, Inc.
- B. The boring plans, results of laboratory tests, and description of stratum for each test hole are enclosed in this Section.
- C. The Contractor is hereby advised to review the geotechnical report and visit the site to ascertain the conditions affecting the work. In the event of discrepancies between the drawings, specifications and geotechnical report, the contractor shall bring to the attention of the architect for resolution. In the absence of a Geotechnical Report, discrepancies between Drawings and Specifications shall be brought to the attention of the Architect for resolution. Failure to review the geotechnical report and report discrepancies, between the geotechnical report, if any, and drawings and specifications, to the Architect will not relieve the Contractor from the responsibility to perform the work required by such documents, at no additional expense to the Owner.

1.2 SOIL CONDITIONS

- A. The conditions indicated in the report were known to exist at the location shown on the date the tests were performed; however, these boring logs are for the Contractor's consideration only, and he shall visit the site and fully acquaint himself with the existing conditions and be prepared to complete all work required by the documents.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION 02 32 00

SECTION 02 41 13.23 - ABANDONMENT OF EXISTING UTILITIES

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 - GENERAL

1.1 SUMMARY

- A. Abandon water lines, storm and sanitary sewers, manholes, and associated appurtenances as indicated on the Plans in accordance with the methods outlined herein.

1.2 PAYMENT

- A. Payment will be made if an item is provided for such on the bid form; otherwise, include cost of work in the lump sum price.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Specific products are not required. Reference other applicable sections of the specifications for material required.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Coordinate all work so that existing utilities are operable until new utilities are complete and in place. Keep any service interruptions to a minimum.

3.2 WATER LINE ABANDONMENT

- A. Remove at least one joint of existing pipe where crossing or tying-in with new water lines. Plug both ends of abandoned line with an appropriate manufactured fitting (cap or plug) or fill end of line with 3000 psi concrete. Backfill as per SECTION 31 23 00 - CONSTRUCTION OF UNDERGROUND UTILITIES.

3.3 SEWER ABANDONMENT

- A. Unless noted on drawings to be removed, abandon sewers 12 inches in diameter and smaller by filling with a liquid concrete slurry composed of a 3 sack per cubic yard mix using pea gravel (1-1/2 inch and smaller aggregate) or drilling mud. Limit length of application to individual sections between manholes. Construct a temporary dam in downstream manholes above top of pipe. Pour slurry or mud in upstream manhole or in riser pipe attached to upstream end of sewer. Fill line till slurry or mud rises above top of pipe on both ends.
- B. Sewers between 12" – 36" in diameter shall be abandoned in accordance with either 3.3.A or 3.3.C.
- C. Unless noted on drawings to be removed, abandon sewers 36 inches in diameter and larger by breaking in top of pipe and backfilling. Excavate and expose top half of existing sewer. Using appropriate equipment, cave-in the top half of pipe; as a minimum, the upper 120-degree section of pipe must be broken in. Fill open pipe with backfill material and compact to top of existing pipe. Backfill to grade in accordance with SECTION 31 23 00 - CONSTRUCTION OF UNDERGROUND UTILITIES.

3.4 MANHOLE ABANDONMENT

- A. After abandoning sewer lines in the appropriate manner, fill manholes to be abandoned with bank sand. Excavate around top of manhole and remove manway (reducer) section of manhole. Fill manhole with bank sand in 12-inch compacted lifts to top of manhole barrel. Backfill to finished grade in accordance with SECTION 31 23 00 - CONSTRUCTION OF UNDERGROUND UTILITIES.

END OF SECTION 02 41 13.23

SECTION 03 11 00 - CONCRETE FORMWORK

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 - GENERAL

1.1 DESCRIPTION OF REQUIREMENTS

- A. Work Included: Perform all work necessary and required for the construction of the project as indicated. Such work includes but is not necessarily limited to the furnishing and installing of forms for all cast-in-place concrete work as shown and noted on the drawings and specified herein, including the removal of forms at completion of concrete work.
- B. Related Work in Other Sections: The following items of associated work are included in other sections of these specifications:
 - 1. Excavating, filling, backfilling, and other earthwork operations.
 - 2. Furnishing and placing of reinforcing steel.
 - 3. Cast-in-place concrete.
 - 4. Filling of tie rod, bolt holes, and defects. Curing of concrete.
 - 5. Furnishing of dovetail anchor slots for masonry adjacent to concrete.
 - 6. Furnishing of anchor bolts and miscellaneous metal items to be embedded in concrete.
 - 7. All other carpentry work.
 - 8. Furnishing of sheet metal reglets to be embedded in concrete.

1.2 CODES AND STANDARDS

- A. The American Concrete Institute's "Recommended Practice for Concrete Formwork", ACI 347, and Chapter 4, ACI 301 are hereby made a direct part of this specification, and all concrete formwork included in this contract shall conform with the applicable requirements therein except as specified otherwise herein.

1.3 SHOP DRAWINGS

- A. For exposed concrete submit fabricating drawings of forms showing the jointing of facing panels, the location of form ties, and any necessary alignment bracing.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Forms for exposed concrete at exterior of building: Unless otherwise shown or specified, construct all formwork for exposed concrete surfaces (this includes all surfaces to receive a painted finished coat) with plywood, metal-framed plywood-faced or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Provide form material with sufficient thickness to withstand pressure of newly placed concrete without bow or deflection.
- B. Forms for exposed concrete at interior of building: Form concrete surfaces with plywood, lumber, metal or other acceptable material. Provide lumber dressed on at least two edges and one side for tight fit. Use either 6" or 8" wide lumber, nominal 1" thickness, or plywood as specified for exterior exposed concrete, at Contractor's option. Use "BB FIR" or "MDO" grade plywood for underside of parking decks.

- C. Form Ties and Spreaders: Standard metal form clamp assembly, of type acting as spreaders and leaving no metal within one inch (1") of concrete face. Inner tie rod shall be left in concrete when forms are removed. No wire ties or wood spreaders will be permitted.
- D. Form Anchors and Hangers: Anchors and hangers used for exposed concrete shall not leave exposed metal at surface. Hangers supporting forms from structural steel shall be symmetrically arranged on supporting members to minimize twisting or rotation of member. Penetration of structural steel members will not be permitted.
- E. Form Coatings: Form coating shall be a polymeric material and shall contain no wax or oil.

PART 3 - EXECUTION

3.1 CONSTRUCTION OF WORK

- A. The design layout, construction and removal of formwork shall be the sole responsibility of the Contractor.
- B. Earth Forms: If conditions warrant, and the approval of the Engineer is secured, earth trench forms for footings will be allowed. Where footings are placed on dry soil or pervious material, waterproof paper shall be laid over the earth surfaces to receive concrete. Soil may be thoroughly wetted to optimum moisture content prior to placing concrete in lieu of using waterproof paper.
- C. Formwork-General: Forms shall be constructed of sound material, shall be of the correct shape and dimensions, mortar tight, of sufficient strength, and so braced and tied together that the movement of men, equipment, materials, or placing and vibrating the concrete will not throw them out of line or position. Before reusing forms, or when using second-hand lumber for forms, same shall be cleaned and all nails removed therefrom. Forms shall be strong enough to maintain their exact shape under all imposed loads. Camber where necessary to assure level finished soffits. Forms shall be so constructed that they may be easily removed without damage to the concrete. Before concrete is placed in form, the horizontal and vertical position of the form shall be carefully verified, and all inaccuracies corrected. All welding and bracing shall be completed in advance of placing of concrete.
- D. Forms for Exterior Exposed Concrete (concrete to receive paint): Plywood panels shall be clean, smooth, uniform in size, and free from damaged edges and holes. Full size panels shall be used wherever possible. After construction, tape joints of plywood panels to prevent joint protrusions in concrete. Horizontal joints must be level and continuous. All edges of plywood must be backed to prevent separation. Use special care in the forming and stripping of the forms to protect the corners. Form inside corners with mitered boards so that no concrete is placed against form ends.
- E. Framing and Bracing: Framing, bracing, supporting members, and centering shall be of ample size and strength to safely carry, without deflection, all dead and live loads to which forms may be subjected, and shall be spaced sufficiently close to prevent any bulging or sagging of forms. Concrete out of line, level, or plumb will be cause for rejection of the whole work affected. Distribute bracing loads over base area on which bracing is erected. When placed on ground, protect against undermining or settlement.
- F. Tolerances:
 - 1. Variation from plumb in lines and surfaces of walls and arises shall not exceed 1/8 inch in 10 feet with maximum "in" and "out" variation occurring in not less than 20 feet.
 - 2. Variation in linear building lines from established position of columns, piers, or walls shall not exceed 1/4 inch in any bay of 20 feet or 1/2 inch in 40 feet or greater length.
 - 3. Variation in thickness of slabs and walls shall not exceed minus 1/4 inch or plus 1/2 inch.
 - 4. Variation from the level or from the grades indicated on the drawings:

- a. In slab soffits, ceilings, and in arises
 - In 10 feet.....1/4 inch.
 - In any bay or 20 feet max.....3/8 inch.
 - In 40 feet or more.....3/4 inch.
- b. For exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines.
 - In any bay or 20 feet max.....1/4 inch.
 - In 40 feet or more.....1/2 inch.
- 5. Variation from level in floors or from the grade indicated: In any 10 feet.....1/4 inch.
- 6. Size and location of sleeves, pits, floor openings, etc., the location of bolts, inserts and fastenings: Plus or minus 1/4 inch.
- 7. Footings:
 - a. Variation in dimensions in plan:
 - minus.....1/2 inch, plus.....2 inch.
 - b. Misplacement or eccentricity: Two percent of the footing width in the direction of misplacement but not more than 2 inches. These tolerances for footings apply to the concrete only, and not to reinforcing bars or dowels.
- G. Chamfered Corners: As indicated, provide moldings in forms for all chamfering required. Moldings shall be 45-degree right triangle in profile of size required, milled from wood free from open defects.
- H. Form Ties: Form ties shall be of sufficient strength and used in sufficient quantities to prevent spreading of the forms. Ties shall be placed at least one inch away from the finished surface of the concrete. The use of ties consisting of twisted wire loops will not be permitted. Inner rods shall be left in concrete when forms are stripped. All form ties shall be spaced equidistant, and symmetrical, and shall line up both vertically and horizontally.
- I. Cleanouts and Access Panels: Provide removable cleanout sections or access panels at the bottom of all forms to permit inspection and effective cleaning of loose dirt, debris, and waste material. All forms and surfaces to receive concrete shall be cleaned of all chips, sawdust, and other debris and shall be thoroughly blown out with compressed air just before concrete is placed.
- J. Arrangement: Arrange formwork to allow proper erection sequence and to permit form removal without damage to concrete.
- K. Construction Joints: Construction joints shall be formed as specified in Section intitled "Cast-In-Place Concrete." Provide a surfaced pouring strip where construction joints intersect exposed surfaces to provide straight line at joints. Just prior to subsequent pour, remove strip and tighten forms to conceal shrinkage. Construction joints shall show no "overlapping" of concrete and shall, as closely as possible, present the same appearance as butted plywood joints. Joints in a continuous line shall be straight, true, and sharp.
- L. Embedded Items: Provisions shall be made for pipes, sleeves, anchors, inserts, reglets, anchor slots, nailers, and other features. No wood other than necessary nailing blocks shall be embedded in concrete. Complete cooperation shall be extended suppliers of embedded items in their installation. Secure information for embedded items from other trades as required. All embedded items shall be securely anchored in correct location and alignment prior to placing concrete, electrical and telephone conduits shall be run in concrete only upon the written approval of the Engineer. Under NO circumstances will ALUMINUM CONDUIT be permitted in concrete. No conduit larger than 3/4 inch in diameter and no plumbing pipes of any size will be permitted in concrete walls, columns, or slabs.

- M. Opening for Items Passing Through Concrete: Frame openings in concrete where indicated on architectural, structural, plumbing, mechanical, or electrical drawings. Contractor shall establish exact locations, sizes, and other conditions required for openings and attachment of work specified under other sections. Contractor shall be held responsible for proper coordination of all work of this nature in order that there will be no unnecessary cutting and patching of concrete. Any cutting and repairing to concrete required as a result of failure to provide for such openings shall be paid for by the Contractor at no additional expense to the Owner.
- N. Screed: Contractor shall set screeds and establish levels for tops of concrete slabs and leveling for finish on slabs. Shape slabs to drain where required or as indicated on drawings. Before depositing concrete, all debris shall be removed from the space to be occupied by the concrete, and forms shall be thoroughly wetted. Reinforcement and inserts shall be secured in position. Free-standing water shall be removed.
- O. Screed Supports: Screed supports for concrete over waterproof membranes and/or vapor-barrier membranes shall be of a cradles, pad, or base type which will not puncture the membrane. Staking through the membrane will not be permitted.
- P. Shores and False Work: Contractor shall be fully responsible for the proper strength, safety, and adequacy of all falsework, supports, posts, footing, etc., used on and in connection with work. Falsework and supports shall be adequate in size and strength to resist the loads imposed upon them without deformation, deflection, or settlement. Wedges in pairs or jacks shall be used where required to bring forms, shoring, or falsework for beams, girders, slabs, and other parts of the structure to the exact elevations and uniform bearing before placing concrete. Single wedges will not be permitted. Vertical and lateral loads shall be carried to ground by form-work system or by completed structure, after it has attained adequate strength. Submit manufacturer's data for patented shores, shore splicing, and methods of shore support.
- Q. Reuse and Coating of Forms: Thoroughly clean forms and recoat with specified form coating before each reuse. Do not reuse any form for exposed work which cannot be reconditioned to "like new" condition. Apply form coating to all forms in accordance with the manufacturer's specifications. Apply form coatings before placing reinforcing steel.
- R. Inspection: Prior to placing of any concrete, and after placement of reinforcing steel in the forms, Contractor shall notify the Engineer so that proper inspection may be made. Such notification shall be made at least 72 hours in advance of placing concrete to permit proper arrangements to be made for inspection.
- S. Rejection of Defective Work Due to Improper Forms: Any movement or bellying of forms during construction or variations in excess of the tolerances specified will be considered just cause for the removal of such forms and, in addition, the concrete work so affected. Reconstruction of forms and new concrete shall be furnished at no additional cost to the Owner.

3.2 REMOVAL OF FORMS AND SHORES

- A. The supporting forms and shoring shall not be removed until the members have acquired sufficient strength to support their weight and the loads superimposed thereon safely. The contractor will be responsible for obtaining competent personnel to determine not only the method of forming, but the sequence of removal to assure that this requirement is met. All form work shall be removed without damage to the concrete.
- B. The Contractor shall be guided in the removal of forms by ACI publication 347. The removal of forms and shoring shall be determined by the method of forming and supports. The removal of forms and shoring must be related to the strength of concrete as determined by tests of job-cured specimens in accordance with procedures outlined in ACI 347 and ACI 301 and test cylinders

prepared in accordance with ASTM C31 with compression tests performed in accordance with ASTM C39.

- C. Shoring shall be adequate in strength and shall be so designed and placed that the load from successive parts of the structure will be transmitted directly through the falsework without creating bending or shearing stresses in the concrete. Do not remove shores until supporting members have attained sufficient strength to carry the imposed loads.
- D. During the period that forms are in place on the concrete work, said forms shall always be kept wet.
- E. In removing plywood forms, no metal pinch bars shall be used, and special care shall be taken in stripping. Start at top edge or vertical corner where it is possible to insert wooden wedges. Wedging shall be done gradually and shall be accompanied by light tapping on plywood panels to crack them loose. Do not remove forms with a single jerk after it has been started at one end.
- F. Forms shall be left in place as long as possible to permit shrinkage away from concrete, and plywood forms shall be left in place until all other forms around are stripped and until there is no danger of damaging the concrete due to other work in the vicinity.
- G. Nothing herein shall be construed as relieving the Contractor of any responsibility for the safety of the structure.
- H. After stripping, Contractor shall properly protect all concrete from damage.

END OF SECTION 03 11 00

SECTION 03 15 00 - CONCRETE ACCESSORIES

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Conditions of the Contract and the General Requirements are hereby made a part of this Section.

1.2 WORK INCLUDED

- A. The Work under this Section includes all material, labor, equipment and supervision to install anchor bolts, to install formwork and reinforcing steel for cast-in-place concrete and to epoxy coat exposed reinforcement as shown on the Drawings.

1.3 RELATED WORK

- A. Section 03 30 00 – Cast-In-Place Concrete

1.4 QUALITY ASSURANCE

- A. Materials and installed work may be reviewed by the Engineer at any time during the progress of the Work.

1.5 SUBMITTALS

- A. Contractor shall submit to the Engineer copies of the Manufacturers Specs. Data Sheets and Health and Safety Data Sheets for the following:

- Reinforcement
- Form Coating
- Anchor Bolt Fastening System
- Epoxy Coating
- Permanent Compressible Joint Filler
- Expansion Joint Assembly

1.6 DELIVERY, STORAGE AND HANDLING

- A. Store all materials clear of ground, protected, so as to preclude damage.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

- A. Forms for Concrete Surfaces: APA exterior plyform BB or metal forms. Forms shall be clean and straight with mortar tight joints.
- B. Form Coatings: Provide commercial formulation form-coating compounds that will not bond with, stain nor adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces to be cured with water or curing compound. Form oil shall be similar to that manufactured by Nox-Crete Company.

2.2 ANCHOR BOLT FASTENING SYSTEM

- A. Provide sizes indicated on the Drawings.

Provide one of the following embedded anchor systems:

1. "HILTI HIT Fastening System" By HILTI, Inc. Fastening Systems.
2. "HILTI HVA Adhesive Anchors" By HILTI, Inc. Fastening Systems.
3. "Molly Parabond Capsule Anchors" By Molly Fastener Group.
4. or Approved Equivalent.

2.3 REINFORCING MATERIALS

- A. Reinforcing Bars: ANSI/ASTM A615, grade 60 unless noted.
- B. Field Applied Epoxy Coating Materials for Existing Steel Reinforcement and Embedded Items.
- C. Provide one of the following epoxy coatings for existing steel reinforcement and miscellaneous metals that are to be embedded in concrete:
1. "Sikagard 62 with Tan, Grey, Yellow or Green Pigment" by Sika Chemical Corp., Lyndhurst, N.J.
 2. or Approved Equivalent.

2.4 PERMANENT COMPRESSIBLE JOINT FILLER

- A. Joint filler in grout pockets and joints - as indicated on the Drawings. Acceptable products are:
1. "Flexcell" by Celotex Corporation
 2. "Sonoflex F" by Sonneborn Building Products, Minneapolis, MN
 3. "Ceramar Flexible Foam E. J. Filler" by W.R. Meadows, Elgin, IL.

PART 3 - EXECUTION

3.1 FORMWORK

- A. Design: The design, engineering and proper construction of the formwork shall be the responsibility of the Contractor. Design formwork to be readily removable without impact, shock or damage to cast-in-place concrete surfaces, the structure and adjacent materials. Formwork shall be braced properly to prevent displacement under vibration or sagging between supports.
- B. Edge Forms and Screed Strips for Overlay: Set edge forms or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in finished slab surface. Provide and secure units sufficiently strong to support types of screed compacting type screeds.
- C. Preparation of Form Surfaces: Coat contact surfaces of forms with a form-coating compound before reinforcement is placed.
- D. Removal of Forms: Concrete formwork shall not be disturbed until the concrete has hardened to be able to support its own weight.
- E. Re-Use of Forms: Clean and repair surfaces of forms to be re-used in Work. Split, frayed, delaminated or otherwise damaged form facing material will not be acceptable for exposed surfaces. Apply new form coating compound as specified for new formwork.
1. Do not use "patched" forms for exposed concrete surfaces.
- F. Tolerances: Comply with tolerances for formed surfaces as defined in ACI 301, Chapter 4, except as herein modified.

3.2 ANCHOR BOLT FASTENING SYSTEM

- A. Install anchor bolts according to manufacturer's recommendations.

3.3 EPOXY COATING FOR EXISTING REINFORCEMENT

- A. Preparation: Existing reinforcing and miscellaneous metal to remain shall be cleaned of rust and latency to Near White Metal.
- B. Installation: Existing reinforcing and miscellaneous metals that are to be embedded in concrete shall be epoxy coated in accordance with manufactures recommendations. Epoxy shall be cured prior to concrete placement.

3.4 SUPPLEMENTAL REINFORCEMENT

- A. Placing Reinforcement: Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars", for details and methods of reinforcement placement and supports, and as herein specified.
 - 1. Clean reinforcement of loose rust and mill scale, oil, earth and other materials which reduce bond with concrete.
 - 2. Accurately position, support and secure reinforcement against displacement by formwork, construction, or concrete placement operations.
 - 3. Place reinforcement to obtain at least minimum coverages for concrete protection. Arrange, space and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.
- B. Splices: Provide standard reinforcement splices by lapping ends, placing bars in contact, and tying tightly with wire. Comply with requirements of ACI 318 for minimum lap of spliced bars.

END OF SECTION 03 15 00

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Labor, materials, services and equipment required in conjunction with or properly incidental to placing of cast-in-place concrete slabs, building members, and MEP equipment pads as described herein or as shown on the Drawings, including but not limited to:
 - 1. Concrete mix designs.
 - 2. Assistance with Owner provided laboratory testing of concrete.
 - 3. Installation of items to be built-in formwork or embedded in concrete but furnished by other trades, including metal anchors, anchor slots, reglets, hangers, supports, ties, inserts, bolts, corner guards, and sleeves.
 - 4. Cast-in-place concrete, with formwork, under slab vapor barrier, reinforcing, accessories, appurtenances, finishing and curing required to complete concrete work.
 - 5. Grouting under structural steel base plates.
 - 6. Foundation for columns, walls, and slabs on grade.
 - 7. Super-structure for walls, columns, slabs, curbs, stairs, steps, equipment pads, walks, and pre-molded expansions joints.

- B. Examine the drawings for Plumbing, Mechanical, and Electrical work. These subcontractors will furnish and set sleeves or box forms required for openings. Contractor shall use care in placing reinforcement and pouring concrete so as not to displace such sleeves or boxes.
 - 1. All slots, chases, recesses, or openings indicated on the drawings, which are not formed by sleeves or boxes shall be provided in locations shown. When the work of other contractors is completed, the excess part of the openings shall be completely closed with concrete.

1.2 RELATED REQUIREMENTS

- A. Division 1 Sections applicable to the Work of this Section.

1.3 RELATED SECTIONS

- A. Section 02 32 00 - Geotechnical Report
- B. Section 31 00 00 - Earthwork
- C. Section 32 13 13 - Concrete Paving

1.4 QUALITY ASSURANCE

- A. Where standards or requirements of this Section conflict with those noted on the Contract Drawings, or the Building Code, the more stringent requirements shall govern. Bring all conflicts and discrepancies to the attention of the Architect and do not start work until such conflicts and discrepancies are clarified and corrected. Failure to do so will not relieve the Contractor from performing the Work correctly at no additional expense to the Owner.

- B. Testing Laboratory Services:
 - 1. Test results shall meet or exceed established standards. A technician from the Owner's Testing Laboratory must be present during all operations.

C. Evaluation and Acceptance:

1. Codes and Standards: The Work described in this Section, unless otherwise noted on the Drawings, or herein specified, shall be governed by the editions of the following codes or specifications approved by authorities having jurisdiction.
 - a. American Association of State Highway and Transportation Officials (AASHTO)
 - 1) TP 23, "Proposed Standard Method of Test for Water Content of Freshly Mixed Concrete Using Microwave Oven Drying"
 - b. American Concrete Institute (ACI)
 - 1) 211.1, "Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete"
 - 2) 214, "Recommended Practice for Evaluation of Strength Test Results of Concrete"
 - 3) 301, "Specifications for Structural Concrete for Buildings"
 - 4) 302, "Guide for Concrete Floor and Slab Construction"
 - 5) 304, "Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete"
 - 6) 305, "Hot Weather Concreting"
 - 7) 306, "Cold Weather Concreting"
 - 8) 309, "Standard Practice for Consolidation of Concrete"
 - 9) 311, "ACI Manual of Concrete Inspection"
 - 10) 315, "Manual of Standard Practice for Detailing Reinforced Concrete Structures"
 - 11) 318, "Building Code Requirements for Reinforced Concrete"
 - 12) 347, "Recommended Practice for Concrete Formwork"
 - 13) 355.2, "Qualification of Post-Installed Mechanical Anchors in Concrete & Commentary"
 - 14) Keep one copy of "Manual of Concrete Practice" at job site at all times.
 - c. American Society for Testing and Materials (ASTM)
 - 1) A36, Standard Specification for Carbon Structural Steel
 - 2) A108, Standard Specification for Steel Bars, Carbon, Cold-Finished, Standard Quality
 - 3) A123, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
 - 4) A185, Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
 - 5) A615, Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
 - 6) A704, Standard Specification for Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement
 - 7) C33, Standard Specification for Concrete Aggregate
 - 8) C42, Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
 - 9) C94, Standard Specification for Ready-Mix Concrete
 - 10) C136, Standard Method for Sieve Analysis of Fine and Coarse Aggregates
 - 11) C150, Standard Specification for Portland Cement
 - 12) C172, Standard Practice for Sampling Freshly Mixed Concrete
 - 13) C260, Standard Specification for Air-Entraining Admixtures
 - 14) C330, Standard Specification for Lightweight Aggregates for Structural Concrete
 - 15) C494, Standard Specification for Chemical Admixtures for Concrete
 - 16) C595, Standard Specification for Blended Hydraulic Cements
 - 17) C881, Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete
 - 18) C979, Standard Specification for Pigments for Integrally Colored Concrete

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- 19) C1107, Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-Shrink)
 - 20) C1315, Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete
 - 21) E96, Standard Test Methods for Water Vapor Transmission of Materials
 - 22) E1643, Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill under Concrete Slabs
 - 23) E1745, Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs
 - 24) F710, Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring
- d. American Welding Society (AWS)
- 1) D1.4 Structural Welding Code- Reinforcing Steel
- e. Federal Specification (FS)
- 1) FF-S-325
 - 2) QQ-Z-325C
- f. Concrete Reinforcing Steel Institute (CRSI)
- 1) "Reinforced Concrete – A Manual of Standard Practice"
 - 2) "Recommended Practice for Placing Reinforcing Bars"
 - 3) "Recommended Practice for Placing Bar Supports"

D. Source Quality Control:

1. Concrete production facilities shall meet the requirement for certification by the National Ready Mixed Concrete Association. All ready-mix concrete trucks proposed for use on the project shall meet the requirements of NRMCA, Certification of Ready Mix Concrete Production Facilities.
2. Concrete batchers shall be completely interlocked semi-automatic or automatic batchers, as defined by the Concrete Plant Manufacturers Bureau.
3. Concrete batchers shall have graphic, digital, or photographic recorders, which shall register both empty balance and total weight (or volume of water or admixture) of each batched material, time to the nearest minute, date, identification of batch, and numerical count of each batch. Copies of the record shall be furnished to the Inspection and Testing Laboratory.
4. The Inspection and Testing Laboratory shall provide concrete batch plant inspection as follows:
 - a. Provide a qualified inspector with necessary equipment and apparatus to inspect weighing and batching of controlled concrete at batch plant on a random basis, approximately once daily as the concrete is being placed on this project.
 - b. Make certain that materials and batch equipment used are in accordance with requirements of Specifications.
 - c. Check for adjustment in batch weights to compensate for variations in moisture content.
 - d. Submit promptly to Architect, certification of weights used in loads of acceptable concrete which has been batched during plant inspection time.

E. Concrete Mix Design Criteria:

1. Design concrete mixes in accordance with ACI 318, Section 5.3, Proportioning on the basis of field experience and/or trial mixtures.
2. Submit the proposed mix designs for each concrete mix type proposed.
3. Determination of required average strength above specified strength shall be in accordance with ACI 318.
4. If trial mixes are used as the basis for the proposed mix design, mold and cure test cylinders in accordance with ASTM C39. Do not place concrete on project until laboratory reports

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and results of confirmation cylinder tests have been evaluated by the Inspection and Testing Laboratory and results indicate that proposed mixes will develop required strengths.

5. Inspection and Testing Laboratory shall furnish the Architect with a written evaluation of each proposed concrete mix design submitted by the Contractor.
6. Check mix designs and revise if necessary wherever changes are made in aggregates or in surface water content of aggregate or workability of concrete. Water content shall be minimum to produce workable mix. The water content shall be verified in the field by use of the Microwave Test.

1.5 SUBMITTALS

- A. Mix Designs: Submit proposed mix designs, including confirmation cylinder test results, in accordance with ACI 318, Section 5.3, Proportioning on the basis of field experience and/or trial mixtures. Submit mix designs to Architect/Engineer and Inspection and Testing Laboratory for evaluation a minimum of 14 days prior to placing concrete. Key requirements:
 1. Combined aggregate gradation.
 2. Proportions of cement, fine and coarse aggregates, and water.
 3. Type, color and dosage of integral coloring compounds, where applicable.
 4. Range of ambient temperature and humidity for which design is valid.
 5. Any special characteristics of mix which require precautions in mixing, placing, or finishing techniques to achieve finished product.
- B. Complete test data for trial mixes or a complete summary of previous project test results for mix design based on standard deviation analysis must be included.
- C. Provide duplicate delivery tickets for each load of ready-mix concrete delivered to site, in accordance with ASTM C94. Show batch weights on each ticket.
- D. Provide mill test reports on an as-used basis for each type and brand of cementitious material used.
- E. Provide certification from independent test laboratory indicating under slab vapor retarder compliance with specification and ASTM 1745 Class A requirements.
- F. Provide product data for each accessories item specified but necessarily not listed above which are required for a complete installation, including, but not limited to reinforcing, chairs, admixtures, stains and color pigments, grouts, sealers, vapor retarders and barriers, water stops, epoxy adhesives, curing compounds and anchors.
- G. Provide Shop Drawings for all reinforcing steel. Show bending diagrams, splicing and laps of rods, shapes, dimensions and details of bar reinforcement and accessories.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Mix and deliver concrete to project ready-mixed in accordance with ASTM C94. Mix concrete a minimum of 70 revolutions of transit mix drum at mixing speed. A minimum of 40 revolutions shall be at the production plant.
- B. Schedule delivery so that continuity of any pour will not be interrupted for over 15 minutes.
- C. Place concrete on site within 90 minutes after proportioning materials at batch plant.
- D. Store bagged cement on platforms off ground. Protect stored cement against the elements. Handle and store fine and coarse aggregate separately in manner to prevent intrusion of foreign material or segregation of the material. Protect all reinforcement until used. Do not use any hardened cement.

- E. Mild steel reinforcement at the time of placement of concrete shall be clean and free of all loose dirt, form oil, and other coatings affecting bond.

1.7 JOB CONDITIONS

- A. Hot Weather Concreting:
 - 1. Follow ACI 301 and ACI 305.
 - 2. Provide water-reducing retarding admixture conforming to ASTM C494, Type D when necessary to retard initial set. The admixture shall be dispensed in accordance with manufacturer's recommendations.
 - 3. Maximum concrete temperature shall not exceed 95 degrees F at time of placement.
 - a. Concrete with temperatures above 90 degrees F shall be placed only if a high range water reducer (superplasticizer) is added to the mix as directed by the Testing Laboratory to maintain the specified slump during placement.
- B. Cold Weather Concreting: Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures.
 - 1. Follow ACI 301 and ACI 306.
 - 2. When ambient temperature at site is below 40 degrees F or is expected to fall to that temperature within ensuing 24 hours, heat water and/or aggregate prior to adding to mix so that temperature of concrete will be between 55 degrees F and 85 degrees F at time of placement.
 - 3. Maintain temperature of deposited concrete between 50 degrees F and 70 degrees F for minimum of seven (7) days after placing.
 - 4. Add the specified non-corrosive accelerator for all floor concrete placed at air temperatures below 50 degrees F.
- C. Temperature Changes: Maintain changes in concrete temperature as uniformly as possible, but in no case exceed change of 5 degrees F per hour or 25 degrees F in any 24-hour period.
- D. Combustion heaters shall not be used during the first 48 hours without precautions to prevent exposure of concrete and workmen to exhaust gasses containing carbon dioxide and/or carbon monoxide.
- E. Admixtures intended to accelerate hardening of concrete or produce higher than normal strength at early periods will not be permitted unless approved by the Architect. The use of calcium chloride is specifically prohibited.

1.8 PRE-INSTALLATION CONFERENCE

- A. Refer to Section 01 31 13 – Project Management and Coordination.

1.9 SEQUENCING/SCHEDULING

- A. Coordinate Work of this Section with work of other Sections as required to properly execute the Work and as necessary to maintain satisfactory progress of the work of other Sections.

PART 2 - PRODUCTS

2.1 APPROVED MANUFACTURERS

- A. Manufacturers named within this Section are approved for use on the Project for the product for which they are specified. Other manufacturers must have a minimum of five (5) years of experience manufacturing the product specified and meet or exceed the specifications for that product.

Substitution of products must be in accordance with the General Conditions, Supplementary Conditions, and Section 01 33 00, Submittals to be considered prior to proposal.

2.2 MATERIALS

A. Formwork:

1. General: Contractor may use any of the following formwork materials as long as material meets the following and will not stain, or impart any undesirable texture, i.e. wood grain, where such texture would be objectionable in an exposed location.
 - a. Wood Forms:
 - 1) Plywood: PS 1, Douglas Fir or Spruce species.
 - 2) Medium Density Overlay (MDO): One (1) side grade; sound undamaged sheets with clean, true edges.
 - 3) Lumber: Southern Yellow Pine species; No. 2 grade, with grade stamp clearly visible.
 - b. Prefabricated Forms:
 - 1) Preformed Steel Forms: Minimum 16 gauge matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.
 - 2) Glass Fiber Fabric Reinforced Plastic Forms: Matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.
 - c. Form Liner: Any material recommended by manufacturer to impart finish which will exhibit the finish or design characteristics, i.e. smooth, textured, ribbed, etc. detailed by the Architect for exposed locations as shown or required and capable of being stripped from complex designs without damaging the finish or design. Form liner shall be as manufactured by Symons by Dayton Superior or Architect approved equal.
 - d. Self-expanding corkboard expansion joint fillers should conform to ASTM D1752 for exterior work. Joint fillers shall extend full depth of slab or joint and be of thickness and lengths indicated on drawings.

B. Metal Reinforcement:

1. Bars:
 - a. General: Conform to ACI 315, latest edition.
 - b. Comply with ASTM A615, Grade 60.
 - c. Number 3 bars comply with ASTM A615, Grade 40
2. Welded Steel Wire Fabric (Mesh): Not permitted in structural concrete, unless approved by Structural Engineer

C. Concrete, General:

1. Ready-mixed concrete, ASTM C94
2. Comply with ACI 318.
3. Concrete must be approved by Architect through design mix and cylinder test of testing laboratory.
4. Unless approved otherwise by the Architect, use one (1) brand of cement throughout the work where finished surface will be exposed to view.
5. Strength: Refer to Paragraph 2.3, A.

D. Concrete Materials:

1. Cement:
 - a. Portland Cement, Type I or III, conforming to the requirements of ASTM C150.

- b. Combined aggregate gradation for slabs and other designated concrete shall be 8 percent - 18 percent for large top size aggregates (1-1/2 in.) or 8 percent - 22 percent for smaller top size aggregates (1 in. or 3/4 in.) retained on each sieve below the top size and above the No. 100.
 2. Fly ash: Not permitted.
- E. Aggregate:
1. Fine Aggregate: ASTM C33; clean, hard, durable, uncoated, natural and manufactured sand, free of silt, loam or clay.
 2. Coarse Aggregate: ASTM C33; hard, durable, uncoated, crushed stone; gradation in accordance with Size No. 467 for piers and concrete footings and Size No. 67 for all other concrete. Maximum aggregate size in accordance with ACI 318.
 3. Grading shall be in accordance with "Standard Method for Fine Analysis of Sieve and Coarse Aggregates" (ASTM C136).
- F. Water: ASTM C94, Paragraph 4.1.3; potable, clean and free from oil, acid and injurious amount of vegetable matter, alkalies, and other impurities.
- G. Admixtures:
1. Cement-dispersing, water-reducing types. Admixtures shall conform to ASTM C494, Type A or D, and shall be used strictly in accordance with manufacturer's recommendations and as determined by the Inspection and Testing Laboratory. Admixture shall not discolor concrete or in any way affect the appearance of the concrete.
 - a. High-range water reducing admixture conforming to ASTM C494, Type F or G shall be used as required and shall be one (1) of the following or Architect approved equal:
 - 1) Eucon 37 (Type F), Eucon 537 (Type G) by The Euclid Chemical Company
 - 2) Master Rheobuild 1000 (Type F), Rheobuild 716 (Type G) by BASF Admixtures
 - 3) Sikament 300 (Type F), Sikament 86 (Type G) by Sika Corp.
 - 4) WRDA-19 (Type F), Daracem 100 (Type G) by GCP Applied Technologies
 2. An air-entraining admixture conforming to ASTM C260 shall be used as required on the Drawings and shall be one (1) of the following or Architect approved equal:
 - a. Air-Mix or AEA-92 by The Euclid Chemical Company
 - b. Sika Aer by Sika Corporation
 - c. MB-VR or MB-AE by BASF Admixtures
 3. Prohibited Admixtures: Calcium chloride, thiocyanates or admixtures containing more than 0.05 percent chloride ions are not permitted.
 4. Certification: Written conformance to the above-mentioned requirements and the chloride ion content of admixtures will be required from the admixture manufacturer prior to mix design review by the Architect/Engineer.
- H. Non-Shrink Cement Grout:
1. The non-shrink grout shall be a factory pre-mixed grout and shall conform to ASTM C1107, "Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-Shrink)." In addition, the grout manufacturer shall furnish test data from an independent laboratory indicating that the grout when placed at a fluid consistency shall achieve 95 percent bearing under a 4 foot x 4 foot base plate. Provide one (1) of the following or Architect approved equal:
 - a. NS Grout by The Euclid Chemical Company
 - b. Five Star Grout by U.S. Grout LLC
 - c. Horn Non-Corrosive Non-Shrink Grout by Tamms Industries
 - d. DuragROUT by L & M Construction Chemicals, Inc.

- e. Masterflow 713 by BASF Admixtures
 - f. SikaGrout 212 by Sika Corp.
 - g. SonogROUT 10K by Sonneborn
 - h. 588 Grout by W. R. Meadows, Inc.
 - i. US SPEC GP Grout by US Mix Products Company
2. High Flow Grout: Where high fluidity and/or increased placing time is required, use high flow grout. The factory pre-mixed grout shall conform to ASTM C1107, "Standard Specification for Packages Dry, Hydraulic-Cement Grout (Non-Shrink)." In addition, the grout manufacturer shall furnish test data from an independent laboratory indicating that the grout when placed at a fluid consistency shall achieve 95 percent bearing under a 18 inch x 36 inch base plate. Provide one (1) of the following or Architect approved equal:
- a. Hi-Flow Grout by The Euclid Chemical Company
 - b. Crystex by L & M Construction Chemicals, Inc.
 - c. Masterflow 928 by BASF Admixtures
 - d. CG-86 Grout by W. R. Meadows, Inc.
 - e. US SPEC MP Grout by US Mix Products Company
- I. Non-Oxidizing Metallic Hardener: (For use at Loading Dock where shown)
1. Non-Oxidizing Metallic Floor Hardener: The specified non-oxidizing metallic floor hardener shall be formulated, processed and packaged under stringent quality control at the manufacturer's owned and controlled factory. The hardener shall be a mixture of specially processed non-rusting aggregate, selected portland cement and necessary plasticizing agents. Product shall be Diamond-Plate by The Euclid Chemical Company or Architect approved equal.
- J. Evaporation Retardant:
1. Evaporation Retardant shall be a thin, continuous film which prevents rapid moisture loss from the concrete surface. For use when concrete operations must be performed in direct sun, wind, high temperatures, or for relative humidity. Products: Subject to compliance with requirements, provide one (1) of the following or Architect approved equal:
 - a. Eucobar by The Euclid Chemical Company
 - b. Confilm by BASF Admixtures
 - c. Evapre by W. R. Meadows, Inc.
 - d. US SPEC Monofilm ER by US Mix Products Company.
 - e. E-Con by L& M Construction Chemicals
- K. Sealer/Densifier: Provide "Euco Diamond Hard" by The Euclid Chemical Company, "Sealhard" by L&M Construction Chemicals, or equal by Master Builders, Sika Corp., Sonneborn, US SPEC, or Architect approved equal.
- L. Chemical Hardener/Dustproofer: Provide "Surfhard" by The Euclid Chemical Company, "Chemhard" by L&M Construction Chemicals, or equal by Master Builders, Sika Corp., Sonneborn, US SPEC, or Architect approved equal.
- M. Curing Compound: dissipating resin type, which chemically breaks down after approximately eight (8) weeks. Membrane forming compound shall meet ASTM C309, Types 1 and 1D Class B, water based, VOC/AIM Compliant. Provide "Kurez DR VOX" by The Euclid Chemical Company, "Cure R" by L&M Construction Chemicals, "1100 Clear" by W. R. Meadows, Inc., US SPEC "Maxcure Resin Clear" by US Mix Products Company, or equal by Master Builders, Sika Corp., BASF, or Architect approved equal.
- N. Curing and Sealing Compound: high solids acrylic copolymer emulsion blend. Membrane forming compound shall meet ASTM C1315, Type 1 Class B. Provide "Super Rez-Seal" by The Euclid Chemical Company, "Dress & Seal" by L&M Construction Chemicals, "VOCOMP 25 1315" by W.

- R. Meadows, Inc., US SPEC "CS-25-1315" by US Mix Products Company, or equal by Master Builders, Sika Corp., BASF, or Architect approved equal.
- O. Epoxy Adhesive for rebar and threaded rod dowelling: Adhesive anchors shall have been tested and qualified for use in accordance with ICC-ES AC308 for cracked and uncracked concrete recognition. Size and location of anchors shall be as indicated on the drawings. Provide one (1) of the following or Structural approved equal:
1. Simpson Strong-Tie SET-XP (ICC-ES ESR-2508)
 2. Hilti Corp. RE 500-SD (ICC-ES ESR-2322)
 3. Powers Fasteners PE1000+ (ICC-ES ESR-2583)
- P. Epoxy Adhesive to bond fresh concrete to hardened concrete and grout base plates: ASTM C881, two (2) component, 100 percent solids, 100 percent reactive compound suitable for use on dry or damp surfaces. Provide one (1) of the following or Architect approved equal:
1. Euco #452 Epoxy System or Euco #620 Epoxy System by The Euclid Chemical Company
 2. Sikadur Hi-Mod by Sika Corp.
 3. Rezi-Weld 1000 by W. R. Meadows, Inc.
 4. US SPEC Maxibond 2500 by US Mix Products Company.
 5. Epobond by L& M Construction Chemicals.
- Q. Underslab Vapor Retarders and Barriers:
1. Vapor Retarder Membrane:
 - a. Requirements:
 - 1) Class: ASTM E1745, Class A.
 - 2) Water Vapor Permeance: ASTM E96, 0.015 perms maximum.
 - 3) Tensile Strength: ASTM E154 (Section 9, Average), 45.0 pounds per inch, minimum.
 - 4) Puncture Resistance: ASTM D1709 (Method B), 2400 grams, minimum.
 - b. Provide compatible seam taping and pipe boots or sealing mastic in accordance with manufacturer's requirements.
 - c. Provide proof of compliance to Architect at time of delivery of materials.
 - d. Provide one (1) of the following under entire slab, unless noted otherwise:
 - 1) Barrier Bac-Inc "VB-350"
 - 2) Insulation Solutions, Inc. "Viper II 15 mil"
 - 3) Raven Industries, Inc. "VaporBlock 15"
 - 4) Reef Industries, Inc. "Griffolyn 15 Mil Green"
 - 5) Stego Industries, LLC "Stego-Wrap 15-mil"
 - 6) Tex-Trude, "Xtreme 15 Mil"
 - 7) W. R. Meadows, Inc. "Perminator 15"
 2. Vapor Barrier: Under Wood Floors at Gymnasiums, Stages, and Dance Floors, and at Auditorium Areas Below Finish Floor Level: Premoulded Membrane Vapor Seal with Plasmatic Core manufactured by W.R. Meadows, Inc., Hampshire, IL; or Architect approved equal.
 3. Below Grade Waterproofing: Provide below grade waterproofing at vertical walls below grade and beneath elevator pit in accordance with Section 07 16 00.
- R. Miscellaneous Structural Metals Associated with Structural Concrete:
1. Structural steel pieces, including miscellaneous structural metals placed in concrete, exposed to weather, in permanent contact with soil, or accessible to salt intrusion shall be hot dipped galvanized in accordance with ASTM A123.
 2. Structural steel pieces embedded in concrete shall conform to ASTM A36, unless noted otherwise on the Drawings.
 3. Welding of inserts, anchors and other steel pieces used in conjunction with structural concrete shall conform to AWS DI.4.

4. Welding of reinforcing steel used in conjunction with structural concrete shall conform to AWS DI.4.
 5. Headed stud anchors shall conform to ASTM A108, minimum tensile strength 60,000 PSI.
 6. Mechanical and screw anchors shall have been tested and qualified for use in Accordance with ACI 355.2 and ICC ES AC193 for cracked and uncracked concrete recognition. Size and location shall be as indicated on the Drawings. Provide one (1) of the following or Structural approved equal.
 - a. Simpson Strong-Tie Strong-Bolt wedge anchor (ICC-ES ESR-1771)
 - b. Simpson Strong-Tie Strong-Bolt 2 wedge anchor (ICC-ES ESR-3037)
 - c. Simpson Strong-Tie Titen HD screw anchor (ICC-ES ESR-2713)
 - d. Hilti Corp. Kwik-Bolt TZ wedge anchor (ICC-ES ESR-1917)
 - e. Hilti Corp. Kwik HUS-EZ screw anchor (ICC-ES ESR-3037)
 - f. Hilti Corp. HAD undercut anchor (ICC-ES ESR-1546)
 - g. Powers Fasteners Power-Stud+ SD2 wedge anchor (ICC-ES ESR-2502)
 - h. Powers Fasteners Wedge-Bolt+ screw anchor (ICC-ES ESR-2526)
 - i. Powers Fasteners Atomic+ undercut anchor (ICC-ES ESR-3067)
- S. Miscellaneous Materials and Accessories:
1. Form ties: Adjustable length and type which will not leave holes larger than 1 inch in diameter in face of concrete. Ties shall be such that when forms are removed, no metal will be within 1 inch of the finished concrete surface. The holes must be patched.
 2. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages, Fasteners: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.
 3. Form Release Agent: Colorless mineral oil which will not stain concrete or absorb moisture.
 4. Chairs and Spacers: Heavy-duty plastic-type sized to support all reinforcing steel to proper height. Use type with sand cushion pads where concrete is on grade. Provide chairs and spacers Series "B" by W.H.C. Products, Inc., E-Z Chair by Aztec Concrete Accessories, Inc., GTI Bar Chair by General Technologies, Inc., or Architect approved equal.
 5. Waterstops:
 - a. Ribbed flat 3/16 inch by six (6) inch with 1/8 inch ribs, rated for 75 foot of head pressure. Provide factory made corner fittings weld splices with thermostatically controlled heating iron. Style No. 782 by Greenstreak, Inc., or Architect approved equal.
 - b. Contractor's Material Option: Specially formulated preformed joint sealant that provides a lasting,, watertight bond to both fresh and cured concrete surfaces. Synko-Flex Preformed Plastic Adhesive Waterstop and Synko-Flex Primer manufactured by Synko-Flex Products, Division of Henry Company, Houston, Texas; (713) 671-9502 or Architect approved equal.
 6. Carton Void Forms: If shown or required, shall be wax coated corrugated paper material, rectangular in shape and same width as the grade beams, with 1/8-inch thick tempered hardboard for top plane. Provide void forms as required (i.e. with curves, radial) that have vertical supported edges adjacent to all drilled piers, in order to prevent damage to the interior supporting network caused by field cutting.
 7. Soils retainers: If shown or required, shall be composed of lightweight, plastic material that is not adversely affected by moisture. They must be flexible, impact resistant and must be able to resist lateral loads applied by the soils. Retainers shall extend both 6" above and below the top and bottom of void forms.
 8. Corners: Chamfer, wood strip type; one (1) inch x one (1) inch size; maximum possible lengths.
 9. Dovetail Anchor Slot: Galvanized steel, 22 gauge thick, foam filled, release tape sealed slots, anchors for securing to concrete formwork.
 10. Flashing Reglets: Galvanized steel, 22 gauge thick, longest possible lengths, with alignment splines for joints, foam filled, release tape sealed slots, anchors for securing to concrete formwork.
 11. Bonding Agent: Acrylic latex emulsion type as recommended for bonding new concrete to old concrete.

12. Integral Color Pigment (If shown or required): Mineral oxide, lightfast, lime-proof, water-resistant type conforming to ASTM C979. Color(s) shall be as selected by Architect from manufacturer's standard color line. Provide one (1) of the following or Architect approved equal:
 - a. ChemSystems, Inc.
 - b. Davis Colors
 - c. New Riverside Ochre Co., Inc.
 - d. L.M. Scofield Company
13. Color Stain (If shown or required): A chemically reactive stain, designed for adding variegated color to new or old concrete. Color(s) shall be as selected by Architect from manufacturer's standard color line. Provide Lithochrome Chemstain by L.M. Scofield Company or Architect approved equal.
14. Joint Sealants: Refer to Section 07 92 00, Building Sealants

2.3 CONCRETE MIXES

- A. Strength: Concrete is classified and specified by ultimate compressive strength (f c) at the age of 28 days. Unless indicated otherwise on the Drawings, strengths shall be as follows:
 1. All concrete including grade beams, footings, slabs, and pads: 5 sack/3,000 psi/28 days.
 2. Strength recommendations on Structural Drawings supersede when they are greater than specified here.
- B. Interior slabs subjected to vehicular traffic: This concrete shall have a maximum W/cm of 0.48 and maximum air content of 3 percent. No air-entraining admixture shall be added to this mix.
- C. Concrete permanently exposed to freezing and thawing shall conform to Chapter 4 – Durability Requirements of ACI 318. W/cm and air content ratios shall coincide with its respective Exposure Class.
- D. Proportions: Proportions of cement, aggregate, admixture and water to attain required plasticity and compressive strength shall be in accordance with ACI 318, Section 5.3, Proportioning on the basis of field experience and/or trial mixtures. Do not make changes in proportions without submitting proposed changes to Inspection and Testing Laboratory for evaluation.
 1. Trial mixtures having proportions and consistencies suitable for the work shall be made based on ACI 211. 1, using at least three (3) different water-cement ratios which will produce a range of strengths encompassing those required for this project.
 2. Trial mixes shall be designed to produce a slump within 3/4 inch of the maximum permitted, and for air-entrained concrete, within 0.5 percent of maximum allowable air content. The temperature of concrete used in trial batches shall not exceed the maximum temperature specified.
 3. For each water-cement ratio, at least three confirmation compression test cylinders for each test age shall be made and cured in accordance with ASTM C192. Confirmation cylinders shall be tested at seven (7) and 28 days in accordance with ASTM C39.
 4. From the results of the 28-day confirmation tests, a curve shall be plotted showing the relationship between the water-cement ratio and compressive strengths. From this curve, the water-cement ratio to be used in the concrete shall be selected to produce the average strength required.
 5. The cement content and mixture proportions to be used shall be such that this water-cement ratio is not exceeded when slump is the maximum permitted. Control in the field shall be based upon maintenance of proper cement, water content, slump and air content.
 6. Mix designs furnished by the concrete supplier, shall be based on the standard deviation analysis of previous test records meeting the requirements of Section 5.3.1 - Standard deviation of ACI 318. These mixes will be accepted in lieu of trial mixtures described in paragraphs above.

- a. Temperature of concrete in test data shall be within 5 degrees F of maximum temperature specified for this project.
- b. Strengths indicated in test data shall be in accordance with ACI 318, Section 5.3.
- c. The specified strength of concrete used in supporting test data shall vary no more than 500 PSI plus or minus from that specified for this project.
- d. The Testing Laboratory shall keep a strength and standard deviation record of all concrete for the duration of the project as specified in this section.

PART 3 - EXECUTION

3.1 GENERAL

- A. Inserts: Give the various trades and subcontractors ample notification and opportunity to furnish all anchors, nailers, pipes, conduits, boxes, inserts, thimbles, sleeves, frame vents, wires, supports, or other items required to be built into the concrete by the provisions of the Drawings or of the Specification governing the work of such trades and subcontractors, or as it may be necessary for the proper execution of their work. Obtain suitable templates or instructions for the installation of such items which are required to be placed in the forms.
- B. Install under-slab vapor retarder as instructed by manufacturer in accordance with ASTM E1643. Penetrations shall be sealed to maintain integrity of barrier. Tape around all openings and seal all penetrations as instructed by the barrier manufacturer. Grade stakes shall not be driven through the vapor barrier. Avoid punctures during reinforcement and concrete placement.
- C. Slump:
 1. Concrete not containing a high range water reducing admixture shall not be placed when its plasticity, as measured by slump test, is outside the following limits:
 - a. Footings: 6 inches maximum, 4 inches minimum
 - b. All other Structural Concrete: 5 inches maximum, 3 inches minimum
 - c. Pavement: 4 inches maximum. Coordinate slump with requirements in Section 32 13 13, Concrete Paving.
 - d. Slump drop not to exceed 2 inches when pumped.
 2. Concrete containing a high range water reducing admixture shall not be placed when its plasticity, as measured by slump test, is outside the following limits:
 - a. Prior to addition high range water reducer: 3 inches maximum, 2 inches minimum.
 - b. After addition of high range water reducer: 9 inches maximum.
- D. Classes of Concrete and Usage: Concrete of the several classes of concrete required shall have the characteristics shown on the Drawings.
- E. Mixing:
 1. Transit-mixed concrete conforming to the requirements of ASTM C94 and ACI 304 shall be used in lieu of concrete mixed at the job site. Concrete shall not be transported or used in any case after a period in excess of 90 minutes has elapsed after the introduction of water into the mixer.
 2. Indiscriminate addition of water to increase slump of concrete is prohibited. Add water only at the direction of the Testing Laboratory. No water shall be added which increases the water cement ratio of the concrete in excess of the water cement ratio indicated on the approved mix design. At the direction of the Inspection and Testing Laboratory the addition of a high range water reducing admixture may be used to retemper concrete.
 3. The agency supplying transit-mixed concrete shall have a plant of sufficient capacity and adequate transportation facilities, to assure continuous delivery at the rate required. The frequency of deliveries to the site of the work must be such as to provide for placing the concrete continuously throughout any one (1) pour.

- F. Conveying Concrete: Convey concrete from the mixer to the place of final deposit by methods which will prevent the separation or loss of the ingredients. Concrete to be conveyed by pumping shall be submitted to the Inspection and Testing Laboratory for evaluation for each class of concrete specified before being used. Test cylinders for pumped concrete shall be taken at the discharge end of the pumping equipment.
- G. Equipment for chuting, pumping, and pneumatically conveying concrete shall be of such size and design as to assure a practically continuous flow of concrete at the delivery end without separation of the materials. The use of gravity-flow or aluminum chutes or conveyors for transporting concrete horizontally will not be permitted.
- H. Miscellaneous Materials and Accessories: if not specifically noted, install all materials and accessories per manufacturer's instructions as if noted here in full.
- I. Extend underslab vapor barrier continuously under entire slab, slab turn downs, vertical face of grade beams and footings to completely protect concrete adjacent to earth. Overlap joints and install seam tape and pipe boots, and seal penetrations as instructed by manufacturer.
- J. Bars shall be supported on chairs or spacers on metal hangers, accurately placed and securely fastened to steel reinforcement in place. No wood or clay brick will be permitted inside forms.
- K. All reinforcing shall be set in place, spaced, and rigidly and securely tied or wired at all splices and at all crossing points and intersections.
- L. Minimum center to center distance between parallel bars shall be in accordance with the details on the drawings. Where not shown, the clear spacing shall be 1-1/2 times the bar diameter but never less than 1-1/2 inches.
- M. Lap of splices where shown and noted on the drawings shall be a minimum of 32 bar diameters but never less than 12 inches.
- N. Except where shown on the drawings, minimum concrete coverage for reinforcing steel shall be:
 - 1. 3 inches...where concrete is placed against earth
 - 2. 1-1/2 inches...over column ties
 - 3. 1-1/2 inches...for #5 and smaller bars in formed walls
 - 4. 2 inches...for all bars larger than #5 in formed walls
 - 5. 1 inch...for #11 and smaller bars in suspended slabs
 - 6. 1-1/2 inches...for all bars larger than #11 in suspended slabs

3.2 CONCRETE CONTROL AND TESTING

- A. Inspection and Testing laboratory services shall be in accordance with Section 01 45 23, Testing and Inspecting Services.
- B. Except as noted below, all inspection and testing related to concrete placement, including reinforcing and embedded items, shall be the responsibility of the Owner. The Owner will directly engage the services of a qualified Testing and Inspection Laboratory, however, the Contractor shall provide access to the Owner's consultant, and, if required, the Contractor shall provide patching and repairing of surfaces removed to facilitate testing and inspection.
- C. Should the strength of concrete fall below the minimum, then additional tests, including load tests, may be required. These tests, if required, shall be made at the Contractor's expense and shall be in accordance with ASTM C42 and ACI 318. If tests do not meet the applicable requirements, then the structure, or any part of the structure, shall be removed and replaced at the Contractor's expense.

- D. Any concrete testing requested by the Contractor for early formwork or shoring removal, etc., shall be at the Contractor's expense.
- E. Do not permit placement of concrete having a measured slump outside limits given on Drawings or Specifications, except when approved by Architect/Engineer.

3.3 PLACING CONCRETE

- A. Place concrete in reasonably uniform layers, approximately horizontal, and not more than 18 inches deep, exercising care to avoid vertical joints or inclined planes. The piling up of concrete in the forms in such a manner as to cause the separation or loss of any of its ingredients will not be permitted. Concrete which has partially set or hardened shall not, under any circumstances, be deposited in the work. All slabs shall be placed for full thickness in one operation without change in proportions, screeded to proper elevation, and floated. Dusting of surfaces with cement is prohibited.
- B. Place concrete in the forms as nearly in its final position as is practical to avoid re-handling. Exercise special care to prevent splashing the forms or reinforcement with concrete. Remove any hardened or partially hardened concrete which has accumulated on the forms or reinforcement before the work proceeds. Do not place concrete on previously deposited concrete which has hardened sufficiently to cause the formation of seams or planes of weakness within the respective member of section, except as hereinafter specified.
- C. Do not permit concrete to drop freely any distance greater than five (5) feet. Where longer drops are necessary, use a chute, tremie, or other acceptable conveyance to assist the concrete into place without separation. Do not pour directly into any excavations where water is standing.
- D. Vibration: As soon as concrete is deposited, thoroughly agitate same by means of mechanical vibrators and suitable hand tools, so manipulated as to work the mixture well into all parts and corners of the forms, and entirely around the reinforcement and inserts. Mechanical vibrators shall maintain frequencies in accordance with the recommendations of ACI 309. Table 5.1.4, and shall be operated by competent workmen. Over vibrating and use of vibrators to transport concrete within forms shall not be allowed. A spare vibrator shall be kept on the job site during all concrete placing operations.
- E. Bonding: Before depositing any new concrete on or against previously deposited concrete which has partially or entirely set, the surface of the latter shall be thoroughly roughened and cleaned of all foreign matter, scum and laitance. The specified or an Architect approved bonding agent or epoxy adhesive shall be used.
- F. Construction Joints: Except as otherwise specifically indicated on the Drawings, each concrete member shall be considered as a single unit of operation, and all concrete for the same shall be placed continuously in order that such unit will be monolithic in construction. Should construction joints prove to be absolutely unavoidable, same shall be located at or near the midpoints of spans. Additional construction joints shall not be made under any circumstances without prior review by the Architect.

Protect all freshly placed concrete from washing by rain, flowing water, etc. Do not allow the concrete to dry out from the time it is deposited in the forms until the expiration of the curing period.

Imperfect or damaged work, or any material damaged or determined to be defective before final completion and acceptance of the entire job, shall be satisfactorily replaced at the Contractor's expense and shall be in conformity with all of the requirements of the Contract Documents. Removal and replacement of concrete work shall be done in such a manner as not to impair the appearance or strength of the structure in any way.

- G. Cleaning: Upon completion of the work, all forms, equipment, protective coverings and any rubbish resulting therefrom shall be removed from the premises. Finished concrete surfaces shall be left in clean and perfect condition, satisfactory to the Owner. Sweep with an ordinary broom and remove all mortar, concrete droppings, loose dirt, mud, etc.

3.4 FLOOR AND SLAB FINISHES

- A. Scratch Finish: Apply scratch finish to monolithic slab surfaces that are to receive concrete floor topping or mortar setting beds for tile, portland cement terrazzo, and other bonded applied cementitious finish flooring material, and as otherwise indicated.
1. After placing slabs, surface shall be leveled to an $F_F 15 - F_L 13$ tolerance. Slope surfaces uniformly to drains where required. After leveling, roughen surface before final set, with stiff brushes, brooms or rakes.
- B. Float Finish: Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as hereinafter specified, and slab surfaces which are to be covered with membrane or elastic waterproofing, or sand-bed terrazzo, and as otherwise indicated.
1. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating when surface water has disappeared or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats, or by hand-floating if area is small or inaccessible to power units. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture. Surface shall achieve an $F_F 20 - F_L 17$ tolerance.
- C. Trowel Finish: Apply trowel finish to monolithic slab surfaces to be exposed-to-view, and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint, or other thin film finish coating system.
1. After floating, begin first trowel finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final troweling operation, free of trowel marks, uniform in texture and appearance and to a $FF35/ FL30$ tolerance ($FL17$ for elevated slabs). Grind smooth surface defects, which would telegraph through applied floor covering system.
- D. Non-Slip Broom Finish: Apply non-slip broom finish to exterior concrete platforms, steps and ramps, exterior dugout slabs, and elsewhere as indicated.
1. Immediately after float finishing, slightly roughen concrete surface by brooming with fiber bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application. A sample panel is required.
- E. Liquid Densifier/Sealer: Apply liquid densifier/sealer on exposed interior floors subject to vehicular abrasion and as indicated on the Drawings. Compound shall be mechanically scrubbed into the surface in strict accordance with the directions of the manufacturer and just prior to completion of construction.
- F. Non-Oxidizing Metallic Floor Hardener: All slabs, in the loading dock area, or other areas noted on the Drawings, shall receive an application of the non-oxidizing, metallic floor hardener applied in accordance with manufacturer's instructions to produce a smooth dense finish.

3.5 NON-SHRINK GROUT

- A. Refer to Structural Drawings for column base plates and other structural grouting requirements.
- B. Non-shrink grout shall be mixed only in such quantities as are needed for immediate use. No re-tempering shall be permitted and materials which have been mixed for a period exceeding 30 minutes shall in no case be used upon any portion of the work.

- C. Where high fluidity and/or increased placing time is required use the specified high flow grout. This grout shall be used for all base plates larger than ten (10) square feet.
- D. For every 1/3 cubic yards of grout placed, grout strength shall be tested with a set of cubes as follows:
 - 1. A set of cubes shall consist of three cubes to be tested seven (7) days, and three (3) cubes to be tested at 28 days.
 - 2. Test cubes shall be made and tested in accordance with ASTM C1107, Section 12.5, with the exception that the grout should be restrained from expansion by a top plate.

3.6 CURING AND PROTECTION

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. All concrete shall be kept continuously moist and above 50 degrees F for seven days. When high early strength concrete is used this temperature requirement may be lowered to three (3) days.
- B. Curing Methods: Perform curing of concrete by curing and sealing compound, by moist curing, by moisture-retaining cover curing, and by combinations thereof, as herein specified.
 - 1. Provide specified curing compound to exposed interior slabs. This curing compound must be dissipating or easily removed in the cleaning process prior to the application of any liquid densifier/ sealer.

3.7 DEFECTIVE WORK

- A. Imperfect or damaged work, or any material damaged or determined to be defective before final completion and acceptance of the entire job, shall be satisfactorily replaced at the Contractor's expense and shall be in conformity with all of the requirements of the Contract Documents. Removal and replacement of concrete work shall be done in such a manner as not to impair the appearance or strength of the structure in any way.

3.8 CLEANING

- A. Upon completion of the work, all forms, equipment, protective coverings and any rubbish resulting therefrom, shall be removed from the premises. Finished concrete surfaces shall be left in clean and perfect condition, satisfactory to the Owner. Sweep with an ordinary broom and remove all mortar, concrete droppings, loose dirt, mud, etc.

3.9 REPAIR OF DEFECTIVE AREAS

- A. With prior approval of the Architect/Engineer, as to method and procedure, all repairs of defective areas shall conform to ACI 301, Section 5.3.7, using the polymer repair mortars and/or epoxy adhesives furnished by The Euclid Chemical Company, Sika Chemical Corp., or Architect approved equal.

3.10 FIELD QUALITY CONTROL AND TESTING

- A. Inspection and Testing Laboratory services shall be in accordance with Section 01 45 23, Testing and Inspecting Services.

END OF SECTION 03 30 00

SECTION 11 68 33 - OUTDOOR FOOTBALL EQUIPMENT

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Football Goal Posts

1.2 RELATED WORK

- A. Section 03 30 00 - Cast-In-Place Concrete

1.3 SUBMITTALS

- A. Product Data: Submit schedules, charts, literature, and illustrations to indicate the performance, fabrication procedures, product variations, and accessories.
- B. Shop Drawings: Indicate size, material, and finish. Show locations and installation procedures. Include details of joints, attachments, and clearances.

1.4 COORDINATION

- A. Coordination by all contractors and equipment manufacturers/suppliers for the work of this section shall be performed without delays or damage to parts of any work.

1.5 WARRANTY

- A. Warrant the Work specified for three (3) years against becoming unserviceable or causing an objectionable appearance resulting from either defective or nonconforming materials and workmanship.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. All materials shall be approved and installed in accordance with University Interscholastic League (UIL) and the National Federation of State High School Associations (NFHS) football rules/regulations (latest edition).

2.2 APPROVED MANUFACTURERS

- A. A manufacturer listed whose product meets or exceeds the specifications is approved for use on the Project. Other manufacturers must have a minimum of five (5) years experience manufacturing products equivalent to those specified and comply with Division 1 requirements regarding substitutions to be considered.

2.3 FOOTBALL GOAL POSTS

- A. Competition and Practice Field Football Goal Posts:
 - 1. *(30' High School)* All aluminum goal post having a main standard (gooseneck) 10-feet in height above the playing surface with an 8-foot offset, a crossbar being 23 feet-4 inches in width, and uprights being 30-feet in height. The main standard (gooseneck) shall be 6"

diameter Schedule 40 aluminum, the crossbar shall be 6" diameter Schedule 40 aluminum includes patented AdjustRight® feature, and the uprights shall be fabricated of Extruded 6061-T6 Aluminum Tube (4" O.D.) with rigid wire loop welded to upper end. The aluminum goal post shall be a plate mount style gooseneck with stainless steel hardware. The manufacturer shall supply all necessary hardware including anchor bolts for installation, including an access frame kit to go around the plate mount for future access. The frame kit shall come with a split cover for goal post installed and a solid cover for goal post removal. The goal post shall be powder coated white or yellow as directed by the owner.

Paint goal posts prior to installation using Sulfur Yellow "DS311Y57" fluorescent yellow paint or Reflective White "ZS211W48" white paint as manufactured by ProTech Powder Coatings or approved equivalent fluorescent yellow or white paint. Paint shall be applied to goal posts in accordance with manufacturer's recommendations for paint system, utilizing all recommended primers, sealers, etc.

Approved manufacturer/product: Sportsfield Specialties Inc. Model No. GP830HSPL- Base Plate Mount High School Football Goal Post System, Model No. GPAFIT access frame kit with infill retainer system, Model No. GPAFITC full cover plug.

2. Provide safety pad to wrap around the main standard gooseneck as recommended by goal post manufacturer to suit application. The goal post pad shall have a minimum 18" outside diameter, be 6 feet in height, and be constructed of a dense polyurethane foam core. The pad shall be covered with a heavy coated vinyl with polyester scrim (18 oz. per square yard). Custom digitally printed graphics available upon request.
 - B. Approved manufacturer/product: Sportsfield Specialties Inc., GPPR round football goal post pad. GPPRDG- custom digitally printed graphic round football goal post pad.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install items in accordance with manufacturer's instructions, and in locations shown on drawings or as directed by Owner/Consultant.
- B. Football Goal Posts: Goal posts and foundations shall be installed and assembled in accordance with manufacturer's requirements.

END OF SECTION 11 68 33

SECTION 11 68 43 - OUTDOOR SOCCER EQUIPMENT

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Soccer Goals

1.2 RELATED WORK

- A. Section 03 30 00 - Cast-In-Place Concrete

1.3 SUBMITTALS

- A. Product Data: Submit schedules, charts, literature, and illustrations to indicate the performance, fabrication procedures, product variations, and accessories.
- B. Shop Drawings: Indicate size, material, and finish. Show locations and installation procedures. Include details of joints, attachments, and clearances.

1.4 COORDINATION

- A. Coordination by all contractors and equipment manufacturers/suppliers for the work of this section shall be performed without delays or damage to parts of any work.

1.5 WARRANTY

- A. Warrant the Work specified for three (3) years against becoming unserviceable or causing an objectionable appearance resulting from either defective or nonconforming materials and workmanship.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. All materials shall be approved and installed in accordance with NCAA rules and regulations (latest edition).

2.2 APPROVED MANUFACTURERS

- A. A manufacturer listed whose product meets or exceeds the specifications is approved for use on the Project. Other manufacturers must have a minimum of five (5) years experience manufacturing products equivalent to those specified and comply with Division 1 requirements regarding substitutions to be considered.

2.3 SOCCER GOALS

- A. Portable Soccer Goals:
 - 1. Aluminum soccer goal (provide two) being 8-foot high by 24-foot wide by 8-foot deep, with the front frame being 4" round-faced aluminum tubing.
 - a) Soccer goals shall be powder coated with color being "White".
 - 2. Approved Product/Manufacturer:

- a) Sportsfield Specialties Inc. Model SG4950, UCS Model 900-8025, SportsEdge Model SE2B3806, or approved equivalent.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install items in accordance with manufacturer's instructions, and in locations shown on drawings or as directed by Owner/Consultant.

END OF SECTION 11 68 43

SECTION 11 68 63 - OUTDOOR TRACK AND FIELD EQUIPMENT

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Pole Vault Box
- B. Shot Put Ring
- C. Shot Put Toe Board
- D. Shot Put Cage
- E. Long Jump/Triple Jump Take-Off System
- F. Long Jump/Triple Jump Pit Cover

1.2 RELATED WORK

- A. Section 03 30 00 - Cast-In-Place Concrete

1.3 SUBMITTALS

- A. Product Data: Submit schedules, charts, literature, and illustrations to indicate the performance, fabrication procedures, product variations, and accessories.
- B. Shop Drawings: Indicate size, material, and finish. Show locations and installation procedures. Include details of joints, attachments, and clearances.

1.4 COORDINATION

- A. Coordination by all contractors and equipment manufacturers/suppliers for the work of this section shall be performed without delays or damage to parts of any work.

1.5 WARRANTY

- A. Warrant the Work specified for three (3) years against becoming unserviceable or causing an objectionable appearance resulting from either defective or nonconforming materials and workmanship.

PART 2 - PRODUCTS

2.1 MATERIALS

All materials shall be approved and installed in accordance with UIL/NCAA/IAAF rules and regulations (latest edition).

2.2 APPROVED MANUFACTURERS

- A. A manufacturer listed whose product meets or exceeds the specifications is approved for use on the Project. Other manufacturers must have a minimum of five (5) years experience manufacturing products equivalent to those specified and comply with Division 1 requirements regarding substitutions to be considered.

2.3 POLE VAULT BOX

- A. Provide stainless steel vault box to meet UIL/NCAA/IAAF standards. The vault box form shall be made of 13-gauge, 304 stainless steel. Contractor shall make a plug for the vault box using the same synthetic materials as the running track surface.
- B. Approved Product/Manufacturer: Sportsfield Specialties Inc. Model TFPV002SS, UCS Model 725-2595, or approved equivalent SportsEdge Model SE504.

2.4 SHOT PUT RING

- A. Provide an 84-inch aluminum (2"x2"x1/4" thick angle) 2-piece, pre-bent throwing ring to meet UIL/NCAA/IAAF standards.
- B. Approved Product/Manufacturer: Sportsfield Specialties Inc. Model TFSPH084AL, UCS Model 725-2575, or approved equivalent SportsEdge Model SE374.

2.5 SHOT PUT TOE BOARD

- A. Provide a cast aluminum toe board being 48-3/4"x12-1/4"x3-1/4" with the exact radius for the 84-inch diameter recessed shot put ring meeting UIL/NCAA/IAAF standards.
- B. Approved Product/Manufacturer: Sportsfield Specialties Inc. Model TFSPT001AL, UCS Model 716-1630, or approved equivalent SportsEdge Model SE364.

2.6 SHOT PUT CAGE

- A. Provide removable Shot-Put Cage installed to meet UIL/NCAA/IAAF standards. The cage shall have four (4), 4-inch diameter schedule 40 aluminum posts with manufacturer provided ground sleeves. Pole height above finish grade shall be 14-feet high with a 3-foot curved offset. Cage Netting shall be 13' by 42'-6", #36 (1-3/4" square mesh) nylon black twine treated for UV.
- B. Approved Product/Manufacturer: Sportsfield Specialties Inc. Model TFSPCCOLL or approved equivalent SportsEdge Model SE8050.

2.7 LONG JUMP/TRIPLE JUMP TAKE-OFF SYSTEM

- A. Provide Take-Off Board Tray System to include foundation tray, take-off board, blanking lid and plasticine insert to meet UIL/NCAA/IAAF standards.
- B. Approved Product/Manufacturer: Sportsfield Specialties Inc. Model TFLT008SS-SYN-BL, UCS Model 519-2300, or approved equivalent SportsEdge Model SE43501.

2.8 LONG JUMP/TRIPLE JUMP PIT PANEL COVER SET

- A. Provide weight mesh and vinyl pit covers constructed with tear and UV resistant mesh and vinyl.
- B. Approved Product/Manufacturer: Sportsfield Specialties Inc. Model XXXXX, or approved equivalent.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install items in accordance with manufacturer's instructions, and in locations shown on drawings or as directed by Owner/Consultant.

END OF SECTION 11 68 63

SECTION 31 11 00 - CLEARING AND GRUBBING

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Protecting and preserving trees and vegetation designated to remain.
- B. Clearing of site, including, but not limited to the removal of trees, shrubs, and vegetation which is not designated to remain, and brush, branches, logs, rock, debris, rubbish and other objectionable material from the entire project area.
- C. Grubbing of site, including, but not limited to uprooting and removal of all stumps, roots, other organics, etc. to their full depth from the project area and disking to a depth of nine (9) inches.
- D. Removal and legal, satisfactory disposal of all material cleared and grubbed from the site.

1.2 PAYMENT

- A. No separate measurement or payment will be made for materials and labor performed under this section. Include all costs in the lump sum price.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

3.1 CONDITIONS AT SITE

- A. Execute all work in an orderly and careful manner with due consideration for any and all surrounding areas, planting or structures which are to remain. Periodically, water as required to allay dust and dirt. Protect any adjacent property and improvements from damage and replace any portions damaged through this operation.
- B. Coordinate and comply with the following:
 - 1. Geotechnical Report.
 - 2. Local ordinances and requirements of authorities having jurisdiction.
- C. The Contractor shall take proper precautions to protect adjacent or adjoining property from damage caused by clearing and grubbing activities. All damage shall be repaired or replaced at Contractor's expense.
- D. The Contractor shall be responsible for obtaining all permits required by State and local governing agencies.

3.2 DISPOSAL OF MATERIAL

- A. All cleared and grubbed material becomes the property of the Contractor and shall legally and satisfactorily be removed and disposed of off-site. **On-site burning will not be permitted.**

3.3 FINAL SITE PREPARATION

- A. Remove all rubbish, debris, etc., resulting from Work of this Section from the site.
- B. After clearing, grubbing and discing the project site, rake and pick the entire site to remove all debris material.

END OF SECTION 31 11 00

SECTION 31 13 13.13 - WASTE MATERIAL DISPOSAL

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 - GENERAL

1.1 SCOPE

- A. Waste material disposal consists of disposal of trees, brush, vegetation, rubbish and other objectionable matter from operations such as clearing and grubbing, demolition, excavation, concrete placement and grading. Unless otherwise specified, the Contractor is responsible for removal and disposal of waste material.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Specific products are not required. Use equipment and materials necessary to properly complete disposal of waste materials.

PART 3 - EXECUTION

3.1 DISPOSAL AREA

- A. Items noted on plans to be "removed" or "disposed" will be taken completely off the site.
- B. Concrete wash-out will become property of Contractor to be disposed of with other waste materials.

3.2 COMPACTION AND GRADING

- A. Level off waste material to an elevation 12 inches below final grade. Place excess topsoil on waste material in a layer not less than 12 inches thick and compact to the density of the surrounding area.

END OF SECTION 31 13 13.13

SECTION 31 20 00 – EARTHWORK (UNDER PAVING AND SITE APPURTENANCES)

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 - GENERAL

1.1 SCOPE

- A. This section includes the furnishing of all plant, labor, equipment, materials and the performance of all operations required to complete the Earthwork indicated on the Drawings and specified herein, including the following: Clearing and Grubbing, Stripping, Excavation, Embankment, Borrow, Subgrade Preparation, Compaction and Finish Grading.

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

3.1 CLEARING & GRUBBING

- A. This item shall consist of clearing the ground of all trees, brush, rubbish, and of grubbing the roadway, pavement areas, roadside ditches and/or outfall ditch right-of-way or other easements as designated within the limits of the project. The designated areas shall be cleared of stumps, brush, logs, rubbish, trees and shrubs, except such trees and shrubs and certain areas designated by the Engineer for preservation shall be carefully protected from abuse, marring or damage during construction operations. Continual parking and/or servicing of equipment under the branches of trees designated for preservation will not be permitted. Trees and shrubs designated for preservation, that must be pruned, shall be trimmed as directed by the Engineer and all exposed cuts over two (2) inches in diameter shall be treated with an approved material.
- B. On areas required for paving, channel, or structural excavation, all stumps, roots, etc., shall be removed to a depth of approximately 2-feet below the lower elevation of the excavation. On areas required for embankment construction, all stumps, roots, etc., shall be removed to a depth of approximately 2-feet below the existing ground surface. All holes remaining after clearing and grubbing shall be backfilled and compacted to ninety percent of Standard Proctor Density (ASTM Method D698) at a moisture content of between optimum and plus 3 percent of optimum as directed by the Engineer and the entire area bladed to prevent ponding of water and to provide drainage; except in areas to be immediately excavated, the Engineer may direct that the holes not be backfilled. On areas required for borrow sites and material sources, stumps, roots, etc., shall be removed to the complete extent necessary to prevent such objectionable matter becoming mixed with the material to be used in construction.
- C. All cleared and grubbed materials shall be disposed of off site. Contractor shall be responsible for obtaining any necessary disposal permits. The Contractor shall not bury any refuse on site. No burning shall be permitted unless specifically noted and permitted by local jurisdictions.
- D. No separate measurement or payment will be made for furnishing all labor, materials, permits, supervision, equipment and supplies required to complete all items of work specified for clearing and grubbing.

3.2 STRIPPING

- A. Within the limits indicated, or in areas where existing grade is to be altered either by excavation or embankment, the Contractor shall strip existing topsoil to approximately 3-inches in depth, except that areas beneath foundations or structures shall be stripped to a minimum depth of 6-inches, and

may be stockpiled for future use or disposed of at the Contractor's expense. Stripping shall include the removal and disposal of scrap iron, rubbish, logs, abandoned utilities, signs, and any and all other debris, if within the project site or right-of-way, whether above or below existing grade. Stripping and excavation can take place in the same operation, provided the topmost material is suitable for use in future construction and provided it is not to be set aside for backfill or topsoil. The upper topsoil and debris to be stripped as noted above, shall be removed regardless of whether the site is to be excavated or receive embankment. Surface soil, not suitable for use in the future construction and any other unsatisfactory material shall be excavated, removed off the site and placed in designated spoil banks or shall otherwise be disposed of as directed by the Engineer in such a manner as not to create an unsightly or objectionable condition.

- B. Stripping will not be paid for directly. Payment for stripping shall be subsidiary to excavation, borrow or embankment.

3.3 EXCAVATION

- A. Excavation shall consist of the required excavation within the project limits, the removal and proper utilization or disposal of all excavated materials; and the constructing, shaping and finishing of all earthwork on the entire project site, in conformity with the required lines, grades and typical cross sections, and in accordance with the specification requirements herein outlined. All suitable excavated materials shall be utilized, insofar as practicable, in grading the site, uniformly widening embankment, flattening slopes, etc., or as directed by the Engineer. The Engineer will define suitable materials. Unsuitable excavation in excess of that needed for construction shall be known as waste and shall become the property of the Contractor to be disposed of by the Contractor outside the limits of the site. Unsuitable material encountered below subgrade elevation, shall be replaced with material from the excavation, or with other suitable material.
- B. No separate measurement or payment will be made for materials and labor performed under this section. Include all costs in the lump sum price, including preparing ditches, trimming of slopes, disposal of surplus materials (wastage), preparation and completion of subgrade, shoulders, roadway, any necessary hauling and the furnishing of all labor, tools, equipment and incidentals necessary to complete the work.

3.4 EMBANKMENT

- A. This item shall govern for the placement and compaction of all materials obtained from the site, borrow, channels, structural and sewer excavation, including all underground utility excavation, used in the construction of project fill and/or embankment. Prior to placing any embankment, all stripping and/or clearing and grubbing operations shall have been completed on the excavation sources and areas over which the embankment is to be placed. Stump holes or other small excavations in the limits of the embankments shall be backfilled with suitable material and thoroughly compacted by approved methods before commencing embankment construction.
- B. Unless otherwise indicated on the plans, the surface of the ground of all unpaved areas, which are to receive embankment, shall be loosened by scarifying or plowing to a depth of not less than 4-inches. The loosened material shall be recompacted with the new embankment as hereinafter specified and shall not exceed 8-inches in total depth. Where indicated on the plans or as directed by the Engineer, the surface of a hillside to receive embankment shall be loosened by scarifying or plowing to a depth of not less than 4 inches, or cut into steps, benched or notched before embankment materials are placed. The embankment shall then be placed in layers, not to exceed 8-inches, as hereinafter specified, beginning at the low side in part width layers and increasing the widths as the embankment is raised. The material, which has been loosened, shall be recompacted simultaneously with the embankment material placed at the same elevation. Where embankments are to be placed adjacent to or over existing roadbeds, the roadbed slopes shall be plowed or scarified to a depth of not less than 4-inches and the embankment built up in successive layers, as hereinafter specified to the level of the old roadbed before its height is increased. The top of the

old roadbed shall be scarified and recompacted with the next layer of the new embankment. The total depth of the scarified and added material shall not exceed the permissible depth of layer.

- C. Trees, stumps, roots, vegetation or other unsuitable materials shall not be placed in the embankment.
- D. Except as otherwise required by the plans, all embankment shall be constructed in layers approximately parallel to the finished grade of the site or paving. Embankments shall be constructed to the grade established by the Engineer and completed embankments shall correspond to the general shape of the typical sections shown on the plans and each section of the embankment shall correspond to the detailed section or slopes established by the Engineer. After completion, the site shall be continuously maintained to its finished section and grade until the project is completed.
- E. No material placed in the embankment by dumping in a pile or windrow shall be incorporated in a layer in that position, but all such piles or windrows shall be moved by blading or similar methods. Clods or lumps of material shall be broken, and the embankment material mixed by blading, harrowing, discing, or similar methods to the end that a uniform material is secured in each layer. Water required for sprinkling to bring the material to the moisture content necessary for maximum compaction shall be evenly applied and it shall be the responsibility of the Contractor to secure uniform moisture content throughout the layer by such methods as may be necessary.
- F. After each layer of embankment or select material is complete, the Engineer will make tests as necessary. If the material fails to meet the density specified, the course shall be reworked, as necessary, to obtain the specified compaction. Should the subgrade, due to any reason or cause, lose the required stability, density or finish before the pavement is placed, it shall be recompacted and refinished at the sole expense of the Contractor. Excessive loss of moisture in the subgrade shall be prevented by sprinkling, sealing or covering with a subsequent layer of asphaltic or other approved material. Embankment shall not be paid for directly, but shall be incidental to site excavation, channel excavation, construction of underground utilities, including all sewers, or borrow.

3.5 BORROW

- A. Borrow shall consist of the required excavation, removal and proper utilization of materials secured from sources obtained by the Contractor and approved by the Engineer. Borrow shall be used only when shown on the bid form or directed by the Engineer and then only from approved sources. Borrow material shall come only from sources approved by the Engineer. The Engineer shall provide samples of the fill material for testing and approval. In the event the material is not acceptable, as determined by the Engineer, the Contractor shall find other sources. All fill material shall be free from organic matter and deleterious material.
- B. No separate measurement or payment will be made for materials and labor performed under this section. Include all costs in the lump sum price. All work performed as required herein shall be full compensation for furnishing all labor, for all materials, for all royalties and freight involved, for all hauling, delivery, spreading and compacting complete and in place and for all tools, equipment and incidentals necessary to complete the work.

3.6 SUBGRADE

- A. The subgrade shall be brought to the lines, grades and typical cross section shown on the plans and in accordance with these specifications. Whenever unsuitable natural material is encountered and cannot be handled by the excavation or embankment requirements, then the following requirements shall apply. The unsuitable material shall be excavated to a depth deemed sufficient by the Engineer and the excavated material shall be disposed of off the jobsite at the expense of the Contractor. The excavated area shall be filled to its original level with suitable material meeting

the requirements of borrow. This imported material shall be compacted to 95-percent of standard proctor density, (ASTM Method D698) using a moisture content ranging from optimum to plus 3-percent above optimum. Soils shall not be compacted at less than the optimum moisture content.

- B. After all holes and depressions are filled with approved material, the subgrade shall be brought up to the lines and grades required and if it is not to be stabilized, it shall be compacted to 95-percent of standard proctor density, (ASTM Method D698), using a moisture content ranging from optimum to plus 3-percent above optimum. The subgrade, without stabilization, shall be compacted to a depth of 9-inches. The subgrade shall be kept free from all ruts and weak spots. Any ruts and weak spots that develop under traffic shall be repaired with suitable material as they develop.

3.7 COMPACTION

- A. All fill material shall be placed in uniform layers, dried or moistened as required to obtain approximate optimum moisture content and rolled to a density of at least 95 percent of maximum density at optimum moisture as determined by ASTM D-698. Compaction equipment shall be as hereinafter specified. The maximum thickness of uniform layers (loose measurements) shall be as follows:
 - 1. If the Contractor elects to use a pneumatic tired roller, the thickness of each uniform layer shall not exceed six (6) inches.
 - 2. If the Contractor elects to use sheepsfoot rollers, the thickness of each uniform layer shall not exceed eight (8) inches.
 - 3. In locations where it is impractical to use the roller equipment, mechanical hand tampers will be used, and the thickness of each uniform layer shall not exceed four (4) inches. The method used to secure the optimum moisture content will be the Contractor's responsibility. The compacting equipment and the method of compaction shall be such that a uniform density will be obtained over the entire area and depth of material being compacted. All fill material deposited in place by means of scrapers, dump trucks, draglines or other similar equipment shall be thoroughly broken up before being spread into the uniform layers. Rolling shall start longitudinally at the sides and proceed toward the center of the crowned sections or start longitudinally at the low side and proceed toward the high side of sloped areas, overlapping on successive trips by at least one-half (1/2) the width of the roller unit. Alternate trips of the roller shall be slightly different in length.
- B. Excess loss of moisture shall be construed to exist when the soil moisture content is three (3) percent less than optimum moisture.
- C. An independent qualified Testing Laboratory either selected by or approved by the Owner or Engineer, for every 500 square yards of the compacted subgrade shall take density tests. The Testing Laboratory will furnish written reports covering results of all tests and inspections made. Reports will be made promptly to the Engineer, Contractor and Owner.

3.8 FINISH GRADING

- A. Uniformly smooth grade all areas indicated on the drawings to be graded. The finish surface shall be not more than 0.05 feet above or below the established grade or approved cross section. All ditches and swales shall be properly graded so as to drain readily. Where existing grade is disturbed by the Contractor in areas not marked to be graded, the Contractor will regrade the disturbed area to its original grade at no additional expense to the Owner.

END OF SECTION 31 20 00

SECTION 31 23 00 - CONSTRUCTION OF UNDERGROUND UTILITIES

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 – GENERAL

1.1 SUMMARY

- A. This Section shall govern for all excavation required for the construction of sewers, sewer structures, pipe culverts, appurtenances and connections and for the backfilling around completed sewers to the level of the original ground, all in conformity with the locations, lines and grades shown on the plans or as given by the Engineer and in accordance with these specifications. This Section shall also govern for any necessary pumping or bailing and drainage and all sheathing and bracing of trench walls. Also governed by this Section are the cutting and restoration of pavement and base courses, the furnishing and placing of cement stabilized backfill, the hauling and disposing of surplus materials and the bridging of trenches and other provisions for maintenance of traffic or access as provided herein.

1.2 QUALITY ASSURANCE

- A. The Testing Laboratory's representative will determine the moisture density relationship in accordance with ASTM D698 on material secured from the trench excavation. Samples secured from the cement stabilized sand supplier shall be blended with Portland cement in accordance with Section 31 23 23.16 - Cement Stabilized Sand Bedding and Backfill, and the moisture density relationship will be determined in accordance with ASTM D558.
- B. The Testing Laboratory's representative will determine the in-place density in accordance with ASTM Methods D2922 or D1556. The minimum level of testing will consist of at least one test for each 200 linear feet of trench per lift of backfill.
- C. At the completion of the project, all on site storm and sanitary sewer lines shall be cleaned out using a hydraulic jet machine in the presence of the owner and engineer. After hydro-jetting storm and sanitary sewer lines, all segments shall be video tape recorded and tapes shall be furnished to the owner.

1.3 REQUIRED INSPECTIONS

- A. The contractor is solely responsible for meeting with all inspecting authorities having jurisdiction over the project (to include, but not limited to: Water District, City, County, State and Federal) prior to construction. All required inspections shall be coordinated by the contractor prior to installation of the WORK. All WORK found to be deficient by the inspector(s) and WORK installed prior to notification of inspector(s) shall be removed and replaced at the contractor's sole expense.

PART 2 – PRODUCTS

2.1 CONNECTIONS TO BUILDING GRAVITY SEWERS

- A. Connections to building gravity sewers, to include roof drains and sanitary sewer connections shall be made with SCH 40 X SDR adapter couplings.
- B. Fernco couplers are not allowed.

PART 3 – EXECUTION

3.1 EXCAVATION & TRENCH PREPARATION

- A. Excavate trench to the alignment and depth required. Brace the trench and drain, as required, so that the work may be accomplished safely and efficiently. If necessary, install a dewatering system to provide a dry trench bottom. Pumps shall discharge into natural drainage channels or to drains. Shoring for excavations and trenches shall meet the requirements of the latest edition of OSHA Regulation 1926, Subpart P.
- B. For pipes less than 30 inches in diameter, the minimum width of the trench shall be the width of the outside barrel of the pipe plus 24 inches, the maximum width of the trench shall be the width of the outside barrel of the pipe plus 36 inches. For pipe 30 inches and larger, the minimum trench width shall be the width of the outside barrel of the pipe plus 32 inches, and the maximum width of the trench shall be the width of the outside barrel of the pipe plus 36 inches.
- C. Side sloping or benching of the trench, where permitted, will begin at one foot above the top of the pipe and will not encroach upon private property or endanger existing or future structures or underground utilities. Depth of trench, without sheathing or bracing shall comply with OSHA Regulation 1926.650.
- D. The full width of the trench shall be excavated to a depth below the invert elevation of the pipe so as to permit placing the bedding material specified on the attached drawings below the outside bottom of the pipe. Any additional depth excavated by the Contractor shall be replaced with an equal depth of cement-stabilized sand. The cost of this additional material, in place shall be at the expense of the Contractor.
- E. Where necessary, excavations shall have sheathing and bracing to prevent caving. At these locations, increase the trench width as required and leave the sheathing in place until the pipe has been laid and the backfill compacted to a depth of 2 feet over the pipe. All sheathing and bracing shall be designed to the requirements of OSHA Standard 1926, Subpart P (latest edition).
- F. Sewers shall not be constructed, or sewer pipe laid in the presence of water. All water shall be removed from the excavation sufficiently prior to the sewer placing operation to ensure a dry, firm bed on which to place the sewer and shall be maintained in such unwatered condition until all concrete and mortar is set. Removal of water may be accomplished by bailing, pumping or by a well-point system as conditions warrant. There will be no separate pay for well pointing without the prior approval of the Engineer. Contractor shall include in base proposal all costs associated with de-watering, well pointing, stabilizing, etc. necessary to install all underground utilities.
- G. In the event that the excavation cannot be dewatered to the point where the pipe subgrade is free of mud, excessive wet soil, sand silt or clay with water, a seal slab shall be used in the bottom of the excavation. Such seal slab shall consist of a lean concrete mixture. The seal slab shall be a Class "D", 5 sacks of cement per cubic yard with a minimum compressive strength of 1,750 P.S.I. at 7 days and 2,500 P.S.I. at 28 days. A precast seal slab may be used, provided that the joints of the seal slab do not occur at the joint of the pipe. Contractor shall have an option of using a three-day cylinder break test at no expense to the Owner.
- H. For unstable conditions requiring outside forms, seals, sheathing, and bracing, or where groundwater is encountered, any additional excavation in width and backfill required shall be done at the Contractor's expense. Portable trench boxes may be used in lieu of sheathing upon approval in writing by the Engineer. The trench box must be in accordance with OSHA Regulation 1926.650 (latest edition).
- I. Use of the trench box does not relieve the Contractor of any liability for damages to person or property. When a trench box is moved, the jointed pipe or in-place backfill shall not be disturbed.

- J. All materials from excavation operations not required for backfilling, if considered suitable shall be placed in embankments or wasted, in accordance with Section 31 20 00 - Earthwork. All material not suitable for use in embankments will be declared surplus by the Engineer and shall become the responsibility of the Contractor to dispose of as he wishes. Such surplus material shall be promptly removed from the work following the completion of the portion of the sewer involved. No separate payment shall be made for disposal of this surplus material.
- K. Unless otherwise specifically approved, Contractor shall use ladder or wheel-type trench-digging machinery, except where hand methods must be employed to avoid damage to existing structures above or below ground, or where hand excavation is indicated.
- L. Engineer may limit the amount of trench opened or partially opened at any time in advance of the completed pipe laying operation and the amount of trench left unfilled. Open no more than 500 feet of trench at any one time.

3.2 PIPE LAYING

- A. No pipe shall be laid in water or when the trench conditions or weather is unsuitable for such work, unless specifically approved by the Engineer.
- B. Non-pressure concrete pipe shall be laid with the ends abutting and true to line and grade. Fit and lay the pipe to form a smooth and uniform invert. Laying of pipe shall commence at the lowest point, so that the spigot ends point in the direction of flow. Lay cast iron pipe on firm earthen foundation with bell ends facing the direction of laying.
- C. All other types of pipe shall be laid in accordance with the applicable provisions of this specification, in accordance with the Special Provisions preceding this Subsection, or with the manufacturer's recommendations.
- D. Cut cast iron pipe with wheel-type cutters or cold chisel. Flame cutting of cast iron pipe is not allowed. Make cuts in a neat and workmanlike manner without damage to pipe and so as to leave a smooth end at right angles to axis of pipe. Field cutting of Polyvinyl Chloride shall be in accordance with the pipe manufacturer's recommendations.
- E. Minor deflections may be obtained in pipe joints. Contractor must obtain approval when the degree of deflection is necessary to deflect from a straight line. Where necessary to make major deflections in concrete pipe, use sections of pipe with beveled ends for deflections not greater than five degrees. For deflections greater than five degrees, use fabricated fittings for concrete pressure pipe and use cast iron fittings for cast iron pipe.
- F. When the pipe laying operation is halted, seal the open end of the pipe with a temporary plug. Plug is to remain in place until the pipe laying operation re-commences. Standard plugs shall be inserted into bells of all dead-end pipe.
- G. All underground pipe shall have a 12-gauge metallic tracer wire running the full length of the pipe. Tracer wire shall be taped to the pipe at intervals not to exceed 15-feet using duct tape and terminate at each end above ground in a 2" PVC riser.
- H. Pipe shall be installed with the labels facing upward.
- I. At the completion of the project, all on site storm and sanitary sewer lines shall be cleaned out using a hydraulic jet machine in the presence of the owner and engineer. After hydro-jetting storm and sanitary sewer lines, contractor shall run video-camera through pipes and video-record each line segment in order to document proper installation.

3.3 BACKFILLING

- A. As soon as practicable after completion of laying and jointing of pipe, backfill the trench. Not more than 200 feet of the trench shall be left open after laying the pipe.
- B. Trenches shall be backfilled in accordance with drawing details and notes. Backfill material selected from sewer trench excavation, or obtained from other sources, shall be free from stones, which will interfere with compaction and free of large lumps, which will not break down readily under compaction. Do not use material excavated in large lumps which will not break down or which cannot be spread in loose layers. Material excavated by trenching machine will generally be suitable for use as backfill. Cement stabilized sand shall be in accordance with Section 31 23 23.16 - Cement Stabilized Sand Bedding and Backfill.
- C. When placing backfill in the trench simultaneously on both sides of the pipe for the full width of the trench, moisten if necessary and tamp in approximately 6-inch layers, thoroughly compacting under and on each side of the pipe to provide solid backing against the external surface of the pipe. Walking or working on the completed pipeline, except as necessary in tamping or backfilling shall not be permitted until the trench has been backfilled to at least 12-inches over the top of the pipe.

3.4 RESTORATION OF SURFACES

- A. Replace or repair sidewalks, driveway culverts, inlets, curbing, gutters, shrubbery, trees, fences, sod and other like obstructions removed or disturbed, to the condition equivalent to that existing prior to commencement of this work. Use concrete having a compressive strength of not less than 3,000 psi in 28 days for the replacement of curbing, gutters, inlets and sidewalks.
- B. Use reasonable care in the removal and replacement of shrubbery and trees designated to be replaced at original locations. Where at all possible, ditch alignment will be such as to minimize this work. The restoration of asphalt-topped flexible base and concrete streets shall be as specified under other items of the specifications.

3.5 CLEAN-UP

- A. The Contractor shall remove from the site of the work and from public and private property temporary structures, rubbish, and waste materials, including excess excavated materials. The Contractor is responsible for disposing of all surplus earth. The pipe laying operation shall be temporarily suspended if the clean-up is falling behind as determined by the Engineer or Owner.

3.6 MEASUREMENT & PAYMENT

- A. No separate measurement or payment will be made for materials and labor performed under this section. Include all costs in the lump sum price.

END OF SECTION 31 23 00

SECTION 31 23 16.16 - STRUCTURAL EXCAVATION AND BACKFILL

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 – GENERAL

1.1 SCOPE

- A. This section describes the excavation for all structures except pipe sewers, the backfilling around completed structures and the disposal of all excess excavated material. All operations required for the proper completion of the excavation work, including sheeting, shoring and bracing, dewatering of excavations and compaction of backfill are included under this section.

1.2 PROTECTION

- A. Before the start of earthwork operations, adequately protect existing structures, utilities, trees and shrubs and other permanent objects. Costs resulting from damage to permanent facilities due to negligence or lack of adequate protection will be charged to the Contractor. The Contractor will also be charged for damage to facilities scheduled for later removal or demolition if the damage sufficiently impairs proper operation to the extent that temporary replacement or repair is required.

1.3 PAYMENT

- A. No separate payment will be made for work performed under this section. Include the cost of such work in the bid form and specified in other sections of this work.

1.4 BLASTING

- A. Blasting will not be permitted.

PART 2 - PRODUCTS

2.1 REGULAR BACKFILL

- A. Where no other backfill is specified, use suitable soils from the excavation as backfill material.

2.2 SAND BACKFILL

- A. Where sand backfill is specified, use reasonably clean bank sand from an approved source. The sand must be free from large lumps of clay, rubbish, organic matter or other deleterious substances. Not more than 12 percent by weight shall pass the 200-mesh sieve and the plasticity index shall not exceed 4.0. This backfill shall be placed a minimum of 18 inches wide around all below-grade structures.

2.3 FILTER MATERIAL BACKFILL

- A. Where shown, use a mixture of concrete gravel and concrete sand. Proportion the mixture with two parts gravel to one-part sand by volume. Gravel and sand shall meet requirements of ASTM C 33. The maximum size of acceptable gravel is 1-1/2 inches.

2.4 CEMENT STABILIZED BACKFILL

- A. Prepare a mixture of sand, cement and water.

- B. Use washed river sand free from large clay lumps or unacceptable amounts of other foreign materials. The sand must not be darker than the standard color when subjected to a color test in accordance with ASTM C 40.
- C. Required gradation of sand:

Screen Size	Percent Retained
3/8-inch screen	0 percent
1/4-inch screen	0 percent - 5 percent
20 mesh screen	15 percent - 50 percent
100 mesh screen	80 percent - 100 percent
- D. Use Type I cement conforming to ASTM C 150.
- E. Mix in a pug mill using not less than 1-1/2 sacks of cement per cubic yard (unless otherwise specified) of mixture with sufficient water to hydrate the cement.

PART 3 - EXECUTION

3.1 EXCAVATION

- A. Excavation work shall be unclassified and includes removal of all types of materials encountered without exception. Make excavations to lines and grades indicated on drawings. Complete excavations within the tolerances specified. Perform all work in conformity with the rules and regulations of the Federal Occupational Safety and Health Act.
 - 1. **Shoring, Bracing, Dewatering:** Provide shoring, bracing and dewatering of excavations required to properly and safely complete the work as shown. Construct shoring and bracing to prevent the excavation from extending beyond specified or indicated limits and to protect workmen. Keep excavations dewatered by drainage, pumps or well points as necessary while work is in progress. Dewatering methods are subject to approval. Remove shoring, bracing and sheathing as excavations are backfilled in a manner to prevent injurious caving.
 - 2. **Pipe Trenches:** Excavate by open cut methods. Make and maintain the sides of the trench as nearly vertical as practical. Provide shoring to maintain the sides of the trench in a vertical position and to protect workmen. Complete and shape the trench to provide free working space and to permit thorough tamping of backfill around the pipe. Grade trench bottoms accurately to provide uniform bearing on firm soil along the entire length of each pipe section. Remove rubbish, rock or debris encountered at grade to at least 6 inches below the bottom of the pipe. Reshape and compact the trench bottom. Working space measured from the outside of the pipe to the side of the trench must be at least 6 inches but not more than 24 inches. Provide bell holes where required for making proper connections at joints.
- B. Structures Other than Pipes:
 - 1. Wherever practicable cut all footing excavations to neat lines with a tolerance of minus 1 inch or plus 3 inches and place concrete to bear against earth sides. Cut all excavations a sufficient distance from walls, shafts or similar elements of structures to allow for placing and removing forms and for inspection. Make all excavations at a minimum slope of 1:1 with 3 feet cut outside of footing lines or wall lines except as shown or specifically authorized.
 - 2. Carry all excavations to the elevations shown and to deeper levels as directed when suitable foundation soils are not encountered at plan depth. Remove all pockets of soft or otherwise unstable soils and replace with concrete or with suitable well compacted soil as directed.
 - 3. Fill all unauthorized excessive excavation with concrete at no change in the contract sum.

4. Protect all open excavations from rainfall or excessive drying. Provide pumps and other equipment as required to keep excavations reasonably free of water at all times and completely free of water during placement of concrete.
5. Do not remove the last 4-inch depth of excavation for slabs or footing until reinforcing steel and concrete are ready to be placed.
6. For footings founded on rock, hard shale or similar material, remove all loose material. Clean and cut to a firm surface either level, stepped or serrated as directed. Clean out seams and fill with concrete at the time footing concrete is placed.

3.2 BACKFILL

- A. Complete backfill to the surface of natural ground or to the lines and grade shown on drawings. Except where special materials are requested, use suitable soils from the excavation as backfill material. Do not use peat or other organic matter, silt, muck, debris or similar materials. Deposit backfill in uniform layers and compact each layer as specified.
 1. Backfill at Structures: Place backfill as promptly as practicable after completion of each structure or portion of a structure. Do not, however, place backfill against concrete walls or similar structures until concrete has been cured at least seven days. Remove concrete forms before starting to backfill and remove shoring and bracing as the work progresses. Take care to prevent any wedging action of backfill against the structure. Step cut or serrate the slopes bounding the excavation as required to prevent wedging.
 2. Backfilling of Pipe Trenches:
 - a. Refer to appropriate paragraphs of SECTION 31 23 00 – CONSTRUCTION OF UNDERGROUND UTILITIES.
 3. Compaction of Backfill:
 - a. Refer to appropriate paragraphs of SECTION 31 23 00 – CONSTRUCTION OF UNDERGROUND UTILITIES.

3.3 DISPOSAL OF EXCESS MATERIAL

- A. Dispose of excess or unsuitable material from the excavation off the job site.

END OF SECTION 31 23 16.16

SECTION 31 23 23.16 - CEMENT STABILIZED SAND BEDDING AND BACKFILL

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 – GENERAL

1.1 SUMMARY

- A. This Section specifies cement stabilized sand to be used for backfilling and bedding as called for on the drawings, in other parts of the specifications, or as directed by the Engineer.

1.2 PERFORMANCE

- A. The sand cement mixtures shall produce a minimum unconfined compressive strength of one hundred pounds per square inch (100 psi) in forty eight hours, when compacted to ninety five percent (95%) of Standard Proctor density (ASTM Method D558), without additional moisture control and when cured in plastic bags at a temperature of 73.4° F at plus or minus 3° F and tested in accordance with ASTM D1633.
- B. Random samples of the delivered product will be taken in the field at the direction of the Engineer and tested at the Owners expense.

1.3 MEASUREMENT AND PAYMENT

- A. No separate measurement or payment will be made for materials and labor performed under this section. Include all costs in the lump sum price.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Cement shall be Type I Portland cement conforming to ASTM C150. Sand shall be clean durable sand containing not more than the following:
 - 1. Deleterious Materials:
 - a. Clay lumps, when tested in accordance with ASTM C142 shall be less than 0.5 percent. Lightweight pieces, when tested in accordance with ASTM C123 shall be less than 5.0 percent. Organic impurities when tested in accordance with ASTM C40 shall not show a color darker than the standard color.
 - 2. The plasticity index shall be six (6) or less when tested in accordance with ASTM D4318.
 - 3. Sand shall be free of organic matter and deleterious substances and shall meet the following gradation requirement.

<u>Square Sieve Size</u>	<u>% Passing, By Weight</u>
3/8"	100%
No. 200	5 - 30%

- 4. Water shall be clean and clear, free of oils, acids, alkalis, organic matter or other deleterious substances and shall conform to the requirements of ASTM C1602.

2.2 SAND-CEMENT MIXTURE PRODUCT

- A. The mixture shall consist of not less than 1.5 sacks of Portland cement per cubic yard (1.1 sacks per ton) of material mixture as placed. The mixture shall contain sufficient water to hydrate the cement.

- B. The cement, sand and water shall be mixed in a pug mill type mixer, which meets the approval of the Engineer. It shall be mixed for a minimum period of two minutes per batch.

PART 3 – EXECUTION

3.1 APPLICATION

- A. The sand cement mixture shall be placed in maximum eight (8) inch thick lifts, loose measure, and thoroughly rodded and tamped around the pipe, boxes, structures, and paving sections. Placement and compaction shall be performed in a manner that will thoroughly fill all voids without placing undue strain on or displacement of the structure.
- B. Cement stabilized sand backfill below the top of sewers, manholes, inlets or other structures shall be placed equally along all sides of the structure. Cement stabilized sand backfill/bedding shall be placed in a manner that will completely fill all voids in the trench. Should compaction be required to fill all voids in the areas described, hand operated tampers may be used.
- C. Materials not placed and compacted within four (4) hours after mixing shall be rejected. Do not place or compact sand-cement mixtures in standing or free water.
- D. Cement stabilized sand backfill/bedding that is placed in trench bottoms or all other locations between the tops of sewer lines to the bottom of the subgrade, shall be compacted to a minimum of ninety five percent (95%) of Standard Proctor Density (ASTM Method D558), and shall apply to all areas of construction within the limits of the project.
- E. In-place density tests shall be taken at each location, each day, to test the placement of bedding/backfill material as directed by the Engineer. In-place densities shall be determined in accordance with ASTM D6938 or ASTM D1556.

END OF SECTION 31 23 23.16

SECTION 31 32 13.19 - LIME STABILIZED SUBGRADE

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 – GENERAL

1.1 SUMMARY

- A. This item shall consist of treating the subgrade, by the pulverizing, addition of lime, mixing and compacting the mixed material to the required depth and density, and in the amounts shown on the plans.
- B. This item applies to natural ground, embankment, base or sub-base and shall be constructed to the sections, lines and grades shown on the plans. The subgrade shall be stabilized with lime to a depth of at least 6-inches in the amount recommended by a materials engineering laboratory. The P.I. shall be determined by ASTM Method D4318.

1.2 QUALITY ASSURANCE

- A. The Testing Laboratory's representative will determine the Moisture-Density Relationships in accordance with ASTM Method D698 on material secured from the roadway after stabilization with lime, for each type of material encountered.
- B. The Testing Laboratory's representative will determine the in-place density in accordance with ASTM Method D2922 or D1556. The minimum level of testing will consist of at least three tests for each 1,000 feet per lane of roadway or 4,000 square feet (500 square yards) of embankment.

1.3 MEASUREMENT AND PAYMENT

- A. No separate measurement or payment will be made for materials and labor performed under this section. Include all costs in the lump sum price.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Lime for stabilization shall be classified as Type A- Hydrated Lime, or Type B- Commercial Lime Slurry, conforming to the requirements of Section 31 32 13.20 - Hydrated Lime and Lime Slurry.

2.2 EQUIPMENT

- A. The machinery, tools and equipment necessary for proper execution of the work shall be on the project and approved by the Engineer prior to the beginning of construction operations. All machinery, tools and equipment used shall be maintained in a satisfactory and workmanlike manner.

PART 3 – EXECUTION

3.1 CONSTRUCTION METHODS

- A. It is the primary requirement of this specification to secure a completed course of treated material containing a uniform lime soil mixture free from loose or segregated areas, of uniform density and moisture content, well bound for its full depth and with a smooth surface suitable for placing subsequent courses. It shall be the responsibility of the Contractor to regulate the sequence of his

work, to use the proper amount of lime, maintain the work and rework the courses as necessary to meet the above requirements.

- B. The subgrade shall be constructed and shaped to conform to the typical sections, lines and grades as shown on the plans or as established by the Engineer. The subgrade shall be firm and able to support, without displacement, the construction equipment at the density herein specified. Any wet or unstable materials below the secondary grade shall be corrected, as directed by the Engineer, by scarifying, adding lime, and compacting, or other methods until satisfactory stability is obtained. The cost of the repair of the secondary subgrade and any materials below the secondary subgrade is incidental to this Section.
- C. The Contractor shall be required to proof-roll the subgrade, as directed by the Engineer, before using the pulverizing machine and correct any soft areas that this rolling may reveal.
- D. Lime shall be spread only on that area where the first mixing operations can be completed during the same working day. The application and mixing of lime with the material shall be accomplished by the methods hereinafter described as "Dry Placing" or "Slurry Placing". When Type A, Hydrated Lime, is specified, the Contractor may use either method, unless otherwise noted on the plans.
- E. When dry placing, the lime shall be spread by an approved spreader or by bag distribution at the rates shown on the Bid Sheet, or as directed by the Engineer.
- F. The lime shall be distributed at a uniform rate and in such a manner as to reduce the scattering of lime by wind to a minimum. Lime shall not be applied when wind conditions, in the opinion of the Engineer, are such that blowing lime becomes objectionable to traffic or adjacent property owners. A motor grader shall not be used to spread the lime.
- G. The material shall be sprinkled as directed by the Engineer, until the proper moisture content has been secured. Where Type A, hydrated lime is specified and slurry placement is used, the Type A hydrate shall be mixed with water to form a slurry of the solids content designated by the Engineer. A minimum of two mixing passes will be required.
- H. Where Type B, commercial lime slurry is to be used, it shall be of the minimum solids and purity for the applicable grade being used. The distribution of lime shall be at the rates shown on the proposal form, or as directed by the Engineer. Proper application shall be attained by successive passes over a measured section of the roadway, until the proper moisture and lime content has been secured. The distributor truck shall be equipped with an agitator, which will keep the lime and water in a uniform mixture.
- I. The material and lime shall be thoroughly mixed by approved road mixers or other approved equipment, and the mixing continued until, in the opinion of the Engineer, a homogenous friable mixture of material and lime is obtained, such that when all non-slaking aggregates retained on the 3/4-inch sieve are removed, the remainder of the material shall meet the following requirements when tested in accordance with ASTM Method C136, from samples procured from the roadway.

TABLE I

Minimum Passing 1 3/4" sieve	100 Percent
Minimum Passing 3/4" sieve	85 Percent

- J. If gradation is achieved on the first mixing, no additional mixing is required.
- K. The soil lime mixture shall be sprinkled during the mixing operation as directed by the Engineer to provide optimum moisture in the mixing. The subgrade shall be stabilized to a minimum depth of 6-inches and compacted to a minimum of 95-percent of standard proctor density (ASTM D698) at a moisture content of optimum to 3-percent above optimum.

- L. During the interval of time between application and mixing, hydrated lime that has been exposed to the open air for a period of 6-hours, or more, or has had excessive loss due to washing or blowing will not be accepted for payment.
- M. Compaction of the mixture shall begin immediately after final mixing unless approval has been obtained from the Engineer not to do so. The material shall be aerated and/or sprinkled as necessary, to provide the optimum moisture content. Compaction shall begin at the bottom and shall continue until the entire depth of mixture is uniformly compacted.
- N. The material and lime shall be thoroughly mixed by approved road mixers or other approved equipment and the mixing continued until, in the opinion of the Engineer, a homogenous, friable mixture of material and lime is obtained, free from all clods or lumps. Materials containing plastic clays or other materials which will not readily mix with lime shall be mixed as thoroughly as possible at the time of lime application, brought up to the proper moisture content and left to cure 48 to 96, hours as directed by the Engineer. During the curing period the material shall be kept moist as directed.
- O. If a second mixing is required, the material shall be given a final mixing, using approved methods. If the soil binder-lime mixture contains clods, they shall be reduced in size by raking, blading, discing, harrowing, scarifying, or the use of other approved pulverization methods, so that all non-slaking material retained on the 3/4-inch sieve is removed and the remainder of the material shall meet the gradation requirements outlined by Table I. After the second mixing has been completed, the material shall be allowed to cure for a minimum of 3 days, unless otherwise directed by the Engineer.
- P. The material shall be sprinkled and rolled, as directed by the Engineer. All irregularities, depressions or weak spots which develop shall be corrected immediately by scarifying the areas affected, adding or removing material as required and reshaping and re-compacting by sprinkling and rolling. The surface of the course shall be maintained and cured for a minimum of 3 days, prior to placing a base or surface course or until traffic is allowed to travel thereon.
- Q. In addition to the requirements specified for density, the full depth of the material shown on the plans shall be compacted to the extent necessary to remain firm and stable under construction equipment. After each section is completed, tests as necessary will be made by the Engineer. If the material fails to meet the density requirements, it shall be reworked as necessary to meet these requirements. Throughout this entire operation, the shape of the course shall be maintained by blading and the surface upon completion shall be smooth and in conformity with the typical section shown on the plans and to the established lines and grades. Should the material, due to any reason or cause, lose the required stability, density and finish before the next course is placed or the work is accepted, it shall be reprocessed and refinished at the expense of the Contractor.

3.2 FINISHING

- A. After the final course of the lime treated subgrade has been compacted, it shall be brought to the required lines and grades in accordance with the typical sections. The completed section shall then be finished by rolling as directed with a pneumatic tire or other suitable roller sufficiently light to prevent hair cracking. The completed section shall be moist, or emulsion cured until covered by base material, unless otherwise directed by the Engineer. If the plans provide for the treated material to be sealed or covered by other courses of material, such seal or course shall be applied within 14 days after final mixing and compaction is completed, unless otherwise directed by the Engineer.

END OF SECTION 31 32 13.19

SECTION 31 32 13.20 - HYDRATED LIME AND LIME SLURRY

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 – GENERAL

1.1 DESCRIPTION

- A. This Section establishes the requirements for hydrated lime and commercial lime slurry of the type and grade considered suitable for use in the treatment of natural or processed materials or mixtures for subgrade, sub-base and base construction.

1.2 MEASUREMENT AND PAYMENT

- A. No separate measurement or payment will be made for materials and labor performed under this section. Include all costs in the lump sum price.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. The various types and grades are defined and identified as follows:
 - 1. Type A, Hydrated Lime: Shall consist of a dry powder obtained by treating quicklime with enough water to satisfy its chemical affinity for water under the conditions of its hydration. This material is to consist essentially of calcium hydroxide or a mixture of calcium hydroxide and a small allowable percentage of calcium oxide, magnesium oxide and magnesium hydroxide. Hydrated lime shall meet the requirements of ASTM Designation.
 - a. When sampled and tested according to prescribed Texas Highway Department procedures, hydrated lime shall conform to the following requirements as to chemical composition:

1)	Hydrate alkalinity, percent by weight	CA (OH) ₂	Min. 90.0%
2)	Unhydrated lime content, percent by weight	CaO	Max. 5.0%
3)	"Free Water" content, percent by weight	H ₂ O	Max. 4.0%
 - b. The percent by weight of residue retained shall conform to the following requirements:

1)	Residue retained on a No. 6	sieve	Max. 0.0%
2)	Residue retained on a No. 10	sieve	Max. 1.0%
3)	Residue retained on a No. 30	sieve	Max. 2.5%
 - c. Specifications for Type "A" applies specifically to the normal hydrate of lime made from "high-calcium" type limestone. Hydrated Lime for stabilization purposes shall be applied, as provided in the governing specifications, as a dry powder or mixed with water to form a slurry.
 - 2. Type B, Commercial Lime Slurry: Shall be pumpable suspension of solids in water. The water or liquid portion of the slurry shall not contain dissolved material in sufficient quantity and/or nature injurious or objectionable for the purpose intended. The solids portion of the mixture, when considered on the basis of "solids content", shall consist principally of hydrated lime of a quality and fineness sufficient to meet the following requirements as to chemical composition, residue and delivered in trucks which shall be equipped with an agitator which will keep the lime and water in a uniform mixture.
 - a. Chemical Composition: The "solids content" of the lime slurry shall have a hydrate alkalinity Ca (OH)₂ of not less than 90% by weight.

- b. Residue: The percent by weight of residue retained in the "solids content" of lime slurry shall conform to the following requirements:
 - 1) Residue retained on a No. 6 sieve Max. 0.0%
 - 2) Residue retained on a No. 10 sieve Max. 1.0%
 - 3) Residue retained on a No. 30 sieve Max. 2.5%

- c. Type B: Commercial Lime Slurry shall conform to one of the following grades:
 - 1) Grade 1: The "Dry Solids Contents", shall be at least 31 percent by weight of the slurry.
 - 2) Grade 2: The "Dry Solids Contents", shall be at least 35 percent by weight of the slurry.
 - 3) Grade 3: The "Dry Solids Contents", shall be at least 46 percent by weight.

PART 3 – EXECUTION

3.1 SAMPLING AND TESTING

- A. The sampling and testing of lime slurry shall be as determined by Test Method Tex-600-J, "Lime Testing Procedure".
 - 1. When Type A: Hydrated Lime is used, the quantity of lime will be measured by the ton of 2000 pounds, dry weight.
 - 2. When Type B: Commercial Lime slurry, is used, the quantity of lime shall be calculated from the required minimum percent solids based upon the use of Grade 1, Grade 2, or Grade 3 as follows:
 - a. Grade 1: The "Dry Solids Content" shall be at least 31 percent by weight of the slurry and the quantity of lime will be calculated by the ton of 2000 pounds based on the 31 percent dry weight solids.
 - b. Grade 2: The "Dry Solids Content" shall be at least 35 percent by weight of the slurry and the quantity of lime will be calculated by the ton of 2000 pounds based on the 35 percent dry weight solids.
 - c. Grade 3: The "Dry Solids Content" shall be at least 46 percent by weight of the slurry and the quantity of lime will be calculated by the ton of 2,000 pounds based on the 46 percent dry weight solids.

END OF SECTION 31 32 13.20

SECTION 31 32 13.21 - LIME-FLYASH STABILIZED SUBGRADE

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 - GENERAL

1.1 SCOPE

- A. This item shall consist of treating the subgrade by the pulverizing, addition of lime flyash and/or flyash, mixing and compacting the mixed material to the required density. This item applies to natural ground and embankment and shall be constructed as specified herein and in conformity with the typical sections, lines and grades shown on the Plans.

1.2 QUALITY ASSURANCE

- A. The Materials Engineer will determine the Moisture-Density Relationship in accordance with ASTM Method D698, on material secured from the roadway. Samples shall be blended with Lime-Flyash in the laboratory for each type of material encountered.
- B. The Materials Engineer will determine the in-place density in accordance with ASTM Method D2922 or D1556. The minimum level of testing will consist of at least three tests of 4,000 square feet (500 square yards) of subgrade.

1.3 MEASUREMENT AND PAYMENT

- A. No separate measurement or payment will be made for materials and labor performed under this section. Include all costs in the lump sum price.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Hydrated lime shall meet the requirements of ASTM C977 and SECTION 31 32 13.20 – HYDRATED LIME AND LIME SLURRY of these Specifications. When Type B, commercial lime slurry, is specified, the Contractor shall select, prior to construction, the grade to be used and shall notify the Engineer in writing before changing from one grade to another.
- B. Flyash shall meet the requirements of ASTM C618, Class C. Flyash shall also have a minimum CaO content of 20 percent.
- C. Water shall meet the requirements of ASTM Designation C94.

2.2 EQUIPMENT

- A. Machinery, tools and equipment for proper performance of the work shall be on the Project and approved by the Engineer prior to the beginning of construction operations.
- B. All machinery, tools and equipment used shall be maintained in a satisfactory and workmanlike manner.
- C. Hydrated lime and flyash shall be stored and handled in closed, weatherproof containers until immediately before distribution on the subgrade. If storage bins are used, they shall be completely enclosed. Materials in bags shall be stored in weatherproof buildings with adequate protection from ground dampness.

- D. If lime and/or flyash are furnished in trucks, each truck shall have a weight ticket from a certified scale.
- E. If lime and/or flyash are furnished in bags, each bag shall bear the manufacturer's certified weight. Bags varying more than five percent from that weight may be rejected and the average weight of the bags in any shipment, as shown by weighing 50 bags taken at random, shall not be less than the manufacturer's certified weight.

PART 3 – PRODUCTS

3.1 CONSTRUCTION METHODS

- A. It is the primary requirement of this Specification to secure a complete course of treated material containing a uniform lime-flyash or flyash mixture free from loose or segregated areas, of uniform density and moisture content, well bound for its full depth, and with a smooth surface and suitable for placing subsequent courses. It shall be the responsibility of the Contractor to regulate the sequence of his work, to use the proper amount of lime and flyash, maintain the work and rework the courses as necessary to meet the above requirements.
- B. Before other operations are begun, the subgrade shall be graded, shaped, and compacted as required to construct the lime-flyash or flyash treatment for materials in-place in conformance with the lines, grades, thickness and typical cross sections shown on the Plans. Unsuitable soil or material shall be removed and replaced with acceptable material.
- C. The subgrade shall be constructed and shaped to conform to the typical sections, lines and grades as shown on the plans or as established by the Engineer. The subgrade shall be firm and able to support, without displacement, the construction equipment at the density herein specified. Any wet or unstable materials below the secondary grade shall be corrected, as directed by the Engineer, by scarifying, adding lime and/or fly ash, and compacting, or other methods until satisfactory stability is obtained. The cost of the repair of the secondary subgrade and any materials below the secondary subgrade is incidental to this Section.
- D. The Contractor shall be required to proof-roll the subgrade, as directed by the Engineer, before using the pulverizing machine and correct any soft areas that this rolling may reveal.
- E. The Contractor shall be required to use a cutting and pulverizing machine that will remove the subgrade material accurately to the secondary subgrade; and pulverize the material at the same time. He will not be required to expose the secondary grade nor windrow the material. However, the Contractor shall be required to roll the subgrade, before using the pulverizing machine and correct any soft areas that this rolling may reveal. This method will be permitted only where a machine is provided which will ensure that the material is cut uniformly to the proper depth and which has cutters that will plane the secondary grade to a smooth surface over the entire width of the cut.
- F. The cost of the repair of the secondary subgrade and any materials below the secondary subgrade is incidental to this item.
- G. When lime-flyash stabilization is required it shall be a two-phase operation, with the lime placed and allowed to cure, before the flyash stabilization begins.
- H. Application of the lime and the subsequent curing shall be in accordance with SECTION 31 32 13.19 - LIME STABILIZED SUBGRADE. After the subgrade has cured for the time required by that Specification, then flyash stabilization may begin. Flyash stabilization shall be in accordance with this Specification. Unless otherwise noted, the thickness of stabilization shall be 6-inches.

- I. The machine will be of such design that a visible indication is given at all times that the machine is cutting to the proper depth.
- J. Lime shall be spread only on that area where the first mixing operation can be completed during the same working day.
- K. The sequence of application of lime and flyash, with the material, shall be accomplished by the methods hereinafter described as "Dry Placing", or "Slurry Placing". When Type A, hydrated lime is specified, the Contractor may use either method.
- L. The lime or flyash shall be spread by a spreader or by bag distribution at the rate directed by the Engineer.
- M. For dry placing, the lime or flyash shall be distributed at a uniform rate and in such a manner as to reduce the scattering of lime or flyash by wind to a minimum. Lime or flyash shall not be applied when wind conditions are such that blowing lime or flyash becomes objectionable to traffic or adjacent property owners. A motor grader shall not be used to spread the lime or flyash.
- N. The materials shall be sprinkled until the proper moisture content has been secured. However, initial mixing after the addition of lime or flyash will be accomplished dry or with a minimum of water to prevent lime and/or flyash balls.
- O. For slurry placing, the lime or flyash shall be mixed with water in vehicles with approved distributors and applied as a thin water suspension or slurry.
- P. Type B, commercial lime slurry, shall be applied with a lime percentage not less than that applicable for the grade used. The distribution of lime and flyash shall be attained by successive passes over a measured section of roadway until the proper moisture and lime or flyash content has been secured. The distributor vehicle shall be equipped with an agitator, which will keep the lime or flyash and water in a uniform mixture.
- Q. The mixing procedure shall be the same for "Dry Placing or "Slurry Placing", as hereinafter described.
- R. The material shall be uniformly mixed by approved methods. If the soil binder lime mixture contains clods, they shall be reduced in size by raking, blading, discing, harrowing, scarifying or the use of other approved pulverization methods so that when all non-slaking aggregates retained on the 3/4" sieve are removed, the remainder of the material shall meet the following requirements when tested at the field moisture condition, or dry by laboratory sieves in accordance with ASTM Method C136.

Minimum Passing 1-3/4 sieve	100 percent
Minimum Passing 3/4 sieve	85 percent
- S. It is the intent of this Specification that lime and flyash shall be spread as directed by the Engineer.
- T. The amount of lime and flyash used shall be as directed by the Engineer.
- U. During the interval of time between application and mixing, hydrated lime or flyash that has been exposed to excessive loss due to washing or blowing will not be accepted for payment. Spreading, mixing, compaction and finishing for lime-flyash stabilized subgrade should be completed during daylight hours of the same day.
- V. If flyash only is to be used without lime, the following mixing procedures shall apply.

- W. The raw material shall be thoroughly mixed by approved road mixers or other approved equipment, and the mixing continued until a homogeneous, friable mixture is obtained, free from all clods or lumps.
- X. The flyash shall be distributed at a uniform rate and in such manner as to reduce the scattering of flyash by the wind to a minimum. Flyash shall not be applied when wind conditions, are such that blowing flyash becomes objectionable to traffic or adjacent property owners. A motor grader shall not be used to spread flyash.
- Y. The material and flyash shall be thoroughly mixed by approved road mixers or other approved equipment and the mixing continued until a homogeneous, friable mixture of materials is obtained, free from all clods or lumps. If the soil binder-flyash mixture contains clods, they shall be reduced in size by raking, blading, discing, harrowing, scarifying or the use of other approved pulverization methods so that when all nonslaking aggregates, retained on the 3/4" sieve are removed, the remainder of the material shall meet the following requirements when tested at the field moisture condition or dry by laboratory sieves using ASTM Method C136:

Minimum Passing 1-3/4 sieve	100 percent
Minimum Passing 3/4 sieve	85 percent

- Z. Flyash shall be applied only to such an area that all the operations can be continuous and completed in daylight.
- AA. During the interval of time between application and mixing, flyash that has been exposed to the open air for a period of 6 hours or more, or to excessive loss due to washing or blowing will not be accepted for payment. It is recommended that the mixing and compaction of flyash stabilized subgrade be completed within 2 hours in order to take advantage of rapid initial set characteristics.
- BB. Mixing after the addition of flyash will be accomplished dry or with a minimum of water to prevent flyash balls.
- CC. Compaction of the mixture shall begin immediately after adding and mixing of the last stabilizing agent and be completed within 6 hours. The material shall be aerated or sprinkled as necessary to provide the optimum moisture. Compaction shall begin at the bottom and shall continue until the entire depth of the mixture is uniformly compacted to 95 percent of standard proctor density (ASTM D698), to a minimum depth of 6 inches. In addition to the requirements it shall be compacted to the extent necessary to remain firm and stable under the construction equipment. Throughout the entire operation the shape of the course shall be maintained by blading, and the surface upon completion shall be smooth and in conformity with the typical section shown of the Plans and to the established lines and grades.
- DD. After the final layer of the lime-flyash or flyash treated subgrade has been compacted, it shall be brought up to the required lines and grades, and in accordance with the typical sections.
- EE. The resulting surface shall be thoroughly rolled with a pneumatic tire roller and skinned by a power grader to achieve final grade, removing all loosened stabilized material from the section. The surface shall be thoroughly compacted with the pneumatic roller, adding small increments of moisture as needed during rolling. If aggregate larger than a 3/4" screen is present in the mixture, one complete coverage of the section with the flat wheel roller shall be made immediately after the skinning operation. Surface finishing methods may be varied from this procedure to provide a dense, uniform surface, free of surface compaction planes. The moisture content of the surface material must be maintained at optimum during all finishing operations. Surface compaction and finishing shall proceed in such a manner as to produce, in not more than 2 hours, a smooth, closely knit surface, free of cracks, ridges or loose material conformity to the crown, grade and line shown on the Plans.

- FF. After the lime-flyash or flyash treated course has been finished as specified herein, the surface shall be protected against rapid drying by either of the following curing methods for a period of not less than 3 days or as directed by the Engineer.
1. Maintain in a thorough and continuously moist condition by sprinkling.
 2. Apply an asphalt membrane to the treated course, immediately after same is completed. The asphalt material for the membrane shall be MC-30. Asphaltic material shall meet the requirements of Item 300, Oils, Asphalts and Emulsions, of the TxDOT "Standard Specifications for Construction of Highways, Streets and Bridges". The asphalt shall completely cover and seal the total surface of the base and fill all voids. If the Contractor elects to use this method, it shall be his responsibility to protect the asphalt membrane from being picked up by traffic.
- GG. The asphalt membrane may remain in place when the proposed surface or other base courses are applied.
- HH. Completed sections of lime-flyash or flyash treated material in-place may be opened immediately to local traffic and to construction equipment and to all traffic after the curing period, provided the lime-flyash or flyash treated course has hardened sufficiently to prevent marring or distorting the surface by equipment or traffic, and after the minimum 3 day curing period. If the Plans provide for the treated material to be sealed or covered by other courses of material such seal or course shall be applied within 14 days after compaction unless otherwise directed by the Engineer. Should the material, due to any reason or cause, lose the required stability, density and finish before the next course is placed, it shall be reprocessed and refinished at the expense of the Contractor.

END OF SECTION 31 32 13.21

SECTION 31 41 00 - TRENCH SAFETY SYSTEM

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 – GENERAL

1.1 SUMMARY

- A. This item is for furnishing all labor and materials for installation and maintenance of a trench safety system.
- B. For any trench excavation in materials other than solid rock, greater than five (5) feet in depth, or where shown on the plans, the contractor shall provide a trench safety system. This trench safety system shall be in accordance with the appropriate requirements established in the Occupational Safety and Health Administration (OSHA), Safety and Health Regulations, Part 1926, Subpart P - "Excavations, Trenching and Shoring" (latest edition).

1.2 MEASUREMENT

- A. Measurement of the "Trench Safety System" for gravity pipelines and boxes and for pressure pipelines shall be made by the linear foot of trench measured along the centerline of the trench.

1.3 PAYMENT

- A. No separate measurement or payment will be made for materials and labor performed under this section. Include all costs in the lump sum price.

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

END OF SECTION 31 41 00

SECTION 32 05 19.18 - PVC - GEOMEMBRANE LINER FOR TURF SYSTEMS

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. The GEOSYNTHETICS CONTRACTOR shall furnish all labor, materials, equipment, tools and appurtenances required to complete the installation of all geomembrane, complete with appurtenances, as shown, specified or required by the Drawings.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. D 618 Conditioning
 - 2. D 751 Hydrostatic Burst Test, Section 33, Procedure A
 - 3. D 792 Specific Gravity
 - 4. D 882 Tensile Properties
 - 5. D 1004 Standard Test Method for Initial Tear Resistance of Plastic Film and Sheeting
 - 6. D 1203 Volatile Loss
 - 7. D 1204 Dimensional Stability
 - 8. D 1239 Water Extraction
 - 9. D 1790 Low Temperature Impact
 - 10. D 4354-99 Standard Practice for Sampling of Geosynthetics for Testing
 - 11. D 4551 PVC Plastic Concealed Water Containment Membrane
 - 12. D 4873-01 Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples
 - 13. D 5199-01 Standard Test Method for Measuring the Nominal Thickness of Geosynthetics
 - 14. D 5321-92 (1997) Standard Test Method for Determining the Coefficient of Soil and Geosynthetic or Geosynthetic and Geosynthetic Friction by the Direct Shear Method
 - 15. D 5820-95 Standard Practice for Pressurized Air Channel Evaluation of Dual Seamed Geomembranes
 - 16. D 6214 Chemical Seam Evaluation
 - 17. D 6243-98 Standard Test Method for Determining the Internal and Interface Shear Resistance of Geosynthetic Clay Liner by the Direct Shear Method
 - 18. D 6392-99 Standard Test Method for Determining the Integrity of Nonreinforced Geomembrane Seams Produced Using Thermo-Fusion Methods
 - 19. D 7176 Standard Specification for Non-Reinforced Polyvinyl Chloride (PVC) Geomembranes used in Buried Applications.
 - 20. D 7177 Standard Specification for Air Channel Evaluation of Polyvinyl Chloride (PVC) Dual Track Seamed Geomembranes
- B. Environmental Protection, Inc.
 - 1. Quality Control Manual for Fabrication and Installation of PVC Geomembranes. January 1, 2006.
- C. The most current version of the specified test method shall be followed by the MANUFACTURER, GEOSYNTHETICS CONTRACTOR or authorized testing laboratory.

1.3 DEFINITIONS

- A. Minimum Value – Property value representing the lowest individual allowable value obtained when tested according to the specified test method. This applies to individual readings, such as thickness; or where only one specimen is tested for the specified parameter.
- B. Minimum Average Value – Property value representing the lowest allowable value for the average of results for the specimens tested.
- C. Nominal Value – Property value that is representative of a measurable property, determined under a set of prescribed test conditions, by which a product may be described.
- D. Lot - For the purposes of this project, a “Lot” will be defined as a single run of geosynthetic material from the same production facility, where the tooling and raw materials of production have not changed during manufacturing.
- E. Roll - A quantity geomembrane rolled up to form a single package as supplied from the manufacturer
- F. Sheet - A part of the manufacture’s geomembrane material cut from the roll.
- G. Panel - A series of geomembrane sheets fabricated together to make a larger unit, as supplied by a fabricator usually folded onto a pallet or folded then rolled on a core.
- H. Manufacturer - A company that takes raw materials and calendars or extrudes them into geomembrane rolls
- I. Fabricator - a company that converts geomembrane rolls into panels
- J. Installer - a company that installs PVC geomembrane panels in field applications.

1.4 SUBMITTALS

- A. The GEOSYNTHETICS CONTRACTOR shall submit to the ENGINEER all items included in this Article. Submittals shall be provided as follows:
 - 1. With the GEOSYNTHETICS CONTRACTOR's BID:
 - a. A project reference list documenting the experience of the GEOSYNTHETICS CONTRACTOR on a minimum of 5 projects consisting of at least 10 million square feet of installed PVC geomembrane.
 - b. A copy of the Fabricator's Quality Assurance/Quality Control (QA/QC) Plan for the complete geomembrane fabrication process.
 - c. A schedule of operations, including means and methods of installation.
 - d. The name of the fabricator of the geomembrane panels to be used for the project and the proposed method of joining adjacent geomembrane panels.
 - 2. At least 15 days prior to delivery of geomembrane to the site, unless otherwise noted below:
 - a. Shop drawings, including proposed panel diagram and details of proposed work, pipe boots, and details of sealing around all necessary geomembrane penetrations, to be submitted at least 15 days prior to delivery of geomembrane to the site. The panel diagram must depict and/or note the planned number and orientation of panels, the panel sizes, seam orientation, placement of seams in corners, treatment of tee seams and the GEOSYNTHETICS CONTRACTOR's preferred sequence of panel placement. The PVC panels shall be orientated in a manner that minimizes seams. The ENGINEER, prior to geomembrane installation must approve the panel diagram. The ENGINEER, in writing, prior to altering the installation, must approve proposed revisions to the panel diagram.

- b. Geomembrane - Manufacturing Quality Control (MQC) data (Material Certifications) for the geomembrane to be delivered to the site. The reports shall include the quality control test results obtained during the manufacture of the material. In the event material is delivered to the site prior to the receipt of the MQC certificates, the material without certificates will be stored separately from the material with certificates. Material with unacceptable MQC data will be segregated from approved material and shall be marked for rejection. The geomembrane will be rejected if it is found to have defects, rips, holes, flaws, deterioration or other damage deemed unacceptable by the ENGINEER.
 - c. Geomembrane Sample - Samples of the proposed geomembrane shall be sent to the OWNER for interface shear testing within 5 days after the OWNER makes such request. The GEOSYNTHETICS CONTRACTOR shall coordinate the quantity and dimensions of the samples with the OWNER.
 3. At least 15 days prior to installation:
 - a. Resumes of geomembrane crew; including, Supervisor, QC Manager, and Master Seamer. The resumes shall include prior experience in installing PVC geomembrane. Individual geomembrane crew members will be subject to the approval of the ENGINEER and OWNER.
 - b. A copy of the GEOSYNTHETICS CONTRACTOR's standard operating procedure (SOP) for operating an ATV on site, particularly with respect to specific uses of the ATV and the prevention of damage to materials.
 - c. Field tensiometer calibration certificate showing that the equipment to be used for shear/peel testing in the field as been calibrated by a qualified individual within the previous 6 months.
 4. During Installation Submitted Daily:
 - a. Completed Subgrade Acceptance Form, as endorsed by the ENGINEER, prior to geomembrane deployment in any area.
 - b. Construction progress reports clearly showing geomembrane placed by date.
 - c. Passing and failing test results for trial seams.
 - d. Documentation of passing and failing destructive and nondestructive testing of installed seams.
 5. Within 5 days after completion:
 - a. Summary and log of all field quality control work completed by the GEOSYNTHETICS CONTRACTOR.
 - b. Certification statement signed by the Supervisor that geomembrane installation is complete and in accordance with these Specifications, with details of any changes or exceptions noted.
 - c. Statement of material and installation warranties.
- B. The above-noted requirements shall apply to all shop-fabricated materials and those items specified for fabrication in the field.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. The GEOSYNTHETICS CONTRACTOR shall protect the work described in this Section before, during, and after installation, and shall protect the installed work specified in other Sections, as well as work completed by the OWNER.
- B. Geomembrane labeling, shipment and storage shall follow ASTM D4551 as modified according to this Specification.
- C. Product labels shall be placed on the top of panels such that they can be seen, clearly showing the fabricator or supplier name, product description, panel number, and panel dimensions.

- D. Each panel of PVC shall include any additional information required to allow the ENGINEER to relate that panel with the manufacturing quality control and raw material quality assurance documentation. Additionally, if any special handling is required, it shall be so marked on the outside surface of the wrapping.
- E. During storage, the geomembrane shall be placed on a stable, relatively flat, dry, well-drained surface. The geomembrane pallets shall not be placed on objects that may cause deformation of the geomembrane panels. Adequate space shall be left between stored panels, such that panel labels can be examined. The geomembrane shall be protected from the following:
 - 1. Site construction damage.
 - 2. Chemicals that are strong acids or bases.
 - 3. Flames, sparks, geomembrane temperatures in excess of 150° F.
 - 4. Any environmental condition that might damage the geomembrane.
- F. Panel numbers on partially used panels must be maintained such that each panel number can be readily identified prior to deployment of the remaining portions of the panel.
- G. If the ENGINEER determines the geomembrane is damaged, the GEOSYNTHETICS CONTRACTOR shall make all repairs and replacements in a timely manner, so as to prevent delays in the progress of the work.

PART 2 - MATERIALS

2.1 GENERAL

- A. The geomembrane sheet shall consist of polyvinyl chloride (PVC) resin in amounts greater than 50% of the total polymer content suitably compounded with plasticizers, stabilizers, additives, and pigments, to satisfy the physical property requirements.
- B. The ENGINEER shall conduct conformance testing on the geomembrane. The GEOSYNTHETICS CONTRACTOR shall, at no additional cost to the OWNER, provide whatever reasonable assistance the ENGINEER may require in obtaining samples for conformance testing. Geosynthetic material sampling frequency shall be in accordance with ASTM D4354, unless determined otherwise by the ENGINEER. A qualified laboratory with GAI-LAP accreditation shall conduct conformance testing.
- C. Conformance testing will be at the expense of the OWNER, unless the tests show the material does not comply with the Specifications, in which case the GEOSYNTHETICS CONTRACTOR shall pay the cost of re-sampling and testing.
- D. The GEOSYNTHETICS CONTRACTOR shall be solely responsible for the quality of the material provided. Should any of the tests performed on the material yield unsatisfactory results, the GEOSYNTHETICS CONTRACTOR will be responsible for replacing the material with satisfactory materials without delay to the project or cost to the OWNER.

2.2 GEOMEMBRANE

ASTM D7176 Standard Specification for Non-Reinforced Polyvinyl Chloride (PVC) Geomembranes used in Buried Applications.

Certified Properties	ASTM	PVC 10	PVC 20	PVC 30	PVC 40	PVC 50	PVC 60
Thickness	D 5199	10 ±0.5 mil 0.25±.013mm	20 ±1 mil 0.51 ± .03 mm	30 ±1.5 mil 0.76 ± .04 mm	40 ±2 mil 1.02 ± .05 mm	50 ±2.5 mil 1.27 ± .06 mm	60 ± 3 mil 1.52 ± .08 mm
Tensile Properties ²	D 882 Min						
Strength at Break		24 lbs/in 4.2 kN/m	48 lbs/in 8.4 kN/m	73 lbs/in 12.8 kN/m	97 lbs/in 17.0 kN/m	116 lbs/in 20.3 kN/m	137 lbs/in 24.0 kN/m
Elongation		250%	360%	380%	430%	430%	450%
Modulus at 100%		10 lbs/in 1.8 kN/m	21 lbs/in 3.7 kN/m	32 lbs/in 5.6 kN/m	40 lbs/in 7.0 kN/m	50 lbs/in 8.8 kN/m	60 lbs/in 10.5 kN/m
Tear Strength	D 1004 Min	2.5 lbs 11 N	6 lbs 27 N	8 lbs 35 N	10 lbs 44 N	13 lbs 58 N	15 lbs 67 N
Dimensional Stability	D 1204 Max Chg	4%	4%	3%	3%	3%	3%
Low Temperature Impact	D 1790 Pass	-10° F -23° C	-15° F -26° C	-20° F -29° C	-20° F -29° C	-20° F -29° C	-20° F -29° C

Index Properties	ASTM	PVC 10	PVC 20	PVC 30	PVC 40	PVC 50	PVC 60
Specific Gravity	D 792 Typical	1.2 g/cc	1.2 g/cc	1.2 g/cc	1.2 g/cc	1.2 g/cc	1.2 g/cc
Water Extraction Percent Loss (max)	D 1239 Max Loss	0.15%	0.15%	0.15%	0.20%	0.20%	0.20%
Volatile Loss	D 1203 Max Loss	1.5%	0.9%	0.7%	0.5%	0.5%	0.5%
Soil Burial	G 160 Max Chg						
Break Strength		5%	5%	5%	5%	5%	5%
Elongation		20%	20%	20%	20%	20%	20%
Modulus at 100%		20%	20%	20%	20%	20%	20%
Hydrostatic Resistance	D 751 Min	42 psi 290 kPa	68 psi 470 kPa	100 psi 690 kPa	120 psi 830 kPa	150 psi 1030 kPa	180 psi 1240 kPa

Seam Strengths	ASTM	PVC 10	PVC 20	PVC 30	PVC 40	PVC 50	PVC 60
Shear Strength ²	D-882 Min	20 lbs/in 3.47 kN/m	38.4 lbs/in 6.7 kN/m	58.4 lbs/in 10 kN/m	77.6 lbs/in 14 kN/m	96 lbs/in 17 kN/m	116 lbs/in 20kN/m
Peel Strength ⁴	D-882 Min	10 lbs/in 1.8 kN/m	12.5 lbs/in 2.2 kN/m	15 lbs/in 2.6 kN/m	15 lbs/in 2.6 kN/m	15 lbs/in 2.6 kN/m	15 lbs/in 2.6 kN/m

***FTB = Film Tearing Bond *MD = Machine Direction *TD = Transverse Direction**

Notes:

1. Certified properties are tested by lot as specified in ASTM D-7176.
2. Metric values are converted from US values and are rounded to the available significant digits.
3. Modifications or further details of test are described in ASTM D-7176.
4. Index properties are tested once per formulation as specified in ASTM D-7176.

- A. Geomembrane Conformance Testing - The ENGINEER shall take samples of the geomembrane panel for conformance testing. Unless otherwise specified, samples shall be three feet long by the roll width and shall not include the outer wrap. The ENGINEER or authorized representative shall mark the machine direction on the samples with an arrow.
1. Unless otherwise specified, conformance samples shall be taken at a rate of one per 100,000 square feet. An appropriate number of samples, as determined by the ENGINEER in accordance with ASTM D4354 will be taken. The ENGINEER will ship these samples directly to the CQA laboratory.
 2. Geomembrane conformance samples selected by the ENGINEER may be tested for any properties specified in Article 2.3, but shall as a minimum be tested for the following:

GEOMEMBRANE CONFORMANCE
MINIMUM TESTING AND FREQUENCY

PROPERTY	TEST METHOD	
Thickness	ASTM D 5199	
Strength at Break	ASTM D 882	
Elongation	ASTM D 882	
Modulus at 100%	ASTM D 882	
Tear Strength	ASTM D 1004	
Low Temperature	ASTM D 1790	

3. Non-conforming material will not be used in the work. In the event nonconforming results are obtained from the laboratory, the nearest numbered rolls on each side of the non-conforming roll shall be sampled and tested for the full suite of conformance tests, until the extent of nonconformance is established, at no cost to the OWNER. The owner reserves the right to reject the lot of rolls at any stage of extended sampling and testing.

- B. Interface Shear Testing - Interface shear strength testing of the geomembrane and related materials is the responsibility of the OWNER. The results must comply with the criteria determined by the OWNER, as specified in the Construction Drawings. All testing must meet the minimum requirements, and the analysis of those results must be completed by the ENGINEER prior to installation of the materials. Testing for geosynthetic to geosynthetic, or geosynthetic to soil interface, shall be conducted according to the current version of ASTM D 5321-92 (97). Testing for interfaces involving geosynthetic clay liner (GCL) shall be conducted according to the current version of ASTM D 6243-98.

2.3 FACTORY FABRICATION

- A. All completed factory seams are 100% inspected. Factory seams will be visually inspected for full seam continuity over their full length. Any areas that do not meet the specified requirements shall be removed and repaired per section.
- B. Destructive tests will be performed to verify that the seam strength requirements of the specifications are met. Random samples shall be taken at a minimum of every 3,000 lineal feet of factory seam or once per factory panel fabricated, which ever is more frequent, and the following quality assurance tests will be performed on each sample:
 - 1. Thickness
 - 2. bonded seam strength (shear strength)
 - 3. peel adhesion
- C. The sample shall be cut into ten one - inch wide specimens. Five peel and five bonded seam specimens are removed. Five specimens shall be tested for bonded seam strength (bss) and five for peel adhesion. To be acceptable, the average of five test specimens for peel and the average of five test specimens for bonded seam strength must meet the minimum peak load requirements of factory seams as follows:
 - 1. Bonded Seam Strength: One-inch strips cut with the weld centrally located are tested by stressing the weld in a "shear" configuration. That is, the top sheet is stressed in relation to the bottom sheet in a direction away from the weld. A pass result occurs when the specimen averages meet the minimum peak load requirements stated in the contract (usually 80% of specified sheet strength). A failure occurs when the weld separates or the material breaks at a peak load less than the minimum requirements. The test result to be reported will be the average of the peak loads recorded for each of the five specimens.
 - 2. Peel Adhesion: One-inch strips cut with the weld centrally located are tested by stressing the top sheet in relation to the overlapped edge of the lower sheet in an effort to peel the weld away. Each specimen will be peeled one inch along the seam length. A pass result occurs when the specimen meets the minimum peak load requirements stated in the contract. A failure occurs when the weld peels at a peak load less than the specification without film tearing bond. The test result to be reported is the average of the peak loads recorded for each of the four specimens.
- D. Each test will be identified by panel serial number and the manufacturer's roll number. These tests shall be performed in the fabricator's laboratory.
- E. Prior to installation of the geomembrane at the site, the fabricator will provide to the ENGINEER, copies of manufacturer material certifications and a copy of quality control test results for all panels to be supplied, verifying conformance with this specification and the requirements as represented in ASTM D 7176 specification. The location of any defects and repairs and all necessary retesting results will also be documented in the report.
- F. When a seam sample is removed from the panel being fabricated the resulting hole will be repaired with a patch with a minimum of a one-inch bonded area around the patch, and the patch will be rounded on all corners.

- G. Factory fabricated geomembrane panels are packaged accordion folded on a sturdy wooden pallet designed for forklift truck access. Smaller panels (i.e. less than 500 lbs.) can be rolled on a fiber core and placed on a pallet.
- H. All panels will be packaged with a protective, black stretch wrap or cardboard cover to protect the panel from weather or shipping damage.

2.4 GEOMEMBRANE PENETRATION BOOTS

- A. The GEOSYNTHETICS CONTRACTOR shall furnish all geomembrane penetration boots and other materials required for completion of the geomembrane installation. All geomembrane boots required for the project shall be factory prefabricated boots. The geomembrane shall be of the same thickness as the geomembrane panels.
- B. Geomembrane penetrations are to be constructed only at the locations shown on the Plans. The GEOSYNTHETICS CONTRACTOR is cautioned that no deviation in the quantity or configuration of geomembrane penetrations will be accepted without the advance written approval of the ENGINEER.
- C. All penetrations through the geomembrane shall be thoroughly and securely sealed. The seal between the geomembrane and the pipe shall be without any detectable leakage.
- D. In attaching the geomembrane penetration boot in the field, no field seams will be allowed in locations or configurations that do not allow for Construction Quality Control testing. Visual observation is not considered a sole acceptable method for in-field quality control.
- E. Where clamps, fasteners, gasket seals or sealants are used, the GEOSYNTHETICS CONTRACTOR shall use only materials that are compatible with the geomembrane.

PART 3 - EXECUTION

3.1 SITE PREPARATION

- A. All required grading, grooming and construction quality assurance (CQA) testing on any low permeability soil or GCL to be covered by the geomembrane shall be complete and accepted by the ENGINEER prior to geomembrane placement.
- B. The surface to be covered by the geomembrane shall be cleared of sharp objects, angular stones, sticks, or any materials that may contribute to punctures, shearing, rupturing or tearing of the geosynthetic materials. The geomembrane subgrade shall have a smooth, finished surface, free from pockets, holes, ruts, and discontinuities that, in the judgment of the ENGINEER, will cause bridging of the material. The subgrade shall be inspected for unsuitable areas or soft spots before the geomembrane is placed, and additional surface preparation will be required to eliminate any unsuitable areas as determined by the ENGINEER.
- C. The GEOSYNTHETICS CONTRACTOR and ENGINEER shall carefully and completely inspect the subgrade surface immediately prior to the deployment of each geomembrane panel. No geomembrane shall be placed on unsuitable subgrade surface, or without the ENGINEER's written approval. The ENGINEER and the GEOSYNTHETIC CONTRACTOR's Quality Control (QC) inspector shall furnish their signatures on a Subgrade Acceptance Log prior to the installation of each panel or series of panels placed on a daily basis.
- D. Under no condition shall the geomembrane be placed over standing water on the subgrade.

3.2 SEAMING METHODS

- A. A six - inch wide overlap must be cleaned of all dust, dirt or foreign debris no more than 30 minutes prior to welding. Only clean, soft rags will be used for cleaning. If mud has adhered to the sheet surface overlap area, it will be removed with clean water and allowed to dry prior to seaming.
- B. During the cleaning operation, the sheet will be inspected for defective areas which must be removed and/or repaired prior to seaming. The seaming operation requires a solid, smooth subsurface. Subsurface voids, hard nodules, rocks, soft areas or unsuitable conditions will be removed or repaired prior to seaming during subgrade preparation.
- C. Seaming cannot be conducted in the presence of standing water. Wet surfaces must be allowed to dry. A slip sheet or seaming board may be used to lift the geomembrane above damp surfaces. If wind conditions contaminate the seaming area or displace the geomembrane sheets, temporary ballast and additional cleaning procedures will be required.
- D. The geomembrane panels shall be joined utilizing approved seaming methods. Dual-track fusion welding shall be the required method on all seams where it is feasible. Chemical welds shall be made only where approved by the ENGINEER.
- E. All geomembrane surfaces that are to become a seam interface are to be free of dust, dirt, excess moisture or any other condition that may affect the quality of the seam.
- F. Seaming will not be allowed during rain or snowfall, unless proper precautions are made to allow the seam to be made on dry subgrade and geomembrane materials. If weather conditions are not satisfactory, panels will not be put into place. If panels are placed and pulled out, the installation crew will do what is necessary to finish or secure those individual panels that day.
- G. The field seams shall be produced using one of the following methods:
 1. Dual-Track Thermal Fusion Weld – All field seams shall be fused using Dual-Track Thermal Fusion Welding. A seam produced by melting the two intimate surfaces by running a hot metal wedge or hot air device between the surfaces, followed immediately by pressure to form a homogeneous bond. This seam has a center air channel for non-destructive testing of the seam. Panels to be seamed shall be overlapped sufficiently to allow proper destructive testing of seams. The CONTRACTOR shall mark the liner where the Dual-Track Fusion Welding machine settings are adjusted (including speed, temperature and pressure). Measurable setting values shall be indicated on the liner.
 2. Chemical Fusion Weld – Chemical Fusion Welding shall only be used for repairs and detail work. All field seams will be a minimum of 2 inches wide. A sufficient amount of chemical fusion agent will be applied that, upon compressing the seam surfaces together, a thin excess of chemical fusion agent will be forced out. A high durometer rubber, nylon or steel roller will be used to compress the seam surfaces together until a bond is formed. Roller action will be at a parallel direction to the seam's edge so that excessive amounts of chemical fusion agent will be purged from between the sheets. Trapped chemicals should be rolled out of the seaming area. Care will be exerted in applying the chemical fusion agent. A continuous wet layer of chemical fusion agent is necessary to prevent a leak at the tie - in point between the last chemical fusion agent application and the next. If the chemical fusion agent, which is initially shiny when applied, takes on a dull filmy appearance, the interfaces may require a faster closing together or the ambient temperature is too high to continue seaming. The installer will monitor this condition at sheet temperatures over 105°F. At the completion of seaming, all rags, chemical containers, etc., will be properly removed from the geomembrane.

3.3 INSTALLATION

- A. The number of panels to be deployed in any day will be limited to the number of panels which can be seamed that day. The geomembrane will be placed over the prepared surface in such a manner as to assure minimum handling.
- B. Based on the approved geomembrane panel diagram and material certifications, the individual panels will be numbered, and seams will be identified by using the panel numbers that create the seam. The PVC panels shall be installed in a manner that minimizes seams. Wherever possible longitudinal seams shall be oriented to be no greater than ten degrees from parallel with the direction of the slope. Cross seams (i.e. those seams which join the ends of contiguous panels) shall not be placed on any slope that exceeds a ten percent grade. All panels placed on slopes shall be cut no closer than five feet from the top of the slope or ten feet from the toe of slope. All seam overlaps shall be shingled in a downslope direction. In no case shall parallel seams be placed within five feet of the centerline of any leachate collection pipe.
- B. During installation, and any other period of exposure of geomembrane, pedestrian and equipment activity over the geomembrane shall be kept to a minimum and restricted to only that which is necessary for geomembrane construction.
- C. Smoking is not permitted on the geomembrane.
- D. Construction workers shall take precautions not to damage the geomembrane surface. Construction workers shall wear smooth-soled footwear, and exercise care not to drag tools across the geomembrane surface. All large tools are to have smooth base plates or shoes. Construction and landfill staff shall be informed of the restricted access to areas of geomembrane placement by use of barriers and signs posted as necessary.
- E. The GEOSYNTHETICS CONTRACTOR shall perform all activities of geomembrane construction in such a way as to avoid damage to the geomembrane. Any damage caused to the geomembrane by the GEOSYNTHETICS CONTRACTOR shall be repaired or the material replaced at the expense of the GEOSYNTHETICS CONTRACTOR.
- F. No tracked or wheeled vehicles, other than low ground pressure ATVs as preapproved by the ENGINEER, shall be permitted on the geomembrane prior to placement of adequate soil cover, as determined by the ENGINEER.
- G. The GEOSYNTHETICS CONTRACTOR shall complete his work in a manner that will prevent water or wind from getting under the partially installed geomembrane. This could include, but is not limited to, installing sandbags along the leading edges. Should excessive moisture become trapped below the geomembrane, or should wind damage occur due to the negligence of the GEOSYNTHETICS CONTRACTOR, the GEOSYNTHETICS CONTRACTOR, at no extra cost to the OWNER, will be required to perform all work, including removing and replacing as much of the in-place geosynthetic material as the ENGINEER directs, to assure that the integrity of the geomembrane and the underlying subbase or geosynthetic clay liner (GCL) has not been compromised.
- H. Seams shall be welded throughout the entire length of the panels during initial panel seaming.
- I. Sandbags or other approved ballast shall be used to prevent bridging or material movement in areas such as toe of slope or near sumps. Ballast shall not be used to force the geomembrane into contact with the subgrade.
- J. Special care shall be taken to prevent tensile stress in the geomembrane and geomembrane seams in all corners and grade changes.

- K. The GEOSYNTHETICS CONTRACTOR shall exercise his best judgment and care to provide sufficient slack in the PVC geomembrane.
- L. The geomembrane shall not be installed when ambient or sheet temperatures are below 32° F, when the sheet temperature exceeds 158° F, or when the air temperature is above 120° F unless the GEOSYNTHETICS CONTRACTOR demonstrates, to the satisfaction of the ENGINEER, that procedures can be implemented which will result in the proper installation and seaming of the geomembrane.
- M. Adjacent geomembrane panels shall be allowed to reach essentially equivalent temperatures prior to seaming to avoid development of fish mouths.
- N. If fish mouths are created at the seam overlaps, they shall be cut to achieve a flat overlap.
- O. Geomembrane covering operations shall be performed in a manner that does not damage the geomembrane lining system. Geomembrane covering operations shall be performed only in the presence of a Construction Observer such that the condition and cleanliness of the geomembrane is observed at the time the material is covered, and any effects of the covering operation on the geomembrane lining system can be observed.
- P. Any use of ATV's on the site must be pre-approved by the ENGINEER. The GEOSYNTHETICS CONTRACTOR shall submit an S.O.P. describing how ATV's are to be used, if at all, in the deployment of geomembrane at the site. As a minimum, the following shall apply:
 - 1. Any damage resulting from the use of ATV's, as determined by the ENGINEER, shall be repaired according to Article 3.3, at no additional cost to the OWNER. If repeated repairs are required as the result of the use of ATVs operating on geosynthetic material, further use of ATVs will be prohibited.
 - 2. Any and all ATV's proposed to be used in the deployment of geosynthetics will be inspected by the ENGINEER. ATV's which are found to be leaking oil or fuel, or which in any other way exhibit the potential to damage the lining system components, will not be permitted.
 - 3. Any oil or fuel which leaks onto geosynthetic materials shall be thoroughly removed (cleaned) by the GEOSYNTHETICS CONTRACTOR, or the geosynthetic material shall be replaced at the discretion of the ENGINEER, at no additional cost to the OWNER.
 - 4. Re-fueling of ATVs on geosynthetic materials is prohibited.
 - 5. ATVs shall have tires with low ground pressure, typically less than 5 psi, and shall have shallow treads.
 - 6. ATVs shall be operated by a single operator at speeds less than 5 mph.
 - 7. Quick starts, stops, spinning wheels and sharp turns will not be permitted above any geosynthetic material.

3.4 REPAIRS

- A. All geomembrane panels and seams shall be examined by the ENGINEER for defects, holes, blisters, undispersed raw materials, and any sign of contamination by foreign matter. The geomembrane surface shall be clean at the time of examination. Each suspect location shall be repaired, and all repairs shall be non-destructively tested.
- B. Damaged geomembrane shall be removed and replaced with acceptable geomembrane if damage cannot be repaired to the satisfaction of the ENGINEER.
- C. Any portion of the geomembrane, or any portion of a seam exhibiting a flaw or failing a destructive or non-destructive test, shall be repaired as follows:
 - 1. Geomembrane patches shall be used for holes over 1/8 of an inch in diameter, tears, and contamination by foreign matter. Patches shall be constructed of the same geomembrane and will be joined to the panel using adhesive or chemical fusion welding where possible.

2. Geomembrane patches or caps shall extend at least 6 inches beyond the edge of the defect or failed seam area, and all corners of material to be patched. The corners of the patch shall be rounded.
3. Geomembrane caps shall be used to repair failed seams that are left in place. Seams that fail destructive or non-destructive testing may also be removed and replaced if determined necessary by the ENGINEER.

PART 4 - FIELD QUALITY ASSURANCE/QUALITY CONTROL PROGRAM

4.1. GENERAL

- A. Before installation begins, and weekly thereafter (more often if determined necessary by the ENGINEER) project coordination meetings shall be held with the designated representative of the EARTHWORKS CONTRACTOR, GEOSYNTHETICS CONTRACTOR, ENGINEER and OWNER in attendance to review the following information:
 1. Progress of the work.
 2. Adherence to the Specifications.
 3. Adherence to the Construction Quality Assurance Program described in this Section, including the timely submission of the pertinent forms.
 4. Planned work and methods for the ensuing week, including estimate of time remaining to completion of the work.
 5. Problem resolutions to be implemented during the upcoming week.
- B. All of the Forms specified and required must be submitted to the ENGINEER in a timely fashion.
- C. The OWNER and ENGINEER must approve any changes in the proposed method of work, subcontractors to be utilized, geomembrane resin, or manufacturing in advance.
- D. The GEOSYNTHETICS CONTRACTOR assumes all responsibility relevant to providing an acceptable product.

4.2. INSTALLATION QA/QC

- A. The ENGINEER and GEOSYNTHETICS CONTRACTOR shall visually inspect all material to be included in the work and compare panel identification numbers with those on the certifications provided by the manufacturer to assure delivery of the appropriate material.
- B. Damage to geomembrane during installation shall be repaired according to Article 3.4. If the ENGINEER determines that any damage cannot adequately be repaired, the damaged material will be replaced.
- C. The GEOSYNTHETICS CONTRACTOR will be required to conduct both destructive and non-destructive testing on seams during the geomembrane installation, as part of the Construction Quality Control program. All trial and installed seam samples shall be tested.
- D. Thermal Weld Trial Seams –
 1. Trial seams shall be produced each day, at the start of each workday, after every four hours of continuous operation, after each break in seaming of 1 hour or more, after a break that results in equipment replacement or shutdown, and if the geomembrane temperature changes by more than 45°F. Trial seams shall be required each day for each piece of seaming equipment and each welding crew combination (including welding technician, seam cleaners and/or helpers). The trial seams will be performed on strips of geomembrane from approved rolls and shall be produced at the work location such that the conditions mimic those under which production seams will be made.
 2. A trial seam shall be a minimum of 5 feet in length for self-propelled seaming devices, and a minimum of 3 feet for hand-held seaming devices. The material for the trial seam and the

- test fixture for making the field tests shall be provided by the GEOSYNTHETICS CONTRACTOR at no additional cost. One-inch wide cutouts of the trial seams will be subject to shear and peel testing at the site. A minimum of 3 cutouts will be tested for shear, and a minimum of 3 cutouts will be tested for peel. The ENGINEER shall document the locus of break code for each specimen as shown in Figure 3 and Figure 4 of ASTM D6392-99, included at the end of this Section.
3. All trial seam specimens must be acceptable, or the trial seam will be repeated until all results from a given trial seam are found acceptable. If any trial seam fails at any time during the workday, the reason for the failure shall be resolved before any production seaming of the geomembrane by the subject equipment and crew. All trial seam welding and testing must be observed by the ENGINEER.
 4. A trial seam specimen will be considered a failure if:
 - a. In the shear test, the bonded thickness of the seam fails or the material breaks at a stress lower than specified.
 - b. In the peel test, the two sheets comprising the seam separate at a peak stress lower than specified. Should the ENGINEER, at any time during the installation, believe the production seaming process may not be performing adequately, he may, to avoid destructive sampling of the installed geomembrane, request additional trial seams. The GEOSYNTHETICS CONTRACTOR at no additional cost shall do this.
- E. The GEOSYNTHETICS CONTRACTOR shall complete non-destructive testing of all seams along their entire length, in the manner approved prior to installation, in the presence of the ENGINEER. The recommended test methods are as follows:
1. Pressurized Air Channel
 - a. All field seams made by a dual-track fusion welding device will be tested by applying air pressure within the air channel to a sealed length of seam, and monitoring the pressure over time. The testing shall be conducted in accordance with ASTM D 7177.
 - b. For the geomembrane, the initial inflation pressure shall be equal to or greater than the minimum according to ASTM D 7177. The minimum allowable pressure drop over a 30 second period shall be 5.0 psi.
 - c. A pressure gauge shall be inserted into the end of the air channel to check for continuity in the air channel. Alternately, the far end of the seam may be cut to relieve the air pressure. An audible rush of air shall serve as an indicator that the test represents the entire length of seam.
 - d. Air channels that do not hold the minimum specified air pressure shall be further inspected to identify the location and nature of any defects or unbonded sections of seam. The seam will then be repaired and retested. The ENGINEER may, at his discretion, require the entire questionable seam area to be capped or replaced.
 2. Air Lance Testing
 - a. The ENGINEER shall witness the testing, and the seam shall be clearly visible to the ENGINEER and GEOSYNTHETICS CONTRACTOR during the test. Unbonded areas or defects shall be marked by the ENGINEER for repair by the GEOSYNTHETICS CONTRACTOR.
 - b. The air lance will be capable of supplying 50 PSI through a 3/16-inch diameter nozzle. The air stream is directed at the upper edge of the seam no more than 2 inches from the seam edge. Any voids in the seam will be marked, repaired, and re-tested with the air lance. The testing technician and the inspector will mark each seam or repair with an indelible marker as accepted immediately after completion of final air lance testing.
- F. All inadequate seams or portions thereof that fail the non-destructive testing shall be repaired in accordance with this Specification and the method approved by the ENGINEER. Should differences of opinion between the GEOSYNTHETICS CONTRACTOR and the ENGINEER develop during

the installation relevant to seam integrity, the ENGINEER may, at his discretion, obtain samples of the seams in dispute for field and/or laboratory testing. The GEOSYNTHETICS CONTRACTOR will be responsible for patching the resulting void in accordance with the previously approved procedures at no additional cost to the OWNER.

- G. Destructive Sample Collection - Samples of the in-place seams shall be cut from the installed geomembrane at a minimum frequency of one sample per 500 linear feet of seam, excluding repair seam length. A minimum of one seam sample shall be obtained for each seaming machine/operator combination for each day, or as directed by the ENGINEER. The cutout sections shall be 12 inches wide by 40 inches long with the seam centered lengthwise. The sample size can be reduced to 30" if the CONTRACTOR does not elect to have a cutout section for their use. A 1-inch wide specimen shall be cut from each end of the sample, and these two specimens shall be peel tested in the field in accordance with 4.2 G. The remaining sample shall be cut into 2 parts and distributed as follows:
1. One 12-inch by 18-inch sample to the ENGINEER for independent laboratory testing; and,
 2. One 12-inch by 18-inch sample to the OWNER for archive storage.
 3. The remainder of the sample shall be available for the CONTRACTOR if requested at the time of sample collection.
- H. The 12-inch by 18-inch laboratory sample will provide 5 specimens for shear testing and 5 specimens for peel testing. Specimens that will be subject to peel and shear testing shall be selected alternately from the sample. All peel tests shall be performed on the outer track of dual track fusion welds. The laboratory shall report the locus of break code for each specimen according to the definitions included in Figure 3 and Figure 4 of ASTM D 6392, included at the end of this Section. The laboratory sample will be considered acceptable only if all 10 specimens meet the minimum requirements. The specimen will be considered a failure if:
1. In the shear test, the bond of the seam fails or the material breaks at a stress lower than specified.
 2. In the peel test, the two sheets comprising the seam separate at a peak stress lower than specified. Complete peel separation of the seam is allowable.
 3. In the shear or peel test, locus of break codes AD, AD-BRK, BRK, and SE are reported by the ENGINEER.
- I. If a sample fails destructive testing, the welding path must be retraced to intermediate locations at least 10 feet in each direction from the location of the sample that failed the test, and a second sample shall be taken for an additional field test. If the tracking samples pass, the seam must be reconstructed between the location of the two tracking samples and the original sampled location. If the tracking sample fails, this process must be repeated. The seam between 2 passing test locations shall be capped, the cap seams shall be nondestructively tested, and shall include one field peel and shear test location along the reconstructed seam.
- J. The ENGINEER and GEOSYNTHETICS CONTRACTOR shall visually inspect all geomembrane seams.
- K. All welds shall be observed for traces of deformation to the geomembrane panels. Any seams, which in the opinion of the ENGINEER, have caused excessive deformation of the sheet, show signs of discoloration, exhibit thinning or stepping of the sheet, or show visual signs of overheating of the geomembrane panels, shall be repaired at no additional cost to the OWNER regardless of the result of any destructive testing on the seam. The deficient seam or portion thereof shall be cut out, the geomembrane panels again overlapped and seamed, or the questionable seam length shall be capped, as approved by the ENGINEER.
- L. The GEOSYNTHETICS CONTRACTOR shall not place overlying materials on the installed geomembrane until the ENGINEER has reviewed and accepted the written test results for the geomembrane to be covered. At a minimum, the predelivery testing, the daily log of trial seam results, laboratory destructive sample results, non-destructive test results, record drawings of the completed area, and approval of the seams in place will be reviewed.

- M. The GEOSYNTHETICS CONTRACTOR shall provide a report to the OWNER and the ENGINEER at the conclusion of the work which shall include the following:
 - 1. The quality control tests used as specified and/or directed, including all requirements of the Report section of the specified test method.
 - 2. Complete description of field sampling procedure, number of test specimens, size of test specimens.
 - 3. Log of all Construction Quality Control work.
- N. The GEOSYNTHETICS CONTRACTOR shall be responsible for all costs incurred by the OWNER including, but not limited to, additional field and laboratory CQA testing resulting from greater than 5 percent of the CQA testing not meeting or exceeding the Specifications.
- O. All seams that cannot be subjected to the required Construction Quality Control or Construction Quality Assurance (CQA/CQC) testing shall be overlapped.

4.3. WARRANTY

- A. The GEOSYNTHETICS CONTRACTOR shall issue a warranty on the installation of geomembrane for a minimum period of 1 year.
- B. The GEOSYNTHETICS CONTRACTOR shall issue a warranty on the geomembrane material for a minimum period of 20 years.

END OF SECTION 32 05 19.18

SECTION 32 11 23 - CRUSHED AGGREGATE BASE COURSE

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 – GENERAL

1.1 DESCRIPTION

- A. This item shall consist of a foundation course for a surface course or for other base courses and shall be composed of a compacted flexible base course of crusher-run, broken limestone.

1.2 QUALITY ASSURANCE

- A. The Materials Engineer will determine the Moisture-Density Relationship in accordance with ASTM Method D1557 on material secured from the source of supply, or the Contractor.
- B. The Materials Engineer will determine the in-place density in accordance with ASTM Methods D2922 or D1556. The minimum level of testing will consist of at least three tests for each 1,000 feet per lane of roadway, or as recommended by the Materials Engineer.

1.3 MEASUREMENT & PAYMENT

- A. No separate measurement or payment will be made for materials and labor performed under this section. Include all costs in the lump sum price.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. The materials shall be obtained from approved sources, shall be crushed, and shall consist of durable particles of crushed aggregate, mixed with approved binding material. The crushed material shall have a minimum compressive strength of 45 psi at 0 psi lateral pressure and 175 psi at 15 psi lateral pressure using triaxial testing procedures. The crushed aggregate shall meet the following gradation when tested in accordance with ASTM Method C136.

Table I

<u>Retained on Sieve Conforming to ASTM E11</u>	<u>Percent Retained By Weight</u>
1-3/4"	0
7/8"	10 - 35%
3/8"	30 - 50%
No. 4	45 - 65%
No. 40	70 - 85%

- B. The material passing the No. 40 sieve shall meet the following requirements when tested in accordance with ASTM Method D4318.
- C. The liquid limit shall not exceed 35. The plasticity index shall not exceed 10
- D. All material retained on the No. 40 sieve shall have a Los Angeles Abrasion percent of wear not exceeding 40 when tested in accordance with ASTM Method C131.
- E. With prior written permission of the Engineer, additives may be used to meet the above requirements.

PART 3 – EXECUTION

3.1 CONSTRUCTION METHODS

- A. The subgrade shall be prepared in accordance with Section 31 20 00 – Earthwork (Subsection 2.6 – Subgrade). Immediately before placing the base material, the subgrade shall be checked as to conformity with the grade and section. Any deviation in excess of one-half (1/2) inch in cross-section and in a length of sixteen (16) feet measured longitudinally shall be corrected by loosening, adding or removing material, reshaping and compacting by sprinkling and rolling. Sufficient subgrade shall be prepared in advance to insure satisfactory prosecution of the work.
- B. The material for the first course shall be deposited on the subgrade in a lift not to exceed six (6) inches in thickness. Material deposited upon the subgrade shall be spread and shaped the same day unless otherwise directed by the Engineer. The material shall be sprinkled, if directed and shall then be bladed, dragged and shaped to the typical sections as shown on the plans. All areas and most of segregated coarse or fine material shall be corrected or removed and replaced with well graded material as directed by the Engineer. If additional binder is considered desirable or necessary after the material is spread and shaped, it shall be furnished and applied in the amount directed by the Engineer. Such binder material shall be carefully and evenly incorporated with the material in-place by scarifying harrowing, brooming or by other approved methods.
- C. The course shall be sprinkled as required and compacted to the extent necessary to provide not less than 95-percent of modified proctor density (ASTM D1557) at a moisture content ranging from optimum to three percent above optimum. In addition to the requirements specified for density, the full depth of the flexible base shown on the plans shall be compacted to the extent necessary to remain firm and stable under construction equipment. After each section of flexible base is completed, tests as necessary will be made by the Engineer. If the material fails to meet the density requirements, it shall be reworked as necessary to meet these requirements. Throughout this entire operation the shape of the course shall be maintained by blading, and the surface upon completion shall be smooth and in conformity with the typical sections shown on the plans and to the established lines and grades. In that area on which pavement is to be placed, any deviation in excess of 1/4-inch in cross section and in length of 16-feet measured longitudinally shall be corrected by loosening, adding or removing material as required, reshaping and recompacting by sprinkling and rolling. Should the base course, due to any reason or cause, lose the required stability, density or finish before the surface is complete, it shall be recompacted and refinished at the sole expense of the Contractor.
- D. Construction methods for succeeding courses shall be the same as prescribed for the first course. Prior to placing the surfacing on the completed base, the base shall be dry cured to the extent directed by the Engineer.

3.2 ACCEPTANCE REQUIREMENTS

- A. The completed base course will be checked for determining acceptance as provided herein. Upon completion of compaction operations, the density of the completed course will be determined in accordance with ASTM Methods D2922 or D1556. A minimum of one density test will be taken per 1,000 linear feet per roadway, or as recommended by the Materials Engineer. The location of the test will be chosen randomly. If any density test is below requirements, two additional tests will be taken within 5-feet of the failing test location and the average of the three tests will be used as the value for the 1,000-foot location.
- B. The density requirements as based on ASTM Method D1557, will be ninety-five percent (95%) of the maximum density. If the density test value per 1,000-foot section is below ninety-five percent (95%), a price adjustment will be supplied as follows:

Percent of Contract	
<u>Density Test Value</u>	<u>Unit Price</u>
95.0 and above	100
93.0 to 94.9	90
90.0 to 92.	75
Below 90	50 or remove*

*At the option of the Engineer.

- C. The completed base course will not vary from plan thickness in excess of the following tolerances. Base course thickness deficiencies in excess of these tolerances shall be corrected, as specified herein, at the Contractor's expense.

<u>Underthickness</u>	<u>Overthickness</u>
1 inch	1-1/2 inches

- D. If an individual test exceeds allowable tolerances, two additional tests will be taken within 5-feet of the failing test location and the average of the three tests (rounded off to the nearest 1/4-inch) will be used as the value for that location. Any railing areas will be isolated for purposes of correction. Base course thickness deficiencies in excess of the foregoing tolerances shall be corrected as follows.
- E. If no grade adjustments are permitted, thickness deficiencies shall be corrected by removing and replacing the full depth of base course in deficient areas with one of the following materials:
1. Cement Stabilized Crushed Aggregate
 2. Hot Mix Asphaltic Concrete
- F. If grade adjustments are permitted, the Contractor shall have the option of correcting thickness deficiencies by furnishing and placing a supplemental layer of hot mix asphaltic concrete, for the full width of the base course, in lieu of removing and replacing deficient base course. The thickness of the supplemental layer of asphaltic concrete shall be as follows:

BASE COURSE THICKNESS CORRECTION

<u>Underthickness</u>	<u>Overthickness</u>	Minimum thickness of Supplemental <u>Asphaltic Concrete</u>
Inches	Inches	Inches
1/4 to 1-1/2	1-3/4 to 2	1
1-3/4 to 2	2-1/4 to 2-1/2	1-1/2
2-1/4 to 2-1/2	2-3/4 to 3	2
Over 2-1/2	Over 3	Remove and replace

END OF SECTION 32 11 23

SECTION 32 11 23.23 - "FREE-DRAINING STONE" BASE FOR SYNTHETIC TURF SYSTEM

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 - GENERAL

1.1 SCOPE

- A. This specification covers the installation of a "free draining stone" base to provide a vertical drainage system beneath an infilled synthetic turf.

1.2 RELATED WORK

- A. 31 20 00 – Earthwork
- B. 31 23 00 - Construction of Underground Utilities
- C. 32 05 19.17 HDPE- Geomembrane HDPE Liner
- D. 32 05 19.18 PVC- Geomembrane PVC Liner
- E. 33 41 00 - Storm Sewer and Appurtenances

1.3 QUALITY CONTROL

- A. Contractor shall use an independent testing laboratory selected by the Owner to provide testing of the "free draining stone" base material.

1.4 SUBMITTALS

- A. Submit the "free draining stone" base material to the Testing Laboratory for testing. The quantity of the "free draining stone" base material for testing to be determined by the Testing Laboratory.

1.5 STORAGE AND HANDLING

- A. The "free draining stone" base material used for placement around the subdrain system may be temporarily stored on a clean, hard surface to prevent contamination of the stone material. Stone material used for placement on the subgrade shall be delivered and back dumped onto the subgrade such that the delivery truck is not traveling on the subgrade itself. The stone material shall be pushed onto the subgrade by working off of previously placed material. Contractor shall sequence delivery of the stone material to minimize storage of the material on site.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. "Free Draining Stone" Base
 - 1. The "free draining stone" base material shall consist of clean washed gravel or crushed stone. Soft limestone or other soft materials are not acceptable. The "free draining stone" base material shall not lose more than 12% by weight when tested for weathering stability based on ASTM C-88 sodium sulfate soundness test. The "free draining stone" base material shall be tested by the L.A. Abrasion test, ASTM C-131, with a percentage lost by weight not exceeding 40.
 - 2. The "free draining stone" material shall have the following gradation as a guide for selection of material:

<u>Sieve Size</u>	<u>Percent Passing</u>	
	<u>Base Stone</u>	<u>Finishing Stone</u>
1 1/2"	100	
1"	95-100	
1/2"	25-60	100
3/8"		40-75
#4	0-10	5-25
#8	0-5	0-10

3. The "free draining stone" material shall be checked for the following:
 - a. Structural stability: $D_{60}/D_{10} > 5$ and $1 < D_{2/30}$
 $\frac{D_{10}}{D_{60}} > 3$
 - b. Fragmentation shall be 100%.
 - c. Separation of both stones: D_{85} of finishing stone
 $\frac{D_{15}}{D_{85}} > 2$
 And $3 < \frac{D_{50}}{D_{15}}$ of base stone
 $\frac{D_{50}}{D_{15}} < 6$ of finishing stone
 - d. Drainage: Permeability of base stone > 600 in/hr. (0.42 cm/sec.)
 Permeability of finishing stone > 150 in/hr. (0.106 cm/sec.)
 Porosity of both stones $> 25\%$
 (when stone is saturated and compacted to 95% max. density)
 - e. Depending on the type of stone used, other mechanical characteristics may be necessary for approval.

PART 3 - EXECUTION

3.1 SUBDRAINS

- A. The Contractor shall layout and excavate all of the trenches for the storm sewer system on the perimeter of the athletic field. The trenches shall be excavated to proper width and grade to allow for the placement of the geomembrane liner and "free draining stone" material in the trench. Trench walls shall be cut straight without sloughing of any material from the sidewalls. Bottom of the trenches shall be graded smooth and compacted to 95% maximum density ASTM D698. All excavated material for the storm sewer system shall be removed and the subgrade shall be cleaned, graded and amended as required to maintain the design elevations of the subgrade.

3.2 GEOMEMBRANE LINER

- A. The geomembrane liner shall be installed the length of the playing field. A separate liner panel shall be used for each trench. End seams will not be allowed in the trench. Place liner in trench so that fabric at a higher elevation overlaps liner at a lower elevation to prevent free water from running underneath the liner in the event of a tear or hole. The geomembrane liner shall be installed in accordance with SECTION 32 05 19.17.

3.3 GRAVEL DRAINAGE - TRENCHES

- A. With the geomembrane liner in place, the Contractor shall place initial “free draining stone” in the perimeter storm sewer trench and then place the perforated storm sewer pipe to design grade and alignment, as specified and/or shown on the drawings.
- B. After storm sewer pipe is in place and has been approved by Owner’s Representative, Contractor shall place “free draining stone” around the sides of the pipe and continue to fill the trench with the “free draining stone” to the elevation of the subgrade.
- C. The Contractor shall install composite drains on top of the geomembrane liner in the pattern as shown on the drawings.

3.4 “FREE DRAINING STONE” BASE AND FINISH COURSE

- A. The Contractor shall inspect the surface of the geomembrane liner to assure there are no irregularities in elevation, wrinkles in the liner and that the surface is free of any debris.
- B. The “free draining stone” shall be laid without damaging the subgrade, geomembrane liner or composite drains by back dumping the stone material onto the geomembrane liner so as to keep the delivery trucks off the liner. Contractor shall use the proper equipment to push the stone material over the athletic field.
- C. The “free draining stone” base and finish courses shall have a combined minimum thickness of 6-inches at the centerline of the athletic field. The “free draining stone” base course shall be placed in maximum 6” lifts. The top 1 to 2-inches of the “free draining stone” base shall be a finishing stone of the gradation listed above. The “free draining stone” material shall maintain a moisture content of 90% to 110% of optimum moisture at all times. Contractor shall ensure the stone at the plant meets this requirement and shall maintain this moisture content while placing, grading and compacting the stone material. The “free draining stone” base and finish courses shall be compacted to 95% maximum density ASTM D698, and shall have a maximum deviation from design grade of +0” to -1/4” in 10’ feet when measured in any direction using a 10’ straight-edge.
- D. After the “free draining stone” has been finished to grade, at the Owners option a minimum of five (5) permeability tests shall be made at random locations on the “free draining stone” base in accordance with ASTM D3385 test methods.
- E. If the “free draining stone” base fails to meet any of the design specifications, it shall be the Contractor’s responsibility to restore at his expense, the materials to meet all requirements for permeability, cross-section, grade and density as outlined in the specifications. The “free draining stone” base shall be approved by the Owner’s Representative before the Contractor is allowed to install the synthetic turf.

3.5 DISPOSAL OF WASTE MATERIAL

- A. All excess excavated material, debris or other objectionable material shall become the property of the Contractor and shall be removed from the project site and legally disposed of at no cost to the Owner.

END OF SECTION 32 11 23.23

SECTION 32 12 16 - HOT MIX-HOT LAID ASPHALTIC CONCRETE

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. This section provides for furnishing and installing hot mix asphaltic concrete (HMAC) pavement. The material shall consist of a compacted mixture of coarse and fine aggregates and asphaltic cement. The paving will be constructed over compacted flexible base course.

1.2 WEATHER CONDITIONS

- A. Place no asphaltic mixture, prime or tack coat, when the air temperature is below 45 degrees F. and falling. Materials may be placed after the air temperature is above 40 degrees F. and rising. Take temperature readings in the shade away from artificial heat. Place asphaltic mixtures only when weather conditions are suitable in the opinion of the engineer.

1.3 RELATED WORK

- A. Section 32 11 23 – Crushed Aggregate Base Course

1.4 MEASUREMENT & PAYMENT

- A. No separate measurement or payment will be made for materials and labor performed under this section. Include all costs in the lump sum price.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Mineral Aggregate. The mineral aggregate shall be composed of a coarse aggregate and a fine aggregate. Samples of coarse aggregate and fine aggregate shall be submitted in accordance with the methods prescribed in the Texas SDHPT Item 6 "Control of Materials" and approval of both material and of the source of supply must be obtained from the Engineer prior to delivery.
 - 1. Combined mineral aggregate, prior to addition of asphalt, shall have a sand equivalent value of not less than 45 when sampled and tested in accordance with Test Method Tex-203-F.
 - 2. Mineral aggregate from each source shall meet the tests specified herein unless otherwise specified on the plans.
 - a. Course Aggregate, General. The course aggregate shall be that part of the aggregate retained on a No. 10 sieve and shall consist of clean, tough, durable particles. The aggregate shall be natural limestone and of uniform quality throughout.
 - 1) The point of sampling for tests, Tests Method Tex-217-F (Part I and Part II), will be after final processing at the mixing plant and prior to the addition of asphalt for weigh-batch and continuous plants and at the cold feed for the drum mix plants.
 - 2) When the course aggregate is sampled during delivery to the plant, from the stockpile, or from the cold feed, the material removed when tested in accordance with Test Method Tex-217-F (Part II, Decantation), shall not exceed 2 percent.

- 3) When the course aggregate is tested in accordance with Test Method Tex-217-F (Part I, Separation of Deleterious Material), the amount of organic matter, clay, loam or particles coated therewith or other undesirable materials shall not exceed 2 percent.
- 4) The coarse aggregate shall have an abrasion loss of not more than 40 percent by weight when subject to the Los Angeles Abrasion Test, Test Method Tex-410-A. Coarse aggregate from each source shall meet the abrasion requirement.
- b. Fine Aggregate. The fine aggregate shall be that part of the aggregate passing the No. 10 sieve of uniform quality throughout as hereinafter specified.
 - 1) Fine aggregate shall consist of durable particles, free from injurious foreign matter. The plasticity index of that part of the fine aggregate passing the No. 40 sieve shall be not more than 6 when tested in accordance with Test Method Tex-106-E. Fine aggregate from each source shall meet plasticity requirements.
- c. Limestone Screenings. When limestone screenings are specified for use, or authorized by the Engineer, the screenings shall be the result of a crushing operation and meet the following grading requirements:

Percent by Weight

Passing the 3/8" sieve.....	100
Passing the No. 10 sieve	70-100
Passing the No. 200 sieve	0 – 15

- 1) When authorized by the Engineer, limestone screenings containing particles larger than 3/8 inch may be used but only that portion of the material passing the 3/8 inch sieve shall be considered as fulfilling the requirements for screenings when a minimum percentage of screenings is specified for a particular mixture.
 - d. All mineral aggregate shall be sterile material. Aggregate with foreign matter or suspect of same shall be sterilized by treatment with a weed killer. Weed killer shall be compatible with continued use of material in asphaltic concrete mixture. Seed germination and subsequent growth in asphaltic concrete pavement constitutes unacceptable pavement and shall be removed and replaced at Contractor's sole expense.
- B. Asphaltic Material. Provide moisture-free homogeneous material which will not foam when heated to 347 degrees F., and which meets the requirements of the Texas ADHPT, Item 300 "Asphalts, Oils and Emulsions."
- 1. Material must not be cracked.
 - 2. Grade of asphalt used will be designated by the Engineer after design tests have been made. Only one grade of asphalt will be required, after grade is determined by test design for project.
 - 3. Asphalt material for the tack coat shall be RC-70 or RC-250, and for the prime coat MC-70 or MC-250. Use SS-1 emulsion during the summer months.
- C. Hot-Mix Asphaltic Concrete.
- 1. Design Mixes. Materials and design mixes will be subject to approval of the Engineer after being tested in accordance with these specifications and current Texas Highway Department methods. Design mixes and tests for density and stability are the responsibility of the Contractor and must be made at his expense. Furnish test results to the Engineer. Furnish Testing Laboratory certificates certifying that asphaltic materials and aggregates comply with specified requirements.

2. Density and Stability Requirements.

Density			Stability %
% Theoretical Density			
Min.	Max.	Optimum	Not Less Than
95	99	96	35
			Not More Than
			60

3. Design mix shall contain anti-stripping agent. Quantity of anti-stripping shall be proven by mix design.
4. Evaluation of indirect tensile strength for stripping. Texas Highway Department Test Method 531-C. Minimum value of 70% of stripping ratio. Only for top 1-1/2 inch surface course.

D. Hot-Mix Asphalt Concrete Level-up Course - Type "B".

1. Grading Requirements for Aggregates.

Sieve Size	Percent by Weight
Passing 1" sieve	100
Passing 7/8" sieve	95 -100
Passing 5/8" sieve	75-95
Passing 3/8" sieve	60-80
Passing No. 4 sieve	40-60
Passing No. 10 sieve	27-40
Passing No. 40 sieve	10-25
Passing No. 80 sieve	3-13
Passing No. 200 sieve	1- 6
VMA % Minimum	12

2. Proportions for Asphaltic Material.
 Four (4) to eight (8) percent of mixture by weight is required.

E. Hot-Mix Asphalt Concrete Surface Course - Type "D".

1. Grading Requirements for Aggregates.

Sieve Size	Percent by Weight
Passing 1/2" sieve	100
Passing 3/8" sieve	85 -100
Passing No. 4 sieve	50-70
Passing No. 10 sieve	32-42
Passing No. 40 sieve	11-26
Passing No. 80 sieve	4-14
Passing No. 200 sieve	1-6
VMA % Minimum	14

2. Proportions for Asphaltic Material. Five (5) to eight (8) percent of mixture by weight is required.

- F. Asphalt Patch Fillers. Court Patch Binder by California Products Corp. patching materials may be used for repairing minor "pockmark" or "skin" type repairs to surface, as well as filling in low areas no deeper than 1/2 inch as determined from surface test if approved by Turf Contractor/Installer. Patch fillers shall only be used on football field pavement.
- G. Non-Woven Paving Fabric. The following fabrics may be used:
 - 1. Petromat Engineering Paving Fabric by Propex

2.2 EQUIPMENT

- A. Type of Plant. Mixing plants must have capacity for continuously producing mixtures meeting specifications and must be approved by the Engineer. Either weight-batching type of continuous mixing type are acceptable. Regardless of the type, the plant must have satisfactory conveyors, power units, aggregate handling equipment, hot aggregate screens and bins, and dust collectors. Provide equipment to adequately supply materials in accordance with rated capacity of the plant and produce finished material within specified tolerances. The following equipment is considered essential:
 - 1. Cold aggregate bins and proportioning device.
 - 2. Dryer.
 - 3. Screens.
 - 4. Aggregate weight box and batching scales.
 - 5. Mixer.
 - 6. Asphalt storage and heating devices.
 - 7. Asphalt measuring devices.
 - 8. Truck scale (if used).
- B. Bins. Separate aggregate into at least four bins so that uniform grading and asphalt content are consistently produced in the completed mix.
- C. Spreading and Finishing Machine. The spreading and finishing machine shall be of a type approved by the Engineer, shall be capable of producing a surface that will meet the requirements of the typical cross section and the surface test, when required and when the mixture is dumped directly into the finishing machine shall have adequate power to propel the delivery vehicles in satisfactory manner. The finishing machine shall be equipped with a flexible spring and/or hydraulic type hitch sufficient in design and capacity to maintain contact between the rear wheels of the hauling equipment and the pusher rollers of the finishing machine while the mixture is being unloaded.
 - 1. The use of any vehicle which requires dumping directly into the finishing machine and which the finishing machine cannot push or propel in such a manner as to obtain the desired lines and grades without resorting to hand finishing will not be allowed. Vehicles dumping directly or indirectly into the finishing machine shall be so designed and equipped that unloading into the finishing machine can be mechanically and/or automatically operated in such a manner that overloading the finishing machine being used cannot occur and the required lines and grades shall be obtained without resorting to hand finishing.
- D. Automatic Screed Controls for Spreading and Finishing Machines. Asphaltic-concrete spreading and finishing machines shall be equipped with an approved automatic dual longitudinal screed control system and a transverse screed control system. The longitudinal controls shall be capable of operating from longitudinal grade references of a stringline or laser or matching shoe or ski. A matching shoe or ski shall be used only for adjacent paving lines. The Contractor shall furnish all equipment required for grade reference. It shall be maintained in good operating condition by personnel trained in the use of this type of equipment. The equipment shall be capable of constructing a finished surface within specified tolerances.

1. Surface Requirements. The automatic grade control device shall produce a finished surface meeting the requirements of the surface test on the items of work for which a spreading and finishing machine is required. Skin-patching on wearing surface course will not be permitted. Sections of pavement exceeding the minimum tolerance shall be corrected at the Contractors expense.
 2. Construction Procedure. The grade reference used by the Contractor may be of any type approved by the Engineer. Contractor shall set control point for the finished profile. These points will be set on both sides of the course being laid, at intervals not to exceed 25 feet. The Contractor shall set the grade reference for the sensor of the automatic control to follow from the control points, and the grade reference shall have sufficient support so that the maximum deflection shall not exceed 1/8 inch per 25 feet.
- E. Rollers. It shall be the responsibility of the Contractor to have rolling equipment available on the job to properly compact the paving mixture in place as required without delay to the lay down operation. Rollers provided shall meet the qualifications for their type as follows:
1. Pneumatic Tire Rollers. The rollers shall be acceptable medium pneumatic tire rollers (Type B) conforming to the requirements of Texas High Department Standard Specification 1982, Item 213 Rolling (Pneumatic Tire). This roller shall only be used with Engineer's approval.
 2. Two Axle Tandem Roller. This roller shall be an acceptable power driven tandem roller weighing not less than 8 tons.
 3. Vibratory Steel-Wheel Roller. This roller shall be two-axle tandem roller and have a minimum weight of 6 tons. The compactor shall be equipped with amplitude and frequency controls and shall be specifically designed to compact the material on which it is used. It shall be operated in accordance with the manufacturer's recommendations.

PART 3 - EXECUTION

3.1 PRE-INSTALLATION MEETING FOR PAVEMENT TO RECEIVE TRACK SURFACING

- A. Prior to commencing installation of the finished surface course and at the asphaltic concrete paving Contractor's initiative, a meeting will be called at the project site to review materials, installation procedures and coordination with the Track Surface Contractor. Meeting shall include Track Surface Contractor, Paving Contractor, the Engineer, and the Owner.
- B. The surface course shall be laid in such a manner as to be compatible with requirements to install the track surface material.

3.2 PREPARATION

- A. The lime stabilized subgrade base shall be prepared and shaped in accordance with appropriate section of these specifications. Keep all unnecessary traffic off the stabilized subgrade.

3.3 PRIME COAT

- A. Apply prime coat to the surface of the flexible base with an approved distributor at the uniform rate of 0.25 gal/sy. Allow sufficient time for prime to cure before starting paving operations.

3.4 TACK COAT

- A. Apply tack coat to the surface of the asphaltic base course with an approved distributor at the uniform rate of 0.15 gal/sy. Thoroughly clean asphaltic base course surface and apply tack coat with an approved distributor at the uniform rate shown on the drawings.

3.5 LAYING

- A. The asphaltic concrete mixture, heated and prepared as specified, shall be hauled to the work in tight vehicles previously cleaned of all foreign materials. The mixture shall be laid only on approved surfaces free of all foreign materials. The mixture shall be at a temperature of 250 degrees to 350 degrees Fah. when laid. The mixture shall be placed in an approved spreading and finishing machine. Spreading and finishing machine shall have automatic screed controls and operate off of sensing devices establishing uniform grades. The mixture shall be spread into place in a uniform layer of such depth that after receiving ultimate compaction by rolling, finish grades and section will be met. Minimum allowable lift is 1-1/2 inches. Maximum allowable lift is 2 1/2 inches. Extreme care shall be taken to prevent depression at matching edges of each lay-down lanes.

3.6 ROLLING

- A. Begin rolling while pavement is still hot and as soon as it will bear the roller without undue displacement or hair cracking. To prevent adhesion of surface mixture to the roller, keep wheels properly moistened with water. Excessive use of water will not be permitted.
- B. Compress the surface thoroughly and uniformly with tandem rollers weighing from 8 to 10 tons. Obtain subsequent compression by starting at the side and rolling longitudinally toward the center of the pavement, overlapping on successive trips by at least one-half width of the wheels. Make alternate trips slightly different in length. Continue rolling until no further compression can be obtained and all rolling marks are eliminated.
- C. Use a tandem roller for final rolling. Double coverage with an approved pneumatic roller may be acceptable after flat wheel or tandem rolling has been completed, but must be approved by Engineer.

3.7 HAND TAMPING

- A. Along curbing and at other locations not accessible to rollers, compact the mixture thoroughly with a vibrating plate or roller compactor.

3.8 DENSITY

- A. Compact the asphalt overlay to density not less than 95 percent of the laboratory density of a mixture composed of the same materials in like proportions. If density tests show paved section has a density less than 95 percent, additional rolling will be required until density requirements are obtained. All rolling shall be complete before the temperature of the in place mixture falls below 185 degrees F.

3.9 SURFACE TEST

- A. Surface test shall be conducted within three days after final paving operations. Surface test shall be conducted by Paving Contractor, Track Surface Contractor and Engineer.
- B. Completed surface shall be tested with 16 ft. straight-edge laid parallel to and transverse to the longitudinal centerline of pavement. No deviation in excess of 1/8 inch per foot from the nearest point of contact will be permitted. The maximum ordinate measured from the face of the straight-edge must not exceed 1/4 inch at any point. Paving Contractor shall furnish approved straight-

edge. Straight-edge shall be of such strength and rigidity that when supported at the ends, the center deflection will not be more than 1/8 inch.

- C. In addition to straight-edge test, the completed surface shall be flooded with water by Contractor at the time of the joint inspection. Water trucks will not be allowed onto asphaltic concrete pavement. Low areas holding water after 30 minutes of elapsed time from application, shall be outlined and the area repaired as defective pavement or patched with approved asphalt patch filler material.

3.10 DEFECTIVE PAVEMENT

- A. Pavement sections not meeting specified densities shall be replaced with new asphaltic material. Replace with new asphaltic concrete material pavement sections not meeting surface test requirements or having unacceptable surface texture. Patch asphalt overlay as outlined for repair sections in this specification. Removal and replacement of defective pavement will be done at no cost to Owner.

3.11 REPAIR SECTIONS FOR NEW ASPHALTIC PAVEMENT

- A. Preparation for Repairs. Damaged new pavement or pavement not meeting density requirements shall be removed and replaced with new asphaltic concrete materials. Sawcut surface course the full thickness of the course. Cut in straight lines at a distance of at least 2 feet outside of the area to be removed. Area where pavement is removed shall be thoroughly cleaned and dry of moisture before tack coat and new asphaltic material is placed. Tack edges of existing asphalt pavement as well as base.
- B. Laying. The asphaltic concrete mixture, heated and prepared as specified, shall be hauled to the work in tight vehicles previously cleaned of all foreign materials. The mixture shall be at a temperature of 250 degrees to 350 degrees F. when laid. The mixture shall be distributed by shovels or forms or satisfactory mechanical means. Broadcasting of the material will not be permitted. Mixture shall not be dumped into area where it is to be spread. Spread mixture into place in a uniform layer of such depth that after receiving ultimate compaction by rolling the finished surface will match the surface elevation of the adjacent pavement. Extreme care shall be used in placing mixture as depressed or humped areas shall not be allowed.
- C. Rolling.
 - 1. While hot and as soon as it will bear the roller without undue displacement or hair cracking the surface shall first be compressed thoroughly and uniformly with an acceptable power-driven tandem roller weighing not less than 8 tons.
 - 2. Rolling shall start longitudinally at the sides and proceed toward the center of the pavement, overlapping on successive trips by at least one-half of the width of the wheels. Rolling shall continue until no further compression can be obtained and all roller marks are eliminated.
 - 3. The motion of the roller shall at all times be slow enough to avoid displacement of the hot mixture; and any displacement occurring as a result of reversing the direction of the roller or any other cause shall at once be corrected by the use of rakes and of fresh mixture where required. The roller shall not be allowed to stand on the completed pavement which has not cooled to normal atmospheric temperature. To prevent adhesion of the surfacing mixture to the roller, the wheel shall be kept properly moistened with water; but an excess of water will not be permitted. All equipment shall be in good condition, as the dropping of gasoline, oil, grease, or other foreign material on pavement shall be grounds for rejection.
- D. Density. Compact the asphalt pavement section to density not less than 95 percent of the laboratory density of a mixture composed of the same material in like proportions. If density tests show overlay has a density less than 95 percent, additional rolling will be required until density

requirements are obtained. All rolling shall be completed before the mixture temperature of in place material drops below 185 degrees F.

- E. Surface Test. Extreme care shall be used in placing material so that repair section will not have a depressed or humped area when compared to adjacent pavement surfaces. Completed surface shall be tested with 10 foot straight-edge laid parallel to and transverse to longitudinal center line of pavement. No deviation in excess of 1/8 inch per foot from the nearest point of contact will be permitted. The maximum ordinate measured from the face of the straight-edge shall not exceed 1/8 inch at any point. Contractor shall furnish approved straight-edge. Straight-edge shall be of such strength and rigidity that when supported at the ends the center deflection will not be more than 1/8 inch.

END OF SECTION 32 12 16

SECTION 32 13 13 - CONCRETE PAVING

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Concrete paving, including, but not limited to parking lots, aprons, sidewalks, curbs, handicapped accessible ramps, approaches, and miscellaneous exterior concrete shown on drawings.
- B. Traffic lane and parking space paint striping, including, but not limited to painting of curbs and stenciling of signs stipulating FIRE LANES, NO PARKING and BUS LOADING areas, crosswalks, handicapped accessible parking spaces, and other areas shown on drawings or required by authorities having jurisdiction.
- C. Precast concrete wheel stops and accessories shown on drawings.

1.2 QUALITY ASSURANCE

- A. Where standards or requirements of this Section are in conflict with those noted on the Contract Drawings, or the Building Code, the more stringent requirements shall govern. Bring all conflicts and discrepancies to the attention of the Architect and do not start work until such conflicts and discrepancies are clarified and corrected. Failure to do so will not relieve the Contractor from performing the Work correctly at no additional expense to the Owner.

1.3 REFERENCES

- A. American Association of State Highway and Transportation Officials (AASHTO)
 - 1. M-90
 - 2. M-213
- B. American Concrete Institute (ACI)
 - 1. 305, Hot Weather Concreting
 - 2. 306, Cold Weather Concreting
- C. ASTM International (ASTM)
 - 1. A185, Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
 - 2. A615, Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
 - 3. C33, Standard Specification for Concrete Aggregates
 - 4. C94, Standard Specification for Ready-Mixed Concrete
 - 5. C150, Standard Specification for Portland Cement
 - 6. C260, Standard Specification for Air-Entraining Admixtures for Concrete
 - 7. C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
 - 8. C494, Standard Specification for Chemical Admixtures for Concrete
 - 9. C881, Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete
 - 10. C920, Standard Specification for Elastomeric Joint Sealants
 - 11. C979, Standard Specification for Pigments for Integrally Colored Concrete
- D. Federal Specifications (FS)
 - 1. TT-S-00227E, Elastomeric Joint Sealants
 - 2. TT-P-1952B, Traffic and Airfield Marking Paint, Water Emulsion Base

1.5 PROJECT CONDITIONS

- A. Do not place concrete in contact with frozen earth. Do not commence concrete placement unless temperature is at least 35 degrees F and rising, or slabs until the temperature rises above 40 degrees F.
- B. Discontinue concrete placement when air temperatures exceed 100 degrees F.
- C. Dispose of any concrete that exceeds 95 degrees F as determined by Architect in field.
- D. Do not place concrete during rain.
- E. Cold Weather Placing: Comply with ACI 306 to protect all concrete work from physical damage and reduce strength caused by frost, freezing actions, or low temperatures. Place no concrete against frozen earth.
- F. Hot Weather Placing: Prepare aggregates, mix water and other ingredients, and place, cure, and protect concrete in accordance with the requirements of ACI 305.
- G. Do not apply traffic or zone marking paint on wet or damp surfaces or when rain is imminent. Do not commence painting operations until material, air, and/or surface temperature and dew point are within paint manufacturer's recommended application limits.

1.6 TESTS AND INSPECTIONS

- A. Before starting any work under this section, make all required arrangements with testing agency. Provide testing laboratory with certified reports on proposed cements, aggregates mixing water and admixtures.
- B. Lab shall review design mixes for each type of concrete using previously tested and approved materials.
- C. The testing lab will proportion mixes by laboratory trial batch, using materials to be employed in the work for each class of concrete required and reporting to Architect.
 - 1. Concrete Compression Test - 7 day and 28 day
 - 2. Concrete Slump Test
 - 3. Concrete Air Content
- D. Furnish certified reports of format shown herein of each proposed mix for each type of concrete at least 30 days prior to start of installation of the Work of this Section.
- E. Furnish ready mix delivery tickets to field Architect upon request.

1.7 SUBMITTALS

- A. Product Data: Manufacturer's descriptive literature for concrete admixtures.
- B. Shop Drawings: Show locations and installation procedures. Include details of joints, accessories, reinforcement, and clearances. Include concrete placement sequence schedule.
- C. Concrete Design Mix Reports:
 - 1. One (1) for each type of concrete to be used.
- D. Submit product data and shop drawings for ALL items to be installed.
- E. Refer to Section 01 33 00 for submittal procedures.

1.8 INSTALLATION CONFERENCE

- A. Refer to Section 01 31 13 – Project Coordination
- B. Required Participants:
 - 1. General Contractor Superintendent
 - 2. Placement and Finishing Foreman
 - 3. Concrete Supplier
 - 4. Testing Lab

1.9 MEASUREMENT AND PAYMENT

- A. No separate measurement or payment will be made for materials and labor performed under this section. Include all costs in the lump sum price.

PART 2 - PRODUCTS

2.1 APPROVED MANUFACTURERS

- A. Manufacturers named within this Section are approved for use on the Project for the product for which they are specified. Other manufacturers must have a minimum of five (5) years experience manufacturing the product specified and meet or exceed the specifications for that product. Substitution of products must be in accordance with the General Conditions, Supplementary Conditions, and Section 01 33 00, Submittals to be considered prior to proposal.

2.2 MATERIALS

- A. Formwork:
 - 1. General: Contractor may use any of the following formwork materials if material meets the following and will not stain, or impart any undesirable texture, i.e. wood grain, where such texture would be objectionable in an exposed location.
 - a. Wood Forms:
 - 1) Plywood: PS 1, Douglas Fir or Spruce species.
 - 2) Medium Density Overlay (MDO): One (1) side grade; sound undamaged sheets with clean, true edges.
 - 3) Lumber: Southern Yellow Pine species; No. 2 grade, with grade stamp clearly visible.
 - b. Prefabricated Forms:
 - 1) Preformed Steel Forms: Minimum 16 gauge matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.
 - 2) Glass Fiber Fabric Reinforced Plastic Forms: Matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.
- B. Metal Reinforcement:
 - 1. Bars:
 - a. Conform to ACI 315, latest edition.
 - b. Comply with ASTM A615, Grade 60, deformed billet steel bars, unfinished, except Number 3 bars shall comply with ASTM A615, Grade 40, deformed billet steel bars, unfinished.
 - 2. Tie Wire: 16 gauge annealed.
- C. Concrete Materials (Other than concrete for extruded curbs, unless noted otherwise)
 - 1. Cement: Type 1, ASTM C150, unless approved otherwise by Architect. Use one (1) brand of cement for entire project.

2. Concrete Admixtures: Provide admixtures produced and serviced by established, reputable manufacturer and used in compliance with manufacturer's recommendations.
 - a. Air-Entraining Admixture: ASTM C260, certified by manufacturer to be compatible with other required admixtures. Provide one (1) of the following, or Architect approved equal:
 - 1) Eucon AEA-92 and Eucon Air Mix 200 by The Euclid Chemical Company.
 - 2) Sika AEA 14 by Sika Corp.
 - 3) MasterAir AE or MasterAir VR by BASF Admixtures.
 - b. Water-Reducing Admixture: ASTM C494, Type A, and containing not more than 0.05 percent chloride ions. Provide one (1) of the following, or Architect approved equal:
 - 1) Eucon WR 75 or Eucon WR 91 by The Euclid Chemical Company.
 - 2) Master Pozzoloth 322 by BASF Admixtures.
 - 3) Plastocrete 161 by Sika Corp.
 - c. High-Range Water-Reducing Admixture (Superplasticizer): ASTM C494, Type F or Type G and containing not more than 0.05 percent chloride ions. Provide one (1) of the following, or Architect approved equal:
 - 1) Eucon 37 by The Euclid Chemical Company.
 - 2) ViscoCrete by Sika Corp.
 - 3) Master Rheobuild 1000 by BASF Admixtures.
 3. Prohibited Admixtures: Calcium chloride, thiocyanates or admixtures containing more than 0.05 percent chloride ions are not permitted.
 4. Integral Color Pigment (Required for new concrete handicapped accessibility ramps): Mineral oxide, lightfast, lime-proof, water-resistant type conforming to ASTM C979. Color(s) shall be as selected by Architect from manufacturer's standard color line. Provide one (1) of the following, or Architect approved equal:
 - a. ChemSystems, Inc.
 - b. Davis Colors
 - c. New Riverside Ochre Co., Inc.
 - d. Scofield Decorative Concrete by Sika Corp.
 5. Color Stain (Required for existing concrete handicapped accessibility ramps): A penetrating acrylic concrete stain, designed for adding color to existing concrete. Color(s) shall be as selected by Architect from manufacturer's standard color line. Provide H & C Silicone Acrylic Concrete Stain manufactured by Sherwin Williams, or Architect approved equal.
 6. Aggregates:
 - a. Comply with ASTM C33
 - b. Maximum size not larger than 1/5 of narrowest dimension between forms of the member for which concrete is to be used. Not larger than 3/4 of minimum clear spacing between reinforcing bars.
 - c. 1-1/2 inch maximum in paving slabs.
 7. Strengths:
 - a. Five and a half (5.5) sack (shall contain no less than 5.5 sacks of Portland cement)/3,500 psi/28 days.
 - b. Strength recommendations on Drawings supersede when they are greater than specified here.
 8. Water: Drinking quality.
 9. Water - Cement Ratio (lb water per lb of Portland cement):
 - 1) 0.52 Maximum
 10. Slump:
 - a. Slump shall be 4 inches plus or minus 1 inch, unless specifically noted otherwise.
- D. Joints:
1. Construction Joints and Expansion Joints: Refer to Paragraph on Accessories below.
 2. Tooled Control Joint: Scored ¼-inch wide x 1/4 thickness of concrete in depth.

E. Accessories:

1. Chairs and Spacers: Heavy-duty plastic-type sized to support all reinforcing steel to proper height directly on properly prepared and compacted subgrade. No sand cushion pads will be permitted. Provide chairs and spacers Series "B" by W.H.C. Products, Inc., E-Z Chair by Dayton Superior, MEDCO PC-4 by Meadow Burke, a CHR Company, GTI Bar Chair by General Technologies, Inc., or approved equivalent. Maximum spacing of chairs shall be 36-inches on center each way.
2. Form Release Agent: Colorless mineral oil which will not stain concrete or absorb moisture.
3. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages, Fasteners: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.
4. Epoxy Adhesive: ASTM C881, two (2) component, 100 percent solids, 100 percent reactive compound suitable for use on dry or damp surfaces. Provide one (1) of the following, or approved equal:
 - a. Euco #452 Epoxy System or Euco #620 Epoxy System by The Euclid Chemical Company.
 - b. Sikadur Hi-Mod by Sika Corp.
5. Expansion Joints:
 - a. Fiber Joint Filler: Pre-molded asphalt impregnated rigid fiber board. Comply with AASHTO M-213. Use 3/4-inch-thick at expansion joints adjacent to extruded curbs, 1/2-inch-thick at perimeter of footings for ground-set items such as bollards and fence posts where such footings are incorporated into slabs; elsewhere as shown.
 - b. Wood Expansion Joints: Where indicated in the drawing provide construction clear heart grade redwood joints conforming to AASHTO M-90. Provide sizes indicated on drawings. Do not install adjacent to curbs.
 - c. Joint Sealant: Shall be a self-leveling silicone base, cold-applied joint sealing compound complying with DOWSIL 890-SL Silicone Joint Sealant as manufactured by Dow Silicones Corporation or approved equal.
6. Load Transfer Units:
 - a. Light Duty (sidewalk): 3/4 inch thick clear heart redwood expansion joint form with minimum one (1) inch deep removable top strip, 1/2 inch x 10 inch smooth steel reinforcing bars at 12 inches on center +/- with bond breaker sleeve on one (1) side, and 3/32 inch thick steel bar-support plates each side. Provide custom size as required for full depth of paving and sealant depth as required by sealant manufacturer.
 - b. Medium Duty (Auto) / Heavy Duty (truck/bus traffic): 3/4 inch thick redwood expansion joint form with minimum one (1) inch deep removable top strip, 3/4 inch by 18 inch steel reinforcing bars at 12 inches on center +/- with bond-breaker sleeve on one (1) side and 3/16 inch steel bar-support plates each side. Provide custom size as required for full depth of paving and sealant depth as required by sealant manufacturer.

F. Curing Compound: The compound shall conform to ASTM C309-1315, Type II (A.I.M. Regulations - VOC Compliant). Provide 1600 White by W. R. Meadows, Inc., or equal products by BASF Admixtures, Dayton Superior, or approved equal.

G. Other Materials: Provide all items required to complete work which is not specified, or which is not to be provided by other trades.

H. Extruded Concrete Curbs:

1. Materials:
 - a. Portland Cement: ASTM C150, Type I.
 - b. Aggregate: ASTM C33.
 - c. Water: Clean, free of contaminating material.
2. Epoxy Adhesive: As specified under concrete materials above.

3. Concrete Mixing:
 - a. Slump: No slump allowed.
 4. Curing Compound: As specified under concrete materials above.
- I. Traffic and Zone Marking Paint: (As shown on drawings or required)
1. Type: chlorinated rubber paint conforming to the requirements of TT-P-115E. Sherwin Williams product Setfast Chlorinated Rubber Zone Marking Paint TM5126 – White and TM5127 – Yellow or approved equal.
 2. Stripe Size: Four (4) inches wide for traffic and parking lanes, unless noted otherwise.
 3. Colors:
 - a. Traffic and Parking Striping / crosswalks, directional arrows: White or as selected by Architect.
 - b. Fire Lanes: All curbs at driveways adjacent to building shall be painted solid red with white stenciled lettering to read “FIRE LANE, NO PARKING” in size and spacing required by authorities having jurisdiction. Contractor to verify requirements of local jurisdiction for fire lane striping.
 - c. Accessibility Handicapped Parking: Symbols and spaces shall be in size and color in accordance with ADA and TAS authorities having jurisdiction.
- J. Precast Concrete Wheel Stops: (As shown on drawings or required)
1. Precast of 3,000 psi air-entrained concrete, approximately 6 inches high x 9 inches wide x 6 feet-0 inches long, with chamfered top corners and drainage slots underneath. Unit shall weigh minimum 190 lbs.
 2. Anchor Rods: Two (2) No. 4 by 12-inch-long anchor rods located approximately 12 inches from each end of wheel stop.
 3. Epoxy Adhesive: As specified under concrete materials above.
- K. ADA Detectable Warning Paver
1. As produced by Pavestone or approved Equal.
 2. Color as approved by Architect.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Review approved mix designs with Architect in field.
- B. Clean all mixing and transportation equipment; remove debris from forms; wet forms thoroughly; remove ice and other coatings from reinforcement which might hinder good bond; remove water from place of deposit; and check reinforcement.
- C. Inspection: Examine all areas and conditions under which the Work of this Section will be performed. Correct any conditions detrimental to the approved completion of the work. Do not proceed until all such conditions are corrected.
- D. If thickness of concrete pavement is not labeled on the drawings, the thickness shall be 6-inch thick.

3.2 INSTALLATION

- A. Forms:
 1. Conform to the shapes, lines and dimensions of the members as shown on the drawings, except as modified under the Earthwork Section of these specifications. Review depths with Architect in field.
 2. Care shall be taken to assure that formwork does not stain concrete surfaces.

3. Slab Block-Outs:
 - a. Diamond configuration at paving drains, round or diamond configuration at bollards, fence posts and the like.
 - b. Coordinate with concrete joints, verify with Architect.
 4. Slope exterior concrete slabs away from building and towards paving drains. Verify all slopes with Architect prior to start of concrete pour.
 5. Form Removal:
 - a. Remove only after concrete has thoroughly hardened.
 - b. Vertical forms for ground-supported slabs may be removed 24 hours after pour.
- B. Reinforcing:
1. Cleaning Reinforcement: Free from rust, scale, dirt, or other coatings which will destroy or reduce the bond.
 2. Placing Reinforcement:
 - a. Place accurately and adequately secure in position.
 - b. Bar reinforcement in all concrete slabs shall be held in proper locations by use of plastic chairs spaced a maximum distance of 36 inches on center unless noted otherwise.
 3. Coverage of Reinforcement: The metal reinforcement shall be protected by the thickness of concrete indicated on the plans.
 - a. Three (3) inches: Concrete deposited against ground without use of forms.
 - b. Two (2) inches: Bars more than 5/8-inch diameter where concrete is exposed to the weather or exposed to the ground but placed in forms.
 - c. 1-1/2 inches: Bars 5/8-inch diameter where concrete is exposed to the weather or exposed to the ground but placed in forms.
 - d. Two (2) inches: In slabs and walks on grade.
 - e. 1-1/2 inches-1-3/4 inches from top: Paving
- C. Joints:
1. Construction Joints:
 - a. Shall occur at expansion joints.
 - b. Use at cold joints in paving slabs.
 2. Expansion Joints:
 - a. Locate fiber joint filler type where walks and paving abut curbs and at perimeter of slab infill. Joints shall be continuous and full depth and width of slab. Stop 3/4-inch-thick fillers 1/2 inch below top of paving and 1/2-inch-thick fillers 3/8 inch below top of paving for subsequent application of sealant cap; sealant to be applied to within 1/8 inch of slab surface. Verify other locations with Architect where asphalt impregnated fiber joint filler and sealant cap is to be used.
 - b. Locate redwood expansion joints at paving and walk expansion joints where indicated, complete with load transfer units as specified herein and detailed. Joints shall be continuous and full depth and width of slab. Except where detailed without sealant cap, stop expansion joints 1/2 inch below top of paving for subsequent application of sealant cap. Top surface of sealant shall be approximately 1/8 inch below top of adjacent concrete. Install sealant in accordance with manufacturer's instructions. For applications where no sealant cap is to be applied, stop expansion joints 1/8 inch below top of paving surface. Verify other locations with Architect where redwood expansion joint and sealer cap is to be used.
 - c. Install redwood expansion joints 5 feet either side of water lines under pavement.
 3. Load Transfer Units: Install straight and true, and in accordance with manufacturer's instructions.
 4. Tooled Joints:
 - a. Steel tool all control joints, edges of expansion joints, and all exposed perimeter edges to smooth bullnose, using an edger having a radius of 1/4 inch, as approved.

- b. Form control joints in uniform straight lines in locations indicated, but in no case greater than 5 feet apart, uniformly spaced.
- D. Accessories: Install accessories and boxes, sleeves and other required devices furnished by other trades.
- E. Concrete:
- 1. Conveying:
 - a. Batching, mixing and Delivery Equipment: Use transit mixed concrete from approved batching and mixing plant. Batch, mix, and transport concrete to the site in accordance with provision of ASTM C94.
 - b. Where colored concrete is shown or required, i.e. accessible ramps, use color pigment admixture in concrete. Mix color pigment into concrete in accordance with manufacturer's recommendations to achieve integrally pigmented concrete in specified colors or as selected by Architect.
 - c. Handling concrete from point of delivery and transfer to conveying equipment and to location of final deposit as rapidly as practicable and by methods which prevent segregation and loss of mix materials.
 - d. Provide runways for wheeled conveying equipment from delivery point to location of final deposit.
 - e. Keep interior surfaces of conveying equipment, including chutes and tremies, free from hardened concrete, debris, water and other deleterious materials.
 - f. Pumps may be used only if they can pump the mix designed. Do not add fine aggregate or water to the mix to satisfy needs of a pumping device.
 - g. Use chutes or tremies for placing concrete where a drop of more than 6'-0" is required.
 - h. Addition of water on the job - The maximum water-cement ratio should never be exceeded. If all the water allowed by the specification has not been added at the start of mixing, it may be permissible to add the remaining allowable water at the point of delivery.
 - 2. Concrete Placement, General:
 - a. Place concrete in compliance with practices and recommendations of ACI 304, and as specified herein.
 - b. Do not deposit concrete on concrete which has hardened sufficiently to form seams or planes of weakness within the section.
 - c. Sections between expansion joints shall be placed in continuous pours; construction joints in paving and walks other than at expansion joint locations will not be permitted.
 - d. Place concrete at such a rate that concrete which is being integrated with fresh concrete is still plastic.
 - e. Deposit concrete as nearly as practicable in its final location to avoid segregation due to rehandling or flowing. Do not subject concrete to any procedure which might cause segregation.
 - f. Screed concrete which is to receive other construction to the proper level to avoid excessive skimming and grouting.
 - g. Do not use concrete which becomes non-plastic and unworkable, or does not meet the required quality control limits, or which has been contaminated by foreign materials.
 - 3. Slab Placement:
 - a. Moisten subgrade the evening before and immediately prior to placement of all paving slabs.
 - b. Deposit and consolidate concrete slabs in a continuous operation, within the limits of all expansion joints, until the placing of a panel or section is completed using vibrating bridge screeds, roller pipe screeds or other methods acceptable to Architect.

- c. Consolidate concrete during placement by use of the specified equipment, preferably with power driven floats of impact type, thoroughly working concrete around reinforcement and into corners.
 - d. Bring slab surfaces to correct level with a straight edge, and then strike off.
 - e. Use bull floats or darbies to smooth the surface, leaving it free from bumps and hollows.
 - f. Do not sprinkle water on the plastic surface; do not disturb the slab surfaces prior to start of finishing operations.
4. Extruded Curb Placement:
- a. Install to detail in locations shown.
 - b. Apply epoxy resin adhesive to paved surface prior to extruding curb.
 - c. Machine extrude concrete to shape detailed on Drawings, as approved. Trowel form concrete curbs in areas where machine cannot reach.
 - d. Install pre-molded expansion joints where curbs meet poured-in-place concrete and at 60 lineal feet maximum spacing; elsewhere where indicated.
 - e. Cut crack control joints every 20 lineal feet and at beginning of curves with less than five (5) foot radius.
 - f. Hand trowel rough areas to a dense, uniform texture. Bevel curbs 45 degrees at dead ends.
 - g. Spray apply membrane forming curing compound after curb installation.
 - h. Remove and replace curbs which crack; cut out chipped or cracked areas and reinstall new extruded curbs.
 - i. Remove excess concrete from paving surfaces.
- F. Curing:
1. General:
- a. Protect all freshly placed concrete from premature drying and excessive hot or cold temperature extremes. Start curing procedures on slabs immediately after finishing operation.
 - b. Maintain curing procedures for seven (7) days at minimum temperature of 50 degrees F.; if mean daily temperature drops below 40 degrees F. during this period, extend curing period an equal number of days or provide temporary heat or additional protection to maintain specified minimum temperature of air in contact with concrete.
2. Curing Exterior Paving and Slabs: Spray paving, walks, curbs and other miscellaneous slabs with liquid membrane-forming compound specified above, applied at not less than the manufacturer's specified and recommended rate.
- G. Finishes:
- 1. Spreading of dry cement for finishing is not permitted.
 - 2. Finish all exposed edges and joints with edging tools of 1/4 inch radius.
 - 3. Exterior Paving and Slabs:
 - a. Floating: Do not begin floating until bleed water sheen has disappeared or until leveled material has stiffened sufficiently for power floating. After power floating, re-float by hand immediately to uniform, true, smooth, granular surface within the specified tolerance.
 - b. Medium Broom Finish: Broom after floating and concrete is hard enough to retain scoring. Use a stiff fiber or wire broom. Broom perpendicular to direction of traffic, typically. Broom in opposite directions at sidewalk panels in a checkerboard pattern or as indicated on drawings.
 - 4. Handicapped Accessible Ramps: Slope surfaces as shown on drawings. Texture ramp by providing raised, truncated domes on the surface of the ramp in accordance with TAS.
 - 1) New Concrete Ramps: Integrally color concrete in color selected by Architect from manufacturer's standard colors to provide contrasting color to that of adjacent concrete.

- 2) Existing Concrete Ramps: Stain concrete using specified concrete stain in color selected by Architect from manufacturer's standard colors to provide contrasting color to that of adjacent concrete.
 - a) Prior to applying any stain, existing concrete ramps shall be cleaned up of all dirt, oil, grease, and other contaminants.
 - b) Acid etch with 25 percent muriatic acid solution.
 - c) Power wash at 3,000 psi.
 - d) Water test to determine if water absorbs, thereby making it good to stain.
 - e) Allow concrete to thoroughly dry.
 - f) Apply stain in accordance with manufacturer's instructions.

Note: All colors must be approved by Architect prior to their use. Failure to do so, may be cause for rejection of work and removal and replacement of work with new work at Contractor's expense.

5. Miscellaneous Vertical Surfaces: Finish all vertical surfaces, including but not limited to curbs, risers, low walls and stringer, while concrete is strong enough to stay in place without forms yet green and able to be finished to a homogeneous appearance.
- H. Traffic Lane, Parking Space, and Zone Paint Striping: (As shown on drawings or required)
1. Surface Conditions: Clean and dry, free from dirt, loose paint, oil, grease, wax and other surface contaminants which would affect paint bond.
 2. Allow concrete surfaces to cure the minimum time recommended by the traffic marking paint manufacturer, but in no case less than 30 days prior to applying traffic marking paint.
 3. Locate markings as indicated on drawings. Do not apply paint until layout is verified with Architect. Protect surfaces which are not to receive paint.
 4. Mix paint and apply in accordance with manufacturer's instructions, using skilled labor and proper mechanical equipment to produce uniform, straight lines without bleeding edges or runs.
 5. Paint traffic, parking lanes, and accessibility handicapped parking lines as shown on drawings and to comply with requirements of authorities having jurisdiction.
 6. Paint curbs and stenciled signs for FIRE LANES, NO PARKING, and BUS LOADING areas, crosswalks, handicapped accessible parking spaces, and other areas shown on drawings or required by authorities having jurisdiction. Use proper type, style and size stencils for all numbers and lettering. Do not apply paint until layout is verified with Architect and/or authorities having jurisdiction. Protect surfaces which are not to receive paint.
- I. Precast Concrete Wheel Stops: (As shown on drawings or required)
1. Surface Conditions: Clean and dry, free from dirt, loose paint, oil, grease, wax and other surface contaminants which would affect epoxy bond.
 2. Locate wheel stops as indicated on drawings.
 3. Predrill holes in concrete paving for anchor rods.
 4. Secure wheel stops in 1/8-inch-thick x 3-inch-wide epoxy and drive anchor rods through predrilled holes filled with epoxy grout.
- J. ADA Detectable Warning Paver
1. Install per manufacturer's details and requirements.

3.3 FIELD QUALITY CONTROL

- A. Inspection and Testing Laboratory:
1. Perform the appropriate tests upon notification by the Contractor.
- B. Tolerances:
1. Slope as shown on drawings.
 2. Paving sections containing "bird baths" greater than two (2) feet in diameter or 1/8-inch-deep (regardless of size of area) will be removed and re-poured at Contractor's expense.

3.4 PATCHING AND CLEANING

- A. Clean exposed concrete surfaces and adjoining work stained by leakage of concrete to approval of Architect.
- B. Reinforce or replace all deficient work as directed by Architect and at no additional cost to Owner.
- C. Clean all concrete and cement work on completion of this portion of the work.

3.5 DEFECTIVE WORK

- A. Imperfect or damaged work, as determined by the engineer, shall be satisfactorily replaced at the Contractor's expense and shall be in conformity with all the requirements of the Contract Documents. Removal and replacement of concrete work shall be done in such a manner as not to impair the appearance or strength of the structure in any way.

3.6 PENALTY FOR DEFICIENT PAVEMENT THICKNESS

- A. It is the intent of this specification that the pavement be constructed in strict conformity with the thickness and typical sections shown on drawings. Where any pavement is found not so constructed, the following rules relative to adjustment of payment for acceptable pavement and to replacement of faulty pavement shall govern.
- B. Prior to final acceptance, and if deemed necessary by the Engineer, the pavement will be cored by the Testing Laboratory. Locations of core tests may be selected by the Engineer. Regular testing shall occur for every five hundred (500) square yards of placed concrete pavement and at random locations.
- C. For the purpose of establishing an adjusted price for pavement, units to be considered separately are defined as 500 square yards of pavement.
- D. One core will be taken at locations selected by the Engineer or at random in each unit and tested in accordance with ASTM Method C-174. When measurement of the core from any unit is not deficient more than 0.2 inches from the plan thickness, full payment will be made.
- E. If measurement of any core from any unit is deficient more than 0.2 inch but not more than 0.50 inch from the plan thickness two additional cores will be taken from the unit and the average of the three cores determined. The two additional cores will be taken such that the unit will be well represented. If the average thickness of the three cores is deficient more than 0.2 inch but not more than 0.50 inch from the plan thickness, an adjusted unit price as provided below, will be paid for in these areas represented by these cores. At the option of the Engineer, additional cores may be taken in the adjacent unit/units to determine if the deficiency of thickness continues across all lanes of pavement. If the deficiency is found to exist in one (1) or more adjacent units, adjusted unit prices as provided below will be paid for those adjacent units that are found to be deficient.
- F. Price Adjustments: Concrete Pavement Deficiency

Deficiency in Thickness Determined by Cores (in inches)	Proportional Part of Contract Price Allowed (adjustment factor)
No deficient	1.0
Over 0.00 through 0.20	1.0
Over 0.20 through 0.30	0.80
Over 0.30 through 0.40	0.72
Over 0.40 through 0.50	0.68
Over 0.50	0.50 or removal*

*At option of the Engineer.

- G. Any area of pavement found deficient in thickness by more than 0.50 inch, but not more than 0.75 inch, shall be evaluated by the Engineer. If, in the judgement of the Engineer, the area of such deficiency should not be removed and replaced, there will be no payment for the area retained. If, in the judgement of the Engineer, the area of such deficiency warrants removal, the area shall be removed and replaced, at the Contractor's entire expense, with concrete of the thickness shown on the drawings. Any area found deficient in thickness by more than 0.75 inch shall be removed and replaced, at the Contractor's entire expense, with concrete of the thickness shown on the drawings.
- H. No additional payment, over the contract price will be made for any pavement of a thickness exceeding that required on the drawings. Also, planing of concrete pavement shall not be allowed.

END OF SECTION 32 13 13

SECTION 32 18 23.29 - INFILLED POLYETHYLENE SLIT-FILM SYNTHETIC TURF SYSTEM

1.1 WORK INCLUDED

- A. Furnish all labor, materials, tools and equipment necessary to install all synthetic turf as indicated on the plans and as specified herein. The installation of all new materials shall be performed in strict accordance with the manufacturer's installation instructions and in accordance with all approved shop drawings.
- B. Perimeter edge details required for the system shall be as detailed and recommended by the Manufacturer, and as approved by the Owner.
- C. It is the intent of this Section that the Work shall include, but not be limited to:
 - 1. Sports field construction, and related materials and accessories shown on Drawings or required to complete Work.
 - 2. Work shall be performed and warranted by a single source supplier/contractor.

1.2 RELATED SECTIONS

- A. Section 32 11 23.23 Free-Draining Stone Base for Synthetic Turf System

1.3 REFERENCES

- A. FM P7825 - Approval Guide; Factory Mutual Research Corporation; current edition
- B. ASTM Standard Test Methods:
 - 1. D1577 Standard Test Method for Linear Density of Textile Fiber
 - 2. D5848 Standard Test Method for Mass Per Unit Area of Pile Yarn Floor Covering
 - 3. D418 Standard Test Method for Testing Pile Yarn Floor Covering Construction
 - 4. D1338 Standard Test Method for Tuft Bind of Pile Yarn Floor Coverings
 - 5. D1682 Standard Method of Test for Breaking Load and Elongation of Textile Fabrics
 - 6. D5034 Standard Test Method of Breaking Strength and Elongation of Textile Fabrics
 - 7. F1015 Standard Test Method for Relative Abrasiveness of Synthetic Turf Playing Surfaces
 - 8. D4491 Standard Test Methods for Water Permeability of Geotextiles by Permittivity
 - 9. D2859 Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials
 - 10. F355 Standard Test Method for Shock-Absorbing Properties of Playing Surfaces.
 - 11. F1936 Standard Test Method for Shock-Absorbing Properties of North American Football Field Playing Systems as Measured in the Field
 - 12. D1557 Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort.
- C. UIL, NFHS and/or NCAA rules/regulations, latest edition.

1.4 SUBMITTALS

- A. See Section 01 33 00 - Requirements for submittal procedures.
- B. Prior to the Architect approval of a specified synthetic turf system, the Manufacturer shall specify in writing that their turf system does not violate any other manufacturer's patents, patents allowed or patents pending.

- C. Submit the following with the Proposal (if required):
1. Submit two (2) "dry" turf samples, 12"x12" in size, of the specified turf product,.
 2. A letter and specification sheet certifying that the products of this section meet or exceed specified requirements.
 3. Certified copies of independent (third-party) laboratory reports on ASTM tests as follows:
 - a) Pile Height, Face Width & Total Fabric Weight, ASTM D418 or D5848
 - b) Primary & Secondary Backing Weights, ASTM D418 or D5848
 - c) Tuft Bind, ASTM D1335
 - d) Grab Tear Strength, ASTM D1682 or D5034
 - e) Pill Burn Test ASTM D2859
 - f) Flooring Critical Radiant Panel Test (Flame Spread) ASTM E-648
 4. List of existing installations, including Owner representative and telephone number.
 5. Lists providing specific contacts and telephone numbers of the following:
 - a) A minimum of 5 fields using the specified fiber and infill, in play for at least 5 years. These installations must have used the same manufacturer, product and company they are proposing for this field.
 - b) A list of a minimum of 5 UIL and/or NCAA sports fields (of the type of sports field; i.e.. football, soccer, etc.) installed by the company in play for at least 5 years.
 - c) A list of at least of 5 fields of 65,000 square feet or more in North America with the same manufacturer, product, and company, including the exact same fiber and infill system that is being proposed for this field that have been in play for at least 5 years. Provide owner contact names and numbers and dates of install.
 6. Resume of Installation Supervisor who will be present on site during installation.
 7. The Contractor and the turf Manufacturer (if different from the company) shall, if requested by the Owner or Owner's representative, provide a current audited company financial statement. The Owner shall put in writing that this information shall be held in confidence and not shared with third parties.
 8. The Contractor and Turf Manufacturer (if different from the company) shall provide evidence that their turf system does not violate any other manufacturer's patents, patents allowed or patents pending.
 9. The Contractor and the Turf Manufacturer (if different from the company) shall provide a copy of insured, non-prorated warranty and third party, non-cancelable insurance policy information, as detailed in these documents. The work cannot commence until the 8-year policy documentation is submitted and approved.
- D. Prior to ordering of materials:
1. The Contractor shall submit Shop Drawings indicating:
 - a) Field Layout.
 - b) Field Marking Plan and details for the sport field(s) shall meet UIL, NFHS and/or NCAA rules/regulations (latest edition).
 - c) Roll/Seaming Layout.
 - d) Methods of attachment, field openings and perimeter conditions.
 2. The turf Manufacturer must submit the fiber manufacturer's name, type of fiber, face weight, pile height, and composition of fiber.
- E. Prior to Final Acceptance, the Contractor shall submit to the Owner:
1. Two (2) copies of Maintenance Manuals, which will include all necessary instructions for the proper care and preventative maintenance of the synthetic turf system, including painting and markings.
 2. Project Record Documents: Record actual locations of seams, drains or other pertinent information.
 3. Warranty: Submit Manufacturer Warranty and ensure that forms have been completed in Owner's name and registered with Manufacturer.

4. Warranty Insurance Policy Certificate must match or exceed the requirements outlined in the contract documents, be a minimum 8 year policy, be executed prior to Final Payment, and the Policy must be prepaid for full 8+ year term.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section. The Turf Contractor and/or the turf Manufacturer:
 1. Must be experienced in the manufacture and installation of this specific type of synthetic infill turf system for at least 5 years with the same manufacturer, product and company they are proposing for this field. This includes the same pile fiber, the backing, the backing coating, and the installation method.
 2. Must have at least 5 fields of 65,000 sq. ft or more of the exact specified material, including the infill material and fiber, in play for at least 5 years with the same manufacturer and company they are proposing for this field.
- B. Installer Qualifications: Company specializing in performing the work of this section.
 1. The Contractor must provide competent workmen skilled in this specific type of synthetic turf installation. Technicians must have installed specified type of turf system on at least 10 fields of 65,000 sq. ft. or more within the past 3 years.
 2. The designated Supervisory Personnel on the project must be certified, in writing by the Turf Manufacturer, as competent in the installation of this material, including sewing/gluing seams and proper installation of the infill mixture.
 3. The Manufacturer shall have a representative on site to certify the installation and Warranty compliance.
- C. Prior to the beginning of installation, the Installer of the synthetic turf shall inspect the sub-base. The installer will accept the sub-base in writing when the contractor provides test results for planarity and permeability that are following the synthetic turf manufacturer's guidelines. The Installer shall have the dimensions of the field and locations for markings measured by a registered surveyor to verify conformity to the specifications and applicable standards. A record of the finished field as-built measurements shall be made. The final tolerance-to-grade of the base shall not exceed $\pm\frac{1}{4}$ inch in ten feet in any direction.
- D. The Contractor shall provide the necessary testing data to the owner that the finished field meets the required shock attenuation, as per ASTM F1936.

1.6 DELIVERY, STORAGE, AND PROTECTION

- A. Deliver products to project site in wrapped condition.
- B. Store products under cover and elevated above grade.

1.7 WARRANTIES

- A. See Section 01 77 00 - Closeout Procedures for additional warranty requirements.
- B. The contractor and Turf Manufacturer shall provide a Warranty to the owner that covers defects in materials and workmanship of the synthetic turf system for a period of 8 years from the date of Substantial Completion. The turf manufacturer must verify that their onsite representative has inspected the installation and that the work conforms to the manufacturer's requirements.
- C. The Manufacturer's Warranty shall include general wear and damage caused from UV degradation. The warranty shall specifically exclude vandalism, and acts of God beyond the control of the owner or the manufacturer.

- D. The Manufacturer's Warranty must be supported by a third party, non-cancelable, non-prorated insurance policy for the full eight (8) year period. The policy must be from an A Best Rated company and be paid in full for the 8-year term.
- E. The Contractor shall provide a Warranty to the owner that covers defects in the installation workmanship, and further warrant that the installation was done in accordance with both the Manufacturer's recommendations and any written directives of the Manufacturer's onsite representative.
- F. The synthetic turf for the football/soccer field must maintain an ASTM 355 G-max between 100-160 for the life of the Warranty. The contractor shall pay for a third-party G-max testing upon completion of field installation. If at any point during the 8-year warranty period the field is G-Max tested and does not meet the specified requirements, the turf contractor and/or manufacturer shall reimburse the owner for the test cost and shall make the necessary improvements to the field to bring into the specifications.

1.8 MAINTENANCE SERVICE

- A. The Contractor will train the Owner's facility maintenance staff in the use of the Turf Manufacturer's recommended groomer.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Approved manufacturers (turf systems) are as follows. All manufacturers turf system must meet the properties outlined in Section 2.2.:
 - 1. AstroTurf – Rhino SF 46 (46-ounce face weight, 2.5" pile height)
 - 2. FieldTurf – Prestige XT 65 (36-ounce face weight, 2.5" pile height)
 - 3. FieldTurf - Classic HD 2.5 (36-ounce face weight, 2.5" pile height)
 - 4. Hellas - Velocity (46-ounce face weight, 2.5" pile height)
 - 5. Shaw – Momentum (51-ounce face weight, 2.5" pile height)

2.2 MATERIALS

- A. The component materials of the synthetic turf system consist of:
 - 1. A Carpet made of polyethylene fibers (slit-film) tufted into a fibrous, porous backing. ***The fibers shall be a C8 grade polyethylene.***
 - 2. An Infill that is a controlled mixture of graded sand and rubber crumb that partially covers the carpet.
 - 3. Glue, thread, seaming fabric and other materials used to install and mark the artificial grass field turf.
- B. The installed artificial grass field turf shall be a slit-film fiber having the following properties:

Standard	Property	Specification
ASTM D1577	Fiber Denier	10,800 nominal
ASTM D1577	Fiber Thickness	130 microns
ASTM D418/D5848	Pile Height	2.5" <u>minimum</u>
ASTM D418/D5848	Pile Weight	Ref. 2.1.A.
ASTM D1335	Tuft Bind	8 lbs. (without infill)
ASTM D1682/D5034	Grab Tear (width)	>200 lbs/force
ASTM D1682/D5034	Grab Tear (length)	>200 lbs/force
ASTM F1015	Relative Abrasiveness Index	20
ASTM D4491	Carpet Permeability	>40 inches/hour
ASTM D2859	Flammability (Pill Burn)	Pass

ASTM E648	Critical Radiant Flux	>.2 g/sq.cm. (Class B)
ASTM F355/F1936	Impact Attenuation, Gmax	100 - 160 over field life (8+ years)

- C. The Carpet shall consist of fibers tufted into a primary backing with a secondary elastomeric coating.
1. The Carpet shall be furnished in 15' wide rolls. Rolls shall be long enough to go from sideline to sideline without splicing. The perimeter white line shall be tufted into the individual sideline rolls. Head seams, other than at sidelines, will not be accepted.
 2. The Carpet's primary backing shall be a composite fabric treated with UV inhibitors, consisting of multiple layers of woven polypropylene and non-woven polypropylene needle punched together to function as a single unit. The secondary back coating shall consist of an application of heat-activated urethane to permanently lock the fiber tufts in place.
 3. The fiber shall be 10,800 denier, 130 microns thick, low friction, UV-resistant fiber measuring not less than 2.5 inches high (unless noted otherwise).
 4. The fiber height specified above shall be an absolute minimum dimension as measured in place in the field with infill from the top of the backing to the top of the fibers.
- D. The Infill materials shall be approved by the Manufacturer. The Infill shall consist of a resilient layered granular system, comprising selected and graded dust-free silica sand and cryogenically ground (hammer-milled) or dust free ambient SBR rubber crumb.
- E. Threaded and/or glued seams as well as the method and adhesives used for inlaid markings shall be as recommended by the synthetic turf manufacturer.
- F. If the turf system being submitted is not able to meet the required G-max for the specified warranty period, the turf manufacturer must install a shock pad shall as follows:
1. Factory made rubber shock pad (Regupol or equal), comprised of recycled SBR granules bound by polyurethane under heat and pressure. Thickness shall be a minimum 10mm. Joints shall be seamed properly per the manufacturer's recommendation. Provide detailed specifications with the proposal.
 2. In situ SBR rubber granule pad bound by polyurethane (elastic layer). Polyurethane shall comprise at least 7% of the mix. Thickness of elastic layer pad, which must be installed using suitable equipment designed for the application (P700), shall be a minimum 19mm. System must include a percentage of gravel in the mix to provide sufficient weight and density). Provide detailed specifications with the Bid.
 3. Porous, synthetic shock pad having a minimum thickness of 14mm, by Brock or preapproved equivalent.
 4. Preapproved equivalent shock pad.

2.3 FIELD SWEEPER & FIELD GROOMER

- A. Supply a field sweeper/groomer, which shall include a towing mechanism compatible with a field utility vehicle. The field sweeper/groomer shall be an "SMG TurfCare TCA1400" (or approved equivalent) Synthetic Sweeper/Groomer with 72" tow-behind magnet.

PART 3 EXECUTION

3.1 GENERAL

- A. The installation shall be performed in full compliance with approved Shop Drawings.
- B. Only trained technicians, skilled in the installation of athletic caliber synthetic turf systems working under the direct supervision of the approved installer supervisors, shall undertake any cutting, sewing, gluing, shearing, topdressing or brushing operations.

- C. The designated Supervisory personnel on the project must be certified, in writing by the turf Manufacturer, as competent in the installation of this material, including sewing seams and proper installation of the Infill mixture.
- D. All designs, markings, layouts, and materials shall conform to all currently applicable UIL, NFHS and/or NCAA rules and other standards that may apply to this type of synthetic grass installation.
- E. If an Elastic Layer shock pad system is required, it must be installed using proper paving equipment (SMG P700, modified for the application), and the crew must be experienced in this application.

3.2 EXAMINATION

- A. Verify that all sub-base, drainage and leveling is complete prior to installation.
- B. The surface to receive the synthetic turf shall be inspected by the Installer, and prior to the beginning of installation, the Installer must accept the sub-base in writing. The acceptance will depend on the contractor providing the installer with test results indicating that planarity and permeability are following the synthetic turf manufacturer's written guidelines or recommendations. The surface must be perfectly clean as installation commences and shall be maintained in that condition throughout the process.
- C. The compaction of the aggregate base shall also be accepted in writing by the Turf Installer, and the surface tolerance-to-grade shall not exceed $\pm 1/4$ inch over 10 feet.

3.3 INSTALLATION

- A. Install in accordance with Manufacturer's instructions. The Contractor shall strictly adhere to the installation procedures outlined under this section. Any variance from these requirements must be accepted in writing, by the Manufacturer's onsite representative, and submitted to the Architect/Owner, verifying that the changes do not in any way affect the warranty. Infill materials shall be approved by the Manufacturer and installed in accordance with the Manufacturer's standard procedures.
- B. If a shock pad is required, the pad shall be Installed per these specifications and per the manufacturer's installation procedures using only approved and suitable equipment and skilled technicians experienced in the installation of elastic layer or factory-made pads. In situ pads must be allowed to cure for a minimum 24 hours.

Repairs to an existing shock pad shall be performed per these specifications and per the manufacturer's installation procedures using only approved and suitable equipment and skilled technicians experienced in the installation of elastic layer. The shock pad repairs must be allowed to cure for a minimum 24 hours.

- C. The carpet rolls are to be installed directly over the properly prepared aggregate base or shock pad. Extreme care should be taken to avoid disturbing the aggregate base, both regarding compaction and planarity. It is suggested that a 2-5 ton static roller is on site and available to repair and properly compact any disturbed areas of the aggregate base.
- D. The full width rolls shall be laid out across the field. Turf shall be of sufficient length to permit full cross-field installation from sideline to sideline. No head or cross seams will be allowed in the main playing area between the sidelines. Utilizing standard state of the art sewing or glueing

procedures each roll shall be attached to the next. When all of the rolls of the playing surface have been installed, the sideline areas shall be installed at right angles to the playing field turf.

- E. All seams shall be sewn using double bagger stitches and polyester thread or adhered using seaming tape and high-grade adhesive (per the manufacturer's standard procedures). Seams shall be flat, tight, and permanent with no separation or fraying.
- F. Infill materials shall be applied in numerous thin lifts. The turf shall be brushed as the mixture is applied. The infill material shall be installed to a depth determined by the Manufacturer, but not less than 75% the pile height of the turf. Should the infill depth ever fall below 70% the pile height of the turf during the 8-year warranty period, the turf contractor shall install new infill at his expense.
- G. The Infill materials shall be installed to fill the voids between the fibers and allow the fibers to remain vertical and non-directional. The Infill installation consists of a base layer of sand followed by a homogenous mixture of the sand and the cryogenically processed rubber. A final application of specifically sized cryogenically processed rubber completes the system.
- H. Synthetic turf shall be attached to the perimeter edge detail in accordance with the Manufacturer's standard procedures using non-corrosive fasteners.

3.4 FIELD MARKINGS

- A. A. The field will have the following lines and markings tufted or inlaid according to UIL, NFHS, and/or NCAA standards:
 - 1. Football: As shown on contract documents and turf rendering
 - a. Sidelines
 - b. End lines
 - c. 5-yd lines
 - d. Goal lines
 - e. White Coaches' box
 - f. 12" White Football Boundary Line
 - g. Numbers w/ arrows (numbers shall be shadowed in gray)
 - h. 3-yd line
 - i. 1-yd hash marks
 - j. Tics
 - k. Inbound hash marks
 - l. Kickoff markings
 - m. Center logo (see rendering)
 - n. Endzone lettering (see rendering)
 - 2. Soccer: Red as shown on the contract drawings.
 - a. All lines and markings.
 - 3. Refer to the turf rendering in the project manual.
- B. Standards
 - 1. Standards; all lines and markings shall meet UIL, NFHS, and/or NCAA Standards for the State of Texas.

3.5 CLEANING

- A. Protect installed turf from subsequent construction operations.
- B. Do not permit traffic over unprotected turf surface.

- C. Contractor shall provide the labor, supplies, and equipment as necessary for final cleaning of surfaces and installed items.
- D. All usable remnants of new material shall become the property of the Owner.
- E. The Contractor shall keep the area clean throughout the project and clear of debris.
- F. Surfaces, recesses, enclosures, etc., shall be cleaned as necessary to leave the work area in a clean, immaculate condition ready for immediate occupancy and use by the Owner.

END OF SECTION 32 18 23.29

SECTION 32 18 23.32 - INFILLED DUAL MONOFILAMENT-SLIT FILM SYNTHETIC TURF SYSTEM

1.1 WORK INCLUDED

- A. Furnish all labor, materials, tools and equipment necessary to install all synthetic turf as indicated on the plans and as specified herein. The installation of all new materials shall be performed in strict accordance with the manufacturer's installation instructions and in accordance with all approved shop drawings.
- B. Perimeter edge details required for the system shall be as detailed and recommended by the Manufacturer, and as approved by the Owner.
- C. It is the intent of this Section that the Work shall include, but not be limited to:
 - 1. Sports field construction, and related materials and accessories shown on Drawings or required to complete Work.
 - 2. Work shall be performed and warranted by a single source supplier/contractor.

1.2 RELATED SECTIONS

- A. Section 32 11 23.23 Free-Draining Stone Base for Synthetic Turf System

1.3 REFERENCES

- A. FM P7825 - Approval Guide; Factory Mutual Research Corporation; current edition
- B. ASTM Standard Test Methods:
 - 1. D1577 Standard Test Method for Linear Density of Textile Fiber
 - 2. D5848 Standard Test Method for Mass Per Unit Area of Pile Yarn Floor Covering
 - 3. D418 Standard Test Method for Testing Pile Yarn Floor Covering Construction
 - 4. D1338 Standard Test Method for Tuft Bind of Pile Yarn Floor Coverings
 - 5. D1682 Standard Method of Test for Breaking Load and Elongation of Textile Fabrics
 - 6. D5034 Standard Test Method of Breaking Strength and Elongation of Textile Fabrics
 - 7. F1015 Standard Test Method for Relative Abrasiveness of Synthetic Turf Playing Surfaces
 - 8. D4491 Standard Test Methods for Water Permeability of Geotextiles by Permittivity
 - 9. D2859 Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials
 - 10. F355 Standard Test Method for Shock-Absorbing Properties of Playing Surfaces.
 - 11. F1936 Standard Test Method for Shock-Absorbing Properties of North American Football Field Playing Systems as Measured in the Field
 - 12. D1557 Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort.
- B. UIL, NFHS and/or NCAA rules/regulations, latest edition.

1.4 SUBMITTALS

- A. See Section 01 33 00 - Requirements for submittal procedures.
- B. Prior to the Architect approval of a specified synthetic turf system, the Manufacturer shall specify in writing that their turf system does not violate any other manufacturer's patents, patents allowed or patents pending.
- C. Submit the following with the Proposal (if required):

1. Submit two (2) "dry" turf samples, 12"x12" in size, of the specified turf product.
 2. A letter and specification sheet certifying that the products of this section meet or exceed specified requirements.
 3. Certified copies of independent (third-party) laboratory reports on ASTM tests as follows:
 - a) Pile Height, Face Width & Total Fabric Weight, ASTM D418 or D5848
 - b) Primary & Secondary Backing Weights, ASTM D418 or D5848
 - c) Tuft Bind, ASTM D1335
 - d) Grab Tear Strength, ASTM D1682 or D5034
 - e) Pill Burn Test ASTM D2859
 - f) Flooring Critical Radiant Panel Test (Flame Spread) ASTM E-648
 4. List of existing installations, including Owner representative and telephone number.
 5. Lists providing specific contacts and telephone numbers of the following:
 - a) A minimum of 5 fields using the specified fiber and infill, in play for at least 5 years. These installations must have used the same manufacturer, product and company they are proposing for this field.
 - b) A list of a minimum of 5 UIL and/or NCAA sports fields (of the type of sports field; ie. football, soccer, etc.) installed by the company in play for at least 5 years.
 - c) A list of at least of 5 fields of 65,000 square feet or more in North America with the same manufacturer, product and company, including the exact same fiber and infill system that is being proposed for this field that have been in play for at least 5 years. Provide owner contact names and numbers and dates of install.
 6. Resume of Installation Supervisor who will be present on site during installation.
 7. The Contractor and the turf Manufacturer (if different from the company) shall, if requested by the Owner or Owner's representative, provide a current audited company financial statement. The Owner shall put in writing that this information shall be held in confidence and not shared with third parties.
 8. The Contractor and Turf Manufacturer (if different from the company) shall provide evidence that their turf system does not violate any other manufacturer's patents, patents allowed or patents pending.
 9. The Contractor and the Turf Manufacturer (if different from the company) shall provide a copy of insured, non-prorated warranty and third party, non-cancelable insurance policy information, as detailed in these documents. The work cannot commence until the 8-year policy documentation is submitted and approved.
- D. Prior to ordering of materials:
1. The Contractor shall submit Shop Drawings indicating:
 - a. Field Layout
 - b. Field Marking Plan and details for the sport field(s) shall meet UIL, NFHS and/or NCAA rules/regulations (latest edition).
 - c. Roll/Seaming Layout
 - d. Methods of attachment, field openings and perimeter conditions.
 2. The turf Manufacturer must submit the fiber manufacturer's name, type of fiber, face weight, pile height, and composition of fiber.
- E. Prior to Final Acceptance, the Contractor shall submit to the Owner:
1. Two (2) copies of Maintenance Manuals, which will include all necessary instructions for the proper care and preventative maintenance of the synthetic turf system, including painting and markings.
 2. Project Record Documents: Record actual locations of seams, drains or other pertinent information.
 3. Warranty: Submit Manufacturer Warranty and ensure that forms have been completed in Owner's name and registered with Manufacturer.

4. Warranty Insurance Policy Certificate must match or exceed the requirements outlined in the contract documents, be a minimum 8 year policy, be executed prior to Final Payment, and the Policy must be prepaid for full 8+ year term.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section. The Turf Contractor and/or the turf Manufacturer:
 1. Must be experienced in the manufacture and installation of this specific type of synthetic infill turf system for at least 5 years with the same manufacturer, product and company they are proposing for this field. This includes the same pile fiber, the backing, the backing coating, and the installation method.
 2. Must have at least 5 fields of 65,000 square feet or more of the exact specified material, including the infill material and fiber, in play for at least 5 years with the same manufacturer and company they are proposing for this field.
- B. Installer Qualifications: Company specializing in performing the work of this section.
 1. The Contractor must provide competent workmen skilled in this specific type of synthetic turf installation. Technicians must have installed specified type of turf system on at least 10 fields of 65,000 square feet or more within the past 3 years.
 2. The designated Supervisory Personnel on the project must be certified, in writing by the Turf Manufacturer, as competent in the installation of this material, including sewing/gluing seams and proper installation of the infill mixture.
 3. The Manufacturer shall have a representative on site to certify the installation and Warranty compliance.
- C. Prior to the beginning of installation, the Installer of the synthetic turf shall inspect the sub-base. The installer will accept the sub-base in writing when the contractor provides test results for planarity and permeability that are following the synthetic turf manufacturer's guidelines. The Installer shall have the dimensions of the field and locations for markings measured by a registered surveyor to verify conformity to the specifications and applicable standards. A record of the finished field as-built measurements shall be made. The final tolerance-to-grade of the base shall not exceed $\pm\frac{1}{4}$ inch in ten feet in any direction.
- D. The Contractor shall provide the necessary testing data to the owner that the finished field meets the required shock attenuation, as per ASTM F1936.

1.6 DELIVERY, STORAGE, AND PROTECTION

- A. Deliver products to project site in wrapped condition.
- B. Store products under cover and elevated above grade.

1.7 WARRANTIES

- A. See Section 01 77 99 – Closeout Procedures for additional warranty requirements.
- B. The contractor and Turf Manufacturer shall provide a Warranty to the owner that covers defects in materials and workmanship of the synthetic turf system for a period of 8 years from the date of Substantial Completion. The turf manufacturer must verify that their onsite representative has inspected the installation and that the work conforms to the manufacturer's requirements.
- C. The Manufacturer's Warranty shall include general wear and damage caused from UV degradation. The warranty shall not be prorated. The warranty shall specifically exclude vandalism, and acts of God beyond the control of the owner or the manufacturer.

- D. The Manufacturer’s Warranty must be supported by a third party, non-cancelable, non-prorated insurance policy for the full eight (8) year period. The policy must be from an A Best Rated company and be paid in full for the 8-year term.
- E. The Contractor shall provide a Warranty to the owner that covers defects in the installation workmanship, and further warrant that the installation was done in accordance with both the Manufacturer’s recommendations and any written directives of the Manufacturer’s onsite representative.
- F. The synthetic turf for the football/soccer fields must maintain throughout the 8-year warranty period an ASTM F-355-10a, G-max of between 100-160. The contractor shall pay for a third-party G-max testing of field upon completion of field installation. If at any point during the 8-year warranty period the field is G-Max tested and does not meet the specified requirements, the turf contractor and/or manufacturer shall reimburse the owner for the test cost and shall make the necessary improvements to the field to bring into the specifications.

1.8 MAINTENANCE SERVICE

- A. The Contractor will train the Owner's facility maintenance staff in the use of the Turf Manufacturer's recommended groomer.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Approved manufacturers (turf systems) are as follows. All manufacturers turf system must meet the properties outlined in Section 2.2.:
 - 1. AstroTurf - 3D3 52 (52-ounce face weight; 2” pile height)
 - 2. FieldTurf - Vertex Prime (46-ounce face weight, 2.5” pile height)
 - 3. Hellas - Fusion (46-ounce face weight, 2.5” pile height)
 - 4. Shaw – Legion Pro (50-ounce face weight, 2.5” pile height)

2.2 MATERIALS

- A. The component materials of the synthetic turf system consist of:
 - 1. A Carpet made of polyethylene monofilament and slit-film fibers tufted into a fibrous, porous backing. ***The fibers shall be a C8 grade polyethylene.***
 - 2. An Infill that is a controlled mixture of graded sand and rubber crumb that partially covers the carpet.
 - 3. Glue, thread, seaming fabric and other materials used to install and mark the artificial grass field turf.
- B. The installed artificial grass field turf shall consist of monofilament and slit-film fiber having the following properties:

<u>Standard</u>	<u>Property</u>	<u>Specification</u>
ASTM D1577	Fiber Denier	10,800 nominal
ASTM D1577	Fiber Thickness	260 microns (monofilament) 130 microns (slit-film)
ASTM D418/D5848	Pile Height	2.5” <u>minimum</u> (unless noted otherwise)
ASTM D418/D5848	Pile Weight	Ref. 2.1.A.
ASTM D1335	Tuft Bind	8 lbs. (without infill)
ASTM D1682/D5034	Grab Tear (width)	>200 lbs/force
ASTM D1682/D5034	Grab Tear (length)	>200 lbs/force

ASTM F1015	Relative Abrasiveness Index	20
ASTM D4491	Carpet Permeability	>40 inches/hour
ASTM D2859	Flammability (Pill Burn)	Pass
ASTM E648	Critical Radiant Flux	>.2 g/sq.cm. (Class B)
ASTM F355/F1936	Impact Attenuation (Gmax)	100 - 160 over field life (8+ years)

- C. The Carpet shall consist of fibers tufted into a primary backing with a secondary elastomeric coating.
1. The Carpet shall be furnished in 15' wide rolls. Rolls shall be long enough to go from sideline to sideline without splicing. The perimeter white line shall be tufted into the individual sideline rolls. Head seams, other than at sidelines, will not be acceptable
 2. The Carpet's primary backing shall be a composite fabric treated with UV inhibitors, consisting of multiple layers of woven polypropylene and non-woven polypropylene needle punched together so as to function as a single unit. The secondary back coating shall consist of an application of heat-activated urethane to permanently lock the fiber tufts in place.
 3. The fiber shall be 10,800 denier, 130 microns thick (slit-film) and 260 microns thick (monofilament), low friction, UV-resistant fiber measuring not less than 2.5 inches high (unless noted otherwise).
 4. The fiber height specified above shall be an absolute minimum dimension as measured in place in the field with infill from the top of the backing to the top of the fibers.
- D. The Infill materials shall be approved by the Manufacturer. The Infill shall consist of a resilient layered granular system, comprising selected and graded dust-free silica sand and cryogenically ground (hammer-milled) or dust free ambient SBR rubber crumb.
- E. Threaded and/or glued seams as well as the method and adhesives used for inlaid markings shall be as recommended by the synthetic turf manufacturer.
- F. If the turf system being submitted is not able to meet the required G-max for the specified warranty period, the turf manufacturer must install a shock pad shall as follows:
1. Factory made rubber shock pad (Regupol or equal), comprised of recycled SBR granules bound by polyurethane under heat and pressure. Thickness shall be a minimum 10mm. Joints shall be seamed properly per the manufacturer's recommendation. Provide detailed specifications with the proposal.
 2. In situ SBR rubber granule pad bound by polyurethane (elastic layer). Polyurethane shall comprise at least 7% of the mix. Thickness of elastic layer pad, which must be installed using suitable equipment designed for the application (P700), shall be a minimum 19mm. System must include a percentage of gravel in the mix to provide sufficient weight and density). Provide detailed specifications with the Bid.
 3. Porous, synthetic shock pad having a minimum thickness of 14mm, by Brock or preapproved equivalent.
 4. Preapproved equivalent shock pad.

2.3 FIELD SWEEPER & FIELD GROOMER

- A. Supply a field sweeper/groomer, which shall include a towing mechanism compatible with a field utility vehicle. The field sweeper/groomer shall be an "SMG TurfCare TCA1400" (or approved equivalent) Synthetic Sweeper/Groomer with 72" tow-behind magnet.

PART 3 EXECUTION

3.1 GENERAL

- A. The installation shall be performed in full compliance with approved Shop Drawings.
- B. Only trained technicians, skilled in the installation of athletic caliber synthetic turf systems working under the direct supervision of the approved installer supervisors, shall undertake any cutting, sewing, gluing, shearing, topdressing or brushing operations.
- C. The designated Supervisory personnel on the project must be certified, in writing by the turf Manufacturer, as competent in the installation of this material, including sewing seams and proper installation of the Infill mixture.
- E. If an Elastic Layer shock pad system is required, it must be installed using proper paving equipment (SMG P700, modified for the application), and the crew must be experienced in this application.

3.2 EXAMINATION

- A. Verify that all sub-base, drainage and leveling is complete prior to installation.
- B. The surface to receive the synthetic turf shall be inspected by the Installer, and prior to the beginning of installation, the Installer must accept the sub-base in writing. The acceptance will depend on the contractor providing the installer with test results indicating that planarity and permeability are following the synthetic turf manufacturer's written guidelines or recommendations. The surface must be perfectly clean as installation commences and shall be maintained in that condition throughout the process.
- C. The compaction of the aggregate base shall also be accepted in writing by the Turf Installer, and the surface tolerance-to-grade shall not exceed $\pm 1/4$ inch over 10 feet.

3.3 INSTALLATION

- A. Install in accordance with Manufacturer's instructions. The Contractor shall strictly adhere to his installation procedures outlined under this section. Any variance from these requirements must be accepted in writing, by the Manufacturer's onsite representative, and submitted to the Architect/Owner, verifying that the changes do not in any way affect the warranty. Infill materials shall be approved by the Manufacturer and installed in accordance with the Manufacturer's standard procedures.
- B. If a shock pad is required, the pad shall be Installed per these specifications and per the manufacturer's installation procedures using only approved and suitable equipment and skilled technicians experienced in the installation of elastic layer or factory-made pads. In situ pads must be allowed to cure for a minimum 24 hours.

Repairs to an existing shock pad shall be performed per these specifications and per the manufacturer's installation procedures using only approved and suitable equipment and skilled technicians experienced in the installation of elastic layer. The shock pad repairs must be allowed to cure for a minimum 24 hours.

- C. The carpet rolls are to be installed directly over the properly prepared aggregate base or shock pad. Extreme care should be taken to avoid disturbing the aggregate base, both regarding compaction and planarity. It is suggested that a 2-5 ton static roller is on site and available to repair and properly compact any disturbed areas of the aggregate base.
- D. The full width rolls shall be laid out across the field. Turf shall be of sufficient length to permit full cross-field installation from sideline to sideline. No head or cross seams will be allowed in the main playing area between the sidelines. Utilizing standard state of the art sewing or gluing

procedures each roll shall be attached to the next. When all of the rolls of the playing surface have been installed, the sideline areas shall be installed at right angles to the playing field turf.

- E. All seams shall be sewn using double bagger stitches and polyester thread or adhered using seaming tape and high-grade adhesive (per the manufacturer's standard procedures). Seams shall be flat, tight, and permanent with no separation or fraying.
- F. Infill materials shall be applied in numerous thin lifts. The turf shall be brushed as the mixture is applied. The infill material shall be installed to a depth determined by the Manufacturer, but not less than 75% the pile height of the turf. Should the infill depth ever fall below 70% the pile height of the turf during the 8-year warranty period, the turf contractor shall install new infill at his expense.
- G. The Infill materials shall be installed to fill the voids between the fibers and allow the fibers to remain vertical and non-directional. The Infill installation consists of a base layer of sand followed by a homogenous mixture of the sand and the cryogenically processed rubber. A final application of specifically sized cryogenic or ambient rubber completes the system.
- H. Synthetic turf shall be attached to the perimeter edge detail in accordance with the Manufacturer's standard procedures using non-corrosive fasteners.

3.4 FIELD MARKINGS

- A. The field will have the following lines and markings tufted or inlaid according to UIL, NFHS, and/or NCAA standards:
 - 1. Football: As shown on contract documents and turf rendering
 - a. Sidelines
 - b. End lines
 - c. 5-yd lines
 - d. Goal lines
 - e. White Coaches' box
 - f. 12" White Football Boundary Line
 - g. Numbers w/ arrows (numbers shall be shadowed in gray)
 - h. 3-yd line
 - i. 1-yd hash marks
 - j. Tics
 - k. Inbound hash marks
 - l. Kickoff markings
 - m. Center logo (see rendering)
 - n. Endzone lettering (see rendering)
 - 2. Soccer: Red as shown on the contract drawings.
 - a. All lines and markings.
 - 3. Refer to the turf rendering in the project manual.
- B. Standards
 - 1. Standards; all lines and markings shall meet UIL, NFHS, and/or NCAA Standards for the State of Texas.

3.5 CLEANING

- A. Protect installed turf from subsequent construction operations.

- B. Do not permit traffic over unprotected turf surface.
- C. Contractor shall provide the labor, supplies, and equipment as necessary for final cleaning of surfaces and installed items.
- D. All usable remnants of new material shall become the property of the Owner.
- E. The Contractor shall keep the area clean throughout the project and clear of debris.
- F. Surfaces, recesses, enclosures, etc., shall be cleaned as necessary to leave the work area in a clean, immaculate condition ready for immediate occupancy and use by the Owner.

END OF SECTION 32 18 23.32

SECTION 32 18 23.40 - POROUS STRUCTURAL SPRAY SYNTHETIC TRACK SURFACING SYSTEM

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. A porous polyurethane synthetic track system comprised of a base layer of polyurethane bound SBR rubber granules, and a top spray-applied coating of single-component polyurethane and EPDM granules over an asphaltic-concrete base.
- B. The guidelines established in this Section are considered to be minimum acceptable standards for installing the porous polyurethane synthetic track system. Standards meeting or exceeding the materials and rates of applications of materials established in published and distributed specifications by individual and separate track surface manufacturer's installers shall not preclude such manufacturers from submitting their running track surface system for consideration of the Architect as an approved equal to the specified system.

1.2 RELATED WORK

- A. Section 32 12 16 - Hot Mix-Hot Laid Asphaltic Concrete

1.3 QUALITY ASSURANCE

- A. Subcontractor for Work of this Section shall be a firm specializing in track construction of the type required for this project.
- B. Submittals before Contract Award: To be submitted prior to installation of track surface.
 - 1. Tabulation of synthetic track surface system installations made within the past five (5) years in which the proposed materials for this project were used. State locations, name, title, address and telephone number of contract person at each installation.
 - 2. Manufacturer's technical specification for surfacing materials to be used, including rates of application and installation procedures.
 - 3. Manufacturer's manual for care and maintenance of the track surface system and a list of product accessories or other items of service to be included with warranty.
 - 4. Sample of track surface system. Mark sample with trade name or designation identification.
 - 5. Copy of the warranty for this project.
- C. Submittals after Contract Award.
 - 1. Submit certificate, signed by track surface contractor, stating the asphaltic concrete pavement is acceptable and satisfactory for the installation of the track surface system.
 - 2. Submit certificate from a testing laboratory stating that the chemical composition of the isocyanate component of the proposed system (MDI/TDI) and stating percentage of free TDI monomer present in the MDI/TDI isocyanate and whether the percentage of TDI is to be considered "TDI Free", non-toxic.
 - 3. Submit certificate, signed by track surface contractor, that the track surface work, including every component, complies with the requirements of the Contract Documents, and that the installation methods were adequate and proper for the conditions of installation and use.
 - 4. Electronically submit a copy of the manual describing the materials, devices, and procedures to be followed for use and maintenance of the track surface system, including

the cleaning, paint application, and removal techniques. Include any precautions required by warranty.

5. Submit the warranty for the track surface system.

1.4 CONTRACTOR'S QUALIFICATIONS

- A. Contractors must be an experienced specialty firm, which shall have installed at least 10 polyurethane track surface systems of the type specified herein within the last five (5) years.
- B. Contractors wishing to be considered as an "or equivalent" must provide documentation to the Architect in accordance with requirements of Division 1. Information shall include the following:
 1. Test reports from an independent laboratory stating that the proposed product has been tested and meets the requirements of the International Amateur Athletic Federation (IAAF).
 2. A complete list of references with project name and contacts, with phone numbers, for each equal installation.
 3. Audited financial statements for the past three (3) fiscal years.

1.5 WEATHER CONDITIONS

- A. Place no primers or any component of the track surface system when the air temperature is below the minimum application temperature recommended by the track system manufacturer. Materials may be placed after the air temperature is above the track system manufacturer's recommended minimum application temperature and rising. Take temperature readings in shade away from artificial heat. Place no component of track system when asphaltic concrete surface temperatures exceed the temperature recommended by the track system manufacturer for good application.
- B. Do not place any materials under wet or damp conditions.

1.6 DELIVERY AND STORAGE

- A. Deliver materials to project site in accordance with the construction progress schedule. Components shall be identified with manufacturers' original labeling and otherwise marked to indicate location of the work. Store in a dry location, protected against damage and according to manufacturers' recommendations.
- B. All of the component materials to be used in the track surfacing shall be on site and audited by the Architect before surfacing operations can begin.
- C. All empty containers and bags shall remain on site until all track surfacing operations are complete. A final audit of materials will be made by the Architect before empty containers and bags are removed and disposed of.

1.7 WARRANTY

- A. The track surface Contractor/Manufacturer shall submit to the Owner the manufacturer's warranty which guarantees the usability of the track surface system for its intended uses for a minimum period of five (5) years commencing with the date of its final acceptance. The warranty coverage shall not be prorated nor limited by the amount of usage and shall cover defects in materials and workmanship, significant color fade and granule loss.

PART 2 - PRODUCTS

2.1 APPROVED PRODUCT/MANUFACTURER

- A. Specifications are based on the following running track systems:
1. BSS-100 by Beynon Sports Surfaces
 2. epiQ Tracks S200 by Hellas Construction
 3. PTS 2000 by Paragon Sports Constructors

Other manufacturers must have a minimum of five (5) years' experience manufacturing the running track surface system meeting or exceeding the following specifications and comply with Division 1 requirements for substitutions in order to be considered.

2.1 MATERIALS

- A. Primers: Primers must be polyurethane based, specifically formulated to be compatible with the paved SBR base and track surfacing material.
- B. Black SBR Granules: The rubber granules for the base mat shall be recycled SBR rubber, processed and chopped to 1-3mm size, containing less than 4% dust.
- C. EPDM Granules: The rubber granules for the structural spray wearing coats shall be EPDM peroxide cured, synthetic rubber containing a minimum 20% EPDM resin, with a specific gravity of 1.5 ± 0.1 g/cm³. The EPDM rubber shall be the same color as chosen by the owner for the track surface.
- D. Polyurethane Binder: Binder for the black mat shall be an MDI-based single-component, polyurethane binding agent. The binder shall not have a free TDI monomer level above 0.2%, must be clear in color and must be solvent free. The binder must be specially formulated for compatibility with SBR rubber crumb.
- E. Structural Spray Coating: The spray coating shall be an MDI-based single-component, moisture cured, 100% solids, pigmented polyurethane, specifically formulated for compatibility with EPDM granules. The coating shall be the color specified by the owner. Pigment intergraded in the field shall not be allowed.
- F. Line Marking Paint: The line marking paint shall be polyurethane-based paint specifically manufactured to be compatible with polyurethane synthetic track surfaces.
- G. Performance Standards: The new synthetic track surfacing system shall exhibit the following minimum performance standards (ASTM):
1. Thickness: (13mm) or as specified
 2. Shore A Hardness: 55 ± 5 (ASTM D-2240)
 3. Elongation at Break: ~90% (ASTM D-412)
 4. Tensile Strength: 0.75 N/mm² (ASTM D-412)
 5. Compression Set Recovery: 90%-95% over 24hr period (ASTM D-412)
 6. Abrasion Resistance: 0.25 grams loss after 1000 cycles (ASTM D-501)
 7. Coefficient of Friction: Dry: 0.7-0.75, Wet: 0.6-0.65 (ASTM D-1984)
 8. Resilience: 37%-39% (ASTM D-2632)
 9. Tear Resistance: 50-65 psi (ASTM D-624)

PART 3 - EXECUTION

3.1 WORKMANSHIP

- A. The track surfacing work shall be performed by an experienced specialty firm complying with Contractor's Qualifications Paragraph of this Section and as follows:
 - 1. Track surface Contractor shall use only full-time company employees for installing track surfacing material. Subcontracting the installation of track surfacing material will not be allowed. Track striping work may be subcontracted to a qualified company that is acceptable to the Owner.
 - 2. Track surface Contractor shall have all the component materials and equipment at the site prior to starting his operations so that there will not be any delays in the installation process.
- B. Pre-Installation Meeting: Prior to commencing installation of the work, and at the track surface Contractor's initiative, a meeting will be called at the project site to review material, installation procedures. Meeting shall include the track surface Contractor, General Contractor, Architect and the Owner.
- C. Surface Test: For NCAA certification the following criteria must be followed.
 - 1. The track surface i.e., asphalt substrate, shall not vary from planned cross slope by more than plus or minus 0.1 percent with a maximum lateral slope outside to inside of 1 percent and a maximum slope of 0.1 percent in any running direction. The finished asphalt shall not vary under a ten (10) feet straight edge more than 1/8 inch.
- D. Certificate: Upon completion of surface test and correction of any defects, track surface Contractor shall submit to Architect a signed certificate stating the existing surface is acceptable and satisfactory for the installation of his track surface system.

3.2 INSTALLATION

- A. Sub-base:
 - 1. The Track Surfacing System shall be laid on an approved sub-base. The General Contractor shall provide compaction test results of 95 percent or greater for the installed sub-base and asphalt surface.
 - 2. Comply with surface test as specified above.
 - 3. It shall be the responsibility of the asphalt-paving contractor to flood the surface immediately after the asphalt is capable of handling traffic, but within 24 hours. If, after 20 minutes of drying time, there are birdbaths evident, it shall be the responsibility of the Architect, in conjunction with the surfacing contractor to determine the method of correction. No cold tar patching, skin patching or sand mix patching will be acceptable.
 - 4. All oil spills (hydraulic, diesel, motor oil, etc.) shall be completely removed, either by chipping out or removing and replacing with new, keyed in asphalt. The minimum depth of any asphalt replacement shall be one (1) inch. The curing time for the asphalt base is 28 days. It shall be the responsibility of the surfacing contractor to determine if the asphalt substrate has cured sufficiently prior to the application of the polyurethane surfacing system.
 - 5. It shall be the responsibility of the General Contractor to determine if the asphalt substrate meets all design specifications, i.e. cross slopes, planarity and specific project criteria. After all the above conditions are met, the surfacing contractor shall, in writing, accept the planarity of the asphalt-receiving base, before work can commence.
- B. Cleaning: The area to be surfaced shall be clean and free of all loose or foreign substances (dirt, oil, etc.) prior to the commencement of the work. The surface is usually cleaned by use of a power blower and high-pressure washer.
- C. Thickness: The thickness of the Synthetic Track Surfacing System shall be 13 mm.

- D. Equipment: The Synthetic Track Surfacing System components shall be processed and installed by specially designed machinery and equipment. A mechanically operated paver with variable regulated speed and thermostatically controlled screed shall be used in the installation of the base mat and the wearing course shall be installed using automatic electronic portioning, which provides continuous mixing and feeding for an accurate, quality-controlled installation.
- E. Installation:
1. Base Course: The SBR granules and polyurethane binder shall be mixed together on site to regulate the ratio/quantity of SBR, not to exceed 82% in the base mat portion of the system. The polyurethane binder shall be mixed with the SBR rubber so that a minimum of 18%, by weight, exists in the final mixture. This mixture is then mechanically installed using the paver.
 2. Wearing Course: The 0.5 to 1.5mm EPDM granules shall be mixed with the single-component structural spray coating. The structural spray shall be made in two uniform applications.
- F. Site Conditions:
1. Installation shall not take place if adjacent or concurrent construction generates excessive dust, abrasives or any other by-product that, in the opinion of the installer, would be harmful to the track material, until completion of such works.
 2. If, in the opinion of the installer of the synthetic material, the weather and/or climatic conditions are detrimental to the proper installation of the surfacing materials, work shall be delayed until conditions are acceptable. Preferred installation temperature is fifty degrees Fahrenheit and rising. Installation shall be executed only in dry conditions.
- G. Line Markings: All line and event markings shall be applied by experienced personnel utilizing polyurethane-based paint compatible with the synthetic track surfacing. All marking dimensions shall be certified in accordance with the specifications issued by the appropriate sanctioning or governing body such as IAAF, NCAA, NFHS, etc.
- H. The track surfacing company shall include in their proposal the re-stripping of the track and field events between years 2 and 4 of completion of the track surface.

3.3 FINAL SURFACE TEST AND REPAIRS

- A. After completion of track surfacing and curing, track shall be flooded with water to determine areas that may hold water. All low areas holding water 30 minutes after rain or watering has stopped shall be clearly outlined so that the necessary repairs can be made.
- B. In areas holding water, the base mat shall be removed. The size of the area to be removed will be determined by the Architect. Surface layer shall be replaced and shall be made level with adjacent surfaces.
- C. The track surface may be randomly probed by the Architect in at least five (5) areas per 100-meter length of track to determine the finished thickness of track surface.
- D. When the probe measurements indicate a deficiency of not more than one (1) mm from the specified thickness, the track surface will be considered adequate. When the measurement is deficient by more than one (1) mm, two (2) additional probes will be taken at 25-foot intervals from the deficient probes and the average thickness of the three (3) probes will be determined.
- E. In calculating the average thickness of the track surface, measurements which are in excess of the specified thickness will be considered as specified thickness. Measurements which are deficient of the specified thickness will be considered as specified thickness less the deficiency. If the average measurement of the three (3) probes is not deficient more than one (1) mm from the

specified thickness, additional exploratory probes at five (5) foot intervals parallel to the centerline of the track and in each direction from the deficient probe until in each direction a probe is taken that is not deficient by more than one (1) mm from the specified thickness. Exploratory probe measurements will not be used in averages for deficient track surfacing.

- F. Deficient areas in excess of one (1) mm of specified thickness will be resurfaced to obtain the specified thickness at the track surface contractor's sole expense.

END OF SECTION 32 18 23.40

SECTION 32 31 13 - CHAIN LINK FENCE AND GATES

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 - GENERAL

1.1 SCOPE

- A. This item governs for furnishing all labor materials, and equipment necessary to provide all chain link fencing complete, including terminal posts, gates, posts, tension wire, wire, top rail, and fittings, where indicated on the Drawings.

1.2 SUBMITTALS

- A. Submit product data and shop drawings for ALL items to be installed.

PART 2 - MATERIALS

2.1 WIRE FABRICS

- A. Fabric shall be of chain-link wire woven in a 2 inch iron mesh. Fabric to be woven of #9 gauge wire before galvanizing.
- B. The fabric shall be zinc-coated by the hot-dip process after weaving, with any grade of zinc conforming to ASTM B 6. The weight of zinc-coating shall be not less than 1.2 ounces of zinc per square foot of actual surface covered.
- C. Wire shall be AISI Specification C 10-18 carbon steel wire with a minimum of 0.10 and a maximum of 0.20 silicon added. The wire shall stand a tensile-strength test of 80,000 pounds per square inch based on a cross section of galvanized wire.

2.2 LINE POSTS

- A. Line posts shall be hot-dipped, galvanized steel 2.5" O.D., weight 3.65 pounds per linear foot, iron pipe schedule 40 pipe, minimum wall thickness 0.154 inch spaced on centers not to exceed 10 feet. Fabric shall be attached to line post with No. 6 gauge galvanized clips on 14-inch centers. Posts shall be set in Class A (3000 psi) concrete in a 9-inch diameter hole not less than 36 inches deep. Galvanizing shall be any grade of zinc conforming to ASTM B 6.

2.3 TERMINAL POSTS

- A. End, corner and pull posts shall be hot-dipped galvanized 3-inch O.D. standard pipe, weight 5.79 pounds per linear foot, minimum wall thickness 0.216, equipped with hot-dipped galvanized 1 1/2-inch I.D. pipe weight 2.27 pounds per linear foot minimum wall thickness 0.145 inch horizontal braces and 3/8-inch galvanized truss rods complete with truss tightener set in Class A concrete in a 10-inch diameter hole not less than 42 inches deep. Galvanizing shall be any grade of zinc conforming to ASTM B 6.

2.4 TERMINAL POST FITTINGS

- A. All terminal post fittings, including tension bands and brace connections, shall be made of not less than 14-gauge hot-dipped galvanized steel. Brace and truss bands shall be a minimum of 7/8-inch wide; tension bands shall be a minimum of 3/4-inch wide.
- B. Bands shall be manufactured in a fashion which will not result in sharp and dangerous edges. All

bands and connections to be securely fastened with 5/16-inch x 1-1/4-inch galvanized carriage bolts and nuts. Stretcher bars shall be hot-dipped galvanized a minimum of 3/4-inches wide and 3/16-inches thick and sheared ends shall be given two coats of aluminum paint.

- C. No aluminum or pot metal fittings will be accepted.

2.5 TOP AND BOTTOM RAILS

- A. Top rails and Bottom Rails shall be of galvanized 1-1/2-inch I.D. pipe weighing 2.27 pounds per linear foot, minimum wall thickness 0.145 inch with outside sleeve-type couplings at least 7 inches long; one coupling in every five shall have a heavy spring to permit expansion and contraction of the rails. Couplings shall be within 1 foot of line posts. no couplings will be allowed in mid-span Fabric ties to the rails shall be of No. 9 gauge tie wires at 24-inch centers.

2.6 GATE POSTS

- A. All gate posts shall be hot-dipped galvanized 6-inch O.D. standard pipe, weighing 18.97 pounds per linear foot, minimum wall thickness 0.280 inch.
- B. Posts shall be set in Class A concrete in a hole whose diameter shall not be less than four (4) times the diameter of the post and not less than 48 inches deep.
- C. Gate post shall have a ball top or top of manufacturer's standard design to exclude moisture from the gate post.

2.7 GATES

- A. Gate frames shall be fabricated of 2-inch O.D. hot-dipped galvanized pipe, weighing 2.72 pounds per linear foot, minimum wall thickness 0.154 inch with galvanized pressed steel or malleable iron corner ells, securely riveted to pipe frame with 4 rivets per corner. Internal bracing shall be 1-5/8-inch O.D. hot dipped galvanized pipe weighing 2.27 pounds per linear foot with 3/8-inch adjustable truss rods.
- B. Bottom hinge shall be ball and socket type or type allowing pivot on vertical member of gate frame preventing removal of gate without disassembling of hinge, made of steel upper hinges shall be 180 deg. wrap-around type, made of galvanized steel to allow gate to swing 180 deg. Gates shall be complete with pad-locking device; center rests and semi-automatic catch to secure gates in open positions.
- C. Fabric shall match that used in the line fence and shall be centered in the frame, attached by means of tension bars and hook bolts. Top bar of gate frame shall be on level plane and at the same height as top tension fence rail.

2.8 BRACES

- A. Braces material shall be the same as top rail and shall be Hot Dip Galvanized. Braces shall be spaced midway between top rail and ground, and shall extend from terminal post to first adjacent line post. Braces shall be securely fastened to posts by suitable pressed steel connections, then trussed from line post back to terminal post with 3/8" round rod.

2.9 FITTINGS

- A. All fittings shall be malleable, cast iron or pressed steel, hot dip galvanized. No aluminum or inferior metal will be permitted for line post tops, bands or gate corners.

2.10 FABRIC BANDS

- A. The fabric shall be fastened to the top rail with aluminum tie wires spaced approximately 18 inches apart. The fabric shall be fastened to the line posts with No. 7 gauge hard drawn galvanized carbon steel fabric bands spaced approximately 12 inches apart.

PART 3 – EXECUTION

3.1 ERECTION

- A. The fence shall be installed by skilled and experienced fence erectors and on the lines and grades specified. All posts shall be set plumb and in concrete footings of the size specified under various post specifications. The concrete shall extend a minimum of three (3) inches below the bottom of the posts.

END OF SECTION 32 31 13

SECTION 32 31 13.25 - CHAIN LINK FENCE AND GATES (PVC COATED)

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. PVC-coated chain link fencing, gates, and accessories.

1.2 SUBMITTALS

- A. Shop Drawings: Indicate materials, dimensions, details, and finish, show locations and installation procedures. Include details of fence and gate joints, attachments, accessories, footings, and clearances.
- B. Product Data: Manufacturer's schedules, charts, literature, and illustrations indicating the performance, fabrication procedures, product variations and accessories indicating material compliance and specified options.

1.3 QUALITY ASSURANCE

- A. Chain link fabric shall have the PVC thermally fused to the galvanized steel core wire. Extruded or bonded and glued chain link fence fabric will not be accepted.
- B. Fence framework shall have the PVC thermally fused in compliance with ASTM F1234.

1.4 WARRANTY

- A. Warrant the work specified herein for 15 years against becoming unserviceable or causing an objectionable appearance resulting from either defective or nonconforming materials and workmanship.

PART 2 - PRODUCTS

2.1 APPROVED MANUFACTURERS

- A. Specifications are based on named products and manufacturers. Other manufacturers must have a minimum of five (5) years experience manufacturing products meeting or exceeding the specifications and comply with Division 1 requirements regarding substitutions to be considered.
 - 1. American Fence and Supply Co.; League City, TX (281) 332-0511
 - 2. Merchants Metals, Houston, TX; (800) 254-0080

2.2 CHAIN LINK FENCE MATERIALS

- A. Chain Link Fabric:
 - 1. PVC elastomer coating, 7 mil thickness, thermally fused to zinc-coated steel core wire in accordance with ASTM F668 Class 2b. Core wire tensile strength 75,000 psi.
 - 2. Size: Helically wound and woven to height of 16 feet, unless noted otherwise, with 2-inch diamond mesh, with a core wire diameter of 0.148 inch (9 gauge) and a break load of 850 lbf.
 - 3. Color: Black complying with ASTM F934.
 - 4. Selvage of fabric shall be knuckled at top and knuckled at bottom.

- B. Fence Framing:
1. Steel pipe - Type I: ASTM F1083, standard weight schedule 40; minimum yield strength of 25,000 psi; sizes as indicated below. Hot-dipped galvanized with minimum average 1.8 oz/ft² of coated surface area.
 - a. Terminal, End, Corner, and Pull Posts: 3-inch o.d.
 - b. Line Posts: 2.5-inch o.d.
 - c. Rails and Braces: 1-5/8 inch o.d.
 2. Finish: In accordance with ASTM F1043, apply supplemental color coating of 10 to 15 mils thermally fused PVC in color to match fabric.
- C. Fence Accessories:
1. Chain link fence Accessories: Provide items required to complete fence system. Galvanize each ferrous metal item and finish to match framing.
 2. Post Caps: Formed steel, cast malleable iron, or aluminum alloy weathertight closure cap for tubular posts. Provide one (1) cap for each post. (Where top rail is used, provide tops to permit passage of top rail.)
 3. Top Rail and Brace Rail Ends: Pressed steel in accordance with ASTM F626 for connection of rail and brace to terminal posts.
 4. Top Rail Sleeves: 7-inch expansion sleeve with spring allowing for expansion and contraction of top rail.
 5. Wire ties: 9-gauge galvanized steel wire for attachment of fabric to line posts. Double wrap 13 gauge for rails and braces. Hog ring ties of 12-1/2 gauge for attachment of fabric to tension wire.
 6. Brace and Tension (stretcher bar) Bands: Pressed steel.
 7. Tension (stretcher bar) Bands: One (1) piece lengths equal to 2 inches less than full height of fabric with a minimum cross-section of 3/16 inch x 3/4 inch or equivalent fiber glass rod. Provide tension (stretcher) bars where chain link fabric meets terminal posts.
 8. Tension Wire: Thermally fused vinyl applied to metallic coated steel wire, 7-gauge, diameter core wire with tensile strength of 75,000 psi.
 9. Truss Rods and Tightener: Steel rods with minimum diameter of 5/16 inch. Capable of withstanding a tension of minimum 2,000 lbs.
 10. Nuts and Bolts: Shall be galvanized, but not vinyl coated. Color coat nuts and bolts with PVC touch up paint to match adjacent finishes, provided by manufacturer.
 11. Approved Manufacturers:
 - a. American Fence and Supply Co. Inc., League City, Texas
 - b. Master Halco / Anchor Fence; Houston, Texas (Basis of Specification)
 - c. Merchants Metals, Houston, Texas

2.3 CHAIN LINK SWING GATES

- A. Gate Frames: Fabricate chain link swing gates in accordance with ASTM F900 using galvanized steel tubular members, 2 inches square, weighing 2.60 lb/ft. Fusion or stainless-steel welded connections forming rigid one-piece unit. Vinyl coated frames thermally fused with 10 to 15 mils of PVC in accordance with ASTM 1043. PVC color to match fence.
- B. Chain Link Fence Fabric: PVC thermally fused to metallic coated steel wire, ASTM F668, Class 2b, in color, mesh, and gauge to match fence. Install fabric with hook bolts and tension bars at all four (4) sides. Attach to gate frame at not more than 15 inches on center.
- C. Hardware Materials: Hot dipped galvanized steel or malleable iron shapes to suit gate size. Field coat moveable parts (i.e. hinges, latch, keeper, and drop bar) with PVC touch up paint, provided by manufacturer, to match adjacent finishes.
- D. Hinges: Structurally capable of supporting gate leaf and allow opening and closing without binding. Non-lift-off type hinge design shall permit gate to swing 180 degrees inward.

- E. Latch: Forked type capable of retaining gate in closed position and have provision for padlock. Latch shall permit operation from either side of gate.
- F. Keeper: Provide keeper for each gate leaf over five (5) feet wide. Gate keeper shall consist of mechanical device for securing free end of gate when in fully open position.
- G. Double Gates: Provide drop rod to hold inactive leaf. Provide gate stop pipe to engage center drop rod. Provide locking device and padlock eyes as an integral part of latch, requiring one (1) padlock for locking both gate leaves.
- H. Gate Posts: Steel pipe, ASTM F1083, standard weight schedule 40; minimum yield strength of 25,000 psi, 4 inches in diameter. Hot-dipped galvanized with minimum 1.8 oz/ft² of zinc or respective material finished in accordance with ASTM F1043. PVC color to match fence.

2.6 SETTING MATERIALS

- A. Concrete: Minimum 28-day compressive strength of 3,000 psi.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify areas to receive fencing are completed to final grades and elevations.
- B. Ensure property lines and legal boundaries of work are clearly established.

3.2 CHAIN LINK FENCE FRAMING INSTALLATION

- A. Install chain link fence in accordance with ASTM F567 and manufacturer's instructions.
- B. Locate terminal post at each fence termination and change in horizontal or vertical direction of 30 degrees or more.
- C. Space line posts uniformly at 10 feet on center.
- D. Concrete fence post footings:
 - 1. Drill holes in firm, undisturbed or compacted soil. Excavate deeper than specified below as required for adequate support in soft and loose soils, and for posts with heavy lateral loads.
 - 2. Line posts shall be set in 9-inch minimum diameter concrete piers, with a minimum of 33 inches of post embedment in concrete with an additional 3-inch concrete cover at bottom.
 - 3. All end, corner, and pull posts shall be set in minimum 12-inch minimum diameter concrete piers, with a minimum of 33 inches of post embedment in concrete with an additional 3-inch concrete cover at bottom.
 - 4. Place concrete around posts in a continuous pour.
 - 5. Trowel finish around post. Slope to direct water away from posts.
- E. Check each post for vertical and top alignment and maintain in position during placement and finishing operations.
- F. Bracing: Install horizontal pipe brace at mid-height for fences six (6) and over, on each side of terminal posts. Firmly attach with fittings. Install diagonal truss rods at these points. Adjust truss rod, ensuring posts remain plumb.

- G. Top rail: Install lengths, 21 feet. Connect joints with sleeves for rigid connections for expansion/contraction.
- H. Bottom Rails: Install bottom rails between posts with fittings and accessories.

3.3 CHAIN LINK FABRIC INSTALLATION

- A. Fabric: Install fabric on security side and attach so that fabric remains in tension after pulling force is released. Leave approximately 2 inches between finish grade and bottom selvage. Attach fabric with wire ties to line posts at 15 inches on center and to rails, braces, and tension wire at 24 inches on center.
- B. Tension (stretcher) bars: Pull fabric taut; thread tension bar through fabric and attach to terminal posts with bands or clips spaced maximum of 15 inches on center.

3.4 ACCESSORIES

- A. Tie wires: Bend ends of wire to minimize hazard to persons and clothing.
- B. Fasteners: Install nuts on side of fence opposite fabric side for added security.

3.5 SWING GATE POST INSTALLATION

- A. Install gate posts in accordance with manufacturer's instructions.
- B. Concrete gate post footings:
 - 1. Drill holes in firm, undisturbed or compacted soil. Excavate deeper than specified below as required for adequate support in soft and loose soils, and for posts with heavy lateral loads.
 - 2. All gate posts shall be set in minimum 12-inch minimum diameter concrete piers, with a minimum of 33 inches of post embedment in concrete with an additional 3-inch concrete cover at bottom.
 - 3. Place concrete around posts in a continuous pour.
 - 4. Trowel finish around post. Slope to direct water away from posts.
- C. Gate posts and hardware: Set keeper, stops, sleeves into concrete. Check each post for vertical and top alignment and maintain in position during placement and finishing operations.

3.6 SWING GATE INSTALLATION

- A. Install gates plumb, level, and secure for full opening without interference.
- B. Attach hardware by means which will prevent unauthorized removal.
- C. Adjust hardware for smooth operation.
- D. Touch up hardware with PVC touch up paint, provided by manufacturer, to match adjacent finishes.

3.7 CLEANING

- A. Clean up debris and unused material and remove from the site.

END OF SECTION 32 31 13.25

SECTION 32 92 13 - HYDRO-MULCH SEEDING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. The work covered by this section consists of furnishing all plant, labor, materials, equipment, supplies, supervision and tools and performing all work necessary to top soiling, smoothing, seeding, fertilizing, watering maintenance and cleanups of side slopes, all in accordance with these specifications.
- B. The hydro-mulch seeding operations, together with all necessary related work, shall conform to the requirements specified in this section. The area(s) to be hydro-mulch seeded shall be noted in the construction documents.

1.2 MEASUREMENT & PAYMENT

- A. No separate measurement or payment will be made for materials and labor performed under this section. Include all costs in the lump sum price.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. All seed must meet the requirements of the U.S. Department of Agriculture Rules & Regulations as set forth in the Federal Seed Act and the Texas Seed Law.
- B. Type of seed, purity and germination requirements, rate of application and planting dates are as follows:

TABLE I

Type	Application Rate Pounds per Acre	Planting Date
Hulled Common Bermuda Grass 98/88	40	Jan. 1 to Apr. 15
Unhulled Common Bermuda Grass 98/88	40	Jan. 1 to Apr. 15
Annual Rye Grass, including Gulf	50	Jan. 1 to Apr. 15
Hulled Common Bermuda Grass 98/88	40	Apr. 15 to Oct. 1
Hulled Common Bermuda Grass 98/88	40	Oct. 1 to Jan. 1
Unhulled Common Bermuda Grass 98/88	40	Oct. 1 to Jan. 1

- C. Fertilizer shall be water soluble with an analysis of 10 percent nitrogen, 20 percent phosphoric acid and 10 percent potash. Rate of application shall be 500 pounds per acre, except during the period of April 15 through September 1, when the rate shall be reduced to 400 pounds per acre. The fertilizer shall be delivered to the site in bags or other convenient containers, each fully labeled, conforming to the applicable State Fertilizer Laws and bearing the name and warranty of the producer.
- D. Mulch shall be virgin wood cellulose fiber made from whole wood chips. Within the fiber mulch material, at least 20 percent of the fibers will be 10.7mm in length and 0.27mm in diameter. Rate of application shall be 2000 pounds per acre. Soil Stabilizers such as Terra Type III (or approved equal) shall be applied at a rate of 40 pounds per acre on side slopes and Terra Tack I (or approved equal) shall be applied at a rate of 40 pounds per acre on flatter portions.
- E. Wood cellulose fiber mulch, for use in the grass seed and fertilizer, shall be processed in such a manner that it will not contain germination or growth inhibiting factors. It shall be dyed an appropriate color to allow visual metering of its application. The wood cellulose fibers shall have the property of becoming evenly dispersed and suspended when agitated in water. When sprayed uniformly on the surface of the soil, the fibers shall form a blotter-like ground cover, which readily absorbs water and allows infiltration to the underlying soil. Weight specifications from suppliers for all applications shall refer only to the underlying soil. Weight specifications from suppliers, shall refer only to the air-dry weight of the fiber. The mulch material shall be supplied in packages having a gross weight not in excess of 100 pounds and must be marked by the manufacturer to show the dry weight content. Suppliers shall be prepared to certify that laboratory and field testing of their product has been accomplished and that it meets all of the foregoing requirements.
- F. Water shall be free from oil, acid, alkali, salt and other substances harmful to the growth of grass. The water source shall be subject to approval, prior to use.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Immediately after the finished grade has been approved, begin hydro-mulching operations to reduce erosion and excessive weed growth.
- B. Hydraulic equipment used for the application of fertilizer, seed and slurry of prepared wood fiber mulch shall have a built-in agitation system with an operating capacity sufficient to agitate, suspend and homogeneously mix a slurry containing up to forty (40) pounds of fiber plus a combined total of 70 pounds of fertilizer solids for each 100 gallons of water. The slurry distribution lines shall be large enough to prevent stoppage. The discharge line shall be equipped with a set of hydraulic spray nozzles, which provide even distribution of the slurry on the area to be seeded. The slurry tank shall have a minimum capacity of 800 gallons and shall be mounted on a traveling unit, which may either be self-propelled or drawn with a separate unit which will place the slurry tank and spray nozzles within sufficient proximity to the areas to be seeded, so as to provide uniform distribution without waste. The Engineer may authorize equipment with a smaller tank capacity, provided the equipment has the necessary agitation system and sufficient pump capacity to spray the slurry in a uniform coat.
- C. Care shall be taken that the slurry preparation take place on the site of the work. The slurry preparation should begin by adding water to the tank when the engine is at half throttle. When the water level has reached the height of the agitator shaft, good re-circulation shall be established and seed shall be added. Fertilizer shall then be added, followed by wood pulp mulch. The wood pulp mulch shall only be added to the mixture after the seed and when the tank is at least one-third filled with water. The engine throttle shall be opened to full speed when the tank is half filled with water. All the wood pulp mulch shall be added by the time the tank is two-third to three-fourths full.

Spraying shall commence immediately when the tank is full. The operator shall spray the area with a uniform visible coat, by using the green color of the wood pulp as a guide.

3.2 APPLICATION

- A. The Contractor shall obtain approval of hydro-mulch area preparation from the Engineer prior to application.
- B. Operators of hydro-mulching equipment shall be thoroughly experienced in this type of application. Apply the specified slurry mix in a motion to form a uniform mat at the specified rate. Operators shall keep the hydro-mulch within the areas designated and keep from contact with other plant material. Immediately after application, thoroughly wash off any plant material, planting areas or paved areas not intended to receive slurry mix.
- C. Keep all paved and planting areas clean during maintenance operations. Contractor shall keep hydro-mulching within the areas designated and keep from contact with other plant material.
- D. If in the opinion of the Engineer, unplanted skips and areas are noted after hydro-mulching, the Contractor shall be required to seed the unplanted areas with the grasses that were to have been planted at no additional cost to the Owner.

3.3 CONTRACTOR'S MAINTENANCE AND GUARANTEE PERIOD

- A. The hydro-mulch seeding shall be adequately watered until established. Any areas damaged by erosion or areas that do not have any acceptable turfing shall be redone to the satisfaction of the Engineer. Maintenance of grass areas shall be for 60 days after the completion of the project and shall consist of watering, weeding, repair of all erosion and reseeding, as necessary to establish a uniform stand of the specified grasses. The Contractor shall guarantee growth and coverage of hydro-mulch planting under this contract to the effect that a minimum of 95% of the area planted will be covered with the specified planting after 60 days.
- B. Prior to final acceptance, the Contractor shall be responsible for one (1) mowing per month between the months of April to September and shall mow every thirty (30) days plus or minus five (5) after the initial mowing. The Contractor shall also be responsible for one (1) mowing every six (6) weeks between the months of October to March. In addition, the Contractor shall water the entire sodded and hydro-mulched areas to a saturated depth of one (1) inch at least once a week between the months of April to September and at least once a month between the months of October to March.
- C. The Contractor shall make a second application of specified hydro-mulch planting to those bare areas not meeting specified coverage as determined by the Engineer. Such replanting is to be performed within 60 days of initial application and upon notification by the Engineer to replant.
- D. The Contractor shall apply top dress fertilizer (delayed action), at the rate of 10 pounds per 1000 square feet at 25 days after hydro-mulching of all new lawn areas.
- E. Top dress fertilizer shall be 16-6-8.

END OF SECTION 32 92 13

SECTION 32 92 23 - FERTILIZER

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 – GENERAL

1.1 DESCRIPTION

- A. Fertilizing shall consist of providing and distributing fertilizer over such areas as are designated for block sodding or seeding, for erosion control, and in accordance with these specifications.

1.2 MEASUREMENT

- A. Acceptable material for "Fertilizer" will be measured by the C-WT (100 lbs) as determined by approved scales or guaranteed weight of sacks shown by manufacturer.

1.3 PAYMENT

- A. No separate payment shall be made for materials furnished or work performed under this Section. Include the cost of same in the contract price bid for work of which this is a component part.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. All fertilizer used shall be delivered in bags or containers clearly labeled showing analysis. A pelleted or granulated fertilizer shall be used with an analysis of 10-10-5, unless otherwise specified. The figures in the analysis represent the nitrogen, phosphoric acid and potash nutrients respectively as determined by the methods of the Association of Official Agricultural Chemists. The sources of nitrogen in the fertilizer shall be roughly balanced between ammonical (quick release) and nitrate nitrogen (slow release).
- B. With permission of the Engineer, fertilizer of a different analysis may be substituted. It shall be pelleted or granulated fertilizer with a lower concentration. The total amounts of nutrients furnished and applied per acre shall equal or exceed that specified for each nutrient.

PART 3 – EXECUTION

3.1 CONSTRUCTION METHODS

- A. When fertilizer is included in the specifications, pelleted or granulated fertilizer shall be applied uniformly over the area specified to be fertilized and, in the manner, directed for the particular item of work. Fertilizer shall be dry and in good physical condition. Fertilizer that is powdered or caked will be rejected. Distribution of fertilizer for the particular item of work shall meet the approval of the Engineer.
- B. Unless otherwise indicated on the plans, fertilizer shall be applied uniformly at the average rate of 480 pounds per acre when "Sodding for Erosion Control", and 400 pounds per acre when "Seeding for Erosion Control".

END OF SECTION 32 92 23

SECTION 32 92 23.16 - SOLID SODDING

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 – GENERAL

1.1 DESCRIPTION

- A. Solid Sodding for erosion control shall consist of providing and planting Bermuda grass, or other acceptable sod along or across such areas as are designated on the plans and in accordance with the specification requirements herein outlined.

1.2 MEASUREMENT AND PAYMENT

- A. No separate measurement or payment will be made for materials and labor performed under this section. Include all costs in the lump sum price.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. The sod shall consist of live, growing Bermuda grass (ninety-five percent pure), secured from sources where the soil is fertile and has been fumigated. Bermuda sod shall have a healthy virile root system of dense, thickly matted roots throughout and grown in a sandy loam soil consisting of a minimum of 60% sand. Sod grown in fat clayey materials are not acceptable. The sod shall be cut from the field so that there is a minimum of one-half inch of soil on the roots of the sod, and so that no roots show on the bottom of the soil. Sod shall be dense, with the grass having been mowed to 1-inch height before lifting from the field. Sod shall be in a vigorous condition, dark green in color, free of disease and harmful insects. The contractor shall not use sod from areas where the grass is thinned out, nor where the grass roots have been dried out by exposure to the air and sun to such an extent as to damage its stability to grow when transplanted. The sod shall be free from obnoxious weeds or other grasses and shall not contain any matter deleterious to its growth or which might affect its subsistence or hardiness when transplanted. Unless the area has been closely pastured, it shall be closely mowed and raked to remove all weeds and long-standing stems.
- B. Care shall be taken at all times to retain the native soils on the roots of the sod during the process of excavation, hauling and planting. Sod material shall be kept moist from the time it is dug, until planted. When so directed by the Engineer, the sod existing at the source shall be watered to the extent required, prior to excavating. Do not stack sod for more than 36 hours between the time of cutting and the time of installation. The Engineer reserves the right to reject any sod deemed unacceptable for installation.
- C. All planting shall be done between the average date of the last freeze in the spring and six weeks prior to the average date for the first freeze in the fall, according to the U.S. Weather Bureau.
- D. Fertilizer shall conform to the requirements of SECTION 32 92 23 - FERTILIZER and shall be applied at the rate of 480-pounds per acre.

PART 3 – EXECUTION

3.1 CONSTRUCTION METHODS

- A. Immediately after the finished grade has been approved, begin sodding operations to reduce excessive weed growth. If the sod bed is dry immediately prior to sod installation, dampen the surface with a fine mist of water.

- B. Grass shall be turf sod, cut into approximately 18 inch wide by 24-inch long pieces, or 18 inch wide by continuous length rolls.
- C. All areas to be sodded shall be raked to true lines, free from all unsightly variations, bumps, ridges or depressions. All sticks, stones, roots or other objectionable material, which might interfere with the formation of a finely pulverized seedbed, shall be removed from the soil.
- D. Lay sod so that adjacent strips butt tightly, with no spaces between strips. Lay sod on mounds and slopes, with strips parallel to contours. Stagger joints. Tamp and roll the sod thoroughly to make contact with the sod bed, or as directed by the Engineer.
- E. Peg sod on slopes three to one or steeper with pegs driven through sod into soil, until pegs are flush with the turf. Space pegs 18 inches on center. Pegs to be 1 inch square, 6 inches long or, 6-inch lengths of lath. Commercial fertilizer as outlined in SECTION 32 92 23 - FERTILIZER shall be applied to the entire sodded area at the prescribed rates, immediately following laying of the sod. Immediately after fertilizing, water the entire area to a saturated depth of 2-inches.
- F. Immediately after installation of the sod, remove sod clumps on soil, wash off any plant materials and pavements not to have sod. Edges along curbs and drives, walkways, etc., shall be carefully trimmed and maintained until accepted.

3.2 CONTRACTOR'S MAINTENANCE AND GUARANTEE PERIOD

- A. Maintenance of sodded areas shall be for 60 days after completion of the project and shall consist of watering, weeding, repair of all erosion and resodding as necessary to establish a uniform growth of the specified grass. The Contractor shall guarantee growth and coverage of the sod planted under this contract to the effect that a minimum of 95% of the area planted will be covered with the specified planting after 60 days. Sod panels that are dead or dying shall be replaced.
- B. The Contractor shall be responsible for one mowing, in the event that the time between sodding and final acceptance exceeds thirty days.
- C. The Contractor shall make a second planting to those bare areas not meeting specified planting as determined by the Engineer. Such replanting is to be performed within 90 days of initial application and upon notification by the Engineer to replant.

END OF SECTION 32 92 23.16

SECTION 33 41 00 - STORM SEWERS AND APPURTENANCES

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 - GENERAL

1.1 SCOPE

- A. This section covers storm sewers, culverts, manholes, headwalls, inlets, junction boxes and miscellaneous items indicated in connection with the storm sewer system, complete. Excavation, trenching and backfilling are covered under SECTION 31 23 00 – CONSTRUCTION OF UNDERGROUND UTILITIES.

1.2 SUBMITTALS

- A. Submit product data and shop drawings for ALL items to be installed.
- B. Refer to Section 01 33 00 for submittal procedures.

1.3 MEASUREMENT AND PAYMENT

- A. No separate measurement or payment will be made for materials and labor performed under this section. Include all costs in the lump sum price.

PART 2 – PRODUCTS

2.1 MATERIALS FOR STRUCTURES

- A. Precast Concrete Structures
 1. **Unless otherwise specified, only precast concrete structures shall be installed.** Precast structures shall be traffic duty. Concrete for precast structures shall have a design strength of 4500 psi at 28 days. Precast structures shall be monolithic in design. Reinforcing steel shall be Grade 60 and shall meet ASTM A615.
- B. Mortar
 1. Mortar for pipe joints and connections to other drainage structures shall be composed of one part by volume of Portland Cement and two parts of sand. The Portland Cement shall conform to the requirements of Federal Specification SS-C-192, Type I or II. The sand shall conform to the requirements of AASHO Specification M-45. Hydrated lime may be added to the mixture of sand and cement in an amount equal to ten percent (10%) of the volume of cement used. Hydrated lime shall conform to the requirements of Federal Specification SS-L-351, or ASTM Specification C-141. The quantity of water in the mixture shall be sufficient to produce a stiff workable mortar but shall in no case exceed six gallons of water per sack of cement. Water shall be clean and free of injurious acids, alkalies, and organic impurities. The mortar shall be used within thirty (30) minutes from the time the ingredients are mixed with water. The inside of the joint shall be wiped clean and finished smooth. The mortar bead on the outside shall be protected for such period as is necessary to obtain satisfactory curing.
- C. Cast Iron
 1. Cast iron shall conform to ASTM Standard Specification A 48, latest edition, for Class 20 gray cast iron. Cast iron shapes shall conform to the dimensions shown and shall be clean and perfect, free from sand or blow holes, or other defects. Castings shall be factory coated with asphaltum varnish. Twenty-three and one-half inch (23-1/2") manhole covers will be used for sewers forty-eight inches (48") diameter or less. Thirty-two-inch (32") manhole

covers will be used for sewers in excess of forty-eight inches (48") in diameter.

D. Brick

1. **Brick structures shall only be used when specifically indicated on the drawings.** All structures shall be constructed, complete with covers in accordance with the details shown on the Drawings. Structures shall be constructed of solid precast segmental concrete masonry units or circular sections specially cast for use in manhole construction.

a. When Structures are to be constructed of brick, materials shall conform to the following:

Concrete: As specified in the concrete specification.

Brick: ASTM 662, Grade MW.

Segmental Concrete: ASTM C139, except as modified herein.
1) Curing: Steam cured for at least 8 hours
2) Minimum Thickness: Upper 12 feet of manhole - 8 inches; Portion below 12 feet - 12 inches

Circular Precast Sections: ASTM C478

Mortar:

- 1) Portland Cement - ASTM C150, Type II
- 2) Hydrated Lime - ASTM C207, Type S
- 3) Sand - Concrete Sand (fine aggregate which has been sieved through an 8-mesh screen
- 4) Volumetric Proportions - 1-part Portland Cement, 1/2-part hydrated lime, 3 parts sand
- 5) Mixing - Cement, lime, and sand shall be thoroughly mixed dry and only enough water added to form a mortar of the proper consistency.

Castings:

- 1) Iron - ASTM A 48
- 2) Coating - Hot asphaltum varnish applied the foundry.

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2.2 PIPE FOR CULVERTS AND STORM DRAINS

A. Pipe for storm drains and culverts shall be reinforced concrete pipe (RCP), ASTM C 76, Class III, unless otherwise indicated. Where HDPE (High-Density Polyethylene) is specified, the joints shall meet ASTM F477 and ASTM D3212 (watertight joints). All pipes shall have a smooth interior.

PART 3 - EXECUTION

3.1 CONSTRUCTION

A. All concrete segmental units shall be saturated with water before laying and shall be damp but free from surface water when laid.

B. All mortar shall be used within 30 minutes after mixing. Mortar which has begun to be taken on initial set, shall be discarded and shall not be mixed with additional cement or new mortar. All segmented concrete manholes shall be plastered on all outside surfaces and three feet (3') above

the invert on all inside surfaces with mortar not less than one-half inch (1/2") thick. Manhole inverts shall be carefully constructed to maintain the proper velocities through the manhole with no increase in the velocity in the outgoing pipe. The shape of the invert shall conform exactly to the lower half of the pipe it connects. Side branches shall be connected with as large radius of curve as practicable. All inverts shall be troweled to smooth clean surface. Concrete filling between the sewer invert and walls of manholes shall be flush with top edges of the inverts and slope up from the invert at the rate of two inches (2") per foot. Circular precast sections shall be provided with a mastic gasket to seal the joints between sections. After the sections are in place, the outside of each joint shall be plastered with cement mortar.

- C. Piping shall be constructed of the materials specified in this section, and in the manner indicated on the Drawings. Pipe shall be laid true to the grades shown on the Drawings. Any line in which opening or faulting of the joints occurs during backfill or before final inspection and acceptance, such that infiltration of material or a change in flow characteristics results, must be repaired or replaced to the satisfaction of the Engineer. Under no circumstances shall pipe be laid on unsuitable soft material, and no pipe shall be laid when trench conditions or weather are unsuitable for such work. Full responsibility for the diversion of drainage and dewatering of trenches during construction shall be borne by the Contractor. Any section of the pipe already laid that is found to be defective or damaged shall be taken up and re-laid or replaced as directed by the Engineer immediately, without additional cost to the Owner.

3.2 INSTALLATION OF CONCRETE PIPE AND PRECAST CONCRETE BOX CULVERT

A. Laying Pipe

- 1. The laying of pipes on the prepared foundation shall be started at the outlet and with the spigot or tongue ends pointing in the direction of flow and shall proceed toward the inlet end with the abutting sections properly matched, true to the established lines and grades. The Contractor shall furnish and place in position all the necessary batter boards for controlling the work. The batter boards shall be of sufficient size timber and shall be substantially supported. The boards and all location stakes must be properly maintained in place. The Contractor shall also furnish, at his own expense, good sound twilled lines for use in giving lines and grades and necessary plummets and graduated poles of an approved form.
- 2. Proper facilities shall be provided for hoisting and lowering the sections of pipe into the trenches without disturbing the prepared foundation and the sides of the trench. The ends of the pipe shall be carefully cleaned before the pipes are placed. As each length of pipe is laid, the mouth of the pipe shall be protected to prevent the entrance of earth or bedding material. The pipes shall be fitted and matched so that when laid in the bed they shall form a smooth, uniform conduit. Shape trench bottom and perform excavation as specified under SECTION 31 23 00 – CONSTRUCTION OF UNDERGROUND UTILITIES. Shore and sheet as specified in SECTION 02150 - TRENCH SAFETY per Plans, and referenced documents.

B. Joints in Concrete Pipe

- 1. Unless otherwise specified, joints in reinforced and unreinforced concrete pipe, shall either be neoprene or rubber gasket joints as hereinafter described. Cold compound joints shall only be allowed when specifically noted in the specifications or contract drawings.

C. Neoprene or Rubber Gasket Joints

- 1. Joints made with neoprene, rubber, or other similar material that has been approved by the Engineer will be acceptable for use with reinforced or non-reinforced concrete pipe, either tongue and groove or bell and spigot. The ends of the pipe must be accurately made and designed for use with the gaskets. The type of joint and the gasket must have the approval of the Engineer and may be submitted to the Engineer for approval prior to submitting bids for work on which its use is intended. The joint material and workmanship shall be such as to provide a watertight joint. Joints shall, unless otherwise specified, be

pointed on the outside with cement mortar.

D. Bell and Spigot Pipe – Cold Compound Joints

1. The inside of the pipe bells and the outside of the spigot ends shall, while dry, be completely coated with joint primer. This coating shall be applied sufficiently in advance so that the primer will be thoroughly dry when the pipe is laid. Pipe twenty-four inches (24") and larger shall be primed at the point of manufacture. Apply a fillet of compound on the bottom half of the inside of the bell, press enough dry twisted jute into the compound to pass around the pipe and lap at the top and shove home the spigot of the pipe. Bring the jute around the pipe, firmly caulk into place. The jute should be sufficient to fill one-fourth (1/4) the depth of the bell. Fill the remaining three-fourths (3/4) of the depth of the bell with compound, taking care to leave no voids and provide sufficient compound to form a fillet sloping forty-five degrees from the outer end of the bell to the barrel of the next pipe.
2. Compound used for these joints shall be a well-known brand of material of proven worth, uniform in consistency and approved by the Engineer as being equal to RAM-NECK. Primer shall be of the type recommended by the manufacturer of the compound used.

E. Tongue and Groove Pipe – Cold Compound Joints

1. Unless otherwise specified, this type of joint shall be used for tongue and groove pipe joints not made with approved neoprene or rubber gaskets. The compound and primer shall be the same as described herein for use with bell and spigot pipe.
2. Both ends of the pipe shall, while clean and dry, be coated with primer on all surfaces that will be in contact with the compound. The primer shall be allowed to dry before the pipe is laid. Twenty-four inches (24") and larger pipe shall be primed at the factory.
3. After pipe has been set to proper line and grade in the trench a one-half (1/2") thick layer of the compound shall be troweled or otherwise placed on the groove end of the pipe covering about two-thirds (2/3) of the joint face around the entire circumference. Next the tongue end of the next pipe shall be shoved home with sufficient pressure to make a tight joint. Care shall be taken to avoid leaving ridges of the compound projecting into the pipe in a manner that would obstruct the flow. The Contractor will make the necessary adjustment in the quality and consistency of the compound as the work progresses.
4. An outside band of the joint compound shall be installed completely around the circumference of the pipe at the joint. This will necessitate digging "bell holes" at each joint. The band shall have a thickness at the center of at least three-quarter inch (3/4) tapering uniformly to nothing approximately three inches (3") each side of the center. Where Class A bedding is used, the band may be omitted on portions of the joint that will be embedded in the cement-stabilized sand bedding.

F. Corrugated Steel Pipe

1. Fully bituminous coated corrugated steel pipe shall conform to FS WWP 405, Class I or II, Shape 1, 2, 3, with Coating A. Gauge of pipe shall be as indicated on the Drawings.
2. The space between pipe and connecting bands shall be kept free of dirt and grit so that corrugations fit snugly. Connecting band shall be tapped with soft head mallet of wood, rubber or plastic while being tightened to take up slack and insure tight joint. Fill annular space between abutting sections of fully paved pipe and pipe arch with bituminous material after jointing.
3. Unless otherwise specified, field joints shall be made with outside bands, each consisting of one or two pieces. Type, size, and gauge of band and size of angles and bolts shall be as indicated on the Drawings or as applicable for gauge and type of pipe used.

3.3 INSTALLATION OF HDPE PIPE

- A. HDPE Drainpipe shall be high density corrugated polyethylene heavy duty pipe and shall be manufactured in conformance with the latest AASHTO specifications of M294 Type S and AASHTO

M252. (ADS N12 or equivalent are acceptable materials)

- B. Joints and Fittings: Pipe and fittings shall conform to AASHTO M294 and AASHTO M252. Couplers shall cover not less than one full corrugation on each annular section of pipe.
- C. Bedding Material: Bedding material shall be 1/4 inch to 3/8-inch diameter washed pea gravel, free of lumps of clay, soil or vegetative material. Provide sample and sieve analysis/testing data to owner's representative prior to work commencement.
 - 1. Any gravel selected shall have 100% passing a 1/2-inch (12 mm) sieve and not more than 10% passing a No. 10 (2 mm). A four (4) inch thick layer of pea gravel shall be placed over the entire subgrade after installation of sub-drainage piping.
 - 2. The gravel shall be "quality control" tested at the Owner's expense throughout construction at and approved laboratory for every 800 tons brought to the site. Gravel which does not meet specifications shall be removed and replaced at the Contractor's expense.

3.4 MANHOLES

- A. Installation
 - 1. Manhole installation shall be in strict compliance with the manufacturer's recommended installation procedures.
 - 2. Excavation shall be adequate to accommodate the concrete foundation slab and to provide working room around the manhole.
- B. Stubs
 - 1. Stubs shall be provided in manholes at the locations shown on the Plans. Stubs shall be not less than 2.0 feet long and shall terminate in a bell and plug.
- C. Backfilling
 - 1. Backfilling around manholes shall not begin until concrete base has cured for twenty-four (24) hours. Backfill using native soil free of foreign objects, stones, concrete, or debris. Backfill in layers not to exceed twelve inches (12") to avoid uneven loading. Do not allow equipment to impact manholes during backfill operations.
 - 2. Do not backfill above flat areas at top of cone of manholes to allow for installation of concrete chimney.
- D. Finishing Manhole to Grade
 - 1. Construct chimneys using precast concrete rings to bring manholes to finish grade.
 - 2. Seal both the top and the bottom faces of concrete rings with "RAM-NEK" rope type mastic sealant.
- E. Manhole Frames and Covers
 - 1. Cast iron for manhole frames and covers shall conform to the dimensions shown on detail drawings and shall be clean, free from sand and blow holes or other defects. Manhole covers and Inlet Grates shall include all graphics, logos, and verbiage required by all regulatory agencies having jurisdiction over the project. Holes in cover must be free from plugs or burrs. Bearing surfaces of frames and covers are to be machined so that even bearing occurs when covers are seated in the frame.

END OF SECTION 33 41 00

SECTION 33 44 19 - STORM WATER MANAGEMENT

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 - GENERAL

1.1 STORM WATER MANAGEMENT

- A. "Storm Water Management" shall consist of all requirements to comply with current Texas Commission on Environmental Quality (TCEQ) Texas Pollutant Discharge Elimination System (TPDES) Construction Storm Water Discharge Regulations and Requirements.

1.2 SCOPE

- A. The scope of this item includes satisfying the TPDES Permit Regulation including, but not limited to, any permits that shall be obtained and any construction practices, equipment, materials, labor, and structures necessary to conform with these regulations.

1.3 STANDARDS

- A. This section will be governed by the regulations of the city and or county have jurisdiction over the project.
- B. All provisions, technical specifications, guidelines, intent and construction practices detailed within this handbook will be considered a part of the technical specification and will have full force and effect regarding this project.

1.4 PERMITS

- A. The Contractor is responsible for the planning and implementation procedures for storm water pollution prevention plans (SWPPP) for this construction site. The SWPPP shall be fully developed and implemented before submitting a Notice of Intent (NOI) that this project will be covered by the final TPDES general permit requirements.
- B. The Contractor shall file the NOI with the TCEQ at least seven (7) days prior to the commencement of construction activities.
- C. The Contractor shall also prepare and submit inspection reports pertaining to the Storm Water Management for the City and file the Notice of Termination after the site has been stabilized.

1.5 PAYMENT

- A. Storm Water Management will be incidental to all other Bid Items in the bid proposal.

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

3.1 CONSTRUCTION

- A. The Contractor is responsible for all construction activities, structures, etc., associated with implementing the TPDES Permit and the SWPPP. This includes, but is not limited to, filter fabric fences, straw bale fences, temporary hydro-mulch seeding, sodding, inlet protection barriers, etc. that pertain to the intent of this section.

END OF SECTION 33 44 19

SECTION 33 46 16.34 - SUBDRAINAGE SYSTEM FOR SYNTHETIC TURF ATHLETIC FIELDS

PART 1 - GENERAL

1.1 SUMMARY

- A. Work shall include all labor, materials and equipment to complete the underdrain system as indicated on the Field Subdrainage Plan and as herein specified.

1.2 MEASUREMENT AND PAYMENT

- A. There will be no separate measurement and payment for work performed under this section.

1.3 REFERENCES

- A. The applicable provisions of the following standards shall apply as if written here in their entirety:
 - 1. AASHTO - American Association of State Highway and Transportation Officials
 - 2. ASTM - American Society of Testing and Materials

1.4 SUBMITTALS

- A. Electronically submit the product data which shall include as a minimum manufacturer's product data on: drainpipe, fittings and accessories. Material samples shall also be submitted.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Perforated Drainpipe: Perforated drainpipe shall be high density corrugated polyethylene heavy duty pipe and shall be manufactured in conformance with the latest AASHTO specifications of M294 Type S and AASHTO M252. (ADS N12 or equivalent are acceptable materials)
- B. Joints and Fittings: Pipe and fittings shall conform to AASHTO M294 and AASHTO M252. Couplers shall cover not less than one full corrugation on each annular section of pipe.
- C. Bedding Material:
 - 1. See Specification 32 11 23.23 Free Draining Stone Base for Synthetic Turf Systems
- D. Valve Boxes/Cleanouts: 10-inch round with locking top, Ametek or Carson manufactured.

PART 3 - EXECUTION

3.1 PREPARATION

- A. The subgrade for the underdrain system shall be completed by the Contractor using laser control within an elevation tolerance of plus 0.00 inch to minus 1/2 inch of the design subgrade elevations as determined from the Contract Drawings.
- B. Subgrade elevations and uniformity shall be verified by a Registered Professional Land Surveyor retained and paid by the Contractor and approved by the Owner. A certified copy of the survey shall be submitted to the Owner and the Engineer within three (3) days after completion.
- C. The completed subgrade shall be compacted to a uniform density of no less than 95% of maximum as determined by ATSM Designation D 698-78. The Engineer and the Contractor shall inspect the subgrade prior to construction of the subdrain system. If the system subgrade meets the above

specifications, the Contractor may commence construction. If the subgrade is not acceptable; the Contractor shall correct the deficiencies before proceeding.

3.2 INSTALLATION

- A. Contractor shall commence the underdrain work upon completion of the prepared subgrade. Subgrade of field shall conform to the grading plan. Contractor shall provide for an elevation tolerance of plus or minus 1/2 inch of the designated subgrade. Certified verification of subgrades shall be provided by the Contractor and approved by the Engineer prior to work commencement.
- B. The location of each run of pipe shall be staked out and laser surveyed prior to trenching. Install Geomembrane Liner to bottom and sides of trenches. Extend fabric a minimum of five (5) feet past each side of top of trench on top of the subgrade. All pipe shall be carefully placed in the trenches with bedding material installed per plans and details. The interior of pipes shall be kept free from dirt and debris and when pipe laying is not in progress, open ends of pipes shall be closed by tape or other approved means.
- C. All pipes shall be laid to drain in accordance with the plans. All subdrainage piping shall be emptied into the existing catch basin/storm piping configuration at the west end of the playing fields and at the elevation listed per the plans. Perforation into the existing storm system shall be concrete grouted after installation of pipe.
- D. Coordinate trenching and installation with underground irrigation and existing storm sewer system. If conflicts exist, modify irrigation lines as required and protect the existing storm sewer and catch basins from damage.
- E. Remove all excess waste materials and soils off of field and maintain original subgrade elevations. This work is to be accomplished on a daily basis
- F. Keep up to date as-built documents, as the job progresses and make available to Engineer and Owner's Representative for inspection at all times. Revise drawings as required to indicate field changes made during installation.

END OF SECTION 33 46 16.34