

PART 1 – GENERAL

1.01 WORK

- A. Furnishing, delivery, installation and warranty of a complete synthetic turf system including under field drainage, field turf, field markings and resilient infill material.

1.02 RELATED SECTIONS

- A. Section 02300 – Earthwork
- B. Section 321123 – Aggregate subbase

1.03 REFERENCES

- A. ATSM Standard Test Methods
 - **D1577** – Standard Test Method for Linear Density of Textile Fiber
 - **D5848** – Standard Test Method for Mass Per Unit Area of Pile Yarn Floor Covering
 - **D418** – Standard Test Method for Testing Pile Yarn Floor Covering Construction
 - **D1338** – Standard Test Method for Tuft Bind of Pile Yarn Floor Coverings
 - **D1682** – Standard Method of Test for Breaking Load and Elongation of Textile Fabrics
 - **D5034** – Standard Test Method of Breaking Strength and Elongation of Textile Fabrics (Grab Test)
 - **F1015** – Standard Test Method for Relative Abrasiveness of Synthetic Turf Playing Surfaces
 - **F1551** – Standard Test Methods for Water Permeability
 - **D2859** – Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials
 - **F355** – Standard Test Method for Shock-Absorbing Properties of Playing Surfaces
 - **F1936** – Standard Test Method for Shock-Absorbing Properties of North American Football Field Playing Systems as Measured in the Field
 - **D1557** – Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort.
- B. National Federation of High School (NFHS) Rules, as applicable. FIFA Rules of the Game or NCAA Soccer Rules, as applicable.
- C. ASBA Sports Fields Contractor Manual
- D. STC Suggested Guidelines for the Essential Elements of Synthetic Turf Systems

1.04 SITE EXAMINATION

- A. The Contractor shall verify clearing and grubbing operations were adequate prior to repairing subgrade.
- B. The Contractor, along with the Engineer, Grading Subcontractor (if applicable) and Synthetic Turf Subcontractor (if applicable), shall attend a joint inspection of the completed sub-base assembly for the purpose of determining the acceptability of that surface prior to installing the synthetic turf product and to confirm actual site dimensions.
- C. The inspection shall include a check for planarity. The finished surface shall not vary from a true plane more than 1/4" in 10 feet when measured in any direction. The Contractor shall provide all required tools and materials needed for the planarity check, which may include but not be limited to, a laser level, string line, straight edge and/or other assessment materials. The Contractor shall mark in the field any deviations from grade in excess of those specified above, as well as provide a marked up plan locating the deviations. The Contractor shall correct any deviations to the satisfaction of the Engineer and installer.
- D. The compaction of aggregate base shall be 95% to Standard Proctor and surface tolerances shall not exceed 1/4" over 10 feet.
- E. The Contractor shall have a state registered surveyor conduct an elevation survey of the field area in a 25' grid to determine and verify that subgrade elevations and slopes are within previously specified tolerances. This elevation survey may require further verification of smaller areas within the 25' grid if determined necessary by the Engineer.
- F. When any or all corrective procedures have been completed, the finished sub-base surface must be re-inspected, with the same representatives attending as the initial inspection. If required, additional repair and inspections are to be conducted until the subbase surface is deemed acceptable by the Engineer and Installer
- G. Once the sub-base surface has been deemed acceptable, the Contractor shall submit a written certificate indicating the acceptance of:
 - 1. The sub-base construction finished surface as totally suitable for the application of the selected synthetic turf system, and
 - 2. The sub-base construction as totally suitable for work under this section to proceed with the final installation and fully warrant the athletic surface installation for the period and conditions specified herein.
- H. Commencement of work under this section shall constitute acceptance of the work completed under other sections by the Contractor, acceptance of dimensions of the

subbase, and hence, no claims for extra work based upon these conditions will be permitted.

1.05 ENVIRONMENTAL CONDITIONS

- A. Install synthetic turf surfacing only when ambient air temperature is 35 F or above and the relative humidity is below 35% or as specified by the product manufacturer. Installation will not proceed if rain is imminent.
- B. Install product only when prepared base is suitably free of dirt, dust, and petroleum products, is moisture free and sufficiently secured to prevent unwanted pedestrian and vehicular access.

1.06 QUALITY CONTROL

- A. **Manufacturer Qualifications:** Company specializing in manufacturing products specified in this section. The Manufacturer:
 - 1. Basis of design shall be GT-35 1.5" Pile Split Film Polyethylene Athletic Field Turf by Amarco Products. 866-688-6287. www.amarcomats.com
 - 2. Materials other than those listed must be approved 15 days prior by written addendum. Materials from non-approved manufacturers will not be accepted.
 - 3. Must be experienced in the manufacturing of tall pile synthetic infill grass systems with the same fiber as specified.
 - 4. Must have at least 50 fields of 65,000 sq. ft. or more of the specified material, fiber, infill material and backing, or similar system, in play in the United States.
 - 5. Source Limitations: Obtain synthetic turf fiber through one source from a single manufacturer and provide fiber manufacturer's warranty.
 - 6. Manufacturer must be a member in good standing with the STC.
 - 7. Manufacturer must utilize best practices as certified by ISO-9001 and ISO-14001.
 - 8. Manufacturer must be owned and operated in the U.S.A.
 - 9. Manufacturer must have no periods of insolvency over the last 25 years.
- B. **Installer Qualifications:** Company specializing in performing the work of this section.
 - 1. The Installer must provide competent workmen skilled in this type of synthetic grass installation. All technicians must have installed tall pile synthetic turf.
 - 2. The designated Supervisory Personnel on the project must be certified, in writing by the Manufacturer, as competent in the installation of this material, including seaming and proper installation of the infill mixture.
 - 3. ASBA Certified Field Builder shall be on site for at least 25% of the installation of the sub-base and synthetic turf.

- C. Prior to the beginning of installation, the Installer shall inspect the subbase. The installer will accept the sub-base in writing when the general contractor provides test results for compaction, planarity and permeability that are in compliance with the synthetic manufacturer's recommendations and as stated herein.
- D. The Installer shall provide the necessary testing data to the Owner that the finished field meets the required initial shock attenuation, as per ASTM F1936.
- E. Remove defective Work, whether the result of poor workmanship, defective products or damage, which has been rejected by the Engineer as unacceptable. Replace defective work in conformance with the Contract Documents.

1.07 SUBMITTALS

A. **Submit the following with Proposal:**

- 1. Submit the exact product name/description as well as the name and location of the manufacturers and suppliers of each component. Manufacturers and suppliers must not be changed after the contract is awarded unless approved by the Owner in writing.
- 2. Submit two (2) samples, 12"x12" minimum size, illustrating details of finished product as bid, including full cross section of subbase, turf, and infill material.
- 3. Product Literature: Submit two (2) copies of manufacturer's recommended installation and maintenance information, including any technical criteria for evaluation of the installed product. Descriptions of all equipment recommended for the maintenance and repair of turf product, as well as a list of any activities not recommended relative to the warranty.
- 4. Submit a 1-lb sample of the selected bid infill material(s).
- 5. A letter and specification sheet certifying that the products of this section meet or exceed specified requirements.
- 6. Certified copies of independent (third-party) laboratory reports on ASTM tests as follows:
 - a. Pile Height, Face Width & Total Fabric Weight, ASTM D418 or D5848
 - b. Primary & Secondary Backing Weights, ASTM D418 or D5848
 - c. Tuft Bind, ASTM D1335
 - d. Grab Tear Strength, ASTM D1682 or D5034
 - e. Verification that product meets Gmax minimums for ASTM F1936 for life of installation.
- 7. ASTM test submittals may vary by no more than 1/4" and 6 oz. of the specified product to bid. Bid winner must show NEW ASTM TESTS with contract submittals.

8. Name and experience of the designated supervisory personnel assigned to this project shall be submitted with the proposal. Changes to this assignment after contract can only be made if approved in writing by the Owner. Include a listing of other on-site personnel and their experience.
9. The Installer and Manufacturer shall provide evidence that the turf system does not violate any other manufacturer's patents, patents allowed or patents pending.
10. The Installer and the Manufacturer shall provide complete information on its warranty/insurance policy and coverage, as noted in Section 1.08. Provide a complete sample copy of all warranty documentation.

B. Prior to ordering of materials:

1. The Contractor shall submit Shop Drawings indicating:
 - a. Field Layout.
 - b. Field Marking Plan and details for Soccer, Men's Lacrosse, and Women's Lacrosse if required.
 - c. Mid-field emblem layout with color samples.
 - d. Roll/Seaming Layout.
 - e. Methods of attachment, field openings and perimeter conditions.
2. The Manufacturer must submit the fiber manufacturer's name, type of fiber and composition of fiber.
3. **Shop Drawings:** Shop drawings are to be submitted for review by the Engineer prior to manufacture of product and are to contain information regarding locations of seams, anchorage details, goal post/insert details, line and event marking locations and dimensions, turf roll widths and dimensions.

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

1. Two (2) copies of Maintenance Manuals, which will include all necessary instructions for the proper care and preventative maintenance of the synthetic turf system, including painting and markings. Also address remedial measures for graffiti removal.
2. Written verification of a suitable training session for the Owner's maintenance staff on how to maintain the completed installation.
3. Project Record Documents: Record actual locations of seams, drains or other pertinent information.
4. Enter into a contract with the Owner to provide annual operations and maintenance assistance for two (2) years. Provide contract, contact information and schedule first visit. Quarterly each year provide operations and maintenance that includes:
 - a. On-site inspection analysis of seams, infill, inlay, edge, and field inserts.
 - b. The contractor shall sweep and groom the field at each quarterly visit.

- c. Synthetic turf report with results of inspection analysis, photos, results of cleaning process, recommendations for future cleaning/maintenance, and Gmax testing results.
 - d. The Contractor must execute an annual operations and maintenance assistance contract before substantial completion can be approved.
5. Test Results: Test certifications issued by an independent testing agency that the synthetic surface meets with the requirements of the ASTM tests noted herein are to be submitted.

Base Conditions Acceptance: Prior to installation of the synthetic turf system, the Contractor is to submit in writing an acceptance of the compacted base and sub-base system as being acceptable by the manufacturer and suitable for the successful installation of the proprietary synthetic turf system.

1.08 WARRANTY

- A. The Contractor shall provide a minimum eight (8) year, against defects in materials and workmanship. Defects shall include, but not be limited to ultraviolet ray fading, degradation, or excessive wear of fiber.
- B. Warranty shall be for full replacement of any damaged product within the warranty period. Warranty shall be comprehensive and sufficient to replace entire field if necessary.
- C. Warranty shall become effective from the date of substantial completion.
- D. Warranty shall include Gmax testing on a bi-annual basis demonstrating an initial Gmax not exceeding 125 G's initially and not exceeding 175 G's at any time during the warranty period. Test results shall be submitted to the Engineer within 30 days of each test.
- E. The Warranty shall contain no usage limits for warranted field.
- F. Submit Manufacturer Warranty and ensure that forms have been completed in Owner's name and registered with Manufacturer.
- G. Supply Warranty Insurance Certificate with complete information on contacting the Insurance Carrier should a claim need to be made. Warranty insurance policy shall have the Owner listed as insured.

PART 2 PRODUCTS

2.01 TURF SYSTEM

A. Turf Fiber:

1. The turf fiber must be tufted to the backing with a minimum tuft bind of 10 pounds.
2. The tufted fiber weight shall be a minimum of 40 ounces per square yard.
3. The turf fiber shall be 100% polyethylene.
4. The turf fiber shall be non-abrasive and a minimum of 100 microns thick.
5. The turf fiber must contain less than 100 ppm of lead in all colors.
6. The turf fibers must be from the same dye lots.
7. The turf fibers must be from a single source.
8. The turf fibers must be guaranteed for a period of Eight Years not to fade or fail (as distinguished from a change in texture) or have a pile height decrease to 50% of pile height as result of UV degradation.
9. The infill must be within ¼" of the tips of the fibers upon completion of the install.
10. The turf fiber must retain a minimum of 75% of its original fibril width after 10,000 cycles on the Lisport Studded Roll Test Machine.

11. The pile fiber shall possess the following characteristics:

Characteristic	Value	Test
Linear Density (Denier)	8,000 Combined	ASTM D 1577
Yarn Thickness	100 Microns (slit)	ASTM D 3218
Tensile Strength	80 N (8040 slit)	ASTM D 2256
Pile Weight*	40 oz./yd ²	ASTM D 5848
Fiber manufacturer must be from the same source		
The above specifications are nominal. *Values are +/- 5%.		

12. The pile fabric shall possess the following physical characteristics:

Characteristic	Value	Test
Finished Pile Height*	2" (51mm)	ASTM D 5823
Product Weight (total)*	69 oz./yd ²	ASTM D 3218
Primary Backing Weight*	7.4 oz./yd ²	ASTM D 2256
Secondary coating Weight**	22 oz./yd ²	ASTM D 5848
Fabric Width	15' (4.57m)	ASTM D 5793
Tuft Gauge	3/8"	ASTM D 5793
Grab Tear Strength	200-1b-F	ASTM D 5034
Tuft Bind	>10-1b-F	ASTM D 1335
Infill (Sand)	1 lb Silica Sand	None
Infill (Rubber)	3 lbs. SBR Rubber	None
Except where noted as a minimum, the above specifications are nominal.		
* Values are +/- 5%. **All values are +/- 3 oz./yd ² .		

B. Backing Material

a. Primary Backing:

- i. Primary backing must be a dual layered woven polypropylene material.
- ii. Primary backing system weight must be a minimum of 7.0 ounces/square yard.

b. Secondary Backing:

- i. Secondary backing system weight must be a minimum of 22 ounces/square yard.
- ii. Secondary backing shall saturate the primary backing and effectively lock the fiber tufts in place to the primary backing.
- iii. Secondary backing must be a heat activated polyurethane coating with **no vegetable based polyols.**
- iv. Secondary backing system shall have minimum tuft bind strength of 10 pounds.
- v. Secondary backing must have Drainage Perforations: 3/16" to 1/4" diameter at 4 inches or less on center each way. Non-perforated backing is not acceptable.

C. **Turf roll seams:** to be sewn or glued on site so that no openings larger than the porous backing mat openings are created. Roll width to coincide with tufted-in sports line markings where possible. All turf fabric edges to be securely bound as per the perimeter detail design. Adhesives for joining seams of turf together shall be Amarco Products Turf Adhesive, hot melt technology or equivalent. No substitutions.

D. **Fabric surface:** shall be constructed and installed in minimum widths of 15 feet with no longitudinal or transverse seams, except for inlaid lines with a finish roll assembly. Seams

shall be 15'-0" apart. Rolls that do not comply with the proper length or conform to the seaming diagram, as approved prior to installation, shall be rejected from the site. No fitted pieces shall be allowed to true alignment. Parallel seams only are acceptable in the main playing areas. No head seams are acceptable on the sports fields.

- E. The entire system shall be resistant to weather, including ultra-violet light and heat degradation; insects, rot, mildew and fungus growth and be non-allergenic and non-toxic.
- F. **Fiber Colors:** Submit samples of the full available color palette for owner approval prior to placing order for turf including at a minimum the below listed colors: (Specified)
 - Color 1: Grass, green in standard color, as selected by the Owner
 - Color 2: White for soccer lines and markings
 - Additional colors as needed.
- G. The Mid-field Center Logo shall be provided by the owner in a standard PDF or EPS file to the selected contractor. Contractor shall submit a shop drawing of Logo to include colors and dimensions for approval by the owner prior to ordering. (Specify or Delete)
- H. The turf material shall be non-combustible and pass the DIN standard Pill Burn test or ASTM D 2859.

2.02 LINES, MARKINGS AND IN-LAID TURF

- A. All line material is to be identical dimensionally and of the same material to that used for the main playing field fiber system.
- B. Inlaid material as indicated on the drawings to be identical, except for fiber color, as the main turf field.
- C. All lines and markings shall be accurately set and surveyed to within 1/2" tolerance of the location shown on the drawings and in conformance with specified field marking standards.
- D. All lines and markings shall be installed prior to any installation of in-fill material.

2.03 SYNTHETIC GLUE MATERIAL

- A. Adhesive products shall be Amarco Products Turf adhesive, hot melt technology or equivalent as approved by the engineer.
- B. Any adhesive products required for the installation of a proposed turf system shall be purpose-suited to the system. The material and application methods shall be as recommended by the adhesive manufacturer.
- C. Disposal of adhesive containers and unused adhesives as well as any fees resulting from such disposal shall be the responsibility of the Contractor.

2.04 INFILL MATERIAL

- A. The synthetic infill material shall consist of a blend of graded, silica sand and treated and mixed ground rubber.
 - 1. Sand: specially-graded, dust-free silica sand shall be placed on the turf in a minimum quantity of 1 pound/ square foot and shall include test results that demonstrate the following minimum properties:
 - a. Color – tan
 - b. Sand shall be round non-angular in shape
 - c. Roundness – 0.6+
 - d. Hardness - 0.6-0.8 on the Mohs Scale
 - e. Size – 1.00 mm ± 0.15 mm
 - f. Density – 90 – 95 lbs/ cu ft.
 - g. Dust - < 0.001 %
 - h. Angle of Repose - < 30°
 - i. Sand shall be heavy metal safe
 - 2. Rubber: Rubber is SBR ambient (styrene butadiene rubber) rubber, color black, 10-18 mesh, that is 99% fiber free and is heavy metal safe. Rubber shall be placed on the turf in a minimum quantity as referenced the table in Section 2.02 in this document and shall be of the following Mesh Size Distribution:

Mesh Size	% Retained
a. 10	0-15%
b. 12	5-30%
a. 16	40-70%
b. 20	15-35%
c. 30	0-10%
d. 40	0-1%
e. Pan	0-1%
- B. The infill materials shall be installed to allow an exposed fiber of not less than ¼ inch after finish brushing and ½ inch after 180 days.
- C. Sufficient quantities of the top dressing infill material must be stored on site at the time of installation to be used 180 days after the completion of the installation to mitigate the differential settling of high traffic zones on the field. This fill addition must be carried out by the Contractor within the time specified above.
- D. 100% NEW INFILL ONLY. No replacement rubber from other turf permitted.
- E. New infill must have point of origin with sieve analysis.

PART 3 EXECUTION

3.01 GENERAL

- A. Installation of the synthetic turf system is to comply with the manufacturer's recommendations, requirements and the reviewed and approved shop drawings.
- B. Perform all work in strict accordance with the Contract Documents and the manufacturer's specifications and instructions. Only those skilled technicians proposed in the bid phase are to be assigned to this project by the Contractor.
- C. The designated Supervisor for the Installer must be present during any and all construction activity associated with the field installation, including testing, cleanup and training.
- D. All products and equipment are to be from sources approved by the authorized manufacturer and conform to the specifications.

3.02 PRODUCT DELIVERY, STORAGE & HANDLING

- A. Deliver products to site in original containers and wrappers as agreed between the Engineer and Contractor. Inspect products upon delivery for damage.
- B. Store products in a location and in a position that protects them from crush damage or any other defects.
- C. Handle and store (on and off site) all materials safely to ensure their physical properties are not adversely affected and that they are not subject to vandalism or damage.
- D. Rubber and sand infill shall arrive dry and loose. No rubber shall be accepted that is bulked or solid.
- E. Adhesives shall arrive in dry, sealed containers.
- F. Rubber infill shall arrive in large sacks or bags without tears or loose material about.

3.03 PLUGS AND FITTINGS

- A. All permanent field fittings penetrating the turf indicated on the drawings shall be securely sealed to the turf surface so that no infill material is allowed to spill to the substrate.

3.04 TURF INSTALLATION

- A. Install synthetic turf system in accordance with the manufacturer's written installation instructions.
- B. All inlaid areas shall have full fastenings and no loose areas. At no time can pulling on the section separate the material.
- C. Turf shall be attached to the perimeter edge as shown in the construction plans and as per the manufacturer.
- D. All seams and inlaid areas shall be brushed thoroughly before infill materials are installed.

- E. All terminations shall be as detailed and approved in the shop drawings.

3.05 INFILL INSTALLATION

- A. The synthetic turf shall be thoroughly brushed prior to installation of infill materials to remove wrinkles.
- B. The infill materials shall be installed in layers, in accordance with the manufacturer's installation instructions. Any mix of materials shall be uniform and even in thickness.
- C. Turf shall remain free draining at all times before, during and after the infill materials are installed.

3.06 FIELD MARKINGS

- A. Sports field lines and event markings as per the Contract Documents shall be accurately positioned and marked in accordance with the current rules of the governing body. All lines shall be straight and true along the length of the marked boundary to within ½" along the length of any such boundary.
- B. All markings shall be accurately measured and applied in widths and colors as required by the governing body and selected from the manufacturer's range of standard colors, or not more than one custom color if the manufacturer's standard colors do not meet the Owner's requirements.

3.07 TESTING

- A. At the time of substantial completion and bi-annually during the life of the warranty, the Contractor shall perform a series of tests by use of an independent testing agency to evaluate the shock absorption characteristics of the field. The tests shall be performed on a 50 foot grid in both directions using an accelerometer in accordance with ASTM F1936 and ASTM F355. Test the field at a minimum of 12 points and submit the results to the Owner within 30 days of testing. At no point shall any reading exceed 175 Gmax during the life of the warranty. If any point exceeds the maximum deceleration, the Contractor shall make corrections to provide the allowable Gmax deceleration at the Contractor's expense.

3.08 CLEANING AND COMPLETION

- A. Protect all installed work from other construction activities as installation progresses.
- B. The Contractor shall keep the area clean throughout the construction period and free from the installation process, including track surfaces.
- C. Upon completion of the installation, thoroughly clean surfaces and site of all refuse resulting from the installation process, including track surfaces.



- D. Any damage to existing fixtures or facilities resulting from the installation of the synthetic turf system shall be repaired to original condition at the Contractor's expense prior to Substantial Completion and commencement of the Warranty Period.
- E. A deficiency list will be produced by the Engineer at the conclusion of the project. All installation project deficiencies not in dispute must be remedied by the Contractor prior to the issuance of a certificate of Substantial Completion.
- F. Contractor to provide a written acceptance by the Manufacturer that the turf and base system is installed in accordance with their recommendations prior to final completion.