

Addendum

No. ONE Date: 3.8.19

Project:

Track and Field Improvements to the
Deshler High School for the
Tuscumbia City Schools
Tuscumbia, Alabama

McKee Project No. 17-238
Alabama Building Commission No. 2019087

A1.1 GENERAL MODIFICATIONS:

The following changes and/or substitutions to the plans and specifications are hereby made a part of same and are incorporated in full force as part of the contract.

Bidders shall acknowledge receipt of this Addendum in writing on his Proposal Form.

A. The following General Contractors have pre-qualified to bid this Project based on the criteria set forth by the Tuscumbia City School System:

1. **Baseline Sports**
Knoxville, TN
865-588-4320
2. **Coston General Contractors**
McCalla, AL
205-481-1246
3. **Field Turf USA, Inc.**
Montreal, Quebec
800-724-2969
4. **H & N Construction**
Florence, AL
256-764-5959
5. **Johnson Contractors, Inc.**
Muscle Shoals, AL
256-383-0313
6. **Sprinturf, LLC**
Daniel Island, SC
843-936-6023

7. **Sports Turf**
Whitesburg, GA
770-832-8691
8. **Warner's Athletic Construction, LLC**
Smyrna, TN
615-459-6993
9. **Hellas Construction, Inc.**
Austin, TX
512-250-2910

A1.2 SPECIFICATION MODIFICATIONS:

- A. Refer to **Section 02790, Synthetic Turf And Drainage Field (Revised 3.8.19)**, herein.
Take note of revision to Part 1-General; Quality Assurance; Installer-Paragraph #2.

A1.3 DRAWING MODIFICATIONS: None

END OF ADDENDUM ONE

SECTION 02790 – SYNTHETIC TURF AND DRAINAGE FIELD (Revised 3.8.19)

PART 1 – GENERAL

RELATED DOCUMENTS

Drawings and general provisions of the Contract including General and Supplementary Conditions and other Division 1 Specification Sections apply to this Section.

SCOPE OF WORK

The field turf at the Football Stadium shall be furnished with a drainage field as indicated on the drawings.

The General Contractor shall be responsible for all quantities of all materials for the furnishing and installation of the synthetic turf system. As stated in the General Conditions the General Contractor shall field verify all existing conditions prior to submitting his proposal. Therefore, the actual quantity of the coverage area for the field turf shall be the responsibility of the General Contractor.

It shall be the responsibility of the turf contractor to provide all labor, materials, equipment and tools necessary for the complete installation of a synthetic grass system, with a specially formulated resilient infill component and a porous vertical drainage stone base. The tufted infill system and the porous vertical drainage system shall consist of, but not necessarily be limited to, the following:

1. A complete synthetic turf system, consisting of a vertical draining gravel blanket and nominal 2" to 2.5" long polyethylene-blended, monofilament fiber, tufted into a dimensionally stable, three component primary backing with a secondary backing consisting of a minimum of 22- 26 ounces of urethane per square yard.
2. A resilient infill system consisting of a mixture of rubber granules and rounded silica sand, specifically designed to provide the feel, performance, and safety of an optimally maintained natural grass surface. The finished surface shall have the planarity and subtle undulations normally associated with typical natural grass athletic fields/soccer.
3. A vertical draining field base consisting of a compacted layer of Open Graded Stone (OGS) with a under-drain system installed above a geo-textile membrane. The end of the drains are placed directly into the perimeter trench system containing a properly sized perforated pipe covered with free draining stone that discharges into a designated storm water outlet.
4. The artificial turf shall be specifically designed, manufactured and installed for the intended sports and events. Typically sports include but are not limited to football. At the time of substantial completion, the system's shock attenuation shall have an average G-max value less than 125 based on ASTM-F355A. At no time shall the G-max value exceed 175 throughout the life of the warranty.
5. Acceptance of prepared sub-base.
6. Coordination with related trades to ensure a complete, integrated, and timely installation: Aggregate base course, sub-base material (tested for permeability), grading and compacting, piping and drain components (when required); as provided under its respective trade section.

REFERENCE STANDARDS

1. FM Factory Mutual
2. P7825 - Approval Guide; Factory Mutual Research Corporation; current edition
3. ASTM – American Society for Testing and Materials.
4. D1577 - Standard Test Method for Linear Density of Textile Fiber
5. D5848 - Standard Test Method for Mass Per Unit Area of Pile Yarn Floor Covering
6. D1338 - Standard Test Method for Tuft Bind of Pile Yarn Floor Covering
7. D1682 - Standard Method of Test for Breaking Load and Elongation of Textile Fabrics
8. D5034 - Standard Test Method of Breaking Strength and Elongation of Textile Fabrics (Grab Test)
9. F1015 - Standard Test Method for Relative Abrasiveness of Synthetic Turf Playing Surfaces
10. D4491 - Standard Test Methods for Water Permeability of Geotextiles by Permittivity
11. D2859 - Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials
12. F355 - Standard Test Method for Shock-Absorbing Properties of Playing Surfaces.
13. F1936 - Standard Test Method for Shock-Absorbing Properties of North American Football Field Playing Systems as Measured in the Field
14. D1557 - Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort.
15. ASTM F355-10, Procedure A: Testing Services Inc test number TSI 1202

SUBMITTALS

Substitutions: Other products are acceptable if in compliance with all requirements of these specifications. Submit alternate products to Architect for approval prior to bidding in accordance

Product Substitution Procedures:

1. Provide substantiation that proposed system does not violate any other manufacturer's patents, patents allowed or patents pending.
2. Provide a sample copy of insured, non-prorated warranty and insurance policy information.

Submittals:

Comply with Submittals Procedures. Submit for approval prior to fabrication.

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

1. Shop Drawings
2. Product Data including Independent Test Lab Results
3. Materials Samples
4. Installation Details
5. Sample Warranty
6. Field layout and striping plans
7. Details on construction, especially any details that may deviate from plans and specifications.

Shop Drawings:

1. Indicate field layout; field marking plan and details for the specified sports; i.e., NCAA Football; roll/seaming layout; methods of attachment, field openings and perimeter conditions.
Show installation methods and construction indicating field verified conditions, clearances, measurements, terminations, drainage.
2. Provide joint submission with related trades when requested by Architect.

Product Data:

1. Submit manufacturer's catalog cuts, material safety data sheets (MSDS), brochures, specifications; preparation and installation instructions and recommendations; storage, handling requirements and recommendations.
2. Submit fiber manufacturer's name, type of fiber and composition of fiber.
3. Submit data in sufficient detail to indicate compliance with the contract documents.
4. Submit manufacturer's instructions for installation.
5. Submit manufacturer's instructions for maintenance for the proper care and preventative maintenance of the synthetic turf system, including painting and markings.

Samples:

1. Submit samples, 12 x 12 inches, illustrating details of finished product in amounts as required by General Requirements, or as requested by Architect.
2. One (1) 12" x 12" sample of proposed synthetic turf carpet and one (1) 12" x 12" boxed turf sample including infill representative of finished synthetic turf system. Also submit three (3) copies of product data and testing documents demonstrating that proposed system meets or exceeds all specified requirements.
3. Material Certificates and Samples: Provide seven (7) copies for each material from material producer that will be used for this project. Each material certificate must be stamped and checked as approved by the Field Builder before submittal to the Architect.
4. Provide to the Architect materials samples of the following: Two (2) bagged samples each of rubber and sand infill material, two (2) 12" x 12" samples of synthetic turf carpet and color yarn samples.

Product Certification:

1. Submit manufacturer's certification that products and materials comply with requirements of the specifications.
2. Submit test results indicating compliance with Reference Standards.

Project Record Documents: Record actual locations of seams, drains and other pertinent information in accordance with Division 1 Specifications Series, General Requirements.

List of existing installations: Submit list including respective Owner's representative and telephone number.

Warranties: Submit warranty and ensure that forms have been completed in Owner's name and registered with approved manufacturer.

Testing data to the Owner to substantiate that the finished field meets the required shock attenuation, as per ASTM F1936.

Testing Certification: Submit certified copies of independent (third-party) laboratory reports on ASTM testing:

1. Pile Height, Face Weight & Total Fabric Weight ASTM D5848.
2. Primary & Secondary Backing Weights ASTM D5848.
3. Tuft Bind ASTM D1335.
4. Grab Tear Strength ASTM D1682 or D5034
5. Shock Attenuation ASTM F1936
6. Water Permeability ASTM D4491

QUALITY ASSURANCE

Manufacturer Qualifications: Company specializing in manufacturing products specified in this section. The turf contractor and/or the turf manufacturer:

1. Shall be experienced in the manufacture and installation of specified type of synthetic infill and monofilament fiber tufted grass system for a minimum of five (5) years with the same manufacturer, product and company they are proposing for this field.
2. Shall have 10 fields in play for at least three years with the same manufacturer and company they are proposing for this field. Fields shall be 65,000 ft² or more that are at least 3 years old, which is equal to the respective warranty period, with the same infill system.
3. Shall provide third party certification confirming that the tuft bind exceeds the Synthetic Turf Council minimums.
4. Manufactures documentation of field turf compliance of DOC FF-1 "pill test" (CPSC 16 CFR, Part 1630), must be obtained prior to installation.

Installer: It is the owners desire to insure both quality materials and installation. Therefore, all prospective bidders must comply with the following:

1. All turf contractors must have been actively installing infilled synthetic grass systems for a minimum of eight years.
2. **Subcontractors shall be acceptable for the four (4) approved manufacturers as listed in this specification section PART 2- PRODUCTS; MATERIALS; Manufacturers, for the infilled synthetic grass system installation. Installer shall be certified by the manufacturer and licensed.**
3. All turf contractors shall demonstrate that they meet the minimum eight-year experience requirement by submitting in writing the project names, contacts and telephone numbers of past installations, where the turf contractor has installed in-filled synthetic grass systems over the last three years.
4. The designated Supervisory Personnel on the project shall be certified, in writing by the turf manufacturer, as competent in the installation of specified monofilament material, including sewing seams and proper installation of the infill mixture.
5. The installer supervisor shall have a minimum of 5 years experience as either a construction manager or a supervisor of synthetic turf installations

Pre-Installation Conference: Conduct conference at project site at time to be determined by Architect. Review methods and procedures related to installation including, but not limited to, the following:

1. Inspect and discuss existing conditions and preparatory work performed under other contracts.
2. In addition to the Contractor and the installer, arrange for the attendance of installers affected by the Work, The Owner's representative, and the Architect.

The Contractor shall verify special conditions required for the installation of the system.

The Contractor shall notify the Architect of any discrepancies.

DELIVERY, STORAGE, AND HANDLING

Comply with Section, Product Requirements.

Prevent contact with materials that may cause dysfunction.

Deliver and store components with labels intact and legible.

Store materials/components in a safe place, under cover, and elevated above grade.

Protect from damage during delivery, storage, handling and installation. Protect from damage by other trades.

Inspect all delivered materials and products to ensure they are undamaged and in good condition.

Comply with manufacturer's recommendations.

SEQUENCING AND SCHEDULING

Coordinate the Work with installation of work of related trades as the Work proceeds.

Sequence the Work in order to prevent deterioration of installed system.

WARRANTY AND GUARANTEE

The Contractor shall provide a warranty to the Owner that covers defects in materials and workmanship of the turf and sub-base for a period of eight (8) years from the date of substantial completion.

The turf manufacturer must verify that their representative has inspected the installation and that the work conforms to the manufacturer's requirements. The manufacturer's warranty shall include general wear and damage caused from UV degradation. The warranty shall specifically exclude vandalism, and acts of God beyond the control of the Owner or the manufacturer. The warranty shall be fully third party insured; pre paid for the entire 8 year term and be non-prorated. The Contractor shall provide a warranty to the Owner that covers defects in the installation workmanship, and further warrant

that the installation was done in accordance with both the manufacturer's recommendations and any written directives of the manufacturer's representative. Prior to final payment for the synthetic turf, the Contractor shall submit to owner notification in writing that the field is officially added to the annual policy coverage, guaranteeing the warranty to the Owner. The insurance policy must be underwritten by an "AM Best" A rated carrier and must reflect the following values:

1. Pre-Paid 8-year insured warranty.
2. Insured Warranty Coverage must be provided in the form of 1 single policy.
3. Per Incident limit of no less than Seven Million dollars (\$7,000,000) per claim.
4. Annual Aggregate amount of no less than Sixty million dollars (\$60,000,000).
5. Must cover full 100% replacement value of total square footage installed, minimum of \$7.00 per sq ft. (in case of complete product failure, which will include removal and disposal of the existing surface).
6. Policies that include self insurance or self retention clauses shall not be considered.
7. Policy cannot include any form of deductible amount.
8. Sample policy must be provided at time of contract execution to prove that policy is in force. A letter from an agent or a sample Certificate of Insurance will not be acceptable.

At the time of substantial completion, the system's shock attenuation shall have an average G-max value less than **125** based on ASTM-F355A. At no time shall the G-max value exceed **175** throughout the life of the warranty.

MAINTENANCE SERVICE

Contractor shall train the Owner's facility maintenance staff in the use of the turf manufacturer's recommended maintenance equipment.

Manufacturer must provide maintenance guidelines and a maintenance video to the facility maintenance staff.

PART 2 – PRODUCTS

MATERIALS

Manufacturers: The following manufacturers' products have been used to establish minimum standards for materials, workmanship and function:

1. Basis of Design: by Shaw Sports Turf; Legion; www.shawsportsturf.com; 185 South Industrial Boulevard, Calhoun, Georgia, 30701; Contact Wynn Vinson: Phone: 601.416.4767; Email: wynn.vinson@shawinc.com.
2. The following manufactures are hereby approved subject to the specifications:
 - A. AstroTurf; www.astroturf.com; Contact: Zack Riddleberger (336)238-9060; email: zriddleberger@astroturf.com
 - B. FieldTurf; www.fieldturf.com; Craig Yancey, Regional Sales Manager, (205)908-5608; Calhoun, Georgia

C. Sprinturf, LLC: www.sprinturf.com: Charlie Welsh, (651)239-0400; Daniel Island, SC 29492.

SYNTHETIC GRASS MATERIALS:

The synthetic turf material and resilient infill shall be in accordance with the following:

1. Shall be tufted, polyethylene, grass-like fabric coated with a secondary backing of high-grade polyurethane. Refer to grid in section 9 below. The two fibers specified in this grid shall be tufted through the same needle in a grass-like fabric to a finished pile-height also specified in the grid.
2. All components and their installation method shall be designed and manufactured for use on outdoor and indoor athletic fields. The materials, as hereinafter specified, should be able to withstand full climatic exposure in all climates, be resistant to insect infestation, rot, fungus and mildew; to ultra-violet light and heat degradation, and shall have the basic characteristic of flow through-drainage allowing free movement of surface run-off through the turf fabric where such water may flow to the existing subbase and into the field drainage system.
3. 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 suitable for football, soccer, lacrosse, baseball, softball, physical education classes, intramurals and recreational use.
4. The pile yarn (polyethylene) shall be a proven athletic caliber yarn designed specifically for outdoor use and stabilized to resist the effect of ultraviolet degradation, heat, foot traffic, water and airborne pollutants.
5. The system shall be tufted at the pile height and gauge listed in specification grid, refer to grid in section 9 below.
6. The Primary Backing must be a multi-layer backing, contain UV stabilizers and must pass 3000 hours of QUV A testing, refer to grid in section 9 below.
7. The Secondary Backing of high-grade polyurethane shall be applied to the Primary Backing. Secondary Backing adds resistance to water degradation and strengthens grip on fibers, refer to grid in section 9 below.
8. The entire backing shall be coated with holes perforated throughout the backing at the Synthetic Turf Manufacturer's recommended interval to allow for drainage. Partially coated backings or latex coating materials shall not be acceptable.
9. Perimeter and interior edge details, underground storm sewer piping and connections, and goal post foundations required for the system shall be as detailed and recommended by the manufacturer and as approved by the Architect.
10. All designs, markings, layouts, and materials shall conform to all currently applicable National Federation or NCAA rules and other standards that may apply to this type of synthetic grass installation.
11. All field markings including numbers, arrows, hash marks, and sport specific lines or other designations will either be tufted in at the factory or inlaid on site. **Painted markings are not to be used.** Provide as follows:

A. See Drawings.

12. Composition:

Pile Yarn	Polyethelene Monofilament/Slit Film	METHOD
Linear Density (Denier) Mono/Slit*	7,200/5,000	ASTM D 1577
Yarn Thickness Mono/Slit	240/100 microns	ASTM D 3218
Pile Weight****	46 oz./yd ²	ASTM D 5848
Finished Pile Height****	2.25	ASTM D 5823
Product Weight (total)***	74 oz./yd ²	ASTM D 5848
Primary Backing Weight****	8 oz./yd ²	ASTM D 5848
Secondary Coating Weight+	20 oz./yd ²	ASTM D 5848
Fabric Width	15' (4.57m)	ASTM D 5793
Tuft Gauge	1/2"	ASTM D 5793
Grab Tear Strength Avg.	> 200 lb.-F	ASTM D 5034
Tuft Bind (Avg.)	> 10 lb.-F	ASTM D 1335
Infilltrometer	> 25	ASTM D3885

Except where noted the above specifications are nominal.

* Values are +/- 8%. ***Values are +/- 10 oz. ****Values are +/- 5%. +Values are +/- 3 oz./yd².

13. Infill materials must conform to the following:

Property	Standard	Specification
Rubber Granule Comp	N/A	All black SBR
Rubber Granule Shape	EN 14955	Spherical, Moderate, Angular
Rubber Sieve Analysis	ASTM D 5644	10 / 20MESH (2.0mm – 0.85mm)
Sand Granule Shape	ASTM D442	Semi-rounded to rounded angularity
Sand Sieve Analysis	ASTM E11	20 / 40 MESH (0.85mm - 0.425 mm)
Infill Lbs. of Rubber	N/A	3.10 lbs.
Infill Lbs. of Sand	N/A	3.10 lbs.

FIELD GROOMER & SWEEPER

Contractor shall furnish a field groomer and sweeper as part of the work.

1. Field Groomer and Field Sweeper shall be by the manufacture of the turf system.
2. Field Sweeper shall include a towing attachment compatible with a field utility vehicle.

VERTICAL DRAINAGE BASE MATERIALS

Excavation: Existing natural grass field shall be excavated to the depth as shown on the grading plan. The sub grade shall be shaped to achieve a .5% (one half of one percent) slope from the center of the field to each sideline in order to mirror the grade of the finished synthetic turf surface. The sub grade shall also be compacted and proof rolled to a minimum of a 95% compaction rate.

Geotextile Filter Fabric:

Non-woven polypropylene geotextile fabric shall be chemically and biologically inert and shall be equivalent to Mirafi Inc., Pendergrass, GA (888) 795-0808.

- A. Mirafi 140N or equal for Permeable applications
- B. Mirafi 500X or equal for Silty/Clayey Subgrades with fines content <35% and a PI<20.
- C. 16 Mil Woven Coated Polyethylene line for Impervious applications over moisture sensitive soils.
- D. Liner Selection to be made by Geotechnical Engineer of Record.

Drainage Pipe: A network of perforated HDPE highway grade drainage pipe (1" x 12" flat panel pipe) shall be installed under a 6" layer of free draining base aggregate. **The drainage pipe will be installed in a herringbone pattern every 15 feet on center and will be connected to perimeter collector lines. See Civil Drawings for complete drainage field requirements.**

- 1. ADS AdvanEdge, 800-821-6710 or Hydraway 2000.
- 2. 1 inch by 12-inch flat drain.
- 3. 8-inch diameter perforated collector drainpipe.

Stone Base Courses:

The following gradation of stone is proven and recommended when available in the vicinity of the project. The Base Contractor is required to focus on achieving the planarity, porosity and compaction requirements to provide a sound crushed stone base for synthetic turf installation.

The free-draining base aggregate base layer shall consist of a consistent depth of open graded material. Base drainage aggregate used must achieve a 95% minimum overall compaction rate. Material shall be similar to the ALDOT # 57 classification material. The open graded aggregate material shall conform to the following criteria:

<u>Base Aggregate:</u>	<u>Open Graded Stone (OGS)</u>	
	<u>Weight Passing</u>	<u>Approximate Percentage Passing</u>
2" Sieve	36.99	100.0%
3/4" Sieve	34.04	92.0%
3/8" Sieve	21.5	58.0%
#4 Sieve	9.34	25.0%
#16 Sieve	203.3 grams	9.2%

The choker material shall be a clean washed screenings meeting the Turf Contractor's approval. Material shall be similar to the ALDOT # 89 classification material.

<u>Choker Material:</u>	<u>(Porous Stone Sand)</u>	
	<u>Weight Passing</u>	<u>Approximate Percentage Passing</u>
3/8" Sieve	579.3 grams	100.0%
#4 Sieve	561.5 grams	96.8%
#8 Sieve	420.0 grams	72.0%
#16 Sieve	260.1 grams	45.0%
#30 Sieve	148.8 grams	25.0%
#50 Sieve	74.9 grams	13.0%
#100 Sieve	29.9 grams	5.0%
#200 Sieve	14.7 grams	2.0%

QUALITY CONTROL IN MANUFACTURING

The manufacturer shall own and operate its own manufacturing plant in North America. Both tufting of the field fibers into the backing materials and coating of the turf system must be done in-house by the turf manufacturer. Outsourcing of either is unacceptable.

The manufacturer shall have full-time certified in-house inspectors at their manufacturing plant that are experts with industry standards.

The manufacturer's full-time in-house certified inspectors shall perform pre-tufting fiber testing on tensile strength, elongation, tenacity, denier, shrinkage, and twist i.e., turns per inch, upon receipt of fiber spools from fiber manufacturer.

Primary backing shall be inspected by the manufacturer's full-time certified in-house inspectors before tufting begins.

The manufacturer's full-time in-house certified inspectors shall verify "pick count", yarn density in relation to the backing, to ensure the accurate amount of face yarn per square inch.

The manufacturer's full-time, in-house, certified inspectors shall perform turf inspections at all levels of production including during the tufting process and at the final stages before the turf is loaded onto the truck for delivery.

The manufacturer shall have its own, in-house laboratory where samples of turf are retained and analyzed, based on standard industry tests, performed by full-time, in-house, certified inspectors.

The manufacturer must have ISO 9001, ISO 14001 and OHSAS 18001 certifications demonstrating its manufacturing efficiency with regards to quality, environment and safety management systems.

PART 3 – EXECUTION

Prior to ordering materials, submit a seam layout of field, striping plan and all details of construction that deviate from the plans and specifications.

EXAMINATION

Base Acceptance: The Architect and/or Owner's Representative and Turf Contractor must jointly approve the base before turf installation can begin.

Verify that all sub-base leveling is complete prior to installation.

Installer shall examine the surface to receive the synthetic turf and accept the sub-base planarity in writing prior to the beginning of installation.

1. Acceptance is dependent upon the Contractors test results indicating compaction and planarity are in compliance with manufacturer's specifications.

2. The surface shall be accepted by Installer as "clean" as installation commences and shall be maintained in that condition throughout the process.

Compaction of the aggregate base shall be 95%, in accordance with ASTM D1557 (Modified Proctor procedure); and the surface tolerance shall not exceed 0-1/4 inch over 10 feet and 0-1/2" from design grade.

Correct conditions detrimental to timely and proper completion of Work.

Do not proceed until unsatisfactory conditions are corrected.

Beginning of installation means acceptance of existing conditions.

PREPARATION

Prior to the beginning of installation, inspect the sub-base for tolerance to grade.

Sub-base acceptance shall be subject to receipt of test results (by the Contractor) for compaction and planarity that sub-base is in compliance with manufacturer's specifications and recommendations.

Dimensions of the field and locations for markings shall be measured by a registered surveyor to verify conformity to the specifications and applicable standards. A record of the finished field as-built measurements shall be made.

When requested by Architect, installed sub-base shall be tested for porosity prior to the installation of the turf. A sub base that drains poorly is an unacceptable substrate.

VERTICALLY DRAINING BASE

The synthetic turf Base Contractor shall strictly adhere to the installation procedures outlined under this section. Any variance from these requirements must be accepted in writing, by the Turf Contractor's on-site representative, and submitted to the Architect/Owner, verifying that the changes do not in any way affect the warranty.

Install geotextile fabric over excavated and prepared sub-grade in accordance Architect's recommendations. Provide a 36" minimum overlap at all seams. Fabric shall first be installed in the drainage trenches prior to installation of perimeter collector lines. After backfilling of all trenches is complete, the entire field shall be covered with fabric prior to the base aggregate application.

Trenching, Drainage Pipe Installation and Backfilling: All piping shall be as specified and connected by couplers, plugs etc. Design of the drainage system for the Football Field shall be by this Contractor and accepted by the manufacture of the synthetic grass system prior to installation.

1. The base grade shall be shaped to mirror the finished grade and approved by the Architect and/or Owner's Representative. The Base Contractor shall begin layout and trenching for the drainage network as indicated on the drainage plan and all details that apply. Collector lines shall be installed before lateral lines and shall begin with the

deepest elevations. Collector lines shall be connected to discharge outlet at the onset of operations. Trenching progress shall work upward in elevation to allow for immediate discharge of water from the entire field in the event of a rainfall.

2. No trenches, with or without pipe, shall be permitted, to remain unfilled overnight and/or while crews are not progressively working on site.
3. All perimeter trenches must be dug in accordance with the field drainage plan details.
4. After all collector and lateral lines have been installed, the Base Contractor shall repair any sub grade undulations prior to installing geotextile fabric.

Concrete Header Curb and Pressure Treated Wood Turf Nailer: The synthetic turf perimeter fastening structure shall be installed before the drainage aggregate.

1. The General Contractor shall furnish and install a 6" x 12" concrete header curb around the entire inside of the track at the football field, top of header of the curb shall be flush with track surface. Curb shall be installed in accordance with the manufacturer's requirements. The foundation of the concrete header curb shall be a compacted free draining aggregate. Future water entering the foundation shall have a free draining path directly to the perimeter collector pipe.
2. Install a pressure treated wood 2" x 4" nailer. Pressure treated wood nailer shall be set below top of the curb as specified by means of a Tapcon or ramset every 12 inches. This shall be the responsibility of the Base Contractor.

Base Drainage Aggregate: The installation of the base drainage aggregate shall only begin after the drainage pipe installation has been inspected and approved by Architect/Owner's Representative. Installation of the Free Draining Base Aggregate shall follow procedures that protect the base grade soils and drainage pipe. The drainage pipe network and its existing elevations shall not be disrupted through ground pressures from trucks, dozers or by any other means.

1. The base grade subsoil shall be dry before undertaking the placement of base aggregate.
2. Delivery trucks shall enter the field only from the designated entrance point. Base course stone shall be dumped closest to the entrance first and continuously worked towards the furthest point of the field. Extreme care must be taken not to disturb sub grade or drainage network.
3. Track-type dozers shall push out the stone from behind the pile onto and toward the field center. Dozers shall only traffic the aggregate they are spreading.
4. Bulldozer blades shall be equipped with a laser-guided hydraulic system. Care shall be taken not to disturb or contact the base grade soils with the dozer blades or tracks. All equipment trafficking over the drainage aggregate shall insure there is a minimum depth of 4" of aggregate between the geotextile fabric and the dozer track ground contact position.
5. When the aggregate spreading is completed, the surface shall be further-firmed by a 5-ton roller. Static vibration shall not be part of this process.
6. The stone shall be left firm, but not over-compacted as to protect the porosity and drainage capabilities of the aggregate profile.
7. After the drainage stone has been uniformly spread throughout the surface, the surface shall receive a final laser finished grade. This process shall be accomplished using a turf-type tractor, or lightweight grader, equipped with high flotation tires and a hydraulically controlled laser blade.

8. The free-draining base course must be installed to a depth of 5 inches and shall be independently tested for an overall compaction rate of 95% proctor.

Choker Levels: The base drainage stone final elevations shall mirror the proposed choker layer final grade material. Care shall be taken not to allow the coarser aggregate to surface into the profile or finished grade of the choker layer.

1. The choker layer shall be applied using high flotation grading equipment. The choker material shall be evenly spread throughout the proposed field surface to the final pre-pad or pre-turf elevations.
2. After the choker material has been uniformly spread throughout the surface by the described method, the surface shall receive a final laser finish grade. This process shall be accomplished using a turf-type tractor, or lightweight grader, equipped with high flotation tires and a hydraulically controlled laser blade.
3. Care shall be taken throughout the installation not to force the choker material into the porosity of the base aggregate below.
4. Final choke layer must be graded by means of a laser within 0 to 1/2 inch from design grade. The finished surface tolerance must not exceed 1/4 inch over 10 feet in all directions. Base Contractor must provide a topographical survey with a minimum of 200 shots demonstrating finished grade meets all written requirements.
5. Final layer of stone must be installed at a depth of one (1) inch. Finished aggregate base must be proof-rolled by means of 2- to 5-ton roller. The finished aggregate base must achieve an overall compaction rate of 95% proctor in accordance with ASTM D1557. It shall also be flush with top of pressure treated wood nailer.
6. The Contractor is required to stringline the entire field every five feet to identify high and low spots. And identified high and low spots must be eliminated prior to installation of the synthetic turf.

TURF INSTALLATION - GENERAL

The installation shall be performed in full compliance with approved Shop Drawings.

Only trained technicians, skilled in the installation of athletic caliber synthetic turf systems working under the direct supervision of the approved installer supervisors, shall undertake any cutting, sewing, gluing, shearing, topdressing or brushing operations.

The designated Supervisory personnel on the project must be certified, in writing by the turf manufacturer, as competent in the installation of this material, including seams and proper installation of the Infill mixture.

Designs, markings, layouts, and materials shall conform to all currently applicable National Collegiate Athletic Association rules, NFHS rules, and/or other rules or standards that may apply to this type of synthetic grass installation. Designs, markings and layouts shall first be approved by the Architect or Owner in the form of final shop drawings. All markings will be in full compliance with final shop drawings.

INSTALLATION

Install at location(s) indicated, to comply with final shop drawings, manufacturers' / installer's instructions.

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 supervisors shall undertake the placement of the system.

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.

The Contractor shall strictly adhere to specified procedures. Any variance from these requirements shall be provided in writing, by the manufacturer's on-site representative, and submitted to the Architect and/or Owner, verifying that the changes do not in any way affect the Warranty. Infill materials shall be approved by the manufacturer and installed in accordance with the manufacturer's standard procedures.

The subbase and curbs shall be inspected by the Engineer or Sitework Contractor by means of a laser level and plotted on a 10-foot grid. Based upon the Turf Contractor's inspection of the topographical survey, the Sitework Contractor shall fine grade the subbase suitably - including properly rolling and compacting the base to achieve a surface planarity within $\frac{1}{4}$ " in 10 feet (+0, -1/4"0). OWNER, ENGINEER OR PRIME CONTRACTOR SHALL NOT APPROVE THE SUBBASE FOR TOLERANCE TO GRADE WITHOUT OBTAINING THE TOPOGRAPHICAL SURVEY.

The Turf 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 and proper mixing ratios.

Synthetic turf shall be loose laid across the field and attached to the perimeter edge detail. 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.

All seams shall be flat, tight, and permanent with no separation or fraying. Selvedge edges of all panels must be cut and discarded prior to being sewn together. A butt-stitch method of seaming must be implemented and a double-lock stitch with cord recommended by the Synthetic Turf Manufacturer shall be utilized. Bagger stitching is prohibited. Seaming tape is to be constructed of high tenacity, coated non-woven fabric. Inlaid markings shall be adhered to seaming tape with a high strength polyurethane adhesive applied per the Synthetic Turf Manufacturer's standard procedures for outdoor applications. All main fabric seams shall be transverse to the field direction (i.e. run perpendicularly across the field). Infill materials shall be properly applied in numerous lifts using special broadcasting equipment. The synthetic turf shall be raked and brushed properly as the mixture is applied. The infill material shall be installed to a settled depth of approximately 5/8 inches of the fiber exposed. The infill materials can only be applied when the synthetic turf fabric is dry.

g-Max (shock attenuation) must test below 125 at installation.

FIELD MARKINGS

Field markings shall be installed in accordance with approved shop drawings. Football is designated as the primary sport, all yard lines will be tufted-in.

All sports markings will be inlaid in accordance with the Drawings.

Center field logo shall be inlaid according to artwork indicated on Drawings and in accordance with Owners palette of colors.

End-zone letters and logos shall be inlaid according to artwork and fonts indicated on the Drawings, and in accordance with Owners palette of colors.

ADJUSTMENT AND CLEANING

Do not permit traffic over unprotected surface.

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

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

The Contractor shall keep the area clean throughout the project and clear of debris.

Surfaces, recesses, enclosures, and related spaces shall be cleaned as necessary to leave the work area in a clean, immaculate condition ready for immediate occupancy and use by the Owner.

PROTECTION

Protect installation throughout construction process until date of final completion.

END OF SECTION