

SECTION 32 18 16.13

PLAYGROUND RESILIENT SURFACING

TOTTURF SYNTHETIC TURF PRO PLAY

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 ATTENUATION CUSHION LAYER

See Section 3.04

1.03 REFERENCES

A. ASTM Standard Test Methods

- **F1292** – Standard specification for Impact Attenuation of Surfacing Materials within the Use Zone of Playground Equipment.
- **F1951** – Standard Specification for Determination of Accessibility of Surface Systems under and around Playground Equipment.
- **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

- C. IPEMA Certification: Manufacturer must provide proof of certification. In the interest of public playground safety, IPEMA provides an independent laboratory which validates a manufacturer's certification on conformance to ASTM F1292.

1.04 PROJECT CONDITIONS

- A. Coordinate all work with the work of other sections to avoid delay and interference with other work.
- 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 0.25" in 10' 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 0.25" over 10'.
- 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 sub-base 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 sub-base, and hence, no claims for extra work based upon these conditions will be permitted.

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 “Robertson TotPlay 67 oz” synthetic turf system as provided by Robertson. (800) 858-0519 www.totturf.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 turf 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 turf 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.

- 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 samples, 12"x12" minimum size, illustrating details of finished product as bid, including full cross section of sub-base, turf, and infill material.
3. Product Literature: Submit two copies of manufacturer's recommended installation and maintenance information, including any technical criteria for evaluation of the installed product.
4. 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.
5. Submit a 1-lb sample of the selected bid infill material(s).
6. A letter and specification sheet certifying that the products of this section meet or exceed specified requirements.
7. 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
8. ASTM test submittals may vary by no more than 0.25" and 6 oz. of the specified product to bid. Bid winner must show NEW ASTM TESTS with contract submittals.
9. 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.
10. 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.

1.09 WARRANTY

- A. The Contractor shall provide a minimum eight-year warranty policy by the manufacturer, against defects in materials and one year against defects in the 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. 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 five 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 40 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.
 - 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*	40 oz./yd ²	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*	1.5" (38.1mm)	ASTM D 5823
Product Weight (total)*	67 oz./yd ²	ASTM D 3218
Primary Backing Weight*	7.4 oz./yd ²	ASTM D 2256
Secondary coating Weight**	20 oz./yd ²	ASTM D 5848
Fabric Width	15' (4.57m)	ASTM D 5793
Tuft Gauge	3/8"	ASTM D 5793
Grab Tear Strength	200-1b-F	ASTM D 5034
Tuft Bind	>10-1b-F	ASTM D 1335
Infill (Sand)	2 lbs Silica Sand	None
Except where noted as a minimum, the above specifications are nominal.		
* Values are +/- 5%. **All values are +/- 3 oz./yd ² .		

B. Backing Material

a. Primary Backing:

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

b. Secondary Backing:

- i. Secondary backing system weight must be a minimum of 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.

2.04 INFILL MATERIAL

- A. The synthetic infill material shall consist of a blend of graded, silica sand.
 - 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 - $< 30^\circ$
- i. Sand shall be heavy metal safe
- 2. **Envirofill:** infill for synthetic/artificial turf this product consists of silicon dioxide coated with an acrylic polymer. **HAZARDS DISCLOSURE:** This product does not contain known hazardous materials in reportable levels as defined by the OSHA Hazard Communication Standard 29 CFR 1910.1200. This product should be classified as NOT being toxic, corrosive, skin/eye irritants, or a strong sensitizer as defined in 16 CFR 1500.3(b)(5), and 1500.3(b)(7) – (9) of the Federal Hazardous Substances Act.
 - a. Color – green, tan, red, black
 - b. Odor – Odorless
 - c. pH-value - Not applicable.
 - d. Change in condition - Melting point/Melting range: 1713 °C (3115 °F); Boiling point/Boiling range: 2230 °C (4046 °F)
 - e. Flash point - None
 - f. Flammability (solid, gaseous) - Product is not flammable.
 - g. Ignition temperature - Decomposition temperature - Not determined.
 - h. Auto igniting - Product is not self-igniting.
 - i. Danger of explosion - Product does not present an explosion hazard.
 - j. Explosion limits - Lower - Not determined; Upper - Not determined.
 - k. Vapor pressure @ 1732 °C (3150 °F) - 13.5 hPa (10 mm Hg)
 - l. Density @ 20 °C (68 °F) - 2.9-3.1 g/cm³ (24.201-25.87 lbs/gal)
 - m. Bulk density - 110 (lbs per cu ft)
 - n. Relative density - Not determined.
 - o. Vapor density - Not applicable.
 - p. Evaporation rate - Not applicable.
 - q. Solubility in / Miscibility with: Water - Insoluble.
 - r. Partition coefficient (n-octanol/water) - Not determined.
 - s. Viscosity: Dynamic - Not applicable; Kinematic - Not applicable.
 - t. Solvent content: Organic solvents - 0.0 %; Solids content - 100.0 %
 - u. Other information: No further relevant information available.

PART 3 EXECUTION

3.01 GENERAL

- A. Installation of the synthetic turf system is to comply with the Manufacturer's recommendations, requirements and the reviewed and approved shop drawings.

- B. Perform all work in strict accordance with the contract documents and the manufacturer’s specifications and instructions. Only those skilled technicians proposed in the bid phase are to be assigned to this project by the Contractor.
- C. The designated Supervisor for the 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. Infill shall arrive dry and loose.
- E. Adhesives shall arrive in dry, sealed containers.

3.03 SUB-BASE TYPES AND DETAILS

Sub-Base Requirements: The base shall have the specific minimum slope (2%) and shall vary no more than .125” when measured in any direction with a 10’ straight edge.

STONE: The density requirement is 90% to 95% compaction with final condition of stone as level and stable so as not to shift when traveled on or during surface installation process. A compaction test is required and must be submitted to Robertson Industries Inc. prior to installation of turf sur-facing. Failure to provide proof of compaction test will void the five-year warranty of Turf Surfacing should a sub-base failure occur.

DEPTH: 4” minimum thickness

SLOPE: Stone elevation shall maintain .25” per foot towards low end

POROSITY: Base course shall maintain porosity for direct drainage

ENCLOSURE: Stone base course must be surrounded by a retaining curb

DRAINAGE: Subsurface drainage is recommended under and around stone base. Perforated pipe or similar system is acceptable.

TOLERANCES: .25” in any 10’ direction and .125” in and 3’ direction.

STONE SELECTION: It is critical that different size stones are used so that the base shall be uniformly mixed. The material shall be wetted during mixing operations if necessary, for proper blending.

<u>STONE GRADUATION:</u>	<u>U.S. SIEVE</u>	<u>PERCENT PASSING</u>
	1”	100%
	¾”	90-100%
	No. 4	35-60%

No. 3010	30%
No. 200	2-9%

FINISH LAYER: In the event turf is going directly over the aggregate, a finishing layer of 1” – 1.5” compacted Decomposed Granite (DG) over the aggregate is highly recommended.

CONCRETE or ASPHALT: Concrete should be finished with a medium broom finish. All new concrete slabs must cure for a minimum of seven days prior to installation. Asphalt cure time requires fourteen days. Once the new asphalt has cure, it must be pressure washed prior to the surfacing being installed. The concrete contractor shall be responsible for flooding the pad to insure proper slope and tolerance. Any areas holding enough water to cover a flat nickel shall be patched prior to arrival of turf installation crews.

DEPTH: 4” minimum thickness

SLOPE: Concrete or Asphalt shall maintain a .25” per foot

TOLERANCE: Concrete must maintain a tolerance of .125” in 10’ to avoid low areas that will hold water under the turf.

3.04 ATTENUATION CUSHION LAYER

Cushion Layer Types:

- A. Impact attenuation cushion layer consists of these materials; recycled styrene butadiene rubber (SBR) and/or Cryogenic crumb rubber and/or chunk premium black rubber granules adhered with a 100 percent solids polyurethane binder to form a resilient porous material.
- B. Strands of SBR may vary from 0.5 mm – 2.0 mm in thickness by 3.0 mm – 20 mm in length.
- C. Chunk premium black rubber granules are 5/8” granules: This rubber is pre-consumer, post-industrial, reclaimed rubber, granulated through a 5/8” screen and contains less than 2% dust.
- D. SBR crumb rubber (5-9 Mesh) using sieve analysis ASTM D5644 with a fiber content of .1% or less mixed in.
- E. Binder shall be between 7-12% of the total weight of the material and shall provide 100 % coating of the particles.
- F. The cushion layer shall be compatible with the wear course and must meet requirements herein for impact attenuation.
- G. Optional pad: POLYETHYLENE FOAM PLANK
 - a. Foam Type: Polyethylene, Polyester fabric

- b. Bulk density: 1.5 lb/cu ft
- c. Effective size: 4' x 5'
- d. Tensile strength: 23 psi
- e. Thickness: 1.5"-2"
- f. Compressive strength @ 25%: 7 psi
- g. Compressive strength @ 50%: 14 psi
- h. Compressive Set: <20%
- i. Tear strength: 23 psi
- j. Tear resistance: 7lb/in – 6lb/in
- k. Cell size: 2.5mm
- l. Water absorption: <.3lb/ft²
- m. Thermal stability: <2%

3.05 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.

3.06 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.

3.07 MATERIALS

A. **Playground Synthetic Turf**

Manufacturer:	Controlled Products
As Distributed by:	Robertson Industries, Inc. (800) 858-0519
Location used:	Playground Area

B. **Attenuation Cushion Layer TotTurf Shredded SBR and/or Cryogenic Crumb Mixture**

As Distributed by:	Robertson Industries, Inc. (800) 858-0519
Location Used:	Playground Area

C. **Chunk Premium Black Rubber Granules**

Manufacturer:	American Recycling Center, Inc. (989) 725-5100
	655 Wabasse Drive
	Owosso, MI 48867

As Distributed by: Robertson Industries, Inc. (800) 858-0519
Location Used: Playground Area

D. Binder – VORAMER MR Products

Manufacturer: DOW Chemical
As Distributed by: Robertson Industries Inc. (800) 858-0519
Location Used: Playground Area

E. Foam Attenuation Cushion Layer

Manufacturer: ProdTek –Product and Technical Services, Inc.
1812 S. Hamilton Street, Suites B&C
Dalton, GA 30721
As Distributed by: Robertson Industries Inc. (800) 858-0519
Location Used: Playground Area

3.08 CLEANING AND COMPLETION

- A. Protect all installed work from other construction activities as installation progresses.
- B. The Contractor shall keep the area clean throughout the construction period and free from the installation process, including track surfaces.
- C. Upon completion of the installation, thoroughly clean surfaces and site of all refuse resulting from the installation process, including track surfaces.
- D. Any damage to existing fixtures or facilities resulting from the installation of the synthetic turf system shall be repaired to original condition at the Contractor’s expense prior to substantial completion and commencement of the warranty period.
- E. A deficiency list will be produced by the Engineer at the conclusion of the project. All installation project deficiencies not in dispute must be remedied by the Contractor prior to the issuance of a certificate of substantial completion.
- F. Contractor to provide a written acceptance that the turf and base system is installed in accordance with their recommendations prior to final completion.

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