

Request for Bids

Rivercrest Public Schools

New Stadium Project

For a New Stadium to include a Synthetic Turf Field & Track, Lighting, Bleachers & Pressbox

For

Rivercrest High School

Wilson, Arkansas

Frontier Engineering, Inc.

P.O. Box 11988

Fort Smith, Arkansas 72917

Phone: (479) 414-1013

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Athletic SurfacesPlus Consulting

485 River Ridge Cove

Memphis, TN 38120

Phone: (901) 494-4440

Tim Cowan, E-mail: tim@athleticsurfacesplus.com

Bid Date
Friday, July 21, 2017 @ 1pm

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SECTION A

Announcement

Request for Proposals: Stadium Project

With this request for proposal (this “RFP”), Rivercrest Public Schools (“Owner”) hereby solicits bids, on a competitive basis, from qualified companies (“Respondents”) to provide Owner the services described herein, all in accordance with the terms and conditions detailed herein. ***In particular, the services sought by Owner will require the Respondent to provide Excavation, Track Base & Concrete, Field Base, Synthetic Turf, Asphalt Track Base, Track Surface, Bleachers & Pressbox, Stadium Lights, Concrete Sidewalks, and Fencing.*** Each Respondent must submit their mission statement and customer focus with their Proposal.

The Respondents are to have current Arkansas Contractors licenses and proof of insurance.

Owner reserves the right to accept or reject any or all documents submitted. Owner shall have the right to consider factors other than the proposal response in awarding a contract.

Respondents are required to include a copy of standard contract, modified as deemed necessary for this RFP. This contract will be considered only as a sample. Owner reserves the right to modify or reject the sample contract in the event the Respondent is selected.

(All such services are referred to herein as the “Services”). More information about the requirements pertaining to the Services is set forth in Section B of this RFP.

About Rivercrest Public Schools Project

Rivercrest Public Schools for Rivercrest High School has initiated a project to build a new stadium to include a high quality new synthetic turf surface and new track. Companies interested in bidding, may submit: Excavation, Track Base & Concrete, Field Base, Synthetic Turf, Asphalt Track Base, Track Surface, Bleachers & Pressbox, Stadium Lights, Concrete Sidewalks, Fencing, and/or a complete price for multiple trade packages.

Submission of Proposals

Bids will be accepted until **1:00PM CST, Friday, July 21, 2017. PROPOSALS RECEIVED AFTER THIS TIME WILL NOT BE ACCEPTED.** One (1) original, and two (2) copies of your bid must be submitted. Owner expects to award a contract to the successful contractor/s not later than **July 28, 2017. OWNER RESERVES THE RIGHT TO CONTRACT IN THE BEST INTEREST OF OWNER, AND TO REJECT ANY AND ALL BIDS AT ANY TIME PRIOR TO AWARD.**

Bids must be sealed in a container marked on the lower left-hand corner with the name and address of the Respondent. Owner will date stamp the container with the submission date and the submission time. In addition, the sealed container in which the Bid is submitted should be labeled "Stadium Project", and Trade packages that are being bid on. **FAXED RESPONSES WILL NOT BE ACCEPTED.**

All completed Bids and accessory documents should be mailed or delivered to:

Rivercrest Elementary School Office
1704 State Hwy 14
Wilson, Arkansas 72395
Tel: 870-655-8633
Attn: Sally Bennett, Superintendent sally.bennett@smccolts.com

Bids will be received and read aloud at the Rivercrest Elementary School in the Parent Center which off the Front Entrance Lobby. Inquiries for electronic BID documents, information regarding scope of work, Bid submission requirements or other specification concerns may be directed to the Owner's Representative: Mr. Tim Cowan @ tim@athleticsurfacesplus.com or at: 901-494-4440

SECTION B

SCOPE OF SERVICES

1.1 THE SERVICES

Owner is soliciting bids from qualified contractors for the new Stadium Project. All work to be performed is at the Rivercrest High School site.

Project Description

The project will consist of the: Site Excavation, Track Base & Concrete, Field Base, Synthetic Turf, Asphalt Track Base, Track Surface, Bleachers & Pressbox, Stadium Lights, Concrete Sidewalks, Fencing, and/or a complete price for multiple trade packages Please refer to the engineered drawings for complete information. **SEE SPECIFICATIONS & DWGS FOR COMPLETE DESCRIPTION OF WORK**

Trade Packages: Will include the following General Scope of work and description in the BID documents & Drawings.

Trade package#1- Demolition/ Sitework/ Earthwork:

- Remove Vegetation and approximate 12" of topsoil (field was disced on 6/30/17)
- Preparation and installation of the SWPPP shall be the responsibility of the earthwork contractor; in coordination with the Engineer and Owner during the course of their work.
- Uniformly regrade/dispose of excavated material East & NE of the Stadium Pad
- Construct access road East side of Stadium
- Grade Stadium site and install impermeable liner
- Import approximately 3' of select fill material, moisture Condition and compact
- Install non-woven geotextile in areas to receive concrete paving outside of Track outside curb
- Install 6" of SB2 road base material compacted on top of non-woven geotextile

Trade package#2- Concrete: Curbs, Field Events, Bleacher Pads & Footings, Entrance, Sidewalks:

- Install the Reinforced Concrete Pipe (RCP) in the ditch under the Stadium entry and tie in 24" RCP from South and backfill properly
- Construct the 2- concrete curbs on the inside and outside of the track
- Construct the concrete requirements for the Long jump pit, Construct the High Jump Pad and pole vault runway and standard pads in north D zone
- Provide and install a Pole Vault plant box as specified on DWG
- Construct the footings and pads under the bleachers
- Construct the entrance to the Stadium
- Construct all of the sidewalks around the Stadium

Trade package#3- Masonry:

- Construct Brick Columns and knee walls at entry

Trade package#4- Athletic Field Subsurface Drainage System:

- Finalize Laser grade inside track curb, D zones, & field to specifications and compact with roller

- Supply all of the #57 aggregate, and the # 89 aggregate as specified
- Supply all of the flat drain pipe, French drain pipe, and geo-textile material
- Supply and Install the nailer board composite 2x4 material to the perimeter curbs
- Install the French drain trench, fabric, pipe, and clean rock around the inside of the track as specified
- Complete the installation of geo-textile fabric to the entire field, overlapping 18” as specified
- Install the Herringbone flat drains as specified
- Spread #57 aggregate, and the #2chips/89 aggregate as specified
- Properly grade and compact the entire base as specified
- Supply and Install New goal posts as specified
- Make adjustments as required by turf Installer, necessary for sign off

Trade package#5-Synthetic Turf:

- Manufacture, deliver, and install synthetic turf as specified.

Trade package#6- Asphalt Aggregate Base & Asphalt Paving

- Construct 8” thick aggregate base course for track pavement section with road aggregate base course SB2 per construction requirements and compaction specifications on top of non-woven geotextile material. Uniformly mix/pug aggregate base and place utilizing paving machine or other engineer approved method.
- Asphalt base including 1 lift of 2” and 1 lift of 1.5” on entire track oval and chute

Trade package#7- Track Surface

- Structural spray polyurethane track surface as specified

Trade package #8- Bleachers & Pressbox

- Deliver and install New Bleachers and Pressbox

Trade package #9- Site Electrical System

- Install site electrical from existing transformer and meter supply. System to supply power to Scoreboard and play clocks, Press box power center, Sports field lighting system, and area lighting
- Provide and install play clocks
- Relocate existing Scoreboard from old Stadium site to location shown on plans

Trade package #10- Sports Field Lighting System

- Deliver and install Sports field lighting system to include 4- Poles, fixtures, and lighting controls per specifications

Trade package#11- Fencing

- Provide and install tubular steel fencing, vinyl coated chain link fencing, and associated gates and accessories per specifications

Trade package#12- Sound System

- Deliver and install new Sound System

Trade package#13- Combination of all Trade Packages #1- #12

Trade package #14- Contractor’s Choice Combination

Trade package #15- Contractor’s Choice Combination

Purpose of Stadium

This new stadium will serve the Rivercrest Schools and provide a multi-purpose facility to host a multitude of various events and program for not only the Schools, but for the Wilson, Arkansas community. This is the first phase of a project that will include the construction of a Fieldhouse to the south of the stadium.

Purpose of Synthetic Turf

The improved field will allow for a more reliable playing surface that can be utilized continuously for a multitude of sports and activities that include, but not limited to: Football, Soccer, Baseball and Softball practice, & Band. The synthetic turf itself shall be pervious, allowing water to quickly infiltrate (20+ inches per hour) from the surface to the drainage network below. The drainage network will consist of piping and gravel over a geo-textile membrane that separates the underlying soil from the drainage layer. The field and drainage layer will also provide water storage capacity, slowing the outflow of precipitation even when the infiltration capacity of the underlying soil is exceeded during a large storm event. The only truly impervious part of the field installation will be the narrow concrete border around the field to which the turf is anchored.

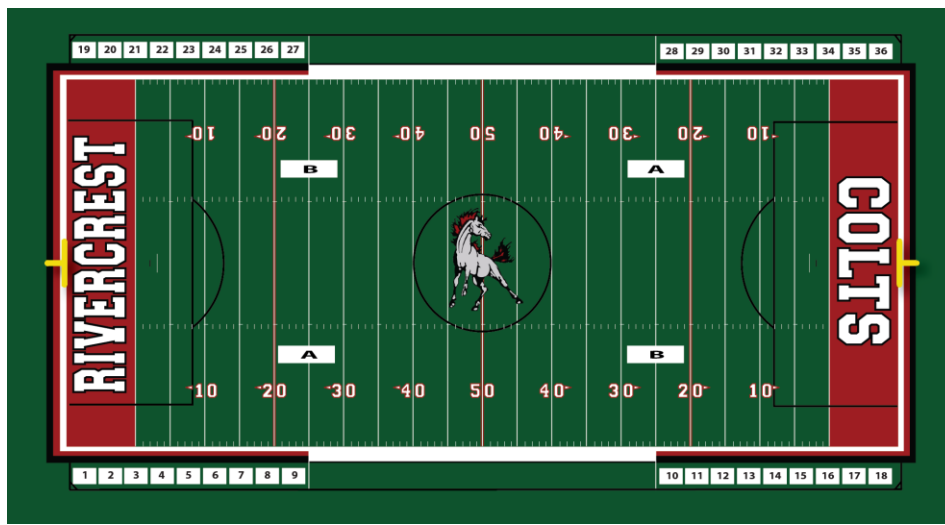
Purpose of Synthetic Track

The new structural spray polyurethane track will provide a pervious track surface that is cost effective and easy to maintain. The tracks composition should include a ½” polyurethane mat that is paved in place, and coated with a clockwise and counterclockwise coat of polyurethane structural spray.

Proposal Requirements

Contractors shall present their qualifications, sample of warranty forms and samples of the product to be installed that meet the attached specifications and requirements (where requested). In addition, the cost proposal shall be submitted on the forms provided, Bond documentation, bidders assurances and disclosure, submittals and all included as part of the bid. Failure to include requirements or submittals could cause rejection.

FIELD & SITE RENDERING: SHOWN ONLY FOR ILLUSTRATION PURPOSES: Please pay close attention to the written specifications. Everything inside the track, with exception of track field events will be covered with synthetic turf. Turf inside of track is 94,782 sq/ft.





SECTION C: BID
For Rivercrest Public Schools Stadium Project

Company _____ **AR License #** _____

Name/Address _____

Phone/fax/email _____

Representative: _____ **Signature:** _____

Pursuant to and in compliance with Bidding Documents, applicable trade package scopes and the proposed Contract Documents, including Addenda _____, I hereby propose and agree to furnish material and labor to construct this project work as set forth in summary of work, for the Rivercrest High School Stadium Field in strict accordance with the Contract Documents for the sum of:

Time duration per project for **this** scope of work is _____ working days.

Scopes may be awarded individually or packaged together depending on pricing and contractor abilities. **Successful bidder must submit a schedule within three business days delineating duration of work as well as lead times for material and equipment. Please provide the cost for the Performance & Payment Bond and applicable taxes included in your BID.**

I further agree to perform the work if required for addition to the Contract Sum at the following unit prices, (if applicable) which include all expenses, including overhead and profit:

1. Undercutting per CU. YD. \$ _____

2. Fill and Compaction per CU. YD \$ _____

Installation of owner provided 7'x10' Legacy 1-36 sideline Logos: \$ _____ Each

Installation of owner provided 28'x12' Field A/B Naming Logos \$ _____ Each

Trade package#1- Demo/Site/Excavation: _____ Dollars(\$ _____)

Trade package#2- Concrete: _____ Dollars(\$ _____)

Trade package#3- Masonry _____ Dollars(\$ _____)

Trade package#4- Field Base Drainage _____ Dollars(\$ _____)

Trade package#5- Synthetic Turf _____ Dollars(\$ _____)

Trade package#6- Rock&Asphalt Track Base _____ Dollars(\$ _____)

Trade package#7- Track Surface _____ Dollars(\$ _____)

Trade package#8- Bleachers & Pressbox _____ Dollars(\$ _____)

Trade package#9- Site Electrical System _____ Dollars(\$ _____)

Trade package#10- Stadium Lights Metal Halide _____ Dollars(\$ _____)

LED _____ Dollars(\$ _____)

Trade package#11- Fencing _____ Dollars(\$ _____)

Trade package#12- Sound System _____ Dollars(\$ _____)

Trade package#13- Combination of #1 - #12 _____ Dollars(\$ _____)

Trade pkg#14- Choice Combination of _____, _____ Dollars(\$ _____)

Trade pkg#15-Choice Combination of _____, _____ Dollars(\$ _____)

TIME SCHEDULE

Completion Time: Work shall begin after July 28, 2017, and should be ready for synthetic turf contractor no later than **10/15/17**. Turf installation shall take no more than **21 calendar days**. Expected Final Completion date for the Project is prior to **11/31/17**. Any excessive weather delays logged will be left up to the discretion of the Owner's Representative. Track running surface will be installed as soon as possible after the completion of the field and 21 day cure time of asphalt.

In submitting this proposal, it is understood that the right is reserved by the Owner to reject any or all proposals. No bid shall be withdrawn for a period of time not to exceed thirty (30) days subsequent to the opening of the Bids, without the consent of the owner. The owner intends to move forward with this project within 7-10 days of reviewing the Bids.

Bidder Assurances and Disclosure **
School District Bid
(Enclose in Bid envelope)

Name of School District: Rivercrest Public Schools, Wilson, Arkansas

Bid Description: Stadium Project

Bid Opening Date: 7/21/17

Assurances:

I, _____ hereby state:

1. I am the duly authorized agent of _____, the bidder submitting the competitive bid which is attached to this statement, for the purpose of certifying the facts pertaining to the existence of collusion among and between bidders and school district officials, as well as facts pertaining to the giving or offering of things of value to school district personnel in return for special consideration in the awarding of any contract pursuant to the bid to which this statement is attached.
2. I am fully aware of the facts and circumstances surrounding the making of the bid to which this statement is attached and have been personally and directly involved in the proceedings leading to the submission of the bid.
3. Neither the bidder nor anyone subject to the bidder's direction or control has been a party:
 - a. To any collusion among bidders in restraint of freedom of competition by agreement to bid at a fixed price or to refrain from bidding;
 - b. To any collusion with any school district official or employee as to quantity, quality or price in the prospective contract, or as to any other terms of the prospective contract; or
 - c. In any discussions between bidders and any school district official concerning exchange of money or other thing of value for special consideration in the awarding of a contract.
4. I hereby guarantee that the specifications outlined in the bid shall be followed as specified and that deviations from the specifications shall occur only as part of a formal change process approved by the Board of Directors of the school district.

Disclosure:

1. Does any school board member or employee of the school district have a financial interest in your business or hold a position as officer, director, trustee, partner, or other top level management? _____ Yes _____ No
2. Does any school board member or employee of the school district have a family relationship with anyone employed by your business? _____ Yes _____ No

(If the answer is yes to either of the above questions, provide details in a separate attachment to this form.)

Did you or your company assist the school district or any agent of the school district with the development of the bid specifications? _____Yes _____No

If yes:

- a. Were you or your company compensated? _____Yes _____No
- b. Is your company's name or identity included anywhere within the specifications? _____Yes
_____No
- c. Were you offered any preferential treatment in the pre-bid process?
_____Yes _____No

Signature

Date

Name

Title

Company

Subscribed and sworn to before me this _____day of _____, 2017

Notary Public

**** Enclose in your Bid envelope with bid**

Evaluation Process

Rivercrest School District RFP process for the construction of the synthetic turf field will include an evaluation component. After the conclusion of the BID openings, an evaluation committee will grade and evaluate the vendors based on the following criteria. This evaluation will provide the basis for a more complete assessment of the Turf and Base companies. We encourage companies to present 1 (one) informational binder for the appropriate scope of work, that provides the following information in the order shown below. Those companies that are presenting bids for base and turf, will be graded separately as well as combined.

Synthetic Turf Companies

VIABILITY	Total Points 25	
Business Tenure/Resources		20%
Customer References		20%
Athletic Field Experience		40%
Post Installation Support		10%
Meets Timeframe for Completion (Include: Construction Sequence Schedule, as specified in RFP)		10%
SUBMITTALS	Total Points 20	
Evidence of 3 Warranties		25%
Meets Turf Specifications		60%
Mission Statement / Customer Focus		15%
TURF EVALUATION SAMPLES	Total Points 15	
Rubber Infill Sample		20%
Raw Turf Sample		30%
Turf Sample with Infill		50%
PROJECT PROPOSAL/PRICE	Total Points 40	
RFP Bid Price / Lease Purchase Option		70%
Base Construction Partner (15% if applicable)		15%
Turf Manufacturer/Installation Crew (30% if no Base Partner)		15%
SCORE		
Total Points Possible	100.00	

Base Construction Companies

VIABILITY	Total Points 40	
Business Tenure / Location		10%
Base Building Experience		20%
Customer References		20%
Meets Timeframe for Completion (Include: Construction Sequence Schedule, as specified in RFP)		40%
RFP SUBMITTALS	Total Points 30	
Equipment Resources		30%
Post Installation Support		20%
Mission Statement / Customer Focus		20%
Portfolio of Projects		20%
Testimonials		10%
PROJECT PROPOSAL/PRICE	Total Points 30	
RFP Price/Lease Purchase Option (100% if no Turf Partner)		80%
Turf Construction Partner (20% if applicable)		20%
SCORE		
Total Points Possible	100.00	

INSTRUCTIONS TO BIDDERS

1. Securing Documents:

Inquiries for electronic BID documents, information regarding scope of work, Bid submission requirements or other specification concerns may be directed to the Owner's Representative: Mr. Tim Cowan @ tim@athleticsurfacesplus.com or at: 901-494-4440

2. General Instructions, Terms and Conditions:

a. These General Instructions, Terms and Conditions and any special terms and conditions become part of any contract entered into in the event any part or the entire bid is accepted by The Rivercrest Public Schools.

3. Definitions:

a. All definitions set forth in the General Conditions of the Contract for Construction, AIA Document A201, are applicable to these Instructions to Bidders.

b. Bidding documents include the advertisement or invitation to bid, execution of the contract which modify or interpret the bidding documents, including drawings and specifications, by addition, deletions, clarifications or corrections. Addenda will become part of the Contract Documents when the construction contract is executed.

c. The words vendor, bidder, offerer, company, proposer and contractor may be used synonymously in this document.

d. The terms "District", "Owner" or Owner's Representative are used interchangeably and refer to the Rivercrest School District.

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

4. Examination of Drawings, Specifications, and Site of Work:

a. Before submitting a bid, each bidder shall carefully examine the Drawings, read the Specifications and all other proposed Contract Documents, and visit the site of the Work. Each Bidder shall fully inform himself prior to bidding as to all existing conditions and limitations under which the Work is to be performed, and he shall include in his bid a sum to cover all costs of all items necessary to perform the Work as set forth in the proposed Contract Documents. No allowance will be made to any bidder because of lack of such examination or knowledge. The submission of a bid will be construed as conclusive evidence that the bidder has made such examination.

b. Should the bidder find discrepancies in, or omissions from the drawings, or other bidding documents, or should he be in doubt as to their meaning, he should at once, notify the owner, who will send a written addendum to all bidders. The Owner will not be responsible for any oral instructions. Any addenda issued during the time of bidding are to be covered in the proposal and in closing a contract; they will become a part thereof.

5. Bidding Procedures:

a. Bids shall be made upon the bid form issued by the Owner. The signature of the individual authorized to bind the bidder shall be in longhand; no oral, telegraphic or telephonic proposals will be considered, but modifications by telegraph or fax of bid already submitted will be considered if received prior to the hour set for opening.

b. Bids shall also include "Bidder Assurances and Disclosure" form contained in this document. Failure to include the "Bidder Assurances and Disclosure" form may result in disqualification.

c. Bids, including "Bidder Assurances and Disclosure" form, must be signed by an individual authorized to bind the bidder. The person signing the bid should show title or authority to bind his/her firm to a contract. Signature must be in ink. Failure to sign the bid may result in disqualification. Bid must be completed in ink or typed. "Bidder Assurances and Disclosure" form must be notarized.

d. Bids shall be addressed to and mailed to the Owner at the address shown on the Bid form or delivered to the place designated for opening of bids before the time for opening the bids as set forth in the Notice to Bidders, enclosed in a sealed envelope, addressed as stated above, marked "Bid" and bearing the title of work and the name and address of the bidder.

e. Bids received prior to the time of opening will be kept, unopened. No bid received after the hour set for their opening, will be considered, except that when a bid arrives by mail after the time fixed for opening, but before the award is made, and is shown to the satisfaction of the Owner that the non-arrival on time was due solely to delay in the mails, a fault for which the bidder was not responsible, such bids will be received and considered. No responsibility will be assumed by any person for the premature opening of a bid not properly addressed and identified.

f. In case of a difference in written words and figures the amount in written words shall govern.

6. Bid Bond:

a. Bids must be accompanied by a Bidder's Bond in an amount equal to 5% of Bid, executed by a surety company approved by the Owner, and authorized to do business in the State of Arkansas. The Bidder may furnish a cashier's check, in an amount equal to 5% of Bid, drawn on National Bank or a Bank having a membership in the Federal Reserve System and signed by the President or Cashier, in lieu of bond. The successful bidder's security will be retained until he has signed the Contract and furnished the required Labor and Materials Payment and Performance Bond of 10% of total bid. The Owner reserves the right to retain the security of the next lowest bidder until the lowest bidder enters into contract or until 60 days after bid opening, whichever is shorter. All other bid security will be returned as soon as practicable. If any bidder refuses to enter into a contract, the Owner will retain his bid security as liquidated damages but not as a penalty.

7. Wage Requirements:

a. Contractors attention is called to the fact that the wage rates for laborers and mechanics engaged in the construction of the project will be not less than required in full compliance with any state minimum wage law that may be applicable.

8. Construction time:

The Agreement will include a stipulation that the Work be completed in a period of time established in the Bid Form. Work shall begin after **7/28/17**. Expected Final Completion date for the Stadium Project is prior to **11/31/17**. Contractors will be expected to complete work within the time period contracted. Any excessive weather delays logged will be left up to the discretion of the Owner's Representative. Contractor may be subject to liquidated damages in the amount of \$250 per day for each day after the time allowed.

9. Substitutions:

a. Where a definite material is specified, it is not the intent to discriminate against any "approved equal" product of another manufacturer. It is the intent to set a definite standard.

b. Open competition is expected, but in all cases, complete data must be submitted for comparison and test when required by the Owner.

c. The materials, products and equipment described in the Bidding documents establish a standard of required function, dimension, appearance and quality to be met by any proposed substitution.

d. No substitution will be considered prior to receipt of Bids unless written request for approval has been received by the Owner at least ten days prior to the date for receipt of Bids. Such requests shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitution including drawings, performance and test data, and other information necessary for an evaluation. Information shall be submitted in a format that compares the proposed product in a direct comparison to the specified product; line number to line number in specifications. A statement setting forth changes in other materials, equipment or other portion of the Work including changes in the work of other contracts that incorporation of the proposed substitution would require shall be included. The burden of proof of the merit of the proposed substitution is upon the proposer. The Owner's decision of approval or disapproval of a proposed substitution shall be final.

e. If the Owner approves a proposed substitution prior to receipt of Bids, such approval will be set forth in an Addendum. Bidders shall not rely upon approvals made in any other manner.

f. No substitutions will be considered after the Contract award unless specifically provided in the Contract documents.

g. No substitution shall be made unless authorized in writing, by the Owner.

h. All bidders shall base their proposals on the material or specialty specified. Any proposal for substitution shall be submitted within 10 days after the award of the contract.

i. Should a substitution be accepted and should the substitute material prove defective or otherwise unsatisfactory for the service intended within the guaranty period, the Contractor shall replace this material or equipment with that which was originally specified, without cost to the Owner.

10. Conflict of Interest:

a. By submitting a bid, the Contractor represents and warrants that no director, board member or employee of the District is in any manner interested directly or indirectly in the bid or contract which may result from the bid or in any of the expected profits which might arise there from; further, that no attempt has been made to influence or gain favorable advantage by communicating directly or indirectly with any official of the School District. It is understood that any action taken which might tend to degrade the integrity of the competitive bidding process will be considered as grounds for disqualification or a breach of this contract.

11. Qualifications of bidders:

a. The bidder will not be acceptable if he is engaged on any other work which impairs his ability to finance this contract or provide proper equipment for the proper execution of same.

b. The bidder must be prepared to furnish a performance bond and labor & material payment bond in accordance with the Contract Documents written by a surety company authorized to do business in the State of Arkansas.

c. Contractor shall name any sub-bidder whose bid he proposes to use. In determining the responsibility of the low bidder, the following will be considered; whether the sub-contractor has:

- State contractor's license.
- Permanent place of business.
- Experienced job superintendent available.
- Adequate equipment.
- Financial ability to perform contract.
- Had appropriate experience.

12. Rejection of bids:

a. The Bidder acknowledges the right of the School District to reject any or all bids and to waive any informality or irregularity in any bid received. In addition, the Bidder recognizes the right of the School District to reject a bid if the Bidder failed to furnish any required bid security, or to submit the data required by the bidding documents, or if the bid is in any way incomplete or irregular. The School District may reject any and all bids and may reject a bid of any party who has failed to perform, been unfaithful and/or delinquent in any former relationship with the School District. The School District shall be the sole judge as to which bid is best and, in determining that fact, may consider the contractor's business integrity, financial resources, experience, facilities and/or capacity for performing the work. The School District also reserves the right to further evaluate and grade bidders based on criteria other than price. Such evaluation as implemented would include: Business tenure, customer relations, references, submittal accuracy, construction partners, as well as others.

13. Submission of post-bid information:

a. Upon receipt of written notice of the acceptance of his bid, the successful Contractor shall execute a contract, in accordance with good and sufficient surety or sureties, within ten (10) calendar days after the prescribed forms are presented for signature. Required bond and insurance documents shall be furnished with the executed contract.

b. Within seven (7) days after execution of the contract, the Contractor shall furnish to the owner; a statement of costs for each major item or the work included in his bid and a list of the subcontractor's proposed for the principal portions of the work. The bidder will be required to establish to the satisfaction of the Owner the reliability and responsibility of the proposed subcontractors to furnish and perform the required work.

c. The Contractor will be required to keep an accurate accounting of all labor and materials entering into the job. It will be required that this be brought up to date each week.

14. Assignments:

Neither this contract nor any interest therein nor claim there under may or shall be assigned or transferred by the Contractor except as expressly authorized in writing by the School District. No contract, subcontract or agreement shall be made by the Contractor with any other party for furnishing any of the product, work or services herein contracted without the written approval of the School District.

15. Contract Changes:

In no event shall any understanding or agreement, contract modification, change order or other matter which would constitute a deviation from the terms of this contract be effective or binding upon the School District unless expressly stated and agreed to in writing executed by the School District official possessing contractual authority for said district.

16. Contract Guidelines:

Bidders agree that a contract does not become effective until it is awarded and a written agreement, purchase order, award letter, or other notice to proceed is executed or issued by the School District.

17. Non-Collusive Affidavit:

By submitting a bid, the company and the individual personally signing the bid represent and warrant that such bid is genuine and is neither collusive nor made for or on behalf of any person not named, and that he has neither induced nor solicited any other company to place a sham bid nor directly or indirectly caused another company to refrain from or be unable to present a bid.

18. Insurance Requirements

The Contractor and subcontractor(s) shall maintain the following insurance:

- a) Workmen’s Compensation and Employer’s Liability Insurance affording: Protection under the Workmen’s Compensation Law of the states in which the work is performed; and Employer’s liability protection subject to a minimum limit of \$100,000.
- b) Comprehensive General Liability Insurance in amounts not less than: Personal Injury \$1,000,000 per person, and Property Damage \$1,000,000 per occurrence.
- c) Comprehensive Automobile liability Insurance in the following minimum amounts: Bodily Injury of \$1,000,000 per person and \$1,000,000 per occurrence. Property Damage \$1,000,000 per occurrence.

19. Penalty for Collusion:

If at any time it shall be found that the person, firm or corporation to whom a contract has been awarded has, in presenting any bid, colluded with any other part or parties, then, in the sole discretion of the District, the contract so awarded shall be null and void or considered breached and the contractor shall be liable to the District for any and all loss and damage of whatsoever nature, which the District may suffer and the District may seek a new contractor.

20. Non-Discrimination:

The company shall not discriminate against, or segregate, a person or a group of persons on account of race, color, creed, religion, sex, sexual orientation, marital status, familial status, national origin, ancestry, disability or condition of acquired immune deficiency syndrome (AIDS) or AIDS-related complex in carrying out its duties and obligations pursuant to this agreement nor shall the company or any person claiming under or through the company establish or permit any such practice or practices of discrimination or segregation. The company must include in any and all subcontracts a provision similar to the proceeding.

21. Proprietary Information:

All information submitted in response to this bid is public after the bid opening. The bidder should not include as a part of the response to the invitation to bid any information which the bidder believes to be a trade secret or otherwise privileged or confidential. If the bidder wishes to include such material with a bid, then the material should be supplied under separate cover and identified as confidential. The District does not warrant or agree to, but will endeavor to, keep that information confidential. Contractor acknowledges that information in the possession of the District may be subject to the provisions of the Arkansas Freedom of Information Act.

22. Reservations:

The RFP does not commit the District to award a contract, to pay any costs incurred in the preparation of a bid in response to the invitation, or to procure or contract for services or supplies. The District reserves the right to accept, or reject, in part or its entirety, any bid received as a result of the RFP, it is in the best interest of the District to do so.

23. Severability:

The finding or determination of any part or parts of the General Instructions, Terms and Conditions is void, unenforceable, invalid or voidable shall result in only that part being stricken with the remainder to continue in full force and effect.

24. Withdrawal of Bid: A bid may be withdrawn before the expiration of the time during which bids may be submitted, without prejudice, by submitting a written request for its withdrawal to the owner.

25. Payment Retainage: Payment retainage will be 5% throughout the project.

(end of section)

Section D-1 Demolition, Sitework, and Excavation

GENERAL SITE WORK REQUIREMENTS

Sub-section 02 001: GENERAL SITE WORK REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

- A. Includes but not limited to:
1. General Procedures and requirements for Site Work.
 2. Due to low consistency soil materials encountered near the surface of the site, specialized construction techniques may need to be implemented to avoid disturbance of the existing subgrade soils. The use of low ground pressure equipment should be considered.
 3. Strip, remove topsoil and subsoils (approximately 1') to 3' minimum elevation below proposed finished subgrade, see grading plans and cross sections.
 4. Uniformly grade/spread the excavated topsoil and subsoils to 6" depth, east and northeast of the stadium site in the waste area identified in plans.
 5. After stripping and grading but prior to installation of the geotextile liner and any fill placement, the site shall be carefully evaluated by the geotechnical engineer. If soft, saturated, or unstable subsoils are encountered, some localized undercut maybe necessary to provide stable subgrade upon which to install an impermeable liner and place structural fill. Undercutting and backfill, if required, will be paid at the bid unit price for each.
 6. The existing site subsoils are fat clays with high Plasticity Index. In an attempt to trap and maintain the moisture content of the soils in its current state and prevent volumetric changes in the soil, an impermeable geotextile liner is to be immediately installed upon completion of the initial site grading/stripping. Should the geotextile liner not be installed immediately after stripping and grading, the subgrade should be moisture conditioned, as necessary per the geotechnical engineer, prior to liner installation. The liner shall extend 5 feet outside the boundaries of the planned construction improvements. The geotextile liner shall be a 20 mil PVC impermeable liner with solvent welded seams. The liner shall be installed in strict conformance with the manufacturer's recommendation.
 7. Structural fill material shall be placed in lifts, moisture conditioned, and compacted. The total height of structural fill required to achieve final subgrade is approximately 3'. Upon completion of the structural fill placement, the subgrade shall be proofrolled with a heavy (40,000 lb. minimum), rubber-tired vehicle, observed by the geotechnical engineer.

Should an area be exposed to any precipitation during construction, and/or have been exposed for more than 48 hours, the area shall be proofrolled.

Due to the use of an impermeable geotextile liner, special care should be taken when placing structural fill. The Contractor shall devise and submit to the Engineer, a plan to place structural fill while protecting the liner. The Contractor should consider placing fill material on a corner of the impermeable liner and working on top of the fill material, spreading and thickening the fill as they progress instead of placing single lifts across the entire site. This will reduce the risk of tearing or damaging the impermeable liner by vibrations and punctures from working heavy equipment over a thin layer of fill material. The Contractor should consider using low ground pressure equipment during fill placement to aid in the protection of the liner.

8. Upon completion of the structural fill placement and final grading of the site, the Contractor shall place a non-woven geotextile over all areas outside the track that are to receive concrete paving.
9. Following placement of the non-woven geotextile the Contractor is to place, compact, and final grade 6" of SB2 road base material over the non-woven geotextile.

1.2 REFERENCES – Not Used

1.3 SUBMITTALS – Not Used

1.4 PRODUCT HANDLING – Not Used

1.5 QUALITY ASSURANCE

Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this section.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

Examine the areas and conditions under which work of this section will be performed. Correct conditions which are detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

3.2 PREPARATION

- A. Protection
 1. Spillage -
 - a. Avoid spillage by covering and securing loads when hauling on or adjacent to public streets or highways.

- b. Remove spillage and sweep, wash, or otherwise clean project, streets, and highways.
 - 2. Dust Control -
 - a. Take precautions necessary to prevent dust nuisance, both on- site and adjacent to public and private properties.
 - b. Correct or repair damage caused by dust.
 - 3. Erosion Control -
 - a. Take precautions necessary to prevent erosion and transportation of soil downstream, to adjacent properties, and into on-site or off-site drainage systems.
 - b. Develop, install and maintain an erosion control plan if required by law.
 - c. Repair and correct damage caused by erosion.
- B. If specified precautions are not taken or corrections and repairs made promptly, Owner may take such steps as may be deemed necessary and deduct costs of such from monies due to Contractor. Such action or lack of action on Owner's part does not relieve Contractor from responsibility for proper protection of Work.

3.3 REPAIR / RESTORATION

- A. Adjust existing covers, boxes and vaults to grade.
- B. Replace broken or damaged covers, boxes and vaults.
- C. Independently confirm size, location and number of covers, boxes and vaults, which require adjustments.

3.4 FIELD QUALITY CONTROL

- A. If work has been interrupted by weather, scheduling or other reason, notify Engineer, 24 hours minimum, prior to intended resumption of grading.
- B. Owner reserves right to require additional testing to re-affirm suitability of completed work, including compacted soils, which have been exposed to adverse weather conditions.

END SUB-SECTION 02 001

Sub-Section 02 110: SITE CLEARING

PART 1 GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To:
 - Prepare site for grading and structure excavation as described in Contract Documents

Including:

- a. Remove trees
- b. Excavate and dispose of buried debris
- c. Strip and remove vegetative layer
- d. Strip existing topsoil
- e. Excavate and dispose of asphaltic concrete track and base
- f. Excavate and dispose of Concrete track appurtenances

B. Related Sections

1. Section 02 001 - General Site work Requirements
2. Section 02 212 - Finish Grading

1.2 REFERENCES – Not Used

1.3 SUBMITTALS – Not Used

1.4 PRODUCT HANDLING – Not Used

1.5 QUALITY ASSURANCE

Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and methods needed for proper performance of the work of this section.

PART 2 PRODUCTS - Not used

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

Examine the areas and conditions under which the work of this section will be performed. Correct conditions which are detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

3.2 EXAMINATION

- A. Examine site to determine type of problems to be encountered.
- B. Locate benchmarks, monuments and other reference points for elevations and locations. Notify Engineer of apparent discrepancies in indicated locations. Do not proceed with construction work until reference points have been approved.

3.3 PREPARATION

- A. Protection
 1. Protect tops, trunks and roots of existing trees on site, which are intended to remain. Do not use heavy equipment within branch spread. Interfering branches may be removed only with permission of Engineer.

2. Protect plants and features, which are to remain.
 3. Do not expose or damage roots of trees or plants to remain.
- B. Grubbing
1. Grub out stumps and roots 12 inches minimum below original ground surface, except as follows:
 - a. Under building, remove roots one inch and larger entirely.
 - b. Entirely remove roots of plants, which normally sprout from roots, as identified by Engineer.
- C. Striping
1. Strip existing topsoil from areas of site to be improved.
 - a. Existing topsoil is property of Contractor with the restriction that topsoil is to be used for Project fill and backfill.
 - b. After Project fill and backfill topsoil requirements are satisfied, remove excess existing topsoil from site. Do not remove existing topsoil from site without Engineer's approval.

3.4 CLEANING

- A. Remove from site trees, vegetative layer and surface debris and dispose of legally.
- B. Do not bury stumps, roots and other vegetative matter or burnt waste material on site.

3.5 LAYOUT

- A. Verify locations of vertical and horizontal reference points. Accurately locate improvements in accordance with Contract drawings.
- B. Erect batter boards and set grade stakes securely to remain in place as necessary.
- C. Notify Engineer when lay-out is substantially completed. Do not proceed with construction until lay-out has been approved.

END SUB-SECTION 02 110

Sub-Section 02 211: ROUGH GRADING PART 1 GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To
 1. Perform rough grading work required to prepare site for construction as described in Contract Documents.

- B. Related Sections
 - 1. Section 02 001 - General Sitework Requirements

1.2 REFERENCES – Not Used

1.3 SUBMITTALS – Not Used

1.4 PRODUCT HANDLING – Not Used

1.5 QUALITY ASSURANCE

Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts who are completely familiar with the specified requirements and methods needed for proper performance of the work of this section.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

Examine the areas and conditions under which work of this section will be performed. Correct conditions which are detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

3.2 EXAMINATION

- A. Carefully examine site with Engineer prior to beginning of work of this Section to pre-plan procedures for making cuts, placing fills, and other necessary work.
- B. Before making cuts, determine areas needing fill and organize to most efficiently place fill.

3.3 PREPARATION

- A. Protect trunks and roots of existing trees on site which are intended to remain in accordance with Section 02-110.
- B. If necessary before making cuts, remove topsoil over areas to be cut and filled not previously removed by stripping as specified in other Sections and stockpile in suitable area.

3.4 PERFORMANCE

- A. Site Tolerances
 - 1. Maximum variation from indicated grades shall be 1/10 of one foot.
 - 2. Make proper allowance for final finish grades.
- B. Compact fills as specified in Section 02 220.

- C. If soft spots, water, or other unusual excavating conditions are encountered, stop work and notify Engineer.

END SUB-SECTION 02 211

Sub-Section 02 220: EXCAVATING, BACKFILLING, & COMPACTING

PART 1 GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To:
1. Perform Project excavating, trenching, backfilling, and compacting, except as specified below.
 2. Procedure and quality for excavating, trenching, backfilling, and compacting performed under other Sections unless specifically specified otherwise.
- B. Related Sections
1. Section 02 001 - General Sitework Requirements
 2. Section 02 110 - Topsoil stripping
 3. Performance of excavating, backfilling, and compacting required for electrical and other work is responsibility of respective Trade doing work unless arranged differently by Contractor.

1.2 REFERENCES

American Society For Testing And Materials

1. ASTM D 1557-91, "Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort"
2. ASTM D 2216-90, "Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock"
3. ASTM D 2487-93, "Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System)"
4. ASTM D 2922-91, "Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)"
5. ASTM D 3017-88, "Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)"

1.3 SUBMITTALS – Not Used

1.4 PRODUCT HANDLING – Not Used

1.5 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this section.

- B. Testing
 - 1. Density Tests shall be made of each lift of fill material.
 - 2. Tests shall be made by a testing laboratory approved by Engineer.
 - 3. Minimum number of tests required for compaction of existing sub-grade and each compacted fill lift shall be as follows:
 - a. Three (3) tests for the first 10,000 s.f. of surface area of compacted area and one (1) additional test for each additional 10,000 s.f. of compacted area.
 - 4. Testing laboratory shall provide a written report stating compliance with specified compaction.
 - 5. All initial costs of testing shall be paid by Owner. Re-testing as the result of failure of initial testing shall be paid for by the Contractor.

1.6 DEFINITIONS

- A. Relative Compaction = Ratio of field dry density as determined by ASTM D 2922 and ASTM D 3017 or 2216, and laboratory maximum dry density as determined by ASTM D 698 or 1557.

1.7 PROJECT/SITE CONDITIONS

- A. If existing utility lines not described are encountered, contact Engineer before proceeding.

1.8 SEQUENCING

- A. Before backfilling, show utility and service lines being covered on record set of Drawings. Do not backfill until utilities involved have been tested and approved by Engineer.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Backfill
 - 1. Well grade material free from debris, organic material, frozen materials, brick, line, concrete and other materials which would prevent performance of backfill.
 - 2. Fill shall conform to ASTM 2487 soil classification groups GW, GP, GC, GM, SW, SP, SC, CL, SM or shale fragment fill.
 - a. Fill more than 24 inches below finish grade may not contain stones over 6 inches diameter and 90 percent minimum of fill shall be smaller than 1-1/2 inch in any direction.

- b. Fill less than 24 inches below finish grade may contain no stones larger than 1-1/2 inches in any direction.
- 3. Imported select fill should consist of low plasticity sandy clay, clayey sand or gravely clay with a maximum plasticity index (PI) of 20.
- 4. Liquid limit no greater than 40.
- 5. No greater than 70% passing No. 200 sieve.
- 6. Two possible sources of select backfill material and hauling have been identified. The Contactor is not required to utilize this material and may utilize other sources. All select backfill material must conform to the requirements of the specifications.
 - A. James "Crab" Watson, 870.281.5484. Borrow Pit located in Bassett, AR approximately 10 miles from the site.
 - B. Keith Harris, 870.740.2830. Borrow Pit located in Bassett, AR approximately 12 mile from site.

B. Impermeable Liner

1. The liner shall be a 20 mil (minimum thickness) PVC Impermeable Liner utilizing solvent welded seams, shall be manufactured to keep the number of seams to a minimum, and meet or exceed the following characteristics:
 - Thickness ± 5% ASTM D-5199 .020"
 - Specific Gravity (min) ASTM D-792 1.20
 - Tensile (lb/in-width, min) ASTM D-882 48
 - Elongation at Break (% min) ASTM D-882 360
 - Modulus (lb/in-width, min) ASTM D-882 20
 - Tear Resistance (lb/in, min) ASTM D-1004 6
 - Resistance to Soil Burial ASTM G-160 (% change, max)
 1. Breaking Factor 5
 2. Elongation At Break 20
 3. Modulus at 100% Elongation 20
 - Impact Cold Crack (°C) ASTM D-1790 -26
 - Dimensional Stability ASTM D-1204
(% change, max) (212°F/15 min.) 4
 - Water Extraction (% max) ASTM D-1239 0.15
 - Volatile Loss (% max) ASTM D-1203(A) 0.90
 - Hydrostatic Resistance ASTM D-751(A) 68 (psi, min)
 - Plasticizer Min Ave Molec Wt ASTM 2124 400

Factory Fabricated Seams:

 - Peel Strength (lbs/in, min) ASTM D-7408 12.5
 - Shear Strength (lbs/in, min) ASTM D-7408 38.4
2. The liner shall be fabricated by EPI and is distributed through Carthage Mills 4243 Hunt Rd. Cincinnati, OH. www.cathagemills.com Phone: 800.543.4430.
3. Substitutions may be considered and must be approved by the Engineer. Submittals should include all necessary properties and specifications and

shall be provided to the Engineer no later than 7 days prior to the Bid Date.

C. Non-woven Geotextile

1. The non-woven geotextile shall be Carthage Mills FX-45HS, or Engineer approved equal, and meet or exceed the following characteristics:

• Thickness ± 5%	ASTM D-5199	38 mils
• Grab Tensile	ASTM D-4632	120 lbs
• Trapezoidal Tear	ASTM D-4533	50 lbs
• CBR Puncture	ASTM D-6241	310 lbs
• Permittivity	ASTM D-4491	1.70 sec ⁻¹
• Water Flow Rate	ASTM D-4491	120 gpm/ft ²
• Apparent Opening Size	ASTM D-4751	70 US Std, Sieve
• Mass	ASTM D-5261	4.5 oz/yd ²

2. Substitutions may be considered and must be approved by the Engineer. Submittals should include all necessary properties and specifications and shall be provided to the Engineer no later than 7 days prior to the Bid Date.

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

Examine the areas and conditions under which work of this section will be performed. Correct conditions which are detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

3.2 EXAMINATION

Carefully examine site and available information to determine type of soil to be encountered. Discuss potential problems with Engineer before proceeding with work.

3.3 PERFORMANCE

A. Excavating (Earth)

1. Building Footings & Foundations

- a. Excavate as necessary for proper placement and forming of footings and foundations. Bottoms to be level, clean and clear of loose material.
- b. Bottom of excavations to receive footings for all columns and rigid frames shall be a minimum of 2'-6" into undisturbed soil. All other footings to be at depth as indicated on Foundation Plan.
- c. Excavation Carried Deeper Than Required -

- 1) Under Footings - Fill with concrete specified for footings.
- 2) Under Slabs - Use specified compacted backfill material.
2. Pavement & Concrete Site Elements -
 - a. Excavate as necessary for proper placement and forming of concrete site elements and pavement structure. Remove vegetation and deleterious material and remove from site.
 - b. Backfill over excavated areas with compacted base material specified in Section 02 500.
 - c. Remove and replace exposed material which becomes soft or unstable.
3. Site Utility Trenches -
 - a. Excavate to proper alignment, depth, and grade.
 - b. Excavate to sufficient width to allow adequate space for proper installation and inspection of site utility.
 - c. Backfill over-excavated areas with compacted native material.
4. If unusual excavating conditions are encountered, stop work and notify Engineer.
5. Dewatering -
 - a. Prevent surface water and sub-surfaces or ground water from flowing into excavations, flooding project site and surrounding area. All grading shall be performed so that surface run-off is directed away from construction area.
 - b. Do not allow water to accumulate in excavations. Remove water from excavations to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of sub-grades and foundations. Provide and maintain pumps, sumps, suction and discharge lines and other de-watering system components necessary to convey water away from excavations.
 - c. Convey water removed from excavations and rainwater to collecting or run-off areas. Provide and maintain temporary drainage ditches and other diversions outside excavation limits for each structure. Do not use trench excavations for site utilities as temporary drainage ditches.

B. Excavating (Rock)

1. Material to be excavated is assumed to be earth and materials that can be removed by power shovel, bulldozer or other equipment normal to excavation work, but not requiring use of explosives or drills. If rock is encountered within limits of excavation, "Contract Price" will be adjusted. When rock is encountered, immediately notify Engineer and do not proceed further until instructions are given and measurement made for purpose of establishing volume of rock excavation.
2. Rock is defined as stone or hard shale in original ledge, boulders over 1/2 cubic yard in volume, masonry or concrete that cannot be broken and removed by normal job equipment (power shovel 1/2 yard capacity, scoops, bulldozers) without use of explosives or drills.
3. Explosives shall be stored, handled and used in accordance with local regulations and "Manual of Accident Prevention in Construction" of Associated General Contractors of America, Inc. Any damage to

foundations or other work caused by use of explosives shall be corrected at Contractor's expense.

- C. Backfilling
 - 1. Around Buildings & Structures - Slope grade away from building as specified in Section 02 212. Hand backfill when close to building or where damage to building might result.
- D. Compacting
 - 1. General -
 - a. Do not use puddling or jetting to consolidate fill areas.
 - b. Provide necessary types and kinds of equipment to perform operations required to obtain specified compaction.
 - c. Densities of sub-grades and fill will be determined by comparing field densities with laboratory density, at optimum moisture content.
 - 2. Sub-Grade -
 - a. Scarify existing sub-grade (minimum 8" depth) and compact.
 - b. Under Slabs, Pads, Concrete Site Elements, Asphalt Concrete Areas & Portland Cement Concrete Areas.
 - 1) Moisture condition soil to uniform moisture content to $\pm 2\%$ of optimum moisture as defined by ASTM D698, and maintain until concrete or paving is placed.
 - 2) Mechanically tamp 8 inches deep to a minimum of 98% of the maximum dry density as defined by ASTM D698.
 - 3. Fill, Base & Backfill
 - a. Under Concrete and Asphalt Areas - Place in 8 inch maximum layers, dampen (do not soak) and mechanically tamp to 95% minimum of maximum density as established by ASTM D 1557.
 - b. Under Concrete Site Elements & around Foundation Walls - Place in 8-inch maximum layers, dampen (do not soak) and mechanically tamp to density specified in Sub-Grade Section above.
 - c. Fill Slopes - Compact by rolling or using sheep foot
 - d. Backfill Under Footings - Not allowed
 - e. Other backfills - Place other fills in 12 inch layers and compact to 90% relative compaction.
- E. Moisture Control
 - 1. Surface of fill and material being placed shall be maintained within moisture content range required to permit proper compaction to specified density. Moisture content shall be controlled in following manner.
 - a. When materials deposited on fill are to dry, each layer shall be sprinkled and uniform moisture distribution shall be obtained by disking, blading or other approved methods. Amount of water applied shall be accurately controlled so that free standing water will not appear on surface.
 - b. Material deposited on fill that is to wet shall be removed or spread and permitted to dry; assisted by disking or blading until moisture content is reduced to specified limits.

- c. When top surface of a partial fill becomes too dry or too compacted to permit suitable bond with subsequent layer, loosen dried material by scarifying or disking. Then moisten loosened material to acceptable moisture content and re-compact material to specified density.
- d. Adjustments of moisture content will be made on basis of determination of moisture content by field tests as construction progresses.

3.4 UTILITIES

- A. Existing utility lines shall be protected from damage, and, if broken or damaged, shall be repaired at Contractor's expense.
- B. Active utilities shall be removed or relocated only as directed by Engineer.
- C. Inactive or abandoned utilities encountered in excavating or grading operations shall be plugged or capped at least 5 feet outside new construction areas or as directed by Engineer.

3.5 REPAIR/RESTORATION

- A. Damage to other portions of the Work due to work of this Section shall be repaired at no additional cost to Owner. On new work, damage shall be repaired by original installer.

3.6 CLEANING

- A. Debris and material not necessary for Project are property of Contractor and are to be removed prior to completion of Project. However, if material necessary for Project is hauled away, replace with specified material.

END SUB-SECTION 02 220

END SECTION D-1 Demolition, Sitework, and Excavation

Section D-2 Concrete Work

Sub-Section 02 233: GRANULAR BASE

PART 1 GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To:
 - Furnish and install granular base (drainage fill) under slabs-on-grade. As shown on drawings, and as specified for a complete and proper installation.

- B. Related Section
 - 1. Section 02 001 - General Sitework Requirements
 - 2. Section 02 510 - Base course under asphalt concrete paving
 - 3. Section 02 521 - Granular base under concrete site elements

1.2 REFERENCES – Not Used

1.3 SUBMITTALS – Not Used

1.4 PRODUCT HANDLING – Not Used

1.5 QUALITY ASSURANCE

Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work in this section.

PART 2 PRODUCTS

2.1 GRANULAR BASE

Crushed Stone Base: Comply with AHTD class 7 material requirements/for County road base materials as approved by the engineer

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

Examine the areas and conditions under which work in this section will be performed. Correct conditions which are detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

3.2 INSTALLATION

Install planned thickness of granular base over compacted sub-base, level and compact as specified in Section 02 220

3.3 FIELD QUALITY CONTROL

Notify Engineer two (2) days prior to installation of concrete to allow observation of granular base installation.

END SUB-SECTION 02 233

Sub-Section 02 521: CAST-IN-PLACE CONCRETE SITE ELEMENTS

PART 1 GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To
 - 1. Furnish and install granular base.
 - 2. Furnish and install following cast-in-place concrete site elements.
 - a. Sidewalks
 - b. Curbs and gutters
 - c. Concrete service slab
 - d. Other elements shown

- B. Related Sections
 - 1. Section 02 001 - General Site Requirements
 - 2. Section 02 220 - Compaction procedures and tolerances.

1.2 QUALITY ASSURANCE

Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and methods needed for proper performance of the work of this section.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Form-work - ACI Standards.
- B. Expansion Joints - W. R. Meadows Seal Tight asphalt
- C. Concrete - Meet requirements specified in Section 03 313 for exterior concrete.

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

Examine the areas and conditions under which work in this section will be performed. Correct conditions which are detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

3.2 INSTALLATION

- A. Sub-base - Compact sub-base as specified in Section 02 220.
Sub-Grade -
 - c. Scarify existing sub-grade (minimum 8" depth) and compact.
 - d. Under Slabs, Pads, Concrete Site Elements & Portland Cement Concrete Areas.
 - 1) Moisture condition soil to uniform moisture content between optimum and 4 percent over optimum, and maintain until concrete or paving is placed.
 - 2) Mechanically tamp 8 inches deep to a minimum of 95% of the maximum modified proctor (ASTM D-1557) dry density.
 - c. Under Asphalt Concrete Areas -
 - 1) Moisture condition soil to uniform moisture content between optimum and 4 percent over optimum, and maintain until concrete or paving is in place.
 - 2) Mechanically tamp 8 inches deep to a minimum of 93% of maximum modified proctor (ASTM D-1557) dry density.
- B. Joints
 - 1. Expansion & Contraction Joints
 - a. Spacing:
 - 1) Sidewalks - 20 feet on center
 - 2) Flat Drainage Structure - 24 feet on center
 - b. Install so top of expansion joint material is 1/4 inch below finished surface of concrete.
 - c. Provide expansion joint at end of walks perpendicular to and terminating at other structures.

2. Scored Control Joints
 - a. Curbs - 10 feet on center
 - b. Sidewalks - 5 feet on center
 - c. Flat Drainage Structures - 6 feet on center
 - d. Control joints shall be approximately one quarter of concrete thickness
- C. Finish
Curbs, Gutters, Sidewalks, Flat Drainage Structures
 1. Broom Finish
 2. Round edges including edges formed by expansion joints.
 3. Remove edger marks.
- D. Special requirements
Sidewalks -
 1. Thickness - 4" minimum
 2. Slope to drain
 - 1) Slope sidewalks, with transverse slope of 1:50 in direction of intended drainage.
 - 2) Slope sidewalks away from building 1:50 percent min
 3. Dusting with cement not permitted
 4. Installed welded wire fabric in all sidewalks (6x6 - W1.4/W1.4) unless otherwise shown on plans.

END SUB-SECTION 02 521

Sub-Section 03 313: NORMAL WEIGHT STRUCTURAL CONCRETE

PART 1 GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To
 1. Furnish and install concrete work as shown on drawings, as specified, and as needed for a complete and proper installation.
 2. Quality of concrete used on Project but furnished under other Sections.
- B. Related Sections
 1. Division 02 - 521 Cast-in-place concrete site elements
 2. Division 02 - 233 Granular base.

1.2 REFERENCES

- A. ACI Standards:
- B. American Society For Testing And Materials

1. ASTM C 33-90, "Specification for Concrete Aggregates"
2. ASTM C 94-90, "Specification for Ready-Mixed Concrete"
3. ASTM C 150-89, "Specification for Portland Cement"
4. ASTM C 260-86, "Specification for Air-Entraining Admixtures for Concrete"

1.3 SUBMITTALS

- A. Testing
 1. Tests shall be made of all concrete.
 2. Make test set each day concrete is placed. Make test sets of cylinders for each 100 cubic yards or fraction thereof poured at any one time.
 3. Each test shall consist of 1 slump test and 4 compression test cylinders. 1 compression test shall be made at expiration of 7 days and 2 compression tests at expiration of 28 days.
- B. Failure to meet performance requirements
 1. When compression test cylinders fail to meet requirements, Engineer may require.
 - a. Core drilling tests in accordance with ASTM C 42-64.
 - b. Load tests in accordance with ACI, Section 202
 2. Removal and replacement at no additional cost to Owner.

1.4 PRODUCT HANDLING

Comply with pertinent provisions of Specifications.

1.5 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this section.
- B. Concrete Flatwork shall be performed utilizing high quality techniques conforming to American Concrete Institute Standards provided for by ACI Publication CP-10, Concrete Flatwork Technician and Flatwork Finisher, ACI Publication CCS-1, Concrete Craftsman Series, Slabs on Grade.
- C. All concrete installation shall be performed by at least one ACI Flatwork finisher or Technician currently certified with ACI.
- D. All projects greater than 10,000 s.f. will require at least two ACI Flatwork Finishers or Technicians currently certified with ACI.
- E. Provide ACI certification documentation for all finishers who will be installing concrete prior to starting any concrete operations.

1.6 SYSTEM DESCRIPTION

- A. Performance Requirements:
Concrete strengths at 28 days -
 - 1. 3500 psi: Exterior, above or on grade concrete exposed to weather with Air Entrainment - 6% plus or minus 1%.
 - 2. 3500 psi where not specified or shown elsewhere on the plans.
 - 3. Water-Cement Ratio - 0.49 maximum by weight.

1.7 PROJECT/SITE CONDITIONS

- A. Environmental Requirements
 - 1. Cold weather concreting procedures -
 - a. No frozen materials shall be used.
 - b. Forms, reinforcement, and fillers shall be free from frost. Place no concrete on frozen ground.
 - c. For temperatures below 40° F, maintain concrete at between 60 and 80° F when placing, and 50° F minimum for five days if regular concrete, or at 50° F for three days if high early strength concrete, or longer if determined necessary by Architect.
 - d. Housing, covering, or other protection shall remain in place for 24 hours after heat is discontinued.
 - e. Use of calcium chloride is not allowed.
 - 2. Hot weather concreting procedures -
 - a. Maximum concrete temperature allowed is 90° F in hot weather.
 - b. Cool aggregate and sub-grades by sprinkling.
 - c. Avoid cement over 140° F.
 - d. Use cold mixing water. Ice may be utilized with prior approval by the Engineer.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Portland Cement - Meet requirements of ASTM C 150, Type I.
- B. Aggregates
 - 1. Coarse -
 - a. Meet requirements of ASTM C 33 or nonconforming aggregate, which by test or actual service produces concrete of required strength and conforms to local governing codes.
 - b. Aggregate shall be uniformly graded as follows -
 - 1) Flat Work - Size #67 (3/4 inch to #4 or 3/4 maximum to 1/4 inch minimum).
 - 2) All Other - Size #57 (One inch maximum to 1/4 inch minimum).
 - 2. Fine - Meet requirements of ASTM C 33.

- C. Admixtures - Except for air entraining agents specified below, use of admixtures is not allowed without written approval of Engineer. Do not use calcium chloride.
- D. Air Entraining Agents - Meet requirements of ASTM C 260, except those containing chlorides may not be used.

2.2 MIXES

- A. Submit mix designs to meet performance requirements specified.
- B. Ready mixed concrete shall be used. Mix and deliver in accordance with ASTM C-94.
- C. No water shall be added to concrete after truck leaves mixing plant; and if additional slump or workability is required, it shall be obtained by adding cement with water in same ration as used in original mix.
- D. Concrete shall not remain unplaced and in the truck longer than 1 hour. Concrete temperatures will be measured when placing each truck. Batch tickets shall accurately show mix and loading times. Any concrete remaining unplaced after 1 hour or having a temperature greater than 90° F shall not be placed or utilized on the project but removed and disposed of at Contractors expense.

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

Examine areas and conditions under which work of this section will be performed. Correct conditions which are detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

3.2 PREPARATION

- A. Inserts, bolts, boxes, templates, pipes, conduits, and other accessories shall be installed and inspected prior to placing concrete.
- B. Remove water and debris from area to be placed.

3.3 INSTALLATION

- A. Site Tolerances
 - 1. ACI Standards shall govern concrete work except where specified differently.
 - 2. Variation from plumb -
 - a. 0 to 10 feet - 1/4" maximum
 - b. 20 feet or more - 3/8" maximum
 - 3. Variation in thickness - 1/4" to 1/2" standard, 5% for footings
 - 4. Variation in grade -

- a. 0 to 10 feet - 1/4" standard, 1/8" for slabs
- b. 10 to 20 feet - 3/8" standard, 1/4" for slabs
- c. 40 feet or more - 3/4" standard, 3/8" for slabs

B. Placing

1. Convey concrete from mixer of mixing trucks by methods that will prevent separation of or loss of materials.
2. Place as soon after mixing as possible. Deposit as nearly as possible in final position. Placing of concrete shall be continuous until a panel or section is complete..
3. Compact concrete in forms by vibrating and other means where required. Thoroughly work in concrete around reinforcing bars.
4. Do not embed aluminum in concrete.
5. Do not use contaminated, deteriorated, or re-tempered concrete.
6. Avoid accumulation of hardened concrete.
7. Locate construction joints where shown on Drawings to least impair strength of completed structure.

C. Bonding Fresh and Hardened Concrete

1. Retighten forms.
2. Roughen surfaces.
3. Clean off foreign matter and Latinate.
4. Wet but do not saturate.
5. Proceed with placing new concrete.

D. Special Requirements

1. Exterior Slabs -
 - a. Dusting with cement not permitted.
 - b. For continuous placing and where shown on Drawings, saw cut one inch deep control joints before shrinkage occurs.
2. Equipment Bases - Coordinate with appropriate Sections for locations and dimensions.
3. Anchor Bolts - Place anchor bolts not tied to reinforcing steel immediately following leveling of concrete. Re-consolidate concrete around bolt immediately after placing bolt. Do not disturb bolts during finishing process.

E. Finishing

Broom Finishes, Exterior Flat-work -

1. Broom finish exterior slabs.
2. Round edges including edges formed by expansion joints.
3. Remove edger marks.

F. Curing

At contractor's option, surfaces shall receive moisture curing or liquid compound curing.

1. Moisture curing - Keep moist seven days minimum by covering with vapor barrier, well lapped and weighted.

2. Liquid compound curing - Sonneborn, Sonosil, 2 coats. Apply in accordance with manufacturer's recommendation or Engineer approved equal.

3.4 FIELD QUALITY CONTROL

Inspection - Notify Engineer 48 hours minimum prior to all placing operations.

3.5 PROTECTION

Protect concrete, which has not received its initial set from precipitation to avoid excess water in mix and unsatisfactory surface finish.

Concrete Acceptability Guidelines

CONCRETE SPECIFICATIONS FOR OUTDOOR POLYURETHANE TRACK INSTALLATIONS:

Dryness: A minimum drying time of 28 days after the concrete slab is poured shall be observed prior to the commencement of the installation of polyurethane surfacing. Moisture content of the concrete receiving surface shall be checked prior to the installation to establish adherence to dryness requirements.

Concrete Surface: The concrete surface condition shall be the responsibility of the General Contractor. The surface shall be light to medium broom finished and shall be completely free of oil, dust, dirt, paint, grease, old adhesives or other foreign substances which will interfere with the adhesion of the polyurethane to the concrete slab. Concrete, which is flaking or has spalled shall be ground to a sound surface. Absolutely no curing compounds can be applied. Expansion joints shall be level with the concrete surfacing or no more than ¼" below. The architect shall dictate expansion joint material. Control joints shall be dictated by the architect as typical for the area for a sidewalk detail for runways and as necessary for larger slabs.

- **Concrete Levels:** Variations in concrete slab levels shall not exceed 1/8" in ten feet, and any designed slab depression shall correspond with the thickness of synthetic surfacing specified by the Architect. Concrete elevations must comply with the guidelines set forth in the contract documents related to the track installation guidelines. NCAA and High School track installations have strict requirements for slope and planarity. It is the responsibility of the General Contractor to install the concrete receiving surface for any track surfacing to these requirements. Prior to commencing with any corrective work on the installed concrete receiving surfacing, the General Contractor shall obtain approval for the proposed methods by the Architect and the Surfacing Contractor. Acceptance of concrete receiving surface for adherence to surface tolerance and dryness requirements shall not be construed as acceptance of the design or construction integrity of the substrate or the work of any other trades relating to the construction of the running track. In the high jump, the maximum inclination of the approach and take off area shall not exceed 1:250 in the direction of the center of the crossbar.

END SECTION D-2 CONCRETE

Section D-3 Masonry

General Scope of Work: 6 Columns and Seat Walls at Entrance

04 100 MORTAR & GROUT

- 04 101 CEMENT & LIME MORTARS
- 04 102 STRUCTURAL GROUT

04 150 MASONRY ACCESSORIES

- 04 151 ANCHOR, TIE & JOINT CONTROL
- 04 161 HORIZONTAL JOINT REINFORCING
- 04 175 WEEP VENTS

04 200 UNIT MASONRY

- 04 211 BRICK UNIT MASONRY
- 04 220 CONCRETE UNIT MASONRY (Block)

04 400 STONE

- 04 435 CAST STONE

SECTION 04 101

CEMENT & LIME MORTARS

PART 1 GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To
 - 1. Furnish and install masonry mortar as shown on drawings as specified and as needed for a complete and proper installation.
- B. Related Sections
 - 1. Section 04 220 - Concrete Unit Masonry

1.2 REFERENCES

- A. Comply with pertinent provisions of Section 01090.

- B. American Society For Testing And Materials
 - 1. ASTM C 144-89, "Specification for Aggregates for Masonry Mortar"
 - 2. ASTM C 150-89, "Specification for Portland Cement"
 - 3. ASTM C 207-79 (1988), "Specification for Hydrated Lime for Masonry Purposes"

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01300.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01600.

1.5 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who is completely familiar with the specified requirements and the methods needed for proper performance of the work of this section.

1.6 SYSTEM DESCRIPTION

- A. Design Requirements
 - 1. Use of proprietary pre-mixed mortar such as "masonry cement" and similar products is not allowed.
 - 2. Admixtures -
 - a. Use no admixtures except for color pigments specified.
 - b. Use of any mixture to meet cold weather requirements is not allowed.
 - c. No additives are allowed for air entrainment.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Portland Cement - Meet requirements of ASTM C 150, Type I.
- B. Hydrated Lime - Meet requirements of ASTM C 207, Type S.
- C. Aggregate - Natural washed sand, meeting requirements of ASTM C 144. All passing a No. 8 sieve.
- D. Mortar Color Pigment
 - 1. High purity, chemically inert, unfading, alkali-fast mineral oxides, finely ground and especially prepared for mortar.
 - 2. Prism Mortar Co. Color as selected by Architect, if any.

2.2 MIXES

- A. Masonry in contact with Earth and All Load-Bearing Walls: Type "S". 1 part Portland Cement, 1/2 Part Lime, and 2-1/4 to 3 parts sand, by volume.
- B. Masonry in All Other Locations: Type "N". 1 Part Portland Cement, 1 Part Lime, and 2-1/4 to 3 parts sand, by volume.
- C. Color Pigment: 5 pounds per sack of cement per each of above mixes.

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine areas and conditions under which work of this section will be performed. Correct conditions which are detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

3.2 MORTAR MIXING

- A. Mixing Mortar: Mix all cementitious materials and sand in a mechanical bath mixer for a minimum of 5 minutes. Adjust the consistency of the mortar to the satisfaction of the mason but add only as much water as is compatible with convenience in using the mortar. If the mortar begins to stiffen from evaporation or from absorption of a part of the mixing water, retemper the mortar immediately by adding water and remix the mortar. All mortar shall be used within 2 ½ hours of the initial mixing. It shall be used after it has begun to set.

END OF SECTION

SECTION 04 102

STRUCTURAL GROUT

PART 1 GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To
 - 1. Furnish and install structural grout as shown on drawings as specified and as needed for a complete and proper installation.
- B. Related Sections
 - 1. Section 04 220 – Concrete Masonry

1.2 REFERENCES

- A. Comply with pertinent provisions of Section 01090.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01300.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01600.

1.5 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who is completely familiar with the specified requirements and the methods needed for proper performance of the work of this section.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Structural Grout.
 - 1. 3000 psi pea gravel aggregate concrete.
 - 2. Install at walls, bond beams, lintels, and other locations as shown on drawings.

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine areas and conditions under which work of this section will be performed. Correct conditions which are detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

3.2 INSTALLATION

- A. Install in accordance with good construction practices. Completely eliminate air pockets and provide full contact between grout and item being grouted.

END OF SECTION

SECTION 04 151

ANCHOR, TIE & JOINT CONTROL SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

- A. Includes but not limited to
 - 1. Furnish and install anchors and ties systems as shown on drawings, as specified, and as needed for a complete and proper installation.
 - a. Veneered masonry units to framed walls.
 - b. Masonry units to building structure.
- B. Related Sections
 - 1. Section 04 211 - Brick Unit Masonry
 - 2. Section 04 220 - Concrete Unit Masonry

1.2 REFERENCES

- A. Comply with pertinent provisions of Section 01090.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01300.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01600.

1.5 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who is completely familiar with the specified requirements and the methods needed for proper performance of the work of this section.

PART 2 PRODUCTS

2.1 COMPONENTS

- A. Masonry Over Block:
 - 1. Brick Ties - Dur-O-Wal Inc., HB-213 Adjustable Veneer anchor.
- B. Masonry Over Steel Column Building Structure:
 - 1. Column Ties – Dur-O-Wal Tie #VBT with Weld-on Tie #359.

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine areas and conditions under which work of this section will be performed. Correct conditions which are detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

3.2 INSTALLATION

- A. Brick Ties
 - 1. Shall be free of material that may destroy bond.
 - 2. Install as detailed with screws. Begin approximately 8 inches from base of masonry with maximum spacing of 16 inches vertically and horizontally thereafter, for modular brick.
 - 3. Begin approximately 9 inches from base of masonry with maximum spacing of 15 inches vertically and horizontally thereafter for king-size brick.
- B. Column Ties
 - 1. Install at locations and at spacing intervals shown on drawings.

END OF SECTION

SECTION 04 161

HORIZONTAL JOINT REINFORCING

PART 1 GENERAL

1.1 SUMMARY

- A. Includes but not limited to
 - 1. Furnish and install horizontal joint reinforcing as shown on drawings as specified and as needed for a complete and proper installation.
- B. Related Sections
 - 1. Section 04 220 - Concrete Unit Masonry

1.2 REFERENCES

- A. Comply with pertinent provisions of Section 01090.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01300.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01600.

1.5 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who is completely familiar with the specified requirements and the methods needed for proper performance of the work of this section.

PART 2 PRODUCTS

2.1 COMPONENTS

- A. Single Wythe Masonry Walls
 - 1. Reinforcing shall conform to ASTM A 82. Exterior wall reinforcing shall be galvanized to meet requirements of ASTM A 153, Class B-2.
 - 2. Size - 2 inches less than nominal thickness of wall.
 - 3. Rod Size -
 - a. Side rods - 9 gauge
 - b. Cross rods - 9 gauge (unless noted otherwise)
 - 4. Corners & Tee Sections - Prefabricated of material and design similar to main reinforcement.
 - 5. Dur-O-Wal Ladur Type, D/A 320.

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine areas and conditions under which work of this section will be performed. Correct conditions which are detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

3.2 INSTALLATION

- A. Reinforcing shall be free of material that may destroy bond.
- B. Install reinforcing 16 inches o.c. vertically unless otherwise shown.
- C. Lap splices and intersections 6 inches minimum.
- D. Wire reinforcement shall be completely embedded in grout or mortar.

END OF SECTION

SECTION 04 175

WEEP VENTS

PART 1 GENERAL

1.1 SUMMARY

- A. Includes but not limited to
 - 1. Furnish and install weep vents in brick veneer as shown on drawings as specified and as needed for a complete and proper installation.
- B. Related Sections
 - 1. Section 04 211 - Brick Unit Masonry.

1.2 REFERENCES

- A. Comply with pertinent provisions of Section 01090.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01300.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01600.

1.5 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who is completely familiar with the specified requirements and the methods needed for proper performance of the work of this section.

PART 2 PRODUCTS

2.1 MANUFACTURED UNITS

- A. Plastic Weep Vents - Dur-O-Wal D/A 1005.

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine areas and conditions under which work of this section will be performed. Correct conditions which are detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

3.2 INSTALLATION

- A. 1. Install at 32 inch o.c. maximum at locations shown on drawings for modular brick.

END OF SECTION

SECTION 04 211

BRICK UNIT MASONRY

PART 1 GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To
 - 1. Furnish and install brick and mortar as shown on drawings, as specified and as needed for a complete and proper installation.
- B. Related Sections
 - 1. Section 04 101Cement & Lime Mortars
 - 2. Section 04 151Anchor, Tie & Joint Control System
 - 3. Section 04 175Weep Vents
 - 4. Section 04 220Concrete Unit Masonry
 - 5. Section 05 500Structural Steel
 - 6. Section 07 650Flexible Flashing

1.2 REFERENCES

- A. Comply with pertinent provisions of Section 01090.
- B. American Society For Testing And Materials
 - 1. ASTM C 216-90a, "Specification for Facing Brick (Solid Masonry Made from Clay or Shale)"

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01300.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01600.

1.5 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who is completely familiar with the specified requirements and the methods needed for proper performance of the work of this section.

1.6 PROJECT/SITE CONDITIONS

- A. Environmental Requirements
 - 1. Cold weather, as referred to in this Section, is four hours below 40° F in a 24-hour period.
 - 2. Do not lay masonry when temperature is below 40° F unless authorized by Architect.
 - 3. Keep materials free of ice and snow.
 - 4. Heat water and sand 140° F maximum if temperature is below 40° F.
 - 5. Temperature of mortar shall be between 70 and 120° F when used.
 - 6. Heat masonry to 40° F when temperature is below 0° F.
 - 7. Do not lay masonry on frozen material.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Brick
 - 1. Acme Brick Co., provide an allowance of \$475.00/thousand
 - 2. a. 2-1/4" " x 3-5/8 " x 7 5/8" " Modular size brick.
Standard red brick to match existing brick on Van Buren Depot.
 - 3. Meet requirements of ASTM C 216, Grade MW, Type FBX or FBS.
 - a. Rating for efflorescence shall be "Not Effloresced".
 - b. Exposed faces shall be finished and have less than 5% chippage and have crack-free appearance when viewed from 15 feet away.
 - 4. Brick shall be cleanable using standard method specified below when using specified mortar.
 - 5. Brick for Project shall be fired in same run.
- B. Mortar - As specified in Section 04 101.

2.2 ACCESSORIES

- A. Cleaning Compounds - "Surekleen" #600 or Vana-Trol by ProSoCo Inc., Kansas City, KS (913) 281-2700.

2.3 SOURCE QUALITY CONTROL

- A. Fabrication Tolerances
 - 1. Brick shall be true to size and shape.
 - 2. No warped, chipped or deformed brick permitted.

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine areas and conditions under which work of this section will be performed. Correct conditions which are detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

3.2 INSTALLATION

- A. Site Tolerances
 - 1. Brickwork shall be true to vertical and horizontal planes within 1/8 inch in 10 feet, non-cumulative.
 - 2. Maintain 3/8-inch mortar joints throughout.
 - 3. Joints to match existing work. Brickwork shall align with existing brickwork, if applicable.
- B. Make cuts proper size to accommodate work of other trades. Cut openings for electrical devices using cover plates no larger than can be covered by standard size plate. Replace unit masonry in which larger than necessary openings are cut. Do not patch openings with mortar or other material.
- C. Step back unfinished work for joining with new work. Use toothing only with Architect's approval.
- D. Layout
 - 1. Running bond except where noted otherwise. Select brick so there is uniform distribution of hues.
 - 2. Use solid brick where brick coursing would otherwise show cores.
- E. Expansion Joints
 - 1. Approximately 3/8 inch wide.
 - 2. Brick on either side to be smooth end brick.
 - 3. Insure no mortar invades joint full depth of brick.
 - 4. Insure no reinforcing ties or connect two sides of joint together.
 - 5. Place backer rod securely in joint and place sealant over backer rod. Color of sealant to match brick color and as selected by Architect.
 - 6. See details as shown on drawings.
 - 7. Control joint/expansion joints locations in non-reinforced masonry to be generally located as follows:
 - a. At major changes in wall height
 - b. At major changes in wall thickness.
 - c. Control joints in foundations, roofs, and floors.

- d. One or both sides of wall openings.
 - e. Near wall intersections
 - f. Near return angles in "L", "T" and U-shaped structures.
 - g. Where shown on drawings.
- Rod.
- 8. Joint backer rod to be equal to Sonneborn polyethylene Closed Cell Backer
 - 9. Sealant to be Sonneborn Sonolastic NP-1 or equal. Color to match brick color.
- F. Joints
- 1. Do not tool until mortar has taken initial set.
 - 2. Tool concave, unless noted otherwise, 3/8" high.
- G. Weep Vents, Brick, Ties, Reinforcing, Column Ties, Etc.
- 1. Install as specified in Section 04 151 and as shown on drawings.
- H. Laying
- 1. Use mortar within two hours of initial mixing. Discard mortar that has begun to set.
 - 2. Lay brick when surface is dry. Brick absorption when laid should not exceed 0.025 oz/sq inch maximum.
 - 3. Shove brick into place in full mortar bed, do not lay.
 - 4. Completely fill horizontal and vertical joints. Do not furrow bed joints.
 - 5. Strike back-side joints on brick flush. Do not allow mortar build-up in cavity
between brick and back up material unless otherwise shown.
 - 6. Build in flashings, sleeves, anchors, clips and accessories.
 - 7. Install loose steel lintels in full beds of mortar.
 - 8. Clean top surface of foundation, free of dirt and debris prior to installing the first course of masonry unit.
- I. Lintels
- 1. Install steel lintels as shown on drawings, coordinate with Section 05 500 Structural Steel, verify with General Contractor.
 - 2. Lintels shall extend into sidewalls at jambs bearing a minimum of 8".
 - 3. Install lintels as detailed on drawings.
- J. Membrane Flashing: See Section 07 650 – Flexible Flashing

3.3 CLEANING

- A. Point holes in joints. Fill and tool properly.
- B. After mortar has hardened, wet brick and clean with specified cleaning compound. Use stiff fibered brush for application. Rinse masonry surfaces with water immediately after cleaning. Leave masonry clean, free of mortar daubs, and with tight mortar joints.

- C. Remove and replace defective material at Architect's direction and at no additional cost to Owner.
- D. Clean up masonry debris and remove from site.
- E. Leave work and surrounding materials clean and free of mortar spots and droppings.

3.4 PROTECTION

- A. Protect masonry with cover during rainy weather. Cover top or wall with non-staining waterproof membrane at end of each day or when work is not in progress.
- B. Maintain temperature around masonry at 40° F minimum for 48 hrs.

END OF SECTION

SECTION 04 220

CONCRETE UNIT MASONRY (Block)

PART 1 GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To
 - 1. Furnish and install concrete unit masonry as shown on drawings, as specified and as needed for a complete and proper installation.
 - 2. Furnish and install anchor bolts, bond beams, lintels, etc. as shown.
 - 3. Grout door frames installed in masonry walls.
- B. Related Sections
 - 1. Section 04 101Cement & Lime Mortars
 - 2. Section 04 151Anchor, Tie & Joint Control System
 - 3. Section 05 500Structural Steel
 - 4. Section 04 102Structural Grout
 - 5. Division 05 Quality of anchor bolts
 - 6. Division 08 Door Frames
 - 7. Division 08 Window Frames
 - 8. Division 15 Walls vents & louvers

1.2 REFERENCES

- A. Comply with pertinent provisions of Section 01090
- B. American Society For Testing And Materials
 - 1. ASTM C 90-90 "Specification for Hollow Load-Bearing Concrete Masonry Units"
 - 2. ASTM C 331-89, "Specifications for Lightweight Aggregates for Concrete Masonry Units"

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01300.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01600.

1.5 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who is completely familiar with the specified requirements and the methods needed for proper performance of the work of this section.

1.6 DELIVERY, STORAGE & HANDLING

- A. Protect block from moisture and keep dry prior to laying. Dry out units which fail to meet moisture content limitation during storage on job and do not lay, until tests prove them satisfactory.
- B. Place no units directly on ground while being stored.
- C. Units are to be delivered to job-site on pallets in accordance with manufacturers recommendations.
- D. Cracked, chipped and spalled masonry units are to be immediately removed from the site as they are discovered.

1.7 PROJECT/SITE CONDITIONS

- A. Environmental Requirements
 - 1. Cold weather, as referred to in this Section, is four hours below 40° F in a 24- hour period.
 - 2. Do not lay masonry when temperature is below 40° F unless authorized by Architect, in writing.

3. Keep materials free of ice and snow.
4. Heat water and sand 140° F maximum if temperature is below 40° F.
5. Temperature of mortar shall be between 70 and 120° F when used.
6. Heat masonry to 40° F when temperature is below 18° F.
7. Do not lay masonry on frozen material.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Concrete Masonry Units
1. Meet requirements of ASTM C 90, Grade N, Type 1, moisture controlled unit.
 - a. Use concrete block below grade
 - b. Use light-weight concrete (L.W.C.) block above grade and in exposed locations.

Re-crushed masonry units shall not be used as aggravates.
 2. Use special shapes as shown and/or as required including sill units, coping units
 3. Use special shapes as shown and/or as required including sill units, coping and corner units. Provide 4x8x8 smooth veneer block where noted.
 4. Uniform color and texture with unbroken edges.
 5. All exterior units should employ the Integral Water Repellant Admixture for the block and mortar as manufactured by Addiment or equal to minimize the potential of efflorescence.
- B. Mortar - As specified in Section 04 100.
- C. Cleaning Compounds - "Surekleen" #600 or Van-Trol by ProSoCo Inc, Kansas City, KS. (913) 281-2700.

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine areas and conditions under which work of this section will be performed. Correct conditions which are detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

3.2 INSTALLATION

- A. Step back unfinished work for joining with new work. Use toothing only with Architect's approval.
- B. Layout - Running bond.
- C. Laying
1. Lay masonry units dry. Do not lay masonry on frozen material.

allowed

2. Align cells or cavities to preserve an unobstructed cavity for grouting and insulation.
3. Lay with full mortar bed on both horizontal face shells and butter both vertical face shells with mortar and shove tight.
4. Use mortar within two hours of initial mixing. Discard mortar that has begun to set.
5. Make cuts proper size to accommodate work of other trades.
6. Bond must not be jumped above or below opening.
7. Use abrasive saw to cut exposed faces. No rough edges or uneven joint
8. Use square ended corner units at door/window jambs, external corners and similar locations.
9. Use sash units at vertical control joints.
10. Clean top surface of foundation, free of dirt and debris prior to installing the first course of masonry unit.

D. Joints

1. Approximately 3/8 inch wide
2. Tool concave, at exposed surfaces, flush at concealed surface unless indicated differently.
3. Do not tool until mortar has been initial set.

E. Reinforcing, Control Joints, Insulation, Etc.

1. Install as specified in Section 04 151 and as shown on drawings.

F. Grouting

1. Use structural grout as specified at Section 04-102.
2. Fully grout cells as follows -
 - a. Cells containing reinforcing bars
 - b. All cells in concrete block foundations
 - c. All cells where sound control requirements are indicated.
 - d. Bond beams and lintel blocks.
3. Place grout in 4 foot maximum lifts.
4. Consolidate grout by means of a mechanical vibrator. Do not use cell reinforcing to rod grout.
5. Before loss of plasticity, mechanically reconsolidate grout.
6. Grout hollow metal door frames solid.

G. Lintels

1. Masonry, see lintel schedule, sheet S2 for type & location.
2. Lintels shall extend into sidewalls at jambs bearing a minimum of 8”.

3.3 CLEANING

- A. Point holes in joints. Fill and tool properly.
- B. After mortar has hardened, wet block and clean with specified cleaning compound. Use stiff fibered brush for application. Rinse masonry surfaces with

water immediately after cleaning. Leave masonry clean, free of mortar daubs, and with tight mortar joints.

- C. Remove and replace defective material at Architect's direction and at no additional cost to Owner.
- D. Clean up masonry debris and remove from site.
- E. Leave work and surrounding materials clean and free of mortar spots and droppings.

3.4 PROTECTION

- A. Protect masonry with cover during rainy weather. Cover top or wall with non-staining waterproof membrane at end of each day or when work is not in progress. Extend over top of wall a minimum of 24" each side.
- B. Cover work at end of each work day with tarpaulins if temperature is 25 to 40° F. If temperature is below 25° F, protect with heaters. Maintain temperature around masonry at 40° F minimum for 48 hrs.
- C. Brace masonry walls until walls attain adequate strength and are tied into building structure.
- D. Do not allow structural loading of masonry walls until walls attain adequate strength.

END OF SECTION

SECTION 04 435

CAST STONE

PART 1. GENERAL

1.1 SUMMARY

- A. Includes But Not Limited to
 - 1. Furnish and install cast stone and accessories as shown on drawings, as specified and as needed for a complete and proper installation.
- B. Related Sections
 - 1. Section 04 211 - Brick Unit Masonry.

1.2 REFERENCES

- A. Comply with pertinent provisions of Section 01090.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01300.
- B. Shop Drawings
 - 1. Include proposed attachment system of cast stone panels, if applicable.
- C. Samples.
 - 1. Submit for Architect's approval prior to starting work of this Section

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01600.

1.5 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this section.

1.6 DELIVERY, STORAGE & HANDLING

- A. Check, carefully unload and deliver material to site in such a manner as to avoid soiling, damaging or snipping.
- B. Store material on planks clear of ground and protect from damage, dirt or disfigurement.

PART 2 PRODUCTS

2.1 MATERIAL

- A. Cast Stone
 - 1. Texture and color variation shall be within limits established by approved sample.
 - 2. Free of defects that would materially impair strength, durability and appearance.
 - 3. Finish – smooth
 - 4. See Drawings for Profiles.
 - a. Cast Stone Concrete Wall Cap-
 - 1) Provide for Brick Knee Wall, and brick Fence Columns

- 2) Provide in sizes and shapes as indicated on plans & details and in lengths as standard or as required for job.
 - c. Color: Assume standard manufacturers colors.
Match existing Auditorium Building, verify with Architect.
5. Manufacturers
 - a. RockCast (A Division of Reading Rock, Inc) Supplied thru ACME Brick Company , Fort Smith, Arkansas 1 (479) 782-7974.
4600 Devitt Drive
Cincinnati, Ohio 45246
1-800-482-6466
Fax 513) 874-2361
www.roackcast.com
 - b. Other suppliers of equal quality are acceptable upon submission for approval.

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this section will be performed. Correct conditions which are detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

3.2 INSTALLATION

- A. Install same as described in Brick Unit Masonry – 04 211.
- B. Install per manufacturers specifications and recommendations.

END SECTION D-3 Masonry

Section D-4 Athletic Field Subsurface Drainage System

1.1. SCOPE OF WORK

Furnish design drawings, labor, equipment and materials to install the Athletic Field Subsurface Drainage System, consisting of perimeter, under-drain/collector pipe, geo-textile, composite flat drains, and bottom and top layer stone bases as all specified herein.

1.2. PROJECT REQUIREMENTS

A. As required by code or the authorities having jurisdiction, the Contractor shall provide design and necessary design documents for all work in these specifications, and indicated on the attached drawings. All designs shall incorporate all code requirements and the special requirements shall be the responsibility of the Contractor.

The design and design documents must be submitted to and approved by the Owner prior to submittal to the authorities having jurisdiction.

- B. As required by code or the authorities having jurisdiction, the Owner shall be responsible for obtaining all licenses and permits, and the payment of all required fees. Copies of all permit applications shall be submitted to the Owner's representative prior to the start of the project. Copies or proof of all final inspection approvals by the Authorities Having Jurisdiction shall be furnished to the Owner's representative prior to final acceptance.
- C. Coordinate work with Owner's Representative.
- D. Compliance with all local, state and federal codes, ordinances, regulations and laws applicable to the work to be done shall be considered as minimum requirements, and everything shown or specified in excess of these minimum requirements shall be installed in excess thereof. No instructions given in the contract documents shall be construed as an authorization to violate any code, ordinance, regulation or law.
- E. Work, once started, shall be diligently carried out toward completion. All work shall be done in a workmanship-like manner in accordance with standard practices, local codes and ordinances, applicable statutes and in accordance with manufacturer's recommendations, where applicable.
- F. The Contractor is required to perform this work within the precepts of OSHA/ TOSHA guidelines for a safe working environment. The Contractor shall erect and maintain, as required by conditions and progress of the work, all reasonable safeguards for safety and protection, including signs, dust barriers, barricades, temporary lights and warning lights. Further, the job site will be continuously kept clear of hazardous

conditions. Conditions, which in the opinion of the Owner's representative are unsafe and correctable, shall be immediately cleared. Failure to do so will result in a job stoppage until the situation has been cleared.

- G. The Contractor and subcontractor(s) shall maintain the following insurance:
 - d) Workmen's Compensation and Employer's Liability Insurance affording: Protection under the Workmen's Compensation Law of the states in which the work is performed; and Employer's liability protection subject to a minimum limit of \$100,000.
 - e) Comprehensive General Liability Insurance in amounts not less than: Personal Injury \$1,000,000 per person, and Property Damage \$1,000,000 per occurrence.
 - f) Comprehensive Automobile liability Insurance in the following minimum amounts:
Bodily Injury of \$1,000,000 per person and \$1,000,000 per occurrence. Property Damage \$1,000,000 per occurrence.
- H. The Owner may, at his discretion, engage the services of a testing laboratory to ensure that all materials and workmanship are in accordance with the plans and specifications. The testing expense will revert to the Contractor should the material or workmanship fail to comply with requirements.
- I. The Contractor shall provide entire copies of these specifications and plans to the installing superintendent. The specifications and plans' copy shall be kept on the job site for referral by the installing craftsmen and the Owner's representative.
- J. No storage space is available on site, the Contractor shall provide adequately sized, on-site storage trailer(s) to store and protect all materials, equipment and tools. The owner or their representative shall determine the location of the storage trailer(s).
- K. The Contractor shall provide an adequate size trash container on site during the duration of the project. The trash container shall not be allowed to overflow and shall be dumped regularly. Demolished materials and trash shall not be placed on the ground around or about the trash container. The principal or their representative shall determine the location of the trash container. The school's trash containers shall not be used for disposal.
- L. The contractor must have a member on their construction team that has built at least 3 base installations on full size (70,000sq/ft or more) fields with similar aggregate drain bases, and provide a reference list of these installations. The Contractor shall employ only qualified, experienced supervisors and technicians skilled in building the base of the specified system.

1.3. REFERENCES

Comply with applicable requirements of the American Society for Testing and Materials (ASTM) standards and Occupational Safety and Health Administration (OSHA). Should the

standards conflict with other specified requirements, the most restrictive requirements shall govern.

1.4. SUBMITTALS

- A. Provide Shop Drawings for materials to be supplied.
- B. Provide certifications stating that the materials used to comprise the system comply with the requirements of these specifications.
- C. All piping and appurtenances shall be new, clean and in accordance with material specifications, unless specifically noted on the plans.
- D. Pipe size and classification shall be as shown on the plans.
- E. Dynamic stone base material gradations shall be submitted for review prior to delivery of any material.

1.5. PRODUCT DELIVERY

- A. Take all required measures to ensure that all piping and related appurtenances are protected from damage.
- B. Special care shall be exercised during delivery and storage to avoid damage or contamination to the products.
- C. All materials shall be delivered and stored within the Contractor's work limits or in an area approved by the Owner.
- D. Products that are damaged will be removed and replaced, unless the product can be repaired in an acceptable manner.
- E. Protect aggregates and base materials from soil contamination.

SECTION 2 Products

2.1 MATERIALS

- A. Perimeter French Drain/Collector Pipe:
 - 1) All specific pipe sizes shall be noted on the Contract Drawings;
 - 2) Fittings and couplers shall be split couplings or snap couplings manufactured by the same manufacturer as the corrugated polyethylene pipe;
 - 3) French Drain/Collector Pipe bedding shall conform to #57 stone.
- B. Non-woven geo-textile as specified by the engineer and shall consist of long-chain polymeric fibers composed of polypropylene, polyethylene or polyimide. The fibers shall be oriented into a multi-directional stable network whereby they retain their positions relative with each other and allow the passage of water as specified. The fabric shall be free of any chemical treatment or coating, which reduces the permeability and shall be inert to chemicals commonly found in soil. The fabric shall be UV resistant. The fabric shall be Carthage Mills FX-45HS non-woven stabilization geo-textile or Engineer approved equal.
- C. The geo-textile shall conform to the following minimum average roll values:
 - Thickness ± 5% ASTM D-5199 38 mils
 - Grab Tensile ASTM D-4632 120 lbs
 - Trapezoidal Tear ASTM D-4533 50 lbs
 - CBR Puncture I ASTM D-6241 310 lbs

4. Gradations:

Dynamic Stone Base – Bottom Layer #57 Aggregate

ASTM Standard

Sieve Size	Percent Passing by Weight
1 1/2"	100
1"	95-100
1/2"	25-60
3/8"	_____
#4	0-10
#8	0-5
#16	_____
#50	_____
#200	0-2

Dynamic Stone Base –Top Layer #89 Aggregate

ASTM Standard

Sieve Size	Percent Passing by Weight
1/2"	100
3/8"	90-100
#4	20-55
#8	5-30
#16	0-10
#50	0-5
#200	0-2

SECTION 3 EXECUTIONS

3.1 PREPARATION

- A. Examine the areas and conditions under which the subsurface drainage system work is to be installed. Correct any and all conditions detrimental to the proper completion of the work. Do not proceed with the work until satisfactory conditions have been achieved.
- B. Verify that the sub grade of field is to the proper grades indicated on the contract drawings. Correct all deficiencies as necessary.
- C. Do not proceed with any installations before receiving written approval from the owner's representative for the material.

3.2 PERIMETER FRENCH DRAIN /COLLECTOR PIPE

- A. Install pipe and bedding in conformance with the Storm Drainage requirements of these specifications and as recommended by the pipe manufacturer.

- B. Excavation for installation of pipes shall be in trenches to the lines, grades and widths as per the Contract Drawings and in accordance with Safety and Health Regulations (OSHA).
- C. After installation of pipe, inspect to determine whether line displacement or other damage has occurred.
- D. Make inspections after lines have been installed prior to backfilling and during the backfilling process and again at the completion of backfilling. After drain pipes have 6" of material on top of them, they are to be compacted with a vibrating pad, and vibrated every 6" until trenches are filled. Backfill material shall conform to the material as specified on the drawings.
- E. If inspection indicates poor alignment, debris, displaced pipe, infiltration or other defects, take whatever steps are necessary to correct such defects.

3.3 GEOTEXTILE/EMBEDDED ITEMS

The geo-textile fabric shall be installed as per manufacturer's recommendations on the entire surface of the finished sub grade. Material should be installed with an 18" overlap of each roll, and pinned with sod staples.

Perimeter and interior edge details, underground storm sewer piping and connections, and goal post foundations required for the system shall be as shown on the drawings and as specified. The costs for these embedded items shall be included in the Contractors' price along with the compacted, porous sub-base.

All sub-surface synthetic wood blocking and synthetic wood nailer boards shall be of wood polymer composite materials as manufactured by Black RHINO Products or Trex Deck or approved equal. Minimum 2"x4", Maximum 2"x6".

All sub-surface fasteners shall be fully corrosion resistant materials of hot dipped galvanized or stainless steel type, with wedge and nut (wedge anchors) tightening design. Zinc or cadmium plated will not be accepted.

3.4 COMPOSITE FLAT DRAIN

The composite flat drain system shall be installed true to line and grade in accordance with the manufacturer's recommendations and in conformance with the contract drawings. At no point shall the drain deviate from the geo-textile due to rock underneath the drain pipe. The drains shall daylight above the French drain perimeter. Spike nails are to be placed every 10' in order to hold the drain pipe tight to the geo-textile.

3.5 STONE BASES

- A. Upon the completion of constructing an approved field sub grade, the Contractor shall install both the bottom and top dynamic stone base layers within a 20' x 20' test area for the purpose of determining that the contractor means and methods of placing the material conforms to the following requirements:
- 1) Compaction of both layers: the dry density after compaction shall be 95% of the dry density for the material being tested in accordance with Proctor procedure according to ASTM 1557;
 - 2) Permeability of base bottom layer shall be greater than 50 in/hr (3.5×10^{-2} cm! sec).
 - 3) Permeability of base top layer shall be greater than 10 in/hr (7.0×10^{-3} cm! sec).
 - 4) Porosity of both layers shall be greater than 25% (when base is saturated and compacted to 95% proctor).
- B. The above testing and any subsequent retesting shall be performed by an independent testing laboratory with the costs borne by the Contractor.
- C. When the results of the above testing requirement are not satisfactory to the Engineer, the Contractor shall adjust his procedure as required to attain the necessary results.
- D. Upon desired test results and approval from the Engineer, the Contractor may proceed with the complete installation of bottom layer of stone base and then the top layer of stone base following the approved installation procedure.
- E. The surface of each stone base layer shall be formed to meet the design elevations to within $\frac{1}{2}$ " and the surface shall not deviate more than $\frac{1}{4}$ " over 10' in any direction.
- F. Contractor will check surface tolerance prior to installation of synthetic athletic surface.
- G. Owner has the right to have independent testing on site during construction at owner's cost.
- H. Furnish and install two (2) White High School Goal Posts with 8' offset 6.625"OD diameter gooseneck, 30' uprights, plate mounted, w/Red directional flags and all hardware and sleeves necessary for complete installation. Goal Posts will be Sportsfield Specialties #gp4383pl with optional #SG2SGP Access Frame Kit, and soccer hold down attachment.

END SECTION D-4 Athletic Filed Subsurface Drainage System

SECTION D-5 SYNTHETIC TURF

Part 1 – General

1.1 Summary

Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this section.

1.2 Scope of Work

Furnish all labor, materials, tools and equipment necessary to install, in place, all synthetic turf materials 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 written installation instruction, and in accordance with all approved shop drawings.

1.3 Submittals

A. Submit the following:

1. 12" x 12" Raw Sample of proposed Synthetic Turf, and same box sample with specified rubber infill material
2. 8 oz. bag of specified SBR rubber granules.
3. Injury documentation/background on system being bid.
4. Past project experience with references per paragraph 1.5 A below.
5. Copy of Testing data on proposed product
6. Copies of (total of 3) 8 yr warranties on Fiber, Manufacturer, & Installation

B. Prior to order of materials, the Contractor shall submit the following:

1. Product Warranty.
2. Details on construction, especially any details that may deviate from plans and specifications.

C. Prior to the beginning of installation, the manufacturer/installer of the synthetic turf shall inspect the base and supply a Certificate of base Acceptance for the purpose of obtaining manufacturer's warranty for the finished synthetic playing surface.

D. Prior to Final Acceptance, Contractor shall submit the following to the Owner:

1. Three (3) copies of Maintenance Manuals, which will include the necessary instructions for the proper care and preventive maintenance of the synthetic turf system, including painting and striping.

2. The Contractor shall provide the necessary testing data to the owner's representative that the finished field meets or exceeds the required shock attenuation property (G-Max) per paragraph 1.5.B2 and will not exceed that level throughout the warranty period.

1.4 Shop Drawings

- A. Shop drawings shall be prepared at the scale of the construction documents and contain all pertinent information regarding installation. These drawings shall be submitted to the owner for approval prior to the manufacturing and shipment of materials.
- B. Submit drawings for:
 1. Seaming plan
 2. Installation details, edge detail, goal post detail, other inserts and covers.
 3. Striping plan, layouts showing any field lines, markings and boundaries, and field logos per project drawings.

1.5 Quality Assurance

- A. Manufacturer/Installer's Experience

The Installer shall have the experience of at least ten (10) acceptable installations of full-size football or soccer fields (minimum of 70,000 SF) in the United States within the past three (3) years of infilled polyethylene long fiber systems. The Contractor must have at least 3 installations with the same manufacturer as proposed, and provide information in the reference list of these installations. The Contractor shall employ only qualified, experienced supervisors and technicians skilled in the installation of the specified system.

- B. Warranty

The Contractor shall submit its Manufacturer's Warranty guaranteeing the usability and playability of the synthetic turf system for its intended use for an eight (8) year period commencing with the date of Substantial Completion. The warranty coverage shall not be limited to the amount of usage.

The warranty submitted must have the following characteristics:

1. Must provide full coverage for eight (8) years from the date of Substantial Completion;
2. Warranty must state that the average G-Max of the play area will not exceed 135 for the life of the warranty.
3. Must warrant materials and workmanship;

4. Must warrant that the materials installed meet or exceed the product specifications;
5. Must have a provision to either make a cash refund or repair or replace such portions of the installed materials that are no longer serviceable to maintain a serviceable and playable surface;
6. Must be a manufacturer's warranty from a single source and a total of three warranties 1)workmanship and all self-manufactured or procured materials 2) a fiber warranty 3) an installation warranty
7. Guarantee the availability of replacement materials for the synthetic turf system installed for the full warranty period;
8. By submitting a bid, the Contractor agrees that upon notification of synthetic turf material failure that the Contractor will, within twenty-four (24) hours, initiate repair of same.

Owner reserves the right to request the addition of a bonded warranty to the specified scope of the work at a cost to be negotiated with the low bidder. Said cost shall be the direct cost of the insurance policy only and shall exclude any markup from the contractor. Owner also reserves the right to send turf sample to TSI for testing and verification of meeting required specifications. If sample does not meet specifications contractor's bid can be dismissed, and contractor liable for reimbursement of testing costs.

1.6 Surface Area

The Contractor is to verify all field measurements.

1.7 Utilities

The Contractor shall supply electricity for installation.

Part 2 – Products

2.1 General

- A) All components and their installation method shall be designed and manufactured for use on outdoor athletic fields. The materials, as hereinafter specified, should be able to withstand full climate exposure in Eastern Arkansas, be resistant to insect infestation, rot, fungus and mildew; to ultra-violet light and heat degradation, allowing free movement of surface run-off where such water may flow to the sub-base and into the field drainage system.
- B) The finished playing surface shall appear as mowed grass with no irregularities and shall afford excellent traction for conventional athletic shoes of all types. The finished surface shall resist abrasion and cutting from normal use. The installed system shall be ideal for football, soccer, lacrosse, baseball, softball, PE classes, intramurals and recreational use. All football five yard lines, as well as soccer and football boundary lines, will be factory tufted in the approaching rolls to meet the required field layout and dimensions as noted in the drawings.

2.2 Synthetic Turf Surface

A. The turf fiber shall be a low abrasive, proven, UV resistant 100% polyethylene slit-film system designed for heavy sports and athletic play.

B. The Synthetic Turf Surface shall meet the following properties:

- | | |
|--|---------------------------|
| 1. Minimum pile length | 2.00" |
| 2. Maximum pile length | 2.125" |
| 3. Minimum yarn denier | Slit-film 8,000+ |
| 4. Filament Minimum Thickness | slit-film 100 microns |
| 5. Minimum pile weight | 42 ounces/sq yd |
| 6. Stitch gauge | 3/8" |
| 7. Tuft Bind | Slit-Film: >12lbs average |
| 8. Minimum total Urethane secondary backing weight | 24 ounces per sq/yd |
| 9. Porous backing by means of 3/16" – 1/4" perforations on minimum of 4" Centers capable of draining 20.25"+ of water per hour | |

C. The Carpet shall consist of FIELD GREEN COLOR 100% Tencate XP Blade Plus, Bonar Ultra HD OR EQUAL, parallel slit-film fibers tufted into a porous or perforated primary backing.

D. The Carpet shall be furnished in 15' wide rolls with white yard line factory tufted on the edge of the roll. Rolls shall be long enough to go from sideline to sideline without splicing. Head seams, other than at sidelines, will not be acceptable.

E. The Carpet's primary backing shall be a **triple-layered** polypropylene/action Back/Non-woven or combination approved. The secondary backing shall consist of an application of 24oz per sq/yd of porous, heat-activated urethane to permanently lock the fiber tufts in place. Urethane with excessive fillers and air will not be acceptable.

F. Alternate Synthetic Turf

Manufacturers may Bid an Alternate turf, but you must include all documentation and specification sheets, samples (rag and infilled product) and meet or exceed all specified standards shown in this RFP.

2.3 Infill Material

The infill system shall provide a safe, highly playable system similar in play, performance and feel to the best natural grass system.

The infill system shall consist of 1.5lbs of sand as a ballast layer with balance of infill being ground SBR ambient processed rubber with second sand layer at the 6th layer or 1" and **must meet** the high standards listed below.

Sand must be material designed for synthetic turf infill, and have sub-rounded to rounded shape angularity from Kaw Valley or equal.

- Rubber material shall have less than 0.002% free metal content as measured in accordance with ASTM D 5603 7.3.2
 - Rubber material shall have less than 0.001% free fiber content as measured in accordance with ASTM D 5603 7.4
 - Rubber material shall have less than 0.002% free mineral content as measured in accordance with ASTM D 5603 7.3.1
 - Rubber material shall have less than 0.3% particles smaller than 35 MESH in accordance with test sieve DIN 3310-1
- A. The rubber shall be installed in 1/8" lifts by a drop or broadcast spreader, and brushed using a Laymor sweeper to fill the voids between the fibers and allow the fibers to remain vertical and non-directional. The rubber shall be 10-20 Mesh. The infill shall be 3/8" inches less than the turf fiber length. There should be 3.1+ Pounds of rubber per sq/ft.

2.4 Seams

All seams, shall be sewn using heavy nylon thread, or glued using 360° hot melt bonding. Seams shall be flat, tight and permanent with no separation or fraying

2.5 Lines and Markings

- A. All perimeter lines and five yard lines will be tufted in. The five yd lines will be tufted on the outside edge of the 15' wide rolls. The 50yd line will have RED 4" borders, and 20 yd lines will have RED 4" borders. The perimeter white line shall be tufted into the individual sideline rolls, and measure 24" of White, 24" of RED, 24" of Black. The coaches box shall be 6' solid white. The end zones will be RED with 18' letters: RIVERCREST & COLTS in White, with Black trim. The center logo will be a 29' **Colt**, with camera ready artwork to be supplied. Standard 6' x 4' yard numbers (no G required) will be White Gettysburg font, with RED shadow.
- B. All markings, lettering and lines not tufted in shall be inlaid and comply with all currently applicable National Federation of State High School Association rules and/or any other rules or standards.

- C. Inlaid markings that cannot be tufted into the fabric shall be installed by removal of the existing green fiber and bonding the field markings to seaming tape in the same manner as the seams. The fiber tips shall be equal in height to the surrounding green turf and not create a raised area on the playing surface.

2.6 Shock Absorbency

Shock Impact Attenuation and ball response characteristics are critical to the successful installation of this field. The Contractor shall test the installed field with the Owner's representative for G-max to assure that the installed system meets the Consumer Products Safety Commission requirements. The Contractor shall also be responsible to ensure that the installed system meets the 135 maximum G-max requirements throughout the warranty period. The method used to measure the shock absorbency of the playing system shall be ASTM F-355, Procedure A and ASTM F1936 - 07e1.

2.7 Embedded Items

Perimeter and interior edge details, underground storm sewer piping and connections, and goal post foundations required for the system shall be as shown on the drawings and as specified. The costs for these embedded items shall be included in the Contractors' price along with the compacted, porous sub-base.

- A. All sub-surface synthetic wood blocking and synthetic wood nailer boards shall be of wood polymer composite materials as manufactured by Black Rhino Products or Trex Deck or approved equal.
- B. All sub-surface fasteners shall be fully corrosion resistant materials of hot dipped galvanized or stainless steel type. Zinc or cadmium plated will not be accepted.

2.8 Manufacturers

Only Manufacturers with the ability to supply synthetic turf (carpet) in strict accordance with the product specifications and installation specifications will be considered for the award.

Part 3 – Execution

3.1 General

- A. The installation shall be performed in full compliance with approved shop drawings.
- B. Only factory-trained technicians, skilled in the installation of athletic caliber synthetic turf systems working under the direct supervision of the synthetic turf manufacturer's installation supervision, shall undertake the placement of the system.

- C. The surface to receive the synthetic turf shall be inspected and certified by the turf manufacturer as ready for the installation of the synthetic turf system and must be perfectly clean as installation commences and shall be maintained in that condition throughout the process.

3.2 Installation

- A. The sub-base and curbs shall be inspected by the Contractor by means of a laser level and plotted on a 10-foot grid. Based upon the owner's rep review of the topographic survey, the Contractor shall fine grade the sub-base suitably, including properly rolling and compacting the base. APPROVAL OF THE SUB-BASE FOR TOLERANCE TO GRADE WITHOUT VERIFYING EXISTING GRADES SHALL NOT BE MADE.
- B. The Contractor Project Superintendent shall thoroughly inspect all materials delivered to the site both for quality and quantity to assure that the entire installation shall have sufficient materials to maintain the schedule.
- C. Synthetic turf shall be loose laid across the field, stretched and attached to the perimeter edge in detail in accordance with the Manufacturer's standard procedures. Turf shall be of sufficient length to permit full cross-field installation. No head or cross seams will be allowed, except as required for inlaid fabric striping or to accommodate programmed cut-outs.
- D. All seams, except for inlaid markings, shall be sewn or bonded via hot melt adhesive per Manufacturer's recommendations. All seams shall be flat, tight and permanent with no separation or fraying. Inlaid markings shall be adhered to a special tape with a high strength polyurethane adhesive applied per the Manufacturer's standard procedures for outdoor applications.
- E. Infill materials shall be installed in accordance with the Manufacturer's standard procedures. The infill material shall be installed to a depth in order to achieve specified G-max requirements.
- F. The Contractor shall provide an adequate size trash container on site during the duration of the project. The trash container shall not be allowed to overflow and shall be dumped regularly. Demolished materials and trash shall not be placed on the ground around or about the trash container. The principal or their representative shall determine the location of the trash container. The school's trash containers shall not be used for disposal.

3.3 Field Markings and Decorations

- A. Game markings, lettering and logos will be inlaid and installed per approved project shop drawings.

B. All designs, markings, layouts and materials shall conform to all currently applicable Arkansas Athletic Association rules and/or other standards that may apply to this type of synthetic turf grass installation.

C. Inlaid markings (that cannot be tufted into the fabric) shall be installed by the removal of the existing green turf, and bonding the field marking by means of seaming

tape and glue. When installed the fiber tips shall be equal in height to the surrounding green turf and not create a raised area on the playing surface. Shearing or trimming of fibers to achieve this requirement is not allowed.

3.4 Clean Up

A. Contractor shall provide the labor, supplies and equipment as necessary for final cleaning of surfaces and installed items.

B. All usable remnants of new material shall become the property of the Owner.

C. The Contractor shall keep the area clean throughout the project and clear of debris, utilizing a job site dumpster.

D. The surface and project site shall be cleaned as necessary to leave the work area in a clean, immaculate condition ready for immediate occupancy and use by the Owner.

Part 4 - Other Materials and Equipment

A. Repair Materials

Upon Substantial Completion, provide directly to Owner the following items in the minimum quantities specified:

1. Seaming Tape – 200 LF
2. Seaming Adhesive–6 Large Caulk tubes PL LOCTITE
3. Turf – 15' x 10' solid green section of playing field turf
4. 4" Wide x 10' Long section of each color used as inlays
5. 500 pounds of SBR Rubber infill material

END SECTION D-5 Synthetic Turf

Section D-6 Asphalt Aggregate Base and Asphalt Paving

The base for the asphalt should be built to DOT standards in Eastern Arkansas, and have a minimum of 8" of Rock profile base, compacted and suitable for 2 layers of asphalt. The first layer of asphalt shall be 2" in depth followed by a 1.5" top layer. The top layer of asphalt should be smooth, consistent, and free of any voids or rocks. The asphalt should be laid to cover a width of 26' around the entire track.

SUBBASE AND ASPHALT INSTALLATION

PART 1 GENERAL: Subbase

1.1 SUMMARY

- A. Includes But Not Limited To:
Furnish and install granular base under Track system, as shown on drawings, and as specified for a complete and proper installation.

1.2 REFERENCES – Not Used

1.3 SUBMITTALS – Not Used

1.4 PRODUCT HANDLING – Not Used

1.5 QUALITY ASSURANCE

Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work in this section.

PART 2 PRODUCTS

2.1 GRANULAR BASE

Crushed Stone Base: Comply with AHTD Class 7 material requirements/for County Road Base materials / SB2 as approved by the engineer.

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

Examine the areas and conditions under which work in this section will be performed. Correct conditions which are detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

3.2 INSTALLATION

Install planned thickness (8") of granular base over compacted sub-base, level and compact as specified in Section 02 220. Aggregate base for track shall be uniformly mixed/pugged and placed using paving machine, or method approved by engineer.

END SUB-SECTION

PART 1 – GENERAL ASPHALT

1.01 SCOPE

- A. This section includes the labor, materials and equipment necessary to provide an asphalt base in two (2) lifts, meeting the requirements of the National High School Federation and the Department of Highways for the State of Arkansas.
- B. The Contractor shall survey the site and establish both hubs for the construction of the track. The new 6-lane track shall be around the Stadium field. The Contractor will be responsible for all staking for setbacks and elevation.
- C. The existing sub base shall be scarified and compacted. A new granular sub base extending 24' 1" in width and 8 inches in depth shall be uniformly mixed/pugged and placed utilizing a paving machine and compacted or by Engineer approved alternate method.

1.02 SUBMITTALS

- A. The Contractor is to provide evidence to the Owner, upon request, showing the sub base is compacted per specifications.
- B. The compaction of the asphalt shall be done by the Ordinary Compaction Method.

2.01 SUBGRADE

- A. The finished surface of the sub grade shall have no deviation in excess of one half (1/2) inch from a true surface when a ten-foot straight edge is applied along any portion of the surface. The sub grade shall reflect a positive one (1%) percent slope to the inside.
- B. Added to the existing sub grade shall be eight (8) inches of granular base rock (accepted by the project engineer). The base material shall be uniformly mixed/pugged, placed

utilizing a paving machine (or by Engineer approved alternate method) and compacted over the sub grade to a ninety-five (95%) percent proctor density.

SUBBASE AND ASPHALT INSTALLATION

PART 1 – GENERAL

1.03 SCOPE

- C. This section includes the labor, materials and equipment necessary to provide an asphalt base in two (2) lifts, meeting the requirements of the National High School Federation and the Department of Highways for the State of Arkansas.
- D. The Contractor shall survey the site and establish both hubs for the construction of the track. The new 6-lane track shall be centered to the present football field. The Contractor will be responsible for all staking for setbacks and elevation.
- E. The existing asphalt base and curbs shall be picked up and removed from the site by the Demolition contractor. In addition, the existing runways shall be removed.
- F. A new granular sub base extending 26 feet in width and 8 inches in depth shall be installed and compacted. The asphalt base shall extend 26 feet.

1.04 SUBMITTALS

- C. The Contractor is to provide evidence to the Owner, upon request, showing the sub-base is compacted per specifications.
- D. The compaction of the asphalt shall be done by the Ordinary Compaction Method.

PART 2 – EXECUTION

2.01 PAVING

- A. The base course of bituminous material shall conform to and meet the State of Arkansas Department of Transportation specifications for asphalt. A mixture typically used in parking lots meeting State requirements is what is specified. The depth of this base course shall be a minimum of two (2) inches compacted. The leveling course shall be no less than two (1.5) inches, as well, in a compacted thickness for a total of three and a half (3.5) inches.
- B. The finished leveling course shall extend thirty 24' 1" from edge to edge and maintain a true plane.

- C. The asphalt lay down machine shall be a self-propelled unit with a heated vibratory screed. The lay down equipment shall be equipped with electronic screed controls.
- D. Initial rolling shall be undertaken using an eight (8) to ten (10) ton flat steel roller. Compaction shall be completed with a vibratory steel or eight (8) to twelve (12) ton pneumatic roller. A flat-face static steel roller, five (5) tons or greater shall be used to finish the surface.
- E. Rolling shall continue until all rolling marks are removed and the asphalt has reached ninety-five (95%) percent of its maximum density.
- F. The bituminous material shall be installed in a manner to provide a smooth surface without any voids, depressions, joints and irregularities that may prevent the installation of an acceptable surface course. The base installation contractor shall work with the surfacing contractor to assure that the ASBA pavement extension method is used for construction and there is adequate excess asphalt on the inside of the first stripe.
- G. The slope of the track shall be one (1%) percent to the inside and shall contain no greater deviation than ¼-inch in ten (10) running feet in any direction.

Asphalt Acceptability Guidelines

The asphalt surface condition is the responsibility of the contractor. The installed asphalt surfacing should be free of oil, dust, dirt or mud, paint, grease or any petroleum based compounds prior to the arrival of the surfacing contractor.

The finished asphalt shall not vary, plus or minus, under a 10' straight edge greater than 1/8". It should be the responsibility of the asphalt-paving contractor to flood the surface, without damaging the integrity of the asphalt, immediately after the asphalt is capable of handling traffic. If, after 20 minutes of drying time, there are "bird baths" evident, it shall be the responsibility of the engineer to determine the method of correction.

- 1% across the width of the track towards the inside lane and across the width of any event runway i.e., long jump, triple jump, javelin and pole vault.
- The maximum inclination permitted for tracks, runways, circles, and landing areas for throwing events shall not exceed 1:100 in a lateral direction and 1:1000 in the running or throwing direction.

Any chemical or petroleum based material spills (hydraulic, diesel, motor oil, gasoline, etc.), must be completely removed either by chipping out and replacing with full depth polyurethane, or removing and replacing with new keyed in asphalt. No 'skin' patching or sand mix patching of asphalt is acceptable. The minimum depth of the asphalt patch or repair can be no less than one inch. It is the responsibility of the contractor to determine the proper tack coating or bonding agent to assure no delamination of the new asphalt patch from the existing asphalt base.

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). Whenever possible it is highly recommended to leave the 'hubs' or radius points in place for the duration of the project. This will ensure that all phases of the track construction follow the same construction points. After all the above conditions are met, the synthetic surfacing contractor must, in writing, accept the planarity of the asphalt-receiving base, before work can commence.

Asphalt Contractor Checklist Installation of Asphalt for Running Tracks

Key items that cause problems with the track installation:

1. Seams too high or low.
2. Roller marks.
3. Asphalt to curb elevations.
4. Oil spots.
5. Excessive cross fall or slope.
6. Birdbaths/puddles that exceed the tolerances.

General 'Checklist' To Avoid Common Problems;

1. Check layout, measurements and staking to ensure that the track is 400 meters and that all of the track surfacing and striping will fit on the installed asphalt-receiving surface. It is recommended to leave the 'hubs' or radius points in place throughout the duration of the project whenever possible.
2. Check your elevations to ensure that the percentage of slope corresponds with the tolerances within the asphalt and track surfacing sections.
3. Make sure that any equipment involved with the asphalt installation is free of leaks. Any machinery that could leak any petroleum-based substance on the top course of asphalt should be removed from the site.
4. It is recommended to have set control elevations on the inside and outside passes, but also in the center. Whenever possible it is recommended to use 'redheads' or something similar at or near any seam for elevation control.
5. When laying the top course, make sure the screed bar is straight and true by checking your

first pass with a straight edge or something similar. Whenever possible it is recommended to check your final lift with a straight edge/smart level/string line combination while the asphalt is being installed. This will allow the opportunity for correction of the placed asphalt as well as notification of any problems to the paver.

6. Asphalt to curb elevations are very critical. If the asphalt is to be flush with any curb, any high spots will have to be ground back to a level surface, and any low spots will have to be corrected by replacement or approved polyurethane leveling material or as dictated by the architect. The same applies to any recessed asphalt. The asphalt elevation must correspond with the thickness of the surfacing being applied.
7. Try to flood the newly installed asphalt upon completion to identify any drainage problems. Correct these problems immediately for a uniform cure.
8. Schedule for the proper amount of asphalt curing time. It is essential to allow the newly installed asphalt to cure properly to achieve a strong bond with the track surfacing. The asphalt needs to cure for 28 days.

END SECTION D-6 Asphalt Aggregate Base and Asphalt Paving

Section D-7 Track Surface Specifications

Structural Spray Polyurethane Track Product Specifications

PART 1 – GENERAL

1.01 SUMMARY

- A. Product name: Structural spray polyurethane (pervious) **6- Lane track** approximately: 4,608 total sq/yds. Includes: PV runway and HJ pad.
- B. Product classification: cast in place, durable, permeable, resilient, all-weather track surface consisting of polyurethane bound rubber base mat.

The mat will be installed full depth in Black. The mat will be sprayed with 2 coats of a monolithic application of polyurethane and rubber (clockwise & counterclockwise) in RED.

1.02 MANUFACTURER AND INSTALLER

Pre-approved Suppliers:

Hellas Construction Inc.
12710 Research Blvd. Suite 240
Austin, TX 78759

Beynon Sports Surfaces
16 Alt Road
Hunt Valley, Maryland 21030

Fisher Tracks, Inc.
1192 235th Street
Boone, IA 50036

McConnell & Associates
1225 Iron Street
North Kansas City, MO 64116

1.03 DESCRIPTION OF WORK

- A. The contracted work to be done under these specifications consists of furnishing all the required labor, materials, equipment, parts and supplies necessary for the installation of the running track surface.

- B. The work hereunder shall be done and conform to:
 - 1. American Sports Builders Association Track Construction Manual and Track Construction Guidelines.
 - 2. As prescribed or approved by the applicable governing body.

1.04 SUBMITTALS

- A. Bidders of this product are to provide a list of at least 10 installations that are a minimum of 3 years old that contain the same products, and use the same method of installation showing locations and the owner representatives. Tracks are to have been installed under the same name and ownership that is presently bidding.
- B. Contractor shall have written maintenance information on this product to be presented to the owner, upon completion of the surface. This will include repair methods and availability of repair materials including cost.

1.05 QUALITY ASSURANCE

- A. No subcontractors are permitted in the installation of the synthetic surface.
- B. The installing foreman must have at least 5 years' experience installing this type of system.

1.06 WARRANTY

- A. The warranty on the all-weather running track surface shall endure for five (5) years from the date of acceptance. This five-year warranty is to be provided directly by the track-surfacing contractor to the owner.
- B. The warranty shall cover defects in materials, workmanship, excessive color changes, or excessive wear from track and field use only.

RELATED WORK

- A. When surfacing on new asphalt, the asphalt must meet the specifications and standards set forth by the architect or engineer. The general contractor is responsible for the elevation survey of the asphalt base if required. The asphalt contractor is to provide a flood test of the asphalt base.
- B. The asphalt, or concrete base, should be sufficiently cured and cleaned in order for work to progress. The rules of track construction allow for a maximum longitudinal slope of one tenth of one percent in the running direction. The lateral inclination should meet the published specifications of the relevant governing association.
- C. Grade conformance tests should be conducted on both the base course and the leveling course. The entire surface should have positive drainage. The maximum allowable planarity deviation within a pass should be 1/4 inch in ten feet when measured in any direction. Deficient areas in the leveling course should be corrected as approved by the architect or engineer. After any corrections, the surface should not allow water to stand greater than 1/16 inch deep, one hour after rain has ended.
- D. The general contractor or the owner shall be responsible to have adjacent grass edged and removed from all areas receiving the synthetic surface. It may be necessary to apply a liquid herbicide such as Roundup to any adjacent edges of track and event areas.
- E. On existing tracks, the owner shall apply a liquid herbicide to any vegetation in surface several weeks before new construction. After removal of weeds, a second application should be applied to the crack areas.

PART 2 – PRODUCT AND MATERIAL DESCRIPTION

2.01 GENERAL

- A. The specified running track surface is a mixture of graded rubber granules bound with 100% polyurethane binders. The track surface is of a permeable design and the mixture is applied to a pervious or impervious base by means of a mechanically operated screed.
 - 1. Only a high quality polyurethane binder is to be used.
 - 2. The depth shall be a minimum of ½ of an inch (12.75mm) or as specified.
- B. The system has a smooth finish and may be applied for both indoor and outdoor use.

- C. The structural spray applied polyurethane and rubber blended coating is resilient and allows moisture to pass through the surface. It has a textured finish and is used primarily in outdoor applications.

2.02 RUBBER

- A. The Poly-Mat rubber shall be specifically graded elastomeric rubber granules with a controlled gradation between 0.1mm to 3.0mm.
 - 1. Dust and rubber particulate smaller than a No 200 sieve size shall not exceed 4% of the total rubber.
 - 2. The rubber shall be black SBR or EPDM.
 - 3. Colored EPDM granules may also be used.
- B. The colored EPDM rubber for the structural spray can have a gradation of 0.5mm to a maximum of 3mm with the typical application being 0.5mm to 1.5mm.

2.03 PRIMER

- A. The Poly-Mat primer shall be polyurethane based and compatible with asphalt and synthetic track surfacing materials.
- B. The polyurethane primer may be diluted to ensure proper penetration of the existing surface.
- C. For an asphalt base, the primer application may be reduced or eliminated when extreme heat conditions soften the asphalt.

2.04 BINDER

- A. The Poly-Mat binding agent shall be a single component; MDI based, moisture cure polyurethane binder.
 - 1. The polyurethane binder is to be 100% solids.
 - 2. The polyurethane binder shall be compatible with SBR and EPDM rubber granules.
- B. All polyurethane binder will be delivered in new unopened containers, clearly labeled by the manufacturer.

PART 3 – EXECUTION

- A. The asphalt or concrete base should be sufficiently cured and cleaned in order for work to progress.
- B. The entire surface shall be swept, power blown, or high pressure washed to remove all dirt, oil, grease, or any other foreign matter. The surface shall be free from any loose material.

3.02 LIMITATIONS

- A. Apply the synthetic surfacing materials only during favorable weather conditions. Work is to progress only when adequate curing can be guaranteed by the installer.
- B. During surface installation and striping all sprinkler systems must be shut off, or controlled so that no water falls on the track or event surfaces.
- C. All materials will be installed in strict compliance with the manufacturer's recommendations.
- D. During setup, installation, and striping of the Poly-Mat it is the responsibility of the general contractor and the owner to have the entire track area, and other pertinent areas such as football field, concessions, etc., closed and secured of all activities 24 hours per day through the curing and completion of the project.

3.03 INSTALLATION

- A. The entire area to be surfaced shall receive an application of polyurethane primer applied uniformly at a rate between 0.18 – 0.27 lb. per sq. yd. A minimum cure time of 30 minutes is required before application of the base mat materials.
- B. The mixing ratio of rubber to binder should not be less than 5 parts rubber to 1 part binder as determined by the weight of the products. The materials shall be prepared in a mechanical mixer until a homogenous mix is obtained.
- C. The mixed materials making up the Poly-Mat shall be applied by a mechanically operated finishing machine, which shall have an electrically heated screed. The surface will be applied in one layer to the specified depth.

- D. The cured edge of each joint shall be primed with the Poly-Mat binding agent prior to the laying of the adjacent base mat. All joint work will be troweled flush with the adjacent mat.
- E. According to the manufacturers specification, a weighed quantity of the two-component parts (A & B) of the structural spray shall be mixed thoroughly. The specified quantity of colored EPDM granules are then added to this mixed material and mixed thoroughly.
- F. This mixed structural spray material is placed into a spray machine and the material is applied to the base mat. A second coat of material over the first is applied in the opposite direction. The total rate of application of both coats of spray will range from 3.2 to 4.0 lbs. per square yard.

3.04 STRIPING

- A. Experienced personnel specializing in all-weather running track striping shall accomplish all striping.
- B. Provide lane lines, starting lines, and markings required, and conform to the standards for track construction as prescribed by the applicable governing body.
- C. Contractor shall verify with the owner's representative for exact locations, size, shape, and color of the lines and markings before proceeding with markings and striping.
- D. Calculations shall be made to the nearest 0.001'. These shall be rounded to the nearest 0.01' for marking.
- E. A transit or Theodolite capable of reading direct to 20 seconds shall set angles.
- F. Measurement shall be made with a steel tape in engineering scale that will read directly to 0.01'.
- G. All lane lines shall have a width of 5cm (approximately 2").
- H. Track certification as to its accuracy for the correct distance of 400mm around the track oval shall be provided by the track professional.

3.05 CLEANING

- A. Upon completion of all work, remove all containers, surplus materials and installation debris. Leave area of work in clean orderly condition.

END SECTION D-7 Track Surface Specifications

Section D-8 Bleachers and Press Box

SECTION 13 125 PERMANENT GRANDSTANDS

PART I. GENERAL

1.01 SYSTEM DESCRIPTION

- A. Provide labor, material, equipment and supervision necessary to complete installation of new permanent steel grandstands, including the following:
 - 1. Steel substructure
 - 2. Aluminum decking system
 - 3. Aluminum bench seating
 - 4. Exit steps and ramps
 - 5. Guard railing
 - 6. Press Box support structure

- B. See plans for number of rows and length

1.02 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
 - 1. Manufacturers must have ten years of experience in the manufacture of bleachers and grandstands
 - 2. Manufacturer must exhibit proof of business existence for past five years
 - 3. Manufacturer must be an AISC certified fabrication facility
 - 4. Welders must be AWS certified

- B. Installer Qualifications: Minimum three years of experience installing grandstands for an approved manufacturer.

- C. Source Quality Control: Mill Test Certification.

1.03 SUBMITTALS

- A. Manufacturer's Product Data: Submit manufacturer's descriptive product data for project.

- B. Shop Drawings: Manufacturer to submit shop drawings sealed by a registered professional engineer and shall be of sufficient clarity to indicate location, nature, and extent of the work proposed and show in detail that it will conform to the applicable code and relevant laws.

1.04 BUILDING CODES

- A. Must meet or exceed all State and Local applicable codes and be in the compliance with the International Building Code adopted by the jurisdiction and CABO/ANSI A117.1 Barrier Free Subcode.

1.05 WARRANTY

- A. Permanent Grandstand shall be under warranty for a period of one year beginning at Date of Substantial Completion for Projects installed by Manufacturer. The Grandstand is warranted to be free from defect in materials and workmanship in the course of manufacture. This warranty excludes any other defects resulting from abnormal use in service, accidental or intentional damage or any occurrences beyond Manufacturer's control.

1.06 MAINTENANCE

- A. Owner is to conduct annual inspection and required maintenance of grandstand to ensure safe conditions. It is also recommended that a professional engineer or registered architect perform inspections biennially.

PART II. PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Southern Bleacher Company. Other manufacturers seeking to be approved must submit product literature on horizontal beam design to the Engineer for review and receive approval from the Engineer seven days prior to bid date.

2.02 PERMANENT STEEL GRANDSTAND

- A. Understructure:
 - 1. Columns and horizontal beams: Wide flange or angle
 - 2. Stringers: Wide flange with steel angle rise and depth fabrication and are placed at 6 feet on center.

- B. Stairs:
 - 1. Stair rise: per Building Code with aluminum closure
 - 2. Stair tread depth: per Building Code with contrasting aluminum stair nose
 - 3. Guardrails on Stair to be 42 inches above leading edge of step with intermediate rail
 - 4. Handrail: Stairs to have handrail extension. The handgrip portion of handrails shall not be less than 1 1/2 inches or more than 2 inches in cross-sectional dimension or the shape shall provide an equivalent gripping surface. The handgrip portion of handrails shall

have a smooth surface with no sharp corners. The use of external cast fittings for handrails is unacceptable. The top of handrails and handrail extensions shall be placed not less than 34 inches or more than 38 inches above the nosing of treads and landings. Handrails shall be continuous the full length of the stairs and shall extend in the direction of the stair run not less than 12 inches beyond the bottom riser. Ends shall be returned or shall terminate in newel posts or safety terminals.

C. Ramps:

1. Slope: 1 in 12.
2. Guardrails on Stair to be 42 inches above leading edge of step with intermediate rail plus toe board
3. Handrail: Ramps to have handrail extension. The handgrip portion of handrails shall not be less than 1 1/2 inches or more than 2 inches in cross-sectional dimension or the shape shall provide an equivalent gripping surface. The handgrip portion of handrails shall have a smooth surface with no sharp corners. The use of external cast fittings for handrails is unacceptable. The top of handrails and handrail extensions shall be placed not less than 34 inches or more than 38 inches above the ramp surface. Where handrails are not continuous between runs, the handrail shall extend horizontally above the landing 12 inches minimum beyond the top and bottom ramps. Ends shall be returned or shall terminate in newel posts or safety terminals.

D. Aisles:

1. Aisles with seating on both sides to have discontinuous mid-aisle handrails. The handrails shall be discontinuous with breaks at intervals not to exceed 5 rows. These breaks shall have clear width of at least 22 inches (min.) and not greater than 36 inches (max.) horizontally.
2. Handrails to have 34-inch high top rail with rounded ends and intermediate rail. The use of external cast fittings for handrail is unacceptable.
3. Aluminum tread nosing of contrasting color (brite red) on aisle steps.
4. Halfsteps shall be provided for riser heights above 8 inches
5. Halfsteps shall provide equal rise and run throughout aisle. Each shall have aisle nosing with non-skid black powder coated finish or other paint system meeting AAMA 603.8-92 specifications with a hardness rating of 2H and riser closure with clear anodized finish.
6. Aisles with a riser height of non-uniformity shall be indicated with distinctive markings as required by code.

E. Decking:

1. 8" rise by 24" tread depth per row
2. Closed decking system

F. Seating:

1. Each seat 17 inches above its respective tread.
2. Bench Seating:

- a. 2 x 10 sloped aluminum seat
 - b. Joint and splice sleeves required for seating
- G. Guardrailing: To be at all sides of bleacher, entry stairs and ramps, portals, and landings. Railing to be clear anodized aluminum with end plugs at ends of straight runs and/or elbows at corner. All guardrails shall be secured to galvanized steel angle rail risers by galvanized fasteners. Railing shall be at heights required by code for its location on the grandstand. Guardrailing shall include a separate aluminum top rail and galvanized chain link mesh infill.
- H. Handicap provision:
- 1. Quantity of wheelchair spaces: as required by building code
 - 2. Riser area adjacent to wheelchair spaces to have intermediate construction so 4 inch sphere cannot pass through opening.

2.03 MATERIALS/FINISHES

- A. Substructure:
- 1. Structural shapes meet one of the following ASTM specifications: A36, A36/A572 grade 50, A572 grade 50, A529-50, or A500 grade B.
 - 2. Shop connections are seal welds.
 - 3. After fabrication, all steel is hot-dipped galvanized to ASTM-A-123 specifications.
 - 4. Painted steel finish is unacceptable.
- B. Extruded Aluminum:
- 1. Seat and risers planks and rail: Extruded aluminum alloy, 6063-T6, Clear anodized 204R1, AA-M10C22A31, Class II. Bench seat backs to be "brite red".
 - 2. Tread planks and joint sleeves: Extruded aluminum alloy, 6063-T6, mill finish
- C. Accessories
- 1. Channel End Caps: Aluminum alloy 6063-T6, clear anodized 204R1, AA-M10C22A31, Class II.
 - 2. Hardware:
 - a. Bolts, Nuts: Hot-dipped galvanized or mechanically galvanized.
 - b. Hold-down Clip Assembly: Aluminum alloy 6005A-T6, mill finish.
 - c. Structural Hardware: Equal to or greater than hot-dipped galvanized ASTM-A307. No connections utilizing high strength bolts are classed as slip critical.
 - 3. Aisle Nose and Stair Nose: Aluminum alloy, 6063-T6, non-skid "brite red" powder coated finish or other paint system meeting AAMA 603.8-92 specifications with a hardness rating of 2H.
- D. Fabrication
- 1. Live Load: 100 psf gross horizontal projection.

2. Lateral Sway Load: 24 plf seat plank.
3. Perpendicular Sway Load: 10 plf seat plank.
4. Live Load of Seat and Tread Planks: 120 plf.
5. Guardrail: per Building Code.
6. Windload: per Building Code

PART III. EXECUTION

3.01 INSTALLATION

- A. All work performed by technicians experienced in bleacher seating installation.
- B. Project as per approved shop drawings.

3.02 FOUNDATIONS

- A. Foundation slab and/or footings for the grandstand shall provide sufficient bearing area at bottom to support all loads of the grandstand. Depth and design of foundation slab/footings shall be based on geotechnical report.
- B. Galvanized anchors shall be provided by manufacturer and drill set during erection of steel. No cast embeds required.

3.03 CLEAN UP

- A. Clean up all debris caused by work of this section.
- B. Mill finish aluminum as specified has the natural tendency to oxidize and stain from exposure to moisture through transportation and storage during installation. The stains will range from chalky white to black and may affect some or all of the material. Removal of these stains is not part of this specification.
- C. Stand to be broom cleaned at completion

END SECTION 13 125

SECTION 13 126
MODULAR STEEL PRESS BOX

PART I: GENERAL

1.01 SYSTEMS

- A. Press Box Type II Construction
 1. Home Side: 8'x 30' with (3) rooms
 2. Filming Area/Observation Deck located on press box roof
 3. Canopy

- B. Press Box Support Structure:
 1. Structural shapes meet one of the following ASTM specifications: A36, A36/A572 grade 50, A572 grade 50, A529-50, or A500 grade B.
 2. Shop connections are seal welds.
 3. After fabrication, all steel is hot-dipped galvanized to ASTM-A-123 specifications.

1.02 PRODUCT DESCRIPTION

- A. Floor
 1. Main support to be a galvanized steel floor frame sized to support structure and metal belly pan for support of insulation.
 2. Floor to be INTERLOCK Aluminum Decking System, extruded aluminum alloy 6063-T6, mill finish. Attach Decking System to steel floor frame with mechanical fasteners at end of plank and at intermediate supports. (Tongue & Groove or Standard extrusion is not acceptable.)
 3. Insulation: Poly-encapsulated Formaldehyde-free fiberglass building insulation R-13, 3 1/2 inches thick. Batt or roll as manufactured by Johns Manville, or equal.

- B. Wall Structure
 1. 4 inch x 4 inch x 11 gauge square tubing with maximum span of 14 feet on front wall and maximum span of 6 feet on back wall and 4 inch x 2 1/2 inch x 14 gauge steel "cees" with maximum spacing of 5 feet for all walls with siding. Spans greater than these require engineered calculations for design.
 2. Steel framing shapes to meet one of the following ASTM's, A500 Grade A or B 45 ksi, A36 50ksi, A1011 CS Type B.
 3. Insulation: Poly-encapsulated Formaldehyde-free fiberglass building insulation R-13, 3 1/2 inches thick. Batt or roll as manufactured by Johns Manville or equal.
 4. Interior Finish
 - a. 1/2 or 5/8 inch vinyl coated gypsum panels (as required), Gold Bond vinyl-surfaced Durasan.
 - b. Cove Base: Vinyl 4 inches x .080.
 5. Exterior Finish

- a. 26 gauge prefinished R-Panel paneling as manufactured by MBCI, Signature 300 color series "brite red", or equal.
- b. Wall panels are attached with #12 TEK screws - 6" O.C. at the top, midpoint and bottom of the panels.
- c. Lap screws are placed at each end of the panels, at the intermediate supports, and at the mid point between supports (TEK #14).
- d. All fasteners to be painted same color as exterior paneling.

C. Roof Structure

- 1. 4 inch x 4 inch x 11 gauge square tubing with maximum spacing of 6 feet on center and 4 inches x 2 1/2 inches x 14 gauge steel "cees" with maximum spacing of 2 feet on center.
- 2. Roof: 1/8 inch fourway steel plate roof, continuous welded seams coated with acrylic metal primer as manufactured by Coronado and 36 mils of acrylink roof coating as manufactured by Isothermal Protective Coatings, or equal. Plate is welded on both sides of rafters with 1-1/2 inch long 1/8 inch fillet welds on 12 inch centers.
- 3. Insulation: Poly-encapsulated Formaldehyde-free fiberglass building insulation, R-19 (minimum) 6 inches thick. Batt or roll as manufactured by Johns Manville or equal.
- 4. Cornice: 26 gauge steel prefinished to match metal siding.
- 5. Ceiling: 24 inch x 24 inch x 5/8 inch acoustical lay in ceiling tile with removable tiles, per 2006 IBC or local code, applicable category per seismic zone, (in California per 2007 CBC, applicable category per seismic zone, ref. DSA IR 25-5).

D. Exterior Door(s)

- 1. Full flush steel construction with hollow or polystyrene core. 18 gauge skin sheets. Dimensions: 3 feet 0 inches x 6 feet 8 inches. Color: Coordinated with press box siding color.
- 2. Steel door frame (16 gauge) complete with 1/2 inch threshold and weather-stripping.
- 3. Exterior Hardware: Yale 546F Exterior Trim, or equal. Handles shall be lever type that allow operation without tight grasping or twisting of the wrist. Keyed alike locks.
- 4. Interior Hardware: Yale 2100 Exit Device, or equal. Handle shall be panic bar that allows for opening without any grasping, twisting or turning.

E. Interior Door

- 1. Interior Hollow Core Birch Unit. Dimensions: 3 feet 0 inches x 6 feet 8 inches.
- 2. Hardware: Handles shall be lever type that allow operation without tight grasping or twisting of the wrist.

F. Interior Walls

- 1. Framing to be steel galvanized studs (25 gauge) 1 1/4 inch x 3 5/8 inch or 4 inch at maximum 2 feet on center.
- 2. Finish consistent with all other interior finishes.

G. Windows

1. Frame: Extruded aluminum single hung, vertical sliding unit, thermal break.
2. Sash: Tilt toward inside for easy cleaning.
3. Glazing: Clear tempered panes, 3/4" insulated
4. Dimensions of each unit: Dependent on compartment size. At interior wall locations or structural support locations the dimension between windows shall be no greater than 6 inches.
5. Finish: Electrostatically applied acrylic enamel.

H. Work Bench

1. 1 inch thick x 21 inch wide clear anodized aluminum work bench supported by 4 inch x 2 1/2 inch x 14 gauge steel.
2. Countertops heights shall be constructed to allow wheelchair usage at all locations.

I. Painting: Materials equal to Coronado, or equal.

1. Surfaces: Exterior Door(s), Door Frame(s)
 - a. Primer: Applied by Door Manufacturer.
 - b. Finish: 2 coats acrylic latex semi-gloss enamel applied by press box manufacturer.
2. Surfaces: Interior Doors
 - a. Primer: Jones Blair Interior Exterior Oil Primer, or equal.
 - b. Finish: 2 coats acrylic latex semi-gloss enamel.
3. Surfaces: Exterior Siding
 - a. Primer: Applied by Siding Manufacturer.
 - b. Finish: Applied by Siding Manufacturer.
 - c. Touchup: If applicable
4. Surfaces: Wall and Roof Structure
Primer: Coronado DTM Industrial 180-11 acrylic metal primer applied after welding, or equal.

J. Caulking: Sonneborn NP1 – Polyurethane sealant, All temperature, UV resistant, or equal. Silicone products are not acceptable.

K. Electrical

1. Submittal drawing shall indicate devices and circuitry.
2. Fixtures: 2-lamp, 58 or 64 watt fluorescent, 2' x 4' lay-in design as manufactured by Lithonia Lighting, or equal. Fixtures shall be located above countertop and be maximized to full length of compartment space.
3. Wiring to be in EMT or flexible metal conduit. Surface-mounted raceway or wiremold not allowed. N.E.C. breaker panel to be 100 amp flush or surface mounted on wall with 1 1/4 inch conduit stubbed out bottom of press box or 2 inch rigid conduit to be stubbed out at back wall of press box ready for service line to be connected. (Service line to Press Box is responsibility of Owner).

4. Electrical outlet(s) installed per NEC shall be standard duty. All outlets shall be flush mounted.
 5. Sound, Telephone, Clock, Field Communication: Empty single or double outlet boxes per N.E.C. with 3/4 inch conduit stubbed out bottom of Press Box for use of Owner. Outlet boxes to be flush mounted into wall. Any wiring completed on-site will be responsibility of such contractor for inspections. Quantity. Two per room will be provided.
 6. Filming Area/Observation Deck: Weathertight outlet box for cameras. Quantity: Two
 7. Provide thru-wall PTAC unit (heat/air) in each room
- L. Filming Area/Observation Deck
1. Exterior Access: Stairs up to roof shall run along back wall of press box with support of same being provided by extended landing platform at bottom and by stub beam attached to press box back wall at top of stairs. No supports from grade are required.
 2. Roof guard railing to be 42" above walking surface around perimeter of deck attached to 5/8 inch galvanized studs to be welded to roof support structure. The guard railing to include anodized aluminum with 9 gauge galvanized chain link fencing fastened in place with galvanized fasteners and aluminum ties.
 3. Canopy: galvanized steel frame support, galvanized purlins, and 26 gauge metal roof panel. Metal trim and panel to match type/finish of press box.

END SECTION 13 126

**SECTION 13 127
FRAME-TYPE BLEACHER
SILVER EDITION
ELEVATED SERIES**

PART I. GENERAL

1.01 SYSTEM DESCRIPTION

- A. Design and fabrication of Frame-Type Bleacher

1.02 QUALITY ASSURANCE

- A. Manufacturer: Southern Bleacher Company, P. O. Box One, Graham, Texas 76450 U.S.A., (800) 433-0912 or (940) 549-0733. Fax: (940) 549-1365.
Stadium Pros Inc, 4894 Hwy 24, Red Bay, AL 35582 256-356-6868 Fax: 256-356-2626
- B. Manufacturer Qualifications: Manufacturer must have ten years of experience in the manufacture of bleachers and grandstands; AISC certified; welders must be AWS certified.
- C. Source Quality Control: Mill Test Certification.

1.03 BUILDING CODES

- A. Owner to confirm the national code and the version which applies to project for inclusion in specifications.

1.04 WARRANTY

- A. Southern Bleacher warrants its Frame-Type Bleacher to be free from defect in material and workmanship in the course of manufacturing for a period of one (1) year beginning at Date of Substantial Completion for Projects installed by Southern Bleacher's certified installation subcontractors, or beginning at Date of Initial Delivery of Product for Projects installed by others. This warranty excludes defects resulting from abnormal use, accidental or intentional damage, or any occurrences beyond Southern Bleacher's control.

PART II. PRODUCTS

2.01 ACCEPTABLE MANUFACTURER

- A. Southern Bleacher Company. Stadium Pros Inc. Other manufacturers seeking to be approved must submit product literature on horizontal beam design to the Engineer for review and receive approval from the Engineer seven days prior to bid date.

2.02 FRAME-TYPE BLEACHERS

A. Product Description

1. Silver Edition (5 Row, 10 Row and 15 Row) Elevated Frame-Type Bleachers:
2. Rise and Depth Dimensions: Vertical rise and horizontal depth per row: 8 inches x 24 inches. Seat is 17 inches above its respective tread.
3. Framework: Prefabricated angle bleacher frames are spaced at 6-foot (max.) intervals and connected by cross braces.
4. Seats: Nominal 2 x 10 anodized aluminum plank with 2 x 10 anodized end caps.
5. Treads: Two nominal 2 x 11 mill aluminum planks with 2 x 11 anodized end caps.
6. Risers: Nominal 1 x 6-1/2 anodized aluminum riser planks beginning at Row 1; two 1 x 6-1/2 aluminum riser plank on top row.
7. Guard railing: Two lines of aluminum rail with chain link 42 inches above seat on both sides of bleacher and across back of bleacher. Front rail, 3 line with chain link 42 inches above front walk.
8. Entry Steps: Frames with 2 x 12 mill aluminum plank with step riser, contrasting aluminum stair nose and 2 line rail 36 inches above nose of step. Handrails shall extend in the direction of the exit steps 12 inches beyond the end of the steps. Ends shall terminate in newel posts.
9. Front Walkway: 30-inch elevation and 68-inch clear width.
10. Aisle: Aisle to be provided with 34" high handrail and intermediate rail at approximately 22" above tread. Handrails with rounded ends are discontinuous to allow access to seating through a 24" wide space. Aluminum tread nosing of contrasting color on aisle steps.
11. Wheelchair Area: Wheelchair area to be 5' 6" wide for two wheelchairs (33" each) and 36" for single.
12. Ramp:
 - a. Slope: 1 in 12.
 - b. Guard railing: Two line aluminum rail 36 inches above ramp tread with intermediate rail at approximately 20 inches. Railing shall be continuous the full length of the ramp, and shall extend in the direction of the ramp 12 inches beyond the end of the ramp, returning to end at a newel post.
13. Landing: Optional: 74" Return Landing: 74" Landing to have 3-line 36" chain link with rail at 42" above front walk plank.

B. Materials/Finishes

1. Framework: Galvanized Steel: Structural fabrication with ASTM-A529 steel. Shop connections are seal welded. After fabrication, all steel is hot-dipped galvanized to ASTM-A123 specification.
2. Extruded Aluminum:
 - a. Seat Planks, Riser Planks, Step Risers: Extruded aluminum alloy 6063-T6, clear anodized 204R1, AA-M10C22A31, Class II, and a wall thickness of .094".

- b. Tread Planks: Extruded aluminum alloy 6063-T6, mill finish and wall thickness of .094".
- 3. Accessories:
 - a. Channel End Cap: Aluminum alloy 6063-T6, clear anodized 204R1, AA-M10C22A31, Class II.
 - b. Hardware:
 - i. Bolts, Nuts: Galvanized or plated.
 - ii. Hold-Down Clip Assembly: Aluminum alloy 6061-T6.
- 4. Guard railing: Front, sides and back anodized aluminum rail 1-5/8" O.D. with galvanized chain link
- 5. Handrails: Anodized aluminum rail 1-5/8" O.D.
- 6. Cross braces: Extruded aluminum angle alloy 6061-T6, mill finish
- 7. Aisle Nose and Stair Nose: Aluminum alloy, 6063-T6, black powder coat finish.

C. Fabrication

- 1. Design Load:
 - a. Live Load: 100 psf gross horizontal projection
 - b. Lateral Sway Load: 24 plf seat plank
 - c. Perpendicular Sway Load: 10 plf seat plank
 - d. Live Load of Seat and Tread Plank: 120 plf
 - e. Guardrail: 100 plf vertical and 50 plf horizontal.
- 2. All connections made in shop to be shop welded.
 - a. Manufactured by certified welders conforming to AWS Standards.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install bleacher unit in accordance with manufacturer's installation procedures.
- B. The frame-type Silver Edition bleacher unit shall be securely anchored to a flat, level concrete slab.
- C. Clean up all debris caused by work of this section.
- D. Mill finish aluminum as specified has the natural tendency to oxidize and stain from exposure to moisture through transportation and storage during installation. The stains will range from chalky white to black and may affect some or all of the material. Removal of these stains is not part of this specification.
- E. Stand to be broom cleaned at completion

END SECTION 13 127

END SECTION D-8 Bleachers and Pressbox

Section D-9 Site Electrical System

SECTION 16000

BASIC ELECTRICAL REQUIREMENTS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The scope of the work consists of furnishing and installing all electrical power distribution equipment, modifications to existing distribution equipment, raceways, electrical handholes, and cabling for the installation of new football field lighting, area lighting, and miscellaneous equipment. The Contractor shall provide all supervision, labor, materials, equipment, machinery, and all other items necessary to complete the work shown on the Drawings and/or specified in Division 16.
- B. The facility has an existing 1000KVA, 277/480V utility transformer, Entergy Meter # 3407695 and Square D HCRU I-Line 1200A main panelboard mounted in the building interior near the transformer. The Contractor shall install new branch circuit breakers into the I-Line panelboard for the proposed electrical additions. The Contractor shall provide and install all raceways, cables, and devices from the panelboard additions to the football field lighting and other improvements.
- C. The Contractor shall provide pricing as detailing in these specifications for two separate lighting systems, an HID system and an LED system. The system shall include all necessary lighting controls required for the system selected by the Owner/Engineer.
- D. The Contractor shall provide all minor details not shown or specified, but necessary for proper installation and operation of the equipment. These items shall be included in the Contractor's bid.
- E. Provide Fair Play (or approved equal) two (2) Model T-830B-2 LED delay-of-game timers, 6'-0" wide by 3'-0" high, displaying TIME REMAINING in seconds for periods up to 99 seconds or less. Provide all necessary vinyl captions and vinyl trim for above. Cabinet color to be Black. Provide wireless hand switch with TIMER on/off and RESET1 and RESET2 switches for remote operation of timers. Hand switch communicates by wireless signal to controller console listed above. Paint back of timers Black.

- F. Contractor to re-locate the existing scoreboard from the current Stadium field in Wilson, AR. This playclock is an Electro-Mech model LX3680 24'x10'x 6" depth 730 lbs with 2 support I-beam Posts. Contractor should include 2 new posts and disassemble, move, and re-assemble, and install. Electrical contractor to wire. More info at: <https://www.electro-mech.com/Manuals/lx3680.pdf>
Picture of Existing scoreboard site:



1.02 GENERAL CONDITIONS

- A. The General and Special Conditions for the construction of this project shall be a part of the Electrical Specifications.
- B. The Contractor shall be responsible for all work included in this section and the delegation of work to a subcontractor shall not relieve him of this responsibility.
- C. The naming of a certain brand or make or manufacturer in the specifications is to establish a quality standard for the article desired. The Contractor is not restricted to the use of the specific brand of the manufacturer named unless so indicated in the specifications. However, where a substitution is requested, a substitution will be permitted only with the written approval of the Engineer. All proposed substitutions shall be submitted to the Engineer no later than seven working days prior to bid closing. The Contractor shall be responsible for installing the specified equipment unless approval by the Engineer is granted prior to bid closing.
- D. The Contractor shall visit the project site prior to submitting a bid. Any conditions that prevent installation of equipment in the manner intended shall be clarified prior to submission of the bid.
- E. No consideration or allowance will be granted for failure to visit site, or for any alleged misunderstanding of materials to be furnished or work to be done.
- F. The Contractor shall be responsible for installation of temporary electrical service required for the project. Coordinate location with the utility and the

Engineer.

1.03 CODES AND STANDARDS

- A. All work and materials shall comply with the latest rules, codes, specifications, local ordinances, industry standards, and utility company requirements, including but not limited to the following:
 - 1. ASME –American Society of Mechanical Engineers
 - 2. ASTM – American Society for Testing and Materials
 - 3. EIA – Electronic Industries Association
 - 4. IEEE – Institute of Electrical and Electronic Engineers
 - 5. IPCEA – Insulated Power Cable Engineers’ Association
 - 6. NEC – National Electrical Code (NFPA 70)
 - 7. NBS – National Bureau of Standards
 - 8. NEMA – National Electrical Manufacturers’ Assoc.
 - 9. NFPA – National Fire Protection Association
 - 10. UL – Underwriters’ Laboratories

- B. Code compliance is mandatory. Nothing in these Drawings and Specifications permits work not conforming to these codes. Where work is shown to exceed minimum code requirements, comply with the Drawings and Specifications.

- C. The Contractor shall be responsible for the cost of correcting any work or material found to be noncompliant.

- D. In the examination and prior to submission of bid, the Contractor shall notify the Engineer of any conflicts with applicable codes and standards.

1.04 FEES, PERMITS, AND INSPECTIONS

- A. Arrange for required inspections and pay all license, permit, and inspection fees. Arrange with the serving utility companies for the connections to all utilities and pay all charges for same including inspection fees and meters if required.

- B. No work shall be concealed until after inspection and approval by the proper authorities or Engineer. If work is concealed without inspection and approval, the Contractor shall be responsible for all work required to open and restore the concealed areas in addition to the required modifications.

1.05 DRAWINGS AND SPECIFICATIONS

- A. All Drawings and these Specifications shall be considered as a whole and work of

this Division shown therein shall be furnished under this Division.

- B. It is the responsibility of the Contractor to examine all project documents. Failure to coordinate the work of this Division with details of other Divisions shall not be used as a basis for additional compensation.
- C. The Drawings are diagrammatic and indicate the general arrangement of equipment and wiring. The most direct routing of conduits and wiring is not assured. Exact requirements shall be governed by architectural, structural, and mechanical conditions of the job. Consult all other Drawings. Extra lengths of wiring and addition of pull boxes, junction boxes, and other raceways necessitated by such conditions shall be included. The Contractor shall cooperate with all other trades in order to make minor field adjustments to accommodate the work of others without additional compensation.
- D. The Drawings and Specifications are complementary; each to the other, and the work required by either shall be included in the Contract as if called for by both.
- E. The Contractor shall keep a complete set of prints in good condition and on these shall indicate all field changes made. These prints shall be turned over to the Engineer at completion of the project.

1.06 SUBMITTAL DATA

- A. Submittal data shall be bound in folders or ring binders. The submittals shall include a table of contents listing items in order of Specification section and paragraph number.
- B. Submittals shall consist of detailed shop drawings, specifications, catalog "cut" sheets and data sheets containing physical and dimensioned information, performance data, electrical characteristics, materials used in fabrication, material finish, and those which are excluded.
- C. The Contractor shall not order material until receipt of approved submittals.

1.07 OPERATIONS AND MAINTENANCE MANUALS

- A. The Contractor shall compile an O&M manual that will detail each item of equipment and its operation. These manuals shall also include a recommended spare parts list.
- B. Submit five copies for review to the Engineer.

1.08 WARRANTY

- A. The Contractor shall issue a certificate of guarantee certifying that all materials and workmanship supplied and/or installed by the Contractor shall be free of defects for a period of not less than one year from the date of substantial completion.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. All materials and equipment used on this project shall be new and of equal or greater quality than specified in the Drawings and Specifications.
- B. The design, manufacture, and testing of electrical equipment and materials shall conform to or exceed latest applicable standards as set out in 1.03 (A).
- C. All materials shall bear a U.L. label. All materials that are not covered by U.L. testing standards shall be tested and approved by an independent testing laboratory or government agency having code enforcement authority.
- D. No substitutions shall be made in the materials submitted and approved without a re-submittal and prior approval of the Engineer.
- E. Manufacturer must be shown for all material submittals.
- F. The Contractor shall be responsible for confirming and correlating all quantities and dimensions.

PART 3 EXECUTION

3.01 WORKMANSHIP AND QUALIFICATIONS

- A. Only quality workmanship meeting today's industry standards will be accepted. Poor installation practice will result in the rejection of work.
- B. The Contractor shall provide supervision at the site at all times. A licensed Arkansas electrical journeyman shall be the minimum qualifications for a site foreman.

3.02 COOPERATION WITH OTHER TRADES

- A. The Contractor shall coordinate work with other trades to avoid conflict and to provide correct rough-in and connection for equipment furnished under other trades that require electrical connections. Inform Contractors of other trades of the required access to and clearances around electrical equipment to maintain serviceability and code compliance.
- B. Verify equipment dimensions and requirements with provisions specified under this Division. Check actual job conditions before fabricating work. Report and resolve any discrepancy to prevent rework.
- C. The Contractor shall schedule his work according to the master schedule and follow the general building construction closely.
- D. The Contractor shall set all pipe and conduit sleeves, or install conduits and raceways where necessary, prior to the placement of masonry or the pouring of concrete.

3.03 MANUFACTURER INSTRUCTIONS

- A. Where the specifications call for an installation to be made in accordance with Manufacturer's recommendations, a copy of such recommendations shall be kept at all times in the Contractor's site office.
- B. Follow manufacturer's instructions where they cover points not specifically indicated on the Drawings and Specifications. Obtain clarification from the Engineer where required.

3.04 CONSTRUCTION REQUIREMENTS

- A. The locations and elevations of equipment shown on the Drawings are approximate and subject to slight revisions if necessary at the time the work is installed. Final locations should be confirmed with the Engineer in advance of construction. Minor changes in location shall be made at no cost by the Contractor.
- B. Holes for raceway penetration into sheet metal cabinets and boxes shall be made accurately with a hole punch. Cutting openings with a torch or other device will not be acceptable.
- C. Raceway entry into equipment shall be carefully planned. Cutting of the enclosure framework to accommodate poorly planned raceways will not be acceptable.
- D. Cabling inside equipment shall be carefully planned, routed, and laced. Cables

shall be placed such that they do not cause obstruction.

- E. Equipment shall be set level and plumb. Equipment shall be braced and secured for a rigid fit.

3.05 EQUIPMENT PROTECTION

- A. Provide suitable protection for all equipment, work, and property against damage during construction.
- B. The Contractor shall assume all responsibility for material and equipment stored at the site.
- C. Conduit openings shall be closed with caps or plugs during construction. All outlet boxes will be kept free of concrete, plaster, and debris.
- D. Equipment shall be covered and tightly sealed against the entrance of dust, dirt, and moisture.
- E. Interiors of panelboards and motor control centers shall be kept clean and dry prior to placing into service.

3.06 EXCAVATION AND BACKFILLING

- A. The Contractor shall perform all excavation and backfilling necessary for the installation of the electrical system. The work shall include shoring and pumping in ditches to keep them dry until the work has been installed. All shoring required to protect the excavation and safeguard employees shall be properly performed according to code.
- B. All excavations shall be made to the proper depth with allowances made for floor slabs, forms, beams, finished grades, etc. Ground under conduits shall be compacted prior to raceway installation.
- C. All backfill shall be made with selected soil, free of rocks and debris. The backfill shall be mechanically tamped in six-inch layers to secure a ninety percent density ratio.
- D. All excavated material not suitable and not used in the backfill shall be removed to a disposal area as directed by the Engineer.
- E. Field check and verify all locations of underground utilities prior to any excavating. In the event existing utilities are broken, they are to be repaired to the original

condition.

- F. Where the excavation requires the opening of existing walks, drives, or other existing equipment, these facilities shall be cut as required to facilitate the new construction. The sizes of the cut shall be kept to a minimum. After installation is complete, repair the existing walks, drives, or other pavement to original condition or to match the new installation.

3.07 CUTTING AND PATCHING

- A. Cutting and patching required under this section shall be done in a workmanlike manner. Cutting lines shall be uniform and smooth.
- B. Use concrete saws for large cuts in concrete and use core drills for small round cuts in concrete.
- C. Where openings are cut through masonry walls, provide lintel or other structural supports to protect the existing masonry. Adequate support shall be provided during the cutting operation to prevent damage to the masonry.
- D. Patch concrete openings that are to be filled with nonmetallic, non-shrinking grout. Finished concrete patching shall be smooth and shall be uniform with surrounding surfaces.

3.08 FLASHING

- A. Provide waterproof flashing for each penetration of exterior walls and roofs.
- B. Flashing for conduit penetrations through built-up roofs shall be made with patch panel filled full with pitch.

3.09 EQUIPMENT CLEAN-UP

- A. Remove all temporary labels, dirt, paint, grease, and stains from all exposed equipment. Upon completion of work, clean equipment and the installation such as to produce a first class job suitable for occupancy. No loose or scraps of equipment shall be left at the site.
- B. Repair any scars to paint with kits supplied by the manufacturer.
- C. Clean interiors of each item of electrical equipment.

3.10 FIELD AND OPERATIONAL TESTING

- A. The Contractor shall be responsible for testing all installations and equipment prior to final acceptance testing. Testing shall be defined within individual sections of these Specifications.
- B. The Contractor shall be responsible for all protective device settings in accordance with the Engineer's Specifications and the functional testing of the protective devices.
- C. The Contractor shall maintain calibrated equipment required for field and operational testing. Calibration labels shall be visible on all test equipment.

3.11 ACCEPTANCE TESTING

- A. Upon completion of work, the Contractor shall coordinate with the Engineer an acceptance test to demonstrate operation of all installed equipment.

END SECTION 16 000

SECTION 16 110

RACEWAYS AND BOXES

PART 1 – GENERAL

1.01 DESCRIPTION OF WORK

- A. Provide complete raceways systems, boxes and fittings for all required electrical systems.

1.02 RELATED WORK

- A. Section 16000 – Electrical General Provisions
- B. Section 16111 – Electrical Handholes

C. Section 16115 – Support Devices

1.03 SUBMITTALS

- A. Submit seven (7) copies and in accordance with 16000 for all products.

1.04 STANDARDS

- A. Except as modified by governing codes and by the Contract Documents, comply with the latest applicable provisions and latest recommendations of the following:

1. Rigid Steel Conduit

- a. U.L. Standard UL-6
- b. A.N.S.I. C80-1
- c. Federal Specification WW-C-581E

2. Electrical Metallic Tubing

- a. U.L. Standard UL-797
- b. A.N.S.I. C80-3
- c. Federal Specification WW-C-563

3. Flexible Steel Conduit

- a. U.L. Standard UL-1

4. Liquid Tight Flexible Conduit

- a. U.L. Standard UL-360

5. Non-Metallic Conduit

- a. U.L. Standard UL-651
- b. A.N.S.I. Standard F512
- c. N.E.M.A. Standard TC-2

6. Wireways and Auxiliary Gutters

- a. U.L. Standard UL-870

7. Rigid Aluminum Conduit

- a. A.N.S.I. C80.5

PART 2 – PRODUCTS

2.01 RACEWAY TYPES

- A. Standard Threaded Rigid Steel Conduit.
 1. Rigid conduit heavy wall galvanized.
 2. Threaded type fittings: “Erickson” couplings where threaded cannot be used.
- B. Electrical Metallic Tubing
 1. Continuous, seamless tubing, galvanized on the exterior, coated on the interior with a smooth hard finish of lacquer, varnish, or enamel.
 2. Couplings and connectors:
 - a. Indoor and two (2”) inches in size and smaller, shall be steel set-screw type fittings.
 - b. 2 ½ inch size and larger must employ steel compression gland fittings.
 - c. Outdoor shall be rain tight steel compression gland fittings.
 3. Indent type fittings shall not be used.
 4. All connectors shall have insulated throat.
 5. Where installed in slab or concrete work, provide approved concrete tight fittings.
- C. PVC Coated Rigid Steel Conduit (CRSC) shall conform with NEMA RN 1.
 1. Provide with a 40 mil external coating.
 2. Provide with a 2 mil interior urethane coating.
 3. Shall be similar or equal to Robroy Plasti-Bond or Perma-Cote.
- D. Liquid Tight Flexible Electrical Conduit

1. Same as flexible steel conduit except with tough, insert watertight plastic outer jacket.
2. Cast malleable iron body and gland nut, cadmium plated with one-piece brass grounding bushings that thread to interior of conduit. Spiral molded vinyl-sealing ring between gland nut and bushing and nylon-insulated throat.

E. Non-Metallic Raceway

1. Composed of polyvinyl chloride suitable for 90 degrees C.
2. Raceway, fittings, and cement must be produced by the same manufacturer who must have had a minimum of ten (10) years experience in manufacturing the products.
3. Materials must have a tensile strength of 7,000-7,200 psi at 73.4 degrees F., flexural strength of 12,000 psi and compressive strength of 9,000 psi.
4. All joints shall be solvent cemented in accordance with the recommendations of the manufacturer.

F. Wireways and Auxiliary Gutters

1. Painted steel or stainless steel.
2. Of sizes and shapes indicated on the Drawings and as required.
3. Provide all necessary elbows, tees, connectors, adapters, etc.
4. Wire retainers not less than twelve (12") inches on center.

G. Duct Banks

1. Provide duct banks for exterior work as indicated on the Drawings.
2. Support raceways installed in duct banks every five (5) feet to assure correct alignment.
3. Terminate raceways with flared bells to enable ease of pulling cable and to eliminate stress on the cable. Free bells and raceway terminations of burrs and rough edges.
4. Provide concrete markers at grade where duct banks are stubbed out for

future use.

5. Provide PVC coated rigid steel elbows for turns and for vertical risers.
6. Provide vinyl tracer ribbon twelve (12") inches above each duct bank buried in backfill.

2.02 LOCKNUTS AND BUSHINGS

- A. Locknuts shall be steel. Die cast locknuts shall not be used.
- B. All bushings shall be insulated. Use nylon insulated metallic bushings for sizes 1" and larger. Plastic bushings may be used in ½" and ¾" sizes.

2.03 OUTLET, JUNCTION, AND PULL BOXES

- A. Cast Type Conduit Boxes, Outlet Bodies and Fittings
 1. Provide surface mounted outlet and junction boxes, in indoor locations, where exposed to moisture and in outdoor locations.
 2. Use Ferrous Alloy Boxes and conduit bodies with Rigid Steel or IMC.
 3. Use Ferrous Alloy or cast aluminum boxes and conduit bodies with Electrical Metallic Tubing.
 4. Covers: Cast or sheet metal unless otherwise required.
 5. Tapered threads for hubs.
- B. Galvanized Pressed Steel Outlet Boxes
 1. General
 - a. Pressed steel, galvanized or cadmium-plated, minimum of four (4") inches, octagonal or square, with galvanized cover or extension ring as required.
 7. Concrete Box
 - a. Four (4") inch octagon with a removable backplate and 3/8" fixture stud, if required. Depth of box shall allow for a minimum of one (1") inch of concrete to be poured above the backplate.

8. Switch and Receptacle Box, Indoors

- a. Nominal four (4") inches square, 1 ½" or 2 1/8" deep as required, with raised cover unless otherwise indicated on drawings. Gangable boxes shall not be used.

9. Telephone outlet box, Indoors

- a. Nominal four (4") inches square, 2 1/8" deep, with raised cover unless otherwise indicated on drawings. Gangable boxes shall not be used.

10. Lighting Fixture Box

- a. Four (4") inch octagon with 3/8" fixture stud.
- b. For suspended ceiling work, four (4") inch octagon with removable backplate where required, and two (2) parallel bars for securing to the cross-furring channels and extend flexible conduit to each fixture.

11. Plug any open knockouts not utilized.

C. Sheet Steel Boxes Indoors

- 1. No. 12 USS gauge sheet steel for boxes with maximum side less than forty (40") inches, and maximum area not exceeding 1,000 square inches; riveted or welded ¾ inch flanges at exterior corners.
- 2. No. 10 USS gauge sheet steel for boxes with maximum side forty (40") to sixty (60") inches, and maximum area 1,000 to 1,500 square inches, riveted or welded ¾ inch flanges at exterior corners.
- 3. No. 10 USS gauge sheet steel riveted or welded to 1 ½ by 1 ½ by ¼" welded angle iron framework for boxes with a maximum side exceeding sixty (60") inches and more than 1,500 square inches in area.
- 4. Covers
 - a. Same gauge steel as box.
 - b. Subdivided single covers so no section of cover exceeds fifty (50) pounds.

- c. Machine bolts, machine screws threaded into tapped holes, or sheet metal screws as required; maximum spacing twelve (12”) inches.

5. Paint

- a. Rust inhibiting primer; ANSI No. 61 light gray finish coat.

6. Where size of box is not indicated, size to permit pulling, racking and splicing of cables.

D. Floor Boxes

1. General

- a. Class I, watertight, normal depth cast iron construction Type I, fully adjustable, for use in concrete.
- b. Single Gang Round type.
- c. Multiple Gang or Combination - Rectangular type partitions of separating power from communication sections.

2. Floor Box Covers

- a. Rugged construction, impervious to cleaning detergents.
- b. Compatible with floor covering.
- c. Brass or bronze for flush mounting.
- d. Providing continuous ground path to box.
- e. Provide carpet flange in carpeted areas.

PART 3 – EXECUTION

3.01 APPLICATION OF RACEWAYS

- A. The following applications must be adhered to except as otherwise required by Code. Raceways not conforming to this listing must be removed by this Contractor and replaced with the specified material at this Contractor’s expense.

- 1. Galvanized Rigid Steel (GRS) – Application: Use outdoors for above grade

installation, where exposed to mechanical injury, where specifically required, where required by codes and for all circuits in excess of 600 volts.

2. Use PVC coated rigid steel conduit (CGRS) for elbows and bends below grade, and vertical risers from below grade to above grade. Use CGRS for all entrance and exit to electrical handholes, 10' minimum.
3. Non-Metallic Conduit – Applications: Schedule 40 – Where specifically indicated on the drawings and for raceways in slab or below grade.
4. Wireways and Auxiliary Gutters – Application: Where indicated on the Drawings and as otherwise specifically approved.

3.02 RACEWAY SYSTEMS IN GENERAL

- A. Install capped bushings on raceways as soon as installed and remove only when wires are pulled. Securely tie embedded raceway in place prior to embedment. Lay out the work in advance to avoid excessive concentrations of multiple raceway runs.
- B. Locate raceways so that the strength of structural members is unaffected and they do not conflict with the services of other trades. Install one (1") inch or larger raceways, in or through structural members (beams, slabs, etc.) only when and in the manner accepted by the Engineer. Draw up couplings and fittings full and tight.
- C. Above-grade raceways to comply with the following:
 1. Install raceways concealed except at surface cabinets and for motor equipment connection in electrical and mechanical rooms. Install a minimum of six (6") inches from flues, steam pipes, or other heated lines. Provide flashing and counter-flashing for waterproofing of raceways, outlets, fittings, etc., which penetrate the roof. Route exposed raceways parallel or perpendicular to building lines with right-angle turns and symmetrical bends. Run concealed raceways in a direct line and, where possible, with long sweep bends and offsets. Provide sleeves in forms for new concrete walls, floor slabs, and partitions for passage of raceways. Waterproof sleeved raceways where required.
 2. Raceways shall not be run on roofs or exposed on the outside of the buildings unless specifically noted as exposed on the drawings or approved by the Engineer.
 3. Provide raceway expansion joints for exposed and concealed raceways with

necessary bonding conductor at building expansion joints and between buildings or structures and where required to compensate for raceway or building thermal expansion and contraction. Provide expansion fittings every 200 feet on outdoor conduit.

4. Provide raceway installation (with appropriate seal-offs, explosion-proof fittings, etc.) in special occupancy area, as required. Provide conduit seal-offs where portions of an interior raceway system pass through walls, ceiling, or floors that separate adjacent rooms having substantially different maintained temperatures, as in refrigeration or cold storage rooms.
5. Provide pull string in spare or empty raceways. Allow five (5) feet of slack at each end and in each pull box. Tie each end of the string to a washer or equivalent that does not fit into the conduit. Tag both ends of string denoting opposite end terminations location.

D. No raceway may be installed in a concrete slab or members except with the permission of the Structural Engineer and with the written consent of the Owner.

1. Conduits embedded in structural concrete slabs shall have an outside diameter less than one third of the thickness of the concrete slab and shall be installed entirely within the center one third of the concrete slab.
2. Raceways embedded in concrete slabs shall be spaced not less than eight (8") inches on centers and as widely spaced as possible where they converge at panels or junction boxes.
3. In no case will installation of raceways be permitted to interfere with the proper placement of principal reinforcement.
4. Raceways running parallel to slab supports, such as beams, columns, and structural walls, shall be installed not less than twelve (12") inches from such supporting elements.
5. To prevent displacement during concrete pour of lift slab, saddle supports for conduit, outlet boxes, junction boxes, inserts, etc., shall be secured with suitable adhesives.

E. Non-metallic raceway installation shall conform to the following:

1. All joints are to be made by the solvent cementing method using the material recommended by the raceway manufacturer. To insure good joints, components shall be cleaned prior to assembly.

2. Raceway cut-offs shall be square and made by handsaw or other approved means which does not deform the conduit. Raceway shall be reamed prior to solvent cementing to couplings, adapters, or fittings.
 3. Electrical devices that are served by PVC raceways shall be grounded by means of a ground wire pulled in the raceway.
 4. Bends shall be made by methods that do not deform or damage the conduit. The radii of field bends shall not be less than those established by the N.E.C.
 5. Raceway expansion fittings shall be provided where necessary. The position of the expansion fitting shall be adjusted proportional to the temperature at installation.
 6. Raceway supports shall be installed, in such a manner, to allow the PVC conduit to slide through the supports as the temperature changes.
 7. Elbows must be PVC coated rigid steel conduit.
- F. Raceways in hung ceiling shall be run on and secured to slab or primary structural members of ceiling, not to lathing channels or T-bars, Z-bars, or other elements which are the direct supports of the ceiling panels. Secure conduit firmly to steel by clips and fittings designed for that purpose. Install as high as possible, but not less than 1'-0" above hung ceilings.
- G. Exposed raceways shall be run parallel or at right angles with building lines. Secure raceway clamps or supports to masonry materials by toggle bolts, expansion bolts, or steel inserts. Install raceway on steel construction with approved clamps that do not depend on friction or set screw pressure alone.
- H. Clear raceway of all obstructions and dirt prior to pulling in wires or cables. This shall be done with ball mandrel (diameter approximately 85% of conduit inside diameter) followed by close fitting wire brush and wad of felt, or similar material. This assembly may be pulled in together with, but ahead of, the cable being installed. All empty raceways shall be similarly cleaned. Clear any raceway, which rejects ball mandrel.
- I. Support raceways at intervals no greater than ten (10) feet and with one support within three (3) feet of each coupling, box, fitting, or outlet box. Provide one support within three (3) feet of each elbow or bend.

3.03 OUTLET, JUNCTION AND PULL BOXES

- A. Provide outlet, junction and pull boxes as indicated on the drawings and required for the complete installation of the various electrical systems, and to facilitate proper pulling of wires and cables. J-boxes and pull boxes shall be sized per electrical code minimum. Boxes on empty conduit systems shall be sized as if containing conductors of #4 AWG.
- B. Install boxes and covers for wiring devices so that the wiring devices will be installed with a vertical orientation unless otherwise noted on the drawings.
- C. The exact location of outlets and equipment is governed by structural conditions and obstructions or other equipment items. When necessary, relocate outlets so that when fixtures or equipment are installed, they will be symmetrically located according to the room layout and will not interfere with other work or equipment. Verify final location of outlets, panels equipment, etc., with Architect.
- D. Back-to-back outlets in the same wall, or "thru-wall" type boxes not permitted. Provide twelve (12") inch (minimum) spacing for outlets shown on opposite sides of a common wall to minimize sound transmission. Provide twenty-four (24") inch (minimum) horizontal spacing for outlets shown on opposite sides of a fire rated wall to maintain fire rating.
- E. Fit outlet boxes in finished ceilings or walls with appropriate covers, set flush with the finished surface. Where more than one switch or device is located at one point, use gang boxes and covers unless otherwise indicated. Sectional switch boxes or utility boxes will not be permitted. Provide Series "GW" (Steel City) tile box, or as accepted, or a four (4") inch square box with tile ring in masonry walls, which will not be plastered or furred. Where drywall material is utilized, provide plaster ring. Provide outlet boxes of the type and size suitable for the specific application. Where outlet boxes contain two (2) or more 277 volt devices, or where devices occur of different applied voltages, or where normal and emergency devices occur in same box, provide suitable barrier.
- F. Pull Box Spacing
 - 1. Provide pull boxes so no individual conduit run contains more than the equivalent of four (4) quarter bends (360 degrees total).
 - 2. Conduit Sizes 1 ¼" and larger.
 - a. Provide boxes to prevent cable or wire from being excessively twisted, stretched, or flexed during installation.

- b. Provide boxes for medium voltage cables so that the maximum pulling tensions do not exceed cable manufacturer's recommendations.
 - c. Provide support racks for boxes with multiple sets of conductors do not rest on any metal work inside box.
 - 3. Conduit Sizes one (1") and smaller, low voltage wire and cable (maximum distances)
 - a. 200 feet straight runs.
 - b. 150 feet runs with one 90 degree bend or equivalent.
 - c. 125 feet runs with two 90 degree bends or equivalent.
 - d. 100 feet runs with three or four 90 degree bends or equivalent.

END SECTION 16 110

SECTION 16111

ELECTRICAL HANDHOLES

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Provide and install electrical handholes as indicated in the Specifications and Drawings.

1.02 RELATED WORK

- A. Section 16000 – Electrical General Provisions
- B. Section 16110 – Raceways and Boxes

1.03 SUBMITTALS

- A. Submit seven (7) copies and in accordance with 16000 for all products.

PART 2 PRODUCTS

2.01 MANUFACTURER

- A. Electrical handholes shall be Quazite as manufactured by Strongwell or equal.

2.02 PROPERTIES

- A. Boxes and covers shall be concrete gray and sustain a minimum vertical test load of 7,500#.
- B. All covers will have a minimum coefficient of friction of .50.
- C. Boxes will be constructed of polymer concrete. Plastic and fiberglass boxes will not be accepted.
- D. Boxes shall be stackable for extra depth.
- E. Enclosures, boxes, and covers are required to conform to all test provisions of ANSI/SCTE 77 for Tier 5 applications.
- F. The electrical handholes shall be UL Listed.
- G. The electrical handholes shall meet requirements of section 314.30 NEC70-2005.

PART 3 EXECUTION

3.01 GENERAL

- A. Handholes will be installed approximately where shown on the Drawings with the sizes shown. The exact location of each handhole shall be determined after careful consideration has been given to location of other utilities. The cover plate shall be engraved "Electric".
- B. Handholes shall have reinforced concrete collar which shall be poured around the box extensions as shown on the Drawings. Cable inside the box shall be installed with at least two feet of slack within the box. No cable or wire splices will be allowed in the handholes.

- C. Conduit entrances into the electrical handhole shall be PVC coated rigid steel (CGRS), and shall include ground bushings to connect the steel conduit to the supplementary grounding electrode in the handhole.

END SECTION 16 111

SECTION 16 115

SUPPORT DEVICES

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Continuous slot, bolted metal framing channels and all associated fittings and hardware.
- B. Trapeze type supports for cable tray, conduit, pipe and other similar systems.
- C. Framing members for support of raceway and equipment.
- D. Use of bolted metal framing as a surface metal raceway.

1.02 REFERENCES

- A. ASTM A123 - Specification for Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars, and Strip
- B. ASTM A653 - General Requirements for Steel Sheet, Zinc-Coated Galvanized by the Hot-Dip Process
- C. ASTM A1011 - Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability
- D. ASTM F1136 – Standard Specification for Chromium/Zinc Corrosion Protective Coatings for Fasteners
- E. ASTM A907 - Standard Specification for Steel, Sheet and Strip, Heavy-Thickness Coils, Carbon, Hot-Rolled, Structural Quality

- F. ASTM B633 - Specification for Electrodeposited Coatings of Zinc on Iron and Steel
- G. MFMA - Metal Framing Manufactureres Association
- H. ANSI/NFPA 70– National Fire Protection Association (National Electrical Code)

1.03 SUBMITTALS

- A. Submit seven (7) copies and in accordance with 16000.
- B. Submit drawings of strut and accessories including clamps, brackets, hanger rods, and fittings.
- C. Submit manufacturer's product data on strut channels including, but not limited to, types, materials, finishes, gauge thickness, and hole patterns. For each different strut cross-section, submit cross sectional properties including Section Modulus (S_x) and Moment of Inertia (I_x).

1.04 QUALITY ASSURANCE

- A. Manufacturers: Firms regularly engaged in the manufacture of bolted metal framing of the types required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. NEC Compliance: Comply with the latest revision NFPA 70 - Article 352 "Surface Metal Raceways and Surface Nonmetallic Raceways".
- C. UL Compliance: Comply with UL "Standard for Surface Metal Raceway and Fittings", UL 5.
- D. Bolted framing channels and fittings shall have the manufacturers name, part number, and material heat code identification number stamped in the part itself for identification. Material certification sheets and test reports must be made available by the manufacturer upon request.
- E. Bolted framing channels and fittings shall have the manufacturers name, part number, and material heat code identification number stamped in the part itself for identification. Material certification sheets and test reports must be made available by the manufacturer upon request.

1.05 DELIVERY AND STORAGE

- A. Deliver strut systems and components carefully to avoid breakage, denting, and scoring finishes. Do not install damaged equipment.
- B. Store strut systems and components in original cartons and in clean dry space; protect from weather and construction traffic.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Cooper B-Line or equal.

2.02 STRUT CHANNELS AND COMPONENTS

- A. Strut shall be 1-5/8 inches wide in varying heights and welded combinations as required to meet load capacities and designs indicated on the Drawings.
- B. Materials and Finish: Material and finish specifications for each strut type are as follows:
 - 1. Aluminum: Strut shall be manufactured of extruded aluminum alloy 6063-T6. All fittings and hardware shall be zinc plated according to ASTM B633 (SC3 for fittings, SC1 for threaded hardware) for indoor use only. For outdoor use, all fittings and hardware shall be stainless steel Type 304.
 - 2. Hot-dip Galvanized Steel: Strut shall be made from steel meeting the minimum mechanical properties of ASTM A1011 SS, Grade 33 and shall be hot-dip galvanized after fabrication in accordance with ASTM A123. Fittings shall be manufactured from steel meeting the minimum requirements of ASTM A907 SS, Grade 33, and hot-dip galvanized after fabrication in accordance with ASTM A123. All hardware shall be stainless steel Type 304 or chromium zinc ASTM F1136 Gr. 3. All hot-dip galvanized after fabrication products must be returned to point of manufacture after coating for inspection and removal of all sharp burrs.
 - 3. Stainless Steel: All strut, fittings and hardware shall be made of AISI Type 304 stainless steel as indicated.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install strut in accordance with MFMA-102 'Guidelines for the Use of Metal Framing'; in accordance with equipment manufacturer's recommendations, and

with recognized industry practices.

- B. All nuts and bolts shall be tightened to the following values:

<u>Bolt Size</u>	<u>Torque (ft-lbs)</u>
1/4 - 20	6
5/16 - 18	11
3/8 - 16	19
1/2 - 13	50

**END SECTION 16 115
SECTION 16120**

WIRE AND CABLE

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall provide under this section of the Specifications all materials, labor, equipment, tools and supplies for the installation of wire and cable for a complete installation.

1.02 RELATED WORK

- A. Conduits and raceways are specified in Section 16110.

1.03 SUBMITTALS

- A. Submit seven (7) copies and in accordance with 16000, including the following minimum information:
1. Manufacturer product data.

PART 2 PRODUCTS

2.01 GENERAL

- A. Wire and cable shall meet all standards and specifications applicable, and shall be in conformance with the latest edition of the NEC. Insulated wire and cable shall have size, type of insulation, voltage and manufacturer's name permanently marked on outer covering at regular intervals not exceeding four feet. Wire and cable shall be delivered in complete coils or reels with identifying tags, stating size, type of insulation, etc.

- B. Wire and cable shall be suitably protected from weather and other damage during storage and handling, and shall be in first-class condition after installation.
- C. Wire sizes shall be No. 12 AWG minimum, except as specified for control and instrumentation circuits.
- D. Conductors shall be 98 percent conductivity soft drawn copper, ASTM B8 for stranded conductors.
- E. Wire and cable shall be factory color-coded with a separate color for each phase and neutral used consistently throughout the system. The color code below shall be used unless otherwise specified:

<u>Phase</u>	<u>480Y/277V</u>	<u>208/120V</u>
A	Brown	Black
B	Orange	Red
C	Yellow	Blue
N	Gray	White
G	Green	Green

- F. Control conductors shall be colored red for 120V circuits with white for neutral. Control conductors shall be colored blue for low voltage DC circuits, 24 volts and below. Yellow conductors shall be used for separately powered control circuits entering a control enclosure.
- G. All conductors shall be rated 600 volts, unless otherwise specified or shown on the drawings, or for electronic or communication use.

2.02 BUILDING WIRE

- A. NEC type THHN/THWN shall be used for lighting, receptacles, and all circuits not exceeding 150 volts to ground.
- B. NEC type THHN/THWN shall be used for all circuits above 150 volts to ground. NEC type XHHW shall be used for cable sizes 250MCM and larger for circuits above 150 volts to ground.

2.03 CONNECTORS

- A. Joints on branch circuits shall occur only where such circuits divide as indicated on plans and shall consist of one through circuit to which shall be spliced the branch

from the circuit. No splices shall be made in conductor except at outlet boxes, junction boxes, or splice boxes.

- B. All joints or splices for #10 AWG or smaller shall be made with UL approved wire nuts or compression type connectors
- C. All joints or splices for #8 AWG or larger shall be made with a mechanical compression connector. After the conductors have been made mechanically and electrically secure, the entire joint or splice shall be covered with Scotch #33 tape or approved equal to make the insulation of the joint or splice equal to the insulation of the conductors. The connector shall be UL approved.

PART 3 EXECUTION

3.01 INSTALLATION

- A. All wire and cable shall be continuous from origin to panel or equipment termination without splices unless otherwise specified. No splices shall be allowed in handholes below grade.
- B. No more than two conductors shall be installed under terminals for control and instrumentation.

3.02 TESTING

- A. Test all circuits with a megohm meter after installation. Submit a written report to the Engineer. Tests shall be performed at 1000 volts.

END SECTION 16 120

SECTION 16 250

GROUNDING AND BONDING

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish and install grounding systems in compliance with NEC Article 250.

1.02 SUBMITTALS

- A. Submit seven (7) copies and in accordance with 16000.

PART 2 PRODUCTS

2.01 GENERAL

- A. Provide and install supplementary grounding electrodes at lighting pole locations and other locations as shown on the Drawings.

2.02 SUPPLEMENTARY GROUNDING ELECTRODES

- A. All supplementary grounding electrodes shall be 5/8" x 10', copper clad.

2.03 GROUND CONNECTIONS AND BONDING

- A. All conductor to conductor, conductor to ground rod and conductor to structure connections of #6 AWG and larger sized conductors shall be permanent exothermic welded connections. All grounding connections to equipment shall use bolted lugs.
- B. All connections of #8 AWG and smaller and all connections to conduit, equipment or other items where the ground conductor must be removable shall be made using mechanical connections.
- C. All mechanical ground connectors shall be UL listed.
- D. All separately derived voltages shall be bonded to the service ground.

PART 3 EXECUTION

3.01 GENERAL

- A. The CONTRACTOR shall provide a permanent and continuous grounding path for all circuits and equipment of all system neutrals at the main disconnect. The path must be of sufficient capacity to safely transmit available fault current.

END SECTION 16 250

SECTION 16 460

TRANSFORMERS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Provide and install a dry-type distribution transformer to step down the 480V single phase electrical service to 120/240V single phase for the press box, as shown on the Drawings.
- B. The press box has a load center provided with the building. The Contractor does not need to furnish this load center.

1.02 REFERENCE SPECIFICATIONS

- A. NFPA 70 – National Electrical Code
- B. NEMA ST20
- C. Underwriters Laboratories (UL) 1561

1.03 SUBMITTALS

- A. Submit manufacturer data sheets in accordance with project specifications.

1.04 STANDARDS

- A. Transformers 1000 kVA and smaller shall be listed by UL.
- B. Conform to the requirements of ANSI/NFPA 70.
- C. Transformers are to be manufactured and tested in accordance with NEMA ST20.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Transformers shall be as manufactured by Square D, Siemens, General Electric, or equal.

2.02 RATINGS

- A. All insulating materials are to exceed NEMA ST20 standards and be rated for 220 degrees C UL component recognized insulation system.
- B. The maximum temperature of the top of the enclosure shall not exceed 50 degree C rise above a 40 degree C ambient.
- C. The transformer(s) shall be rated as indicated in the following schedule:
 - 1. Identification Number(s)
 - 2. kVA Rating
 - 3. Voltages
 - 4. Phase
 - 5. Frequency
- D. The transformer(s) shall be single phase, 480 volt primary, 120/240 volt secondary, and provided with six (6) 2.5% taps, two positive and four negative.

2.03 CONSTRUCTION

- A. Transformer coils shall be of the continuous wound construction and shall be impregnated with nonhygroscopic, thermosetting varnish.
- B. All cores to be constructed with low hysteresis and eddy current losses. Magnetic flux densities are to be kept well below the saturation point to prevent core overheating. There shall be no metal-to-metal contact between the core and coil and the enclosure except for a flexible safety ground strap. Sound isolation systems requiring the complete removal of all fastening devices will not be acceptable.
- C. The transformer enclosures shall be ventilated and be fabricated of heavy gauge, sheet steel construction. The entire enclosure shall be finished utilizing a continuous process consisting of degreasing, cleaning and phosphatizing, followed by electrostatic deposition of polymer polyester powder coating and baking cycle to provide uniform coating of all edges and surfaces. The coating shall be UL recognized for outdoor use. The coating color shall be ANSI 49.

2.04 SOUND LEVELS

- A. Sound levels shall be warranted by the manufacturer not to exceed the following:

15 to 50 kVA – 45 dB.

2.05 ENCLOSURES

- A. The transformer enclosure shall be rated NEMA 3R for outdoor installation.

PART 3 EXECUTION

3.01 GENERAL

- A. Installation of the transformer shall be coordinated with other equipment and installed on concrete pad.
- B. Ground all separately derived systems according to NEC.

END SECTION 16 460

SECTION 16 471

PANELBOARDS AND MODIFICATIONS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish and install modifications and additions to existing distribution panelboards as specified herein and where shown on the associated Drawings. The main power panelboard, 277/480V, 1200A I-Line from Square D is an HCR-U configuration. The circuit breaker additions to this panelboard must be outfitted with I-Line mounting adapters. Spare space exists on the right side distribution section.
- B. The press box has a load center provided with the building. The Contractor does not need to furnish this load center.
- C. New branch breakers must be supplied for each of the four (4) stadium pole light assemblies. These breakers will feed either the lighting contactor panel (HID lighting system) or directly to the pole assembly (LED lighting system). A new branch breaker will be supplied for the single phase transformer to feed the press

box. A new branch breaker will also be supplied for the area lighting. All new breakers will be 100A frame, Square D FA series, with trip setting as shown on the Drawings. Six (6) total breakers shall be provided and installed.

1.02 REFERENCE SPECIFICATIONS

The panelboards and circuit breakers referenced herein are designed and manufactured according to the latest revision of the following specifications.

- A. NEMA PB 1 – Panelboards
- B. NEMA PB 1.1 – Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less
- C. NEMA AB 1 – Molded Case Circuit Breakers
- D. NEMA KS 1 – Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum)
- E. UL 50 – Enclosures for Electrical Equipment
- F. UL 67 -- Panelboards
- G. UL 98 -- Enclosed and Dead-front Switches
- H. UL 489 – Molded Case Circuit Breakers and Circuit Breaker Enclosures
- I. CSA Standard C22.2 No. 29-M1989 – Panelboards and Enclosed Panelboards
- J. CSA Standard C22.2 No. 5-M91 – Molded Case Circuit Breakers
- K. Federal Specification W-P-115C – Type I Class I
- L. Federal Specification W-P-115C – Type II Class I
- M. Federal Specification W-C-375B/Gen. – Circuit Breakers, Molded Case, Branch Circuit and Service
- N. Federal Specification W-C-865C – Fusible Switches
- O. NFPA 70 – National Electrical Code (NEC)
- P. ASTM – American Society of Testing Materials

1.03 SUBMITTAL AND RECORD DOCUMENTATION

- A. Approval documents shall include drawings. Drawings shall contain overall panelboard dimensions, interior mounting dimensions, and wiring gutter dimensions. The location of the main, branches, and solid neutral shall be clearly shown. In addition, the drawing shall illustrate one-line diagrams with applicable voltage systems.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Inspect and report concealed damage to carrier within their required time period.
- B. Handle carefully to avoid damage to panelboard internal components, enclosure, and finish.

- C. Store in a clean, dry environment. Maintain factory packaging and, if required, provide an additional heavy canvas or heavy plastic cover to protect enclosure(s) from dirt, water, construction debris, and traffic.

1.05 WARRANTY

- A. Manufacturer shall warrant specified equipment free from defects in materials and workmanship for the lesser of one (1) year from the date of installation or eight (18) months from the date of purchase.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable manufacturers shall be Square D, no equal.

2.02 SQUARE D I-LINE PANELBOARD

- A. Molded Case Circuit Breakers – Mains and Branches
 1. Circuit breakers shall be constructed in accordance with the following standards.

UL 489	Federal Specification W-C-375B/GEN
NEMA AB1	CSA 22.2, No. 5-M91
IEC 157-1	BS 4752
 2. Circuit breakers shall be constructed using glass reinforced polyester insulating material providing superior dielectric strength. Current-carrying components shall be completely isolated from the handle and the accessory mounting area.
 3. Circuit breakers shall have an overcenter, trip-free, toggle operating mechanism which will provide quick-make, quick-break contact action. The circuit breaker shall have common tripping of all poles.
 4. Circuit breakers shall have a push-to-trip button for maintenance and testing purposes.
 5. Circuit breaker escutcheon shall have international I/O markings, in addition to standard ON/OFF markings. Circuit breaker handle accessories shall provide provisions for locking handle in the ON or OFF position.

6. Breaker faceplate shall indicate rated ampacity. Breaker faceplate shall indicate UL and IEC certification standards with applicable voltage systems and corresponding AIR ratings.
7. Circuit breakers shall be factory sealed and shall have a date code on the face of the circuit breaker. Poles shall be labeled with respective phase designations.
8. Standard construction circuit breakers shall be UL Listed for reverse connection without restrictive line or load markings. Circuit breakers shall be suitable for mounting and operating in any position.
9. Manufacturer shall provide time/current characteristic trip curves (I_p and I_{2T} let-through curves for true current limiting circuit breakers only) for each type of circuit breaker.
10. Lugs shall be UL Listed to accept solid or stranded copper conductors only. Lugs shall be suitable for 90 degree C rated wire, sized according to the 75 degree C temperature rating per NEC Table 310-16. Lug body shall be bolted in place; snap-in designs are not acceptable.
11. Circuit breakers shall be UL Listed for use with the following accessories: Shunt Trip, Under Voltage Trip, Auxiliary Switch, Alarm Switch, Ground Fault Shunt Trip, Electrical Operators, Cylinder Locks, Mechanical Lugs Kits, Compression Lugs Kits, and Handle Accessories.
12. 480V rating.
13. Two pole.
14. I-Line mounting for breaker line side, lug for load side.
15. 100A FA frame or equivalent, trip ratings as shown on the Drawings.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install panelboards in accordance with manufacturer's written instructions, NEMA PB 1.1 and NEC standards.
- B. Coordinate the panelboard bus ratings and circuit breaker coordination rating with the available fault current.

3.02 FIELD QUALITY CONTROL

- A. Inspect complete installation for physical damage, proper alignment, anchorage, and grounding.
- B. Measure steady state load currents at each panelboard feeder; rearrange circuits in the panelboard to balance the phase loads within 20% of each other. Maintain proper phasing for multi-wire branch circuits.
- C. Check tightness of bolted connections and circuit breaker connections using calibrated torque wrench or torque screwdriver per manufacturer's written specifications.

END SECTION 16 471

SECTION 16 500

AREA LIGHTING FIXTURES

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Provide, install, and test all lighting fixtures as specified herein.
- B. This specification covers the pole mounted lights that illuminate the pedestrian traffic area into the football stadium.

1.02 RELATED WORK

- A. Conduits and Raceways are specified in Section 16110
- B. Lighting Controls are specified in Section 16510

1.03 SUBMITTALS

- A. Submit in accordance with 16000.
- B. Submit manufacturer data sheets listing all accessories.

PART 2 PRODUCTS

2.01 AREA POLE LIGHTING

- A. This article covers area lighting fixture A.
- B. The fixture shall be LED, 4K Kelvin color temperature, 480V input, 175 input watts maximum, low tilt range of 0-18 degrees, architectural mounting, wide roadway optics, with black finish.
- C. The fixture must provide 16350 lumens minimum and shall meet the lighting distribution requirements specified below. The lighting layout utilized a 4 chip design with 1050MA drive current.
- D. The fixture shall have glass optics rated at IP66 to minimize dirt depreciation.
- E. The fixture shall have an electronic driver expected life of 100,000 hours at 25C.
- F. The fixture shall include integral ANSI/IEEE C62.4 Category C (10kV/5kA) surge protection.
- G. The fixture shall be low copper die cast aluminum with epoxy basecoat and polyester topcoat finish.
- H. The fixture shall have a removable power door to facilitate installation and maintenance.
- I. The fixture shall include stainless steel latches and corrosion resistant hardware.
- J. The fixture shall attach to a 5" square steel pole with architectural adapter.
- K. The fixture shall be capable of a 0 to 18 degree tilt, but will initially be set at 0 degrees.
- L. The assembly shall be fully warranted for five years.
- M. The fixture shall have an asymmetric lighting distribution performance, as demonstrated in the manufacturer Isofootcandle plot, of 0.5 foot-candles (fc) that extends 3.0 times the unit mounting height in the X-direction of the plot, and must maintain the distribution for 1.0 times the unit height in the Y-direction of the plot. These are minimum requirements that have been utilized for the project layout.

- N. The fixture shall have an asymmetric lighting distribution performance, as demonstrated in the manufacturer Isofootcandle plot, of 50% Max Cd that extends 3.5 times the unit mounting height in the X-direction of the plot, and must maintain the distribution for 0.75 times the unit height in the Y-direction of the plot. These are minimum requirements that have been utilized for the project layout.
- O. The fixture shall be equal to Holophane Mongoose Model # MGLED 4 4K AH W L A K. Fixture quantities are shown on the Drawings. The fixture shall be supplied with a 480V photocell control for dusk to dawn operation.
- P. All fixtures shall be installed on 5" square steel poles, 20', painted to match the fixture color. See the Drawings for base and anchor details. Provide pole top style drilling for one unit. The mounting drill pattern shall be 3" from the top of pole. The pole handhole shall be installed at 180 degrees, with 2"x4" minimum cover, and be located at 2' from bottom of the pole. The handhole shall include tamper resistant fasteners.
- Q. The pole shaft shall be one piece, low carbon alloy steel per ASTM A595, Grade A. The pole base shall be ASTM A36 and shall telescope the pole shaft and be circumferentially welded top and bottom. The pole base covers shall be two piece, interlocking, and painted to match the pole finish. The pole shall be provided with a pole cap.
- R. The pole shall be equal to Holophane SSS2055C, 5" square x 11 gauge wall.

PART 3 EXECUTION

3.01 GENERAL

- A. Each fixture shall be a completely furnished unit with all components, mounting, and hanging devices necessary for the proper installation of the fixture in the location as shown on the Drawings.
- B. Coordinate all locations with other trades.

END SECTION 16 500

END SECTION D-9 Site Electrical System

Section D-10 Sports Field Lighting Systems

SECTION 16 552

SPORTS FIELD LIGHTING SYSTEMS

PART 1 – GENERAL

1.01 SCOPE OF WORK

- A. Provide and install the football field lighting package as specified herein.
- B. Proposals shall be provided for both HID and LED sportslighting systems.
- C. Electrical systems for the lighting package are supplied and installed by others.

1.02 RELATED WORK

- A. Section 16000 – Electrical General Provisions
- B. Project Drawings

1.03 SUBMITTALS

- A. Submit seven (7) copies and in accordance with 16000, to include the following data.
- B. Photometric design layout for each scene level, showing point by point initial footcandle levels.
- C. Photometric design layout for each scene level showing point by point maintained footcandle levels at 80 percent of rated lamp life.
- D. Manufacturer guarantee that required light levels will be met.
- E. Manufacturer guarantee that the lighting control systems meets the specification.
- F. Manufacturer warranty of equipment and service.
- G. Manufacturer guarantee of energy consumption levels.
- H. Equipment data sheets on all proposed lighting equipment, including controls, luminaires, lamps, ballasts, pole assemblies, and engineered foundation.

- I. Statement of any exceptions or discrepancies to this specification.
- J. The successful bidder shall submit drawings for each pole foundation, signed and sealed by an Arkansas registered professional engineer. The drawings shall include depth, diameter, and required reinforcement.
- K. The photometric design layouts shall be on a 30 foot by 30 foot square grid, and shall indicate the ballast factor used, the max to min ratio of the primary playing area, the coefficient of variance of the primary playing area, the greatest uniform gradient in the primary playing area, the mounting height to the lowest row of luminaires, the number of luminaires at each pole location, the kilowatt consumption of the lighting system, and the lamp lumens used in the calculations.
- L. The layouts shall include a light aiming point plan, indicating the horizontal and vertical degree setting of each fixture on each of the pole assemblies.

1.04 REFERENCES

- A. IES RP-6-2001, Current Recommended Practice for Sports Lighting, current edition

1.05 DEFINITIONS

- A. Light Loss Factor (LLF): $LLF=BF*LTF*LLD*LDD$, where BF equals Ballast Factor, LTF equals Lamp Tilt Factor, LLD equals Lamp Lumen Depreciation, and LDD equals luminaire dirt depreciation.
- B. Coefficient of Variance (CV) shall be as calculated in IES RP-6, section 2.3.2.
- C. Uniformity gradient (UG) is the measure of the rate of change of illuminance expressed as a ratio between the illuminance level of adjacent measuring points on a uniform grid.
- D. Initial illuminance level shall be at 100 hour burn-in period.
- E. Maintained illuminance level shall be at 80 percent rated lamp life.
- F. Primary playing area is the area including the playing field and extending 15 feet beyond the boundaries of the playing field in all directions.

1.06 DESIGN REQUIREMENTS

- A. The HID initial illuminance level shall be calculated using the appropriate ballast factor for the lamp/ballast combination in accordance with the manufacturer spec sheet. Initial light levels must be 10% higher than specified maintained light levels.
- B. The initial illuminance level shall be calculated with a LLD value of 1.0.
- C. The maintained illuminance level shall be calculated using the published lumen output of the lamp at 80% of the rated lamp life in accordance with the manufacturer spec sheet. The maintained level shall also be calculated using the combined LLF.
- D. The maintained illuminance level shall be calculated using the ballast factor for the lamp/ballast combination per the manufacturer spec sheet.
- E. The maintained illuminance level shall be calculated using LTF value per the manufacturer spec sheet, LLD value of 0.9, and LDD value of 0.95.
- F. Glare and spill light control shall be achieved by internal and external hardware. Glare shall be minimized from the lamp and the reflector when standing in front of the lighting assembly beyond the property line and when standing 90 degrees perpendicular to the lighting assembly beyond the property line.
- G. The structural strength of the luminaire assembly as shown in the manufacturer submittal shall be capable of forces equal to 90MPH wind speeds based on AASHTO structure design criteria.
- H. The calculated horizontal average maintained illuminance level for the primary playing areas shall be as follows:
 - I. The football field shall be 50 footcandles average maintained illuminance for games.
 - J. The track surrounding the football field shall be 10 footcandles average maintained.
 - K. The home and visitor bleachers shall be 5 footcandles average maintained.
 - L. The coefficient of variance for the primary playing area shall not exceed 0.12.
 - M. The maximum to minimum uniformity ratio shall not exceed 2.0:1.
 - N. The uniformity gradient of the primary playing area shall not exceed 1.9.
 - O. The lighting design shall be based on four (4) poles.

- P. The mounting heights shall be 70 feet to the bottom row of fixtures on all poles.
- Q. The illumination trespass on neighboring property shall not exceed local ordinances or the following, whichever is more stringent:
 - 1. Single or two family residential, 0.5 horizontal and 1.0 vertical footcandles.
 - 2. Multiple family, 0.5 horizontal and 1.0 vertical footcandles.
 - 3. Non-residential, 3.0 horizontal and 3.0 vertical footcandles.
 - 4. Light industrial, 5.0 horizontal and 5.0 vertical footcandles.

1.07 QUALITY ASSURANCE

- A. Bidders who do not possess the necessary qualifications, including personnel training, financial capacity, documented project experience, and other requirements herein shall be disqualified.
- B. The Owner reserves the right to make all investigations deemed necessary to determine the ability of the bidder to do the work. The bidder shall supply all information requested by Owner or the bid will be rejected. The Owner reserves the right to reject any bid if the evidence submitted by, or investigation of, such bidder fails to satisfy the Owner that such bidder is qualified to complete the work. Conditional bids shall not be accepted. The Owner reserves the right to reject any subcontractor used by the bidder for the same reasons outlined above.
- C. The lighting system supplier must have in house personnel for sports lighting design engineering, sales, and support. The supplier shall maintain personnel to supervise the installation and to conduct system startup, Owner training, and to provide service throughout the warranty period.
- D. The bidder shall provide evidence of at least ten sports lighting installations similar to this project, and shall have been in business at least five years under the same company name.

1.08 WARRANTY

- A. The lighting system manufacturer must repair or replace any part of the sports lighting fixture or wiring that proves to be defective for a period of ten years. The warranty must include the cost of both labor, equipment, and materials. The warranty must include the lighting system, lamps, and structural system.
- B. Warranty excludes fuses, storm damage, vandalism, abuse, and unauthorized repairs

or alternations.

PART 2 – PRODUCTS

2.01 POLE FOUNDATIONS

- A. The pole foundations shall be designed for allowable stresses in accordance with latest AASHTO standards. The foundations must be designed by a structural engineer, licensed in the state of Arkansas, based on the wind speed criteria of these specifications.

2.02 SPORTS LIGHTING POLES

- A. Both the HID and LED sports lighting pole system shall consist of concrete encased galvanized steel poles with a factory pre-wired crossarm assembly. All wiring/connections should be factory assembled from the fixture mounting location to the base of the pole. No field connections, plugs, or Brad-Harrison type connectors are allowed. Strain relief devices must be factory installed in pre-wired crossarm assembly to ensure no weight or tension is placed on electrical connections.
- B. The sports lighting pole structure shall consist of a modular pole assembly. This shall consist of no more than two shaft components. No single component shall weigh over 1500 pounds.
- C. The entire sports lighting system must be supplied by a single company who underwrites the warranty.
- D. The pole shaft structure shall be designed for the combined effective projected area (EPA) and weight of all applicable appurtenances and fixtures. Concrete poles or pole sections are not allowed.
- E. Each section of the pole shaft structure shall be of single-ply material and be made from a single sheet of steel with no circumferential welded splices.
- F. The pole shaft cross section shall be round. The pole shaft sections shall be high strength steel meeting the requirements of ASTM A570 GR65 and/or ASTM A595 GR55.
- G. Each slip joint shall be assembled in the field by telescoping the upper female section over the lower male section by a minimum lap of 1.5 times the inside diameter of the female section. The female telescoped area must be welded both inside and out to ensure 100% weld penetration in an area equal to the minimum slip distance plus 10”.

- H. The embedment shaft section of the pole structure shall be a single piece round tapered shaft section. The taper rate and material cross section properties shall match the adjoining section.
- I. The lower shaft section shall be embedded into the earth a minimum distance of 10% of the free standing height of the structure plus 2' or as recommended by the Engineer.
- J. The shaft section shall be galvanized in accordance with ASTM A123 specifications. The entire embedded shaft portion shall be externally coated with epoxy coating up to 6" above the ground line for corrosion prevention.
- K. Each pole shall have pole climbing steps and safety cages at the top of the pole for maintenance work.
- L. The pole foundation shall be 3000 psi concrete minimum or as recommended by the Engineer.

2.03 HID LUMINAIRES

- A. Luminaires shall comply with current NEMA standard publication "Outdoor Floodlighting Equipment" as applicable with appropriate mounting hardware. Luminaires shall be provided with electrical component housing and optical assembly as an integral unit.
- B. Each integral flood light shall be a complete assembly of lamp, ballast, reflector, and housing to allow each floodlight to be removed/replaced as a single unit.
- C. For adequate heat dissipation, each ballast shall be mounted within its own enclosure at the floodlight and installed to provide maximum surface area exposure of the enclosure to ambient air. Integral ballast housing at each luminaire shall be light weight, corrosion resistant, hydroformed aluminum or die cast ballast housing and shall be thermally and mechanically isolated from the lamp socket and its associated operational heat build up.
- D. The socket housing shall be cast aluminum, thermally and mechanically removed from direct contact with the ballast enclosure. The socket shall have a white glazed porcelain body. The leads shall be welded directly to the copper alloy, nickel plated screw shell and center contact. The socket leads shall be #16 AWG 200 degrees C, 600V, silicone. The optical assembly shall mount directly to the socket assembly by a four hole key-hole slot pattern. A once piece closed cell, vulcanized silicone gasket shall be between the socket and optical housing providing weather tight integrity. The socket housing shall provide the vertical aiming function of the optical assembly and

shall be equipped with an anodized aluminum vertical degree aiming scale and repositioning stop. Vertical aiming shall be accomplished by loosening the aiming scale set screw.

- E. The reflectors shall be anodized spun aluminum with galvanized steel mounting support ring.
- F. The luminaires shall be UL Listed with a minimum reflector diameter of 20 inches. The lens shall be thermal shock and impact resistant, clear tempered glass sealed to the reflector by high temperature gaskets. The lens ring shall be stainless steel secured by a minimum four point latching and stainless steel hinge.
- G. All external screws and fasteners shall be stainless steel.
- H. All external surfaces and components not of stainless steel shall be painted to match the pole and crossarm assembly. The finish shall be cured polyester enamel, electrostatically applied.
- I. The luminaires shall be UL Listed for wet location and 35 degrees C ambient operation.

2.04 HID LAMPS

- A. The lamps shall be 1500 watt metal halide rated for 3000 hour life and shall meet ANSI designation BT56 and be manufactured to industry standards, available through standard electrical wholesalers.
- B. Lamps shall be as manufactured by GE, EYE, or Sylvania.

2.05 HID BALLAST

- A. The ballast shall be integral mounted to optimize heat dissipation. Ballasts shall be 100% copper wound peak load autotransformer. Ballast losses shall not exceed 110 watts for 1500 watt lamps. The ballast and capacitor shall be heat sunked to the ballast housing.

2.06 LED LUMINAIRES

- A. The LED system and luminaires shall provide equal form, fit, function, and performance as outlined in this specification for the HID system. The LED luminaires shall utilize 750 watt sport LED units with visor.

2.07 CONTROLS

- A. The Contractor shall provide a lighting contractor control panel for the HID system. The control panel shall include four (4) contactors. Each contactor shall provide power to one of the sportslighting poles. The contactors shall be directly fed from a branch circuit breaker in the panelboard modifications specification. Each lighting contactor shall have an HOA switch on the front of the enclosure. In Hand mode, the contactors energize. In Auto mode, the contactors are energized by the remote controls from the lighting system supplier.
- B. The Contractor shall wire the panelboard modifications directly to the four (4) sportslighting poles for the LED system. The lighting system supplier shall supply and install a wireless mesh system that controls and energizes the quantity of fixtures required by the Owner. The controls shall be internet/wireless app based.

PART 3 – EXECUTION

3.01 DELIVERY

- A. The entire sports lighting system shall be delivered to the jobsite by the sports lighting supplier. All materials and components shall arrive the same day. The supplier shall off load all material and stage required material at each pole location.

3.02 ERECTION

- A. Erection of the poles shall be in accordance with manufacturer instructions.
- B. Installation of the light fixtures shall be in accordance with manufacturer instructions.

3.03 CONSTRUCTION

- A. Each pole shall be grounded. The ground resistance shall be no more than 2.5 ohms. Ground terminals shall be located not less than 2 feet from the pole.

3.04 SITE TESTS

- A. Testing for acceptance shall be by the sports lighting supplier.
- B. Test methods, instruments, and test intervals shall meet the Engineer and Owner approval prior to testing.
- C. Testing equipment shall be with Konica Minolta T-10 Illuminance Meter or approved equal. The equipment must be within calibration date.

- D. Testing shall occur with Engineer and Owner participation and must be scheduled at least two weeks prior to testing date.
- E. Horizontal illuminance readings shall be taken in accordance with IES Standard for Photometric Measurement of Area and Sports Lighting Installations.
- F. Measurements shall be taken at 36" above grade, with meter held horizontally.
- G. The Contractor shall take voltage, current, power, and power factor readings at each pole base to determine the operating condition.
- H. The measured values shall be within +/- 5% of the calculated values of the initial illuminance levels calculated.
- I. Failure to meet criteria shall require that the fixture be re-aimed and retested until satisfactory results are achieved. Any expense of re-aiming shall be at the expense of the Contractor or supplier, at no additional cost to the Owner.
- J. Failure to meet specified lighting levels must be corrected by the Contractor or supplier at no additional cost to the Owner.

END SECTION 16 552

END SECTION D-10 Sportsfield Lighting System

Section D-11 Fencing

CHAIN LINK FENCES AND GATES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Fence framework, fabric, and accessories.
 - 2. Excavation and anchorages for post bases.
 - 3. Manual gates and related hardware.

1.2 SUBMITTALS

- A. Submit the following under provisions of the Specifications.
- B. Product Data: Include descriptive literature and installation instructions.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with specifications, use products of one of the following:
 - 1. Allied Tube and Conduit Corp.
 - 2. Anchor Fence, Inc.
 - 3. United States Steel.
 - 4. Approved alternate manufacturer.

2.2 MATERIALS

- A. Framework:
 - 1. End, Corner, and Pull Posts: Galvanized steel; minimum sizes and weights as follows:
 - Up to 6 foot fabric height: 2.375 inch outside diameter pipe, 3.65 lbs/lin ft or 3.5 x 3.5 inch roll formed section, 4.85 lbs/lin ft. All fencing materials shall be Black PVC coated.
 - 2. Line Posts: Galvanized steel; minimum sizes and weights as follows:
 - Up to 6 foot fabric height: 1.90 inch outside diameter pipe, 2.70 lbs/lin ft; or 1.875 x 1.625 inch C-section, 2.78 lbs/lin ft. All fencing materials shall be PVC coated.
 - 3. Gate Posts: Galvanized steel; for single gate or one leaf of double gate, as follows:

Up to 6 foot height; 2.875 inch outside diameter pipe, 5.79 lbs/lin ft; or 3.5 x 3.5 roll formed section, 4.85 lbs/lin ft. All fencing materials shall be PVC coated.

4. Top Rail and Intermediate Rails: Galvanized steel, manufacturer's longest lengths. All fencing materials shall be PVC coated.
 - a. Typical: 1.66 inch outside diameter pipe, 2.27 lbs lin ft; or 1.625 x 1.25 inch roll formed section, 1.35 lbs/lin ft.
 - b. Couplings: Expansion type, approximately 6 inches long.
 - c. Attaching Devices: Means of attaching top rail securely to each gate, corner, pull, and end post.
- B. Accessories:
1. Sleeves: Galvanized steel pipe not less than 6 inches long and with inside diameter not less than 1/2 inch greater than outside diameter of pipe. Provide steel plate closure welded to bottom of sleeves of width and length not less than 1 inch greater than outside diameter of sleeve. All fencing materials shall be PVC coated.
 2. Tension Wire: 7 gage galvanized steel, coated coil spring wire, located at bottom of fence fabric. All fencing materials shall be PVC coated.
 3. Wire Ties: 11 gage galvanized steel. All fencing materials shall be PVC coated.
 4. Post brace assembly: Manufacturer's standard adjustable brace at end and gate posts and at both sides of corner and pull posts, with horizontal brace located at mid-height of fabric. Use same materials as top rail for brace, and truss to line posts with 0.375 inch diameter rod and adjustable tightener. All fencing materials shall be PVC coated.
 5. Post tops: Galvanized steel, weathertight closure cap for tubular posts, one cap for each post. Furnish cap with openings to permit passage of top rail. All fencing materials shall be PVC coated.
 6. Stretcher bars: Galvanized steel, one piece lengths equal to full height of fabric; with minimum cross section of 3/16 x 3/4 inch. Provide one stretcher bar for each gate and end post, and two for each corner and pull post. All fencing materials shall be PVC coated.
 7. Stretcher bar bands: Manufacturer's standard.
 8. Gate cross-bracing: 3/8 inch diameter galvanized steel adjustable length truss rods. All fencing materials shall be PVC coated.

- C. Gate Hardware:
 - 1. Swinging gate hardware:
 - a. Hinges: Size and material to suit gate size; offset to permit 180 gate opening. Provide 1-1/2 pair of hinges for each leaf over 6'-0" nominal height. All fencing materials shall be PVC coated.
 - b. Latch: Forked type or plunger-bar type to permit operation from both sides of gate, with padlock eye. All fencing materials shall be PVC coated.
 - 2. Double gate hardware: In addition to the above, provide gate stops for double gates, consisting of mushroom type flush plate with anchors set in concrete to engage center drop rod or plunger bar. Configure for use of one padlock to lock both gate leaves. All fencing materials shall be PVC coated.
 - 3. Sliding gate hardware: Provide manufacturer's standard heavy duty track, ball-bearing hanger sheaves, overhead framing and supports, guides, stays, bracing, and accessories required. All fencing materials shall be PVC coated.
- D. Fabric: No. 9 gage (0.148 nominal) galvanized steel wire in 2 inch mesh, with both top and bottom selvages knuckled. Gage of wire specified is for the metallic-coated core wire. All fencing materials shall be PVC coated.

2.3 SETTING MIXES

- A. Concrete: ASTM C94.
- B. Grout: Premixed, factory-packaged, non-staining, non-corrosive grout. See Section 03 30 00. Provide type especially formulated for exterior application.

2.4 GATE FABRICATION

- A. Fabricate swing gate perimeter frames of 1.90 inch outside diameter galvanized steel pipe. Provide horizontal and vertical members to ensure proper gate operation and for attachment of fabric, hardware, and accessories. Space frame members maximum 8'-0" apart.
- B. Assemble gate frames rigidly by welding or with special fittings and rivets. Use same fabric as for fence. Install fabric with stretcher bars at vertical edges. Bars may also be used at top and bottom edges. Attach stretchers to frame at not more than 15 inches on center. Install diagonal cross-bracing on gates as required to ensure frame rigidity without sag or twist.

2.5 FINISH

- A. All fencing materials shall be PVC coated, thermally fused and adhered to a primer that is thermally cured onto galvanized core wire. PVC coating color to be manufacturer's color (Black).
- B. Galvanize as follows:
 - 1. Fabric: Not less than 1.2 oz zinc/sq ft.
 - 2. Framing: Not less than 1.8 oz zinc/sq ft.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Space line posts 8'-0" on center maximum.
- B. Grade-set Posts:
 - 1. Drill or hand excavate.
 - 2. Post not in concrete curb, excavate each post hole to 12 inch diameter, or not less than four times diameter of post. Excavate approximately 3 inches lower than post bottom; set post bottom not less than 36 inches below finish grade.
 - 3. Hold post in position while placing, consolidating, and finishing concrete.
- C. Post in Concrete Curb: Anchor posts in concrete by means of core drill or pipe sleeves preset and anchored into concrete. After posts have been inserted into core void or sleeves, fill annular space between post and sleeve solid with grout, mixed and placed to manufacturer's recommendations.
- D. Top Rails: Run rail continuous through post caps, bending smoothly for curved runs. Provide expansion couplings as recommended by fencing manufacturer.
- E. Center Rails: Provide center rails where indicated. Install in one piece between posts and flush with post on fabric side, using offset fittings where necessary.
- F. Brace Assemblies: Install braces so posts are plumb with rod tension.
- G. Tension Wire: Install tension wires through post cap loops before stretching fabric and tie to each post cap with not less than 6 gage galvanized wire. Fasten fabric to tension wire using 11 gage galvanized steel hog rings spaces 24 inches on center.
- H. Fabric: Leave approximately 1 inch between finish grade and bottom selvage. Pull fabric taut and tie to posts, rails, and tension wires. Install fabric on security side of fence, and anchor to framework so fabric remains in tension after pulling force is released.

- I. Stretcher Bars: To secure end, corner, pull, and gate posts, thread through or clamp to fabric 4 inches on center and secure to posts with metal bands spaced 15 inches on center.
- J. Tie Wires:
 - 1. Use U-shaped wire conforming with diameter of pipe to which attached, clasping pipe and fabric firmly with ends twisted at least two full turns. Bend ends of wire to minimize hazards to persons or clothing
 - 2. Tie fabric to line posts with wire ties spaced 12 inches on center. Tie fabric to rails and braces with wire ties spaced 24 inches on center. Manufacturer's standard procedure will be accepted if of equal strength and durability.
- K. Fasteners: Install nuts for tension bands and hardware bolts on side of fence opposite fabric side. Peen ends of bolts or score threads to prevent removal of nuts.
- L. Gates: Install gates plumb, level, and secure for full opening without interference. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation.

TUBULAR STEEL FENCING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work included: Provide shop fabricated ferrous metal items, galvanized, primed and powder coated finish where indicated on the drawings, as specified, and as needed for a complete and proper installation. Work generally includes decorative metal fence and associated gates.

1.02 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this section.

1.03 SUBMITTALS

- A. Comply with pertinent provisions of the specifications

1. Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories.
2. Include erection drawings, elevations, and details where applicable.
3. Indicate welded connections using standard AWS welding symbols. Indicate net weld lengths.

1.04 PRODUCT HANDLING

- A. Comply with pertinent provisions of the specifications.

1.05 REFERENCES

- A. ASTM A36 - Structural Steel.
- B. ASTM A53 - Hot-Dipped, Zinc-coated Welded and Seamless Steel Pipe.
- C. ASTM A307 - Low-Carbon Steel Externally and Internally Threaded Fasteners.
- D. ASTM A366 - Cold-Rolled Carbon Steel Sheet, Commercial Quality.
- E. ASTM A446 - Steel Sheet, Zinc Coated (galvanized) by the Hot-Dip Process, Structural (Physical) Quality.
- F. ASTM A500 - Cold-formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
- G. ASTM A570 - Hot-Rolled Carbon Steel Sheet and Strip, Structural Quality.
- H. ASTM A591 - Steel Sheet, Cold-Rolled, Electrolytic Zinc-Coated.
- I. AWS D1.1 - Structural Welding Code.
- J. FA TT-P-31 - Paint, Oil: Iron Oxide, Ready Mix, Red and brown.
- K. FS TT-P-645 - Primer, Paint, Zinc Chromate, Alkyd Type.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Steel Sections: ASTM A36.

- B. Cold Rolled Steel: ASTM A366, Class I, matte finish.
- C. Cold Rolled Steel: ASTM A570.
- D. Stainless Steel: ASTM A304.
- E. Galvanized Structural Steel Sheets: ASTM A466, G90.
- F. Galvanized Sheet Steel: ASTM A591, Class C.
- G. Steel Tubing: ASTM A500, Grade B.
- H. Steel Piping: ASTM A53.
- I. Bolts, Nuts and Washers: ASTM A307.
- J. Welding Materials: AWS D1.1; type required for materials being welded.
- K. Primer: FS TT-P-31; for shop application and field touch up.
- L. Touch up primer for Galvanized Surfaces: FS TT-P-641.
- M. Concrete Inserts: Cast steel or malleable bolts, washers and shims; galvanized.

2.02 FABRICATION

- A. Verify dimensions on site prior to shop fabrication.
- B. Fabricate items with joints tightly fitted and secured.
- C. Fit and shop assemble in largest practical sections, for delivery to site.
- D. Grind exposed welds flush and smooth with adjacent finished surface. Ease exposed edges to small uniform radius.
- E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of structure, except where specifically noted otherwise.
- F. Make exposed joints butt tight, flush, and hairline.

- G. Supply components required for anchorage of metal fabrications. Fabricate anchorage and related components of same material and finish as metal fabrication, except where specifically noted otherwise.

2.03 DECORATIVE METAL FENCE

- A. ±6' High Ornamental Steel Fence.
1. 6' tall ornamental fence with 3" square, 14 ga. posts at 8' o.c. and 1", 18 ga. pickets at 7" o.c. with finials.
 2. Finish to be black powder coated; styling to be similar to "Estate" style "A" by Monumental Iron Works.
 3. Rails are to be punched to receive pickets. Weld pickets to railing. Rails to be hot rolled "U" channel, 1 3/8" x 1 1/2", 12 ga.
 4. All components to be hot dipped galvanized then powder coated.
 5. Pickets to stick past top and bottom rail by 2" with finials above.
 6. Provide gates as shown on plan.
 7. See drawings for style and layout.
 8. Shop drawings required.
 9. At curved installation at track: Set posts in 5" o.d. steel sleeves 12" into new 12" wide x 16" deep concrete footing. Posts in concrete slabs to set in 12" of concrete.
 10. At gates, provide 6" square posts filled with concrete, set 30" minimum into 24" square x 30" deep concrete footing.
- B. Gates - 2 locations:
1. Match general styling of fence.
 2. Stadium Entrance Sliding Gates: Provide manufacturer's standard heavy duty track, ball-bearing hanger sheaves, overhead framing and supports, guides, stays, bracing, and accessories required. All fencing materials shall be black powder coated. Gates are to be a pair of 8' wide x varying arched height (see drawing), total open width of 16'.
 3. Ambulatory Access Swing Gates: Gates are to be a pair of 6' wide x 6'tall, total open width 12', with welded hinges, "X" bracing; with (2) 3" caster rollers each leaf and drop pins to hold closed, fork latch and hasp lock for Owner supplied pad lock.
 4. Swinging gate hardware: Hinges: Size and material to suit gate size; offset to permit 180 gate opening. Provide 1-1/2 pair of hinges for each leaf over 6'-0" nominal height. All fencing materials shall be black powder coated.
 5. Latch: Forked type or plunger-bar type to permit operation from both sides of gate, with padlock eye.
 6. Double gate hardware: In addition to the above, provide gate stops for double gates, consisting of mushroom type flush plate with anchors set in concrete to

engage center drop rod or plunger bar. Configure for use of one padlock to lock both gate leaves.

2.05 MISCELLANEOUS

- A. Miscellaneous Framing and Supports: Fabricate as required to complete work; coordinate with Section 05120. Fabricate of welded construction in as large units as possible. Drill and tap for hardware and other items. Include anchors required for building into work of other sections.
- B. Miscellaneous stainless steel structural shapes, nuts and bolts: A304 in sizes and locations called out on the plans.
- C. Miscellaneous Steel Trim: Profiles and sizes as indicated on Drawings; continuous welded joints and smooth exposed edges. Use concealed field splices where possible. Provide cutouts, fittings, and anchorages; coordinate assembly and installation into work of other sections. Prime paint finish.
- D. Rough Hardware: Custom fabricated bolts, plates, anchors, hanger, dowels, and other miscellaneous steel and iron shapes required for framing, supporting, and anchoring other construction. Galvanized unless indicated otherwise.

2.06 FINISH

- A. Clean surfaces of rust, scale, grease and foreign matter prior to finishing.
- B. Do not prime surfaces in direct contact bond with concrete or where field welding is required.
- C. Prime paint items scheduled with one coat; touch up with same primer.
- D. Galvanize items to minimum 2.0 oz/sq.ft. zinc coating.
- E. Black powder coat finish!!!

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this section will be performed. Correct conditions detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

3.02 PREPARATION

- A. Clean and strip site primed steel items to bare metal where site welding is scheduled.
- B. Make provisions for erection loads with temporary bracing. Keep work in alignment.
- C. Supply items required to be cast into concrete or embedded in masonry with setting templates, to appropriate sections. Use grout specified in Section 03300 for setting metal fabrications.

3.03 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Perform field welding in accordance with AWS D1.1. After installation, touch up field welds, scratched or damaged surfaces with primer.
- C. Provide and install items listed in Schedule and shown on Drawing with anchorage and attachments necessary for installation.

END SECTION D-11 Fencing

SECTION D-12 SOUND SYSTEM

PUBLIC ADDRESS SYSTEM FUNCTIONALITY

MAIN SPEAKERS

The main loudspeakers on this installation shall, "light pole" mount with approved stainless steel bands so not penetrate the pole to avoid any conflicts of the pole mfg's warrant. The light pole mfg MUST approve the wind load/weight rating at the specified height of each location. The "Home Side" light poles will have 2 speakers each, each speaker weight approx 80lbs. a piece. Recommended speaker trim height is at (approx) 50'Per pole. One speaker will aim toward the visitors side bleachers, and the other pole will cover the home bleacher. There will be a speaker mounted in the center of the press box to cover the seats and cancel any echo for the home stands.

SYSTEM OPERATION

The sound system will be controlled by a "Digital Signal Processor" (DSP). There are a total of 10 mic/line inputs by 6 outputs. The volume levels of each input shall be via a "password" protected control panel. As an optional upgrade, the control shall be a Crestron TSW-760 color, 7.5" touch panel.

ANCILLIARY EQUIPMENT

For playback of CD, MP3, or Blue tooth audio, there shall be a Tascam CD-200BT installed and connected via a stereo unbalances to mono balanced, transformer. There shall also be a ProCo I-Rack installed in the equipment rack for additional audio provided by other sources. (Laptop, phones, mp3, etc.)

The announcers microphone shall be a Shure SM-58s, (with switch). All of the audio equipment shall be mounted in a Wall-mounted, lockable, with a fully-vented front door, equipment cabinet. There shall be a small, powered loudspeaker, located at the announcers position to allow audio monitoring of the sound system. The Power amplifiers and all line level devices, with the exception of the DSP, shall be powered off/on, via a power sequencer.

LIGHTNING PROTECTION FUSES

All of the speaker cables that exist the press box and travel to loudspeakers, shall have an EDCO PH70a Fuse mounted in the equipment cabinet. (Provide one complete set of spares).

PART 1 – GENERAL

1.1 DESCRIPTION

- A. Section Includes - Complete and working Stadium Sound System for Rivercrest High School Stadium

1.2 WORK INCLUDED

- A. Stadium Sound System Equipment Procurement & Delivery
- B. Stadium Sound System Installation - Provide labor to fabricate and install complete and working system. Provide proper tools, ladders, scaffolds, lifts, and other equipment necessary to perform installation (including Sound System components installed in Equipment Racks).
- C. Cable Installation
- D. Transportation Services
- E. Testing and Adjustment - Provide proper test equipment.
- F. Submittals - Includes Project Schedule, Shop Drawings, Product Data, Operation and Maintenance Manuals, Project Record Drawings, Warranties, etc.

1.3 RELATED WORK NOT INCLUDED

- A. Electrical Work (conduit and electrical power wiring), specified under other section.

1.4 QUALITY ASSURANCE

A. Contractor Qualifications

1. Be established Sound Systems Contractor, regularly engaged in furnishing and installing sound reinforcement systems. NOTE: Electrical or general contracting firms responsible for completion of this work, but not meeting above requirement, shall employ services of qualified Sound Systems Contractor as subcontractor to perform work described herein.
2. Be experienced in installations of similar size and scope within last five years.
3. Be Authorized Dealer for major lines of equipment provided.
4. Employ personnel (at all levels of work) experienced in projects of similar scope and size.
5. Be able to respond to an emergency service call within two (2) hours of an event.
6. Codes - Execute work in accordance with standard sound system installation practices, National Electrical Code, and applicable state and local codes.
7. Regulations - Comply with terms and conditions of Americans With Disabilities Act, especially regarding provisions for hearing impaired and wheelchair access in control areas.
8. Rigging - Use precautions when lifting and attaching equipment overhead. Select mounting or lifting hardware to provide safety factor meeting or exceeding project value (minimum safety factor of
9. Provide attachment hardware rated SAE Grade 5 minimum. Lag screws or formed eye bolts not acceptable. Verify load ratings of hanging components, including attachment details, on Shop Drawings reviewed by Structural Engineer licensed to practice in the

State of Arkansas. Execute attachments, attachment points reinforcements, and hardware selection in accordance with following references.

- a. Newberry, W. G., - Handbook for Riggers, 1977 Revised Edition, Calgary, Alberta Canada
- b. "Basic Principals for Suspended Loudspeaker Systems," Technical Notes Volume 1, Number 14, JBL Professional, Northridge, California

1.5 SUBMITTALS

A. Work Progress Schedule

1. Number of Sets: Provide quantity as required by General Conditions (minimum of three (3) sets).
2. Guidelines: estimated progress schedule for Work, in relation to entire Project. This schedule shall indicate dates for starting and completing various classifications of construction. Schedule shall include (but not be limited to) specific dates for each submittal requirement, expected completion of conduit by Electrical Contractor (coordinate), expected completion of electrical power by Electrical Contractor (coordinate), Initial Tests and Adjustments, Final Tests and Adjustments, and Owner Training. Coordinate 8 hours of quiet time (during first shift) for Final Tests and Adjustments. Schedule items shall be subdivided such that no single item spans more than 30 calendar days.
3. Timetable: Submit for review within 2 weeks after receipt of contract. Schedule shall be updated as required.

B. Product Data

1. Number of Sets - As required by General Conditions, minimum quantity 6.
2. Guidelines - As required by General Conditions
3. Timetable - As required by General Conditions

C. Shop Drawings

1. Number of Sets - As required by General Conditions, minimum quantity 6.
2. Minimum Scale
 - a. Site Plan: 1/8 inch = 1 foot
 - b. Rack Elevations: 1-1/2 inch = 1 foot
 - c. Plate/Panel Details: 6 inches = 1 foot
 - d. Loudspeaker Details: 1 inch = 1 foot
3. Include as a minimum:

- a. Floor plans indicating locations of devices.
- b. Rack elevations
- c. Schematic diagram. One-line diagram with detailed descriptions of product inputs and outputs is acceptable.
- d. Wiring diagram of grounding and shielding scheme.
- e. Drawings for custom-fabricated items (i.e., plates, panels, cables, and assemblies).
- f. General construction drawings necessary for completion of work.

4. Timetable - As required by General Conditions

D. Samples

- 1. Request for Samples - Upon request, furnish samples (at no additional cost) of submitted items proposed as substitutes for specified items. Products will be reviewed to determine if proposed substitute items meet required function and quality.
- 2. Product Tests - Products submitted as samples may require testing by independent laboratory. Testing at expense of Contractor.
- 3. Number of Samples: 1 for each item requested.
- 4. Timetable - Provide samples within 2 weeks of request. Allow minimum 2 weeks for review and product tests.
- 5. Approval - Obtain written approval of tested products before incorporating into system.

E. Report of Initial Tests and Adjustments Data - Submit written report of Initial Tests and Adjustments data upon completion of initial tests. (Initial Tests and Adjustments described in Part 3 of this section.) Include printed name(s) of technician(s) performing tests, date(s) and time(s) of tests, model and serial numbers of test equipment, results of each initial test, descriptions of problems encountered and their solutions, and statement that system is ready for Final Tests and Adjustments. Initial Tests and Adjustments Data to include signatures of technician(s) performing tests. Submit report of Initial Tests and Adjustments data within 2 days of completion of initial tests and at least 5 days prior to Final Tests and Adjustments. Allow minimum of 5 days for review. If resubmittal is required, Owner shall be reimbursed by Contractor for expenses incurred.

F. Project Record Documents - Submit record documents in quantities, format, and timetable as required by General Conditions.

G. Operation and Maintenance Manuals

- 1. Number of Sets: As required by General Conditions, minimum of 3 sets
- 2. Bind Operation and Maintenance Manuals using either GBC or 3-ring type binders.
- 3. Format and Minimum Information

H. Section 1 - System Operation

- a. Introduction/overview to system components and their functions and locations; brief listing of basic system functions
- b. Certificate indicating names of Owner personnel trained by Contractor, date of training, name of Contractor representative that provided training, and name of project.

I. Section 2 - System Documentation

- a. Simplified system one-line schematic diagram, including changes made during construction
- b. Complete inventory of system components including serial numbers. Identify location (equipment rack, speaker pole, stored in press box, etc.) of each component.
- c. Cable and terminal strip documentation including cable numbers, functions, originating locations, terminating locations, and signal levels
- d. All Shop Drawings corrected to reflect as-built conditions
- e. Other data and drawings required during construction
- f. Initial Tests and Adjustments data
- g. Final Tests and Adjustments data
- h. CD-ROM discs including all utilized manufacturer's software and saved copies of software configurations, if applicable (configurations as established during Final Tests and Adjustments)

J. Section 3 - Manufacturer's Documentation - Provide following documentation for each equipment model at no additional costs to Owner, even if manufacturer does not include costs of such documentation with purchase of e

1. Manufacturer's Product Data
2. Operating instructions
3. Installation instructions
4. Service information
5. Schematic diagrams
6. Replacement parts lists

K. Section 4 - Maintenance Information

1. Maintenance instructions including recommended maintenance schedule and information concerning proper inspection, testing, and replacement of components

L. Section 5 - Warranty Information

1. System warranty letter - See Warranty requirements under Part 3 of this specification section.
2. Manufacturer's warranties - Identify products with manufacturer's warranties extending beyond one year (Community, Biamp, QSC, etc.). Provide terms and conditions of support for such warranties.
3. Service Personnel Information - Provide telephone number(s) and name(s) of service representative(s) to be contacted regarding repair and maintenance. If names are not required for a qualified service response, then they need not be included.

M. Timetable

1. Leave 1 set of Operation and Maintenance Manuals with Consultant immediately following Final Tests and Adjustments procedures (minus data from Final Tests and Adjustments). Owner will utilize this set during initial use of the system. Following Final Tests and Adjustments, update this set of manuals at the project site as necessary so that it will match other completed sets of manuals.
2. Other than additional copy noted above, submit Operation and Maintenance Manuals as required by General Conditions.

PART 2 – PRODUCTS

2.1 GUIDELINES

- A. Design Parameters - System design is around products listed in Part Two. Intent of product specification is to provide standard of quality and function for installed materials. Certain performance specifications are given to clarify job requirements.
- B. Performance - Regardless of completeness of descriptive paragraphs herein, each device shall meet its manufacturer's published specifications. Verify performance.
- C. Quantities - Quantities given in specifications are for reference only; confirm quantities prior to installation. If disparity exists between Contract Documents and quantities necessary to deliver complete working system, provide notification of disparity, and install required quantity of devices for complete working system.
- D. Balanced Lines - Unless specifically directed otherwise, wire all line and microphone level circuits as balanced with respect to signal ground. For products without balanced inputs or outputs, provide high quality balancing transformers by Jensen or ProCo with proper level, shielding and impedance characteristics.
- E. Small Parts - Systems are described in terms of major products. Even if not specifically mentioned, provide and install patch cables, connectors, hardware, labels, terminals, etc. necessary for complete and working system meeting design intent of specifications. Install shaft locks or security covers on rack-mounted equipment not normally adjusted by user.
- F. Keys - Provide 5 sets of keys for any sound system product requiring keys.
- G. Condition - Provide and install products listed in this section in factory new condition, conforming with applicable provisions of American National Standards Institute.

H. Designations - Each major product item is given unique designation (such as MIX-1 for mixer number 1). The product designations are unique in this section only and may be repeated in other specification sections.

2.2 SOUND PRODUCTS

A. Loudspeakers, lightning protection

1. Provide and install (4) four, One Systems 212HTH, outdoor loudspeakers, or approved equal. Two per light pole L1, & L2. Install One Systems PM3 pole mount for all pole mounted speakers.
2. Provide and install (1) one, One Systems, 112IM (105x60) outdoor loudspeakers, or approved equal. Install speaker w/ approved mount, center and above press box.
3. Provide and install (4) four, Edco PHC-SP70 with PCB1B base, lightning arrestors, installed in the rear of the equipment cabinet. Provide two (4) spares.

B. Equipment Cabinet, power sequencing, misc rack items.

1. Provide and install, one, (1) Lowell LER-3552 (rack)
2. Provide and install one, (1) Lowell LFD-35FV (front door)
3. Provide and install one, (1) Lowell LMSB-22 (rack caster set)
4. Provide and install one, (1) Lowell, SAS4r, power sequencer.
5. Provide and install one, (1) Lowell RPC-20, remote sequencer modules.
6. Provide all necessary rack blanks to completely "blank-out" the remaining rack openings.

C. Digital Signal Processor/Mixer

1. Provide and install one, (1) Biamp Nexia CS. For a total of 10 inputs 6 outputs.
Successful bidder MUST BE factory authorized dealer and certified programmer.
2. Provide and install one, (1) Biamp RED-1, Remote control Ethernet device, with POE switch. Locate within equipment cabinet or TBD by owners rep and/or architect.

D. Amplifiers

1. Provide and install (2) two, Crown 2/1250, power amplifiers. (PA1-PA2) Main speakers/Visitor speakers.
2. Provide and install (1) one, Crown DCI 2/300 power amplifier. (PA3) Center speaker/future booth speakers.

E. Desktop Microphone

1. Provide one, (1) Shure SM58s, microphone, Include short, desk top stand.

F. CD/MP3/USB Player

1. Provide (1) Tascam CD-200BT, install in equipment cabinet.

G. MP3 Player Jack

1. Provide (1) Pro Co, "I-Rack", installed in equipment cabinet.

VIDEO CONTROL ROOM MISC AUDIO ITEMS

PART 3 – EXECUTION

3.1 STORAGE AND HANDLING

- A. Damage Prevention - Ensure that materials (especially electronic and electro-acoustic devices) are protected against physical, environmental, and electronic damage during transport to and installation at job site.
- B. Magnetic Materials Handling - Take special precautions with magnetic devices. Keep temperature during storage and delivery below 110 degrees Fahrenheit. Keep devices with magnetic fields (loudspeakers, microphones, etc.) away from magnetic storage media (computers, floppy disks, cassette tapes, etc.), especially in common storage area.
- C. Materials Acceptance - As defined in General Conditions.
- D. Storage Location - Coordinate storage location at job site or designated storage area at contractor warehouse.
- E. Storage Protection - Provide storage protection against temperature and humidity extremes, theft, vandalism, physical damage, and environmental damage.

3.2 INSTALLATION

A. General Guidelines

1. Quality of Work - Perform labor to accepted industry standards and state and local codes to accomplish complete and working system.
2. Material and Labor - Provide specified products and other incidental materials, appliances, tools, scissors lifts and transportation required for complete and functioning systems. Provide personnel to perform labor who are skilled in techniques and installations.
3. Documents at Job Site - Keep following documents at job site during entire construction period:
 - a. Complete Specifications and Drawings
 - b. Approved Shop Drawings
 - c. Approved Product Data
 - d. Progress Set of Project Record Documents
4. Mounting - Mount equipment and enclosures plumb and square. Ensure that permanently installed equipment is firmly and safely held in place. Design equipment supports to support loads imposed with project safety factor of 5 or greater. For devices hung overhead, obtain review by Structural Engineer licensed to practice in State of Arkansas.
5. Speaker Aiming - Angles or aiming points for loudspeakers are approximate. Adjust loudspeakers as required to achieve smooth, even distribution.
6. Minor Equipment Moves - The process of equalizing and testing sound systems may necessitate moving and adjusting certain component parts such as loudspeakers. Perform requested minor moves during Final Tests and Adjustments without claim for additional payment.
7. Dimension Verification - Verify dimensions and space requirements to assure that proper mounting, clearance, and maintenance access space is available for system components.
8. Grommets - Cover edges of cable pass-through holes in chassis, rack, boxes, etc. with rubber grommets or Brad GRNY nylon grommets.
9. Future Maintenance Access - Install equipment rack and mixing consoles allowing access to rear connections by maintenance personnel without removal or disconnection of equipment. Install field devices and field wiring such that maintenance personnel can access terminations and splices without special equipment or disconnection of installed equipment.
10. Coordination - Coordinate work with other trades to avoid delays in construction schedule. Meet construction schedule.
11. Clean-Up - Leave project clean each day. Place debris where designated by General Contractor. Debris includes but not limited to: solder splatter, cable ends, stripped insulation, spent crimp connectors, gypsum board and ceiling tile dust, and product wrappings and cartons. After completion of installation, thoroughly clean areas worked, including non-visible areas such as equipment rack interiors, rack top panels, and inside lockable floor and wall boxes.

B. Labeling

1. Equipment Labels - Provide engraved lamincoid labels on front and rear of rack-mounted equipment. Mount labels plumb and square. Include schematic reference design, item name, and system or area controlled by labeled component. On program preamps and mixers, provide label for each input indicating which source is controlled by labeled channel. Unless otherwise indicated, provide permanently-mounted black labels engraved with 1/8-inch white block characters. Handwritten, self-laminating, or embossed plastic (Dymo) labels are not acceptable. Provide labels for major equipment with 3 lines (minimum) of engraving, coded as follows:
 - a. Line 1: Generic name of device, such as POWER AMPLIFIER.
 - b. Line 2: Schematic designation of device, such as PA-1.
 - c. Line 3: Control area of device, such as HOME SIDE.
2. Terminal Strip Labels - Label each terminal strip with unique identification code in addition to numerical label (Cinch MS series) for each terminal. Show terminal strip codes on system schematic drawings included with Project Record Documents.
3. Cable and Wire Labels - Label cables and wiring logically, legibly and permanently for easy identification. Labels on cables to be adhesive strip type, covered with clear heat shrink tubing. Factory stamped heat shrink tubing may be used. Hand-written or self-laminating type labels are not acceptable.
4. Cable Label Codes and Locations - Label each cable with unique alpha-numeric code. Locate cable designation at start and end of each cable run, within 3 inches of termination point. For cable runs that have intermediate splice points, label cable with same designation throughout, with additional suffix to indicate each segment of run. Provide cable designation codes in schematic drawings included with Project Record Documents and Operation and Maintenance Manuals.

C. Power and Grounding

1. Power Coordination - Coordinate final connection of power and ground wiring to rack. Electrical contractor will provide power to sound systems. Before installation, verify load requirements for systems as accepted.
2. Bus Bars - Install 1-inch by 1/4-inch copper ground bus bar, top to bottom in each rack. Ground equipment chassis of each rack-mounted component without three-pin grounding plug to bus bars with #12 AWG insulated green wire using 6-32 or larger nuts, bolts, lockwashers, and appropriate connectors. Electrical Contractor to provide and connect #4 AWG green insulated wire to ground point in electrical panel.

D. Equipment Racks

1. Assembly - Mount, wire, and fully test equipment in racks.

2. Ventilation - Provide ventilation adequate to keep temperature in rack below 100 degrees Fahrenheit. Use "whisper" type ventilation fans in racks, adjusted to come on when temperature in rack rises above 100 degrees Fahrenheit, only if adequate cooling cannot be provided by Owner.
3. Rack Wiring - Wire equipment racks neatly, allowing proper slack for future serviceability. Locate power, digital control, DC control, video, and loudspeaker cables on one side of equipment rack interior; and, locate microphone and line-level audio cables on other side of equipment rack interior. Maintain separate cable bundles for different types of signals. Do not bundle power cords permanently attached to equipment with other power cords. Do not block access to front-mounted equipment with equipment mounted to rear rack rails.

E. Wiring

1. Wiring Standards - Execute wiring in strict adherence to standard broadcast and sound engineering practices, as described in the following publications:
 - a. "Recommended Wiring Practices," Broadcast Audio Equipment for AM, FM Television (5th Edition), Radio Corporation of America (RCA), Camden, N.J., 1962.
 - b. Sound System Engineering, Second Edition, By Don & Carolyn Davis, Howard W. Sams and Co., Indianapolis, Indiana, 1986. "Chapter 15 - Installing the Sound System" and "Appendix II – Recommended Installation Practices."
2. Field Connection Devices - Connect cable to active components through screw terminal connections, spade lugs, or punch blocks when appropriate. Make connections to loudspeaker transformers with properly sized, closed end connectors, crimped with factory-approved, ratchet type tool. Wire nut or "Skotchlock" connectors are not acceptable. Do not wrap audio cable splices or connections with adhesive backed tape.
3. Exposed cabling in ceiling plenums to be run neatly parallel to building walls, supported every three feet to structure.
4. Raceways - Run vertical wiring inside rack in Panduit (or equivalent) plastic raceways with snap-on covers, sized to allow at least 50% future wiring. Mount raceways on full length 3/4-inch flat black plywood backboards, attached to rack sides. If between-rack wiring chases are provided, Panduit raceways are not required. Horizontal wiring in rack to be neatly tied in manageable bundles with cable lengths cut to minimize excess cable slack, but still allow for service and testing. Provide horizontal support bars if cable bundles sag. Individually bundle excess AC power cable away from rack mounted equipment with cable ties. Electrical tape and adhesive backed cable tie anchors are not acceptable.
5. Terminal Blocks - Connect wiring entering equipment racks via terminal blocks (Cinch 140 or 142 series). Leave terminal blocks fully exposed and labeled, mounted on 3/4-inch plywood painted flat black.
6. Accessibility - Ensure that wiring and connections are completely visible and labeled in rack. Mount termination resistors, if required, on terminal strips, fully visible and not concealed within equipment or connectors.

7. Loudspeaker Polarity - Connect loudspeakers electrically in phase, using same wire color for loudspeaker wiring throughout project.
8. Physical Damage Prevention - Take necessary precautions to prevent physical damage to cables and equipment. Damaged cables or equipment will not be accepted. Separate, organize, and route cables to restrict channel crosstalk and feedback oscillation.
9. Hum Prevention - Ensure that electromagnetic and electrostatic hum is at inaudible levels. For line level signals, float cable shields at the output of the source device. Do not cut or remove shield conductors; fold back unconnected shields over cable jacket and cover with clear heat-shrink tubing. Do not obstruct cable labels.
10. Other Connections - Make connections using rosin core solder or approved mechanical connectors. Where spade lugs are used, crimp properly with ratchet type crimping tool. Solder spade lugs mounted on #22 AWG or smaller cable after crimping.

3.3 INITIAL TESTS AND ADJUSTMENTS - These tests are to ensure that system is ready for Final Tests and Adjustments (described later).

A. Inspection - Verify prior to beginning actual tests and adjustments on systems:

1. Proper grounding of all electronic components (through third prong of power connector or separate connection between component chassis and ground bus bar).
2. Cables dressed, routed, and labeled, connected with proper polarity.
3. Insulation and shrink tubing in place.
4. Dust, debris, solder splatter, etc. removed.
5. Proper frequency settings (or modules) at crossovers and controllers.
6. All equalizer bands and tone controls set for flat frequency response. Confirm all computer-controlled processors are set for flat equalization, unity gain, and no limiting compression. Confirm all remote volume controls in the full open position.

B. Test Instruments - Perform measurements using professional quality test equipment. Following test instruments are required as minimum.

1. Sound Level Meters - Perform acoustical measurements with instruments meeting ANSI Standard Type 1 or IEC Precision Sound Level Meter specifications, set for "slow" meter damping and flat response(unless otherwise indicated).
2. Third Octave Real-Time Analyzer - Ivie Technologies Inc. model PC-40 real-time analyzer, or approved equivalent.
3. Pink Noise Source - Equal energy per octave with bandwidth of 20 Hz to 20,000 Hz, 1 dB (long term average).
4. Impedance Meter - Capable of testing audio lines at three frequencies minimum: one frequency between 63 Hz and 100 Hz, a second frequency between 500 Hz and 1000 Hz, and a third frequency between 2000 Hz and 4000 Hz. Measurement range: 1 ohm - 100,000 ohms.

5. Multimeter - Measurement range (DC and AC to 20,000 Hz): 100 mV – 300 V, 10 mA - 10 A.
6. Electronic Polarity Checker - Goldline APT-2 or approved equal.
7. Audio Oscillator - Bandwidth 20 Hz to 20,000 Hz 1 dB at 0 dBm output level. Output balanced and adjustable in level.
8. Dual-Trace Oscilloscope - 100 MHz bandwidth, 1 mV/cm sensitivity.
9. Program Source Material - Wide range of music programs recorded using professional quality recording equipment; provide following formats: CD and Cassette Tape.
10. Tools - Provide standard hand tools including screwdrivers, pliers, wire strippers, nut drivers, soldering iron, and other tools appropriate for troubleshooting system problems during testing.
11. Ladders and Scaffolds - Provide ladders, lifts and scaffolds as necessary to inspect loudspeakers and rigging points.

C. System Grounding Tests

1. While all sound system power panel circuit breakers turned off, coordinate with Electrical Contractor to temporarily lift incoming main ground conductor from ground bus in sound system power panel. Measure and record DC resistance between the power panel ground bus (now floating) and the disconnected feed from main ground. Resistance should be greater than 1000 ohms. If less than 1000 ohms, determine the electrical paths between system ground and power panel ground causing such readings, and report findings.

D. Audio System Tests - Perform following tests and adjustments. Make corrections necessary to bring systems into compliance with specifications.

1. Loudspeaker Circuit Impedance Measurements - Measure and document the impedance of each loudspeaker circuit terminating at equipment rack. Use one frequency between 63 Hz and 100 Hz for low frequency loudspeakers, one frequency between 2000 Hz and 4000 Hz for high frequency devices, and one frequency between 500 Hz and 1000 Hz for full range devices. For each circuit measure and document: (a) impedance across the high and low conductors of the speaker pair, (b) impedance between high conductor and ground, and (c) impedance between low conductor and ground. Also document frequency at which each measurement was performed.
2. Electrical Power Quality - While all sound system components are unplugged from electrical power outlets, turn on power to outlets, and confirm proper voltages at each outlet across the following pairs of terminals: hot and neutral, hot and ground, and neutral and ground (zero volts across neutral and ground). Document measurements.
3. Motorized Circuit Breaker Sequence - With all devices connected to power outlets and all power amplifier gains turned down, initiate power up and power down sequences, and confirm proper sequence of devices: platform outlets power up first, console

- mixer second, line-level processing equipment next, and power amplifiers last. Power down sequence in reverse order. Document whether proper sequence was achieved.
4. Gain Adjustments - Adjust gain of each line-level device to provide unity gain. With amplifiers off and while applying 0 dBu pink noise signal, set each active device to unity gain. Document whether these adjustments were achievable for each line-level device.
 5. Basic Check of Processing Equipment - With all power amplifier gains turned down or off, apply pre-recorded music through system, and, using lineman's test set, listen to program audio at inputs of each power amplifier. Confirm clean audio with proper frequency content at each amplifier input. Document whether this test was performed without any discernable errors.
 6. Basic Check of Power Amplifiers and Loudspeakers - With proper program audio present at each power amplifier input (previous step), individually turn gain up on each power amplifier to confirm proper loudspeaker connection and general quality of sound through loudspeaker. For each loudspeaker circuit, document general quality of sound heard through loudspeakers.
 7. Loudspeaker Polarity Tests - Check polarity of each loudspeaker using electronic polarity checker and by applying pink noise signal to loudspeakers while walking through transition areas from one loudspeaker to next. Transition should be smooth with no apparent shift in source from one loudspeaker to next. Correct polarity wiring errors. Document whether this test was performed without errors.
 8. General Function Tests - Test each piece of equipment to ensure that it performs its intended function. Include all portable equipment in tests. Intent of initial tests is to verify complete, functioning system before Final Tests and Adjustments. Correct problems found during initial testing before beginning Final Tests and Adjustments. Document whether all pieces performed intended functions; note any unresolved malfunctions.
 9. Frequency Response Measurements - Using pink-noise generator and one-third octave real time analyzer, measure system electronic frequency response for one mixer input channel through each power amplifier output. Repeat measurement for frequency response of all system inputs through one full-range power amplifier output. Document measurements for all instances where frequency response deviation exceeded 1 dB, 30 Hz to 20,000 Hz; and, state in writing that all other inputs and outputs did not exceed 1 dB, 30 Hz to 20,000 Hz.
 10. Oscillation and RFI Tests - While system mixer inputs are turned down, use oscilloscope to observe voltage at each power amplifier output. Check output signals to assure freedom from oscillation and stray radio frequency interference (RFI). Correct oscillation and RFI problems. Document whether oscillation or RFI problems were detected and corrected.
 11. Rattle Tests - Apply sine wave sweep signal to each loudspeaker system, sweeping slowly (2 minutes) from 50 Hz to 5000 Hz, 10 to 15 dB below full system output. Listen carefully for rattles and vibrations. Note problems found during test. Correct problems resulting from sound system equipment or hardware.

12. Initial Tests and Adjustments Data - Submit written report of Initial Tests and Adjustments data upon completion of initial tests. Include printed name(s) of technician(s) performing tests, date(s) and time(s) of tests, model and serial numbers of test equipment, results of each initial test, descriptions of problems encountered and their solutions, and statement that system is ready for Final Tests and Adjustments. Initial Tests and Adjustments Data to include signatures of technician(s) performing tests.

13. Timetable

a. Submit report of Initial Tests and Adjustments data within 2 days of completion of initial tests.

b. Allow minimum of 5 days for review. If resubmittal is required, Owner shall be reimbursed by Contractor for expenses incurred.

3.4 FINAL TESTS AND ADJUSTMENTS –

These tests are to be witnessed by the Owner's Maintenance Staff Personnel to determine if system is complete and functioning as designed.

A. Timetable - Coordinate with Owner to schedule Final Tests and Adjustments at least one week before Owner's scheduled first use of the system and after submittal of Initial Tests and Adjustments data.

B. System and Site Conditions - Have systems fully functional and ready for inspection and testing upon arrival of Consultant. If upon arrival of Consultant, systems do not meet criteria, or if Consultant is required to make additional trips to job site to witness additional testing or perform additional reviews of installed equipment, Contractor shall reimburse Owner for labor and expenses incurred by having incurred costs deducted from payments to contractor.

C. Test Labor - Provide technician familiar with sound systems and operation of test equipment to perform testing. Provide additional technician to assist in the tests and to perform troubleshooting, repairs, and adjustments. Include labor for these technicians to be present for one (1) eight (8)-hour day during Final Tests and Adjustments.

D. Test Equipment - Provide professional quality test equipment on site for final acceptance testing. Test equipment to be available for entire period through final system acceptance. Submit letter listing test equipment make and model numbers 10 days prior to scheduled Final Tests and Adjustments.

1. Techron TEF Analyzer or JBL Smart software with associated hardware –For use in proper adjustment of delays. May also be used in lieu of Third-Octave Real-Time Analyzer required below.

2. Sound Level Meters - Perform acoustical measurements with instruments meeting ANSI Standard Type 1 or IEC Precision Sound Level Meter specifications, set for "slow" meter damping and flat response(unless otherwise indicated).

3. Third Octave Real-Time Analyzer - Ivie Technologies Inc. model PC-40, or approved equivalent.

4. Pink Noise Source - Equal energy per octave with bandwidth of 20 Hz to 20,000 Hz, 1 dB (long term average).
 5. Laptop Computer - Compatible with Biamp hardware and software. Also compatible with QSC DSP-3 hardware and software (if applicable). Provide with necessary cable and software for configuring all and QSC DSP-3 hardware. Confirm compatibility and program initial layouts prior to Final Tests and Adjustments.
 6. Impedance Meter - Capable of testing audio lines at three frequencies minimum: one frequency between 63 Hz and 100 Hz, a second frequency between 500 Hz and 1000 Hz, and a third frequency between 2000 Hz and 4000 Hz. Measurement range: 1 ohm - 100,000 ohms.
 7. Multimeter - Measurement range (DC and AC to 20,000 Hz): 100 mV – 300 V, 10 mA - 10 A.
 8. Audio Oscillator with Frequency Counter - Bandwidth 20 Hz to 20,000 Hz 1 dB at 0 dBm output level. Output balanced and adjustable in level.
 9. Dual-Trace Oscilloscope - 100 MHz bandwidth, 1 mV/cm sensitivity.
 10. Program Source Material - Wide range of music programs recorded using professional quality recording equipment; provide following formats: CD and Cassette Tape. Also provide one blank (or erasable) medium for each recording format in the system.
 11. Resistor - Provide a 620-ohm, 1/4-watt, 5% resistor. Solder across pins 2 and 3 of a male XLR connector.
 12. Tools - Provide standard hand tools including screwdrivers, pliers, wire strippers, nut drivers, soldering iron, and other tools appropriate for troubleshooting system problems during testing.
 13. Ladders, Scaffolds, and Lifts - Provide ladders, scaffolds, and lifts necessary to inspect/adjust loudspeakers and rigging points.
- E. Communication - Provide 3 portable UHF band two-way radios for use during final testing. Transmission range: sufficient to cover the entire project. Include rechargeable batteries/recharger and holster for wearing on belt. Make radios available for duration of testing process, including follow-up visits. Confirm that radio frequencies used are acceptable and do not conflict with operation of other RF devices in vicinity.
- F. Verification of Initial Tests and Adjustments - Verify that Initial Tests and Adjustments have been performed and meet criteria. During Final Tests and Adjustments, Consultant may require portions of the Initial Tests and Adjustments to be repeated. Repeat measurements as requested without claim for additional payment.

G. Procedures

1. Gain Adjustments & Compressor/Limiter Settings - Confirm power amplifiers turned down and turned off. Connect pink noise generator to mixer input, adjust mixer input for optimum gain structure and flat EQ settings. Set mixer output levels for +3 VU. Measure output voltages of mixer (while loaded) and adjust all processing components

- (except crossovers) for unity gain. Confirm that no processing equipment is indicating audio signal overload. Set system limiter thresholds for mild limiting at this voltage. Reduce mixer output by 3 dB (0 VU); confirm output voltage with voltmeter (71% of original voltage). Set system compressor thresholds for mild compression (3:1 ratio) at this voltage.
2. Power Amplifier Output Settings - Change source signal to pink noise and reduce mixer output voltage to -10 VU. Confirm mixer output voltage using voltmeter (32% of previous voltage, 22% of original voltage). Set power amplifier output levels for 16 dB down from rated Program Power for each loudspeaker or amplifier output (whichever is less) and at least 13 dB down from loudspeaker RMS Power ratings. Using pink noise with mixer output set to -10 VU, measure output voltage at each amplifier (using voltmeter) and slowly bring up each amplifier to calculated output levels.
 3. General Delay Adjustments - Power up (or connect) only two loudspeakers at a time, and using TEF or Smart Analyzers, adjust digital delay equipment for proper delay times.
 4. Loudspeaker Coverage - Using pink noise generator and sound pressure level meter, demonstrate to Consultant the loudspeaker audio coverage for each system. Maximum permissible variance: 2 dBA. Adjust power amplifiers (downward only) and loudspeakers angles (if necessary) to obtain specified coverage.
 5. Equalization - Using pink noise generator and real-time analyzer, adjust parametric filter sets and other devices to achieve relatively flat audio frequency response for position near center of audience. Adjust filters only in cut mode. Make no adjustments that will increase signal levels to amplifier outputs above those shown for gain adjustments above (for -10 dB on mixer output meter). Check frequency response at several other audience locations. Modify frequency response for best average. Modify frequency response as directed by Consultant.
 6. Re-Check of Loudspeaker Coverage - Using pink noise generator and sound pressure level meter, demonstrate to Consultant that the loudspeaker audio coverage for each system is still within 2 dBA following equalization.
 7. System Music Quality Demonstration - Demonstrate system music performance to Consultant by playing pre-recorded music over system using highest quality system program source. Allow Consultant to walk through entire stadium area. Modify system and loudspeaker adjustments and re-test as necessary or as directed by Consultant.
 8. System Speech Quality Demonstration - Demonstrate system speech performance to Consultant by speaking into all microphones and reading available text while Consultant walks entire stadium area. Modify system and loudspeaker adjustments and re-test as directed by Consultant.
 9. General Adjustments - Adjust, balance, and align all equipment for optimum quality, meeting manufacturer's published specifications. Check display levels of VU meters on console mixer for typical speech at the primary microphone. Confirm that appropriate recording levels are possible at the recording devices during typical use of the system.

10. Adjust System Settings - Set individual gain and tone controls of Mixer for best settings under anticipated use. Take care to ensure that speech intelligibility is optimized and the risk of feedback is minimized.
11. Power-Up Demonstration - Demonstrate system power-up and power-down sequences to Consultant. Note any pops or clicks heard during power up or power down (these should be very quiet if heard at all).
12. Input Jack Demonstration - Demonstrate proper performance and phase of each system input jack (microphone and program input jacks).
13. Inventory - Inventory all installed and portable equipment for correct quantities per specifications and drawings.
14. Functional Demonstration - Demonstrate proper operation of each function of each major piece of equipment that has not been previously demonstrated during these Final Tests and Adjustments.
15. Other Tests - Perform any other tests on any piece of equipment or audio system as requested by Consultant.
16. Review of Labels - Review installed labels on cables, equipment, controls, and terminal strips.
17. Review of Heat Dissipation - Survey temperatures of each piece of equipment after 4 hours use (minimum). Note any hot equipment.
18. Security Inspection - Inspect equipment for security from tampering (covers, shaft-locks, etc.).

3.5 POST-TESTING MEASUREMENTS AND DOCUMENTATION

- A. Hum and Noise Measurements - Measure and record overall system hum and noise level (as compared with full output level) at output of PA-1, channel 2 with controls set so that -50 dBm microphone signal or +4 dBm line level signal would drive system to full output. (It is not recommended that the system actually be driven to full output; instead drive system to 10 dB below full output with test signal, measure resulting output voltage, add 10 dB to resulting voltage, then disconnect signal source, and raise marked gain controls by 10 dB.) Terminate input with appropriately sized resistor (150 ohms if microphone input, 600 ohms if line input) for the noise measurement. Include results in Operation and Maintenance Manual.
- B. Final Gain Structure - Measure and document final gain structure using pink noise generator and multimeter. Include measurements in Operation and Maintenance Manual.
- C. Final Equipment Settings - Record final settings of all equalizer bands, tone controls, filters, delays, limiters, etc., including those established through computer software settings (if applicable). Include text descriptions of settings (including software settings) in Operation and Maintenance Manual. Include software copy of configuration file(s) and configuration software (version used during installation) in Operation and Maintenance Manual.

3.6 OWNER TRAINING

A. Provide owner training as required by General Conditions. As a minimum, provide 4 hours instruction (within a single trip to site) regarding sound systems operation to Owner-designated personnel. Schedule instruction time with Owner to occur after completion of Final Tests and Adjustments and prior to first use of the system. Coordinate with Owner in advance to schedule instruction time. Document date, time, and attendees of the training session and include documentation in Operation and Maintenance Manuals to serve as record of trained personnel.

3.7 OWNER FIRST USE OF COMPLETED SYSTEM

A. Provide personnel familiar with design, installation, and operation of the system to be present at Owner's first use of the completed system (up to 4 hours in a single session). During first use, respond to Owner requests for troubleshooting, adjustments, and additional training. If no one contractor employee or representative can provide expertise in all aspects of the system, provide multiple personnel for the 4 hours as required. Schedule presence of personnel in advance with Owner. Should significant elements of the new system be operational prior to final completion, Owner may elect to schedule contractor presence for function prior to final completion of system. Should Owner exercise this option, contractor presence will not be required at first use following final completion.

3.8 WARRANTY

A. Provide system warranty. Terms as described in General Conditions. Minimum terms as follows:

1. System Warranty Period - Systems to be free of manufacturing or installation defects for a period of one year from the date of final acceptance. Provide letter of warranty clearly designating begin and end dates of system warranty period. Bind in Operation and Maintenance Manuals.
2. Parts and Labor - Provide parts and labor to repair defects in provided materials and workmanship during system warranty period.
3. Response Time - Within system warranty period, provide initial on-site service response 2 hours of service call, especially on game day.
4. Replacement Products - If any item must be removed for repair during system warranty period, provide temporary replacement item of similar quality at no charge.
5. Repair Limit - Do not repair any piece of equipment found defective during installation or system warranty period more than 2 times. After second repair, replace defective item with similar approved item at no additional cost to Owner.
6. Extended Manufacturer's Warranties - Honor extended warranties (after the first year) for equipment as provided by manufacturers. Identify products with manufacturer's warranties extending beyond one year (Community, Biamp, QSC, etc.). Provide terms and conditions of support for such warranties in Operation and Maintenance Manuals.

END SECTION D-12 Sound System

END OF RFP