

Section 02790 SYNTHETIC TURF SYSTEMS

Artificial Turf – Illusion

PART 1 – GENERAL

1.01 WORK

- A. Furnishing, delivery, installation and warranty of a complete synthetic turf system including drainage, synthetic turf, 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)
 - **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
 - **D1557** – Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort.
- B. STC Suggested Guidelines for the Essential Elements of Synthetic Turf Systems

1.04 PROJECT CONDITIONS

- A. Coordinate all work with the work of other sections to avoid delay and interference with other work.

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- B. Protect excavations by shoring, bracing sheeting, underpinning, or other methods as required to prevent cave-ins or loose dirt from entering excavations. Barricade open excavations and post warning lights at work adjacent to public streets and walks.

1.05 SITE INSPECTION

- A. 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 Synthetic Turf installer.
- B. The compaction of aggregate base shall be 95% to Standard Proctor and surface tolerances shall not exceed 1/4" over 10 feet.
- C. The Contractor shall have a state registered surveyor conduct an elevation survey of the 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.
- D. 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 Synthetic Turf Installer
- E. 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.
- F. 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.

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1.06 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.
- C. Maintain all benchmarks, monuments, and other reference points. If disturbed or destroyed, replace as directed.
- D. Adjacent streets, sidewalks, and property shall be kept free of mud, dirt, or similar nuisances resulting from earthwork operations.

1.07 QUALITY CONTROL

- A. **Manufacturer Qualifications:** Company specializing in manufacturing products specified in this section. The Turf Manufacturer:
 - 1. Basis of design shall be “Mirage II” synthetic turf system as provided by GrassTex™. (800) 544-0439, www.grass-tex.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. Manufacturer must be a member in good standing with the STC.
 - 5. Manufacturer must utilize best practices as certified by ISO-9001 and ISO-14001.
 - 6. Manufacturer must be owned and operated in the U.S.A.
 - 7. 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 Synthetic Turf Installer must provide competent workmen skilled in this type of synthetic grass installation. All technicians must have installed similar synthetic turf.
- C. Prior to the beginning of installation, the Synthetic Turf 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 turf manufacturer’s recommendations and as stated herein.

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- D. 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.

1.08 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
7. ASTM test submittals may vary by no more than ¼" 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 Synthetic Turf Installer and Turf Manufacturer shall provide evidence that the turf system does not violate any other manufacturer's patents, patents allowed or patents pending.

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1.09 WARRANTY

- A. The Contractor shall provide a minimum eight (8) year warranty policy by the manufacturer, 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 all turf if necessary.
- C. Warranty shall become effective from the date of substantial completion.
- D. The Warranty shall contain no usage limits for warranted turf.
- E. Submit Manufacturer Warranty and ensure that forms have been completed in Owner's name and registered with Manufacturer.

PART 2 PRODUCTS

2.01 SUPPLIER QUALIFICATIONS

- A. The Owner has conducted an extensive review of synthetic turf products, including visiting installed sites and review of other agencies' review criteria. Based upon their research, they have established the following criteria for acceptance of a synthetic turf product. No variation from these criteria shall be allowed. The Owner's review is considered final.
- B. The Synthetic Turf Installer shall have minimum experience of at least 5 years, actively selling, installing and maintaining in-fill synthetic turf project of similar size.
- C. The Synthetic Turf Installer must provide a list of references based on previous installations.
- D. Installation team shall be established, insured installation firm experienced as a premium turf installer with suitable equipment and supervisory personnel, with a minimum of 5 years' experience with 15 foot wide tufted materials.

2.02 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 78 ounces per square yard.
 - 3. The turf fiber shall be non-abrasive and a minimum of 100 microns thick.
 - 4. The turf fiber must contain less than 100 ppm of lead chromate in all colors.
 - 5. The turf fibers must be from the same dye lots.

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6. 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.
7. 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.
8. The pile fiber shall possess the following characteristics:

Characteristic	Value	Test
Linear Density (Denier)	13600	ASTM D 1577
Yarn Thickness	100 Microns (PE mono); 100 Microns (PP)	ASTM D 3218
Tensile Strength	71 N (PE Mono);16 N (PP)	ASTM D 2256
Pile Weight*	78 oz./yd2	ASTM D 5848
Fiber manufacturer must be from the same source		
The above specifications are nominal. *Values are +/- 5%.		

9. The pile fabric shall possess the following physical characteristics

Characteristic	Value	Test
Finished Pile Height*	2" (51mm)	ASTM D 5823
Product Weight (total)*	105 oz./yd2	ASTM D 3218
Primary Backing Weight*	7.4 oz./yd2	ASTM D 2256
Secondary coating Weight**	20 oz./yd2	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)	2 lbs Silica Sand	None
Infill (Rubber)	N/A	None
Except where noted as a minimum, the above specifications are nominal.		
* Values are +/- 5%. **All values are +/- 3 oz./yd2.		

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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 20 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. All turf fabric edges to be securely bound as per the perimeter detail design. Adhesives for joining seams of turf together shall be Nordot 34G Glue, Mapei 2K, Turf Claw, 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.

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. The turf material shall be non-combustible and pass the DIN standard Pill Burn test or ASTM D 2859.

2.03 SYNTHETIC GLUE MATERIAL

A. Adhesive products shall be Nordot 34G, Mapei 2K, Turf Claw, 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.

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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%

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.

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- C. The designated Supervisor for the Synthetic Turf 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 turf 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.
- E. Adhesives shall arrive in dry, sealed containers.

3.03 TURF INSTALLATION

- A. Install synthetic turf system in accordance with the manufacturer's written installation instructions.
- B. Turf shall be attached to the perimeter edge as shown in the construction plans and as per the manufacturer.
- C. All seams shall be brushed thoroughly before infill materials are installed.
- D. All terminations shall be as detailed and approved in the shop drawings.

3.04 INFILL INSTALLATION

- A. The synthetic turf shall be thoroughly brushed prior to installation of infill materials to remove wrinkles.
- B. Turf shall remain free draining at all times before, during and after the infill materials are installed.

3.05 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.

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- 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 Turf Manufacturer that the turf and base system is installed in accordance with their recommendations prior to final completion.