

**SECTION 32 2201**  
**INFILL ARTIFICIAL TURF – SOCCER**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. Work included in this Section includes design, procurement, and installation of a new synthetic playing field system as shown on the drawings.
- B. Synthetic Turf work includes, but is not limited to, the following:
  - 1. A complete installation of turf including sewing seams, attachment to perimeter nailer, markings, installation of infill materials, etc.
  - 2. A unit price per foot for perimeter nailer replacement is included in the bid.
  - 3. Coordination/protection of existing curbs, track, sidewalks, fences, nets, Goals, etc.
  - 4. A resilient infill system, consisting of a mixture of sand and rubber granules.
  - 5. The primary method of attaching turf together will be by sewing. Gluing shall be limited to areas in which sewing is impossible.
  - 6. Maintenance manual.
  - 7. Written 8-year warranty supported by a 3rd party insured warranty policy from an A-Rated domestic insurance carrier. Warranty shall be full replacement for lifetime of warranty. (No pro-rated warranties)
  - 8. Striping and seaming shop drawings: Striping plan; layouts as shown on the diagrams included in this section.
  - 9. Supply and maintenance equipment and training of field maintenance personnel in proper care maintenance procedures.
- C. Facility Understanding
  - 1. The Facility is an existing artificial turf field. There is a concrete curb with a nailer.
- D. Evaluation: Owner and the Design team will evaluate the following items when determining the successful bidder:
  - 1. Product,
  - 2. Schedule/Construction methodology,
  - 3. Experience,
  - 4. References,
  - 5. Warranty,
  - 6. Insurance,
  - 7. Price,
  - 8. Disposal/Re-purpose/Recycle Strategy
  - 9. Voluntary Alternates.
- E. Interviews: The Owner and their representatives intend to conduct interviews with at least two proposers. This will give the proposers an opportunity to describe their methodology and commitment to the project.

**1.3 SYSTEM DESCRIPTION**

- A. General: The existing synthetic playing field system is comprised of subgrade drainage system and synthetic turf with infill material of sand and ground rubber. This project consists of removing the existing turf and infill, and replacing with a new turf and new/re-used infill.

1. *Components include, but are not limited to:*
  - a. *Protection of concrete curb.*
  - b. *Protection of existing football goal posts.*
  - c. *Installation of perimeter turf nailer.*
  - d. *Repair of curb as necessary.*
  - e. **Base Bid** *will be to remove existing artificial turf.*
  - f. **Alternate 01** *will be to provide and install 2.25" height combination Mono/Slit Film Fiber turf.*
  - g. **Alternate 02** *will be to provide and install 2.25" height Dual Slit Film Fiber turf.*
  - h. **Alternate 03** *will be to provide and install 2.25" height all Monofilament Fiber turf.*
  - i. **Alternate 04** *will be to for an addition/deduction to the turf price to reduce the height of the turf to 2" and a corresponding reduction of infill, and the addition of a shock pad. Brock SP14 is the basis for design, alternative pads will be considered. Multiple pads can be proposed.*
  - j. **Unit Cost Allowance 1** *Allowance for 100 linear feet of curb removal and replacement. Assume that shortest length of curb will be 10'. A proportionate amount may be added or subtracted from contract depending upon actual amount determined during construction.*
  - k. **Unit Cost Allowance 2.** *Allowance for each additional ton of top gravel.*
  - l. **Grading Requirements:**
    - 1) *Finish grading of surface gravel prior to turf installation.*
  - m. *Complete installation of turf including sewing seams, attachment to perimeter nailer, installation of infill materials, etc.*

#### 1.4 PROJECT CONDITIONS

- A. Site Information: Existing design drawings are based on previous design drawings and limited field measurements. Architect/Owner cannot guarantee subsurface conditions.
- B. Use of Explosives: Use of explosives is not permitted.
- C. Protection of Persons and Property: Barricade open excavations occurring as part of this Work and post with warning lights.
  1. Operate warning lights as recommended by authorities having jurisdiction.
  2. Protect structures, utilities and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
- D. Existing Benchmarks: Carefully preserve and maintain existing benchmarks, vertical/horizontal control, monuments, property line pipes and pins, and other reference points. If disturbed or destroyed, restore or replace at no additional cost to the Owner.
- E. Field Measurements: Each bidder is encouraged to visit the site of the Work to verify the existing conditions. No adjustments will be made to the Contract Sum for variations in the existing conditions.
- F. Environmental Limitations: Do not delivery surfacing material if either ambient air temperature or material temperature is below 32 degrees F.
  1. Do not proceed with installation until weather conditions are satisfactory according to the manufacturer's recommendations.

**1.5 SUBMITTALS**

- A. **Submittals required with Bid** (One (1) sample from each manufacturer is required. Multiple submittals from each bidder is not necessary)
- The following information from independent testing laboratory:

<b>Property</b>	<b>Test</b>	<b>Value/Description</b>
Fiber Denier (Mono)	ASTM 1907	
Fiber Denier (Slit Film)	ASTM 1907	
Structure (Monofilament & Slit Film)		
Yarn Thickness		
Face Weight	ASTM D5848 or FIFA/ISO 8543	
Tuft Gauge		
Pile Height	ASTM D5848 or FIFA/ISO 8543	
Primary Backing Material		
Secondary Backing		
Total Weight	ASTM D5848 or FIFA/ISO 8543	
Drainage Through Turf	ASTM F1551	
Primary Backing Dimensional Stability		
Backing tear Strength		
Lead Content		
Infill Rubber type		
Infill Rubber size		
Infill Sand Type		
Infill Sand Shape		
Infill Sand Size		
Infill Mix sand/rubber %		
Amount of fiber above infill		
Artificial Weathering (3,000 hrs UVA) Turf Color Change	FIFA/EN ISO 20105-A02	
Artificial Weathering (3,000 hrs UVA) Pile Yarn tensile Strength	FIFA/EN 13864	
Artificial Weathering (3,000 hrs UVA) Infill Color Change	FIFA/EN ISO 20105-A02	
Wear Tolerance (100,000 wear cycles) provide photo.		

<b>Property</b>	<b>Test</b>	<b>Value New</b>	<b>Value after Lisport (20,200) &amp; UV (3000)</b>
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			hrs)
Tuft bind Pull-out, without infill material.	ASTM 1335 or ISO 4919		
Impact attenuation	ASTM 1936		
Shock Absorption	FIFA 04 & 09		
Water Permeability	ASTM F1551		

2. Synthetic Turf Rag Sample: 12 inches by 12 inches, Grass colors, and striping colors.
  3. Third party insurance policy
  4. Turf manufacturer's non-pro-rated 8 year warranty.
  5. Contractor Qualifications.
  6. Installer Qualifications.
  7. Turf Manufacturer's Qualifications, including but not limited to fiber source, tufting, coating, etc.
  8. Turf and Infill Removal Strategy (narrative).
  9. Schedule/Project Approach (narrative).
  10. Product Data: For each product specified. Include details of construction relative to materials, dimension of individual components.
  11. Maintenance Manual.
  12. CLIENT REFERENCES. Provide a list of facility operators that have a working knowledge of the proposed product in terms of installation and maintenance.
- B. Samples: Provide samples of the following components (after award of bid):
1. Striping: 6 inch minimum.
  2. Sewn Seams: 6 inches minimum.
  3. Drainage Aggregate Mixture: 1 quart of each size.
  4. Infill Material: 1 quart each.
- C. Quality Assurance Information:
1. Turf Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.
    - a. Provide a list of a minimum of ten existing installations, completed over the past five years, including contact information, including telephone number, for the owner's representative for each project.
- D. Product Test Reports: Based on evaluation of tests performed by manufacturer and witnessed by a qualified independent testing agency, indicate compliance of surfacing material with requirements based on comprehensive testing of current systems.
- E. Shop Drawings: Show detail of installation, including plans, sections, and interfaces with existing construction.
1. Provide details of all edge conditions for playing surface.
  2. Provide dimensioned seaming plan.
  3. Provide striping plan. Plan to comply with drawings.
- F. Maintenance Instructions: Submit to the Owner three copies of manufacturer's printed instructions for maintenance of installed work, including methods and frequency recommended for maintaining optimum condition under anticipated use conditions. Include precautions against all materials and methods that may be detrimental to finishes and performance.
1. The turf installer/supplier shall provide on-site maintenance training for the Owner's maintenance personnel on how to maintain the field properly for the amount of time as required to fully demonstrate proper field maintenance.
- G. Grade Verification: Turf installer will string line finished gravel with Owner and Landscape Architect prior to turf installation. Visual inspection and infill depth verification will be conducted by Owner and Landscape Architect after turf installation.

- H. Prior to the beginning of installation, the manufacturer/installer of the synthetic turf shall inspect the aggregate surface course and supply a Certificate of Acceptance for the purpose of obtaining manufacturer's warranty for the finished synthetic playing surface.
- I. Environmental: Provide third party material testing confirming that turf and infill rubber meets or exceeds Federal requirements for consumer products safety.
- J. Certified Conformance Surveys: Contractor will hire an independent Surveyor, licensed in the State of Missouri to perform Conformance Survey of the finish gravel on each field. The survey will consist of 3 rows (running goal to goal) on a 25' grid centered on the crown of the field.

## **1.6 WARRANTY**

- A. General Warranty: The special warranty specified in this Article shall not deprive the Owner or other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
- B. Turf Warranty: Submit written warranty/warranties, executed by the manufacturer and installer agreeing to repair or replace components of synthetic surfacing that fail in materials or workmanship within the specified warranty period. Failures include, but are not limited to, the following:
  - 1. Premature wear and tear.
  - 2. Seam failure, including delamination, raveling, and separation.
  - 3. Degradation of fiber or backing resulting in excessive "shedding" and/or discoloration to the extent that the playing surface is no longer serviceable to maintain, playable, and safe for all levels of participants.
  - 4.  $G_{max}$  exceeding 165 (as determined by an independent testing agent), in any single location.
- C. Warranty Period: 8 years from date of Substantial Completion.
  - 1. Conditions: Contractor shall perform yearly inspections including  $G_{max}$  testing throughout the warranty period.
  - 2. Warranty will be non pro-rated. Failure in any location on the field at any time during the warranty period shall be cause for the entire field to be replaced or an amount to be determined by the Owner and Supplier.

## **1.7 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: A firm that complies with the following requirements and is experienced in manufacturing synthetic playing surface materials similar to those indicated for this Project and with a record of successful in-service performance.
  - 1. Assumes responsibility for engineering synthetic playing surface components to comply with performance requirements. This responsibility includes preparation of Shop Drawings and comprehensive analysis by a qualified professional engineer.
  - 2. Has provided synthetic playing surface components for at least 30 athletic fields at the high school level or higher.
  - 3. Has sufficient production capacity to produce required materials without delaying the Work.
  - 4. Turf has been produced by same manufacturer since inception of turf line.
- B. Installer Qualifications: Engage an experienced installer to perform work of this Section who, in the past 5 years, has installed at least 20 synthetic playing field systems similar to that required for this Project and who is acceptable to manufacturer. Installer shall be a member of the American Sports Builders Association and have a Certified Field Builder working on this project.
  - 1. Installer shall provide a 24-hour call back for warranty work and 48-hours for site visit and/or commencement of warranty repairs.

- C. Re-Used infill Materials: If the infill extracted from fields is planned to be re-used, one randomly taken sample for the field infill material shall be tested for particle size compatibility with new infill.
- D. Playing field surface shall be manufactured, located and installed in strict compliance with NFHS and MSHSAA Rules and Regulations for Football and Soccer.
- E. Pre-Installation Conference: Conduct conference at the job site for coordination of schedule, access, procedures and security with the Owner, Architect, Contractor and other related subcontractors.

**1.8 TURF AND INFILL REMOVAL STRATEGY:** Provide a description in narrative for that addresses how the infill may or may not be extracted, plans for re-use/disposal, method of turf removal and strategy to re-use/re-cycle/dispose of the turf components.

**1.9 SCHEDULE:** Contractor shall submit a schedule for both alternative bid scenarios explaining safeguards and guarantees that the schedules proposed can be met.

## **PART 2 - PRODUCTS**

### **2.1 TURF**

- A. Turf Product Requirements – **ALTERNATE 01:**
  - 1. Structure: *Minimum* 46 oz. Slit Film/Three dimensional monofilament, blend turf fiber.
  - 2. Monofilament Fiber Denier: 7,200-10,800 dtex min/max.
  - 3. Slit Film Fiber Denier: 5,000-8,000 min/max.
  - 4. Two ends per needle tufting preferred.
  - 5. Yarn Thickness: Minimum 210 microns. (monofilament)
  - 6. Yarn Thickness: Minimum 100 microns. (slit film)
  - 7. Yarn Tensile Strength: 135 N minimum.
  - 8. Tuft Gauge: 1/4-inch minimum, 1/2" maximum.
  - 9. Pile Height: 2-1/4 inches, 2" for alternate turf over "Shock Pad".
  - 10. Primary Backing: Two part composite, comprised of both woven and non-woven components.
  - 11. Primary Backing Weight: 8 oz/square yard minimum.
  - 12. Primary Backing Dimensional Stability: 47.10 N/square meter.
  - 13. Secondary Backing Coating: polyurethane, or proprietary drain through.
  - 14. Secondary Backing Coating Weight: 22 oz/square yard minimum.
  - 15. Backing Tear Strength: Grab Tear Strength (X-Y) >250-400 lb.
  - 16. Drainage through Turf: Holes (4" O.C. min.). Minimum of 20" per hour with infill in place.
  - 17. Tuft Bind Pull-out without infill: 10 lbs. or 30N
  - 18. Lead Content: below 100 ppm.
  
- B. Turf Product Requirements – **ALTERNATE 02:**
  - 1. Structure: *Minimum* 46 oz. Slit Film/Three dimensional monofilament, blend turf fiber.
  - 2. Slit Film Fiber Denier: 5,000-8,000 min/max.
  - 3. Two ends per needle tufting preferred.
  - 4. Yarn Thickness: Minimum 100 microns. (slit film)
  - 5. Yarn Tensile Strength: 135 N minimum.
  - 6. Tuft Gauge: 1/4-inch minimum, 1/2" maximum.
  - 7. Pile Height: 2-1/4 inches.
  - 8. Primary Backing: Two part composite, comprised of both woven and non-woven components.
  - 9. Primary Backing Weight: 7.5 oz/square yard minimum.
  - 10. Primary Backing Dimensional Stability: 47.10 N/square meter.
  - 11. Secondary Backing Coating: polyurethane, or proprietary drain through.
  - 12. Secondary Backing Coating Weight: 20 oz/square yard minimum.

13. Backing Tear Strength: Grab Tear Strength (X-Y) >200 lb.
14. Drainage through Turf: Holes (4" O.C. min.). Minimum of 20" per hour with infill in place.
15. Tuft Bind Pull-out without infill: 10 lbs. or 30N
16. Lead Content: below 100 ppm.

C. Turf Product Requirements – **ALTERNATE 03:**

1. Structure: *Minimum* 46 oz. Three dimensional monofilament, blend turf fiber.
2. Monofilament Fiber Denier: 7,200-10,800 dtex min/max.
3. Two ends per needle tufting preferred.
4. Yarn Thickness: Minimum 100 microns. (slit film)
5. Yarn Tensile Strength: 135 N minimum.
6. Tuft Gauge: 3/8-inch minimum, 1/2" maximum.
7. Pile Height: 2-1/4 inches, 2" for alternate turf over "Shock Pad".
8. Primary Backing: Two part composite, comprised of both woven and non-woven components.
9. Primary Backing Weight: 8 oz/square yard minimum.
10. Primary Backing Dimensional Stability: 47.10 N/square meter.
11. Secondary Backing Coating: polyurethane, or proprietary drain through.
12. Secondary Backing Coating Weight: 22 oz/square yard minimum.
13. Backing Tear Strength: Grab Tear Strength (X-Y) >250-400 lb.
14. Drainage through Turf: Holes (4" O.C. min.). Minimum of 20" per hour with infill in place.
15. Tuft Bind Pull-out without infill: 10 lbs. or 30N
16. Lead Content: below 100 ppm.

D. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Mondo
2. Sporturf
3. ACT Global
4. AstroTurf
5. Shaw

## 2.2 SYSTEM COMPONENTS

A. Fiber: Monofilament polyethylene fibers, and Slit Film fibers with proprietary (per manufacturer) blade shape for improved dimensional memory that resists matting, tufted into a permeable multiple-layered primary backing with a secondary backing.

1. Surfacing material shall have qualities including, but not limited to, the following:
  - a. Resistance to insect, vermin, rot, mildew, fungus growth.
  - b. Non-toxic components.
  - c. Traction with conventional athletic shoes, without cleats.
  - d. Stabilized to resist the effects of ultraviolet degradation.

B. Carpet rolls shall be 15' wide rolls.

1. Rolls shall be long enough to go from sideline to sideline without splicing.
2. Lines shall be 5" wide and tufted into each roll.

C. Infill materials shall be approved by the manufacturer.

1. Sand (10%):
  - a. Siliceous (95%) washed and dried.
  - b. Round grain shape.
  - c. Size: 0.5-1.8 mm.
2. Rubber (90%):

- a. Provide 100 percent ambient SBR ground rubber pellets.
  - b. No evidence of metal fragments.
  - c. Size: 0.5-2.0 mm. (1% less than 0.5 mm).
3. Fine Tuning material:
- a. Provide additional sand and/or rubber to achieve playing characteristics suitable to Owner and Field Architect.
4. RE-USE OF RUBBER INFILL:
- a. Testing: Re-use the existing rubber that is removed from the existing playing field will be allowed to be re-used pending testing from a qualified testing lab to conduct a Hardness Test, and particle size analysis. Results of the report shall be submitted to the Owner with an interpretation form the lab concerning longevity of the rubber.
  - b. Cleaning: Existing rubber to be re-used shall be clean of all fiber, dust and debris.
  - c. Amount of rubber: Contractor will be allowed to use no more than 2 lbs./SF of re-used rubber in new field. The balance of the rubber shall be new.
- D. Seams:
1. All seams between rolls of turf are to be sewn. Thread for sewing seams of turf shall be as recommended by the synthetic turf manufacturer.
  2. Adhesive shall be Nordot Outdoor Adhesive as appropriate for backing and temperature or approved equal.
- E. SHOCK PAD/E-LAYER
1. Manufactured "shock pad" shall Brock SP 14. Voluntary alternates will be considered.

### **2.3 SPECIAL MAINTENANCE EQUIPMENT**

- A. General: Provide special materials, tools, and equipment, as recommended by the synthetic material manufacturer, required for maintenance of the playing surface based on the conditions of the manufacturer's warranty. Include training for Owners maintenance personnel. Provide the following field grooming equipment or approved equal:
1. Equipment specified in Section 32 2200.

### **2.4 FIELD MARKINGS**

- A. General: Field markings shall be as indicated on the Drawings or to NFHS & MSHSAA standards.
- B. Markings, including perimeter lines shall be tufted into the playing surface using polypropylene fibers.
1. Colors:
    - a. Soccer: White.
    - b. Alternate line colors to pair with logo colors, but provide a visible continuous playing field line per NFHS & MSHSAA standards.
  2. Width:
    - a. Soccer: 5 inches.

### **2.5 QUALITY CONTROL IN MANUFACTURING**

- A. A certified coating inspector employed by the turf manufacturer shall be on site at all times to ensure that the coating is applied properly.
- B. The manufacturer shall own and operate its own manufacturing plant in North America.
- C. The manufacturer shall have full-time certified in-house inspectors at their manufacturing plant that are experts with industry standards.

- D. The manufacturer's full-time in-house certified inspectors shall perform pre-tufting fiber testing on tensile strength, elongation, tenacity, denier, shrinkage, and twist i.e., turns per inch, upon receipt of fiber spools from fiber manufacturer.
- E. Primary backing shall be inspected by the manufacturer's full-time certified in-house inspectors before tufting begins.
- F. The manufacturer's full-time in-house certified inspectors shall verify "pick count" yarn density in relation to the backing, to ensure the accurate amount of face yarn per square inch.
- G. The manufacturer's full-time, in-house, certified inspectors shall perform turf inspections at all levels of production including during the tufting process and at the final stages before the turf is loaded onto the truck for delivery.
- H. The manufacturer shall have its own, in-house laboratory where samples of turf are retained and analyzed, based on standard industry tests, performed by full-time, in-house, certified inspectors.

## **2.6 SUSTAINABILITY STRATEGY (with bid)**

- A. Provide a description of construction methods designed to minimize waste during the construction process.
- B. Provide a description of recycle/re-use strategy for the turf that is removed. Include a description of all cost responsibilities by turf company/contractor/owner.
- C. Provide a description of the recycle/re-use strategy for the end of the life cycle of the turf being installed.

## **PART 3 - EXECUTION**

### **3.1 CONSTRUCTION LAYOUT**

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, relative to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.
- B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.
  - 1. Establish benchmarks and control points to set lines and levels as necessary to locate each element of Project.
  - 2. Establish dimensions within tolerance indicated. Do not scale Drawings to obtain required dimensions.
  - 3. Inform installers of lines and levels to which they must comply.
  - 4. Check the location and level of every major element as the Work progresses.
  - 5. Notify Architect when deviations from required lines and level exceed allowable tolerance.
  - 6. Close site surveys with an error closure equal to or less than the standard established by authorities having jurisdiction.
- C. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

### **3.2 SYNTHETIC TURF INSTALLATION**

- A. Examine substrates, areas, and conditions where playing surface will be installed, with Installer present, for compliance with requirements for conditions affecting performance of installed playing surface.
  - 1. Verify that substrates for placing playing surface are dry, clean and well-compacted.

2. Verify that installation of grounds, anchors, recessed frames and covers, electrical and mechanical units of work, and similar items located under playing surface has been completed before installing drainage tile.
  3. Verify that irregularities in substrates will not adversely affect installed playing surface.
  4. Verify ambient temperatures are in compliance with manufacturer's recommendations for installation.
- B. Do not proceed with installation until unsatisfactory conditions have been corrected.
- C. Over subgrade and filter fabric, install synthetic turf in accordance with manufacturer's written instructions. Seams shall be sewn with thread specifically made for the turf materials according to manufacturer's recommendations for installation. Glued seams are unacceptable.
- D. Fasten synthetic turf to 1-1/2-inch nailer around perimeter of field with corrosion-resistant mechanical anchors (staples), per manufacturer's recommendations.
- E. Designs, markings, layouts, and materials shall conform to all currently applicable National Collegiate Athletic Association rules, NFHSA rules, MSHSAA rules, and/or other rules or standards that may apply to this type of synthetic grass installation. Designs, markings and layouts shall first be approved by the Architect or Owner in the form of final shop drawings. All markings will be installation full compliance with final shop drawings.
- F. Carpet rolls shall be installed directly over the properly prepared aggregate base. Extreme care shall be taken to avoid disturbing the aggregate base, both in regard to compaction and planarity.
1. Repair and properly compact any disturbed areas of the aggregate base as recommended by manufacturer
  2. Full width rolls shall be laid out across the field.
  3. Turf shall be of sufficient length to permit full cross-field installation from sideline to sideline.
  4. No head or cross seams will be allowed in the main playing area between the sidelines.
  5. Each roll shall be attached to the next roll utilizing standard state-of-the-art sewing procedures.
  6. 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.
  7. Artificial turf panel seams shall be sewn. Seams secured by other means including gluing are unacceptable.
  8. Minimum gluing will only be permitted to repair problem areas, corner completions, or as required by the specifications.
  9. All seams shall be sewn using top or butt stitches and polyester thread or, in the case of seams that are impossible to sew, adhered using seaming tape and high grade adhesive (per the manufacturer's standard procedures).
  10. Seams shall be flat, tight, and permanent with no separation or fraying.

### **3.3 FIELD QUALITY CONTROL**

- A. Testing Agency: Contractor shall engage a qualified independent testing agency to perform field quality-control testing.
- B. Testing agency shall inspect and test the following:
1. Surface performance requirements.
  2. Surface impact and shock absorbency according to ASTM F 1936 and ASTM F 355.
- C. Proceed with subsequent work only after test results for previously completed work comply with requirements.

### **3.4 TURF QUALITY CONTROL TESTING**

- A. Prior to delivery of turf rolls to site, remove 1 square foot sample from every one of ten rolls, document roll that sample came from and where roll is placed in the field and send to an independent testing laboratory to test for physical properties of turf fiber and fabric (weights, lengths, thickness, material type, turf pull out).

- B. Submit results to Architect prior to shipping materials to site. Shipping prior to test result verification is at the turf manufacturer's risk. In no event shall turf be installed on field prior to verification of test results.
- C. **WARRANTY MAINTENANCE**
- D. As a condition of the warranty, Contractor shall review the condition of the playing surface on a yearly basis, provide one deep cleaning, and provide  $G_{max}$  testing annually through the warranty period. Contractor shall also evaluate Owner's maintenance protocols and make any recommendations in writing.
- E. Testing Agency: Contractor shall engage a qualified independent testing and inspecting agency to perform tests and inspections throughout the duration of the warranty, and to prepare test reports, to ensure satisfactory performance.

**3.5 G-MAX TESTING:**

- A. At Substantial Completion, hire an independent testing agency to perform G-Max test (ASTM 355, 1936 method) to verify that the shock attenuation properties of the field meet the requirements set forth in this specification. Submit test results in PDF format, to the Owner.
- B. At the time of Substantial Completion, no readings shall exceed 135 for turf placed on gravel, and 120 for turf placed on "Shock Pad". The maximum G-Max shall not exceed 165 for the turf on gravel, and 120 for turf on a pad, through the life of the warranty.
- C. The Owner reserves the right to have the field tested at its own cost at anytime. If at anytime the G-Max reaches unacceptable levels, it is the responsibility of the turf contractor to bring the field back into the required ranges at no cost to the Owner.

**3.6 MAINTENANCE INSTRUCTIONS AND TRAINING**

- A. Submit three copies of manufacturer's printed instructions for maintenance of installed work, including methods and frequency recommended for maintaining optimum condition under anticipated use conditions. Include precautions against all materials and methods that may be detrimental to finishes and performance.
- B. Turf installer/supplier shall provide on-site maintenance training for the Owner's maintenance personnel on how to maintain the field properly.

**3.7 RECORD DRAWINGS:** Provide as-constructed drawings illustrating locations and depths of all drainage pipe, conduit, etc.

**3.8 MATERIAL LEAVE BEHIND:**

- A. Turf Groomer/Sweeper/Magnet
- B. One super sack of crumb rubber.
- C. 2 tons of infill sand.
- D. 50 LF each striping color.
- E. 15' x 30' piece of each color of green turf. (two total)
- F. 15' x 10' piece of logo color.
- G. 15' x 10' piece of end zone color
- H. 100 LF seam tape.
- I. 1 pail of adhesive.

**3.9 CLEANING AND PROTECTING**

- A. Cleaning: Upon completion of installation, clean all playing surfaces so they are free of foreign matter.
- B. Provide final protection and maintain conditions in a manner acceptable to manufacturer and installer that ensure playing surface is without damage or deterioration at the time of Substantial Completion.

Park Hill South High School Turf, Track &  
Tennis Riverside, MO

C. **END OF SECTION 32 2200**