NOTE TO CONSULTANTS: Edit with Track Changes turned on, any text in this section that appears in bold and italics then turn off the bold and italics for the final approved version. (Remove this Note).

PART 1- GENERAL

1.01 Description: Provide all labor, materials, tools, equipment, and incidentals necessary to install a complete Sand and Rubber Infilled Synthetic Monofilament Turf System as indicated on the Drawings and as specified herein. The installation of all materials shall be performed in strict accordance with the manufacturer's installation instructions and in accordance with all approved shop drawings.

1.02 Related Sections:

Section 03 10 00 - Concrete Formwork
Section 03 20 00 - Concrete Reinforcement
Section 03 30 00 - Cast-in-Place Concrete
Section 03 35 00 - Concrete Finishing
Section 31 00 00 - Earthwork
Section 32 11 23.23 - Synthetic Athletic Field Turf Base

1.03 References:

A. FM P7825 - Approval Guide; Factory Mutual Research Corporation; current edition.

B. ASTM Standard Test Methods:

D1577 - Standard Test Method for Linear Density of Textile.
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.
D4491 - Standard Test Method for Water Permeability of Geotextiles by Permittivity.
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.
E-648 - Flooring Critical Radiant Panel Test (Flame Spread).

1.04 Quality Assurance:

A. The approved fiber manufactures:

1. The following fiber manufacturers are pre-approved for the Sand – Rubber Infilled Synthetic Turf System: TC Thiolon USA
2. The synthetic turf vendor shall provide written documentation certifying the source of the fiber used for the field, including the green and all colors used for lines and markings.

B. The approved supplier and installer must exhibit all of the following points of experience:

1. Must be experienced in the manufacture and installation of infilled synthetic turf system for a minimum of 10 years with the same manufacturer, product, and company. This includes same or similar pile fiber, backing, backing coating, and installation method. Periodic upgrades and advances in products are not included in this requirement as long as the general products listed in the sentence above remain the same. At least one installation must be a minimum of 9 years old at the date of the originally advertised Bid Opening for this project.
2. Must have installed a minimum of 40 fields of 65,000 contiguous square feet or more in the United States in the past two years and 100 fields of 65,000 contiguous square feet or more in the United States in the past 5 years with the same manufacturer, product, and company. This includes same or similar pile fiber, backing, backing coating, and installation method. Periodic upgrades and advances in products are not included in this requirement as long as the general products listed in the sentence above remain the same.
3. Must have 20 full sized field installations that are the exact specified material for this project including the monofilament fiber system, backing, backing coating, and installation method that have been installed for at least 1 year. At least one of these installations must be 65,000 square feet or more.
4. Must have at least 5 Division 1 Baseball field with the entire field surface being infilled synthetic turf except for home plate and pitchers mound. Must have at least 5 FIFA recommended soccer fields with the entire field surface being infilled synthetic turf meeting or exceeding FIFA lab tests.
5. Each Project Site must include laying and sewing carpet sections, inlaying lines and markings, blending and installing infill materials, and warranty work as necessary.

B. The apparent low and second low bidder to supply the Engineer with documentation illustrating experience identified in 1.04.A above within (3) working days of bid opening. Include the following information for each qualified project site:

1. Owner Name
2. Name of Responsible Owner Representative, including title

3. Telephone Number of Owner Representative
4. Project Name
5. Project Location
6. Dates of Execution, including Date of Notice to Proceed and Date of Final Acceptance.
7. Size of Installation in Square Feet of finished sand-rubber infilled synthetic turf surface area.
8. Record of Warranty Work performed from date of Final Acceptance, including dates and specific descriptions of work performed.

C. Installer Qualifications

1. The Turf Installation Contractor must provide competent personnel skilled in this specific type of infilled synthetic turf installation. They must have installed a minimum of 50 fields of 65,000 square feet or more of infilled synthetic turf with the same manufacturer and company as specified including laying and sewing carpet sections, inlaying lines and markings and blending and installing infill materials.
2. The designated Supervisory Person on this project must be certified, in writing by the turf Manufacturer, as competent in the installation of the infilled synthetic turf system being proposed for this project, including sewing seams and proper installation of the infill mixture.
3. The Manufacturer shall have a representative on-site to certify the installation and Warranty compliance.

D. Prior to commencing the work of this section, inspect, test, and provide in writing certification that the aggregate base preparation meets or exceeds the infilled synthetic turf manufacturer's requirements for warranty of the installation of the infilled synthetic turf. The Contractor shall test the aggregate base for compliance to the synthetic turf Manufacturer's guidelines and Section 02205 of these Specifications for compaction, planarity, and permeability.

E. The Turf Contractor shall provide the necessary testing data to the owner that the finished field meets the required shock attenuation, as per ASTM F1936.

1.05 Submittals: A minimum of two (2) weeks prior to delivery of the following products to the project site, provide to the Engineer for approval two (2) complete sets of the following:

A. Certified copies of independent (third-party) laboratory reports on ASTM tests as follows:

1. Pile Height, Face Width & Total Fabric Weight, ASTM D418 or D5848
2. Primary and Secondary Backing Weights, ASTM D418 or D5848
3. Tuft Bind, ASTM D1335
4. Grab Tear Strength, ASTM D1682 or D5034
5. Pill Burn Test, ASTM D2859

6. Flooring Critical Radiant Panel Test (Flame Spread), ASTM E-648

B. 1/2 cubic foot sample of blended sand & rubber infill material w/detailed sieve analysis.

C. Carpet Material Samples

1. 4” x 36” sample of both the white and yellow play line inlay.
2. 18” x 18” sample of green field carpet.
3. 18” x 18” sample of beige field carpet
4. 3 examples of sewn green field carpet seams, minimum width 36”, including a minimum 48” on each side of seam (total size 36” x 96” with seam centered), fabricated as proposed for the work.

D. A minimum 18” square sample of complete infilled system, including field and play line materials infilled with the approved sand-rubber blend, enclosed and portable.

E. Recycled Plastic 2x4 Timber: Catalog cut, technical literature, and a single 4’ length, sawn through approx. 85% of cross-section, 3” for nominally dimensioned product, 3½” for fully dimensioned product, showing thorough homogenization of recycled content throughout the cross-section.

F Manufacturers detailed installation instructions for Synthetic Turf System used.

G. Detailed maintenance procedures and equipment requirements for the Synthetic Turf system supplied.

H. Manufacturers written warranty for materials as specified in Paragraph 1.07.B below.

I. Contractors written warranty for workmanship as specified in Paragraph 1.07.E below.

1.06 Delivery, Storage and Handling: Provide for delivery of all materials required to complete the work of this section. Deliver infilled synthetic turf system products to the project site in wrapped condition. Store all materials in such a manner as to prevent ground contact or exposure to sun, wind, or rain. Pay particular attention to maintaining infill materials as dry and flowable. Handle all materials in accordance with the manufacturer’s recommendations or requirements for maintenance of the requirements of warranty

1.07 Warranty:

A. General: Although this installation is intended primarily and specifically for use as a recreational soccer field, baseball and softball, the Turf Contractor (“the Contractor”), Turf Manufacturer (“the Manufacturer”), and Turf Installer shall warrant and guarantee the work of the Contract as suitable for use for recreational, league, and tournament play and practice of soccer, flag football, ultimate Frisbee,

lacrosse, and field hockey, as well as individual or group jogging or running, casual and concentrated pedestrian uses, and occasional maintenance vehicle traffic.

B. Contractor shall ensure that the 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 Physical Completion ("Manufacturer's Warranty"). The Manufacturer's Warranty may not exclude wear and tear or damage caused from UV degradation and must warrant that the artificial grass field turf maintain an ASTM 355 G-max of between 135-175 for the life of the Warranty. Degradation in excess of the following values shall also be considered a valid warranty claim.

Property	Value / Test	Max. Annual Deviation	Maximum Deviation from initial value*
Yarn Density	9000 Denier / ASTM D1577	-10%	-20%
Yarn Breaking Strength	24 lbs / ASTM D2256	-5%	-20%
Backing Grab Tear Strength, including seams	170 lbs / ASTM D1682	-10%	25%
System Impact Attenuation	<200G ASTM F355	+5%	+30%
System Permeability	>40"/hour	-10%	-25%

*Life of Warranty

C. Contractor shall ensure that the Manufacturer's Warranty be insured for the full eight (8) year warranty period either by an authorized insurer in the State of Washington that has an A.M. Best's rating of not less than A- XII, an insurer filed as Washington State surplus lines or as may otherwise be approved by Owner. The Manufacturer's Warranty insurance policy must be supplied to Owner with pre-award submittals and is subject to Owner's approval of terms, conditions, definitions and exclusions, which may not differ materially from the Manufacturer's Warranty. Coverage shall, as a minimum, include limits of liability sufficient to pay for the warranty obligations and the policy shall not be cancelable for any reason, including the bankruptcy of the manufacturer and non-payment of premium.

D. Contractor shall provide a Warranty to the Owner that covers defects in the installation workmanship, and further warrants that the installation will be done in

accordance with both the Manufacturer's recommendations and any written directives of the Manufacturer's onsite representative.

E. Contractor shall ensure that the Manufacturer accepts responsibility for the following:

1. Verifying that Manufacturer's onsite representative will inspect the installation and confirm that the work has been done in accordance with both the Manufacturer's recommendations and specifications and any written directives of the Manufacturer's onsite representative.
2. Providing the Owner with complete instructions, schedules, training and demonstrations for proper maintenance necessary to maintain the Manufacturer's Warranty; Training to include all at a minimum (2) Parks personnel responsible for the given field. Trainer to be qualified in maintaining same specified type of field and to impart (in written form, verbal and via demonstration) all necessary and probable maintenance needs within the first (3) years of the field's existence; and,
3. Where agreement cannot be reached on future Owner claims of unreasonable wear or degradation, disproving such claims by removing samples of sufficient size/weight for testing and promptly replacing with new materials at the Manufacturer's cost. Testing shall be at the Manufacturer's expense, at an independent laboratory approved by Engineer. Where claims are successfully disproved through independent testing, the Owner shall compensate the Manufacturer for the cost of testing.

PART 2- PRODUCTS

2.01 General: Supply all products necessary to provide for the complete installation of the Sand – Rubber Infilled Synthetic Turf System as indicated in the Contract Drawings, including materials which may not be mentioned here but are required either by the manufacturer or installer to complete the installation.

2.02 Synthetic Turf Carpet:

A. Synthetic Turf System shall be 2 1/2" pile Field Turf Duraspine FTOM-1F Series Synthetic Grass System,as manufactured by:

FIELDTURF International, Inc
5211 Mitchell Bridge Road
Dalton, GA 30721
1-800-724-2969

Or, approved equal.

B. Synthetic Turf Carpet Colors:

Colors of the Synthetic Turf Carpet, as shown on the Drawings shall be a natural grass green for 'simulated turf areas', beige for 'simulated skinned infield areas', and woven or sewn-in white, red, and gold play lines. All colors to be approved by Engineer prior to installation.

C. The component materials of the Infilled Synthetic Turf System consist of:

1. A Carpet made of UV-resistant polyethylene monofilament fibers, measuring not less than 2-1/2 inches high and not less than 125 microns in thickness. Fibers shall have been extruded individually, stretched, twisted and designed low in friction to eliminate abrasion. The fibers shall be permanently secured into a non-perforated and porous backing.
2. An Infill that is a controlled mixture of graded dust free silica sand and smooth, rounded crumb rubber that partially fills the carpet in layers per the manufacturer's instructions.
3. Glue, thread, seaming fabric and other materials used to install and mark the artificial grass field turf.

D. The installed artificial grass field turf shall have the following properties:

Standard	Property	Specification
	Pile Yarn Type	UV-Resistant Polyethylene
ASTM D1577	Fiber Denier	9000 nominal
ASTM D 1577	Fiber Thickness	125 microns
ASTM D418/D5848	Pile Height	2 1/2" nominal
ASTM D418/D5848	Pile Weight	36 oz./sq. yd.
ASTM D1682/D5034	Grab Tear (width)	200 lbs/force
ASTM D1682/D5034	Grab Tear (length)	200 lbs/force
ASTMD2256	Yarn Breaking Stregnth	24 lbs.
ASTM F1015	Relative Abrasiveness Index	20.2 or less abrasive
ASTM D4491	Carpet Permeability	>40 inches/hour
ASTM D2859	Flammability (Pill Burn)	Pass
ASTM E648	Critical Radiant Flux (Flame Spread) with filling (Class B Rating)	>.2 g/sq. cm.
ASTM F355/F1936	Impact Attenuation, Gmax	=<200 G-Max
	Machine Gauge	¾" on center

E. The Carpet shall consist of fibers tufted into a primary backing with a secondary elastomeric coating.

1. The Carpet shall be furnished in 15' wide rolls. Rolls shall be long enough to go from sideline to sideline without splicing. The perimeter white line shall

be tufted into the individual sideline rolls. Head seams, other than at sidelines, will not be acceptable

2. The Carpet's primary backing shall be a composite fabric treated with UV inhibitors, consisting of one layer of woven polypropylene and one layer of non-woven polypropylene needle punched together so as to function as a single unit. The secondary back coating shall consist of an application of heat-activated urethane to permanently lock the fiber tufts in place and be porous. Perforated (i.e., with punched, drilled or burned holes) backed carpet shall not be acceptable.
3. The fiber shall be 9,000 denier, 125 microns thick, low friction, UV-resistant monofilament fiber measuring not less than 2 ½ inches high. Systems with less than a 2 ½ inch fiber and/or shock pad enhancements will not be accepted as equivalent.
4. The fiber tufts shall be fanned or unfolded prior to installation, rolling or spiraling is not acceptable.

F. The Infill materials shall be approved by the Manufacturer. The Infill shall consist of a resilient layered granular system, comprised of selected and graded dust-free silica sand and cryogenically hammer-milled SBR rubber crumb. Artificial Grass products without cryogenically processed rubber or a finish application of pure rubber cryogenically processed will not be acceptable. The sand component of the infill must represent a minimum of 51% or more of the total infill, by weight.

G. All seams shall be sewn. Thread for sewing seams of turf shall be as recommended by the synthetic turf Manufacturer. Glued seams shall not be allowed, except as required for inlaid markings. The method and adhesives used for inlaid markings shall be as recommended by the synthetic turf

2.03 Edging:

A. All edges of the Infilled Synthetic Turf System installation shall be secured using 2"x 4"x12' (dimensional or nominal) recycled plastic timbers as approved. Recycled Plastic materials shall be thoroughly blended and homogenized within the full cross section of any extrusion.

B. Recycled Plastic edging shall be secured to the concrete band, concrete curb, and concrete wall with 5/8" concrete wedge anchors as shown on the Drawings and specified herein.

2.04 Maintenance Equipment: The Synthetic Turf Contractor may provide the following equipment separately or as an approved combination assembly.

A. Field Groomer: Supply a field groomer, which shall include a towing mechanism compatible with a field utility vehicle. The field groomer shall be the FieldTurf RT Groomer (Phone 1-800-724-2969), or equal.

B. Surface Sweeper: Provide a friction-drive sweeper(s) with mesh bottom. Mesh opening shall allow passage of the infill materials picked up by the sweeper while trapping particles in the hopper. Provide sweepers in sufficient numbers to cover 10' width per pass.

C. Surface Drag Brush: Provide surface drag brushes consistent with the synthetic turf manufacturer's recommendations for routine maintenance of the turf surface. Provide a minimum of 15' effective width. Surface Drag to be Sportsfield Specialties/ FieldSpec 15' Drag Brush or approved equal.

PART 3- EXECUTION

3.01 Base Inspection: Inspect the finished Base Course and Leveling course installation for satisfaction of the Infilled Synthetic Turf System Manufacturer's requirements for optimum system performance. Notify the Engineer of discrepancies or conditions which may result in less-than-optimum performance of the Synthetic Turf System or voiding of the Manufacturers Warranty.

Prior to commencing the work of this section, inspect and provide in writing certification that the aggregate base preparation meets or exceeds the Infilled Synthetic Turf Manufacturer's requirements for warranty of the installation of the Infilled Synthetic Turf System.

3.02 Maintenance: Coordinate with other trades to insure that all work in progress and completed work is protected and maintain all completed work in a like-new condition. Correct all damage to a condition acceptable to Engineer at no additional cost to the Owner.

3.03 Edging: Install recycled plastic timber edging in such a manner as to allow the finished Infilled Synthetic Turf System to conform to the finish grade lines and elevations as indicated in the Contract Drawings, generally 2" below finished grade of adjacent surfaces. Drill each length of timber a minimum of 3 places per timber, beginning 6" from each end and spaced equally a maximum of 4'-0 on center. Drilled holes shall be sized to insure a tight friction bond with concrete wedge anchors, generally 1\2" diameter.

3.04 Infilled Synthetic Turf System Installation:

A. Install in accordance with Manufacturer's instructions. The Contractor shall strictly adhere to the installation procedures outlined under this section. Any variance from these requirements must be accepted in writing, by the Manufacturer's onsite representative, and submitted to the Engineer, 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.

B. The carpet rolls are to be installed directly over the properly prepared aggregate base. Extreme care should be taken to avoid disturbing the aggregate base, both in regard

to compaction and planarity. A 2-5 ton static roller should be on site and available to repair and properly compact any disturbed areas of the aggregate base.

C. The full width rolls shall be laid out across the field. Turf shall be of sufficient length to permit full cross-field installation from sideline to sideline. No head or cross seams will be allowed in the main playing area between the sidelines. Utilizing standard state of the art sewing procedures each roll shall be attached to the next. When all of the rolls of the playing surface have been installed, the sideline areas shall be installed at right angles to the playing field turf.

D. This is a 99% sewn installation. Gluing of rolls shall not be acceptable. Minimum gluing will only be permitted to repair problem areas, corner completions, and to cut in any logos or inlaid lines as required by the specifications. All seams shall be sewn using double bagger stitches and polyester thread or adhered using seaming tape and high grade adhesive (per the manufacturer's standard procedures). Seams shall be flat, tight, and permanent with no separation or fraying.

E. Infill materials shall be applied in numerous thin lifts. The turf shall be brushed as the mixture is applied. The infill material shall be installed to a depth determined by the Manufacturer.

F. The Infill materials shall be installed to fill the voids between the fibers and allow the fibers to remain vertical and non-directional. The Infill installation consists of a base layer of sand followed by a homogenous mixture of the sand and the cryogenically processed rubber. A final application of specifically sized cryogenically processed rubber completes the system. The Infill shall be installed to the depth of 1 ¾". The infill density shall consist of no less than 6 lbs of silica sand and at least 3 lbs of cryogenically processed, smooth rubber per square foot. The Infill shall be placed so that there is a void of ¾" to the top of the fibers and a final layer of pure cryogenically process rubber.

G. Synthetic turf carpet shall be attached to the perimeter edge detail in accordance with the Manufacturer's standard procedures.

H. Play Lines:

1. Play lines shall be laid out as shown on the Drawings.
2. Play lines shall be cut-in and sewn in place incorporating the pre-approved seaming detail.

I. Finishing:

1. Following completion of the infill, continue to work the surface of the installation, separating individual carpet tufts along their longitudinal axis and spread evenly over the area between attachment points of each tuft. Produce a uniform stand of synthetic turf fibers above the surface of the infill.

2. Removal all accumulations of loose tufts and fibers from the finished surface. Clear all installation debris from the site including loose infill materials, packaging, containers, etc.

3.05 Inspections & Testing:

A. Initial Installation:

Following the installation of the first two panels of carpet fabric and the sewing of those two panels, request inspection and approval by the Engineer. Do not proceed beyond the first two panels without this approval. Notify Engineer 48 hours prior to inspection. The Engineer will make every effort not to delay progress of the carpet installation due to this inspection requirement.

The Engineer will inspect the work on a regular basis for compliance with the approved manufacturers detailed installation instructions. Work that appears not to be in compliance will be rejected and must be removed and replaced to the satisfaction of the Engineer.

B. Following completion of the infill, defibrillation of the carpet fibers, and cleanup of the installation debris, perform an on-site permeability test establishing initial benchmark data for warranty performance.

C. Perform an on-site impact attenuation test in conformance with ASTM F355, Standard Test Method for Shock-Absorbing Properties of Playing Surface Systems and Materials, modified as approved by the Engineer for field testing, to establish benchmark data for warranty performance.

3.06 Synthetic Turf Acceptance: Until the Physical Completion of the complete work of the Contract, protect and maintain the installation. Keep the surface of the field free of construction debris, leaves, and other litter. Repair or replace any damage caused by vandalism, other trades, traffic, or weather.

END OF SECTION