

SECTION 32 18 23.29

SYNTHETIC FIELD SPORTS SURFACING

PART 1 – GENERAL

1.01 GENERAL REQUIREMENTS

- A. Include GENERAL CONDITIONS and all other Division 1 - General Requirements as part of this section.
- B. It is the intent of this Section to specify an Infilled Synthetic Turf System that provides a high quality playing surface for multi-purpose MIAA athletic use that is similar to well maintained natural grass. The finished surface shall be immediately firm, consistent and stable while providing long term durability, safety and shock attenuation. The Infilled Synthetic Turf System Vendor's attention is called to the testing requirements related to G-Max rating per ASTM F355-A. A G-Max rating of less than 90 or in excess of 165 at any time from acceptance through the end of the Warranty Period is unacceptable.
- C. Examine all other Sections of the Specifications for requirements that affect work of this Section whether or not such work is specifically mentioned in this Section.
- D. Coordinate work with trades affecting, or affected by, work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.02 DESCRIPTION OF WORK

- A. Provide an inspection and certification of subsurface drainage system and free draining subbase prior to commencement of subsequent work.
- B. Furnish and install a new Infilled Synthetic Turf System on the amended existing free draining base. Synthetic Turf system to include parallel long-slit film polyethylene fibers and spinneret or extruded monofilament fibers woven into a high quality polyurethane backing, resilient infill mix, and cast-in-place concrete nailer as shown on the plans and otherwise specified herein.
- C. Provide tufted, inlaid and/or painted lines and markings or other such graphics as shown on the Drawings and approved Shop Drawings.
- D. Provide all attachments and penetrations as required to complete the work as shown on the Drawings and approved Shop Drawings.
- E. Provide a drainage test on free draining subbase prior to installation of new synthetic turf surface in conformance with *ASTM F 2898 - 11 Standard Test Method for Permeability of Synthetic Turf Sports Field Base Stone and Surface System by Non-confined Area Flood Test Method*
- F. Provide GMax testing upon completion.
- F. Provide warranty and field maintenance training.
- G. Provide Field Groomer and Sweeper attachments for field maintenance.

1.03 RELATED WORK

- A. Site Preparation

- B. Earthwork
- C. Cast-in-Place Concrete Curb
- D. Chain Link Fence and Gates
- E. Storm Drainage System
- F. Protective Netting

1.04 REFERENCES

- A. American Society for Testing and Materials (ASTM).
- B. Consumer Products Safety Commission (CPSC).
- C. Massachusetts Interscholastic Athletic Association (MIAA)
- D. US Lacrosse (USL).
- E. United States Soccer Federation (USSF).
- F. Federation Internationale de Football Association (FIFA).

1.05 QUALITY CONTROL

- A. Experience:
 - 1. Infilled Synthetic Turf System shall be provided by an experienced specialty vendor which shall have supplied at least 25 outdoor athletic field systems of 75,000 s.f. or greater of the type and installation process herein specified within the last three (3) year period.
 - 2. Infilled Synthetic Turf System installation shall be performed by an experienced specialty contractor which shall have laid at least 25 outdoor athletic field systems of 70,000 s.f. or greater of the type and installation process herein specified within the last three (3) year period.
 - 3. All installation operations shall be performed by personnel fully familiar with the materials and their application under the full time direction and supervision of a qualified technical supervisor directly employed by the Infilled Synthetic Turf System Vendor. Installation supervisors shall have a minimum of 3 years experience in the installation of Infilled Synthetic Turf Systems.
- B. Source Limitations: Obtain Infilled Synthetic Turf System including tufted synthetic turf yarn and carpet backings from a single Tufted Synthetic Turf Manufacturer. Provide additional system components including anchoring materials, seaming products, binders and adhesives, and infill materials meeting the criteria of this Specification Section from single sources.
- C. Inspection and Acceptance: The Infilled Synthetic Turf System Vendor and Contractor shall inspect the subgrade and drainage system to verify their acceptance of installation and condition. Commencement of subsequent installation in a given work area indicates acceptance of underlying substrates and systems.
- D. Planarity and Grade: Deviation in planarity within the finished surface shall not exceed 1/8" beneath a 10' straightedge. Deviation from a straight grade between levels on drawings shall not exceed 1/4".

- E. Protection: Heavy equipment or vehicles of any kind should not be allowed on the field area subsequent to the completion of the drainage system.
- F. Restoration of Damage: Infilled Synthetic Turf System Vendor shall exercise care in the execution of his work and avoid damage or defacement of adjacent or surrounding areas by using suitable protective means. Damage or defacement which occurs shall be remedied at Infilled Synthetic Turf System Vendor's cost to the satisfaction of the Awarding Authority.

1.06 SUBMITTALS

- A. General: Submit the following with the General Bid in accordance with Conditions of the Contract.

- 1. Manufacturer's Literature:

- a. Submit a signed statement from the Infilled Synthetic Turf System Vendor that the Drawings and Specifications have been reviewed by a qualified representative of the Infilled Synthetic Turf System Vendor and major materials suppliers, and that they are in agreement that the materials and installation method to be used for the Infilled Synthetic Turf System are proper and adequate for use a multi-purpose athletic field in the Commonwealth of Massachusetts.
- b. A recent reference list of at least 25 fields supplied by the Infilled Synthetic Turf Vendor of the type and installation process specified herein with contract name, address and telephone number to enable such data to be validated prior to the commencement of work.
- c. A recent reference list of at least 25 fields installed by the Infilled Synthetic Turf Installer of the type and installation process specified herein with contract name, address and telephone number to enable such data to be validated prior to the commencement of work.
- d. Job Resumes of Infilled Synthetic Turf System Vendor's Installation Supervisor and Infilled Synthetic Turf System Installers.
- e. Cut Sheets for all materials required under this Section including third party ASTM certified lab reports.
- f. Manufacturer's written warranties for all individual component's of the Infilled Synthetic Turf System.
- g. Provide a sample written 8-year labor and materials warranty from the Infilled Synthetic Turf System Vendor.

- B Submit the following in accordance with the Conditions of the Contract and Division 1 Specifications:

- 1. Manufacturer's Literature:

- a. Infilled Synthetic Turf System Vendor's written eight (8) year Infilled Synthetic Turf System warranty.
- b. Manufacturer's written warranties for the Field Groomer and Sweeper.
- c. Material Safety Data Sheets for all products listed in this Section.

2 Shop Drawings:

- a. Provide details which illustrate the scope of work, including but not limited to materials, cross sections, subsurface and penetration details
- b. Provide a seaming plan at 1"=20'-0".
- c. Provide a striping plan at 1"=20'-0" which includes layout for Men's baseball, football, soccer and youth soccer showing field lines, center markings, boundaries, and other field markings in compliance with MIAA requirements and as otherwise shown on the drawings.
- d. Supply shop drawings (including details) at an approved scale for location, installation and erection of the cast-in-place concrete nailer.

3. Product Samples and Information:

- a. Provide color samples of manufacturer's standard parallel long-slit film polyethylene and spinneret or extruded monofilament fiber.
- b. Provide a minimum 12-inch by 12-inch sample of slit film polyethylene and mono-filament carpet. One edge of the sample shall contain a 4-inch tufted white line and a 4-inch yellow line inlaid through the middle to depict materials, colors and workmanship. Provide additional carpet samples for other colors required under this section.
- c. Provide 12" long sample of 15" wide seaming tape.
- d. Provide sieve analysis of infill materials for approval.
- e. Provide a 1-quart sample of the infill mix at the Landscape Architect's approved mix ratio.
- f. Provide information regarding future requirements for painting of field surface.

4. Provide delivery slips for all Infilled Synthetic Turf System materials delivered to the site.

5. Provide Field Maintenance Training and written Operations and Maintenance Manual to the Awarding Authority.

6. Provide As-Built Field Layout Drawing upon completion of Work.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle products in exact accordance with the Manufacturer's requirements and specifications.

- B. Products delivered to the site which are not in compliance with the requirements of this Section shall be removed from the site immediately at no cost to the Awarding Authority.

1.08 PROJECT CONDITIONS

- A. Weather Limitations: No part of the construction shall be conducted during a rainfall or when rainfall is imminent. No part of the construction shall be conducted unless both ambient and materials temperatures are at least 40 degrees F and rising.
- B. After a rainfall, sufficient time shall be given to allow surfaces and infill materials to dry before resuming work. Surfaces and materials shall be dry, as well as clean. Adhesives should not be applied within 12 hours after rainfall, or when rainfall is forecast.
- C. Do not apply Infilled Synthetic Turf System materials or components over wet, frozen, or muddy base.

1.09 WARRANTY

- A. Warranty: The Infilled Synthetic Turf System Vendor shall provide a third party insured warranty guaranteeing all manufactured and procured Infilled Synthetic Turf System materials and workmanship against damage by climatic conditions or proper and normal use (including the use of cleats) for a minimum period of eight (8) years from the official date of Substantial Completion. In addition, the Infilled Synthetic Turf Warranty shall guarantee all manufactured and procured materials and/or workmanship including such defects as premature decrease in infill height, premature decrease in pile height or weight (stipulated as more than 10% decrease), UV degradation, fading, seam rupture, dislodgement, inadequate drainage or inadequate air transmission. The guarantee shall be in writing, stating the any defects, including the need to remove and replace manufactured and/or procured materials will be repaired at no cost to the Awarding Authority within 7 days written notice of the Awarding Authority. The warranty coverage shall not be prorated nor limited to the amount of the usage. Warranty coverage shall provide for \$15 million per year in the aggregate and \$5 million per claim minimum.
- B. Performance Testing:
 - 1. The Infilled Synthetic Turf System Vendor shall, at their own expense, have G-Max testing performed by an approved and certified independent testing laboratory prior to requesting Substantial Completion. Testing shall consist of shock attenuation per ASTM F-355-A. The Awarding Authority and Landscape Architect shall be provided with copies of all testing.
 - 2. Testing shall be performed at the field's center, the goal locations for all sports and at 10 yards inside each corner of the field. Tests shall also be taken at 4 random spots as chosen by the Landscape Architect or Awarding Authority.
 - 3. At no time shall the G-Max be less than 90 nor exceed 165 at any one point of the field.

4. In cases where the result of a test falls outside the specified values, additional tests shall be taken in 10-foot increments in 4 opposite directions (north, south, east and west) from the failing test point and each subsequent failing test point until all tests fall within the specified values. The failing area shall be marked off, repaired and retested by the Infilled Synthetic Turf System Vendor until all tests fall within the specified values.
5. G-Max testing during the remainder of the warranty period will be performed by and at the discretion of the Awarding Authority. Results of these tests will be provided to the Contractor and Infilled Synthetic Turf Vendor.

1.10 PATENT RIGHTS AND INFRINGEMENT

- A. There are various established performance criteria throughout this request for products and services. There may exist patent coverage for some means and methods of achieving those performance criteria. Bidders are responsible for ascertaining that means and methods of the products and services which they are providing are not being provided in violation of any such patent rights. Bidder's responsibilities are as follows:
 1. To hold harmless, the Awarding Authority, Landscape Architect and the Awarding Authority's other consultants, as to any violation to include dollar amounts that could be owed as a result of damages for infringement including potential treble damages as provided for under U.S. Patent Law.
 2. Any and all costs that the Awarding Authority, Landscape Architect and/or the Awarding Authority's other consultants, would incur in replacing materials and services which are determined to infringe patent rights.
 3. All administrative, legal and other costs that would be incurred as a result of an infringement.
- B. If any product or services proposed to be provided by the bidder are known by the bidder to be subject to any existing claims of infringement, bidder shall notify Awarding Authority and Landscape Architect of such claim and provide evidence of financial ability to perform on the above hold harmless requirements.

PART 2- PRODUCTS

2.01 BASE AND DRAINAGE MATERIALS

- A. Geotextile Fabric:
 - 1 Non-woven polypropylene geotextile fabric shall be chemically and biologically inert and shall be equivalent to the following:
 - a. Mirafi 140N, Mirafi Inc., Pendergrass, GA (888) 795-0808
 - b. Poly Filter-X, Carthage Mills (800) 543-4430
 - c. Supac-5P, Phillips Fibers Corp.
- B. Free Drainage Gravel Sub-Base for Infill Synthetic Turf System.
The contractor shall verify that the existing subbase system provides a uniformly mixed

processed stone over the entire synthetic turf subgrade. The contractor shall extend and repair the aggregate to a depth as indicated on the record drawings and shall insure that the final base constitutes a compacted, stable, permeable stone subbase course. Care shall be taken during installation, amendment and recompaction of the aggregate to maintain the grade designed and installed for the subgrade below. The capability of the processed stone drainage layer to meet the stability and permeability requirements must be determined by a certified laboratory prior to the construction of the base course. Aggregate shall be durable and shall not exceed 12% loss of materials as determined by a sulfate soundness test (ASTM C88). The processed stone layer shall be compacted to a minimum of 95% of maximum density per ASTM D698. Gradation shall conform to the following:

<u>Sieve Designation</u>	<u>% Passing by Weight</u>
1.5"	100
1"	95-100
.75"	80-100
.50"	60-80
.375"	30-50
No. 4	20-40
No. 8	10-30
No. 40	5-17
No. 200	0-2

2.02 INFILL SYNTHETIC TURF SYSTEM

- A. The turf fiber shall consist of a dual yarn system. The grass yarn shall be a combination of parallel long-slit film polyethylene and spinneret/extruded monofilament fibers. The fibers shall be tufted in a grass-like fabric to a finished pile height of approximately 2.50" and coated with a secondary backing of high-grade polyurethane. The synthetic turf fabric shall be filled with 70% SBR rubber and 30% rounded silica sand, by weight.
- B. 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 climatic exposure in all climates, be resistant to insect infestation, rot, fungus, mildew, ultraviolet light and heat degradation, and shall have the basic characteristics of flow-through drainage, allowing free movement of surface runoff through the synthetic turf fabric where such water may flow to the existing base and into the field drainage system.
- C. 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 system shall be suitable for football, soccer, lacrosse, baseball, softball, PE classes, intramurals, and recreational use.
- D. The polyethylene parallel long-slit-film pile fiber and the spinneret/extruded monofilament fiber shall be a proven athletic caliber fiber designed specifically for outdoor use and stabilized to resist the effect of ultraviolet degradation, heat, foot traffic, water, and airborne pollutants. The pile fiber shall possess the following physical characteristics:

Linear Density (Denier)		
Monofilament Fibers	10,000 (min)	ASTM D 1577
Slit Film Fibers	8,000 (min)	ASTM D 1577
PE Yarn Thickness / Width		
Monofilament Fibers	240 +/- 10 microns	ASTM D 3218
Slit Film Fibers	110 +/- 10 microns	ASTM D 3218
Break Strength		
Monofilament Fibers	25 lb-F	ASTM D 2256
Slit Film Fibers	8 lb-F	ASTM D 2256
Pile Weight	50 oz/yd ²	ASTM D 5848

- E. The Pile fabric shall possess the following physical characteristics:

Finished Pile Height	2.50"	ASTM D 5823
Product Weight (total)	75 oz/yd ²	ASTM D 5848
Primary Backing Weight	8 oz/yd ²	ASTM D 5848
Secondary Backing Weight	20 oz/yd ²	ASTM D 5848
Fabric Width	15'	ASTM D 5793
Tuft Gauge	3/8 to 1/2"	ASTM D 5793
Grab Tear Strength	200 lb-F	ASTM D 5034
Tuft Bind (Avg)	8 lb-F min.	ASTM D 1335

- F. Pre-Installation Submittal: Prior to the completed synthetic turf product being shipped to the project site, the synthetic turf manufacturer shall provide the in-house Production Report to the Landscape Architect. The Production Report shall be specific to the material being shipped, and include results of in-house testing completed on the turf manufactured for this project. The Production report must indicate that the synthetic turf being shipped is in compliance with all performance criteria identified in Paragraph D and E, above. The Production Report must be signed by the plant's Production Manager and/or Quality Control Manager who oversaw the manufacturing of this synthetic turf product. The Production Report must be submitted to and acknowledged by the project Landscape Architect prior to shipping material to the job site.

The Landscape Architect hereby reserves the right to require that the General Contractor provide independent third party laboratory testing of the manufactured synthetic turf product to insure compliance with the identified performance criteria noted in paragraph D and E, above.

- G. Impregnated (Infill) Layer will be 70% SBR rubber and 30% rounded silica sand mixed homogeneously, as noted in paragraph N, below, or as otherwise recommended by manufactures of approved products listed herein.
- H. Rolls shall be a minimum of 15 feet wide. Rolls shall be of sufficient length to cover from sideline to sideline without head seams.
- I. Adhesives for bonding tufted synthetic turf shall be one part moisture cured polyurethane obtained from a single manufacturer. Adhesive shall be equal to Nordot 34-G as manufactured by Synthetic Surfaces, Scotch plains NJ, or approved equal. "Hot-Glue" method for inlays is also acceptable.

- J. Tape for securing inlaid lines and logos shall be high quality coated cordura tape made specifically for Infilled Synthetic Turf applications with a minimum roll width of 15 inches.
- K. The Infilled Synthetic Turf System Vendor shall provide double stitched locked seams to secure the synthetic turf panels. The Infilled Synthetic Turf System Vendor is informed that all seams shall be flat and indiscernible upon installation. Shearing of the slit film pile will not be permitted as a means of achieving a flat seam.
- K. If the Infilled Synthetic Turf Vendor intends to modify any of the above criteria, it shall first be approved in writing by the Awarding Authority prior to submitting a bid.
- L. Perimeter 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 Awarding Authority.
- M. Acceptable Infilled Synthetic Turf Systems include:

	<u>Manufacturer</u>	<u>Product</u>	<u>Pile Weight</u>	<u>Contact Number</u>
1.	Shaw/Sportexe	Legion	(50oz/sy)	(508) 365-7486
2.	Sprinturf	DF Elite	(50oz/sy)	(877) 686-8873
3.	Fieldturf	Vertex	(50oz/sy)	(781) 883-9663
4.	Greenfields	Evolution XP	(50oz/sy)	(207) 767-4522

- N. Infill Materials shall be uniformly filled to a depth which leaves no more than 1/2" of exposed pile after settlement. Infill materials shall consist of a homogeneous non-compacting mixture of silica sand and recycled rubber granules meeting the following criteria:
- Sand shall be high quality clean grains of rounded silica sand (SiO₂) equivalent to:
 - Granusil 4095 - Unimin Corporation, New Caanan, CT (203) 966-8880
 - 20/40 HC - Oglebay Norton, Brady, TX (915) 597-0721
 - 20/40 Oil Frac - US Silica, Ottawa, IL (800) 243-7500
 - Angular or sub-angular particles will not be accepted. Sand shall comprise approximately 30% by weight of infill mixture with 100% passing the #16 sieve, no more than 80% passing the #30 sieve and no more than 0.5% passing the #50 sieve per ASTM E-1 and also meet the following requirements:
 - Hardness 7.0 Mohs
 - Moisture Content <0.1% per ASTM C-566
 - Specific Gravity 2.65 g/cm³ per ASTM C-128
 - Aerated Bulk Density 92-102 lb/ft² per ASTM C-29
 - Compacted Bulk Density 98-110 lb/ft² per ASTM C-29
 - SBR rubber shall meet the following criteria:
 - The infill material shall consist of 100% recycled tires, also called SBR.
 - Sieve size 10/20 mesh Retained

- a. 10 Mesh 0-8%
- b. 14 Mesh 35-65%
- c. 18 Mesh 35-55%
- d. 20 Mesh 0-5%
- e. 30 Mesh 0-1%
- c.) The infill material shall have less than 0.01 % Free metal content measured in accordance with the ASTM D 5603 7.3.2.
- d.) The infill material shall have less than 0.01 % Free fiber content measured in accordance with the ASTM D 5603 7.4.
- e.) The infill material shall have less than 0.01 % Free mineral content measured in accordance with the ASTM D 5603 7.3.1.
- f.) The bulk density of the infill material shall be 26 lbs./sq.ft. +/- 7%. The variation from bag to bag cannot exceed 7%.
- g.) Approved suppliers: Genan Inc., 18038 Beaumont Highway - Houston, TX 77049 (281) 215 8507, or approved equal.

2.04 CONCRETE SYNTHETIC TURF ANCHOR

- A. The concrete synthetic turf anchor for attaching the synthetic turf carpet shall be an extruded or cast-in-place concrete curb and shall be provided and installed as specified in Section 32 16 13.13, Cast-In-Place Concrete Curb.

2.05 FIELD GROOMER AND SWEEPER

- A. Field Groomer for routinely brushing the field shall be a drag broom unit equivalent to "Synthetic Sports Turf Groomer" with "Spring Tine Rake" attachment as manufactured by GreensGroomer Worldwide, Inc. PO Box 34151 Indianapolis IN 46234 (888) 298-8852 ext. 500, www.greensgroomer.com, or approved equivalent.
- B. Field Sweeper for routinely removing debris from the field shall be drag behind unit equivalent to "LitterKat" with magnetic bar attachment as manufactured by GreensGroomer Worldwide, Inc. PO Box 34151 Indianapolis IN 46234 (888) 298-8852 ext. 500, www.greensgroomer.com or approved equivalent.

PART 3- EXECUTION

3.01 GENERAL

- A. The installation shall be performed in full compliance with approved Shop Drawings.
- B. All installation operations shall be performed by personnel fully familiar with the materials and their application, under the full time direction and supervision of a qualified technical supervisor employed by the Vendor of the Infilled Synthetic Turf System. Installation supervisors shall have a minimum of 3 years of experience.
- C. The surface to receive the Infilled Synthetic Turf System shall be inspected and certified by the Contractor and Infilled Synthetic Turf System Vendor as ready for the installation of the Infilled Synthetic Turf System and must be perfectly clean as installation commences and shall be maintained in that condition throughout the process.

3.02 DRAINAGE AND BASE INSTALLATION

- A. Install backfill in accordance with Section 02722 - Storm Drainage System.
- B. Install Free Draining Base in accordance with paragraph 2.01 of this section.

3.03 BASE VERIFICATION

- A. The Contractor and Infilled Synthetic Turf Vendor shall verify that the subsurface drainage system is functioning properly prior to the commencement of the Infilled Synthetic Turf System installation by performing a drainage test on free draining subbase prior to installation of new synthetic turf surface in conformance with *ASTM F 2898 - 11 Standard Test Method for Permeability of Synthetic Turf Sports Field Base Stone and Surface System by Non-confined Area Flood Test Method*.
- B. The Free Draining Base shall be inspected by the Contractor or Infilled Synthetic Turf System Vendor by means of a laser level on a 25-foot grid pattern. Based on the inspection of the topological survey, the Contractor or Infilled Synthetic Turf System Vendor shall fine grade the Free Draining Base suitably, including proper rolling and compaction. The Free Draining Base shall not be approved for tolerance to grade without obtaining a topographic survey. Submit electronic topographic survey to Landscape Architect for review and approval.
- C. The Free Draining Base shall be tested to insure a 95% maximum dry density per a standard proctor test at the contractor's expense.
- D. Upon written certification from the Contractor and Infilled Synthetic Turf Vendor that the Free Draining Base and drainage system have been properly installed, the Infilled Synthetic Turf System installation shall commence.

3.04 INFILLED SYNTHETIC TURF SYSTEM INSTALLATION

- A. Tufted Synthetic Turf shall be installed with no wrinkles, ripples or bubbles. Shearing of fibers, slits in the fabric or driven spikes or staples to relieve such defects will not be permitted.
- C. Tufted Synthetic Turf rolls with shall be installed perpendicularly across the field. Turf rolls shall be of sufficient length to permit full cross-field (sideline - sideline) installation. No head or cross seams will be allowed. Once all playing surface rolls have been installed, install sideline rolls perpendicularly to playing surface rolls and attached by stainless steel screws or ramset at a maximum of 18-inch intervals directly to the concrete nailer shelf. Rolls shall be installed so that tufted lines are placed as shown on the approved Shop Drawings. Care shall be taken to insure that seams are not located in close proximity to the sliding areas associated with the baseball infield.
- D. All Tufted Synthetic Turf seams shall be adhered with high strength tape and glued as stated above. The Infilled Synthetic Turf Vendor may at their discretion provide sewn or glued and sewn seams. All seams shall run perpendicularly across the field. Seams shall be flat, tight, and permanent with no separation or fraying. Tufted Synthetic Turf Yarn pile that is trapped or glued between seems shall be freed from the seams by hand or other approved method to an upright position prior to brushing and infilling.

- E. All Tufted Synthetic Turf inlays, logos and other field markings shall be adhered with high strength tape and glued as stated above. Inlay seams shall be flat, tight, and permanent with no separation or fraying. Tufted Synthetic Turf Yarn pile that is trapped or glued between inlay seams shall be freed from the seams by hand or other approved method to an upright position prior to brushing and infilling.
- F. Upon completion of seaming and inlaying and prior to infilling, the entire field shall be brushed with a motorized rotary nylon broom to free trapped or tangled fibers. The blended infill materials shall be spread evenly by using a drop spreader in uniform rate multiple applications until the specified infill depth (after settlement) is achieved. Between each application of the blended infill materials the field shall be brushed in multiple directions with the motorized nylon broom to stand the pile upright and fully distribute the blended infill materials within the pile.
- G. Upon completion the Infilled Synthetic Turf System Vendor shall provide the Awarding Authority with independent testing data stating that the finished field falls within the required minimum and maximum G-Max ratings. The cost of this test shall be the responsibility of the contractor.

3.05 FIELD LAYOUT

- A. Soccer Field:
 - 1. Soccer Field shall be marked in accordance with NFHS Rules and Interpretations, latest edition.
 - 2. Field shall have 4" wide inlaid yellow center, halfway, goal line and touchlines. All other field markings shall be installed per the approved Shop Drawings.
 - 3. Perimeter dimensions taken to the outside of the line.
- B. Men's Lacrosse Field:
 - 1. Lacrosse Field shall be marked in accordance with NFHS Rules and Interpretations, latest edition.
 - 2. The center, side, end and restraining lines shall all be 4" wide, the goal lines shall be 2" wide. All lines to be inlaid, color to be selected by owner from manufacturer's standard range of colors.
 - 3. Perimeter dimensions taken to the outside of the line.
- C. Women's Lacrosse Field:
 - 1. Lacrosse Field shall be marked in accordance with NFHS Rules and Interpretations, latest edition.
 - 2. The center, side, end and restraining lines shall all be 4" wide, the goal lines shall be 2" wide. All lines to be inlaid, color to be selected by owner from manufacturer's standard range of colors.
 - 3. Perimeter dimensions taken to the outside of the line.
- D. Field Hockey Field:
 - 1. Field Hockey Field shall be marked in accordance with NFHS Rules and Interpretations, latest edition.
 - 2. All lines to be inlaid, color to be selected by owner from manufacturer's standard range of colors.

3. Perimeter dimensions taken to the outside of the line.
 - E. Football Field:
 4. Football Field shall be marked in accordance with NFHS Field Diagram Guide Rules and Interpretations, latest edition.
 5. Field shall have white inlaid lines, numbers, hashmarks and field markings, installed per the contract documents.
 6. Perimeter dimensions taken to the outside of the line.
 7. Field color shall provide two alternating panel colors, see plans and details.
- 3.06 LOGOS AND GRAPHICS
- A. Electronic files for all logos and graphics will be provided to the Infilled Synthetic Turf Vendor by the Landscape Architect. Do not scan images from the Project Documents or Approved Shop Drawings or download images from websites for use in fabricating logos or graphics. Logos and graphics as indicated on the Drawings shall be inlaid per the Approved Shop Drawing. Logos and graphics shall be cut via laser and assembled offsite for one piece installation. Infilled Synthetic Turf System Vendor to provide mechanical perforations in the assembled logos and graphics as required to meet the specified drainage and air transmission requirements of the Infilled Synthetic Turf System.
- 3.07 AS BUILT FIELD LAYOUT DRAWING
- A. Provide As Built Field Layout Drawing including verification of field layout dimensions to the Landscape Architect.
- 3.08 FIELD GROOMER AND SWEEPER
- A. Deliver Field Groomer and Sweeper to Awarding Authority and provide operational and field maintenance training.
- 3.09 CLEAN UP
- A. Provide the labor, supplies and equipment as necessary for final cleaning of surfaces and installed items. Surfaces, recesses, enclosures, etc. shall be cleaned as necessary to leave the work area in a clean, immaculate condition ready for immediate use by the Awarding Authority.
- 3.10 ACCEPTANCE
- A. Should any imperfections develop in the surface areas prior to the final acceptance of the work, they shall be removed and replaced with new materials.
 - B. All such repair work shall be done at no additional cost to the Awarding Authority.

END OF SECTION