

ADDENDUM ACKNOWLEDGMENT

ADDENDUM NO. 1

Dated: 3/13/23

NOTICE

It is the sole responsibility of the bidder to ensure that it has received any and all Addenda and the Philadelphia Redevelopment Authority may in their sole discretion reject any bid for which all Addenda have not been executed and returned.

PROPOSAL FOR

Project No.: 16449E-01-03

Description: Murphy Recreation

IS AMENDED AS FOLLOWS:

1. BID Questions Due pertaining to Addendum #1: Due by 3/15/23 at 3:00PM
2. Amendments will be posted in <https://phdcphila.org/rfps-rfqs-sales/construction-rfps/> Each Bidder shall acknowledge/sign all Amendments issued and include with their proposal submission.
3. Attached is Addendum #1 which includes revisions to the below:
4. Contract Document Revisions:
 - a. 004114 Construction Bid Sheet
 - b. 321813 Synthetic Turf

Bidder must acknowledge receipt of Addenda in their proposal submission.

Name of Firm:

Signature of Authorized Agent:

Date:

Addendum #1 (3/13/23)

Amendment #1, dated (3/10/23)

SECTION 004114
CONSTRUCTION BID PROPOSAL

PHILADELPHIA REDEVELOPMENT AUTHORITY

**MURPHY RECREATION CENTER
300 W SHUNK ST
PHILADELPHIA, PA 19148**

THIS BID FORM IS COMPLETE AND MUST NOT BE SEPARATED. IF ANY SHEET OR SHEETS ARE DETACHED WHEN SUBMITTED AS A BID, THE PHILADELPHIA REDEVELOPMENT AUTHORITY RESERVES THE RIGHT TO REJECT YOUR BID.

FIRM NAME

FIRM ADDRESS

FEDERAL EIN

TOTAL BASE BID

PHILADELPHIA BUSINESS TAX ID

To the Philadelphia Redevelopment Authority:

I, the undersigned Bidder, hereby propose to furnish all the labor, materials and equipment, perform the whole of the work, and submit to all conditions, as represented, intended and implied, both particularly and generally, by the Plans, Special Specifications, Standard Specifications, Standard Details, Standard Contract Requirements, Form of Agreement, the Ordinance authorizing the work and this bid at the prices herein stated, and agrees that each item bid shall be complete in itself, and the Philadelphia Redevelopment Authority may increase or diminish the amount of work thereunder, or omit the item without invalidating the unit price bid for it or any other item, on the following terms to wit:

A. BID AMOUNT

I will complete the Work in accordance with the Contract Documents for the following Bid Amount as defined in Section 00700, Standard Contract Requirements. (Insert Bid Amount in words as well as figures.)

(1) General Conditions	\$ _____
(2) Temporary Controls	\$ _____
(3) Temporary Sediment Erosion Control	\$ _____
(4) Demolition	\$ _____
(5) Earthwork	\$ _____
(6) Synthetic Turf Field	\$ _____
(7) Sidewalk Improvements	\$ _____
(8) Sitework	\$ _____
(9) Field Accessories	\$ _____
(10) Fencing	\$ _____
(11) Stormwater Management	\$ _____
(12) Site Landscaping	\$ _____
(13) Field Lighting Improvements	\$ _____
(14) Water Line and Yard Hydrant	\$ _____
(15) Basketball Court	\$ _____
(16) Breezeway Improvements	\$ _____

TOTAL BASE BID AMOUNT \$ _____

(17) ALLOWANCE No. 1: Bidders are to include the amount equal to Two Percent (2%) of their base bid amount for payment of Permit and License fees to all regulatory agencies. Refer to Allowances, Section 01210 for more details. ALLOWANCE AMOUNT
_____ DOLLARS, \$ _____

(18) ALLOWANCE No. 2: [EXAMPLE: Bidders are to include the amount of \$30,000.00 to their base bid amount for new site signage. Refer to Allowances, Section 012100 for more details. THIRTY THOUSAND DOLLARS, \$30,000.00.]

TOTAL BASE BID (Base Bid plus Allowance(s)).
\$ _____
_____ DOLLARS

ALTERNATES

ADD ALTERNATE No. 1 – Alternative Natural Infill In Lieu of Rubber/Sand (Refer to Spec Section 321813 Addendum #1)

ADD ALTERNATE No. 1 AMOUNT

B. **COMPLETION**

I will substantially complete the Work, ready for final payment, in accordance with the Contract Documents within 150 consecutive calendar days counting from the date stated in the Notice to Proceed.

C. **ADDENDA**

Bidder must attach Addendum Acknowledgement sheets for all Addenda, if applicable.

EXECUTION OF CONTRACT

MURPHY RECREATION CENTER

004114-3

CONSTRUCTION BID PROPOSAL **Addendum #1 (3/13/23)**

This contract consists of the Standard Contract Requirements; the Department's Standard Details and Specifications, as they apply; the Department's General Bidding and Contract Requirements; the Technical Specifications; the Bid; the Plans with all of the notes thereon (excluding any records or reports of test borings, underground structures, and test piles); any additional exhibits or attachments to any of the foregoing; and any addenda thereto issued by the PRA/City (collectively, the "Contract").

NOTE: ANY CONTRACT THAT IS NOT EXECUTED IN ACCORDANCE WITH THE INSTRUCTIONS PROVIDED BELOW, MAY, IN THE SOLE DISCRETION OF THE PHILADELPHIA REDEVELOPMENT AUTHORITY, BE REJECTED.

SIGNING OF CONTRACT

If Contractor is an INDIVIDUAL or a PARTNERSHIP, date and sign the Contract here, with original signatures, in ink.

This _____ day of _____ 2019

(Signature of Owner, Partner)

(Type or Print Name and Title)

(Business Name of Bidder)

If Contractor is a CORPORATION, date and sign the Contract here with original signatures, in ink, by (a) President or Vice-President of the corporation AND (b) Secretary, Assistant Secretary, Treasurer or Assistant Treasurer of the corporation; and (c) affix the seal of the corporation. If the Contract is not signed by the President or Vice-President; and Secretary, Assistant Secretary; Treasurer or Assistant Treasurer, attach a duly certified corporate resolution authorizing the person signing in place of such officers to execute this Contract for the corporation.

This _____ day of _____ 2023

(Corporate or Business Name of Bidder) **CORPORATE SEAL**

(Address, Including Zip Code)

(Telephone Number)

(Signature of President or Vice President)
or

(Signature of Secretary, Asst. Secretary, Treasurer
Assistant Treasurer)

(Type or Print Name and Title)

(Type or Print Name and Title)

SECTION 321813 - SYNTHETIC TURF

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Furnish all labor, materials, tools and equipment necessary to install all synthetic turf as indicated on the plans and as specified herein and other related specifications. The installation of all new materials shall be performed in strict accordance with the manufacturer's installation instructions and in accordance with all approved shop drawings.
- B. Related Sections:
 - 1. Division 31 Section "Earth Moving"
 - 2. Division 33 Section "Storm Drainage"

1.2 REFERENCES

- A. FM P7825 - Approval Guide; Factory Mutual Research Corporation; current edition
- B. ASTM – American Society for Testing and Materials.

1.3 SUBMITTALS

- A. Submittals shall be provided to Architect, Engineer, and Owner for approval.
- B. Shop Drawings:
 - 1. Field layout including all line packages, logos, and lettering.
 - 2. Roll/ Seaming Marking Plan
 - 3. Show installation methods and construction indicating field-verified conditions, clearances, measurements, terminations, drainage including any details of construction that deviate from the plans and specifications.
 - 4. Football turf system (2.25" turf system)
 - 5. Subdrainage system layout and details.
 - 6. Plan drawing showing location of permeability testing of aggregate base.
- C. Product Data:
 - 1. Submit manufacturer's catalog cuts, material safety data sheets (MSDS), brochures, specifications; preparation and installation instructions and recommendations; storage, handling requirements and recommendations.
 - 2. Submit fiber manufacturer's name, type of fiber and composition of fiber.
 - 3. Submit data in sufficient detail to indicate compliance with the contract documents.
 - 4. Submit manufacturer's instructions for installation.
 - 5. Submit manufacturer's instructions for maintenance for the proper care and preventative maintenance of the synthetic turf system, including painting and markings.
 - 6. Submit product data sheets for the following:
 - a) Permeable Liner

- b) Subdrain System and all standard fittings
 - c) Collector Drain.
 - d) Permeable Stone Aggregate Base Course
- D. Samples:
- 1. Submit one 12x12 inch (minimum) loose carpet sample without infill. Loose sample should demonstrate seaming and include an inlaid line.
 - 2. Submit a sample of sand infill and a sample of selected infill and a sample of the final sand/selected infill mixture, including ratio by volume and by weight equivalent per square foot and method of installation. Sample of each shall represent the exact quantity per square foot. Particle size gradation charts must also be included.
 - 3. Underlayment: One 12x12 inch (minimum) piece of permeable resilient polypropylene drainage layer.
- E. Product Certification:
- 1. Submit manufacturer's certification that products and materials comply with requirements of the specifications.
 - 2. Submit test results indicating compliance with Reference Standards.
 - 3. Submit certificates certifying that all materials used in the permeable aggregate base course work are as specified; submit all sieve gradations etc.
- F. Project Record Documents: Record actual locations of seams, drains and other pertinent information in accordance with Division 1 Specifications Series, General Requirements.
- G. List of existing installations: Submit list including respective owner's representative and telephone number.
- H. Warranties: Per section 1.12, Submit warranty and ensure that forms have been completed in Owner's name and registered with approved manufacturer.
- I. Submit a written "Certification of Acceptance of the Base Construction" from the manufacturer of the infill turf system prior to installation of the synthetic turf system.
- J. Testing Certification: Submit certified copies of independent (third-party) laboratory reports on ASTM testing:
- 1. Pile Height, Face Weight & Total Fabric Weight, ASTM D5848.
 - 2. Primary & Secondary Backing Weights, ASTM D5848.
 - 3. Tuft Bind, ASTM D1335.
 - 4. Grab Tear Strength, ASTM D1682 or D5034.
 - 5. Shock Attenuation, ASTM F1936
 - 6. Water Permeability, ASTM D4491
 - 7. Lead Content, ASTM F2765
- K. Prior to Final Acceptance, the Contractor shall submit to the Owner:
- 1. Three (3) copies of Maintenance Manuals, which will include all necessary instructions for the proper care and preventive maintenance of the turf system, including painting and markings.
 - 2. Project Record Documents: Record actual locations of seams, drains or other pertinent information.
 - 3. Warranty: Submit Manufacturer Warranty and ensure that forms have been completed in Owner's name and registered with Manufacturer and Insurance

Carrier. Submit information confirming that 3rd Party Insurance Policy, non-cancelable and pre-paid, is in effect covering this installation, and underwritten by a Best "A++" Rated Insurance Carrier. Insurance carrier must confirm that the policy is in force and premiums paid. (See Section 1.12)

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section. The Turf Contractor and/or the Turf Manufacturer:
1. Must be experienced in the manufacture and installation of this type of tall pile synthetic infill turf systems as outlined below:
 - a) A minimum of twenty-five (25) multi-purpose fields installed of 65,000 square feet or more in the United States, using the specified fiber.
 2. Approved turf manufacturer must be one of the following, or equal approved by the Philadelphia Dept. of Parks and Recreation.

a)	Sprinturf	www.sprinturf.com
b)	A-Turf	www.aturf.com
c)	AstroTurf	www.astroturf.com
d)	Shaw Sports Turf	www.shawspportsturf.com
e)	Field Turf	www.fieldturf.com
- B. Turf Contractor/ Installer Qualifications: Company specializing in performing the work of this section.
1. The Synthetic Turf Contractor shall have experience of twenty-five (25) acceptable installations (minimum 65,000 sq.ft.) of fields that are at least eight years old. Submit a list of all applicable installations with the bid, including dates of install, owner contact info and phone numbers with the bid.
 2. The designated Supervisory Personnel on the project must be certified, in writing by the Turf Manufacturer, as competent in the installation of this material, including sewing seams and proper installation of the infill mixture with a minimum of 5 years of experience in turf installations.
 3. Installer shall be certified by the manufacturer and licensed.
 4. The Manufacturer shall have a representative visit the site to certify, in writing, the installation and Warranty compliance.
- C. Prior to the beginning of installation of synthetic turf, the installer shall inspect the sub-base. The installer will accept the sub-base in writing when the base contractor provides test results for compaction, planarity and permeability that are in compliance with the synthetic turf manufacturer's recommendations.
- D. Pre-Installation Conference: Conduct conference at project site at time to be determined by Architect. Review methods and procedures related to installation including, but not limited to, the following:
1. Inspect and discuss existing conditions and preparatory work performed under other contracts.

2. In addition to the Contractor and the installer, arrange for the attendance of installers affected by the Work, The Owner's representative, and the Architect.
- E. The Turf Contractor shall provide the necessary testing data to the owner that the finished field meets the required initial shock attenuation, as per ASTM F1936.
 1. Shall provide third party certification confirming minimum requirement of 9 lbs. tuft bind.
- F. The Owner reserves the right to reject and/ or refuse acceptance of any or all aspects of the synthetic turf installation if it fails to meet the requirements of this specification section.

1.5 DELIVERY, STORAGE, AND PROTECTION

- A. Deliver products to project site in wrapped condition.
- B. Store materials/ products in a safe and secure place, under cover and elevated abovegrade.
- C. Deliver and store components with labels intact and legible.
- D. Protect from damage during delivery, storage, handling and installation. Protect from damage by other trades.
- E. Inspect all delivered materials and products to ensure they are undamaged and in good condition.
- F. Comply with manufacturer's recommendations.

1.6 EXISTING CONDITIONS

- A. The contractor shall review and accept existing conditions prior to bidding. The contractor shall again review and accept existing conditions prior to beginning the installation.
- B. The contractor shall protect all existing conditions that are not part of the scope of work and repair any damage to existing conditions that occurs during this scope of work.

1.7 SUBDRAINAGE

- A. Provide subdrainage system to collect drain-through stormwater and conduct it to dispersal area(s) or manholes as indicated on the drawings

1.8 SUBGRADE VERIFICATION

- A. Prior to any permeable aggregate base course construction, check the subgrade for accuracy, uniform bearing strength and crown (slope) toward the subdrainage system as required on the drawings. Verify that all subdrains, utilities, etc. have been properly installed and shall fill and tamp any traces of utility trenches. Maintain all subgrades in a satisfactory condition until superimposed construction is placed. Do not place base on a frozen or muddy subgrade.

3.1 1.9 GRADE CONTROL

- A. Establish and maintain the required lines and grades. Provide crown or cross slope as indicated. Adjust the tops of utility/communication structures to be flush with proposed finish turf grades or as appropriate.
- B. Subgrade for aggregate base must be established by dual plane laser grading equipment; coordinate with EARTH MOVING section.

3.2 1.10 BASE COURSE THICKNESS

- A. Provide the thickness of the stone aggregate course as indicated on the drawings. The thickness indicated is the minimum at any point.

1.11 SEQUENCING AND SCHEDULING

- A. Coordinate the Work with installation of work of related trades as the Work proceeds.
- B. Sequence the Work in order to prevent deterioration of installed system.

1.12 WARRANTIES

- A. The Contractor shall provide a warranty to the Owner that covers defects in materials and workmanship of the turf for a minimum period of eight (8) years from the date of substantial completion. The turf manufacturer must verify that their representative has inspected the installation and that the work conforms to the manufacturer's requirements. The manufacturer's warranty shall include general wear and damage caused from UV degradation. The warranty shall specifically exclude vandalism, and acts of nature beyond the control of the Owner or the manufacturer. The warranty shall be fully third party insured; pre-paid for the entire 8 year term and be non-prorated. The Contractor shall provide a warranty to the Owner that covers defects in the installation workmanship, and further warrant that the installation was done in accordance with both the manufacturer's recommendations and any written directives of the manufacturer's representative. Prior to final payment for the synthetic turf, the Contractor shall submit to owner notification in writing that the field is officially added to the annual policy coverage, guaranteeing the warranty to the Owner. A rated carrier and must reflect the following values:
 - 1. Must provide full coverage for eight (8) years from the date of Substantial Completion.
 - 2. Must warrant materials and workmanship, including but not limited to, gravel base stability, drainage rates, seaming materials and adhesives.
 - 3. No maximum per claim coverage amount.
 - 4. Minimum of twenty-five-million dollar (\$25,000,000) annual aggregate, and a per incident limit of no less than \$1 million per claim. The third party insurer must have an AM Best rating of A++ or better.
 - 5. Must warrant that the finished and accepted playing field elevation shall not vary by more than 0.1' due to instability of the gravel foundation (unrelated to existing, pre- developed subgrade soil conditions) or drainage system and that the field drainage rates will remain at or above design capacity for the life of the warranty.
 - 6. Must cover full 100% replacement value of total square footage installed, minimum of \$7.00 per sq. ft. (in case of complete product failure, which will

include removal and disposal of the existing surface) The warranty shall include all necessary materials, labor, transportation costs, dumping fees, etc to complete any repairs under such warranty.

7. Must have a provision to either make a cash refund or repair or replace such portions of the installed materials that are no longer serviceable to maintain a serviceable and playable surface.
 8. Must be a warranty from a single source covering workmanship and all self-manufactured or procured materials of the turf, turf system, base, and drainage.
 9. Warrant that the yarn used to make the grass-like tufts will maintain its UV stability and tensile strength such that the strength of the fiber when measured in accordance with ASTM D-2256 will not decrease by more than 50% during the warranty period due to breakdown of UV stability.
 10. Policies that include self insurance or self retention clauses shall not be considered.
 11. Sample policy must be provided at time of bid to prove that policy is in force. A letter from an agent or a sample Certificate of Insurance will not be acceptable.
- B. The warranty coverage shall not place limits on the amount of the field's usage.
- C. The synthetic turf system must maintain a G-max of less than 120 for the life of the Warranty as per ASTM F1936. The manufacturer's warranty shall include annual G-Max Testing.
- D. Permeable Resilient Polypropylene Drainage Base
1. Sports field underlayment panels shall be warranted by the manufacturer against warping, cracking, shattering, splitting or deteriorating. They shall not displace turf, deform, buckle from heat or moisture, or form gaps in cold or dry conditions that can be seen through the turf, under normal and proper use. They shall be free from defects in material and workmanship for a period of twenty (20) years after date of installation.
 2. The Panels shall not compress by more than ten percent (10%) during the Warranty Period unless they are subjected to stress loads in excess of those that ordinarily occur during use for athletic performance [35 pounds per square inch].

1.13 MAINTENANCE SERVICE

- A. Contractor shall train the Owner's facility maintenance staff in the use of the turf manufacturer's recommended maintenance equipment.
- B. Manufacturer must provide maintenance guidelines and a maintenance video to the facility maintenance staff.

1.14 TESTING

- A. Turf Manufacturer shall be responsible to provide independent laboratory G-max testing (ASTM 355, 1936 method) at substantial completion, to verify that the shock attenuation properties of the field meet the requirements set forth in this specification.
 1. The field must maintain an ASTM F1936 G-max of less than 120 for the life of the Warranty.

2. In addition to testing at time of completion, the Turf Manufacturer shall be responsible for annual Gmax testing as described above at its own cost. If at anytime the G-max ranges reach unacceptable levels, it is the responsibility of the Turf Manufacturer (or its 3rd party warranty) to bring the field back into the required ranges at no cost to the Owner.
- B. Turf Manufacturer shall be responsible to provide independent laboratory Lead Content testing prior to substantial completion and final acceptance by Owner.
1. Two representative samples of fiber(s) and locations on the field shall be tested by the test methods below. The total lead content measured shall be less than 300 mg/ kg (ppm). Sample locations shall be chosen by the Owner.
 - a. The testing shall be conducted by an independent environmental laboratory accredited for heavy metal testing in solid and hazardous waste.
 - b. Prepare samples as outlined in EPA Method 3052 with the temperature modified from 180 +/- 5 deg C to 210 +/- 10 deg C.
 - c. Analyze prepared samples for lead using inductively coupled plasma- atomic emission spectrometry (AAS) as outlined in Test Method E 1613.
 - d. Report total lead content as mg/kg (ppm).
- C. Turf Manufacturer shall be responsible to provide independent drainage testing of installed field gravel base and turf carpet with infill prior to substantial completion and final acceptance by Owner. The combined tests shall prove installed artificial turf system's drainage capability shall allow water flow through the system at a rate of not less than 10 inches per hour.
1. ASTM test WK22081- Test Methods for Vertical Permeability of Synthetic Turf Sports Field Base Stone and System by Nonconfined Area Flood Test Method. This test does not require special equipment and can be done in the field to test the vertical permeability before the synthetic turf is installed and after installation of the base is complete. This method does not require the application of a head and more accurately mimics rainwater conditions..
 2. ASTM F1551 -Water Permeability of Synthetic Turf Systems and Permeable Bases. Test will provide permeability of synthetic turf carpet with infill.
 3. Provide written report of permeability of base, and carpet with infill over base. Report shall include inches per hour rate.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. The component materials of the synthetic turf system consist of:
1. A carpet made of dual filament polyethylene fibers (spinneret, extruded) tufted into a backing. All backing must meet the drainage requirements

below.

2. All proposed synthetic turf systems shall be a 50/50 blend of arched monofilament yarn, having a 230 to 300 micron thickness and a nominal filament width of 1.5mm inter-tufted with a 100 micron parallel fibrillated slit film yarn. Turf carpet shall have a minimum stitch (tufting) gauge of 1/4" and a maximum stitch gauge of 1/2". All fibers shall be polyethylene or co-polymer fiber tufted into a permeable backing system, and coated with a secondary backing of high-grade polyurethane.
3. All components and their installation method shall be designed and manufactured for use on outdoor athletic fields. The materials as hereinafter specified should be able to withstand full climatic exposure in all climates, be resistant to insect infestation, rot, fungus, mildew, ultraviolet light and heat degradation, and shall have the basic characteristics of flow-through drainage, allowing free movement of surface runoff through the synthetic turf fabric where such water may flow to the existing base and into the field drainage system.
4. The finished playing surface shall appear as mowed grass (except for the baseball infield, which shall appear as shorter, red-clay-colored grass blades) with no irregularities and shall afford excellent traction for conventional athletic shoes of all types. The finished surface shall resist abrasion and cutting from normal use. The pitcher's mound, batter's boxes, and basepaths shall include removable turf sections to allow for replacement and repair of worn or damaged sections.
5. Glue, thread, paint, seaming fabric and other materials may be used to install and mark the artificial turf. All adhesives used in bonding the system together shall be resistant to moisture, bacterial and fungus attacks, and resistant to ultraviolet rays at any location upon installation.
6. Field shall consist of a line package with the following four (4) sports:
 - a. Football
 - b. Soccer
 - c. Baseball
 - d. Softball

B. The installed artificial grass fabric system shall have the following specified properties: _

<u>Standard</u>	<u>Property</u>	<u>Specification</u>
ASTM D1577	Fiber Denier	>10000 nominal
ASTM D3218	Yarn Thickness	>100 microns (slit); >230 microns (mono)
ASTM D2256	Yarn Breaking Strength	>8 lbs. (slit); >25lbs (mono)
ASTM D5793	Stitch Gauge	min. 1/4"- max 1/2"
ASTM D418/D5848	Pile Height	2.25" min.
ASTM D5848	Pile Weight	min. 44 oz. / square
yard ASTM D5848	Primary Backing	min. 6 oz. / square yard
ASTM D5848	Secondary Backing	min. 20 oz. / square
yard ASTM D5848	Total Weight	min. 70 oz. / square
yard ASTM D1335	Tuft Bind (without infill)	min. 9 lbs.

ASTM D1682/D5034	Grab Tear (width)	200 lbs. force
ASTM D1682/D5034	Grab Tear (length)	200 lbs. force
ASTM F1015	Relative Abrasiveness Index	<25
ASTM D4491	Carpet Permeability	> <u>30 inches / hour</u>
ASTM F355/F1936	Impact Attenuation, Gmax	90 min. – 120 max. at installation; 90 min. – 120 max. over field life (including pad beneath)

- C. The Carpet shall consist of fibers tufted into a primary backing with a secondary coating.
1. Synthetic turf shall be loose-laid across the field, stretched, and attached to the perimeter edge detail. Synthetic turf shall be of sufficient length to permit full cross-field installation. No head or cross seams will be allowed except as needed for inlaid fabric striping or to accommodate programmed cut-outs.
 2. All seams shall be flat, tight, and permanent with no separation or fraying. Edges of all panels must be cut and discarded prior to being joined together. Inlaid markings shall be adhered to seaming tape with a high strength polyurethane adhesive applied per the Synthetic Turf Manufacturer's standard procedures for outdoor applications. All main fabric seams shall be transverse to the field direction (i.e. run perpendicularly across the field).
 3. Porous Backing:
 - a. Primary backing shall be double-layered polypropylene fabric treated with UV inhibitors.
 - b. The secondary backing shall consist of an application of porous, heat- activated urethane to permanently lock the fiber tufts in place.

Perforated Backing:

 - a. The primary backing shall consist of two layers of woven fabric and one layer of non-woven fabric.
 - b. The secondary backing of high-grade polyurethane shall be applied to the primary backing at a minimum of 20 oz./yd. Secondary backing adds resistance to water degradation and strengthens grip on fibers.
 - c. The entire backing shall be coated with holes perforated throughout the backing at a minimum 3" interval to allow for drainage. Partially coated materials shall not be acceptable.
 - d. Hole spacing must allow for water drainage of a minimum of 30" an hour. The 30" per hour must account for infill blockage. Turf manufacturer must submit product data for hole spacing and hole size for rate of permeability.
- D. The Infill materials shall be as approved by the Manufacturer and as per the following specifications: The Infill shall consist of a resilient granular system, comprised of selected/graded dust-free silica sand or mineral aggregate and rubber granules. The infill may be a homogeneous mixture of sand and rubber or installed as a layered system per the manufacturer. The silica sand component of the infill shall represent 50% of the total infill, by weight. Total infill amount shall be approx. 10.0 lbs. per square foot but not be less than 9.0 lbs. per square foot (depending on manufacturer stitch gauge) to achieve a +/- 2.000 inch infill depth.

1. Rubber: The rubber shall be dust and contaminant free. Recycled tires shall not be used. The clean, uniformly sized particles shall be consistent in shape and particle size distribution.
2. Sand: Silica Sand shall be whole and not conglomerated or grounded. The shape of the sand particles shall be rounded or sub-angular so as to minimize abrasion to field users and synthetic turf fibers. Size of sand shall be per manufacturer based on selected infill and based on performance of sports specified herein.
3. The particles shall resist abrasion in high traffic and excessive wear applications and provide stability to artificial sports turf applications.
4. The particles shall be structurally pure and consistently uniform in size distribution for predictable performance.
5. **ADD ALTERNATE BID ITEM: Provide natural infill in lieu of rubber/sand. This shall include any modifications necessary to the turf assembly necessary to accommodate the alternative infill material, such as underlayment or other components. Specific infill alternatives by manufacturer are as follows:**
 - a. **Sprinturf – Greenplay fill, or other infill recommended by manufacturer.**
 - b. **A-Turf - Ecore A-R, or other infill recommended by manufacturer.**
 - c. **AstroTurf – Brockfill/Supernatural, or other infill recommended by manufacturer.**
 - d. **Shaw Sports Turf - Natural Play, or other infill recommended by manufacturer.**
 - e. **Field Turf - Pure Select Olive, or other infill recommended by manufacturer.**
 - f. **Motz – Envirofill, or other infill recommended by manufacturer.**
 - g. **Equal, to be approved by Philadelphia Parks and Recreation**

E. Permeable Polypropylene Drainage Base:

1. Athletic field synthetic underlayment, a molded polypropylene base composite material designed specifically for use with synthetic infill turf.
2. Underlayment shall ensure safety of the playing surface (impact attenuation/shoe traction) and high capacity subsurface drainage of the installed playing field.
3. Shall be composed of expanded Polypropylene edge interlocking panels with molded Impact-absorbing pistons and bi-directional channel drainage system
4. Description: The specified material must have both impact absorption and drainage properties that meet the following performance requirements.

Standard	Property	Specification
FIFA 1 and 2 Star		Meets requirements with approved synthetic infilled turf
	Density	3.63 lbs. / cubic ft. (58.2 grams / liter)
EN12616	Vertical drainage	200" per hour
	Surface contact	50% minimum with synthetic turf

		backing
ISO 8295	Friction coefficient	movement of artificial turf over 50mm distance 8.92N maximum force
ASTM D4716	Lateral drainage	0.00583 m ² /sec @ 0.5% slope
ISO 4897	Thermal stability	not to exceed 3mm per 30 degree C change
ISO 8301, EN 12664/7	Thermal resistance (R Value)	minimum 0.6
ISO 1798	Tensile strength	min 700 Kpa or 110 psi
ASTM F355	G-Max; system test under infill turf	120G maximum average
EN 14809	Shock Absorption	60-70%
EN14809	Vertical Deformation	<4mm
ISO 1856C	Compression set - 25% strain, 22hrs, 23°C after 24 hrs.	9% (0.083 ")
	Repeated impact compression resistance	7.45kg/cm ² or 106psi, repeated load, 10,000 cycles system test with infill turf; not to exceed 3%
ASTM G22-76/G21-96	Bacteria and Fungi resistance	Pass
ESSM 105d/1997	Environmental testing-ground water protection	Pass
ASTM F925	Chemical Resistance to the following: Gasoline, Brake Fluid, Chlorine, Underbody coating, Transmission Fluid, Motor Oil, Zinc Chloride, Tar and Oil Solvents, Windshield Washer Fluid, Kerosene, Ethylene and Propylene Glycols	no change to material

5. Material shall be 100% recyclable; recycling for energy not acceptable.
6. Material shall be manufactured in an ISO-9000 certified facility.

F. Aggregate Base Course

1. To guarantee structural stability it is important that both gradations meet the following criteria:
 - 100% Fragmentation
 - $D_{60}/D_{10} > 5$
 - $1 < D_{30}^2/D_{10}/D_{60} < 3$
2. To guarantee separation between finishing stone and base stone, it is important that the gradations meet the following criteria:
 - $D_{85 \text{ FINISHING COURSE}} / D_{15 \text{ BASE COURSE}} > 2$
 - $3 < D_{50 \text{ BASE COURSE}} / D_{50 \text{ FINISHING COURSE}} < 6$
3. To guarantee proper drainage both stones should meet the following criteria when saturated and compacted to 95% Proctor:
 - Permeability > 10 in/hr (7×10^{-3} cm/sec)
 - Porosity > 25%
 - “Dx” is the size of the sieve (in mm) that lets pass x% of the stone. For example: D60 is the size of the sieve that lets 60% of the stone pass. These sizes, for calculation purposes, may be obtained by interpolation on a semi-log graph of the sieve analysis.
4. Aggregate Base shall be AASHTO #57 Stone to be used.
5. Leveling Layer (AKA D85 or Finish Stone):
 - a. Product resulting from the artificial crushing of rocks, boulders or large cobblestones, substantially all faces of which have resulted from the crushing operation. Material shall consist of sound, tough, durable, angular stones, free from soft, thin, elongated, laminated, friable, micaceous or disintegrated pieces, limestone, marble, mud, dirt, organic matter, or other deleterious material. The presence of soft, thin, elongated, laminated, friable, micaceous or disintegrated pieces, feldspar, limestone, marble, mud, dirt, organic matter, or other deleterious material will be cause for rejection at Engineer’s discretion.
 - b. Testing and evaluation of material by the testing laboratory shall evaluate material composition for the presents of feldspar or micaceous materials and note same on testing report. Material may be rejected due to the presence of feldspar or micaceous materials.
 - c. Test for Resistance to Abrasion, ASTM C131. Materials shall show a loss on abrasion of not more than 20%. C. Soundness, ASTM C88. Coarse aggregate shall not have a loss of more than 15% at the end of five cycles.

6. Stone Gradation Specifications:

AVG %
PASSING

<u>Sieve</u> <u>s</u>	<u>#57 Base Layer</u>	<u>Leveling Layer</u> (AKA Finish Stone or D85 Stone)
1½" or 38mm	100	-
1" or 25mm	95 +/-5	-
¾" or 19mm	-	-
½" or 12.5mm	43 +/-17	100
3/8" or 9.5mm	-	85-100
¼" or 6.3mm		75-95
US #4 or 4.76mm	Max. 7	60-85
US #8 or 2.38mm	Max. 3	35-70
US #16 or 1.19mm	-	10-45
US #30 or .595mm	-	5-15
US # 40 or .420mm	-	0-10
US #100 or .149mm	-	0-5
US #200 or .074mm	-	0-2

2.2 PERFORATED UNDERDRAIN

A. Basis-of-Design Product: Subject to compliance with requirements, provide 4" horizontal perforated geotextile-wrapped underdrain system.

B. Product Requirements:

1. The underdrain system shall be of flexible, prefabricated, rounded, perforated composite product. Nominal Size: 4 inches high by approximately 3/8 inches thick. The underdrain system shall be made of a high-density polyethylene. The underdrain piping shall be constructed using corrugated pipes that define and provide the flow channels and structural integrity of the drain. The geotextile shall function only as a filter. The collection system pipes shall conform to the following physical property requirements;

Thickness, inches	ASTM D-1777	0.8
Flow Rate, gpm/ft	ASTM D-4716	30
Compressive Strength, psf	ASTM D-1621 (modified sand method)	6000

2. The collection system shall be wrapped with a non-woven geotextile and shall be a non-woven needle-punched construction and consist of long-chain polymeric fibers composed of polypropylene, polyethylene or polyamide. The fibers shall be oriented

into a multi-directional stable network whereby they retain their positions relative with each other and allow the passage of water as specified. The fabric shall be free of any chemical treatment or coating, which reduces permeability and shall be inert to chemicals commonly found in soil. The geotextile shall conform to the following minimum average roll values

Weight	ASTM D-3776	4.0
Tensile Strength	ASTM D-4632	120
Elongation %	ASTM D-4632	50
Puncture, lb	ASTM D-751	50
Mullen Burst, psi	ASTM D-3786	225
Trapezoidal Tear, lb	ASTM D-4533	42
Coefficient of Permeability	ASTM D-4491	.1 cm/sec
Flow Rate, gpm/ft ²	ASTM D-4491	95
Permittivity, 1/sec	ASTM D-4491	1.8
Apparent Opening Size	ASTM D-4751	70 Max. US Std Sieve Opening
Seam Strength, lb/ft	ASTM D-4595	100
Fungus	ASTM G-21	No growth
UV Resistance after 500 Hrs	ASTM-D4355	70% minimum

4. The fittings used with the collection system shall be of a "snap together" design. In no case shall any product be joined without the use of the manufacturer's connector designed specifically for the purpose.

2.3 COLLECTOR DRAIN PIPE SYSTEM

A. The Contractor shall provide the Owner the following materials:

1. AASHTO M 252, Type CP; smooth interior, corrugated exterior double-wall, for coupled joints.
2. Couplings: Manufacturer's standard, band type.
3. Filter Fabric: Nonwoven, needle-punched Geotextile.

2.4 ADDITIONAL MATERIAL

A. The Contractor shall provide the Owner the following materials:

1. Turf fabric two hundred square feet (200) to be used for emergency repairs of turf. Owner to set forth min size requirements during submittal phase.
2. All usable remnants of new material shall become the property of the Owner and may satisfy the 200 square feet requirement.
3. In-fill material as required to fill two hundred square feet (200). This material may not be used by the Contractor as top dressing as required to maintain depth and Gmax values during the warranty period.

2.5 FIELD MAINTENANCE EQUIPMENT

A. The following field maintenance equipment shall be provided to the Owner, in a fully operational and assembled state, with proper manuals, instruction to the Owner's maintenance staff prior to final acceptance of the project.

1. Four-wheel utility vehicle, equal to John Deere TX 4x2 or equivalent.

<https://www.deere.com/en/gator-utility-vehicles/traditional-gators/tx-4x2-utility-vehicle/>

2. Snow plow compatible with and for attachment to the Four-Wheel Utility Vehicle. Equal to the Meyer Utility Vehicle 6' Drive Pro Angling Snow Plow with Rec Hitch:

<https://www.meyerproducts.com/snow-plows/contractor-off-road-plows/utility-vehicle-snow-plow>

3. Field sweeper device for use on an infill synthetic turf system, to be attached to the Four-Wheel Utility Vehicle. Equal to the Greens Groomer LitterKat Synthetic Turf Sweeper:

<http://www.greensgroomer.com/LitterKat.html>

PART 3 - EXECUTION

3.3 GENERAL

- A. The installation shall be performed in full compliance with approved shop drawings.
- B. Only trained technicians, skilled in the installation of athletic caliber synthetic turf systems working under the direct supervision of the approved installer/manufacturer supervisors, shall undertake any cutting, sewing, gluing, shearing, topdressing or brushing operations.
- C. The designated Supervisory personnel on the project must be certified, in writing by the turf Manufacturer, as competent in the installation of this material, including sewing seams and proper installation of the Infill mixture.
- D. Manufacturer of Pad shall provide supervision for pad installation. Pad Manufacturer must approve pad installation prior to installation of synthetic turf carpet.

3.4 SUBGRADE

- A. Subgrade for installation of permeable aggregate base course and synthetic turf as required in the Earthwork section of these specifications and as set by the approved drawings.
- B. Proof roll subgrade in accordance with the Earthwork specifications and correct unacceptable subgrade as specified.
- C. Examine surfaces and areas for suitable conditions where subdrainage systems are to be installed.
- D. Locate and mark existing utilities, underground structures, and aboveground obstructions before beginning installation and avoid disruption and damage of services

3.5 INSTALLATION OF PERMEABLE LINER

- A. Verify that surface elevations of finished subgrade conform to elevations shown on Drawings prior to underdrain system construction and that the subgrade surface is uniform and free of depressions, voids, and irregularities. Install permeable liner in accordance with liner manufacturer's written recommendations.
1. Overlap joints a minimum of eight inches. Overlap all laps in direction the stone aggregate is to be spread.
 2. Securely bond joints in accordance with the liner manufacturer's recommendations. Joint bonding may be delayed until aggregate placement is completed to minimize joint stress.
 3. Place a suitable amount of ballast on liner to prevent movement by wind. Form ballast to not damage liner.
 4. Do not permit direct loading on the fabric by traffic.
 5. Repair punctured or torn fabric by overlapping additional fabric and jointing in accordance with manufacturer's recommendations.
 6. Completely cover collector drain trench with liner.

3.6 PERMEABLE AGGREGATE BASE COURSE

- A. Moisture Content: Provide aggregate that contains 3.5% to 4.0% moisture content to ensure that fines do not migrate and to facilitate proper compaction. Ensure that aggregate leaving the source plant meets this requirement and is required to apply water to aggregate on site to attain and maintain this minimum moisture content.
- B. Placement: Prior to aggregate placement, remove any excess or contaminated backfill from the drainage trenches or subgrade. Provide a subgrade surface free of standing water prior to aggregate placement.
1. Place the aggregate in a minimum two (2) lifts, each three (3") in compacted depth.
 2. Spread each layer uniformly with equipment that will not cause perceptible separation in gradation (segregation of the aggregates), preferably by a self-propelled paving machine.
 3. Should a separation of the materials or particles occur during any stage of the spreading or stockpiling, immediately remove and dispose of segregated material and correct or change handling procedures to prevent any further separation.
 4. Utilize a laser plane control system for the grading of the permeable aggregate to ensure accuracy in the grade tolerances.
- C. Compaction
1. Compact each layer to a minimum density of not less than 95% of maximum dry density as determined by ASTM 0698 and measured using a nuclear method.
 2. Proof roll and mark "soft spots" for additional compaction. Use static tandem drum-type roller of not less than five (5) tons weight.
- D. Surface Tolerance
1. Do not deviate from the tolerance of the finished surface (tolerance-to-grade) from designated compacted grade. Do not deviate more than 1/8" in 10' (any direction) when placed under a 10 foot long straight edge. This tolerance is required over the entire field.

2. Mark areas that deviate with spray paint and correct with 1/4" limestone or similar chips and rolled tight to achieve density. Perform remedial actions by hand.

3.7 SUBDRAIN INSTALLATION

- A. Inspect delivered subdrain piping. Do not use damaged subdrains in the work.
- B. Install as detailed on drawing and per manufacturer's written instructions.
- C. All ends/joints of any open geotextile fabric must be completely taped closed with 2" wide (minimum) duct tape or the underdrain manufacturer's PVC tape to prevent any soil fines from entering the drain system. Tape all joints at:
 1. Ends of perforated drain.
 2. End of drain at collector/header pipe.
 3. End of drain at fittings.
 4. Any tear, rip or damage to the geotextile fabric.
 5. Any additional openings of the geotextile fabric

3.8 COLLECTION DRAIN INSTALLATION

- A. Install collector drain pipe where shown and as detailed on the drawings. Provide watertight connections at existing inlets/manholes/cleanouts and/or piping.

3.9 TESTING OF INSTALLED AGGREGATE DRAINAGE LAYER

- A. The permeability of the installed aggregate must be field tested by a third party geotechnical service/testing agency prior to installation of the turf system. Test samples must be taken at one sample minimum per 10,000 SF of surface area. Final in-place aggregate must have a percolation rate of not less than 20" per hour.
- B. All test results must be delivered in writing to the Owner, Contractor and Owner's Representative/Project Engineer. If any areas do not meet the minimum infiltration requirements, the Contractor is responsible for corrective action to improve the infiltration rate including the restoring the stone base to required grade, cross-section and density.
- C. When the Contractor has confirmed that the aggregate base is in compliance with all requirements (planarity and elevation verified by a licensed Surveyor and compaction, gradient, and permeability verified by the specified tests) the Contractor to notify the Owner's Representative/Project Engineer to schedule a final inspection by the Synthetic Turf System Installer. During this inspection, the Contractor shall make available an orbital laser system for checking grades. Any deficiencies uncovered during this inspection must be remedied to the satisfaction of the Synthetic Turf System Installer before the aggregate base will be considered acceptable.

3.10 FIELD QUALITY CONTROL

- A. Tests and Inspections:
 1. Test drain piping and entire drainage system with water to ensure free flow before backfilling.
 2. Remove obstructions, replace damaged components, and repeat test until results are satisfactory.

- B. Collector drain piping will be considered defective if it does not pass tests and inspections

3.11 EXAMINATION

- A. Verify that all sub-base, drainage and leveling is complete prior to installation of synthetic turf.
- B. The surface to receive the synthetic turf must be inspected by the Installer, and prior to the beginning of installation, the Installer must accept the sub-base in writing. The acceptance will depend on the base contractor providing the installer with test results indicating that compaction, planarity and permeability are in compliance with the synthetic turf manufacturer's specifications. The surface must be perfectly clean as installation commences and shall be maintained in that condition throughout the process. Acceptance shall be for tolerance to grade (1/4 inch in 10 feet in all directions).
- C. The compaction of the aggregate base shall be 95%, according to the Modified Proctor procedure (ASTM D1557), and the surface tolerance shall not exceed 0-1/4 inch over 10 feet and 1/4" from design grade. All must be verified by means of ASTM testing and surveys to the satisfaction of the turf contractor and Owner.

3.12 INSTALLATION OF TURF SYSTEM

- A. Install in accordance with Manufacturer's instructions. The Turf Contractor shall strictly adhere to the installation procedures outlined under this section. Any variance from these requirements must be accepted, in writing, by the onsite representative of the Manufacturer/Installer, and submitted to the Engineer, Architect, and Owner, verifying that the changes do not in any way affect the warranty or performance of the system. 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. It is suggested that a 2.5 ton static roller be placed on site and made available to repair and properly compact any disturbed areas of the aggregate base.
- C. The rolls of turf shall be rolled out a minimum of six hours (4 hours if mostly sunny) prior to starting seaming procedures to allow for carpet to expand and relax.
 - A. All visible wrinkles shall be stretch out before seaming. If wrinkles cannot be stretched properly, material shall either be removed or allowed to sit long enough to be stretched.
 - B. Seams shall be flat, tight and permanent with no separation or fraying.
- D. The full width rolls shall be laid out across the field. Turf shall be of sufficient length to permit full cross-field installation (from end to end or side to side). No "head" or cross seams will be allowed. Utilizing standard state of the art sewing procedures, each roll shall be attached to the next.
- E. This is basically a sewn installation. Gluing of fabric rolls shall not be acceptable.

Minimal gluing will be permitted and only to repair problem areas, corner completions, and install logos as required by the specifications. All seams shall be sewn using double bagger stitches and polyester thread. Seams shall be flat, tight, and permanent with no separation or fraying.

- F. Infill materials shall be applied in thin lifts. The turf shall be brushed as the mixture is applied. The mix shall be uniform and even in thickness to assure proper playing characteristics. The Infill materials shall be installed to fill the voids between the fibers and allow the fibers to remain vertical and non-directional.
- G. Synthetic turf shall be attached to the perimeter edge, both glued and nailed, in accordance with the Manufacturer's standard procedures and construction details provided in the Bid Documents.

3.13 SYNTHETIC BASE

- A. Job Conditions:
 - a. Base Acceptance: The Owner and Contractor must jointly approve the base before synthetic drainage underlayment can begin.
 - b. Do not install surface in temperatures above 90 degrees Fahrenheit.
- B. Product Requirements:
 - a. Obtain and install the product in accordance with written installation instructions from the manufacturer.
 - b. Use only new materials manufactured and shipped for the specific installation. No used, recycled or refurbished materials are to be installed.
 - c. Product to be shipped as flat panels on prepackaged pallets. Pallets to be wrapped with heavy-duty barrier for protection from moisture and UV exposure. Do not stack pallets.
- C. Installation:
 - a. Place surface directly onto geotextiles.
 - b. Install panels perpendicular to the sidelines, in accordance with manufacturer's instructions. When trimming for the edges of the field, panels must be within 3mm (1/8 inch) of the curb in height and distance.
 - c. Panels shall be fitted together as tightly as possible. Panels are to be overlapped and fit together against the four soft protrusions molded along the overlapping edge of the panels. Panels may have gaps not greater than 3mm (0.125 inch) maximum.
 - d. Seams should be mechanically fastened by hand without use of additional materials, glue, fasteners or secondary processes and equipment.
- D. Turf carpet installation shall begin within 7 days after underlayment installation to avoid prolonged exposure to sun.

3.14 UTILITY COVERS/LIDS

- A. Cover all manhole covers/lids and/or any additional utility boxes within the area of the synthetic turf with turf system and infill.

3.15 CLEAN UP AND PROTECTION OF THE SITE

- A. Protect installed turf from subsequent construction operations.
- B. Contractor shall provide the labor, supplies, and equipment as necessary for final cleaning of surfaces and installed items.
- C. All usable remnants of new material shall become the property of the Owner.
- D. The Contractor shall keep the area clean throughout the project and clear of debris.
- E. Surfaces, recesses, enclosures, etc., shall be cleaned as necessary to leave the work area in a clean, immaculate condition ready for immediate occupancy and use by the Owner.
- F. Contractor shall be fully responsible for any damages outside the Limits of Disturbance.

END OF SECTION 321813