

MOUNT GREYLOCK REGIONAL SCHOOL ATHLETIC IMPROVEMENT PROJECT

100% BID DOCUMENTS

Williamstown, MA

Addendum #1

August 30, 2019

The attention of Bidders submitting proposals for Mount Greylock Regional School Athletic Improvement Project Installation Bid Documents is called to the following changes to the Bidding Contract Documents as prepared by Perkins Eastman, Traverse Landscape Architects, LLC and Doucette Engineering. The items set forth therein below, whether of revision, omission, addition, substitution or clarification are all to be included as changes to Information to Bidders, the Conditions of the Contract, Specifications and Drawings of the Contract.

The number of this Addendum (Number 1) must be entered in the appropriate spaces provided on the Bid Form.

ATTACHMENTS:

- ATT-001: Replacement Specification 26 00 00 Electrical Specification
ATT-002: Replacement Specification 32 92 70 Synthetic Turf System with Pad

CLARIFICATIONS:

- CL-001 A non-mandatory pre-bid conference will be held on **Tuesday, September 3rd, 2019 at 10:00am** local time at the Project location. Interested parties are to meet at the site, main entrance to the school for a walk through at the Mount Greylock Regional High School located at 1781 Cold Spring Road, Williamstown, MA 01267.

CLARIFICATIONS:

- SP-001 Replace in its entirety Specification 26 00 00 Electrical Specification and Replace with Specification 26 00 00 Electrical Specification attached to this addendum.

**SECTION 26 00 00
ELECTRICAL**

PART 1 – GENERAL

1.01 GENERAL PROVISIONS

- A. Applicable provisions of “General Conditions” govern work under this section.
- B. The Electrical Contractor shall review all other sections of these Specifications for requirements therein affecting the work of this Section.
- C. The Electrical Contractor shall conform to all sections of these Specifications and Drawings.
- D. Contractor’s duties for work specified below shall include compliance with all Codes, Ordinances, Rules, Regulations, Orders and all other requirements of Authorities, which bear on performance of work.
- E. The purpose of these specifications is to define the performance and design standards for the Multipurpose Field at the Mount Greylock Regional High School. The manufacturer/contractor shall supply LED lighting equipment to meet or exceed the standards set forth in these specifications.

1.02 SCOPE OF WORK

- A. Furnish all labor, supervision, permits, certificates, materials, equipment, apparatus, accessories, supplies, tools, transportation and services necessary for and incidental to, all electrical work as shown on the Drawings and/or specified hereinafter to the full completion of installation and operation of the electrical system.
- B. The principal items of work for the are as follows;
 - 1. New distribution circuit breaker installed in the main switchboard
 - 2. New Underground feeder and conduit
 - 3. New Emon / Dmon sub-meter
 - 4. Conduit and wire for the various field lighting fixtures as indicated on the drawings
 - 5. Grounding
 - 6. Distribution panel
 - 7. Dry Type Transformer
 - 8. Lighting fixtures, poles, LED arrays and drivers
 - 9. Lighting controls and Lighting Control Panel
 - 10. Safety switches
 - 11. Feeders to panels and equipment
 - 12. Branch circuit wiring
 - 13. Outlet boxes, receptacles, etc.
 - 14. Field Power & Communication Boxes
 - 15. Exterior Enclosure
 - 16. Hand holes
 - 17. Fire Stopping
 - 18. Coring
 - 19. All other systems, equipment and work hereinafter specified and/or shown on the Contract Drawings.
- C. It is the intent of the Specifications and the accompanying Drawings that the systems shall be furnished and installed complete. The Electrical Contractor shall furnish and install all conduit, wire, boxes, equipment, devices and controls needed and usually furnished in connection with such work, whether specifically mentioned or not.
- D. This Contractor shall refer to the Civil Drawings and all other Drawings associated with the project, prior to the installation of the electrical outlets, conduit and equipment to determine the exact location of all handholes, poles bases conduits, etc...

1.03 WORK NOT INCLUDED

- A. The following items of labor and material incidental and/or related to the installation of the electrical work will be provided and/or installed under other sections of the Specification.
 - 1. All cutting, patching and furring.
 - 2. Painting of all equipment and material other than factory finished.
 - 3. Flashing

4. Excavation and backfill.
5. Concrete work.

1.04 DEFINITIONS

- A. The "Electrical Contractor" specifically means, the Contractor working under this section for the specifications.
- B. "Furnish and install" or "provide" means to supply, erect, install and connect up complete, in readiness for regular operation, the particular work referred to unless otherwise specified.
- C. "Piping" includes, in addition to pipe, all fittings, boxes, hangers and other accessories relating to such piping.
- D. "Concealed" means hidden from sight, in chases, furred spaces, shafts, hung ceilings and embedded in construction.
- E. "Exposed" means visible in sight, not installed "concealed" as defined above.
- F. "Approved Equal" means any equipment or material which is equal in quality, durability, appearance, strength, design and performance to the equipment or material specified and which will function adequately in accordance with the general design and is approved by the engineer.

1.05 CODES AND STANDARDS

- A. Unless otherwise specified or indicated, materials and workmanship shall conform to the latest edition of the following Standards, Codes, specifications, Requirements and Regulations.
 1. National Electrical Code
 2. State Electrical Code
 3. National Electrical Contractors Association.
 4. National Electrical Manufacturer's Association
 5. Energy Conservation Code
 6. Underwriters' Laboratories, Inc.
 7. Local Wiring Inspector
 8. All other State and Local Codes and/or Authorities having jurisdiction, including any and all other paragraphs of this Specification.

1.06 PERMITS AND FEES

- A. The Electrical Contractor shall secure and pay for all required permits and fess.
- B. The Electrical Contractor shall carry in his bid price and pay all costs incurred for, standard and special tests to be performed in conjunction with this Contract that are necessary for and incidental to, the accomplishment of his work and the use of work when completed.
- C. The Electrical Contractor shall, after completion, furnish to the General Contractor a Certificate of Final Inspection and Approval from the Local Electrical Inspection Department.

1.07 MATERIALS AND WORKMANSHIP

- A. Materials and workmanship shall be the best of their respective kinds and in full accordance with the most modern construction methods.
- B. Electrical materials and equipment of types for which there are Underwriters' Laboratories standard requirements, listings or labels, shall conform to their requirements and be so labeled.

1.08 TESTS

- A. The right is reserved to conduct acceptance tests of all equipment, wiring or any other work furnished under these Drawings and/or Specifications to determine the fulfillment of specific requirements and/or design.
- B. The Electrical Contractor shall conduct all such tests in the presence of authorized representatives of the Owner and at such times that the Owner may designate.
- C. The Electrical Contractor shall perform all tests, supply all instrumentation, personnel and make all adjustments of equipment and wiring as may be necessary. The Electrical Contractor in the presence of the Owner's representative shall take insulation resistance reading of all equipment and circuits. Megger readings of less resistance than the recommended minimum as called for by the National Electric Code shall be required or conductors shall be replaced by this Contractor at no cost to the Owner.

1.09 PORTABLE OR DETACHABLE PARTS

- A. The Electrical Contractor shall retain in his possession and shall be responsible for, all portable and/or detachable parts and portions of the installation, including fuses, keys, locks, adapters, blocking clips, inserts, lamp instruction, drawings and all other devices or materials that are relative to and necessary for the proper operation and maintenance of the electrical system until final completion of his work.
- B. The Electrical Contractor shall replace all stolen, lost or damaged items relative to the installation and operation of the electrical system at his own expense before the building is accepted by the Owner.

1.10 PROTECTION AND CLEANING OF EQUIPMENT

- A. All electrical equipment, upon receipt, shall be adequately stored and protected from damage.
- B. After inspection, all electrical equipment shall be protected to prevent damage during the construction period. Openings in all conduits, raceways, fittings and boxes shall be closed to prevent entrance of foreign materials.
- C. Before completion of work and before final inspection, all damaged and/or defective equipment and material shall be replaced and all exposed surfaces of electrical equipment shall be clean.

1.11 DRAWINGS AND SPECIFICATIONS

- A. The Drawings and these Specifications are complimentary to each other and any labor or material called for by either, whether or not by both, necessary for the successful operation of any of the particular types of equipment furnished under this Contract, shall be furnished and installed.
- B. Before installing any of the electrical work, see that it does not interfere with the clearances required for existing finished columns, pilasters, partitions, or walls. Installed work, which interferes with other trades, shall be changed as directed by the Owner's representatives. All costs incidental to such changes shall be paid by the Electrical Contractor.

1.12 OBTAINING INFORMATION

- A. Obtain detailed information from the manufacturers of apparatus, which he is to furnish and install as to the proper method of installing and connecting same. Obtain all required information from the Owner's representative and other Subcontractors necessary to facilitate and complete the electrical work. Check all other Contract Drawings and all other sections of Contract Specifications for electrical equipment requiring connections and electrical characteristics of equipment should they differ from the Electrical Drawings.

1.13 SAFETY PRECAUTIONS

- A. The Electrical Contractor shall furnish, place and maintain power guards and other necessary construction, required for the prevention of accidents to secure safety of life and/or property.

1.14 REMOVAL OF RUBBISH

- A. After completion of the work, the Electrical Contractor shall remove all waste, rubbish and other materials left as a result of his operations and leave the premises in clean condition.
- B. In addition to the cleaning up required in the Special Provisions, the Electrical Contractor shall, at the completion of the work, clean, polish, and/or wash all exposed items or materials, equipment and fixtures in this Contact, so as to leave such items bright and clean.
- C. The Electrical Contractor shall repaint any painted metal surfaces, which have been scratched, dented, or marred.

1.15 COORDINATION OF TRADES

- A. The Electrical Contractor shall give full cooperation to other trades and shall furnish (in writing, with copies to Engineers) any information necessary to permit the work of all trades to be installed satisfactorily and with least possible interference or delay.
- B. Where the work of the Electrical Contractor will be installed in close proximity to work of other trades or where there is evidence that this Contractor will interfere with the work of other trades, he shall assist in working out space conditions to make a satisfactory adjustment. If so directed by the Designer, the Contractor shall prepare composite working Drawings and sections at a suitable scale not less than $\frac{1}{4}''=1'-0''$, clearly showing how his work is to be installed in relation to the work to correct the condition without extra charge. All cutting and patching, excavation and backfill shall be done by the General Contractor. The Contractor shall inform the General Contractor well in advance as to his requirements.
- C. The Electrical Contractor shall be responsible for phasing the electrical installation in accordance with the General Contractor and the construction schedule.

1.16 VISITING THE SITE

- A. The Electrical Contractor shall be required to visit each site and examine the existing conditions, which may affect his work under this Contract. Failure to do so shall be his responsibility and no claims for extra compensation or extension of time shall be allowed because of lack of compliance herewith.
- B. The Electrical contractor shall familiarize himself with each portion of the new work and how the phasing may affect the electrical installation.
- C. The electrical contractor shall coordinate with the Director of Operations to gain access to the existing electric room within the school to examine the existing switchgear and familiarize him/herself with the intent of the drawings. The intent to provide power for the field lighting by installing a new 400-amp General Electric Spectra Series circuit breaker and run a new feeder to a new Panel within the electrical enclosure near the field indicated on the drawings. Coring of the existing exterior concrete wall will need to take place in order to exit the building. The feeder length is approximately 800' long. The length includes a portion run down a common corridor from the main electric room before it leaves the building. Once the new feeder leaves the building it will run underground and turn up into the new electrical enclosure and terminate within the new 277/480 volt panel as indicated on the drawings.

1.17 FIELD MEASUREMENTS

- A. The Electrical Contractor shall verify in the field all existing condition, distribution equipment, measurements, etc... necessary for his work and shall assume responsibility for their accuracy.

1.18 GUARANTEE

- A. The Electrical Contractor guarantees by his acceptance of the Contract that all work installed will be free from any and all defects in workmanship and/or materials during period of two (2) years from date of Certificates of Completion and acceptance of work. If any such defects in workmanship or material appear, he will, without cost to the Owner, remedy such defects within a reasonable time.

1.19 SHOP DRAWINGS AND SAMPLES

- A. Before ordering material shipped to the job, the Electrical Contractor shall submit to the General Contractor for approval manufacturers references and bulletins, Shop Drawings, in electronic format, giving all details, dimensions, etc. of the following;
 - 1. New distribution circuit breaker
 - 2. Emon / Dmon sub-meter
 - 3. Panelboards
 - 4. Dry Type Transformer
 - 5. All lighting fixtures, poles, cross-arms, brackets and lamps for the field lighting fixtures
 - 6. Lighting Controllers and contactor cabinets
 - 7. Exterior enclosures
 - 8. Disconnect switches
 - 9. Cable and wire (each type)
 - 10. Conduit (each type)
 - 11. Electrical commodities
 - 12. Wiring Devices (each type)
 - 13. Manholes/Hand holes
 - 14. Field Power & Communication Boxes
- B. Should the Electrical Contractor choose to substitute for the specified equipment, the Shop drawing submittals must include catalog cuts of originally specified equipment. Shop Drawings submitted for approval without all of the required information will not be considered for approval.

1.20 SUPERINTENDENCE OF WORK

- A. The Electrical Contractor shall give his personal superintendence to the work and shall retain at the job site during the period of construction, a competent Foreman, satisfactory to the Contractor, who shall be in full charge of the work under this section.

1.21 STORAGE OF MATERIALS

- A. The Electrical Contractor shall store his material and equipment before installation only where designated by the General Contractor. He shall be responsible for all his property stored on the premises and shall hold the General Contractor free from liability for loss by theft or carelessness of employees of the General contractor or of other Sub-Contractors. The Electrical Contractor shall take particular care to protect any finished work for injury or defacement and must remedy, at his expense, any injury caused thereto by his operations.

1.22 RECORD DRAWINGS

- A. The Electrical Contractor shall maintain at the site a set of black line prints on which shall be accurately shown the actual installation of work under this section of the specifications. The drawings shall indicate any variation, approved by the General contractor, from the Contract Drawings, including changes in sizes, locations and dimensions. The Electrical Contractor shall deliver to the General Contractor for submittal to the Owner, a complete set of Record Drawings in an electronic format, showing the entire work as actually installed.

1.23 CONTRACT DRAWINGS

- A. The Contract Drawings are generally diagrammatic and are intended to convey the scope of work and indicate general arrangements of equipment, conduits, piping and fixtures.
- B. If directed by the General Contractor, the Electrical Contractor shall, without extra charge, make reasonable modifications in the layout as needed to prevent conflict with work of other trades or for proper execution of the work.
- C. Reasonable modifications of equipment and/or conduits locations are acceptable due to sub-surface interferences or structural framing, etc.

PART 2 – PRODUCTS

2.01 RIGID STEEL CONDUIT

- A. All rigid steel conduits shall have a hot-dipped galvanized coating plus a secondary coat, galvanized threads, bear an Underwriters' Laboratories label and shall conform to Federal Specifications WW-C-581d and American Standards Association Specification C80.1. The conduit shall be fully threaded at both ends and each length shall be furnished with one standard threaded coupling. The use of thread less conduit couplings and fittings will not be permitted. Threaded split couplings of the bolted clamp type are permitted. Rigid steel conduit shall be used for all power wiring where indicated.
- B. Galvanized rigid steel conduit sweeps and quarter bends shall be installed at the pad mounted transformer and at the utility company poles. Each sweep to a pole shall extend ten feet up the pole with galvanized rigid steel conduit.
- C. Galvanized rigid steel conduit shall be installed where conduit needs to pass under roadways unless noted otherwise.
- D. All empty conduits shall be installed with Mule Tape that has sequential footage markings and 1800 lb. pulling strength.

2.02 ELECTRICAL METALLIC TUBING

- A. Electrical metallic tubing shall be Electro-galvanized outside and enameled inside. All electrical metallic tubing shall bear an Underwriters' Laboratories label and shall conform to Federal Specifications WW-C-563 and American Standards Association Specification C80-3.
- B. Couplings and fittings for EMT shall be setscrew type. EMT shall not be installed embedded in concrete, outdoors or in wet locations.
- C. Any exposed wiring within the buildings shall be installed in Electrical Metallic Tubing.
- D. EMT shall not have more than 3-90° bends or the equivalent of 270° in bends in any one run. Code compliant pull boxes shall be installed to ensure the contractor maintains this condition.
- E. EMT shall be securely fastened to building structure every 10'-0" on center and a support shall be installed within 3'-0" on any conduit body, pull box or outlet box.

2.03 FLEXIBLE METALLIC CONDUIT

- A. Flexible metal conduit shall be galvanized steel, and shall contain an integral copper-grounding conductor. Liquid-tight flexible metal conduit shall be similar, but shall also have an extruded moisture and oil-proof outer jacket of polyvinyl chloride plastic.
- B. Flexible metal conduit shall be utilized on all vibrating electrical equipment and shall be no greater than three feet in length.
- C. Liquid-tight flexible conduit shall be utilized on final connections to any outdoor equipment or scoreboards.

2.04 PVC CONDUIT

- A. Plastic conduit shall be PVC Schedule 40, iron pipe size, rigid polyvinylchloride equal to or better than ASTM Pipe Material ASTM PVC conduit Type 2, Grade 1, ASTM PVC 2110, Specification P-1785, Underwriters' Laboratory, Inc. approved for lengths beyond ten (10) feet shall be identical to the approved conduit. Where elbows are used, they shall be long radius type. PVC Conduit shall be manufactured by Kraloy, Barrett Division of Allied Chemical, Pittsburgh; Triangle Cable and Conduit Co., or approved equal.
- B. Schedule 40 PVC conduits shall be installed, directly buried in earth as indicated on the drawings.
- C. PVC conduits shall come in 10'-0" lengths and multiple lengths are coupled together they shall be connected with a coupling and PVC glue.
- D. PVC Glue by Gorilla shall be non-flammable, low odor with no harmful fumes. The glue shall be fast acting to adhere to conduits and couplings and shall meet or exceed NSF, ASTM D-2564, IAPMO and R & T standards. The glue shall not require any primer require only the use of water for any spills or clean up.
- E. Conduits shall be installed as indicated on the drawings and all empty conduits shall be supplied with a ¼" nylon pull string. The pull string shall run the entire length of each conduit with at least 24 inches of slack at each end.
- F. All conduits entering or leaving a hand hole, field box or any other enclosure shall be done with 22.5° sweeps and each sweep shall be provided with a bell end.
- G. All exposed exterior PVC conduits shall be equipped with expansion fittings.

2.05 WIREWAYS

- A. Totally enclosed sheet steel wireways, complete with all fittings, tees, elbows, wire retainers, closure plates, hangers, and component parts required for a complete installation shall be installed in all areas indicated on the Drawings and as required to facilitate the installation of the electrical systems.
- B. Physical size, length, and internal cross sectional areas, of the wireways shall be determined in the field by the Electrical Subcontractor to suit field conditions unless noted otherwise on the Drawings.
- C. The wireway systems shall be constructed of code gauge galvanized sheet steel with hinged cover. Straight sections of the wireway system shall be constructed of two separate pieces of sheet steel. One piece shall be used to form the sides and top, the other to form the cover. Captive screws, furnished as a part of the wireway system, shall be used for sealing at all hinged covers and coupling at straight sections or fittings.
- D. All fittings, elbows, tees, and straight sections of the wireway shall be provided with smooth and round edges to protect the wiring from abrasion. All welded seams and joints shall be ground and polished to remove burred edges.
- E. A bonding jumper consisting of an insulated flexible #8 AWG copper conductor with soldered eyelet on each end shall be provided to bound and ground the wireway at each joining section of the wireway system. The bonding jumpers shall be attached to each section by means of a bolt, locknut, and washer. The Electrical Subcontractor shall remove the paint from the wireway at the contact points so that positive contact shall be made between the bare metals at each grounding point.
- F. The wireway system shall be provided with ½ inch and ¾ inch concentric knockouts every 6 inches on center along the top and ½ inch, ¾ inch, 1 inch, and 1-1/4 inches concentric knockouts every 6 inches along both sides.
- G. All sheet metal posts shall be factory primed with rust inhibiting phosphor coating and finished with USASI #24 dark gray enamel. All hardware shall be cadmium-plated to prevent rusting and corrosion.
- H. All lengths, connectors, and fittings of the wireway systems shall be UL approved and bear the Underwriters' Laboratories label. UL listing of lengths without listing of connectors and associated components or fittings shall not be acceptable.
- I. The wireway system, all component parts and fittings, shall be by one manufacturer and shall be manufactured by Kelek, Lee Products, or Keystone.

2.06 OUTLET, HAND HOLES AND FIELD BOXES

- A. The location of outlets shown on Drawings is approximate. The Electrical Contractor shall study the plans in relation to the areas and equipment surrounding each hand hole so that hand holes or other electrical components are symmetrically located and are in line with one another for ease of pulling conductors.

- B. Hand holes or pull boxes, shown on the Drawings, that interfere with the installation of sub-surface utilities, structural pole bases or architectural features, or that will be inaccessible due to the work of other trades shall be relocated accordingly.
- C. Hand holes, junction or pull boxes that are not specifically shown on the Drawings but are required for the proper installation of the electrical system shall be installed by the Electrical Contractor, so that they do not interfere with the structural or architectural features and the installation of materials by the other trades.
- D. Any reasonable change in the location of hand holes or junction boxes requested by the Engineer, prior to roughing, shall not involve additional expense to the Owner.
- E. All hand holes shall be installed so that the cover of each hand hole is at finished grade.
- F. Feeders and branch circuits passing through hand holes shall be individually grouped and bound with tie-raps. The feeders and branch circuits in each hand hole shall be properly tagged to clearly indicate their electrical characteristics, circuit number and panel designation. Cables shall be supported on suitable racks within the boxes and arranged in an orderly manner.
- G. Field boxes shall, in general, be as follows:
 - 1. 18" x 30" aluminum, bottomless box with a removable aluminum divider plate to separate power and communication. Wiring and conduits shall enter through the bottom.
 - 2. Weatherproof outlet boxes for wiring devices shall be mounted to the aluminum divider by drilling into the divider and screwing the outlet box to the divider plate. The outlet boxes installed within the field boxes shall be of the cast metal type with threaded hubs as manufactured by Hubbell, Red Dot, or Pass & Seymour/Legrand.
 - 3. Each field box shall be equipped with two (2) duplex receptacles. See Receptacle section of this specification. The first receptacle in each field box must be GFI type that will feed through to the second Non-GFI receptacle.
 - 4. Outlet boxes within the field boxes shall be provided with UL Listed weatherproof covers that allow a plug to be in place with the cover in closed position. Covers shall be single gang, horizontal duplex, "while-in-use" application in accordance with Article 406 of the National Electric Code and as manufactured by Pass & Seymour/Legrand.
 - 5. Each field box cover shall provide a "zero" surface elevation change in the finished playing field. Each box cover shall be strong enough with withstand small vehicular traffic such as a pickup truck and facility maintenance equipment.
 - 6. Each cover shall have an adjustable ledge to adapt to the various synthetic infill turf heights and be equipped with a threaded stud for grounding. Each box shall be provided with tethered hand hole covers and corner leveling bolts.
 - 7. Each side of the field box shall be accessed by two (2) 5"x7" gasketed hand holes in the main cover. Wires shall exit through open slots when hand hole covers are re-installed.
 - 8. Each field box cover shall have a 1/2" recess to accept synthetic track surfacing materials. The banding around the top of each box unit forms a termination strip for the surrounding surface and allows the covers to be flush.
 - 9. Hand hole covers shall be lockable with a hex key and toggle.
 - 10. Field boxes shall be manufactured by Sports Field Specialties #3000 series.
- H. Hand holes shall, in general, be as follows:
 - 1. Hand holes shall be a minimum of 17" x 30" x 18" deep with straight sided and a gasketed cover.
 - 2. Hand holes shall be flush with grade and comply with the 2017 National Electric Code.
 - 3. Each hand hole shall be made of Polymer Concrete and be stable under freeze and thaw conditions. Each hand hole shall be impact resistant as tested per ATM D-244 and be low water absorption, corrosion resistant, non-flammable and nonconductive.
 - 4. Each hand hole shall be provided with a bolted, gasketed Tier 5 cover. The hardware shall be stainless steel.
 - 5. Each hand hole cover shall be embossed with the word "Electrical".
 - 6. Each hand hole shall be manufactured by Quazite #PC1730BB12 or equal.
- I. Hand holes shall be properly sealed during the course of construction to prevent the entrance of dirt and foreign materials.
- J. Exposed, surface mounted outlet boxes or outlet boxes installed in normally wet locations shall be of the cast metal type with threaded hubs as manufactured by Pass & Seymour/Legrand, Crouse-Hinds or Red Dot.
- K. Outlet boxes on the exterior of any structure shall be provided with UL Listed weatherproof covers that allow a plug to be in place with the cover in closed position. Covers shall be single gang, horizontal duplex, "in-use" application in accordance with Article 406 of the National Electric Code and as manufactured by Pass & Seymour/Legrand.

2.07 METAL CLAD CABLE

- A. All conductor wires and cables for secondary circuits shall consist of thoroughly tinned 98 percent conductivity copper, with 600 volt nylon-covered (75 degrees C) insulation with an interlocked galvanized steel armor, insulated bushings, manufactured in strict accordance with the requirements of the Board of Underwriters' and the A.I.E.E..
- B. Wires, #10/2 w/GRD., #12/2 w/GRD., and #14/2 w/GRD., Metal Clad cable, type "MC", shall be type "THHN" solid, unless otherwise noted or shown on plans; sizes #6 AWG and larger shall be stranded Type "THHN".
- C. No wire smaller than 12/2 w/GRD. metal clad cable shall be used for any branch circuit. Larger sizes shall be used where so indicated on the plans.
- D. All wire shall be color-coded.
- E. Type MC cable shall not be used in concrete, direct buried in earth or where exposed to chemical vapors.
- F. Type MC cable can be used as panel feeders, branch circuits, run exposed, run concealed, in raceway, as open runs above ceilings, etc.
- G. Type MC cable shall be secured by insulated staples, cable-ties, straps and/or hangers at intervals not to exceed 6'-0" on center and within 12" of every cabinet, box or fitting.
- H. In addition to the line and neutral conductors, all Metal Clad cable shall be equipped with a full size, green insulated ground conductor that runs the entire length of every branch circuit.

2.08 WIRES AND CABLES

- A. Unless otherwise specified, all wires and cables shall be thoroughly tinned 98% conductivity copper, single conductor type "THWN" moisture and heat resistant polyvinylchloride thermoplastic for use at 600 volts A.C. and D.C., rated 75 degrees C. operating temperature. Wires and cables #6 AWG and larger shall be type "THWN", unless noted otherwise. The wires and cable shall have the Underwriters' Laboratories, Inc. label and be surface printed throughout the entire length at two-foot intervals with permanent identifying markings indicating manufacturer's name, size, type, and voltage. All wire and cable shall be furnished on reels or spools and in lengths required to minimize splicing.
- B. Services entrance conductors, conductors buried below grade and/or conductors exposed to the elements shall be type "THWN" and meet the criteria mentioned above.
- C. Wires sizes #12, and #10 AWG shall be solid, #8 AWG and larger shall be stranded.
- D. Wires and cables #2 AWG and smaller shall be of continuous solid colors follows:
 - 1. SYSTEM VOLTAGES: 120/208 3 PH., 4 WIRE
 - Phase A Black
 - Phase B Red
 - Phase C Blue
 - Neutral White
 - Equip.Grđ. Green
 - 2. SYSTEM VOLTAGES: 277/480 3 PH., 4 WIRE
 - Phase A Brown
 - Phase B Orange
 - Phase C Yellow
 - Neutral Gray
 - Equip.Grđ. Green
- E. All wires larger than #2 AWG shall be color-tape coded at all terminations.

2.09 RECEPTACLES (Federal Spec. Grade)

- A. All convenience outlets shall be of the single or duplex type, back or side wired, T-slot and polarized slot type. All receptacles shall be of the grounded type and be rated 20-amp as indicated. Receptacles shall be manufactured by Pass & Seymour / Legrand or Hubbell.
- B. Receptacles must feature a solid brass strap with integral ground break-off ears, brass auto ground clip crimped to the strap, wrap around face locking strap and locking drive screws and wide body design.
- C. All receptacles must be finger safe with built-in brass terminals to accept plug tail connector with solid or stranded #12 awg conductors, including the ground conductor. The connector shall have large brass contacts with an audible snapping latch to assure connection and allow release.
- D. All receptacles must be finger safe with no exposed terminals after installation and shall have circuit identification in the label on the face of each receptacle.

- E. Exposed molded parts of the receptacles must be constructed of high impact-resistant nylon or polycarbonate.
- F. All twenty-amp circuits indicated on the drawings shall be wired to twenty amp devices. The use of a fifteen amp rated receptacle on a twenty-amp circuit is not acceptable.
- G. Exterior receptacles and/or receptacles in wet locations shall be provided with an "in-use" cover in accordance with Article 406 of the National Electrical Code. Covers shall be polycarbonate construction with a watershed channel, cord flap gasket, 1" profile and have the ability of being installed without removing a device through the use of keyed mounting holes. In-use covers shall be manufactured by Pass & Seymour/Legrand # WIUC10-SC or Hubbell.
- H. All wiring devices throughout the complex shall be provided with a circuit directory on its respective outlet box that is comprised of the panel designation power originates from along with the exact branch circuit number. (ie, LP1A-10)
- I. All receptacles installed throughout each complex shall be as follows, or equal to:
 - 1. Duplex convenience receptacles 20A, 125V, single phase, 3 wire U-slot grounded type shall be Pass & Seymour / Legrand #PT8300/PT6STR or Hubbell.
 - 2. Duplex 20A, feed thru, 125V, single phase, 3-wire, U-slot ground fault interrupting convenience receptacle shall be Pass & Seymour / Legrand #2094-I or Hubbell.
 - 3. Exact NEMA configuration of all special purpose outlets shall be coordinated in the field with the equipment manufacturer and/or the General Contractor.

2.10 FIRE STOPPING

- A. Electrical contractor shall provide fire stopping all around each conduit that penetrates a rated wall, floor and/or ceiling. Fire stop putty shall be manufactured by Hilti or 3M.
- B. Fire stop putty pads shall be installed around outlet boxes that are located on party walls and/or fire rated walls or ceiling assemblies. Putty pads shall be manufactured by Hilti or 3M.

2.11 A.C. PANELBOARDS

- A. Panelboards and all components shall be designed, manufactured and tested in accordance with the latest applicable standards of NEMA and UL as follows: UL 67 – Panelboards, UL 50 – Cabinets and boxes, NEMA PB1, Fed. Spec. W-P-115C and Circuit breaker – Type I class I.
- B. The convertible distribution and lighting circuit breaker panelboards shall be the dead-front type and shall be in accordance with the Underwriters' Laboratories, Inc. "Standard for Panelboards" and "Standard for Cabinets and Boxes" and shall be so labeled.
 - 1. All cabinets shall be made of code gauge steel or better and if painted shall be undercoated with a rustproof bonderized surface or galvanized and treated with a non-acid agent prior to painting. Fronts, provided with doors, shall be cold-rolled sheet steel with gray finish. Directory frames shall be included on the backs of all doors. All locks shall be keyed alike. Fronts shall be furnished with approved adjustable trim clamps and means shall be provided for entrance to gutter space, lugs, etc.
 - 2. Circuit breakers shall be of the bolt-on type, stab types will not be permitted, indicating "ON-OFF" "TRIPPED" positions of the operating handle. When the breaker is tripped automatically, the handle shall assume a middle position between an overload on one pole shall automatically cause all poles to open. Two or more single pole breakers with one handle extension will not be permitted. The circuit breakers shall be quick-break on manual, as well as automatic operation and shall have inverse time characteristics secured through the use of a bi-metallic tripping element supplemented by a magnetic trip. Circuit breaker arc quenching shall be equal to or better than the "De-Ion" arc extinguishing principle.
 - 3. All panelboard assemblies shall be factory assembled complete with circuit breakers as shown on the Contract Plans. Interiors shall be so designed and assembled that any individual breaker can be replaced without disturbing adjacent units or without removing main bus or branch circuit connectors. All bussing shall be copper. Main bus bars and back pans of distribution and power panelboards shall be of such design that branch circuits may be changed without additional machining, drilling, or tapping. Where copper contact surfaces are furnished on main and branch circuit connectors, the copper shall have a 1,000 amperes/square inch density and contact surfaces of not more than 200 amperes per square inch. Silver Plated contacts which meet the same values are acceptable. Lighting and power branch circuit panelboards shall be so designed that the branch circuit connections to the main bus provide sequence (fully distributed) phasing, and such connections shall be clearly and permanently identified on the face of the front of the panel interior.
- C. A.C. Power Distribution Panels shall be convertible circuit breaker distribution Panelboards as manufactured by Eaton.

- D. Frame size for each breaker shall be as shown on the Contract Plans. All bussing shall be copper. The bare, solid, copper neutral bus shall be electrically insulated from the panel and a separate, bare copper grounding bus shall be provided in each panel. Copper ground bus shall be the equivalent of the solid neutral bus. Buses shall be clearly identified.
- E. A.C. Lighting Panels shall be circuit breaker Panelboards as manufactured by Eaton. Frame size for each breaker shall be as shown on the Contract Plans. All bussing shall be copper. The bare solid copper neutral bus shall be electrically insulated from the panel and a separate, bare copper grounding bus shall be provided in each panel. Copper grounding bus shall be the equivalent size of the solid, neutral bus. Buses shall be clearly identified.
- F. Trims for branch circuit panelboards shall be supplied with a hinged door over all circuit breaker handles. Doors in panelboard trims shall not uncover any live parts. Doors shall have a semi flush cylinder lock and catch assembly. Doors over 48 inches in height shall have auxiliary fasteners.
- G. A directory card with a clear plastic cover shall be supplied and mounted on the inside of each door. All locks shall be keyed alike.

2.12 TRANSFORMER

- A. Transformer shall be dry type, floor mounted, ventilated style with 480-volt delta primary and 120/208 volt three phase, four-wire secondary. Transformers shall be 115 degree C temperature rise with 6-2 1/2 percent taps.
- B. Transformer shall be U.L. listed and constructed in accordance with NEMA TP1 with efficiency levels not to exceed the requirements set forth in the latest edition of the Massachusetts State Building Code, Chapter 13. Sound levels shall not exceed 45 dB for transformers 10 to 50 KVA, 50db for transformers 51 KVA to 150 KVA and 55db for transformers 151 KVA to 300 KVA.
- C. Transformer shall be equipped with vibration isolators located between the core and coil assembly and the transformer enclosure to reduce sound levels.
- D. The electrical subcontractor shall be responsible for grounding between the XO terminal and the transformer enclosures and in accordance with the 2017 NEC.
- E. Transformer rating shall be as indicated on the drawings.

2.13 SAFETY SWITCHES AND FUSES

- A. Safety switches shall be of the fusible or non-fusible type as indicated on Drawings equipped with an external lever or handle for manual operation. Each unit shall be enclosed in a code-cage, sheet steel cabinet suitable for surface mounting as indicated on the drawings. Surface mounted units shall have hinged door and catches. Neutral conductors shall be solid throughout. Weatherproof switches shall be of the NEMA 3R type.
- B. Safety switches shall be heavy-duty type as manufactured by Cutler Hammer.
- C. Furnish and install a complete set of fuses for installation and deliver to the Owner one complete set of spare fuses for each installation. Fuses shall be as manufactured by Chase Shawmut, Bussman, or Littlefuse/Tracor.

2.14 GENERAL PANEL INFORMATION

- A. All panels shall be properly balanced, the circuit numbers on the Plans being a numerical indication rather than any attempt to indicate proper balance.
- B. Care shall be taken in the use of common neutral conductors to make certain that no more than one leg is taken from each phase.
- C. Typed indexes shall be provided in each panel indicating circuit number and the outlets or items controlled or fed from same.

2.15 NAMEPLATES

- A. Nameplates shall be furnished and installed on all panelboards, transformers, control cabinets, etc., furnished under this Contract, to designate the equipment controlled and function. Nameplates shall be laminated black bakelite with 1/4 inch high white recessed letters. Nameplates shall be securely attached to the equipment with galvanized screws or rivets.

2.16 SUPPLEMENTARY STEEL, CHANNEL, AND SUPPORTS

- A. The Electrical Contractor shall furnish and install all supplementary steel, channels, and supports required for the proper installation, mounting and support of all lighting fixtures and electrical equipment, to be installed under this Contract, as required.

- B. All supplementary steel, channels, and supports shall be furnished, installed, and secured with all fittings, support rods, and appurtenances required for a complete support mounting system.
- C. The type and size of the supporting channels and supplementary steel shall be determined by the Electrical Contractor and shall be of sufficient strength and size to allow only a minimum deflection in conformance with requirement for loading.
- D. All supplementary steel and channels shall be installed in the neat and workmanship manner parallel to the walls, floor, and ceiling construction. All turns shall be made with 90 degree and 45 degree fittings, as required to suit the construction and installation conditions.

2.17 EXTERIOR ENCLOSURE

- A. The exterior enclosure shall be pad mounted on a concrete pad and manufactured by Hoffman. The enclosure shall be a two door configuration with a three-point latching system with padlocking handles and a foam-in-place gasket for security purposes. The enclosure shall be NEMA 4, IP66, suited for use in outdoor applications.
- B. The enclosure shall be manufactured from 12 gauge Type 304 or 316L stainless steel, Back panels shall be 10 gauge stainless steel with x-form stiffeners, Seams shall be continuously welded and ground smooth; no holes or knockouts will be permitted.
- C. A removable center-post for easy panel installation shall be provided along with collar studs for mounting optional panels. Mounting panel and panel supports shall be included.
- D. Heavy-duty lifting eyes shall be Type 316L stainless steel.
- E. Heavy-duty 3-point latching mechanism operated by Type 316L stainless steel POWERGLIDE padlocking handles shall be included.
- F. Body flange trough collar shall exclude liquids and contaminants
- G. Heavy-duty stainless steel continuous hinges shall support each door
- H. Bonding provision on doors along with grounding studs on body shall be provided.
- I. Accessory mounting channel shall be provided in enclosure top.
- J. Data pocket shall be high-impact thermoplastic and mounted to the inside of the doors.
- K. 12" removable floor stands shall be bolted to enclosure.
- L. Seamless foam-in-place one-piece gasket shall provide oil-tight and dust-tight seal against contaminants.
- M. External hardware manufactured of Type 316 stainless steel and the enclosure shall be unpainted and front, sides, top and back shall have smooth #4 brushed finish.

PART 3 – PRE-PACKAGED SPORTS LIGHTING SYSTEMS

3.01 SUMMARY

- A. Work covered by this section of the specifications shall conform to the contract documents, engineering plans as well as state and local codes.
- B. The purpose of these specifications is to define the lighting system performance and design standards for Mount Greylock Regional High School using an LED Lighting source. The manufacturer / contractor shall supply lighting equipment to meet or exceed the standards set forth in these specifications.
- C. The sports lighting will be for the following venues:
 - 1. Multi-purpose Field
- D. The primary goals of this sports lighting project are:
 - 1. Guaranteed Light Levels: Selection of appropriate light levels impact the safety of the players and the enjoyment of spectators. Therefore light levels are guaranteed to not drop below specified target values for a period of 25 years.
 - 2. Environmental Light Control: It is the primary goal of this project to minimize spill light to adjoining properties and glare to the players, spectators and neighbors. The LED design should provide better control than a good HID design.
 - 3. Life-cycle Cost: In order to reduce the operating budget, the preferred lighting system shall be energy efficient and cost effective to operate. All maintenance costs shall be eliminated for the duration of the warranty.

4. Control and Monitoring: To allow for optimized use of labor resources and avoid unneeded operation of the facility, customer requires a remote on/off control system for the lighting system. Fields should be proactively monitored to detect luminaire outages over a 25-year life cycle. All communication and monitoring costs for 25-year period shall be included in the bid.

3.02 LIGHTING PERFORMANCE

- A. Illumination Levels and Design Factors: Playing surfaces shall be lit to an average target illumination level and uniformity as specified in the chart below. Lighting calculations shall be developed and field measurements taken on the grid spacing with the minimum number of grid points specified below. Appropriate light loss factors shall be applied and submitted for the basis of design. Average illumination level shall be measured in accordance with the IESNA LM-5-04 (IESNA Guide for Photometric Measurements of Area and Sports Lighting Installations). Illumination levels shall not to drop below desired target values in accordance to IES RP-6-15, Page 2, Maintained Average Illuminance and shall be guaranteed for the full warranty period.

Area of Lighting	Average Target Illumination Levels	Maximum to Minimum Uniformity Ratio	Grid Points	Grid Spacing
Football/Soccer	50 FC	2 : 1	72 / 84	30' X 30'

- B. Color: The lighting system shall have a minimum color temperature of 5700K and a CRI of 75.
- C. Mounting Heights: To ensure proper aiming angles for reduced glare and to provide better playability, minimum mounting heights shall be as described below. Higher mounting heights may be required based on photometric report and ability to ensure the top of the field angle is a minimum of 10 degrees below horizontal.

# of Poles	Pole Designation	Pole Height
4	F1, F2, F3, F4	70'

3.03 ENVIRONMENTAL LIGHT CONTROL

- A. Light Control Luminaires: All luminaires shall utilize spill light and glare control devices including, but not limited to, internal shields, louvers and external shields. No symmetrical beam patterns are accepted.
- B. Spill Light and Glare Control: To minimize impact on adjacent properties, spill light and candela values must not exceed the following.

Measured 150' From Field	Average
Vertical Footcandles	< 1/2 FC
Horizontal Footcandles	< 1/2 FC

- C. Spill Scans: Spill scans must be submitted indicating the amount of horizontal and vertical footcandles along the specified lines. Light levels shall be taken at 30-foot intervals along the boundary line. Readings shall be taken with the meter orientation at both horizontal and aimed towards the most intense bank of lights. Illumination level shall be measured in accordance with the IESNA LM-5-04 after 1 hour warm up.
- D. The first page of a photometric report for all luminaire types proposed showing horizontal and vertical axial candle power shall be provided to demonstrate the capability of achieving the specified performance. Reports shall be certified by a qualified independent testing laboratory with a minimum of five years' experience or by a manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products. A summary of the horizontal and vertical aiming angles for each luminaire shall be included with the photometric report.

3.04 LIFE-CYCLE COSTS

- A. Manufacturer shall submit a 25-year life cycle cost calculation as outlined in the required submittal information.
- B. Preventative and Spot Maintenance: Manufacturer shall provide all preventative and spot maintenance, including parts and labor for 25 years from the date of equipment shipment. Individual outages shall be repaired when the usage of any field is materially impacted. Owner agrees to check fuses in the event of a luminaire outage.

3.05 SPORTS LIGHTING SYSTEM CONSTRUCTION

- A. Manufacturing Requirements: All components shall be designed and manufactured as a system. All luminaires, wire harnesses, drivers and other enclosures shall be factory assembled, aimed, wired and tested.
- B. Durability: All exposed components shall be constructed of corrosion resistant material and/or coated to help prevent corrosion. All exposed carbon steel shall be hot dip galvanized per ASTM A123. All exposed aluminum shall be powder coated with high performance polyester or anodized. All exterior reflective inserts shall be anodized, coated, and protected from direct environmental exposure to prevent reflective degradation or corrosion. All exposed hardware and fasteners shall be stainless steel of 18-8 grade or better, passivated and coated with aluminum-based thermosetting epoxy resin for protection against corrosion and stress corrosion cracking. Structural fasteners may be carbon steel and galvanized meeting ASTM A153 and ISO/EN 1461 (for hot dipped galvanizing), or ASTM B695 (for mechanical galvanizing). All wiring shall be enclosed within the cross-arms, pole, or electrical components enclosure.
- C. System Description: Lighting system shall consist of the following:
 - 1. Galvanized steel poles and cross-arm assembly.
 - 2. Non-approved pole technology:
 - a. Square static cast concrete poles will not be accepted.
 - b. Direct bury steel poles which utilize the extended portion of the steel shaft for their foundation will not be accepted due to potential for internal and external corrosive reaction to the soils and long term performance concerns.
 - 3. Lighting systems shall use concrete foundations. See Structural Parameters for details.
 - a. For a foundation using a pre-stressed concrete base embedded in concrete backfill the concrete shall be air-entrained and have a minimum compressive design strength at 28 days of 3,000 PSI. 3,000 PSI concrete specified for early pole erection, actual required minimum allowable concrete strength is 1,000 PSI. All piers and concrete backfill must bear on and against firm undisturbed soil.

- b. For anchor bolt foundations or foundations using a pre-stressed concrete base in a suspended pier or re-enforced pier design pole erection may occur after 7 days. Or after a concrete sample from the same batch achieves a certain strength.
4. Manufacturer will supply all drivers and supporting electrical equipment
 - a. Remote drivers and supporting electrical equipment shall be mounted approximately 10 feet above grade in aluminum enclosures. The enclosures shall be touch-safe and include drivers and fusing with indicator lights on fuses to notify when a fuse is to be replaced for each luminaire. Disconnect per circuit for each pole structure will be located in the enclosure.
5. Manufacturer shall provide surge protection at the pole equal to or greater than 40 kA for each line to ground (Common Mode) as recommended by IEEE C62.41.2_2002.
6. Wire harness complete with an abrasion protection sleeve, strain relief and plug-in connections for fast, trouble-free installation.
7. All luminaires, visors, and cross-arm assemblies shall withstand 150 mph winds and maintain luminaire aiming alignment.
8. Control cabinet to provide remote on-off control and monitoring of the lighting system. See Section 2.4 for further details.
9. Manufacturer shall provide lightning grounding as defined by NFPA 780 and be UL Listed per UL 96 and UL 96A.
 - a. Integrated grounding via concrete encased electrode grounding system.
 - b. If grounding is not integrated into the structure, the manufacturer shall supply grounding electrodes, copper down conductors, and exothermic weld kits. Electrodes and conductors shall be sized as required by NFPA 780. The grounding electrode shall be minimum size of 5/8 inch diameter and 8 feet long, with a minimum of 10 feet embedment. Grounding electrode shall be connected to the structure by a grounding electrode conductor with a minimum size of 2 AWG for poles with 75 feet mounting height or less, and 2/0 AWG for poles with more than 75 feet mounting height.
- D. Safety: All system components shall be UL listed for the appropriate application.

3.06 ELECTRICAL

- A. Electric Power Requirements for the Sports Lighting Equipment:
 1. Electric power: 480 Volt, 3 Phase
 2. Maximum total voltage drop: Voltage drop to the disconnect switch located on the poles shall not exceed three (3) percent of the rated voltage.
- B. Energy Consumption: The kW consumption for the field lighting system shall be 51.00 kW.

3.07 STRUCTURAL PARAMETERS

- A. Wind Loads: Wind loads shall be based on the 2015 International Building Code. Wind loads to be calculated using ASCE 7-10, an ultimate design wind speed of 120 and exposure category C.
- B. Pole Structural Design: The stress analysis and safety factor of the poles shall conform to 2013 AASHTO Standard Specification for Structural Supports for Highway Signs, Luminaires, and Traffic Signals (LTS-6).
- C. Foundation Design: The foundation design shall be based on soil parameters as outlined in the geotechnical report. If no geotechnical report is available, the foundation design shall be based on soils that meet or exceed those of a Class 5 material as defined by 2009 IBC Table 1806.2.
- D. Foundation Drawings: Project specific foundation drawings stamped by a registered engineer in the state where the project is located are required. The foundation drawings must list the moment, shear

(horizontal) force, and axial (vertical) force at ground level for each pole. These drawings must be submitted at time of bid to allow for accurate pricing.

3.08 CONTROL

- A. Instant On/Off Capabilities: System shall provide for instant on/off of luminaires.
- B. Lighting contactor cabinet(s) constructed of NEMA Type 4 aluminum, designed for easy installation with contactors, labeled to match field diagrams and electrical design. Manual off-on-auto selector switches shall be provided.
- C. Dimming: System shall provide dimming capability for all pole top luminaires - High/Medium/Low
- D. Remote Lighting Control System: System shall allow owner and users with a security code to schedule on/off system operation via a web site, phone, fax or email up to ten years in advance. Manufacturer shall provide and maintain a two-way TCP/IP communication link. Trained staff shall be available 24/7 to provide scheduling support and assist with reporting needs.

The owner may assign various security levels to schedulers by function and/or fields. This function must be flexible to allow a range of privileges such as full scheduling capabilities for all fields to only having permission to execute "early off" commands by phone. Scheduling tool shall be capable of setting curfew limits.

Controller shall accept and store 7-day schedules, be protected against memory loss during power outages, and shall reboot once power is regained and execute any commands that would have occurred during outage.

- E. Remote Monitoring System: System shall monitor lighting performance and notify manufacturer if individual luminaire outage is detected so that appropriate maintenance can be scheduled. The controller shall determine switch position (manual or auto) and contactor status (open or closed).
- F. Management Tools: Manufacturer shall provide a web-based database and dashboard tool of actual field usage and provide reports by facility and user group. Dashboard shall also show current status of luminaire outages, control operation and service. Mobile application will be provided suitable for IOS, Android and Blackberry devices.

Hours of Usage: Manufacturer shall provide a means of tracking actual hours of usage for the field lighting system that is readily accessible to the owner.

 - 1. Cumulative hours: shall be tracked to show the total hours used by the facility
 - 2. Report hours saved by using early off and push buttons by users.
- G. Communication Costs: Manufacturer shall include communication costs for operating the controls and monitoring system for a period of 25 years.

PART 4 – EXECUTION

4.01 GENERAL PROVISIONS

- A. All locations of equipment and materials are subject to review by the Engineer in order to coordinate with field conditions.

4.02 TESTS

- A. The right is reserved to conduct acceptance tests of all equipment wiring or any other work furnished under these Drawings and/or Specifications to determine the fulfillment of specific requirements and/or design.
- B. The Electrical Contractor shall conduct all such tests in the presence of authorized representative of the Owner and at such times that the Owner may designate.
- C. The Contractor shall perform all tests, supply all instrumentation, personnel and make all adjustments of equipment and wiring as may be necessary. Insulation resistance readings of all equipment and circuits shall be taken by the Contractor in the presence of the Owner's representative. Megger readings of less

resistance than the recommended minimum as called by Section 110.7 of the NEC shall be required or replaced by this Contractor at no cost to the Owner.

4.03 GROUNDING

- A. The Contractor shall furnish and install all material required for grounding and/or bonding of the field lighting system, service entrance equipment and all equipment, power systems, as shown on the Drawings and/or specified, as a minimum.
- B. The electrical contractor shall install a green insulated equipment ground conductor as a part of all branch circuit wiring. The ground conductor shall run the entire length of each branch circuit and terminate on a ground lug.
- C. All grounding and bonding shall conform to NEC Article 250.

4.04 INSTALLATION OF WIRING AND CONDUIT

- A. In general, all wiring is to be run concealed unless otherwise indicated to be run exposed. Exposed wiring in the mechanical spaces is acceptable.
- B. Raceways shall be continuous from outlet to outlet and from hand hole to hand hole, and shall enter and be secured to all boxes in such manner that each system shall be electrically continuous from service to all outlets. Terminal of all conduits shall be furnished with double locknuts and bushings. Underground conduits shall enter all hand holes and field boxes with 45 degree sweeps and provided with bell ends and capped until put into use.
- C. In no place shall conduit be run within twelve inches of any other utilities, except where crossing is unavoidable, and in that case the conduit shall be kept at least three inches from covering of pipe crossed.
- D. Conduits shall be supported on approved conduit supports every 8'-0" on center.
- E. In general, no splices or joints will be permitted in feeder cables, and branches shall be spliced at outlets or accessible junction boxes.
- F. All splices in wire #6 AWG and smaller shall be standard pig-tail made mechanically tight, then cleaned, and insulated with proper layers and thickness of rubber and friction tape. Wire splicing nuts, Thomas and Betts, Sta-Kon or Minnesota Mining and Manufacturing Co., Scotchlock Type R, may be used subject to approval of the local inspector. Joints, tape and splices in wire #6 AWG and larger shall be taped with approved rubber and friction tapes providing insulation not less than that of the conductor over Burndy Servits or equivalent connectors made by Penn Union or Blackburn.
- G. Wire #6 AWG and larger shall be connected to panels and apparatus by means of approved lugs and connectors. Connectors shall be solderless type, sufficiently large to enclose all strands of the conductor and securely fastened.
- H. Wiring method shall conform to local wiring inspector. Prior to submitting bid, Contractor shall confirm wiring method to be allowed by local ordinances.

4.05 INSTALLATION OF HANDHOLES & MANHOLES

- A. Handholes and Manholes shall be of size and type to accommodate structural conditions; size and number of raceways; conductors or cables entering; and device for which required.
- B. Install embossed covers on all hand holes with the word "Electric". Hand holes and manholes shall be set flush with the finished and level.
- C. Special care should be taken to set all hand holes, manholes and field boxes correctly, square and true with the athletic fields. The edge of the field boxes shall come flush with the respective turf finish.
- D. The exact location of all field boxes, hand holes and manholes shall be coordinated with the general contractor and sports lighting manufacturer.
- E. Hand holes and manholes shall be furnished and installed under this Section of the Specification where indicated on the Drawings and wherever else such a box may be deemed necessary to facilitate the pulling or splicing of wire and cable.

4.06 GENERAL PANEL INFORMATION

- A. All panels shall be properly balanced, the circuit numbers on the Plans being a numerical indication rather than any attempt to indicate proper balance.
- B. Care shall be taken in the use of a common neutral to make certain that no more than one leg is taken from each phase as necessary.
- C. Typed directories shall be provided in each panel indicating circuit number and the outlets or items controlled or fed from same.

4.07 QUIET OPERATION

- A. *All equipment and material furnished by this Contractor shall operate under all conditions of load without objectionable noise or vibration, which in the opinion of the Engineer is objectionable. Where sound or vibration conditions occur, which the Engineer considers objectionable, this Contractor shall eliminate same in a manner approved by the Engineer.*

4.08 RECORD DRAWINGS

- A. A set of as-built Record Drawings, consisting of an electronic version of the Drawings with additional sketches as required, denoting and dimensioning accurately, all the changes in elevation location and size of material deviating from the Contract Drawings, shall be kept concurrently with the progress of the installation. Upon completion of the work, the Contractor shall deliver to the Engineer an up-to-date set of these as-built Record Drawings.

4.09 SUPPLEMENTARY STEEL, CHANNELS AND SUPPORTS

- A. Supplementary steel and channels shall be firmly connected to building construction in a manner approved by the Architect prior to the installation of same. The Electrical Contractor shall submit to the Architect, via the General Contractor the location where he proposes to use supplementary steel and channels, for the support of equipment, fixtures and raceways. The submittal shall indicate the mounting methods, size, and details of the supports, channels and steel. It shall indicate also the weight, which the supports, channels and supplementary steel are to carry.

4.10 SOIL QUALITY CONTROL

- A. It shall be the Contractor's responsibility to notify the Owner if soil conditions exist other than those on which the foundation design is based, or if the soil cannot be readily excavated. Contractor may issue a change order request / estimate for the Owner's approval / payment for additional costs associated with:
1. Providing engineered foundation embedment design by a registered engineer in the State of Massachusetts for soils other than specified soil conditions;
 2. Additional materials required to achieve alternate foundation;
 3. Excavation and removal of materials other than normal soils, such as rock, caliche, etc.

4.11 DELIVERY TIMING

- A. Delivery Timing Equipment On-Site: The equipment must be on-site 6 to 8 weeks from receipt of approved submittals and receipt of complete order information.

4.12 FIELD QUALITY CONTROL

- A. Illumination Measurements: Upon substantial completion of the project and in the presence of the Contractor, Project Engineer, Owner's Representative, and Manufacturer's Representative, illumination measurements shall be taken and verified. The illumination measurements shall be conducted in accordance with IESNA LM-5-04.
- B. Field Light Level Accountability
1. Light levels are guaranteed not to fall below the target maintained light levels for the entire warranty period of 25 Years.
 2. The contractor/manufacturer shall be responsible for an additional inspection one year from the date of commissioning of the lighting system and will utilize the owner's light meter in the presence of the owner.
 3. The contractor/manufacturer will be held responsible for any and all changes needed to bring these fields back to compliance for light levels and uniformities. Contractor/Manufacturer will be held responsible for any damage to the fields during these repairs.

- C. Correcting Non-Conformance: If, in the opinion of the Owner or his appointed Representative, the actual performance levels including footcandles and uniformity ratios are not in conformance with the requirements of the performance specifications and submitted information, the Manufacturer shall be required to make adjustments to meet specifications and satisfy Owner.

4.12 WARRANTY AND GUARANTEE

- A. 25-Year Warranty: Each manufacturer shall supply a signed warranty covering the entire system for 25 years from the date of shipment. Warranty shall guarantee specified light levels. Manufacturer shall maintain specifically-funded financial reserves to assure fulfillment of the warranty for the full term. Warranty does not cover weather conditions events such as lightning or hail damage, improper installation, vandalism or abuse, unauthorized repairs or alterations, or product made by other manufacturers.
- B. Maintenance: Manufacturer shall monitor the performance of the lighting system, including on/off status, hours of usage and luminaire outage for 25 years from the date of equipment shipment. Parts and labor shall be covered such that individual luminaire outages will be repaired when the usage of any field is materially impacted. Owner agrees to check fuses in the event of a luminaire outage.

PART 5 – DESIGN APPROVAL

5.01 PRE-BID SUBMITTAL REQUIREMENTS

- A. Design Approval: The owner / engineer will review pre-bid submittals per section 4.0.B from all the manufacturers to ensure compliance to the specification 10 days prior to bid. If the design meets the design requirements of the specifications, a letter and/or addendum will be issued to the manufacturer indicating approval for the specific design submitted.
- B. Approved Product: Musco's Light-Structure System™ with TLC for LED™ is the approved product. All substitutions must provide a complete submittal package for approval as outlined in Submittal Information at the end of this section at least 10 days prior to bid. Special manufacturing to meet the standards of this specification may be required. An addendum will be issued prior to bid listing any other approved lighting manufacturers and designs.
- C. All listed manufacturers not pre-approved shall submit the information at the end of this section at least 10 days prior to bid. An addendum will be issued prior to bid; listing approved lighting manufacturers and the design method to be used.
- D. Bidders are required to bid only products that have been approved by this specification or addendum by the owner or owner's representative. Bids received that do not utilize an approved system/design, will be rejected.

REQUIRED SUBMITTAL INFORMATION FOR ALL MANUFACTURERS (NOT PRE-APPROVED) 10 DAYS PRIOR TO BID

*All items listed below are mandatory, shall comply with the specification and be submitted according to pre-bid submittal requirements. Complete the Yes/No column to indicate compliance (Y) or noncompliance (N) for each item. **Submit checklist below with submittal.***

Yes/ No	Tab	Item	Description
	A	Letter/ Checklist	Listing of all information being submitted must be included on the table of contents. List the name of the manufacturer's local representative and his/her phone number. Signed submittal checklist to be included.
	B	Equipment Layout	Drawing(s) showing field layouts with pole locations
	C	On Field Lighting Design	Lighting design drawing(s) showing: <ol style="list-style-type: none"> Field Name, date, file number, prepared by Outline of field(s) being lighted, as well as pole locations referenced to the center of the field (x & y), Illuminance levels at grid spacing specified Pole height, number of fixtures per pole, horizontal and vertical aiming angles, as well as luminaire information including wattage, lumens and optics Height of light test meter above field surface. Summary table showing the number and spacing of grid points; average, minimum and maximum illuminance levels in foot candles (fc); uniformity including maximum to minimum ratio, coefficient of variance (CV), coefficient of utilization (CU) uniformity gradient; number of luminaires, total kilowatts, average tilt factor; light loss factor.
	D	Off Field Lighting Design	Lighting design drawing showing initial spill light levels along the boundary line (defined on bid drawings) in foot candles. Light levels shall be taken at 30-foot intervals along the boundary line. Readings shall be taken with the meter orientation at both horizontal and aimed towards the most intense bank of lights.
	E	Environmental Light Control Design	Environmental glare impact scans must be submitted showing the maximum candela from the field edge on a map of the surrounding area until 500 candela or less is achieved.
	F	Photometric Report	Provide first page of photometric report for all luminaire types being proposed showing candela tabulations as defined by IESNA Publication LM-35-02. Photometric data shall be certified by laboratory with current National Voluntary Laboratory Accreditation Program or an independent testing facility with over 5 years' experience.
	G	Performance Guarantee	Provide performance guarantee including a written commitment to undertake all corrections required to meet the performance requirements noted in these specifications at no expense to the owner. Light levels must be guaranteed to not fall below target levels for warranty period.
	H	Structural Calculations	Pole structural calculations and foundation design showing foundation shape, depth backfill requirements, rebar and anchor bolts (if required). Pole base reaction forces shall be shown on the foundation drawing along with soil bearing pressures. Design must be stamped by a structural engineer in the state of Massachusetts, if required by owner.
	I	Control & Monitoring System	Manufacturer of the control and monitoring system shall provide written definition and schematics for automated control system to include monitoring. They will also provide ten (10) references of customers currently using proposed system in the state of Massachusetts.
	J	Electrical Distribution Plans	Manufacturer bidding an alternate product must include a revised electrical distribution plan including changes to service entrance, panels and wire sizing, signed by a licensed Electrical Engineer in the state of Massachusetts.
	K	Warranty	Provide written warranty information including all terms and conditions. Provide ten (10) references of customers currently under specified warranty in the state of Massachusetts.
	L	Project References	Manufacturer to provide a list of ten (10) projects where the technology and specific fixture proposed for this project has been installed in the state of Massachusetts. Reference list

			will include project name, project city, installation date, and if requested, contact name and contact phone number.
	M	Product Information	Complete bill of material and current brochures/cut sheets for all product being provided.
	N	Delivery	Manufacturer shall supply an expected delivery timeframe from receipt of approved submittals and complete order information.
	O	Non-Compliance	Manufacturer shall list all items that do not comply with the specifications. If in full compliance, tab may be omitted.

The information supplied herein shall be used for the purpose of complying with the specifications for Mount Greylock Regional High School. By signing below I agree that all requirements of the specifications have been met and that the manufacturer will be responsible for any future costs incurred to bring their equipment into compliance for all items not meeting specifications and not listed in the Non-Compliance section.

Manufacturer: _____

Signature: _____

Contact Name: _____

Date: ____/____/____

Contractor: _____

Signature: _____

SECTION 32 92 70
SYNTHETIC TURF SYSTEM

PART 1 - GENERAL

1.0 GENERAL REQUIREMENTS

- A. The turf system shall be grass-like in appearance and play. This includes grass-like levels of traction, energy restitution, ball rebound, and shock attenuation. The turf shall provide a stable surface for play with little infill displacement in use and shall be ideal for a variety of sports in all weather conditions without special footwear.

1.1 RELATED MATERIALS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this section.
- B. Section 31 1000 Site Clearing
- C. Section 31 2000 Earth Moving
- D. Section 33 4000 Storm Drainage
- E. Section 33 4460 Shock Pad for Synthetic Turf System
- F. Section 01 81 19 - SUSTAINABLE DESIGN REPORTING: Special administrative and procedure requirements related to the Owner's LEED v4, LEED for Building Design and Construction, LEED BD+C: Schools rating system certificate goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.
- G. Section 01 60 00 - PRODUCT REQUIREMENTS: Listing of VOC requirements for adhesives, cleaning/maintenance materials, paints, coatings, and sealants.
- H. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.
- I. Testing References
 1. ASTM F1015-03--RELATIVE ABRASIVE INDEX Standard Test Method for Relative Abrasiveness of Synthetic Turf Playing Surfaces
 2. ASTM F2117-01--AVERAGE BALL REBOUND HEIGHT-- Standard Test Method for Vertical Rebound Characteristics of Sports Surface/Ball Systems; Acoustical
 3. ASTM F1551-03--COEFFICIENT OF RESTITUTION (CR)-- Standard Test Methods for Comprehensive Characterization of Synthetic Turf Playing Surfaces and
 4. ASTM F1551-03--AVERAGE BALL BOUNCE-- Standard Test Methods for Comprehensive Characterization of Synthetic Turf Playing Surfaces and Materials

5. ASTM F1551-03--SOCCKER SHOE TRACTION – DRY Standard Test Methods for Comprehensive Characterization of Synthetic Turf Playing Surfaces and
6. ASTM F1551-03--SOCCKER SHOE TRACTION – WET Standard Test Methods for Comprehensive Characterization of Synthetic Turf Playing Surfaces and
7. ASTM F1551-03--FOOTBALL SHOE TRACTION – DRY Standard Test Methods for Comprehensive Characterization of Synthetic Turf Playing Surfaces and
8. ASTM F1551-03--FOOTBALL SHOE TRACTION – WET Standard Test Methods for Comprehensive Characterization of Synthetic Turf Playing Surfaces and
9. ASTM D5848-07--TOTAL WEIGHT --Standard Test Method for Mass Per Unit Area of Pile Yarn Floor Coverings
10. ASTM D5848-07-- PILE WEIGHT --Standard Test Method for Mass Per Unit Area of Pile Yarn Floor Coverings
11. ASTM D5848-07-- PRIMARY BACKING WEIGHT-- Standard Test Method for Mass Per Unit Area of Pile Yarn Floor Coverings
12. ASTM D5848-07 --SECONDARY BACKING-- Standard Test Method for Mass Per Unit Area of Pile Yarn Floor Coverings
13. ASTM D5823-05a-- PILE HEIGHT-- Standard Test Method for Tuft Height of Pile Floor Coverings
14. ASTM D1335-05 TUFT BIND STRENGTH-- Standard Test Method for Tuft Bind of Pile Yarn Floor Coverings
15. ASTM D5034-09 GRAB TEAR STRENGTH-- Standard Test Method for Breaking Strength and Elongation of Textile Fabrics (Grab Test)
16. ASTM D5793-05-- STITCHES PER 3 INCHES-- Standard Test Method for Binding Sites Per Unit Length or Width of Pile Yarn Floor Coverings
17. ASTM D5793-05-- MACHINE GAUGE --Standard Test Method for Binding Sites Per Unit Length or Width of Pile Yarn Floor Coverings
18. ASTM D2859-06-- FLAMMABILITY – PILL BURN --Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials
19. ASTM F1951-09--WHEELCHAIR ACCESSIBILITY--Standard Specification for Determination of Accessibility of Surface Systems Under and Around Playground Equipment
20. BS7044-Method 4 INFILTRATION RATE--Determination of Infiltration Rate-Buffered Ponding-Type Infiltrometer
21. ASTM D1907-07 FIBER DENIER--Standard Test Methods for Linear Density of Textile Fiber by the Skein Method
22. ASTM D3218-07 FIBER THICKNESS--Standard Specification for Polyolefin Monofilaments
23. ASTM D3218-07-- FIBER WIDTH-- Standard Specification for Polyolefin Monofilaments

24. ASTM D789-07 -FIBER MELTING POINT Standard Test Methods for Determination of Solution Viscosities of Polyamide (PA)
25. ASTM D792-08--FIBER SPECIFIC GRAVITY--Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement
26. ASTM D2256-02--FIBER BREAKING STRENGTH-- Standard Test Method for Tensile Properties of Yarns by the Single-Strand Method
27. ASTM D2256-02--FIBER ELONGATION-- Standard Test Method for Tensile Properties of Yarns by the Single-Strand Method
28. ASTM 3052@210°-- LEAD --Standard Test Method for Lead - Method 6010 (MDL)
29. RCRA 7471B--MERCURY (Hg)-- Standard Test Method for Mercury - Method 7471B (MDL)
30. RCRA 6010--METALS--Standard Test Method for Heavy Metals - Method 6010 (MDL)

1.2 SCOPE OF WORK

Furnish all labor, materials, tools, and equipment necessary to install, in place, all synthetic turf material as indicated on the plans and as specified herein. The installation of all new materials shall be performed in strict accordance with the Manufacturer's written installation instructions, and in accordance with all contract documents.

- A. Prior to order of materials, the Synthetic Turf Contractor shall obtain approval of the following:
 1. Product data, including Independent Laboratory Test Results,
 2. Complete Installation details
 3. Sample Warranty
 4. Sample of Warranty Insurance Policy
 4. Field layout and striping plans,
 5. Details on construction, especially any details that may deviate from plans and specifications.
- B. Prior to the beginning of installation, the Synthetic Turf Contractor of the synthetic turf shall verify the base for proper planarity. Proper planarity will be determined by the allowance of no more than 1/8 inch deviation within 10 feet. Installation of synthetic turf will not commence until written confirmation from the base contractor that compaction/planarity and drainage/permeability specifications are in compliance for each level of the base below the turf including, subgrade, base stone, and top stone.
- C. Prior to Final Acceptance, the Synthetic Turf Contractor shall submit to the Owner three (3) copies of Executed Warranty Documents and Care Card (Maintenance

Manuals), which will include necessary instructions for the proper care and preventative maintenance of the synthetic turf system, including painting and striping.

- D. Testing- There are two (2) categories of testing required by this specification. Product testing and Surface Testing. It is the responsibility of the contractor/manufacturing to provide documentation by a reputable third party testing agency certifying the results of all testing requirements.

1. Product Testing

It is the manufacturers responsibility to ensure that any product being installed has been previously tested (within 2 calendar years of the date of the installation) in a third-party laboratory ensuring that the product meets the requirements set out in this specification. Product testing within a controlled laboratory shall be broken down into the following categories.

- a. Identification Testing
- b. Performance Testing

1.3 BID SUBMITTALS

J. Mandatory Bid Submittal Requirements

The submittals, as detailed, are each individually a requirement to be considered as a responsible bidder for the project. All Items listed in this Appendix must be submitted to be considered as a responsible bidder for the project.

1. Material Samples

- a. 12" by 12" raw piece of the actual green color turf surface (with perforations)
- b. 12" by 12" raw sample of a 4" tufted line (white) – without infill
- c. 12" by 12" raw sample of the specified seaming method – without infill
- d. 12" by 12" raw sample of an inlaid line (Yellow or White) – without infill
- e. One (1) pound of the proposed infill material
- f. Sample Hand Wraps of the actual fiber construction and colors to be utilized.

2. Insurance and Warranty Requirements

- a. Synthetic Turf System Providers Warranty Document
- b. Sample Warranty certificate
- c. Sample Insured Warranty Accord (Minimum 25 Million Aggregate / 1 Million per field)
- d. Sample Insurance Accord – General Liability, Auto, and Workmen's Compensation

- e. Sample Insured Warranty Policy Accord
 - f. AM Best Rating sheet for Insurance Provider
 - g. AM Best Rating sheet for the Insured Warranty Provider
3. Documentation
- a. Product Data Sheet (PDS) for the proposed turf product with relative characteristics and all associated details
 - b. All Mandatory Testing Documents for the actual product, conducted by a third party laboratory, as required and listed in this specification (1.3.B) Any Contractor that does not submit all of the required testing, or does not meet the minimum qualifications outlined in the specifications, may be disqualified and may no longer be considered a responsible bidder for the project.
 - c. Submit a copy of the Synthetic Turf System Providers maintenance manual
 - d. Submit a copy of the Synthetic Turf System Provider's installation standards
 - e. Submit a copy of the Sports Field Contractors health and safety manual
 - f. Submit a copy of the Sports Field Contractors environmental and recycling policy
 - g. Submit a copy of the Sports Field Contractors drug free policy
 - h. Resumes for three potential superintendents or quality assurance professionals, one of which will be directly responsible for overseeing the project.
 - i. Submit a copy of any required contractor's licenses to perform the work proposed in the bid documents
 - j. Submit a copy of any required business licenses and registrations to perform the work proposed in the bid documents
 - k. Submit a legal letter to indemnify the Owner for the allegation of patent infringement by other Contractors
 - l. Submit a Non-Collusion and Anti-Trust Statement from the Contractor for the proposed project
 - m. Submit a lead and heavy metal letter, outlining that the synthetic turf system proposed is in compliance with the proposed 2011 standard of a maximum of 100 parts per million for the entire synthetic turf system including infill for lead and other heavy metals
 - n. Submit a representation letter to outline and confirm the details of the local representative for the Contractor, certifying that the local representative is authorized to act on behalf of the Turf Manufacturer.
 - o. Submit an installation letter, from the Contractor to confirm the staff that will be installing the project have the proper trained and professional experience in the methods required to complete the installation of the synthetic turf system as required in the Bid Document. The letter should

certify that the installation will be constructed to the specifications, and that the specifications are approved by the Turf Manufacturer for use with the proposed synthetic turf system.

- p. Submit the required Gmax-Shock Attenuation Covenant, which clearly commits the Synthetic Turf System Provider to the various Gmax-Shock Attenuation values as detailed in paragraph 1.5. Any vendor who does not submit the Covenant at the time of bid is subject to disqualification for this project.

K. Shop Drawings

1. Shop drawings shall be prepared at the scale of the construction documents and contain all pertinent information regarding installation. These drawings shall be submitted with the bid.
 - a. It shall be the responsibility of the contractor to evaluate all third party survey information and provide the Owner's Representative with Shop drawings of synthetic turf sports field indicating dimensions and layout of field construction including lining and colors, logo, team name and locations.
 - b. Drawing of the project in color to illustrate the lines and layout
 - c. Drawing of the project in Black and White to illustrate the seam locations
 - d. Drawing of the project in Black and White to identify all tufted lines
 - e. Drawing of the project in Black and White to identify all Inlaid lines, markings and logos

1.4 QUALITY ASSURANCE

A. Synthetic Turf Contractor's Experience:

1. The Synthetic Turf Contractor/Manufacturer shall have the experience of at least fifty (50) acceptable installations of full-size football or soccer fields (minimum 70,000 sq.ft.) in the United States within the past five (5) years of tufted, monofilament/slit film polyethylene, grass-like fabrics that are filled with either mixture of ambient SBR rubber and sand
2. The Synthetic Turf Contractor shall have the experience of ten (10) acceptable installations of the specific system specified, including fiber, infill.
3. The Synthetic Turf Contractor shall have the experience (if applicable to this project specification) of twenty-five (25) installations with sewn main fabric seams.

B. Special Requirements:

1. Third party testing shall verify the synthetic turf system meets the minimum performance requirements of this specification. Third party test of products and performance standards are paid for through an allowance administered by

owner and Landscape Architect. Additional testing required due to failure to meet performance standards will be the responsibility of the contractor at no additional cost to the owner.

2. Three (3) copies of Maintenance and Equipment Repair Manuals, which will include all necessary instructions for the proper care and preventative maintenance of the synthetic turf system, including painting and markings.
3. Project Record Documents: Record actual locations of seams, drains or other pertinent information.
4. Warranty: Submit all Manufacturer Warranty and ensure that forms have been completed in Owner's name and registered with Manufacturer per paragraph 1.4d. Response time for warranty repairs is 48 hours or less. Submit information confirming that 3rd Party Insurance Policy, non-cancelable and pre-paid, is in effect covering this installation, and underwritten by an AM Best A (Excellent) Rated Insurance Carrier. Supply Warranty Insurance Certificate with complete information on contacting the Insurance Carrier should a claim need to be made.
5. Written verification of a minimum half-day training session for the Owner's staff on how to maintain the completed installation.
6. Field markings if listed in this specification shall be painted by the synthetic turf manufacturer for a minimum of 2 years 2 times a year. Other field markings listed under 3.3 shall be tufted or inlaid.
7. The subgrade, stone base course and finishing stone course shall be surveyed by a Registered Land Surveyor by means of a laser level shots shall be on a 10'x10' grid.
8. Turf Installer shall supply 4000 lbs of specified infill in unopened 50 lb or less bags to the Owner upon completion of the project.

C. Backing System Requirements:

The Synthetic Turf System Provider shall construct the backing system of the turf material as detailed in the requirements of this section.

1. The primary backing system must consist of a minimum of two layers.
2. As part of the secondary backing material application, the turf material is to be perforated as part of the inline process. The perforations are to be created through a heat process that is adequate in temperature to cauterize the perforations as they are made through both the primary and secondary backing layers. Perforations are the only acceptable drainage design.
3. Each perforation shall be a minimum of 3/16 of an inch in diameter, and shall not be spaced more than 4 inches apart on a grid both with the machine direction (MD) and across the machine direction (CMD).
4. The perforations are to be constructed with a ninety percent (90%) efficiency. The drainage of the synthetic turf system is to be designed to ensure a minimum drainage of 35 inches per hour.

D. Warranty:

The Synthetic Turf Manufacturer/Contractor must provide a non-pro-rated 8-year warranty that covers all materials and installation. This warranty must be backed by a 3rd party pre-paid insurance policy.

Insured Warranty Requirement

The synthetic turf provider shall provide an eight (8) year pre-paid warranty that is insured by a policy of insurance issued by a reputable insurance company and must have the following policy features:

1. Insurance coverage shall specifically provide for reimbursement to the warranty holder in the event of bankruptcy of the synthetic turf provider.
2. Insurance coverage shall apply to playing surface inclusive of infill, seaming, labor and colored inlays for event markings.
3. Provide the following documents with bid: Warranty Certificate, Accord Certificate, the actual Insurance Policy, and proof of A.M. Best rating for the insured warranty provider.
4. Insurance coverage shall apply to the full 8-year period from completion date of project, with no uninsured periods or periods of self-insurance.
5. Insurance is provided by a third party insurer with an A.M. Best financial strength rating of "Excellent" or higher.
6. Insurance coverage shall not have exclusions for epidemic or catastrophic failure.
7. Insurance coverage shall not limit the hours of use.
8. Insurance coverage shall not exclude heavy trafficked areas or related uses such as team or band practices.
9. Sports Field Synthetic Grass Use: The materials utilized in the sports field synthetic grass system (carpet, infill, drainage pad, seaming, logo's, inlays, etc.) shall be guaranteed for the designated uses as follows:
 - a. Football, Rugby, Soccer, Baseball, Softball, Field Hockey, Lacrosse
 - b. Marching Band
 - c. Graduations and Ceremonies
 - d. Physical Education and Intramural Sports Programs
 - e. Physical Education exercises and activities
 - f. Pedestrian traffic and other similar uses
 - g. Pneumatic rubber-tired maintenance and service equipment, designed for use on athletic fields and golf courses.
10. Insurance coverage shall not exclude any colored turf fibers. Colored turf cannot change by more than 5 gray scales.

11. The Insurance Carrier must be licensed in the state of the facility.
12. Insurance coverage offers a minimum claim limit of (US) \$ 25 million in the aggregate per annum.
13. Insurance coverage offers a minimum claim limit of (US) \$ 1 million per field.
14. Must cover full 100% replacement value of total square footage installed, minimum of \$7.00 per sq foot (in case of complete product failure, which will include removal and disposal of the existing surface).
15. Insurance coverage shall apply to the full 8 year period from completion date of project, with no uninsured periods or periods of self-insurance. Policies that include self-insurance or self-retention clauses shall not be considered.
16. Insurance coverage shall not exclude the use of flat soled shoes.
17. Must be a warranty from a single source covering both the materials and installation of the surfacing system.
18. The entire system shall be resistant to rot, mold, insects, microbial attack, and shall be non-toxic to humans.
19. The artificial grass field must maintain an ASTM F355-01 Gmax of 80-120 for the life of the Warranty.
20. Policy cannot include any form of deductible amount.
21. Warranty shall include the cost of eight (8) annual visits for grooming and consultation.

1.5 EXISTING CONDITIONS (NOT USED)

1.6 SCHEDULE

- A. A pre-installation meeting is required. Convene a minimum of one week before starting work of this section and prior to the installation of the top surfacing stone.
- B. The Synthetic Turf Contractor shall complete all work on the synthetic turf system in accordance with the published project schedule, or as mutually agreed upon.

1.7 SURFACE AREA

- A. The Synthetic Turf Contractor shall verify all measurements.

1.8 DELIVERY STORAGE AND PROTECTION

- A. Deliver products to project site in wrapped condition.
- B. Store products under cover and elevated above grade.

1.9 MAINTENANCE REQUIREMENTS

- A. Equipment:

1. Supply the equipment listed which shall include a towing mechanism compatible with a tractor or other utility vehicle. The cost to supply, deliver, set-up and remove/dispose all packaging is to be incorporated within the Work.
 - a. Sweeper – Greens Groomer 760 LitterKat – with 5 or 6-ft tow behind magnet attachment or SMG TurfCare TCA 1400, or approved equivalent approved equivalent
 - b. Groomer – Greens Groomer 920 SED with Spring Tine Rake Attachment and finishing brush

- B. Annual Maintenance for eight (8) years.
 1. Provide contact information and schedule first visit. The Owner is responsible to supply a list of selected personnel to the Contractor within 72 hours of a written request. Contractor shall provide operations and maintenance that includes:
 2. Annual on-site inspection analysis of seams, infill, inlay, edge, and field insert repair as required.
 3. The scheduling of the Annual Maintenance shall be within 15 days of the annual installation anniversary. The Sports Field Contractor is to obtain written confirmation and acceptance of the scheduled time from the Owner a month prior to the Annual Maintenance Service. The scheduling requirement along with all associated work for the Annual Maintenance Service is to be the sole financial responsibility of the Sports Field Contractor.
 4. Annual deep cleaning of synthetic turf consisting of decompaction, deep cleaning, and finish clean/turf grooming.
 5. Annual synthetic turf report with results of inspection analysis, photos, results of cleaning process, and recommendations for future cleaning/maintenance.
 6. GMAX attenuation testing results per ASTM F1936, and HIC (Head Impact Criteria) ASTM 1292 testing by an independent testing agency, shall be provided to the Owner at initial installation and within 12 months upon initial install and each year thereafter for the full duration of the warranty. If the Gmax values are found to be higher than the maximum of 120 at any time or the HIC are above 1000 or a height of 2000mm with fall heights <1.3m, the contractor shall be responsible to bring the field in compliance at the contractor's sole financial expense.
 7. Work with Owner to install additional infill product in low areas or heavy trafficked areas as required.
 8. The Sports Field Contractor will be responsible for training the Owners selected personnel regarding the maintenance and upkeep of the field upon completion. The cost associated with the maintenance training should be incorporated within the Work to be incorporated within the bid submission package. The Sports Field Contractor is responsible for scheduling this event and obtaining written confirmation and acceptance of the scheduled time from the owner a week in advance of the Maintenance Training Session.

PART 2 - PRODUCTS

2.0 PRODUCTS

All products must meet the requirements of this specification including all pre-approved vendors. Products submitted that do not meet the requirements may be considered irresponsible bids and grounds for rejection.

- A. Shaw Sports Turf
Joe Kacevich
171 VFW Drive
Rockland, MA 02370
508.400.0955
- B. FieldTurf
Andrew Dyjak
28 Boston Post Rd. Unit 178
Waterford Ct 06385
1 860 333 7839
- C. SprintTurf
Andrew Giobi
113 Park River Dr.
Westfield Ma,01085
202-403-4348
- D. GreenFields USA
Mark Curran
304 Naples Road,
Harrison Maine, 04040
978-761-5340

2.1 Testing

A. Synthetic Turf

The minimum requirements for the synthetic turf to be included in the project must meet or exceed the specifications as listed: Fiber must be formulated with 100% C6 or C8 resin. Carpet shall be a dual (2) fiber system constructed of slit film (A) and monofilament (B) polyethylene fibers in separate needles A-B stitch pattern on a 3/8"-1/2" stitch gauge. The Carpet shall consist of monofilament and slit film fibers tufted into a primary backing with a secondary backing. The Carpet shall be furnished in minimum 15' wide rolls. Rolls shall be long enough to go from sideline to sideline without splicing. For football, the perimeter white line shall be tufted into the individual sideline rolls. Head seams, other than at sidelines, will not be acceptable. Systems with less than 2" fibers will not be accepted as equivalent.

System submitted by manufacture must show that it meets the minimum performance specification requirements. Laboratory identification requirements provided by third party will be compared to field identification tests by third party. Field ID test must be comparable within tolerances to original laboratory identification tests, products not meeting this requirement are subject to removal and replacement at the contractor's expense. Field performance tests must meet or exceed the standards identified below as test by third party. Areas which do not meet performance testing requirements will be repaired or replaced in full at the contractor's expense. Prior to use of the field and final payment a statement of conformity shall be issued by third party testing (see sample form at the end of this specifications section).

Required Laboratory Testing (Third Party)

Parameter	Laboratory ID Test	On Site Field ID Testing	Permitted Variation
Carpet			
Mass per Unit Area	X	X	<10%
Tufts per Unit Area	X	X	<10%
Tuft Withdrawl Force	X	X	>40N
Pile Height	X	X	<5%
Total Pile Weight	X	X	<5%
Yarns (per yarn)	X	X	<10%
Pile Yarn Characteristics	X	X	
Pile Thickness	X	X	<10%
dTex	X	X	<10%
Infill			
Depth	X	X	<15%
Particle Size	X	X	1 Sieve Size
Particle Shape	X	X	Similar Shape
Bulk Density	X	X	<15%
Thermogravimetric Analysis (TGA)	X	X	
Shock Pad			
Thickness	X	X	>90%
Shock Absorption	X	X	<5%
Vertical Deformation	X	X	<2mm

Specification Requirements

Property	Test Code	Requirement
Pile Weight	ASTM D5848-07	Minimum 46 OZ (Per Square Yard) ± 5% of specification
Primary Backing Weight	ASTM D5848-07	Minimum 8.5 OZ (Per Square Yard)
Secondary Backing Weight	ASTM D5848-07	Minimum 22.0 OZ (Per Square Yard)
Total Product Weight	ASTM D5848-07	Minimum 76.5OZ (Per Square Yard) ± 5% of Specification
Tufting Gauge	ASTM D5793-05	3/8 to 1/2 inch
Fiber Height	ASTM D5823-05a	2.0 inches ± 5% of Specification
Tuft Bind Value	ASTM D1335-05	Average 10 lbs or greater
Flammability - Pill Burn Requirement	ASTM- D2859-06	Pass
Grab Tear Strength	ASTM D5034-09	Min. 270 lbs average both directions
Infiltration Rate	FIFA Method 24	Exceeds 16in/hr (must be tested as the designed system. Pad/Carpet/Infill)
Wheel Chair Accessibility	ASTM F1951-09	Pass

Performance Testing (Laboratory, Third Party)
Results Provided NOT TO BE MORE THAN 3 YEARS OLD

Parameter	Dry	Wet	Temperature Extremes	After Simulated Wear	Hot Water Immersion	UV Exposure	Laboratory Requirement		Test Code	UNITS	
							MIN.	MAX.			
Shock Absorption	X	X	X	X			57	68		%	EN 14808, 2005/ AAA
Vertical Deformation	X	X	X	X			6	10		mm	EN 14809, 2005 / AAA
Energy Restitution	X	X		X			30	50		%	AAA
Rotational Resistance	X	X		X			32	43		Nm	EN 15301-1
HIC	X	X	X	X			1.4			M	ASTM 1292
Ball Roll (Large Ball)	X	X		X			-	12		M	FIFA 03
Ball Roll (Small Ball)	X	X		X			5	-		M	
Vertical Rebound	X	X		X			0.6	1.0		M	EN 12235
Skin Friction	X						0.3	0.75			
Skin Abrasion	X						-30	30		%	
Tensile Strength Yarn	X					X	30	-		N	
Tensile strength of Stitched Seams	X				X		2500			N/100 mm	BS EN 1228: Method 12002 BS 7400 Section 2.4 Method 3,1989

Peel Strength of bonded seams	X				X		75		N/100 mm	BS EN 1228: Method 12002 BS 7400 Section 2.4 Method 3,1989
Water Permeability		X					500		mm/h	EN12616

Performance Testing (On Site Post Installation, Third Party)

Property	Test Code	Requirement
Surface Regularity	3 Meter Straight Edge EN 13036	≤10 mm Finish Stone Layer and Final Install of Carpet and Infill
Grade	Survey 10' Grid *	Not More than 0.5% in any Direction
Deviation from plan grade at any single point	Survey 10' Grid *	≤8 mm
Infiltration Rate	EN12616	16in/hr

* Survey must be performed and approved at every level of subbase
 Construction This testing is the responsibility of the contractor outside of the testing allowance.

Performance Testing (Field Tests, Third Party)

Property	Test Code	Requirement
Shock Absorption	AAA	60-70%
Vertical Deformation	AAA	4mm-10mm
Energy Restitution	AAA	20%-50%

HIC (Head Impact Criteria)	ASTM 1292	≥1.4 M
Rotational Resistance	EN 15301-1	30 Nm-50Nm
Vertical Rebound (large Ball)	EN12235 (absolute)	0.6m-1.0m
Ball Roll (large Ball)	FIFA 03	Maximum 12m
Infill Depth	EN 1969	± 1/8" from Specification
Free Pile Height	FIFA 18	1/2" ± 1/8" avg

2.2 G-Max REQUIREMENTS

A. Required Test Method

- The required test method for determining the various Gmax values as detailed within this section is ASTM F1936-10-Impact Attenuation of Turf Playing Systems as measured in the field. All results must be stated to include both the standard Gmax value based on ASTM F1936-10, and the Head Injury Coefficient (HIC) ASTM 1292.

B. Required Gmax Values and Limits At time of installation:

- The maximum Gmax Value at time of installation shall not exceed 120G
- The average Gmax Value at time of installation shall not exceed 110G.
- The various Gmax Values should not vary by more than 15G above or below the average at time of installation for any individual drop.

C. Lifecycle Gmax Values

- The maximum Gmax Value throughout the warranted lifecycle of the synthetic turf playing surface is not to exceed 120G.

D. Required Gmax Covenant

- The vendor must submit a Gmax-Shock Attenuation Covenant obligating the Sports Field Contractor to remediate and/or replace the synthetic turf playing surface as detailed in the Gmax Covenant Procedure section.
- The Gmax-Shock Attenuation Covenant must reference and acknowledge the Gmax Covenant Procedure specifically as detailed below, be placed on official letterhead of the vendor and executed by a corporate officer with the authority to bind the corporation.
- The following steps and procedures will be followed should the Owner be in possession of a professional Gmax-Shock Attenuation report that results in an average Gmax value of over 120G at any point within the warranted lifecycle of the synthetic turf playing surface.

- a. The Owner must provide written direction to the Sports Field Contractor for reclamation of the synthetic turf playing surface within 10 days of the testing being completed. Failure by the Owner to provide all the documentation within 10 days will relieve the Sports Field Contractor of their obligation to react.
- b. The Owner must provide the Sports Field Contractor with primary access to the synthetic turf playing surface for 30 calendar days from the date the Sports Field Contractor received notification.
- c. The Sports Field Contractor will be required to contract an independent third party Gmax testing at the Sports Field Contractors sole financial expense to retest the field within the 30 calendar day period.
- d. Should the independent third party Gmax test provide an average Gmax value of less than 120G, then the process is complete.
- e. Should the Sports Field Contractor fail to provide an independent third party Gmax test that confirms an average Gmax value of 120G or lower, then the Sports Field Contractor will be solely responsible for the removal and disposal of the existing field surface, and the full installation of a new synthetic turf playing surface that meets all the specifications of the original bid documents and is independently tested to be safe by the original Gmax-Shock Attenuation requirements as listed within this section.

2.2 CAST IN PLACE CONCRETE CURB

- A. Concrete shall comply with 32 13 13 - Site Concrete and 03 00 00 - Cast-In-Place Concrete.
- B. The cast-in-place concrete anchor curb for the synthetic turf field shall be in accordance with details provided in the construction documents.
- C. The anchor curb shall be formed by hand with a broom finish or equivalent to the top.
- D. The anchor curb shall be in strict accordance with the grading plan and shall be inspected and approved by the Turf Installer. Repairs shall be made to the satisfaction of the Turf Installer at no additional cost to the Owner.
- E. Drain system shall be installed as per the contract documents and any modifications from the Turf Manufacturer.

2.3 GEOTEXTILE FABRIC

- A. Geotextile fabric shall be Geotextile 1 (Mirafi 140n or equal) or conforming to the specification in Section 31 00 00 - Earthwork, 2.8, A

2.4 CRUSHED BASE STONE

- A. Crushed stone base shall be a graded, granular, non-frost susceptible, free-drainage material, consisting of either durable stone and coarse sand or of blast furnace slag, stone, and gravel blends free from loam and clay, and which can be readily compacted to form a stable, permeable, foundation, well graded as follows:

Sieve Size	% Passing by Weight
1 in.	100
3/4 in.	85-100
3/8 in.	50-80
No. 4	35-60
No. 10	25-50
No. 40	15-30
No. 200	0

- B. The specified crushed stone base supplied shall conform to the Turf Manufacturer's recommended specifications.
- C. The crushed stone base supplied shall be stable and sufficiently permeable to ensure all-weather availability of the field.
- D. Stone base course for surfacing and the spreading, grading, and compaction methods employed shall conform to standard requirements for usual base course of this type for first class road work, and the following: Massachusetts Highway Department Standard Specifications for Highways and Bridges, Latest Edition.
- E. The crushed stone shall be laid without damaging the subgrade. The Installer shall also ensure that the crushed stone base and drainage structures are not damaged by heavy equipment.
- F. The stone base shall be constructed in layers or lifts less than or equal to the depths indicated on the plans and of approximate equal thickness each, compacted and measured. Each layer shall be separately compacted to a compaction rate of 95% Standard Proctor in both directions.
- G. The stone base shall have a minimum slope of 0.5% from the center of the field towards the sidelines. See plans and details for minimum slope.
- H. The stone base surface shall not vary from the specified grade by more than 1/8" in 10 feet when measured in any direction. Stones greater than one (1) inch shall be excluded from course.
- I. Width of stone base course shall be greater than or equal to the width of turf surface, if continuous lateral support is provided during rolling, and shall extend at least two (2) x base thickness beyond edge of the course above, if not so supported.
- J. Material shall be placed adjacent to structures only after they have been set to required grade and level.

- K. Surface irregularities which exceed 1/8 inch measured by means of a 10 ft. long straightedge shall be replaced and properly compacted.
- L. Subgrade and stone base course shall be kept clean and uncontaminated. Less select materials shall not be permitted to become mixed with gravel. Materials spilled shall not be permitted to become mixed with gravel. Materials spilled outside specified lines shall be removed and areas repaired.
 - 1. Portions of subgrade or of construction above which become contaminated, softened, or dislodged by passing of traffic, or otherwise damaged, shall be cleaned, replaced, and otherwise repaired to conform to the requirements of this specification before proceeding with next operation.
- M. Laser grading of the stone base course is required.
- N. Prepared stone base course shall be inspected by the Turf Manufacturer's representative. The Turf Installer shall not proceed with installation of the finished stone without written approval of the Owner's Representative. Disturbance to stone base caused by inspection procedures shall be repaired under this Section of the specification.
- O. The Turf Installer shall verify that the subsurface drainage system is functioning properly prior to the commencement of the Infilled Synthetic Turf System installation by thoroughly flooding the field area and verifying and recording flow from the drainage system outlet. Documentation shall be submitted to the Owner's Representative for approval.

2.5 FINISHING STONE

- A. The finishing stone shall be clean, free-drainage material free from loam and clay and which can be readily compacted to form a stable, permeable base and shall meet the following gradation requirements:

Sieve Size	% Passing by Weight
1/2"	100
3/8"	85-100
No. 8	35-75
No. 16	10-55
No. 30	0-40
No. 50/60	0-15
No. 100	0-8
No. 200	0

2.6 INFILL MATERIAL

- A. Infill material shall be processed rubber granules mixed with silica sand in proportions of 50% sand 50% rubber. Infill material shall be clean with minimum amount of lead not exceeding 100 ppm (parts per million):

- B. Silica Sand and shall consist of uniform, sub-angular to rounded, single grains. It shall be dust free, and un-ground. Crusher fines are unacceptable. Silica sand within the infill mix shall meet the following size distribution:

U.S. (Mesh)	Metric (mm)	% Retained per sieve
16	1.190	0
20	0.840	0-3
25	0.710	10-30
30	0.590	30-50
35	0.500	15-35
40	0.420	5-15
50	0.297	<5
70	0.210	Trace

- C. Rubber Granules shall have a minimum size of .5 mm and a maximum size of 3.0mm. Crumb Rubber Infill shall be processed rubber granules within the infill mix shall be derived from used whole vulcanized automobile, SUV, and truck tires (DOT tires for over the road). Buffings, bladders, and tubes are not allowed. Crumb rubber infill shall have a specific gravity range from 1.1 minimum to 1.2 maximum grams per cubic centimeters as determined by ASTM D 297. Crumb rubber infill shall have an ash content between 5 percent and 15 percent as determined by ASTM D297. Crumb rubber infill shall not contain not more than .01 percent liberated fiber tested per ASTM D 5603. The liberated fiber remaining in the crumb rubber infill shall be free flowing and not agglomerated into clumps of fiber.

- D. Crumb rubber infill shall have the following size distribution:

U.S. (Mesh)	Metric (mm)	% Passing	% Retained
12	1.680	100	0
14	1.410	96-100	0-5
16	1.190	82-100	0-15
20	0.840	30-66	30-80
30	0.590	0-24	20-50
40	0.420	0-4	5-20
50	0.297	0	0-5
60	0.250		0

- E. The mixture shall be 50% silica sand and 50% processed rubber. Mix shall be by weight and homogeneously mixed.
- F. Sand and rubber mixture shall meet the specified design criteria for the specified

G-max rating for the full warrantee period.

PART 3 - EXECUTION

3.1 GENERAL

- A. The installation shall be performed in full compliance with approved shop drawings.
- B. Only factory-trained technicians skilled in the installation of athletic caliber synthetic turf systems shall undertake the placement of the system.
- C. Subject to the requirements in section 1.2 (B), the surface to receive the synthetic turf shall be verified by the Synthetic Turf Contractor as ready for the installation of the synthetic turf system and must be perfectly clean as installation commences and shall be maintained in that condition throughout the process.

3.2 TURF INSTALLATION

- A. The completed base and adjacent curbs/perimeter nailer shall be inspected by the Engineer or Site work Contractor by means of a laser and plotted on a 10-foot grid. Based upon the Contractor's inspection of the topographical survey, the Site base work Contractor shall fine grade the base suitably, including properly rolling and compacting the base to achieve a surface planarity within 1/8" in 10-feet (+0, - 1/8"). OWNER, ENGINEER, OR PRIME CONTRACTOR SHALL NOT APPROVE THE BASE FOR TOLERANCE TO GRADE WITHOUT OBTAINING THE TOPOGRAPHICAL SURVEY FOR EACH LAYER OF BASE WORK INCLUDING SUBGRADE, BASESTONE AND FINISH STONE.
- B. Subgrade and base shall be uniformly compacted to a minimum of 95% of maximum dry density. Care must be exercised to minimize segregation. Engineer/Site work Contractor shall make written records available to Synthetic Turf Contractor's inspector for both drainage/permeability and compaction/planarity as obtained from a minimum 10' x 10' grid.
- C. The Synthetic Turf Project Superintendent shall thoroughly inspect all synthetic turf materials delivered to the site both for quality and quantity to assure that the entire installation shall have sufficient material to maintain proper mixing ratios.
- D. 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.
- E. Seaming Methodology Requirements:
 - 1. All seams shall be flat, tight, and permanent with no separation or fraying. Field seams shall be sewn using double-lock stitch with cord recommended by the Synthetic Turf Manufacturer.

2. 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.
3. All main fabric seams shall be transverse to the field direction.
4. All lines that run the entire expanse of the individual rolls shall be tufted with the fiber color specified in the Field Layout Plan supplied utilizing the exact same fiber as the green field fiber.
5. All football five (5) yard lines may be placed at the edge of the yard line or centered in the middle of the roll. Contractor is required to ensure straightness.
6. Any other inlaid lines, markings, numbers and logos are to be either sewn utilizing a Union Special 500T sewing machine, and approved thread or adhered when sewing is not possible with a manufacturer approved adhesive. Any thread utilized shall be treated to ensure it will maintain its tensile strength for a minimum of eight (8) years, under heavy sports field use and while subjected to outdoor elements. All sewn seams are to be completed utilizing the double locking thread method. The specified sewing method requires a flat seam, with no height variance and/or flap.
7. Any adhered inlaid lines, markings, numbers and logos shall be cut-in through the entire thickness of the completed turf material, including the primary and secondary backing. The inlaid markings and numbers shall not stick up above the surrounding grass.
8. All logos shall come from the factory in one piece ready for installation.
9. Any adhesive or Hot Melt utilized shall be approved by the Synthetic Turf System Provider for use with the Synthetic Turf System material proposed in the bid. Both methods require the use of an approved seaming tape. The seaming tape utilized is to be approved by both the Sports Turf system provider and the vendors. These methods require a flat seam, with no height variance and/or flap. Hot Melt is not approved as a method for securing turf to the curb or field perimeter.
10. The approved adhesive shall be applied at the rate specified by the adhesive vendor and utilizing their recommended application method.
11. Any Inlaid and/or painted lines, markings, numbers and logos are to be as specified in the Field Layout Plan supplied.
12. All dimensions and colors are to be as specified in the Field Layout Plan supplied.
13. Synthetic turf shall be attached to the perimeter edge detail in accordance with the Manufacturer's standard procedures.
14. Infill materials shall be applied in numerous thin lifts. The turf shall be brushed as the mixture is applied. The infill material shall be installed to a depth determined as shown on the plans and specified herein.
15. The Infill materials shall be installed per the manufacturer's recommendations to fill the voids between the fibers and allow the fibers to remain vertical and

non-directional. The Infill shall be placed so that there is no more than 5/8" or less than 1/2" of exposed fibers. This shall be verified after the infield has settled from end to end and side to side. Anything that is out of tolerance shall be corrected at the vendor's expense.

3.3 MARKINGS (INLAID AND PAINTED)

- A. Field markings and decorations shall be installed in accordance with approved project shop drawings
- B. Carpet Fiber: A synthetic turf carpet consisting of nominal 2.0" long low friction blended polyethylene fiber, of parallel slit film and monofilament design. Color shall be a blend of field green/lime green as the dominate color with alternating lime green panels within football footprint. Colors to be approved by physical samples provided to landscape architect.
 - 1) All logos shall come from the factory in one piece ready for installation.
- C. Sports markings to be tufted or inlaid.
 - 1) Field markings, layouts and materials shall comply with all current NCAA Athletics rules and regulations for Soccer and field hockey.
 - 2) Field markings, layouts and materials shall comply with all current NFHS rules and regulations for Football.
 - 3) All markings listed below shall be approved in writing by the Owner prior to manufacturing of the synthetic turf.

Football: Tufted/Inlaid

- a. 5 yard markings
- b. 10 yard numbers
- c. Hash marks
- d. Sideline markings
- e. 50 yard line
- f. Extra point lines
- g. Endzone markings
- h. Kick-off markings

Soccer: Soccoer shall be tufted/inlaid. Color shall be bright yellow.

- a. Center circle
- b. Goal box, 3 yard line, penalty mark, penalty area
- c. Corner kick
- d. Sideline markings

e. Standards

D. Sport Markings to be Painted.

1) All markings listed below shall be approved in writing by the Owner prior to manufacturing of the synthetic turf. The following items shall be painted onto the synthetic turf with the designated color. Marking Paint: Only paint approved by the Manufacturer is permitted to be used on the turf.

2) Girls lacrosse – Red

- i. endline,
- ii. sideline
- iii. goal line
- iv. scoring area circle
- v. goal circle
- vi. 8 meter fan
- vii. restraining line

3) Boy's lacrosse – Blue

- i. Face off X
- ii. endline,
- iii. sideline
- iv. goal line
- v. goal crease
- vi. goal/defense area line
- vii. wing area

3.5 SIGNAGE

- A. Provide six (6) aluminum signs with dimensions of 12" x 18" to be installed by the contractor with metal brackets and screws indicating what is not allowed on the field. The contractor shall provide language and incorporate the owner's logo. All other verbiage shall be approved by the owner.

3.6 CLEANING

- A. Protect installed Turf from subsequent construction operations.
- B. Do not permit traffic over unprotected surface.
- C. Contractor shall provide the labor, supplies, and equipment as necessary for final cleaning of surfaces and installed items.

- D. All usable remnants of new material shall become the property of the Owner.
- E. The Contractor shall keep the area clean throughout the project and clear of debris.
- F. 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.

3.7 OTHER MATERIALS AND EQUIPMENT

- A. Repair materials:
 1. Upon substantial completion provide directly to the Owner the following items in the minimum quantities specified;
 2. Seaming tape - 200 LF
 3. Seaming epoxy - Sufficient quantity for 50 SF
 4. Turf fabric - 250 SF with at least one-piece 15' wide x 10' long of each shade of green
 5. 4"-wide Colored Fabric - Minimum 100 LF of each color specified for inlaid line striping.
 6. 2,000 lbs infill in 50lb bags

END OF SECTION

Statement of conformity	
We confirm that the combination of artificial grass surface, infill, shockpad and sub-base installed on the pitch to which this Field Test Report applies are the same (within industry production tolerances) as those previously tested in the laboratory and as described in the laboratory test report detailed below	
Signed	
Name	
Position	

Company					
Date					
Laboratory Test Report No.					
Laboratory Test Included	Yes		NO		

MOUNT GREYLOCK REGIONAL SCHOOL
ATHLETIC IMPROVEMENT PROJECT
1781 Cold Spring Road, Williamstown, MA
TRAVERSE LANDSCAPE ARCHITECTS
PEA Project No. 65011

AUGUST 28, 2019

SP-002 Replace in its entirety Specification 32 92 70 Synthetic Turf System with Pad and
Replace with Specification 32 92 70 Synthetic Turf System with Pad attached to
this addendum.

END OF ADDENDUM #1