

SECTION 32 18 13

SYNTHETIC GRASS INFILL SYSTEM

PART 1 - GENERAL

1.01 Work Included

- A. Provide all the materials necessary for the purchase of Synthetic Grass Infill System, over a graded stone base (by others) as outlined in these specifications and in strict accordance with the manufacturer's written specifications with a specially formulated resilient infill of rounded sand and Bio-based Guardian TPE rubber.
 - 1. By Contractor: Furnish and Install a gravel base stone and finishing stone.
 - 2. By Contractor: Furnish and Install a drainage system consisting of a flat drains and collector piping.
 - 3. Furnished by the Owner: A Synthetic Athletic Sport Grass System as supplied By Shaw Sports Turf. The product is: Shaw Legion Pro. The carpet is a 2.25" pile height, dual fiber system with a face weight of 53oz/sy and total weight of 73oz/sy.
 - i. Contractor to install the above materials.
 - 4. Furnished by the Owner: A resilient infill system, consisting of a course, rounded, uniformly sized silica sand and graded Bio-based TPE rubber. Infill shall be installed to provide no more than ½ inch exposed fiber.
 - i. Contractor to install the above materials.

- B. Approved Manufacturers
 - 1. Sprinturf
 - 2. Fieldturf
 - 3. ACT Global
 - 4. Shaw Sports Turf
 - 5. Greenfield USA
 - 6. AstroTurf
 - 7. Approved Equal

1.02 Qualifications and Submittals

- A. Prospective Bidders and / or installers of the turf shall be required to comply with the following:

1. The successful turf contractor must be a member of the Synthetic Turf Council (STC) and Sports Turf Managers Association (STMA).
 2. The turf contractor and / or the turf manufacturer must be experienced in the manufacture and installation of this specific type of sand and TPE infill synthetic grass system, for at least five (5) years and provide references of ten (10) specific installations in the last five (5) years.
 3. The turf manufacturer shall have a minimum of ten (10) installations in the State of Massachusetts.
 4. The turf manufacturer shall have a minimum of Ten (10) NCAA Division 1 game and/or practice fields installed for football or soccer.
 5. The turf contractor and/or turf manufacturer must provide in-house competent workmen skilled in this specific type of synthetic grass installation with a minimum of 10 fields installed. 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 the gluing of seams and the proper installation of the infill mixture. The manufacturer shall have a representative on site to certify the installation and warranty compliance.
 6. All designs, marking, layouts, materials shall conform to current NFHS rules and other standards that may be applicable to this type of synthetic grass installation unless there is a specific exception identified. Submit a full color rendering/drawing indicating all field markings for final approval prior to placing turf order. Failure to do so shall be at the contractor's risk and cost.
- B. All bidders of the turf contract must submit to the Engineer the following information:
1. All Contractors shall submit to the Engineer, after the bid, prior to award, a 1' x 1' minimum sample of the exact synthetic turf and infill system that is specified for this project. A sample of the Resilient Performance Base material shall also be submitted.
 2. The turf contractor / manufacturer shall submit with the bid, a sample copy of the material warranty demonstrating compliance with the warranty requirements.
 3. The turf contractor shall provide evidence - direct from the turf manufacturer corporate headquarters- that the installer is certified by the manufacturer to install this type of synthetic grass installation.

4. Certified copies of independent (third-party) laboratory reports on ASTM tests as follows:
 - a) Pile Height, Face or Pile Weight & Total Fabric Weight, ASTM D418 or D5848
 - b) Primary & Secondary Backing Weights, ASTM D418 and D5848
 - c) Tuft Bind, ASTM D1335
 - d) Grab Tear Strength, ASTM D1682 or D5034
 - e) Infill Materials, ASTM F3188-16
5. List of Ten (10) similar existing installations that have been installed in Massachusetts including, Owner representative and telephone number(s).
6. The Turf Contractor and Turf Manufacturer (if different from the company) shall provide evidence that their turf system does not violate any other manufacturer's patents, patents allowed or patents pending. Evidence shall be in the form of a written document stating such and signed by the Turf Manufacturers Corporate Headquarters.
7. The Turf Contractor and Turf Manufacturer (if different from the company) shall provide a sample copy of insured, non-pro-rated warranty and NON-CANCELABLE third-party warranty insurance policy with a policy minimum claim limits of at least \$350,000 and annual aggregate limit of at least \$10,000,000 in order to fully cover the full replacement of the turf system in the event of total failure.
8. Letter stating the products anticipated lifespan.
9. A certified letter and specifications sheet certifying that the products in this section meet or exceed specified requirements including certification from the turf manufacturer that lead or lead chromate, or the PFAS regulated by MassDEP (PFHxS, PFHpA, PFOA, PFOS, PFNA, PFDA), and on the most current European Union REACH and California Proposition 65 compound lists are not used in the manufacturing of the specified system. Including test results from the time the material leaves the plant indicating such.

Contractor shall submit certified copies of independent (third party) laboratory reports on the actual turf system and its components manufactured for this specific project as follows:

- a. Lead Content – ASTM F2765-09
- b. Drainage capability of 10” minimum / hour
- c. EPA Method 1633, or Engineer approved equivalent showing non-detectable concentrations of all PFAS quantified by the analysis method utilized.

10. Warranty must cover full 100% of replacement value of total square footage installed. Minimum \$10.00 per square foot.

C. The General Contractor / Site Contractor shall be defined as the contractor who is responsible for the construction of the site components related to and located beneath the turf product, inclusive of but not limited to all cuts and fills as needed to establish an approved subgrade, the dynamic stone drainage system, the flat drains, the perimeter collection system. The turf supplier / installer is a subcontractor to the general contractor. The General Contractor / Site Contractor shall have installed a minimum of five (5) Turf Fields in the last three (3) years and shall provide documentation and contact information for such.

1.03 Shock Attenuation Evaluation:

- A. Near the completion of the turf, hire an independent testing laboratory to perform ten (10) in place G max tests in compliance with ASTM F1936 and F355. If any test results exceed 125, modify the infill material ratios as necessary to achieve satisfactory results. Perform additional testing to verify the results as required by the Owner’s Representative.
- B. Guarantee: During the eight (8) year guarantee period, the G max rating shall remain less than 165. The Contractor shall contract with an independent testing laboratory to perform three (3) in place G max tests each on site during the first, third, fifth, seventh and eighth years. If any test results meet or exceed 165, modify the infill material ratios as necessary to achieve satisfactory results. Perform additional testing to verify the results as required by the Architect. If the G max rating exceeds 165 after three attempts to repair the high rating, replace the field within 90 calendar days at no cost to the Owner.

1.04 Quality Control

A. Upon delivery of the turf material to the project site, the Contractor shall deliver to the Engineer three (3) copies of notarized letter addressed to the Owner certifying that all products provided by them for incorporation into the system do not contain PFAS quantified by EPA Method 533 Modified, EPA Method 1633 or Engineer approved equivalent and do not contain any other hazardous materials exceeding current EPA and CPSC requirements. The PFAS testing method utilized must report at least 40 PFAS compounds including the 6 PFAS regulated by the MassDEP, and on the most current European Union REACH and California Proposition 65 compound lists:

Compound	CAS #	Reference
PFBS and Salts	375-73-5	REACH
PFHxS	355-46-4	REACH, MassDEP
PFOA	335-67-1	REACH, Prop 65, MassDEP
PFHpA and Salts	375-85-9	REACH, MassDEP

PFOS	1763-23-1	Prop 65, MassDEP
PFOS precursors	various	Prop 65
PFNA	375-95-1	REACH, Prop 65, MassDEP
PFDA	335-76-2	REACH, MassDEP
PFUnDA	2058-94-8	REACH
PFTTrDA	72629-94-8	REACH
PFTDA	376-06-7	REACH

As of 2/22/24

Separate samples of the turf can also be completed by a certified laboratory of the City's choice

1.04 Pre-Installation Meeting:

A. Convene One (1) Week After Bid Opening:

1. An interview shall take place at a time and date to be determined by the Engineer at the district office or other location determined by the Engineer and Owner. Present at this meeting shall be the Engineer, Owner's Representative(s), the Project Manager and Site Superintendent for the Prime Contractor and the Project Manager and Project Foreman for the Turf Installer. The purpose of this meeting will be to review turf product and installation means and methods, to interview and ascertain the experience and competence of the Turf Installer, as well as, the onsite Project Foreman for this project and to review the project schedule. The basis of choosing this particular product shall be in part due to the results of this interview process. Contractor shall submit all required submittals before this meeting.

B. Convene One (1) Week Prior to Stone Blanket Completion:

1. A second meeting shall take place at a location, time and date to be determined by the Engineer. Present at this meeting shall be the Engineer, Owner's Representative(s), and the Project Manager for the Site Contractor. The purpose of this meeting shall be to review and confirm schedule. (with particular attention on the turf installation) and to confirm that the turf product has been ordered by way of notarized copies of the original confirmed Purchase Order and guaranteed delivery date.

1.05 Delivery, Storage, and Protection

- A. Deliver products to project site in wrapped condition.
- B. Store products under cover and elevated above grade.

- C. Protect all products and installation area from vandalism, theft, other construction, etc.

1.06 Warranties

- A. The Turf Manufacturer shall provide a Warranty to the Owner that covers defects in materials and workmanship of the turf for a period of eight (8) years from the date of Substantial Completion. The turf manufacturer must verify that their onsite representative has inspected the installation and that the work conforms to the manufacturer's requirements. The turf fabric shall not lose more than an average 2% per year. The manufacturer shall guarantee the availability of replacement material for the synthetic turf system installed for the life of the warranty.
- B. 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.
- C. The Turf Manufacturer's Warranty must be supported by an insurance policy of the full eight (8) year period.
- D. The Turf 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 Manufactures' recommendations and any written directives of the Manufacturer's onsite representative.
- E. The synthetic grass turf must maintain an ASTM F355 and ASTM F1936 G-max between 125-165 for the life of the Warranty.
- F. Any repairs or service to the field requested by the Owner or Owner's representative shall be addressed within 14 days from the date of written notification.
- G. The Turf Manufacturer shall be 100% responsible for and warranty all products installed as part of his system inclusive of the fibers whether the fibers are manufactured by the turf company or by others.

1.07 Maintenance Service

- A. The Turf Contractor will train the Owner's facility maintenance staff in the use of the specified maintenance attachments and equipment to routinely groom and sweep the field. Equipment shall be in good working condition.

1.08 ADA Handicap Accessible

- A. Synthetic turf system shall be approved as ADA compliant as determined by Test-Method ASTM 1951-99.

B. Proof of passing must be submitted for approval.

PART 2 - PRODUCTS

2.01 Base Stone and Drainage System (**Furnish and Install By Contractor**)

Sieves	Base Stone-Type 1	Base Stone-Type 2	Finishing Stone
3"			
2"	100		
1 ½"	90-100		
1"	75-100	100	
¾"	65-95	90-100	
½"	55-85	80-100	100
⅜"	40-75	70-100	85-100
¼"	25-65	60-90	75-100
US#4	15-60	50-85	60-90
US#8	0-40	30-65	35-75
US#16	0-20	10-50	10-55
US#30	0-10	0-35	0-40
US#60	0-8	0-15	0-15
US#100	0-6	0-8	0-8
US#200	0-5	0-2	0-2

PLEASE NOTE THAT THE BASE STONE AND DRAINAGE STONE SYSTEM IS A SPECIAL MANUFACTURED PRODUCT AND ANY DEVIATION FROM THIS MATERIAL SHALL REQUIRE WRITTEN APPROVAL FROM THE TURF MANUFACTURER'S CORPORATE HEADQUARTERS. THE BASE STONE AND FINISHING STONE PRODUCT IS A 100% CLEANED WASHED QUARRY

STONE MIXTURE. GRAVEL AND SAND MIX MATERIAL SHALL NOT BE ALLOWED (NO EXCEPTIONS)

RESTRICTIONS:

- A. To ensure structural stability: $D_{60}/D_{10} > 5$ and $1 < D_{30}^2 < 3$
 $D_{10} D_{60}$ Fragmentation must be 100%.
- B. To ensure separation of both stones: D_{85} of finishing stone > 2
 D_{15} of base stone and $3 < D_{50}$ of base stone < 6
 D_{50} of finishing stone
- C. To ensure proper drainage: Permeability of base stone > 50 in/hr (3.5×10^{-2} cm/sec)
Permeability of finishing stone > 10 in/hr (7.0×10^{-3} cm/sec)
Porosity of both stones $> 25\%$
(When stone is saturated and compacted to 95% Proctor.)
- D. Soft aggregate materials such as sedimentary rock sources are not acceptable. Questionable materials shall be evaluated using a sulfate soundnedd test (ASTM C-88) and LA Abrasion Test (ASTM C-131).

2.02 Perimeter Edge: Cast-In-Place Concrete Nailer Curb – (Furnish and Install By Contractor)

- A. Refer to Details.
- B. Concrete for Cast-in-Place Nailer Curb shall have a 28-day compressive strength of at least 5,000 pounds per square inch. Higher minimum compressive strength indicated in the drawings and/or specifications for individual improvements shall govern see section 03 30 13 CAST IN PLACE CONCRETE.
- C. Provide smooth broom finish at all exposed turf edger.
- D. Fence posts shall be embedded directly within curb edger as indicated on the Drawings. Fence posts surfaces shall remain free and clear of dirt and debris as well as remain free of damage as a result of the concrete work.
- E. Sawn control joints at a maximum 20 feet spacing or as indicated in the Drawings shall be perpendicular to nailer curb and penetrate 1 inch minimum into edger. Care should be taken to avoid chipping or damage to turf concrete curb.

2.03 Filter Fabric (Furnish and Install By Contractor).

- A. Non-woven polypropylene geo-textile fabric shall be chemically and biologically inert and shall be equivalent to the following:

1. Mirafi 140N, TenCate Geosynthetics North America, Pendergrass, GA 706-693-2226.
2. 140EX, LINQ Industrial Fabrics, Inc. Summerville, SC 800-445-4675.
3. C45NW, CONTECH Construction Products Inc. West Chester, OH 800-338-1122.

2.04 Underdrain System (**Furnish and Install By Contractor**).

A. The quality of standard, design and function desired is based on AdvanEdge system, manufactured by ADS, 1-800-821-6710.

1. 1-inch by 12-inch flat drain wrapped in geotextile fabric and shall meet ASTM D7001.
 - a. The core collection system shall conform to the following physical properties:

Perforations:

Nominal Pipe Size	12"
Slot Length	1.125"
Slot Width	0.125"
Water Inlet Area	15" / ft

Filter Fabric

Grab Tensile Strength	112lbs
Grab Elongation	50%
Trapezoidal Tear	40 lbs
Puncture	40 lbs
Permittivity	0.5 / sec
AOS	60 (Sieve size)
UV Resistance	50

2. ADS AdvanEdge end connector with 4-inch ADS pipe.
3. 4" Inserta Tee Lateral Connection.
4. 4" Type C single wall pipe.
5. Collector drainpipe, refer to Section 33 41 13.22 CORRUGATED POLYETHYLENE [HDPE] PIPE.
6. Drainage structures, see Section 33 39 13 PRECAST MANHOLES AND CATCH BASINS.
7. Additional acceptable manufacturer:
 - a. Varicore Technologies, Inc. (800) 978-8007.
 - b. Invisible Structures, Inc. (800) (233-1510).
 - c. Approved equivalent

2.05 Synthetic Athletic Grass Infill System Materials (**Furnish by Owner, Install By Contractor**)

- A. The synthetic athletic turf system shall be shall be non-detect (ND) for 40 PFAS compounds tested via EPA Method 1633 and have a statement from the vendor that the turf does not contain PFAS. Refer to the requirements listed in Part-1 of this section.
- B. The Synthetic Athletic Grass Material and TPE rubber infill shall be in strict accordance with the following:
1. The synthetic athletic sport grass system is supplied by Shaw Sports Turf. The product is: Legion Pro-2.25". The fiber shall be a hybrid fiber combo with multi-structured monofilament and slit-film fibers tufted together in same or alternating needle construction.
 2. The carpet shall surpass 200,000 Lisport Cycles as certified by a 3rd party independent testing agency.
 3. The carpet shall be delivered in 15' wide rolls. The rolls shall be of sufficient length to go from edge of track to edge of track. Head seams will not be acceptable.
 4. Tufted and inlaid markings where required per drawings installed in accordance with the manufacturer's recommendations. Lines shall be tufted within the 15-foot wide rolls to the maximum extent possible. All field lines, numbers and markings indicated on the plans shall be permanently installed or painted as indicated in the plans.
 1. As selected by the Town. For informational purposes the colors can be assumed to be:
 2. Soccer: All line/markings shall be YELLOW.
 3. Football: All line/markings shall be WHITE.
 4. All tick marks shall be RED.
 5. The fiber shall be Field Green/Olive Green/Lime Green in color to simulate natural grass as closely as possible and treated with UV inhibitor, guaranteed a minimum of eight (8) years.
 6. Glued seams: Unless other seaming methods are approved by the Owner's Representative. Seaming tape and adhesive shall meet the approved synthetic turf manufacturer's requirements and minimum performance characteristics specified herein.
 - a. Adhesives for bonding tufted synthetic turf shall be one-component fast-set urethane adhesive obtained from a single manufacturer and be equivalent to Ultrabond Turf PU 1K as manufactured by Mapei Corporation, Deerfield Beach, FL (800) 992-6273, or approved equal.

- b. Tape for securing seams in the tufted synthetic turf and inlaid lines shall be high quality tape made with a minimum roll width of 12 inches.
7. The infill system shall consist of a homogeneous, non-compacting mixture of specifically graded sand and TPE rubber. Sand shall be a 20-40 well-rounded to sub-rounded angularity with medium to high sphericity per ASTM F1632. Bio-based Guardian TPE rubber shall conform to all STC regulation standards for safety. The contractor shall submit to the engineer for approval all TPE product data inclusive of material size and content. Failure to do so shall be at the contractor’s risk and cost.

Sand sieve analysis:

*Mesh (ASTM E-11)

*Mesh (ASTM E-11)

Sieve Mesh	Size	Min Retained	%	Max Retained	%
8		0		0	
10		0		0	
12		0		0.1	
14		0		0.5	
16		0		15	
20		10		60	
30		10		90	
40		0		40	
50		0		5	
60		0		2	
70		0		1	
100		0		1	
pan		0		2	

Infill ratio to be 80% TPE / 20% Sand, unless otherwise demonstrated by the manufacturer to meet or exceed the impact attenuation requirements.

*Represents the typical mean percentage (%) retained on individual sieves.

- 8. Infill shall be free of pesticides, heavy metals, and all PFAS compounds quantified by EPA Method 1633 or ENGINEER approved equivalent.
- 9. Total depth of infill shall be a minimum 72% of the fiber height (1.72 inches in depth), with a + tolerance or 1/8” only; or as recommended by the manufacturer to meet the impact attenuation requirements.

2.06 Turf Data

Turf Fabric: Turf fabric with multicolored fiber and UV resistance, complying with the following:

Pile Weight:	Face: 53 oz/sy
Pile Height (Finished)	2.25"
Color:	Field Green/Olive Green/Lime Green
Construction:	Broadloom Tufted
Total Product Weight:	73 oz/sy (± 2 oz) Min.
Finished Roll Width:	15'
Finished Roll Length:	Up to 220'
Perforation (Outdoors):	3/16" Holes on Staggered 4" (approximate)
Center Permeability:	20" ± Per Hour

Turf manufacturer shall provide independent study data on permeability requirements

Infill Composition:	Uniformly-Sized Silica Sand and TPE Rubber Mixture (50% rubber / 50% sand by weight) Refer to above paragraph: 2.05.B.7
Field Lines & Markings:	Tufted, Inlaid and Painted

Shall have no PFAS compounds quantified by EPA Method 1633 or Engineer approved equal.

2.07 Synthetic Turf Maintenance Equipment (**Furnish and Install By Contractor**)

A. Provide one (1) Synthetic Sports Turf Groomer with integrated Spring Tine Rake for routine maintenance of the synthetic turf field. Maintenance equipment shall be Model# 920SDE as provided by GreensGroomer WorldWide, Inc. PO Box 34151, Indianapolis, IN 46234. 888-298-8852, or equal as approved by the Owner's Representative.

1. Sports Turf Groomer shall be:
 - i. Towable product.
 - ii. Constructed of steel tube with powdercoat finish.
 - iii. Length shall be minimum of 48" and minimum width of 72"
 - iv. Groomer shall have an electric lifting mechanism to lift the brushes and spring tines off the field surface.
2. Spring Tine Rake Attachment shall be:
 - i. Attachable product compatible with the Turf Groomer product.
 - ii. Frame shall be constructed of steel with powdercoated finish.
 - iii. Width shall be minimum 72".
 - iv. Tines shall be 3/16" diameter with a tip bend between 38-42 degrees.
 - v. Three (3) rows of tines with each row consisting of 12-14 tines.

Tines shall be spaced 7/8" apart. Tines shall be offset from the other rows.

- vi. Each row shall be independently adjustable for depth and allowed to be set in a forward or backward position for various levels of aggressive raking.
- vii. Rake attachment shall be able to fully retract the tines allowing the rake to remain attached to the groomer when not in use.

B. Provide one (1) LitterKat Synthetic Turf Sweeper with Tow-magnet as provided by GreensGroomer WorldWide, Inc. PO Box 34151, Indianapolis, IN 46234. 888-298-8852, or equal as approved by the Owner's Representative.

1. Sports Turf Sweeper shall be:

- i. Towable product.
- ii. Steel Construction with powdercoat finish.
- iii. Width shall be a minimum of 72".
- iv. Sweeper shall be direct drive gear drive.
- v. Debris basket shall be removable.
- vi. Sweeper shall have an electric lifting actuator to lift basket and sweeping brush off the field surface.

C. Magnet bar shall be.

- 1. Towable product.
- 2. Width shall be minimum of 72", depth of minimum 5", height of 2" minimum.

PART 3 - INSTALLATION

3.01 Subgrade / Subbase Approvals

- A. Prior to the installation of the Synthetic Grass Infill System, the General/Site Contractor shall provide written certification that all subgrade, subbase, leveling course and slopes and elevations are in compliance with the Contract Documents and meets or exceeds all manufacturer's requirements. This certification shall be prepared by an approved Installer. The finished grade of the subbase shall not vary more than 3/16" in ten (10) feet. A laser grader must be used to meet the requirements.
- B. The General/Site Contractor shall also provide an as-built survey of the finished subgrade and also finished leveling course with spot grades every 25 feet on center each way for approval.
- C. The General/Site Contractor shall prepare a minimum 25'x25' (twenty five foot by twenty five foot) mock-up of the approved materials for the subbase and leveling course system in order to evaluate porosity and stability prior to installing material over the entire field. If acceptable the mock-up may become part of the

finished field.

3.02 Synthetic Grass Infill System

- A. Verification of Conditions (by Installer): Examine conditions under which synthetic grass surfacing is to be installed in coordination with Installer of materials and components specified in this Section and notify affected Prime Contractors and Engineer in writing of any conditions detrimental to proper and timely installation. Do not proceed with installation until unsatisfactory conditions have been corrected in a manner acceptable to Installer.
1. When Installer confirms conditions as acceptable to ensure proper and timely installation and to ensure requirements for applicable warranty or guarantee can be satisfied, submit to Architect written confirmation from applicable Installer. Failure to submit written confirmation and subsequent installation will be assumed to indicate conditions are acceptable to Installer.
 2. Synthetic Grass Infill System: Provide manufacturer's inspection and certification that surface to receive synthetic turf is ready for installation of synthetic turf system, is perfectly clean in accordance with manufacturer's standards, and will be maintained in acceptable clean condition throughout installation.
 3. Infill shall be free of pesticides, heavy metals, and all PFAS compounds quantified by EPA Method 1633 or Engineer approved equal.
- B. Installation: Install in strict accordance with manufacturer's written specifications and recommendations.
1. Unless otherwise recommended by turf and base manufacturer, lay turf loosely across field, stretched, and attached to perimeter edge detail with sufficient length to permit full cross-field installation without head or cross-seams. (Head and cross-seams shall not be permitted)
 2. Per the manufacturer's recommendation, the installation of field lines shall be sewn in or cut and glued. All field line installation shall be covered under the warranty.
 3. Provide Infill material properly mixed on site and applied/spread evenly with a large fertilizer type spreader (minimum six (6) foot wide) in strict accordance with manufacturer recommendations. Between each application of infill, the field area shall be brushed with a motorized rotary nylon broom. Minimum infill depth shall be 2.0 inches. Comply with manufacturer's recommendations regarding environmental requirements for installation such as dryness and absence of moisture. Please note that

prior to final approval of the field the Engineer shall perform field infill height measurements and also infill weight tests throughout the field to ensure the proper infill height and weight have been met. The infill weight tests shall include removing a square foot of material and weighing accordingly, in the presence of the turf manufacturer / turf installer, at 8 chosen areas throughout the field of play. Upon completion of the test, the turf manufacturer shall replace the extracted material accordingly. If it is deemed the proper infill weight is not in compliance with the contract documents, the turf manufacturer, at his/her cost, shall import and install added infill material (in the presence of the Engineer) throughout the field until it has been deemed the infill weight is acceptable.

4. Field markings: Apply and install fixed markings as indicated herein and in accordance with the Contract Drawings.
 - a) Football: All lines/markings shall be inlaid white as show on the drawings.
 - b) Baseball/Softball: All lines/markings shall be inlaid white.
 - c) Soccer: All tick marks/markings shall be inlaid yellow.
 - d) Boy's Lacrosse: All tick marks shall be inlaid dark blue.
 - e) Girl's Lacrosse: All tick marks shall be inlaid light blue.
 - f) Field Hockey: All tick marks shall be inlaid red.

All markings can be sheared/shaved or cut and glued.

5. Provide final cleaning of synthetic grass surfacing installations and maintain area clean and free from debris during installation. Clean surfaces, recesses, enclosures, and similar areas as required leaving area of installation in clean, immaculate condition ready for immediate occupancy and using by Owner.
6. Protect installed synthetic grass from subsequent construction operations. Do not permit traffic over unprotected surfacing.
7. The turf manufacturer shall provide training for the Owner's facility maintenance staff in use of grooming equipment recommended by the manufacturer.

3.03 Maintenance and Warranty

- A. The turf installer and/or the turf manufacturer must provide the following:
 1. The turf manufacturer shall provide a warranty to the Owner that covers defects in materials and workmanship of the turf for a period of eight years from the date of Substantial Completion. The turf manufacturer

must verify that their on-site representative has inspected the installation and that the work conforms to the manufacturer's requirements. The polyethylene yarn manufacturer shall provide an eight (8) year "UV stabilization" warranty.

2. The manufacturer's warranty shall include general wear and damage caused from UV degradation. The warranty shall specifically exclude vandalism, acts of War and acts of God beyond the control of the Owner of the manufacturer.
3. The turf contractor shall provide a warranty to the owner that covers defects in the installation workmanship, and further warrant the installation was done in accordance with both the manufacturer's recommendations and any written directives of the manufacturer's on site representative.
4. All turf warranties shall be limited to repair or replacement of the affected areas and shall include all necessary materials, labor, transportation costs, etc. to complete said repairs. All warranties are contingent on the full payment by the Owner of all pertinent invoices.

-END OF SECTION 32 18 13-

SYNTHETIC GRASS INFILL SYSTEM
(REPLACEMENT OF EXISTING SYSTEM)