

SUMMIT CAMPUS NEW MIDDLE SCHOOL AND HIGH SCHOOL

**Summit Bridge Road
Middletown, DE 19709**

**BID PAC 1A
ISSUED FOR BID**



**Volume 2 [Divisions 02-34]
Date: September 8, 2025**

VOLUME 2

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**SECTION 03 30 10
MISCELLANEOUS CAST-IN-PLACE CONCRETE**

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 00 00 – GENERAL REQUIREMENTS, which are hereby, made a part of this Section of the Specifications.
- B. Examine all other Sections of the Specifications for requirements that affect work of this Section whether or not such work is specifically mentioned in this Section.
- C. Coordinate work with that of all other trades affecting, or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.02 WORK INCLUDED

- A. Perform all work required to complete the work of the Section, as indicated. Such work includes, but is not limited to, the following:
 - 1. Cast-in-place concrete foundations (grandstand and press box).
 - 2. Cast-in-place concrete turf anchor.
 - 3. Foundations for ball netting foundations, goal posts, scoreboards.
 - 4. Chain link fence post footings.
 - 5. Other cast-in-place cement concrete site requirements as detailed in the Drawings.

1.03 RELATED WORK UNDER OTHER SECTIONS

- A. Athletic Ball Netting System
- B. Athletic Equipment
- C. Outdoor Scoreboards
- D. Grandstand and Press Box
- E. Chain Link Fence and Gates
- F. Infilled Synthetic Turf System

1.04 REFERENCES

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirement shall govern.
 - 1. American Society for Testing and Materials (ASTM):

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| C 67 | Brick and Structural Clay Tile |
| C 91 | Masonry Cement |
| C 144 | Aggregate for Masonry Mortar |
| C 150 | Portland Cement |

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| C 207 | Hydrated Lime for Masonry Purposes |
| C 270 | Mortar for Unit Masonry |

1.05 SUBMITTALS

- A. Complete shop drawings for reinforcing steel for each site wall, stair and other cast-in-place, reinforced concrete site components shall be submitted.
 - 1. Include placing drawings that detail fabrication, bending, and placement. Indicate bar sizes, lengths, bar schedules, bent bar diagrams, splices, and reinforcement supports.
 - 2. Provide elevation views of each wall.
- B. Manufacturer’s Product Data shall be submitted for all proprietary products used in concrete work including, but not limited to, curing compounds, admixtures, and reinforcement accessories.
- C. Concrete Mix Design: Submit proposed design mix for the type and strength of concrete specified. Provide separate mix designs for any change in ingredients. Include the following items:
 - 1. Mix proportions for all ingredients of the mix. Designate within the submittal where each mix is proposed to be used. Proportions shall be established by one of the following methods in accordance with ACI 301.
 - a. Field experience.
 - b. Trial Batch.
 - c. Water/cement ratio specified herein.
 - 2. Cement type.
 - 3. Aggregate gradations taken within 3 months from the date of submission. Specify size of coarse aggregate in accordance with ASTM size numbers.
 - 4. Provide data for all proprietary items incorporated into the mix including, but not limited to admixtures.
 - 5. Compressive strength results from an independent testing laboratory for mixes designed in accordance with trial batch or field experience methods.
 - a. Trial batches shall be tested within 12 months of the date of submission.
 - b. Submit quantity of tests in accordance with ACI 301. Note that mix designs developed in accordance with the field experience method must include a minimum of 30 consecutive tests, with an allowance for 10 to 30 consecutive tests with a higher average strength required.
 - c. Slump and air content shall be consistent with specifications for this project within tolerances specified within ACI 301.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.
- B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer shall be certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities.
- C. Testing Agency Qualifications: If the trial batch method is used to design concrete mixes, testing shall be performed by an independent agency, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.
 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.
 2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.
- D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.
- E. Reference Publications: Comply with the following unless modified by requirements in the Contract Documents:
 1. ACI 301, "Specification for Structural Concrete", Sections 1 through 5.
 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials".
 3. ACI 318, "Building Code Requirements for Structural Concrete".
 4. ACI 347R "Guide to Formwork for Concrete".
 5. Concrete Reinforcing Steel Institute (CRSI), "Manual of Standard Practice".

1.07 TESTING AND INSPECTION

- A. The Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Inspections will include the following:
 1. Steel reinforcement placement
 2. Concrete placement, including conveying and depositing.
 3. Curing procedures and maintenance of curing temperature.
- C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
 1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.
 2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
 3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each composite sample.
 5. Compression test specimens: ASTM C 31/C 31M. Cast and laboratory cure one set of four standard cylinder specimens for each composite sample.
 6. Compressive-Strength Tests: ASTM C 39/C 39M; test one laboratory-cured specimen at 7 days two specimens at 28 days. Retain the fourth specimen for testing at 56 days in the event that the 28-day strength tests do not attain the specified strength.

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- a. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
7. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
8. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).
9. Test results shall be reported in writing to the Engineer, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
10. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by the Engineer. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by the Engineer.
11. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
12. Correct deficiencies in the Work that test reports and inspections indicate dos not comply with the Contract Documents.

1.08 STRUCTURAL DESIGN

- A. The Contractor shall provide structural designs stamped by a professional engineer licensed in the State of Delaware for the following:
 1. Football Goal Post Footings
 2. Batting Tunnel Post Footings
 3. Athletic Ball Netting Footings
 4. Grandstand and Press Box Foundations
 5. Backstop Tension Netting Systems & Footings
 6. Baseball and Softball Foul Pole Footings
- B. Contractor shall make no additional monetary claims for structural design fees. It is also assumed the Contractor will review items requiring a structural stamp with a professional engineer prior to bid to ensure the Contractor's bid reflects an appropriate structural design.
- C. The Owner reserves the right to have tests made of mortar materials and mortar, at his option, as the job progresses. A recognized Testing Laboratory, selected by the Landscape Architect/Civil Engineer, with all costs paid by the Owner, will perform tests. The Contractor shall agree to abide by the results of the tests; he shall make all adjustments and changes to mortar and materials to meet the specification requirements at no additional cost to the Owner.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Deliver manufactured products in manufacturer's original, unopened, and undamaged containers with labels intact and legible.

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- B. Store and handle manufactured products to prevent damage and deterioration.
- C. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage

PART 2 – PRODUCTS

2.01 COMPACTED DENSE GRADED CRUSHED STONE BASE

- A. Compacted Dense Graded Crushed Stone shall be as specified under Section 31 00 00 – EARTHWORK.
- B. The Contractor shall submit to the Landscape Architect a sieve analysis by an independent recognized testing laboratory of the material he intends to utilize. No material shall be placed until approved by the Landscape Architect in writing.

2.02 CAST-IN-PLACE CONCRETE

- A. Ready mix concrete shall conform to ASTM C-94, the batch plant shall be certified in compliance with the National Ready Mix Concrete Association standards. Concrete shall have a minimum 28-day compressive strength of 4,000 psi. Prepare design mixture for concrete, proportioned on the basis of laboratory trial mixture, field test data, or default water-cement ratio given below, according to ACI 301.
 - 1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
 - 2. When acceptable data is not available for either field experience or trial batch design methods, design mixture based on a maximum water/cement ratio of 0.35.
 - 3. Provide a maximum slump of 4 inches except for concrete containing a high-range water reducer. Concrete containing a high-range water reducer shall have a maximum slump of 8 inches when added to concrete with a maximum slump of 4 inches.
- B. Forms shall be steel or wooden forms at the Contractor's option and as approved by the Landscape Architect. Provide forms capable of producing uniform, straight, or curved concrete surfaces. Use only non-staining form release compounds.
- C. Reinforcing bars shall be deformed steel bars complying with ASTM A-615, grade 60. Provide miscellaneous bar supports and 18 gauge ASTM A-82 annealed steel wire ties.
- D. Portland cement shall conform to ASTM C-150, Type I or Type II. Use only one brand of cement throughout the project. Limit the temperature of the cement to 140 degrees Fahrenheit when delivered to the batching plant.
- E. Supplementary Cementitious Materials: The following cementitious materials may be substituted for a portion of the Portland cement in the design mixture. Limit the percentage, by weight, of cementitious materials as follows:
 - 1. Fly Ash: ASTM C 618, Class C or F. Maximum percentage = 25%.
 - 2. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120. Maximum percentage = 50%.
- F. Aggregates shall conform to ASTM C 33, Class 3S coarse aggregate. Provide aggregates from a single source with a long history of successful use in similar work and conditions.

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1. Maximum coarse aggregate size: Comply with size limits in ACI 301.
2. Fine aggregate: Free of materials with deleterious reactivity to alkali in cement.
- G. Water: ASTM C 94/C 94M, potable, and clean, potable and free of all impurities that are detrimental to concrete.
- H. Air-entraining admixtures shall conform to ASTM C-260; use only admixtures that have been accepted in the mix design. Provide admixture in such quantity to provide the following air entrainment within a tolerance of plus or minus 1.5 percent.
 1. 1-1/2 inch maximum aggregate size: 5.5 percent.
 2. 1 inch maximum aggregate size: 6.0 percent.
 3. 3/4 inch maximum aggregate size: 6.0 percent.
- I. Water reducing admixtures shall conform to ASTM C-494 Type A or F; use only admixtures that have been accepted in the mix design.
- J. Curing/sealing compound shall comply with FS TT-C-800, having at least 30% solids content.
- K. Miscellaneous curing materials:
 1. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.
 2. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- L. Form Ties: Factory-fabricated, removable or snap-off metal or fiberglass reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
 1. Furnish units that will leave no corrodible metal closer than 1 1/2" to the plane of the exposed concrete surface.
 2. Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter in the concrete surface and will permit neat and solid patching at every hole.
- M. Miscellaneous ties, if required, shall be hot-dipped galvanized steel straps, bars, rods and similar items which are fabricated from not less than 16 gauge sheet steel or 3/16" diameter steel wire. For precast and stone work, provide stainless steel slot anchors, threaded rods and other anchors as approved on shop drawings.
- N. Expansion Joint Filler:
 1. Fiber Type: Preformed asphalt impregnated fiber, ASTM D1751, 1/2 inch thick unless otherwise noted.
 2. Cork Type: Preformed cork expansion joint, ASTM D1752. Type II, 1/2 inch thick unless otherwise noted.
- O. Expansion joint Sealant: ASTM C920, Type M, Class 2 5; two part polyurethane traffic grade sealant, color to match concrete wall color and to be approved by the Landscape Architect. Vertical joints shall have Nonsag, Grade NS, Use NT sealant.

2.03 MORTAR

- A. Patching Mortar for exposed concrete shall be made of the same material and of approximately the same proportions as used for the site walls, except that coarse aggregate shall be omitted and mortar shall consist of not more than 1 part Portland cement to 2 1/2 parts damp loose sand by volume. Color to match concrete site walls.

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- 2.04 CAST-IN-PLACE CONCRETE SYNTHETIC TURF ANCHOR
- A. Concrete shall be 4,500 psi. Materials shall comply with paragraph 2.02 except as follows.
 - B. A slump pour for the turf anchor haunch is acceptable. This haunch is meant to prevent future settlement against the anchor and will not be visible.
 - C. Curing/sealing compound shall be equivalent to Day-Chem Sil-Cure J13.
 - D. Expansion materials:
 1. Expansion joints shall be located at the end of all curb runs and at a maximum of 60'.
 2. Expansion joint filler shall be preformed, non-bituminous type joint filler conforming to ASTM D 1752, Type II, similar to Sealtight Cork Expansion Joint Filler, manufactured by W.R. Meadows, Inc., Elgin, IL 60120, or approved equal.
 3. Premolded filler shall be one piece for the full depth and width of the joint leaving a sealant recess as indicated and shall be an asphaltic material.
 4. Use of multiple pieces of lesser dimensions to make up required depth and width of joint will not be permitted.
 5. Except as otherwise noted on the Drawing, joint filler shall be ½" thick.
 6. Expansion joint shall receive joint backer rod and shall be sealed with approved joint sealer.
 7. Control joints shall be tooled in every 20'.
 - E. FIBROUS REINFORCEMENT
 1. All concrete at Infilled Synthetic Turf Anchors shall contain a fibrous reinforcement of 100% virgin polypropylene fibrillated fibers of multi-design gradation as manufactured by Fibermesh, Synthetic Industries, 4019 Industry Drive, Chattanooga, Tennessee 37416 or an equal product approved by the Landscape Architect.

PART 3 – EXECUTION

- 3.01 COMPACTED DENSE GRADED CRUSHED STONE BASE
- A. Refer to Section 31 00 00 – EARTHWORK for preparation of subgrade and dense graded crushed stone base.
 - B. The Contractor shall submit to the Landscape Architect a sieve analysis by an independent recognized testing laboratory of the material he intends to utilize. No material shall be placed until approved by the Landscape Architect in writing.
- 3.02 CAST-IN-PLACE CONCRETE
- A. Contractor shall excavate area to the lines and grades shown to provide proper footing for all concrete footings.
 - B. Contractor shall erect proper formwork to pour the concrete footings, and install reinforcing steel where required on Drawings. Formwork shall be free of defects and shall provide a smooth and even finish to the entire wall surface. Place concrete and finish as indicated on the Drawings and as specified. Contractor shall leave forms for a minimum of 48 hours.
 1. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
 2. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual.

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- a. For concrete surfaces to be concealed, provide surface tolerance Class D, allowing surface irregularities of 1" when measured with a 5 foot straight-edge.
- b. For concrete surfaces to be exposed to view, provide surface tolerance Class B, allowing irregularities of ¼" when measured with a 5 foot straight-edge.

- C. Contractor shall protect the concrete against injury from the elements and defacement of any nature during construction.
- D. Strictly comply with industry standards and recommendations National Concrete Masonry Association except where more restrictive requirements are specified in this Section.
- E. Embedded Items: Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.03 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

3.04 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired.
 - 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated.
 - 2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete. Width of keys shall be equal to 1/3 of the member thickness unless otherwise noted.
 - 3. Intentionally roughen the concrete surface of construction joints between footings and walls and elsewhere as indicated. Provide a minimum surface roughness amplitude of 1/4 inch.

3.05 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
 - 1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- C. Maintain a minimum of 2 working vibrators on the jobsite during each concrete placement.
- D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

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1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- E. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
1. When average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
 4. Protection of Footings against Freezing: Cover completed work at footing level with sufficient temporary or permanent cover as required to protect footings and adjacent subgrade against possibility of freezing; maintain cover for time period as necessary.
- F. Hot-Weather Placement: Comply with ACI 301 and as follows:
1. Maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.06 CONCRETE CURING AND PROTECTION

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Cure formed concrete surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.
- C. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.
 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than

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seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.07 CONCRETE SURFACE REPAIRS

- A. Repair surface imperfections by patching or grinding in accordance with ACI referenced standards. Allow 28 days after placement before performing surface repairs unless otherwise directed.
- B. At concealed surfaces, grind projections larger than 1". Patch voids larger than 1-1/2" wide or 1/2" deep. Finished surface shall comply with Surface Finish 1.0 per ACI 301.
- C. At surfaces that will be exposed to view, grind projections larger than 1/4". Patch voids larger than 3/4" or 1/2" deep. Patching material shall have color to match adjacent surfaces.
 1. Prepare a patching mock-up for approval before performing patching to surfaces that will be exposed to view. Patch an area that will be inconspicuous and allow for viewing by Activitas before proceeding with successive patching.

END OF SECTION

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SECTION 11 65 00
ATHLETIC BALL NETTING SYSTEMS**PART 1 - GENERAL**

1.01 GENERAL REQUIREMENTS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 00 00 – GENERAL REQUIREMENTS, which are hereby, made a part of this Section of the Specifications.
- B. Examine all other Sections of the Specifications for requirements which affect work of this Section whether or not such work is specifically mentioned in this Section.
- C. Coordinate work with trades affecting, or affected by, work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.02 WORK INCLUDED

- A. Perform all work required to complete the work of the Section, as indicated. Such work includes, but is not limited to, the following:
 - 1. 20' Protective Ball Netting System
 - 2. 10' Protective Ball Netting System
 - 3. Athletic Netting Post Padding (at Track & Field, only)
 - 4. Custom 30' High Pole-to-Pole Tension Backstop System
 - 5. Custom 40' High Pole-to-Pole Tension Backstop System

1.03 RELATED WORK UNDER OTHER SECTIONS

- A. Miscellaneous Cast-in-place Concrete
- B. Bituminous Concrete Pavement
- C. Infilled Synthetic Turf System
- D. Natural Grass Athletic Field System
- E. Resilient Track Surfacing
- F. Chain Link Fence and Gates

1.04 REFERENCES

- A. ASTM - American Society for Testing and Materials
- B. The State of Delaware Department of Transportation Standard Specifications for Road and Bridge Construction.

1.05 LAWS, ORDINANCES, PERMITS AND FEE

- A. The Contractor shall:
 - 1. Give necessary notices, obtain all permits and pay all Governmental taxes, fees and other costs in connection with this work, file all necessary plans, prepare documents and obtain all necessary approvals of the local Building Departments having jurisdiction.

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2. Obtain all required certificates of inspection for this work and deliver same to the Field Consultant before request for acceptance and final payment for the work.
3. Include in the work, without extra cost to the Owner, any labor, materials, services, apparatus, drawings (in addition to Contract Drawings and Documents) in order to comply with all applicable laws, ordinances, rules and regulations, whether or not shown on the Drawings and/or specified.

1.06 QUALITY ASSURANCE

- A. Source: For each type of product required for the work of this Section, provide products of one manufacturer and source for consistency.
- B. Codes and Standards: Perform site improvements work in compliance with applicable requirements of governing authorities having jurisdiction. Workmanship and finish shall be equal to the best practice of modern shops for each item of work.
- C. Qualifications of Workers: Use adequate numbers of skilled workers who are trained in the necessary crafts and who are completely familiar with the specified requirements and methods needed for proper performance of the work of this Section.
- D. The work of this Section shall be completely coordinated with the work of other Sections. Verify dimensions and work of other trades which adjoin materials of this Section before installing items specified.

1.07 SUBMITTALS

- A. Shop Drawings: Supply shop drawings at an approved scale for location, installation and erection of all parts of the work under this Section including but not limited to the following:
 1. 20' Protective Ball Netting System
 2. 10' Protective Ball Netting System
 3. Athletic Netting Post Padding (at Track & Field, only)
 4. Custom 30' High Pole-to-Pole Tension Backstop System
 5. Custom 40' High Pole-to-Pole Tension Backstop System
- B. Product Information: Provide manufacturer's data showing installation and limitations in use. Supply Certificates of Compliance for all materials required for fabrication and installation. Work includes but is not limited to the following items:
 1. 20' Protective Ball Netting System
 2. 10' Protective Ball Netting System
 3. Athletic Netting Post Padding (at Track & Field, only)
 4. Custom 30' High Pole-to-Pole Tension Backstop System
 5. Custom 40' High Pole-to-Pole Tension Backstop System
- C. Material Selection and Samples: Submit samples showing the complete range of colors, textures and finishes available for all components required for construction. Work includes but is not limited to the following:
 1. Provide a 12" x 12" sample of each type of protective netting.
 2. Provide a 12" section of support tubing.
 3. Provide pipe sleeve sample.
 4. Provide samples of all connections.

5. Provide samples of a padding system and connections.

1.08 STRUCTURAL DESIGN, TESTING, AND INSPECTION

- A. The Contractor shall provide structural designs for all of the proposed footings that shall be stamped by a professional engineer licensed in the State of Delaware. Contractor shall make no additional monetary claims for structural design fees. It is also assumed the Contractor will review items requiring a structural stamp with a professional engineer prior to bid to ensure the Contractor's bid reflects an appropriate structural design.

PART 2 - PRODUCTS

2.01 CAST-IN-PLACE CONCRETE FOOTINGS

- A. Refer to Section 03 30 50 – Miscellaneous Cast-in-place Concrete.

2.02 20' ATHLETIC BALL NETTING SYSTEM

- A. 20' Athletic Ball Netting System shall be equivalent to Model BSS420 StormGuard® Professionally Pre-Engineered 20' High Straight Pole Break-Away Ball Safety Netting System and Accessories as manufactured by Sportsfield Specialties, 41155 State Highway 10, Delhi, NY 13753, (888) 975-3343 or approved equal.
 1. 3-1/2" Schedule 40 Aluminum Pipe (4" O.D.), 23'-6"L
 2. Upright post color to be custom powder coat as selected from the Manufacturer's Standard Colors. Color to be black. **One (1) pole shall be yellow – refer to drawings.**
 - a. One (1) Post at Multi-Purpose Field #2 shall be Powder Coated Yellow to act as a foul pole.
 3. 1 3/4" mesh netting and cables to be black.
 - a. Netting heights, lengths, and cutouts shall be verified in field prior to ordering.
 4. Ground Sleeve to be 30" length. Provide Ground Sleeve Caps for each Ground Sleeve.
 5. Provide Ground Sleeve Cap Removal Tool
 6. Provide Quick-Clips for Net Attachments and Net Guide Rings.

2.03 10' ATHLETIC BALL NETTING SYSTEM

- A. 10' Athletic Ball Netting System shall be equivalent to Model BSS210 10' Straight Pole Ball Safety Netting System and Accessories as manufactured by Sportsfield Specialties, 41155 State Highway 10, Delhi, NY 13753, (888) 975-3343 or approved equal.
 1. 2" Schedule 80 Aluminum Pipe (2.375" O.D.), 12'-8.25"L
 2. Upright post color to be custom powder coat as selected from the Manufacturer's Standard Colors. Color to be black.
 3. 1 3/4" mesh netting and cables to be black.
 - a. Netting heights, lengths, and cutouts shall be verified in field prior to ordering.
 4. Ground Sleeve to be 24" length. Provide Ground Sleeve Caps for each Ground Sleeve.
 5. Provide Ground Sleeve Cap Removal Tool
 6. Provide Quick-Clips for Net Attachments and Net Guide Rings.

2.04 ATHLETIC NETTING POST PADDING

- A. Padding shall be 6' high and 2" thick high impact foam, wrapped in 19 oz. heavy coated vinyl with 1 ½" wide sewn in hook and loop vertical closure, as manufactured by Sportsfield Specialties, 41155 State Highway 10, Delhi, NY 13753, (888) 975-3343 or approved equal.
- B. Colors shall be selected by the Owner from the manufacturer's standard list.
- C. Pads shall be fabricated to align with the outside diameters of the 20' ball netting systems and shall have an opening for the net post rope cleats.
- D. Refer to plans for quantity. One pad shall be furnished for each 20' ball netting post at the track and field only.

2.05 CUSTOM 30' HIGH POLE-TO-POLE TENSION BACKSTOP SYSTEM

- A. 30' High Pole-to-Pole Tension Ball Safety System shall be equivalent to Model TNPPUC Pole-to-Pole Tension Ball Safety Netting System with Ultra Cross Netting and Accessories as manufactured by Sportsfield Specialties, 41155 State Highway 10, Delhi, NY 13753, (888) 975-3343 or approved equal.
- B. Components
 - 1. Pole-to-Pole Tension Ball Safety Netting System Upright Support Posts and Pole Structures – Fabricated, Sized and Configured as Required:
 - a. Height Above Finish Grade as Required
 - b. Super Durable Powder Coated Black Finish with Enhance Resistance to UV and Fade
 - c. Ground Sleeve, Base Plate or Permanent Embedment Mount
 - d. Hot Dipped Galvanized Assembly Hardware - Quantities, Sizes and Configurations as Required
 - 2. Pole-to-Pole Tension Ball Safety Netting System Wire Rope Support Structure:
 - a. Length, Height and Configuration as Required
 - b. 7 x 19 GAC Galvanized Aircraft Cable - 5/16" Diameter Main Horizontal Support, 9,800 lb. Minimum Breaking Strength, 3,267 lb. Minimum Working Load Limit
 - c. 7 x 19 GAC Galvanized Aircraft Cable - 1/4" Diameter Vertical and Bottom Horizontal Supports, 7,000 lb. Minimum Breaking Strength, 2,333 lb. Minimum Working Load Limit
 - d. Hot Dipped Galvanized Attachment and Assembly Hardware - Quantities, Sizes and Configurations as Required
 - 3. Pole-to-Pole Tension Ball Safety Netting System Net and Rope Bound Border:
 - a. Length, Height and Configuration as Required
 - b. Ultra Cross Knotless Netting
 - c. Dyneema® Ultra-High Molecular Weight Polyethylene (UHMWPE) SK-75 Black Fiber Construction
 - d. 4 Ply, 1.2 mm (0.0472") Diameter Twine
 - e. 95% Open Mesh Area (See-Through Visibility)
 - f. 58,445 psi Minimum Breaking Strength
 - g. 30% Maximum Elongation at Break
 - h. 1-3/4" (44 mm) Square Mesh Size, 0.009 lbs. per Square Foot
 - i. 4-Strand, Braided, Continuous Monofilament Dyneema® Fiber

- j. Black Multi-Filament Polypropylene Solid Braid Derby Rope
Sewn Binding on Perimeter Edges - 1/4" Diameter, 530 lb.
Minimum Breaking Strength
- k. Urethane Black Bonded Finish
- l. Strong Resistance to Ultraviolet (UV) Light Degradation
- m. Excellent Resistance to Chemicals and Water Absorption

2.06 CUSTOM 40' HIGH POLE-TO-POLE TENSION BACKSTOP SYSTEM

- A. 40' High Pole-to-Pole Tension Ball Safety System shall be equivalent to Model TNPPUC Pole-to-Pole Tension Ball Safety Netting System with Ultra Cross Netting and Accessories as manufactured by Sportsfield Specialties, 41155 State Highway 10, Delhi, NY 13753, (888) 975-3343 or approved equal.
- B. Components
 - 1. Pole-to-Pole Tension Ball Safety Netting System Upright Support Posts and Pole Structures – Fabricated, Sized and Configured as Required:
 - a. Height Above Finish Grade as Required
 - b. Super Durable Powder Coated Black Finish with Enhance Resistance to UV and Fade
 - c. Ground Sleeve, Base Plate or Permanent Embedment Mount
 - d. Hot Dipped Galvanized Assembly Hardware - Quantities, Sizes and Configurations as Required
 - 2. Pole-to-Pole Tension Ball Safety Netting System Wire Rope Support Structure:
 - a. Length, Height and Configuration as Required
 - b. 7 x 19 GAC Galvanized Aircraft Cable - 5/16" Diameter Main Horizontal Support, 9,800 lb. Minimum Breaking Strength, 3,267 lb. Minimum Working Load Limit
 - c. 7 x 19 GAC Galvanized Aircraft Cable - 1/4" Diameter Vertical and Bottom Horizontal Supports, 7,000 lb. Minimum Breaking Strength, 2,333 lb. Minimum Working Load Limit
 - d. Hot Dipped Galvanized Attachment and Assembly Hardware - Quantities, Sizes and Configurations as Required
 - 3. Pole-to-Pole Tension Ball Safety Netting System Net and Rope Bound Border:
 - a. Length, Height and Configuration as Required
 - b. Ultra Cross Knotless Netting
 - c. Dyneema® Ultra-High Molecular Weight Polyethylene (UHMWPE) SK-75 Black Fiber Construction
 - d. 4 Ply, 1.2 mm (0.0472") Diameter Twine
 - e. 95% Open Mesh Area (See-Through Visibility)
 - f. 58,445 psi Minimum Breaking Strength
 - g. 30% Maximum Elongation at Break
 - h. 1-3/4" (44 mm) Square Mesh Size, 0.009 lbs. per Square Foot
 - i. 4-Strand, Braided, Continuous Monofilament Dyneema® Fiber
 - j. Black Multi-Filament Polypropylene Solid Braid Derby Rope
Sewn Binding on Perimeter Edges - 1/4" Diameter, 530 lb.
Minimum Breaking Strength
 - k. Urethane Black Bonded Finish
 - l. Strong Resistance to Ultraviolet (UV) Light Degradation
 - m. Excellent Resistance to Chemicals and Water Absorption

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| Summit Campus Middle and High School | | Appoquinimink School District |
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PART 3 - EXECUTION

3.01 PROTECTIVE BALL NETTING SYSTEMS

- A. Provide and install sleeves and posts plumb and true to grade in accordance with the Manufacturer’s recommendations and Approved Shop Drawings.
- B. The posts shall be placed in alignment with the chain link fence at the bottom of the net. Refer to details for the layout of the netting poles and the chain link fence posts.
- C. Install netting so that the bottom is bundled appropriately and attached to the top of the chain link fence so it is a clean connection between the two systems.

END OF SECTION 11 65 00

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| 11 65 00 - 6 | | ATHLETIC BALL NETTING SYSTEMS BP1A- Issued for Bid – 09/08/2025 |
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**SECTION 11 68 00
ATHLETIC EQUIPMENT****PART 1 GENERAL****1.01 GENERAL REQUIREMENTS**

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 00 00 – GENERAL REQUIREMENTS, which are hereby, made a part of this Section of the Specifications
- B. Examine all other Sections of the Specifications for requirements, which affect work of this Section whether or not such work is specifically mentioned in this Section.
- C. Coordinate work with trades affecting, or affected by, work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.02 DESCRIPTION OF WORK

- A. Work Included: Perform all work required to complete the work of the Section, as indicated. Such work includes, but is not limited to, the following:
 - 1. Football Goal Posts in Synthetic Turf
 - 2. Football Goal Posts Pads
 - 3. Football Endzone Pylons
 - 4. Football Sideline Yardage Markers
 - 5. Pole Vault Boxes and Covers
 - 6. Pole Vault Standards
 - 7. Pole Vault Landing Pad and Cover
 - 8. Pole Vault Standard Forming System
 - 9. High Jump Standards
 - 10. High Jump Landing Pad and Cover
 - 11. Long/Triple Jump Landing Pit & Sand Catchers
 - 12. Long/Triple Jump Take-off Boards
 - 13. Weighted Track Crossing Mat
 - 14. Track Hurdles
 - 15. Hurdle Carts
 - 16. Starting Blocks
 - 17. Shot Put Toe Board
 - 18. Shot Put Throw Circle
 - 19. Discus Cage
 - 20. Discus Throw Ring
 - 21. Weighted Corner Flags
 - 22. Soccer Goals
 - 23. Lacrosse Goals
 - 24. Field Hockey Goals
 - 25. 20' Foul Poles
 - 26. 30' Foul Poles
 - 27. Bases
 - 28. Home Plate
 - 29. Pitching Rubber
 - 30. Dugout Storage Units
 - 31. Dugout Shelf and Coat Rack Units

32. Baseball Dugout Guard Rail System
33. Softball Dugout Guard Rail System
34. Batting Tunnels
35. Two-Tier Team Benches
36. Single-Tier Team Benches
37. Backstop Fence Padding
38. Batter's Eye
39. Portable Batting Cage
40. Tennis Posts
41. Tennis Nets
42. Center Strap and Anchor
43. Electrical/Telecommunications Track & Field Box
44. Quick Coupler Valve Track & Field Box
45. Turf Manhole Cover

1.03 RELATED WORK

- A. Site Preparation
- B. Earthwork
- C. Cast-In-Place Concrete
- D. Chain Link Fences and Gates
- E. Infield Mix
- F. Natural Grass Athletic Field Surfacing
- G. Infilled Synthetic Turf System
- H. Resilient Track Surface

1.04 REFERENCES

- A. ASTM - American Society for Testing Materials
- B. ASBA – American Sports Builders Association
- C. NCAA – National Collegiate Athletic Association
- D. NFHSA – Nation Federation of High School Athletics Association
- E. DIAA – Delaware Interscholastic Athletic Association

1.05 LAWS, ORDINANCES, PERMITS AND FEES

- A. The Contractor shall:
 1. Give necessary notices, obtain all permits and pay all Governmental taxes, fees and other costs in connection with this work, file all necessary plans, prepare documents and obtain all necessary approvals of the local Building Departments having jurisdiction.
 2. Obtain all required certificates of inspection for this work and deliver same to the Landscape Architect/Civil Engineer before request for acceptance and final payment for the work.
 3. Include in the work, without extra cost to the Owner, any labor, materials, services, apparatus, drawings (in addition to Contract Drawings and Documents) in order to comply with all applicable laws, ordinances, rules and regulations, whether or not shown on the Drawings and/or specified.

1.06 QUALITY ASSURANCE

- A. Source: For each type of product required for the work of this Section, provide products of one manufacturer and source for consistency.
- B. Codes and standards: Perform site improvement work in compliance with applicable requirements of governing authorities having jurisdiction. Workmanship and finish shall be equal to the best practice of modern shops for each item of work
- C. Qualifications of workers: Use adequate numbers of skilled workers who are trained in the necessary crafts and who are completely familiar with the specified requirements and methods needed for proper performance of the work of this Section.
- D. The work of this Section shall be completely coordinated with the work of other Sections. Verify dimensions and work of other trades, which adjoin materials of this Section before installing items specified.

1.07 SUBMITTALS

- A. Product Information: Provide manufacturer's data showing installation and limitations in use. Supply Certificates of Compliance for all materials required for fabrication and installation. Work includes but is not limited to the following items:

1. Football Goal Posts in Synthetic Turf
2. Football Goal Posts Pads
3. Football Endzone Pylons
4. Football Sideline Yardage Markers
5. Pole Vault Boxes and Covers
6. Pole Vault Standards
7. Pole Vault Landing Pad and Cover
8. Pole Vault Standard Forming System
9. High Jump Standards
10. High Jump Landing Pad and Cover
11. Long/Triple Jump Landing Pit & Sand Catchers
12. Long/Triple Jump Take-off Boards
13. Weighted Track Crossing Mat
14. Track Hurdles
15. Hurdle Carts
16. Starting Blocks
17. Shot Put Toe Board
18. Shot Put Throw Circle
19. Discus Cage
20. Discus Throw Ring
21. Weighted Corner Flags
22. Soccer Goals
23. Lacrosse Goals
24. Field Hockey Goals
25. 20' Foul Poles
26. 30' Foul Poles
27. Bases
28. Home Plate
29. Pitching Rubber
30. Dugout Storage Units
31. Dugout Shelf and Coat Rack Units
32. Baseball Dugout Guard Rail System
33. Softball Dugout Guard Rail System

34. Batting Tunnels
35. Two-Tier Team Benches
36. Single-Tier Team Benches
37. Backstop Fence Padding
38. Batter's Eye
39. Portable Batting Cage
40. Tennis Posts
41. Tennis Nets
42. Center Strap and Anchor
43. Electrical/Telecommunications Track & Field Box
44. Quick Coupler Valve Track & Field Box
45. Turf Manhole Cover

B. Shop Drawings: Supply shop drawings at an approved scale for location, installation and erection of all parts of the work under this Section including but not limited to the following:

1. Football Goal Posts in Synthetic Turf
2. Football Goal Posts Pads
3. Football Endzone Pylons
4. Football Sideline Yardage Markers
5. Pole Vault Boxes and Covers
6. Pole Vault Standards
7. Pole Vault Landing Pad and Cover
8. Pole Vault Standard Forming System
9. High Jump Standards
10. High Jump Landing Pad and Cover
11. Long/Triple Jump Landing Pit & Sand Catchers
12. Long/Triple Jump Take-off Boards
13. Weighted Track Crossing Mat
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17. Shot Put Toe Board
18. Shot Put Throw Circle
19. Discus Cage
20. Discus Throw Ring
21. Weighted Corner Flags
22. Soccer Goals
23. Lacrosse Goals
24. Field Hockey Goals
25. 20' Foul Poles
26. 30' Foul Poles
27. Bases
28. Home Plate
29. Pitching Rubber
30. Dugout Storage Units
31. Dugout Shelf and Coat Rack Units
32. Baseball Dugout Guard Rail System
33. Softball Dugout Guard Rail System

34. Batting Tunnels
35. Two-Tier Team Benches
36. Single-Tier Team Benches
37. Backstop Fence Padding
38. Batter's Eye
39. Portable Batting Cage
40. Tennis Posts
41. Tennis Nets
42. Center Strap and Anchor
43. Electrical/Telecommunications Track & Field Box
44. Quick Coupler Valve Track & Field Box
45. Turf Manhole Cover

1.08 STRUCTURAL DESIGN, TESTING AND INSPECTION

- A. The Contractor shall provide structural designs for all of the proposed footings that shall be stamped by a professional engineer licensed in the State of Delaware. Contractor shall make no additional monetary claims for structural design fees. It is also assumed the Contractor will review items requiring a structural stamp with a professional engineer prior to bid to ensure the Contractor's bid reflects an appropriate structural design.

PART 2 – PRODUCTS

2.01 FOOTBALL GOAL POSTS

- A. Provide two (2) pairs of semi-permanent 8' offset all aluminum goal posts with 30' uprights and adjustable/expandable crossbars for High School / College use.
- B. Goalpost shall be equivalent to Model GP830HSPL Adjustable AdjustRight Base Plate Mount Football Goal Posts as manufactured by Sportsfield Specialties, 41155 State Highway 10, Delhi, NY 13753, (888) 975-3343.
- C. Components:
 1. Single base plate mount gooseneck support: fabricated of 6" schedule 40 aluminum pipe (6.625" O.D.), 5' radius, 8' offset
 2. Base plate mounting kit
 3. Crossbar: fabricated of 6" schedule 40 aluminum pipe (6.625" O.D.)
 - a. Length: adjustable from 18'-6" to 23'-4" (College/High School)
 - b. Includes patented AdjustRight® feature allowing for easy installation through the adjustment of an internal locking rotating sleeve at both the gooseneck/crossbar and upright/crossbar connections. This adjustment can easily be repeated throughout the life of the football goal post ensuring proper alignment of all components for years of competition and all with the added benefit of no exposed hardware on the face of the goal. Thermal arc sprayed internal textured mating surfaces and anti-vibration enhancements such as serrated washers

and nyloc coated bolt ends ensure the AdjustRight® Football Goal Posts remain in position.

4. Uprights: fabricated of extruded 6061-T6 aluminum tube (4" O.D.) with rigid wire loop welded to upper end
 - a. Length: 30'-0"
5. Powder coated finish: yellow or white (to be selected by the Owner)
6. Installation package shall include the following components:
 - a. Base plate mounting kit
 - b. Access frame kit for synthetic turf (Model GPAFIT): 1/8" (0.125") aluminum construction with 1" PVC drain stub and shall include:
 - i. two (2) half moon filler plugs
 - ii. a full-size filler plug
7. Accessories to be included are as follows:
 - a. Directional wind flags
 - b. Touch-up paint (powder coat finish specific)
 - c. Model specific hardware kit and installation instructions

2.02 FOOTBALL GOAL POST PADS

- A. Football goal post pads shall be Model GPPRDG as manufactured by Sportsfield Specialties, 41155 State Highway 10, Delhi, NY 13753, (888) 975-3343.
 1. Pads fully encased 18 oz. heavy coated vinyl polyester scrim with vertically sewn in hook and loop securement and 7" I.D. polyurethane foam core
 2. 6'-0" in height
 3. Color to be selected by the Owner from the manufacturer's list of standard colors
 4. Custom digitally printed graphics (graphics shall be supplied during the submittal/shop drawing review process)
 5. Quantity: four (4), one for each goal post

2.03 FOOTBALL ENDZONE PYLONS

- A. Football Endzone pylons shall be orange vinyl covered foam pylons with self-standing weighted bases as provided by Sportsfield Specialties, 41155 State Highway 10, Delhi, NY 13753, (888) 975-3343.
 1. Pylons shall be 18"H x 4"L x 4"W
 2. Quantity: two sets of four (4), eight (8) total pylons

2.04 FOOTBALL SIDELINE YARDAGE MARKERS

- A. Football Sideline Yardage Markers (Model FSYM22) shall be orange vinyl covered polyurethane foam core with weighted bases and digitally printed graphics as provided by Sportsfield Specialties, 41155 State Highway 10, Delhi, NY 13753, (888) 975-3343.
 1. Markers shall be 15"W x 15"H x 12" deep base
 2. Quantity: twenty-two (22)

2.05 POLE VAULT BOXES AND COVERS

- A. Cast aluminum pole vault box shall be Model PVBCAW Cast Aluminum Vault Box, white finish as manufactured by Sportsfield Specialties, Inc., 41155 State Highway 10, Delhi, NY 13753, (888) 975-3343.
- B. Cover Plug shall be Model PVBCPCA as manufactured by Sportsfield Specialties, Inc.,

41155 State Highway 10, Delhi, NY 13753, (888) 975-3343. Covers to accept track surfacing.

- C. The Contractor / Track Installer shall also provide a full depth urethane plug for each of the pole vault boxes.
- D. Quantity: Two (2) pole vault boxes and two (2) covers.

2.06 POLE VAULT STANDARD FORMING SYSTEM

- A. Pole vault standard forming system shall be Model PVSFS, Pole Vault Standard Forming System as manufactured by Sportsfield Specialties, Inc., 41155 State Highway 10, Delhi, NY 13753, (888) 975-3343.
- B. Quantity: two (2) sets
- C. Components per set:
 - 1. Two (2) PVSFS Forms; 1 for each side of pit: fabricated from 1/8" aluminum sheet, with 1" aluminum round stock tapping blocks welded in each quadrant for mounting
 - a. Shall be compatible with PVS517 Pole Vault Standards
 - 2. Four (4) removable side walls; 2 for each form: fabricated from 1/8" aluminum sheet
 - a. Allow for concrete flow as required by job removing or leaving side walls in place
 - 3. Model specific hardware kit and installation instructions.

2.07 POLE VAULT STANDARDS

- D. Pole vault standards shall be Model PVS0517, 5' -17' Pole Vault Standard Set as manufactured by Sportsfield Specialties, Inc., 41155 State Highway 10, Delhi, NY 13753, (888) 975-3343.
- E. Quantity: one (1)
- F. Components:
 - 1. Two (2) steel base assemblies: each fabricated of two (2) 7-gauge steel sheet bent channels welded to three (3) 1/4" x 1" steel flat bar supports, two (2) of which contain mounting points
 - a. Allows for up to 32" of upright motion away from the zero line of the pole vault box
 - b. Shall be compatible with the PVSFS Pole Vault Standard Forming System
 - 2. Two (2) rolling base assemblies: each fabricated of one (1) 7-gauge steel sheet base with four (4) wheels for movement and two (2) wheels for braking
 - a. Brake wheels shall restrict movement along the steel base assemblies
 - 3. Two (2) mounting stubs, one (1) left and one (1) right: each fabricated of 7-gauge steel sheet
 - a. Mounts uprights to rolling base assembly; left and right sides are labeled as such
 - 4. Two (2) Uprights: each fabricated of a custom aluminum extrusion
 - a. Height: 105.50"
 - 5. Two (2) riser assemblies: each fabricated of one (1) 1.50" square aluminum tube, with 3/8" x 3/4" aluminum collar mounting block welded near the bottom
 - a. Travels inside of uprights to raise and lower pins
 - 6. Two (2) clamping collar assemblies, one (1) left and one (1) right: each fabricated of one (1) custom cast aluminum collar with one (1) clamping knob, and one (1) adjustable readout plate with knob
 - a. Travels up and down with the riser assembly; clamps riser assembly in

- position where desired by pressing riser assembly firmly into the uprights
- b. Left and right collars shall be labels as such
- 7. Two (2) extension arm assemblies, one (1) left and one (1) right; each fabricated of one (1) 1.50" square aluminum tube pin mount, two (2) 1.00" square aluminum tube bracings, and one (1) 1/8" aluminum sheet riser mount
 - a. Left and right collars shall be labels as such
- 8. Twelve (12) 55mm rest pins and twelve (12) 75mm rest pins: fabricated of 1/2" aluminum round stock
 - a. 55mm pins are used for high school competition, while 75mm pins are used in NCAA competition. Both shall be included in each package
- 9. Super durable powder coated finish: Black or custom color to be selected by the Owner
- 10. Model specific hardware kit and installation instructions.

2.08 POLE VAULT LANDING PAD AND COVER

- G. Furnish and install all materials and equipment to provide pole vault landing pad Model PV2224HDZ, DURAZone Field Event Protective Padding and accessories as manufactured and/or supplied by Sportsfield Specialties, Inc., 41155 State Highway 10, Delhi, NY 13753, (888) 975-3343.
- H. Quantity: one (1)
- I. Components:
 - 1. Pole vault landing pad systems
 - 2. Base sections fabricated of nineteen ounce (19 oz.) heavy coated vinyl polyester scrim exterior that has a high tear and tensile strength and inner "Honeycomb" polyurethane foam core consisting of several different layers
 - 3. Vinyl seams double stitched using 6 lb. bonded polyester black thread
 - 4. Adjustable nylon straps with buckles and 8" hook and loop attachment reinforcement securely connects base sections
 - 5. 2" wide nylon web handles for transport purposes
 - 6. Stainless steel snap hooks, buckles and "D" rings
 - 7. 2" thick foam top pad is covered with a heavy duty vinyl coated polyester mesh that is UV and spike resistant, various standard colors available – to be selected by the Owner
 - 8. Pole vault landing pad systems have standard removable 8' x 10' white mesh coach's preferred landing area secured with hook and loop and pole vault planting box safety collar pad fabricated of 2" thick high density polyurethane foam and yellow vinyl
 - 9. Patented DURAZone® Advanced Synthetic Drainage and Impact System provides rapid water evacuation, grid pattern increases air flow under pad and extends life of pad by reduction of mildew, fungus growth and rotting, integrated and lightweight for ease of transport, storage and set-up
 - 10. Ten (10) year warranty on seams, handles and hardware attachments
- J. Include Model PVPBSC, Pole Vault Planting Box Safety Collar as manufactured and/or supplied by Sportsfield Specialties, Inc., 41155 State Highway 10, Delhi, NY 13753, (888) 975-3343.
 - 1. Yellow, 19 ounce, heavy coated vinyl, 2" high density foam core, 4'W x 4'-6"L
 - 2. Shall be compatible with the specified landing pad system.
- K. Include Model PVBPANGN, Angled Base Protectors with notch for offset standards as manufactured and/or supplied by Sportsfield Specialties, Inc., 41155 State Highway 10,

Delhi, NY 13753, (888) 975-3343.

1. 19 ounce, heavy coated vinyl – color to match landing pad system
 2. Custom graphic at side of protector shall be included
 3. Shall be compatible with the specified landing pad system.
- L. Include 19 ounce heavy coated vinyl polyester scrim, all-weather cover for entire system.
1. Color to be selected by the Owner

2.09 HIGH JUMP STANDARDS

- M. High jump standard forming system shall be Model HJS0208, 2' – 8' High Jump Standard Set as manufactured by Sportsfield Specialties, Inc., 41155 State Highway 10, Delhi, NY 13753, (888) 975-3343.
- N. Quantity: one (1)
- O. Components:
1. Two (2) steel base assemblies: each fabricated of 7-gauge steel sheet
 - a. Contains four (4) leveling feet for adjustment
 2. Two (2) mounting stubs, one (1) left and one (1) right: each fabricated of 7-gauge steel sheet
 - a. Mounts upright to base assembly; left and right sides are labeled as such
 3. Two (2) uprights: each fabricated of a custom aluminum extrusion
 - a. Height: 53.00"
 - b. Shall contain metric and English scales
 4. Two (2) riser assemblies: each fabricated of one (1) 1.50" square aluminum tube, with 3/8" x 3/4" aluminum collar mounting block welded near the bottom
 - a. Travels inside of uprights to raise and lower pins
 5. Two (2) clamping collar assemblies, one (1) left and one (1) right: each fabricated of one (1) custom cast aluminum collar with one (1) clamping knob, and one (1) adjustable readout plate with knob
 - a. Travels up and down with the riser assembly; clamps riser assembly in position where desired by pressing riser assembly firmly into uprights
 - b. Left and right collars are labeled as such
 6. Four (4) crossbar rests
 7. Super durable powder coated finish: Black or custom color to be selected by the Owner
 8. Installation Package consisting of the following components:
 - a. Hardware kit (nuts, bolts, flat and lock washers, end caps)
 - b. Installation instructions

2.10 HIGH JUMP LANDING PAD AND COVER

- P. High jump landing pad shall be Model HJ810DZ DURAZone® National High Jump Pad Equipment and accessories as manufactured and/or supplied by Sportsfield Specialties, Inc., 41155 State Highway 10, Delhi, NY 13753, (888) 975-3343.
- Q. Quantity: one (1)
- R. Components:
1. High jump pad landing system
 2. Base sections fabricated of nineteen ounce (19 oz.) heavy coated vinyl polyester scrim exterior that has a high tear and tensile strength and inner "Honeycomb" polyurethane foam core consisting of several different layers
 3. Vinyl seams double stitched using 6 lb. bonded polyester black thread
 4. Adjustable nylon straps with buckles and 8" hook and loop attachment reinforcement securely connects base sections

5. 2" wide nylon web handles for transport purposes
 6. Stainless steel snap hooks, buckles and "D" rings
 7. 2" thick foam top pad is covered with a heavy duty vinyl coated polyester mesh that is UV and spike resistant, various standard colors available – to be selected by the Owner
 8. Patented DURAZone® Advanced Synthetic Drainage and Impact System – to provide rapid water evacuation, grid pattern to increase air flow under the pad and to extend the life of the pad by reducing mildew, fungus growth and rotting, integrated and lightweight for ease of transport, set-up and storage
 9. Ten (10) year warranty on seams, handles and hardware attachments
- S. Provide nineteen ounce (19 oz.) heavy coated vinyl polyester scrim, all-weather cover
1. Color to be selected by the Owner.

2.11 LONG / TRIPLE JUMP LANDING PITS

- A. Furnish and install aluminum long / triple jump pit form meeting NFHS requirements and standards, including aluminum base forms and support grates, sand catchers, aluminum mat supports, synthetic mesh mat, hardware kit and accessories, designed to capture and hold sand expelled from jump pits during use.
1. Provide two (2) long / triple jump forms with sand catchers that shall be equivalent to Model SPSCHS JumpForm – High School 3 meter x 7 meter Sand Pit with Cover Ledges as manufactured by Sportsfield Specialties, Inc., 41155 State Highway 10, Delhi, NY 13753, (888) 975-3343.
 2. Sand: Round silica grains, free from lumps and deleterious substances of a size that when dry one-hundred (100%) percent shall pass a #20 sieve and not more than five (5%) percent shall pass #40 sieve.

2.12 LONG / TRIPLE JUMP TAKE-OFF BOARDS

- A. Long / triple jump boards shall be Model LTJT0B12IAAF, 12" Polyboard IAAF Take-off Board System with Replacement Blanking Lid as manufactured and/or supplied by Sportsfield Specialties, Inc., 41155 State Highway 10, Delhi, NY 13753, (888) 975-3343. Covers to accept track surfacing.
- B. Quantity: Eight (8), refer to Drawings
- C. Components:
1. 8" take-off board – 3/4" replaceable, synthetic white polyboard with textured surface
 2. 4" foul board – 1 1/2" replaceable, synthetic yellow polyboard capable of accepting plasticine
 - a. Four (4) packets of plasticine shall be provided for every board (32 packets total)
 - b. 1/8" formed aluminum spacer
 - c. Aluminum blanking lid (to receive 1/2" of resilient track surfacing – to be installed by track surfacing installer)
 - d. Stainless steel tray with leveling bolts and 1" PVC drain stub

2.13 HURDLES

- A. Provide all equipment and materials, and do all necessary work to furnish Model HRHSA, 41" Advanced High School Rocker Hurdle as manufactured and/or supplied by Sportsfield Specialties, Inc., 41155 State Highway 10, Delhi, NY 13753, (888) 975-3343, or approved equal.

- B. Quantity: Eighty (80)
- C. Components:
 1. Height adjustable to 30", 33", 36", 39", and 42" and meets NFHS tip over requirements at each height.
 2. White UV stabilized polycarbonate construction gateboard
 3. Custom gateboard lettering and/or graphics shall be provided.
 4. Rocker legs fabricated from 1.7" x 1.2" x .154" thick wall rolled aluminum with rectangular tube with radiused corners and fixed internal counterweights
 5. Welded cross support fabricated from 1-1/2" x 1" x .125" thick wall aluminum rectangular tube with radiused corners
 6. Gate tubes fabricated from 1-7/8" x 1-3/8" x 20.5"L powder coated aluminum tube. Color shall be selected by the Owner from manufacturer's list of standard colors
 7. Model specific hardware kit and installation instructions
- D. Hurdles shall be in full compliance with NFHS rules and regulations.

2.14 HURDLE CARTS

- A. Provide all equipment and materials, and do all necessary work to furnish Model, HLRCRT Universal Hurdle Cart for Rocker and "L" Shaped Hurdles as manufactured and/or supplied by Sportsfield Specialties, Inc., 41155 State Highway 10, Delhi, NY 13753, (888) 975-3343, or approved equal.
- B. Quantity: Eight (8) – Each cart shall store and transport up to ten (10) hurdles.
- C. Powder coat finish shall be selected by the Owner from manufacturer's list of standard colors
- D. Provide protective all-weather vinyl cover equivalent to Model HLCRTAWC47, Universal All-Weather Vinyl Cover for HLRCRT Hurdle Cart with custom graphics to be selected by the Owner. Eight (8) covers shall be provided – one for each cart.

2.15 STARTING BLOCKS

- A. Provide all equipment and materials and do all necessary work to furnish Model 410, G2 Starting Block as manufactured and/or supplied by Gill Athletics, Inc., 601 Mercury Drive, Champaign, IL 61822, (800) 637-3090, or approved equal.
- B. Quantity: Eight (8)
- C. Components:
 1. Adjustable pedal feature to 45°, 55°, 65°, and 75°
 2. Aircraft aluminum rail and 8" tall pedals
 3. ½" pyramid spikes for resilient track surfacing shall be included
 4. Pedal pad – color shall be selected by the Owner from manufacturer's list of standard colors
 5. Model specific hardware kit and installation instructions
- D. Meets NFHS, NCAA, World Athletics Specification and Certification

2.16 WEIGHTED TRACK CROSSING MAT

- A. Provide two (2) weighted track crossing mats at 15' wide x 40' long, Model TCM1540 – Weighted Track Crossing Mat as manufactured by Sportsfield Specialties, Inc., 41155 State Highway 10, Delhi, NY 13753, (888) 975-3343 or approved equal.
- B. Covers shall be black non-woven polypropylene geotextile material with a 19 oz. reinforced vinyl wrapped galvanized steel chain perimeter for ballast purposes. The color of the vinyl shall be selected by the Owner from the manufacturer's standard list of colors.

2.17 THROW CIRCLE RINGS

- A. Furnish and install reinforced discus throw ring equivalent to Model TRDAW, ¾" Depressed Pad Web Reinforced Discus Throw Ring equipment and accessories as manufactured and supplied by Sportsfield Specialties, Inc., 41155 State Highway 10, Delhi, NY 13753, (888) 975-3343 or approved equal.
 - 1. ¾" Depressed Pad web reinforced discus throw ring shall be/have:
 - a. Fabricated of 4" x ¼" thick rolled aluminum ring
 - b. Fabricated of 1" x 1" x 3/16" thick aluminum angle cross bracing
 - c. 98.5" inside diameter – discus
 - d. ¾" recessed concrete installation screed line
 - e. Aluminum web reinforcement model
 - f. Stainless steel assembly hardware
 - 2. Discus ring and pad shall be in full compliance with NFHS rules and regulations.
 - 3. Quantity: one (1), refer to Drawings.
- B. Furnish and install reinforced shot put throw ring equivalent to Model TRSPHAW, ¾" Depressed Pad Web Reinforced Shot Put and Hammer Throw Ring equipment and accessories as manufactured and supplied by Sportsfield Specialties, Inc., 41155 State Highway 10, Delhi, NY 13753, (888) 975-3343 or approved equal.
 - 1. ¾" Depressed Pad web reinforced throw ring shall be/have:
 - a. Fabricated of 4" x ¼" thick rolled aluminum ring
 - b. Fabricated of 1" x 1" x 3/16" thick aluminum angle cross bracing
 - c. 84" inside diameter – shot put and hammer
 - d. ¾" recessed concrete installation screed line
 - e. Aluminum web reinforcement model
 - f. Stainless steel assembly hardware
 - 2. Shot put ring and pad shall be in full compliance with NFHS rules and regulations.
 - 3. Quantity: One (1), refer to Drawings.

2.18 SHOT PUT TOE BOARD

- A. Furnish and install one (1) shot put toe boards, and associated accessories, designed for a ¾" depressed circle shot put pad. Boards shall be equivalent to Model SPTBCARHS as manufactured by Sportsfield Specialties, Inc., 41155 State Highway 10, Delhi, NY 13753, (888) 975-3343 or approved equal.
- B. Board shall be cast aluminum and powder coated white.

2.19 DISCUS CAGE

- A. Furnish and install one (1) High School Discus Cage and associated equipment and accessories. Cage shall be Model DCHSEA – High School Discus Cage with Extension Arms as manufactured by Sportsfield Specialties, Inc., 41155 State Highway 10, Delhi, NY 13753, (888) 975-3343 or approved equal.
1. Discus cage details as follows:
 - a. Upright Poles Fabricated of 4" O.D. x 1/8" (0.125") Thick Wall 6061 Aluminum Tube with 3' (36") Arced Rolled Offset, 14'-3 3/8" Above Finish Grade
 - b. Black Powder Coated Finish
 - c. Aluminum Net Attachment Extension Arms Fabricated of 3/8" x 4" x 36" Steel Flat Bar with Upright Pole U-Bolt Fastener shall be included.
 - d. Ground Sleeve Fabricated of 4.3" O.D., 4.1" I.D. Aluminum Pipe with Welded Leveling Plate, Alignment Bolt, and Ground Sleeve Plug
 - e. #36 Black Nylon Net, 1-3/4" Square Mesh with Rope Bound Perimeter, Optional Back-Up Net Systems shall be included
 - f. Retractable Pulley Systems includes Swivel Pulleys, Tethers, and Rope Cleats
 - g. High School Standard Size and Layout
 - h. Stainless Steel Assembly Hardware
 - i. Model Specific Hardware Kit and Installation Instructions
 2. Discus Cage Posts shall be installed in sleeves for easy removal of cage during the off-season. Provide sleeve caps and cap removal tool for when the cage is not installed.

2.20 WEIGHTED CORNER FLAGS

- A. Weighted corner flags shall be Model 6B1404, Premier Corner Flags as provided by Kwik Goal, 140 Pacific Drive, Quakertown, PA18951, (800-531-4252).
- B. Quantity: two (2) sets of four (4) flags

2.21 FIELD HOCKEY GOALS

- A. Field hockey goals shall be Model FHG, Field Hockey Goals and accessories as manufactured and/or supplied by Sportsfield Specialties, 41155 State Highway 10, Delhi, NY 13753, (888) 975-3343, or approved equal.
- B. Quantity: Four (4)
- C. Components:
1. One piece side frame construction fabricated of 2" x 2" x 0.090" thick wall square aluminum tubing, TIG welded
 2. Welded aluminum net clips with lifetime guarantee
 3. Super durable powder coated white finish with enhanced resistance to UV and fade
 4. Replaceable 1/2" black polyethylene bottom boards secured by top and bottom aluminum channels
 5. 7'H x 12'W x 4'D 2.5mm twisted black polyethylene net with 1.5" square mesh
 6. Provide and install one net per goal
 7. Stainless steel assembly hardware
 8. Model specific hardware kit and installation instructions

2.22 SOCCER GOALS

- A. Soccer goals shall be Model SG824R, 8' x 24' regulation size, round face soccer goals and accessories as manufactured by Sportsfield Specialties, 41155 State Highway 10, Delhi, NY 13753, (888) 975-3343, or approved equal.
- B. Quantity: Six (6)
- C. Components:
 1. Top crossbar shall be fabricated of 6061-T6 extruded aluminum tube having the following attributes:
 - a. Length: 24'-0" – regulation size
 - b. 4.375" square x 4.688" round faced crossbar, 0.1875" wall thickness
 - c. Super durable powder coated white finish with enhanced resistance to UV and fade
 - d. 3/16" (0.1875") thick formed aluminum channel crossbar attachment brackets with welded tap blocks, mill finish
 2. One piece end frame construction fabricated of 6061-T6 extruded aluminum tube having the following attributes:
 - a. 4.375" square x 4.688" round face corner post, 8'-0" high, 3/16" (0.1875") wall thickness
 - b. Rolled side frame, 2' x 3" x 0.125" thick wall, TIG welded to corner upright posts
 - c. Radius backside corners
 - d. Super durable powder coated white finish with enhanced resistance to UV and fade
 3. Rear bottom ground bar fabricated of 6061-T6 extruded aluminum tube having the following attributes:
 - a. 2" x 2" x 0.25" thick wall with welded ½" aluminum end plates
 - b. Super durable powder coated white finish with enhanced resistance to UV and fade
 4. Accessories to be included are as follows:
 - a. Welded aluminum net clips with lifetime guarantee
 - b. Provide and install two (2) 5mm braided, knotless white high tenacity polypropylene soccer net with rope bound perimeter a 4" square mesh (8.2'H x 24.4'L x 4.3'B x 8.6'D)
 - c. Provide two (2) back-up nets
 - d. Model specific hardware kit and installation instructions
 5. Goal shall meet and exceed current ASTM F2950-14 Standard Safety and Performance Specifications for soccer goals and F1938-98 Standard Guide for Safer Use of Movable Soccer Goals
 6. Goal shall have a five (5) year limited manufacturer's product warranty
 7. Goals shall come complete with SGMobile® SGMKR – Internal soccer goal portable wheel kit and handle:
 - a. Welded 13 gauge stainless steel frame
 - b. Ultra-high molecular weight polyethylene (UHMWPE) plastic wheel
 - c. Stainless steel hardware
 - d. Roll formed stainless steel rod with stainless steel spring and cushioned rubber handle
- D. Provide six (6) Saddle Anchor Bags, Model 10B3606 as provided by Kwik Goal Ltd., 140 Pacific Drive, Quakertown, PA 18951, (800) 531-4252, or approved equal.

2.23 20' FOUL POLES

- A. 20' Foul Poles with Visibility Wing, shall be equivalent to Model FPW420 – 20' Foul Pole with Wing as manufactured by Sportsfield Specialties, Inc., 41155 State Highway 10, Delhi, NY 13753, (888) 975 – 3343.
 1. Foul Poles shall be powder coated white at softball fields; yellow at baseball.
 2. Ground sleeve to be 4" O.D. and 30" in length.
 3. Wing shall be powder coated to match pole. Bottom of wing shall be +/- 2" above chain

link fence top rail that will be installed in line with the foul pole, refer to Drawings for fence heights.

4. Refer to Drawings for quantity and locations of foul poles.

2.24 30' FOUL POLES

- A. 30' Foul Poles with Visibility Wing, shall be equivalent to Model FPW630 – 30' Foul Pole with Wing as manufactured by Sportsfield Specialties, Inc., 41155 State Highway 10, Delhi, NY 13753, (888) 975 – 3343.
 1. Foul Poles shall be powder coated yellow at baseball.
 2. Ground sleeve to be 6-5/8" O.D. and 48" in length.
 3. Wing shall be powder coated to match pole. Bottom of wing shall be +/- 2" above chain link fence top rail that will be installed in line with the foul pole, refer to Drawings for fence heights.
 4. Refer to Drawings for quantity and locations of foul poles.

2.25 BASES

- A. Bases shall be equivalent Model SHIBD – Hollywood Impact Double First Base Set, as provided by Sportsfield Specialties, Inc., PO Box 231, 41155 State Highway 10, Delhi, NY 13753, (888) 975 – 3344.
- B. Bases shall come complete with 6' stanchion and associated anchors and ground plugs.
- C. Provide five (5) sets of three (3) bases with anchors and rubber plugs. Refer to Drawings for locations.
- D. Baseball fields shall receive Green double first base; Softball fields shall receive Orange double first base

2.26 HOME PLATE

- A. Home Plate shall be equivalent to Hollywood MLB Pro Style Home Plate – Model SHP-UM as provide by Sportsfield Specialties, Inc., PO Box 231, 41155 State Highway 10, Delhi, NY 13753, (888) 975 – 3344.
 1. Each plate shall have:
 - a. 7" stanchion
 - b. ground anchor
 - c. anchor plug
 - d. five (5) zinc plated mounting spikes
- B. Refer to Drawings for location of home plates to be installed.
- C. Quantity: Fifteen (15).

2.27 PITCHING RUBBER

- A. Pitcher's Rubber shall be equivalent to Schutt 24" long x 6" wide, four (4) sided Professional Pitching as provided by Sportsfield Specialties, Inc., PO Box 231, 41155 State Highway 10, Delhi, NY 13753, (888) 975 – 3344.
- B. Refer to Drawings for location of pitching rubbers to be installed.
- C. Quantity: Fifteen (15).

2.28 DUGOUT STORAGE UNITS

- A. Provide one (1) Dugout (bat and helmet) Storage Units for each varsity dugout (four (4) total), as indicated on the Drawings, Model SUAHCBBSS as manufactured by Sportsfield Specialties, Inc., PO Box 231, 41155 State Highway 10, Delhi, NY 13753,

(888) 975 – 3344.

1. Standard Size Cabinet 90.0” x 48.0” x 36” deep.
2. Provide one (1) 19oz. heavy coated vinyl cover for each dugout/team area storage unit – four (4) total. Model SUWHCBSSC as provided by Sportsfield Specialties, Inc., PO Box 231, 41155 State Highway 10, Delhi, NY 13753, (888) 975 – 3344.
 - a. Colors shall be selected from manufacturer’s standard color list.
 - b. Custom graphics shall be applied to the cover. Electronic files of graphics shall be supplied to the Contractor upon request.

2.29 DUGOUT SHELF AND COAT RACK UNITS

- A. Provide three (3) Dugout Shelf and Coat Rack Units per dugout/team area (twelve (12) total), Model SUWCRSWM as manufactured by Sportsfield Specialties, Inc., PO Box 231, 41155 State Highway 10, Delhi, NY 13753, (888) 975 – 3344.
- B. Installation location on interior dugout/team area walls shall be determined in the field with Owner and Owner’s Representative.

2.30 BASEBALL DUGOUT GUARD RAIL SYSTEM

- A. Provide custom height GRS54 Guardrail System and Accessories by Sportsfield Specialties, Inc., P.O. Box 231, 41155 State Highway 10, Delhi, NY 13753, 1-888-975-3343, or approved equal.
- B. Components:
 1. Modular Steel Structure consisting of variable length modules with top, mid, and bottom horizontal rails, equally spaced vertical posts and base plates. Fabricated using the following components with the following attributes:
 - a. 54”H (O.A.) 2” Square x 11ga (.120”) Thick Wall Structural Steel Tube Posts with Factory Pre-Drilled 7” x 7” x 3/8” (.375”) Steel Mounting Plates. Posts at Module Connections are Created by Two (2) Adjacent Tubes and Two (2) Half Size Base Plates
 - b. Four (4) 3/8” Diameter x 5”L Wedge Anchors per Base Plate Fasten Railing Modules to Concrete
 - c. 2” Square x 11ga (.120”) Thick Wall Structural Steel Top Rail Running Across the Entire Module Length
 - d. 2” Square x 11ga (.120”) Thick Wall Structural Steel Bottom and Mid Rails Between Posts
 - e. Fully Welded Modules with Factory Pre-Drilled Holes for Stainless Steel Bolt Module to Module Connection to Assist Installation
 - f. Super Durable Powder Coated Black Finish with Enhanced Resistance to UV and Fade.
 2. Guard Rail Padding System consisting of squared guard rail padding on exposed perimeter edges, flat padding on posts, bottom railing and mid railing.
 - g. Three (3) – faced Squared Padding. 6”H Front and Rear Faces, 6-1/8”W Top Face. All Faces Consist of Vinyl Covering, Foam and Rigid Sheathing
 - h. 6”W Single Face Flat Padding Consisting of Vinyl Covering, Foam and Rigid Sheathing
 - i. Outdoor Vinyl Encasement:

- i. High UV Resistance
- ii. Total Weight: 18 oz./yd² (ASTM D3776)
- iii. Construction: 84% Vinyl Coating, 16% Polyester Fabric (ASTM D751)
- iv. Tongue Tear: Warp 93 lbs., Fill 68 lbs. (ASTM D751)
- v. Grab Tensile: Warp 232 lbs., Fill 213 lbs. (ASTM D751)
- vi. Adhesion: Warp 28 lbs/in, Fill 40 lbs/in (ASTM D751)
- vii. Abrasion: > 1000 Cycles (ASTM D3389-94)
- viii. Cold Crack: -49° F (ASTM D2136)
- ix. Rot, Mildew and Fungus Resistant: Yes
- x. Flame Resistance: None
- xi. Color: as selected by Landscape Architect from Manufacturer's full range.

d. 1.25" Thick High Density Polyethylene Cross-Link Closed Cell Foam

3. Ultra Cross® Knotless Dyneema® UHMWPE Netting

2.31 SOFTBALL DUGOUT GUARD RAIL SYSTEM

C. Provide 8' high GRS96 Guardrail System and Accessories by Sportsfield Specialties, Inc., P.O. Box 231, 41155 State Highway 10, Delhi, NY 13753, 1-888-975-3343, or approved equal.

D. Components:

1. Modular Steel Structure consisting of variable length modules with top, mid, and bottom horizontal rails, equally spaced vertical posts and base plates. Fabricated using the following components with the following attributes:
 - j. 96"H (O.A.) 2" Square x 11ga (.120") Thick Wall Structural Steel Tube Posts with Factory Pre-Drilled 7" x 7" x 3/8" (.375") Steel Mounting Plates. Posts at Module Connections are Created by Two (2) Adjacent Tubes and Two (2) Half Size Base Plates
 - k. Four (4) 3/8" Diameter x 5"L Wedge Anchors per Base Plate Fasten Railing Modules to Concrete
 - l. 2" Square x 11ga (.120") Thick Wall Structural Steel Top Rail Running Across the Entire Module Length
 - m. 2" Square x 11ga (.120") Thick Wall Structural Steel Bottom and Mid Rails Between Posts
 - n. Fully Welded Modules with Factory Pre-Drilled Holes for Stainless Steel Bolt Module to Module Connection to Assist Installation
 - o. Super Durable Powder Coated Black Finish with Enhanced Resistance to UV and Fade.
2. Guard Rail Padding System consisting of squared guard rail padding on exposed perimeter edges, flat padding on posts, bottom railing and mid railing.
 - p. Three (3) – faced Squared Padding. 6"H Front and Rear Faces, 6-1/8"W Top Face. All Faces Consist of Vinyl Covering, Foam and Rigid Sheathing
 - q. 6"W Single Face Flat Padding Consisting of Vinyl Covering, Foam and

- r. Rigid Sheathing
Outdoor Vinyl Encasement:
 - xii. High UV Resistance
 - xiii. Total Weight: 18 oz./yd² (ASTM D3776)
 - xiv. Construction: 84% Vinyl Coating, 16% Polyester Fabric (ASTM D751)
 - xv. Tongue Tear: Warp 93 lbs., Fill 68 lbs. (ASTM D751)
 - xvi. Grab Tensile: Warp 232 lbs., Fill 213 lbs. (ASTM D751)
 - xvii. Adhesion: Warp 28 lbs/in, Fill 40 lbs/in (ASTM D751)
 - xviii. Abrasion: > 1000 Cycles (ASTM D3389-94)
 - xix. Cold Crack: -49° F (ASTM D2136)
 - xx. Rot, Mildew and Fungus Resistant: Yes
 - xxi. Flame Resistance: None
 - xxii. Color: as selected by Landscape Architect from Manufacturer's full range.
 - d. 1.25" Thick High Density Polyethylene Cross-Link Closed Cell Foam
3. Ultra Cross® Knotless Dyneema® UHMWPE Netting

2.32 BATTING TUNNELS

- A. Provide Custom Double Tension Baseball Batting Tunnel, Model BTTBD, as manufactured by Sportsfield Specialties, Inc., 41155 State Highway 10, Delhi, NY 13753, (888) 975 – 3343, or approved equal. Refer to Drawings for proposed layout.
- B. Provide Double Tension Softball Batting Tunnel, Model BTTSD, as manufactured by Sportsfield Specialties, Inc., 41155 State Highway 10, Delhi, NY 13753, (888) 975 – 3343, or approved equal. Refer to Drawings for proposed layout.

2.33 TWO-TIER TEAM BENCHES

- A. Permanent Two-tier polyboard team benches (10' long) shall be Model PTBTT10, as manufactured by Sportsfield Specialties, Inc., 41155 State Highway 10, Delhi, NY 13753, (888) 975 – 3343, or approved equal.
 - 1. Bench shall be constructed of synthetic polyboard planking on an aluminum frame.
 - 2. Polyboard and aluminum frame colors shall be selected by the Owner from the Manufacturer's list of standard colors.
 - 3. Quantity: Twelve (12).

2.34 SINGLE-TIER TEAM BENCHES

- C. Portable single-tier polyboard team benches with backrest (12' long) shall be Model PTBBRBT12, as manufactured by Sportsfield Specialties, Inc., 41155 State Highway 10, Delhi, NY 13753, (888) 975 – 3343, or approved equal.
 - 1. Bench shall be constructed of synthetic polyboard planking on an aluminum frame.
 - 2. Polyboard and aluminum frame colors shall be selected by the Owner from the Manufacturer's list of standard colors.
 - 3. Quantity: Thirty (30).

2.35 BACKSTOP FENCE PADDING

- A. Padding Panels shall be equivalent to BaseZone® Field Wall Padding, chain link attachment with digitally printed graphics, Model #BFWPCL44DG, as manufactured by Sportsfield Specialties, Inc., PO Box 231, 41155 State Highway 10, Delhi, NY 13753, (888) 975 – 3344.
1. Padding panels shall be custom manufactured in height and in the length as indicated on the Drawings to properly fit the backstop fence.
 2. Colors shall be selected by the Owner from the Manufacturer’s list of standard colors during the submittal review process.
 3. Contractor shall carry pricing for custom digitally printed graphics on 25% of all proposed padding.

2.36 BATTER’S EYE

- D. Batter’s Eye at Varsity Baseball Field shall be Model PBESR3060S – 30’x60’ Single Sided Solid Surface Batter’s Eye with Ribbed Profile Wall Panels and Exposed Fasteners, as manufactured by Sportsfield Specialties, Inc., 41155 State Highway 10, Delhi, NY 13753, (888) 975 – 3343, or approved equal.
1. Overall System Dimensions: 30’H x 60’W
 - a. Panel Height: 26’-4”
 2. Vertical Structure:
 - a. Exterior Columns:
 - 1) W12x45 Steel I-Beams
 - 2) Super Durable Powder Coated Finish
 - a. Various Standard Colors Available
 - 3) 5’ Embedment Depth (typ.)
 - b. Interior Column:
 - 1) W12x50 Steel I-Beam
 - 2) Super Durable Powder Coated Finish
 - b. Various Standard Colors Available
 - 3) 6’ Embedment Depth (typ.)
 - c. 30’ Height Above Finish Grade
 3. Horizontal Structure:
 - a. Top and Bottom Beams:
 - 1) W12x26 Steel I-Beam
 - 2) Super Durable Powder Coated Finish
 - c. Various Standard Colors Available
 - b. Horizontal Girts:
 - 1) 4” Square x 11ga Steel Tube
 - 2) Bolted to Welded Steel Angles
 - 3) Spacing: 3’-8 5/8” o.c.
 - 4) Super Durable Powder Coated Finish
 - d. Various Standard Colors Available
 4. Wall Panels (Front Side Only):
 - a. Low Ribbed Profile Exposed Fastener Metal Wall Panels
 - 1) MCBI® PBU 36” W 26 Gauge Metal Panels
 - 2) Galvalume® Coated with Signature 300® Two-Coat Fluoropolymer Finish
 - 3) Finish Available in Various Standard Colors
 - 4) Exposed Rear of Panels are Bare Primer White
 - 5) Panels Field Assembled with Side Laps
 - 6) Fastened to Horizontal Girts with Exposed Fasteners Painted to Match Paneling

- b. Top, Bottom and Side Metal Trim with Attachment Hardware Included (Front Side Only)
- 5. Includes Side Wind Shield and All Necessary Assembly Hardware
- 6. Manufacturer to Provide Stamped and Sealed Drawings and Calculations by a Licensed Professional Engineer of Record in the State of Delaware.

2.37 PORTABLE BATTING CAGE

- A. Portable Baseball Batting Cage shall be Model #101-765-129BK – Big Bubba Elite Portable Batting Cage, as provided by Beacon Athletics, 901 Deming Way, Ste 101, Madison, WI 53717, (800-747-5985).
- B. Quantity: one (1)
- C. Color to be selected from manufacturer’s standard availability

2.38 TENNIS POSTS

- A. Tennis posts shall be the Edwards Wimbledon Tennis Post, 3” square steel post with an internal brass winder mechanism and removable handle as provided by N.J.P. Sports Inc., 548 West Arden Avenue, Glendale, California 91203, or approved equal.
- B. All tennis posts to have galvanized ground sleeves as provided by the post manufacturer.
- C. All tennis posts to be colored black.
- D. Contractor to furnish and install, refer to plans for quantity.

2.39 TENNIS NETS

- A. Tennis nets shall conform to the guidelines established by the United States Tennis Association, Officials Department, 70 West Red Oak Lane, White Plains, NY.
- B. Tennis nets shall be the Edwards #40LS Tennis Net (Model #2002) as provided by N.J.P. Sports Inc., 548 West Arden Avenue, Glendale, CA 91203, (800) 773-4657, or approved equal. One net made of 3.5mm braided polyethylene cord and featuring a 5-year limited warranty shall be provided for each court.
- C. Contractor to furnish and install, refer to plans for quantity.

2.40 CENTER STRAP AND ANCHOR (TENNIS)

- A. Center Strap shall be Center Net Strap (Model #2041) as provided by N.J.P. Sports Inc., 548 West Arden Avenue, Glendale, CA 91203, (800) 773-4657, or approved equal.
- B. Center strap anchor shall be a heavy-duty zinc plated ground anchor with a pin in the top for center strap hook-up.
- C. Contractor to furnish and install, refer to plans for quantity.

2.41 ELECTRICAL/TELECOMMUNICATIONS TRACK & FIELD BOX

- A. Multi-purpose junction box shall be Model CBIT1830 ComBox® for synthetic infill turf as manufactured by Sportsfield Specialties, Inc., 41155 State Highway 10, Delhi, NY 13753, (888) 975 – 3343, or approved equal.
 - 1. Box cover shall be capable of receiving infilled synthetic turf.
 - 2. Quantity: one (1) – refer to plans for locations at Secondary Turf Field
 - 3. Refer to Electrical Plans and Specifications for conduit and wiring connections.
- B. Multi-purpose junction box shall be Model CBTS1830 ComBox® for poured/paved

synthetic track surface, as manufactured by Sportsfield Specialties, Inc., 41155 State Highway 10, Delhi, NY 13753, (888) 975 – 3343, or approved equal.

1. Box cover shall be capable of receiving track surface.
2. Quantity: ten (10) – refer to plans for locations at Track & Field Stadium.
3. Refer to Electrical Plans and Specifications for conduit and wiring connections.

2.42 QUICK COUPLER VALVE TRACK & FIELD BOX

- A. Quick Coupler junction box shall be Model TCITQCV Quick Connect Water Valve Box for synthetic infill turf as manufactured by Sportsfield Specialties, Inc., 41155 State Highway 10, Delhi, NY 13753, (888) 975 – 3343, or approved equal.
 1. Box cover shall be capable of receiving infilled synthetic turf.
 2. Quantity: two (2) – refer to plans for locations at Secondary Turf Field
- B. Quick Coupler junction box shall be Model TCITQCVHD Quick Connect Water Valve Box for track surfacing as manufactured by Sportsfield Specialties, Inc., 41155 State Highway 10, Delhi, NY 13753, (888) 975 – 3343, or approved equal.
 1. Box cover shall be capable of receiving track surface.
 2. Quantity: two (2) – refer to plans for locations at Track & Field Stadium

2.43 TURF MANHOLE COVER

- C. Turf Manhole Cover box shall be Model TMHAFIT40 Manhole Access Frame Kit with Infill Retainer System for Synthetic for synthetic infill turf as manufactured by Sportsfield Specialties, Inc., 41155 State Highway 10, Delhi, NY 13753, (888) 975 – 3343, or approved equal.
 1. Box cover shall be capable of receiving infilled synthetic turf.
 2. Quantity: two (2) – refer to plans for locations at Track & Field Stadium

PART 3 – EXECUTION

3.01 GENERAL

- A. General: Installation/materials for all items in this section shall meet the applicable requirements of the:
 1. American Sports Builders Association
8480 Baltimore National Pike, #307
Ellicott City, MD 21043
(888) 501- 2722
 2. National Collegiate Athletic Association
6201 College Boulevard
Overland Park, KS 66211-2422
(913) 339-1906
 3. Delaware Interscholastic Athletic Association
John W. Collette Education Resource Center
35 Commerce Way, Suite 1
Dover, DE 19904
(302) 857-3365
 4. National Federation of State High School Associations

P.O. Box 690
Indianapolis, IN 46206
(317) 972-6900

3.02 ATHLETIC EQUIPMENT

- A. Furnish, assemble and install per manufacturer's recommendations and approved shop drawings.

END OF SECTION

SECTION 13 12 50
GRANDSTANDS, BLEACHERS, AND PRESS BOX

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. Provide outdoor permanent grandstands, bleachers, and press box as detailed in these performance specifications. Drawings are required with the bid for clarification of design intent.
- B. Provide necessary engineering, materials, freight, installation, and supervision to provide grandstand seating systems in accordance with the following performance criteria.

1.02 PERFORMANCE CRITERIA

- A. The minimum acceptable standards of design are:
 - 1. Grandstand Design to match bid plans and details submitted.
 - a. Home Side Grandstand – Full Custom I-Beam System to be elevated 8'-0" to an Accessible platform with a depth of 15'-10". Seating area to be elevated 5'-5" above the platform. Rise/run per row is 13" rise and 26" treads. Grandstand is 16/19 rows at 240'-0" long. The last row only has painted aluminum backrests. Rear walkway is 5'-0" deep.
 - b. Visitor Side Grandstand – Leg Truss Style System to be elevated 42" to the front walkway with a depth of 6'-2". Rise/run per row 8" rise and 24" treads. The grandstand has 16 rows and at 138' long. The center portal exit was added per code requirements.
 - c. Auxiliary Field Bleachers – (2) non-elevated angle frame bleacher units. They have a rise per row of 8" and tread depths of 24". The bleacher units are 5 rows by 45' long.
 - d. Baseball / Softball Bleachers – (4) non-elevated angle frame units. They have a rise per row of 8" and tread depths of 24". The bleacher units are 8 rows by 45' long.
 - e. Tennis Bleachers – (2) non-elevated "A" shaped angle frame units to face courts on both sides. The overall number of rows is 3 per side (total of 6 rows per unit). They have an 8" rise per row and tread depths of 24". The ends of these units are to be closed with a galvanized steel plate, welded to the end frames. The units are 21' long.
 - 2. Decking System
 - a. Home Side Grandstand to be fully closed interlock decking system with secondary gutters as located on the plans. The gutters require double stingers at gutter locations +/-12" apart.
 - b. Visitor Side Grandstand to be fully closed interlock decking system without the secondary gutters.
 - c. The Auxiliary, Baseball, Softball, and tennis Bleachers to be of a semi-closed deck configuration with closure angles using an aluminum tongue and groove treads
 - 3. Aisle layout is per schematic plans. There shall be center aisle rails or end aisle rails per code.
 - 4. Handicap seating areas per schematic plans and in accordance with local, state and national guidelines.
 - 5. Finishes
 - a. All steel substructure is to be galvanized steel
 - 1) Home side Grandstand to have duplex coating on rear vertical columns, horizontal beams, and crossbracing. Also, provide this coating on the stringers at the ends of the grandstand. Duplex coating consists of a factory-applied

- galvanizing process with a painted finish. Power coating alone will not meet the proper protection of the steel.
- b. Riser boards to be Dur-Kyn painted finish from standard colors.
 - c. Black painted aluminum aisle nosing strips at aisles and stairs risers.
 - d. Perimeter rails
 - 1) Home and Visitor Grandstands – (At back of stands and at press box and/or film platforms) as noted per plans - Aluminum vertical rail risers with horizontal pipe, stretcher bars and clamps all to be painted black. Fastening Hardware to be galvanized steel.
 - 2) Home and Visitor Grandstands along the front, sides, and at all exits to be 6-gauge black vinyl 2” mesh fencing with Aluminum vertical rail risers with horizontal pipe, stretcher bars and clamps all to be painted black. Fastening Hardware to be galvanized steel.
 - 3) All remaining bleachers to have galvanized steel or aluminum vertical rail risers with clear anodized horizontal pipe, galvanized fittings and hardware with 6-gauge black vinyl 2” mesh fencing.
6. Aluminum footboards added to the standard mill finish is an applied Premium traction coating system. Provide a premium traction finish that achieves a “high traction” rating as defined by the ANSI/NFSI B 101.1 standards with a minimum of .80 slip co-efficiency rating. The premium traction system must be verified, tested, and proven. Finishes must prevent any surface oxidation staining. Required on all grandstand and bleacher footboards, stairs, and ramps.
 7. Front façade on both home and visitor stands to be dur-kyn high performance painted finish aluminum riser boards with concealed fasteners. Locations of façade riserboard materials
 - a. Front of Home grandstand, sides and roof of field level portal, elevated area at the back of the accessible platform, closure below press box, sides and back of end ramps.
 - b. Front of Visitor grandstand and side of end stair unit.
 8. Home Side stand Column Line “B” are to be galvanized steel tube columns
 9. Press box – 10’-0” deep by 36’ wide (Home Side)
 - a. Steel framed – sloped front
 - b. Two side landings
 - c. Rails at film platform and side landing platforms to be all black finished vertical picket rails
 - d. Provide drink rails at the front of the side landing platforms
 - e. Two internal partitions with side-to-side viewing glass
 - f. End glass panels to match the slope
 - g. Internal ship's ladder with roof hatch access to film platform
 - h. Full steel-framed rooftop canopy cover over film platform area
 - i. Heat / Air conditioning wall-mounted PTAC units per plans
 - j. Standard finished per drawings and specifications below.
 10. Filming Platform with Roof – 8’-0” by 30’-0” wide (Visitor Side)
 - a. Steel-framed roof canopy
 - b. Rails to be black finished vertical picket rails
 11. Mesh Panels at the back of the stand with graphic letters and logo
 - a. Provide an architectural Megothly system exterior flexible shade pattern system at the back of the stand as noted on the rear elevation plan.
 - b. Finish of mesh, Spade bolts and hardware to be stainless steel
 - c. Graphics to be per bid document renderings.

- B. Signage
 - 1. Properly label all handicap seating areas
- C. An AISC certified steel fabricating plant is a requirement of this project for quality control and assurances. See Section Quality Assurance, C.
- D. Stairs and ramps per plans and in accordance with State and Local codes and guidelines.

1.03 RELATED WORK/ RELATED SECTION

- A. In accordance with plans and specifications:
 - 1. Concrete Foundations/Pads (By G.C.)
 - 2. Main electrical feed and final hook-up to press box (By Electrical Contractor)
 - 3. Press box Sound System (By Electrical Contractor)
 - 4. Surveying, site preparation and final grading (By G.C.)
 - 5. Access to the site for installation equipment and staging (By GC.)

1.04 QUALITY ASSURANCE

- A. Manufacturers Qualifications:
 - 1. Manufacturers must have a minimum of ten years of experience in the manufacturing of grandstands and press boxes under current company name.
 - 2. Manufacturer must provide five references of similar projects within the State of DE. References shall include scope of work, contract amount, owner's name and phone numbers, contract completion date and actual completion date.
- B. Welders must be AWS certified; manufacturing capabilities in accordance with the governmental agencies having jurisdiction.
- C. Steel fabrication to be done in an AISC certified plant or in compliance with IBC Chapter 17. A third party AISC approved inspection agency must be hired to complete and properly document these inspections. The agency must disclose any possible conflicts of interest so that objectivity can be confirmed. Certified reports shall be submitted directly to the architect for confirmation. All associated costs shall be inclusive with the manufacturers bid.
- D. Installers Qualifications:
 - 1. Factory-trained and experienced in the installation of grandstands.
 - 2. Source Quality Control: Mill Test Certification.
 - 3. Single Source Responsibility: Obtain all of each distinct material required from a single manufacturer.
- E. Code Compliance: Provide aluminum bleachers to meet or exceed all State and Local applicable codes and in compliance with the International Building Code and the IBC/ICC National Code and CABO/ANSI A117.1 Barrier Free Sub code, Current Adopted Edition.

1.05 SUBMITTALS

- A. Product Data: Submit technical data for each distinct type of material, component and accessory indicated.
 - 1. Include information which specifically details physical properties and performance characteristics.
- B. Shop Drawings: Manufacturer to submit shop drawings with the bid. After award submittal drawings should be submitted with structural design calculations signed and sealed by a licensed Professional engineer (state of project location), and schedules for type, location, quantity and details of all aluminum components required for this project.
 - 1. Indicate on shop drawings that products are in compliance with International Building Code and all other State and Local Codes and Regulations.
 - 2. Concrete designed per American Concrete Institute Guidelines
 - 3. Samples: Submit manufacturer's samples upon request.

- C. Certificate: Submit manufacturer's certification that materials furnished comply with requirements indicated and also in compliance with the International Building Code along with all other applicable Federal, State and local codes, and that materials meet or exceed test requirements indicated.

1.06 WARRANTY

- A. Submit a written warranty signed by the manufacturer, installer, and the contractor, guaranteeing to correct failures for a period of one (1) year after substantial completion, without reducing or otherwise limiting any other rights to correction which owner may have under the contract documents. Failures are defined to include faulty workmanship or faulty materials. Correction may include repair or replacement.

1.07 BUILDING CODES

- A. Comply with all applicable which includes but not limited to the following:
 1. International Building Code- Current Adopted Edition
 2. AISC Manual of Steel Construction, 9th Edition
 3. Aluminum Association of America Guidelines
 4. International Building Code Guidelines for Accessibility, Current Edition
 5. American Concrete Institute
 6. **COMcheck approval required for the Press box using the 2015 energy conservation code**
- B. The bleacher shall be designed to support, in addition to its own weight, a uniformly distributed live load of not less than 100 pounds per square foot of gross horizontal projection of the bleacher. And 6 pounds per square foot of dead load on seats, footboards, risers and steel framing.
- C. All seat and footboard members shall be designed to support not less than 120 pounds per linear foot. The bleacher shall be designed to resist, with or without live load, horizontal wind load appropriate for local conditions. It shall also be designed to resist, in addition to the live load, sway forces applied to the seats in a direction parallel to the length of the seat planks 24 pounds per liner foot; and, in a direction perpendicular, stresses in aluminum members and connections shall not exceed those specified for Building Type Structures by the Aluminum Association.
- D. General: The structure shall be properly braced for wind and construction loads until all structural elements are secured. Lateral and longitudinal bays shall be cross-braced as required. Guardrails shall be of adequate size, location, and height to meet specified codes and designed to carry required loads. Exit stairs and intermediate aisle stairs shall be completely closed, in the direction of travel and shall have a maximum rise of 7” and a minimum tread of 11”.
- E. Code Compliance: Submittals shall be based upon specifications and drawings contained in the bid documents. Architect will not review any design or product changes prior to the bid date. Design changes to reduce overall aisle egress calculations or number of stair and ramp exits will not be allowed. All bidders must bid in accordance with these specifications.
 1. The Bleacher Contractor shall be responsible to meet the code interpretation provided in the bid documents and modify as required by state or local governmental review boards.
 2. Calculations that demonstrate code compliance with egress and exit of aisles, stairs, and ramps are a required submission with approved drawings.

1.08 MAINTENANCE

- A. Manufacturer's Recommendations:

1. Owner conduct annual visual inspection and required maintenance of grandstand and press box to assure safe conditions.
2. It is also recommended that a professional engineer, registered architect or certified grandstand representative performs inspections biennially.

PART 2 - PRODUCTS

2.01 PRODUCT MANUFACTURERS

- A. The intent of this specification is to only for bidders that can prove they meet the performance criteria. Basis of design is the Southern Bleacher Company, Graham, TX.
- B. Products specified herein have been selected because of their quality of construction, configuration, design, function, available finishes, components, accessories, dimensions, shape and style.
- C. Manufacturers bidding will be held financially responsible for adhering to the products performance criteria herein. No additional money will be allocated after award nor consideration given for non-compliance with the specified products.
- D. Only the Architect/Owner reserves the right to accept or approve Bleacher manufacturers.

2.02 PERMANENT STEEL GRANDSTAND AND BLEACHER SYSTEMS

- A. Product Description Home AND Visitor Side Interlock Decking System, (bleachers to be tongue and groove semi-closed decking with angle closures, per plans) –
 1. The intent of the product design is to reduce and minimize the deflection of the aluminum deck and allow for future reconfiguration of seating as may be needed. All individual deck members shall be fitted together longitudinally at all tread, front walk and cross walk locations. This design, in ambient conditions, allows for expansion and contraction without damage or deformation of the aluminum deck. All deck members shall be secured with two hold down clips at each structural member.
 2. Galvanized steel elevated permanent I-Beam home grandstand home and leg truss, visitor
 3. Framing and spacing of all columns to follow the drawings. Crossbracing will be within every other bay starting with the end section.
 4. Front Walkway:
 - a. Depth of the front walkway, per plans is to be 6'-2" from front fence to first row.
 - 1) Grandstand: Elevated per plans.
 5. Entry stairs to be firmly anchored to uniformly poured concrete bases.
 - a. Stair rise: 7 inches (max) per Building Code with vertical aluminum closure.
 - b. Stair tread depth: 11 inches (min) per Building Code with contrasting extruded aluminum aisle nosing at leading edge of each tread.
 - c. Guardrails on Stair to be 42 inches above leading edge of step with two- line anodized aluminum rail and filled with 6-gauge black vinyl coated chain link fence (2" mesh).
 - d. Stairs to have offset handrail extensions on each side of stair. The handgrip portion of handrails shall not be less than 1 1/2 inches or more than 2 inches in cross-sectional dimension or the shape shall provide an equivalent gripping surface. The handgrip portion of handrails shall have a smooth surface with no sharp corner. The top of handrails and handrail extensions shall be placed not less than 34 inches or more than 38 inches above the nosing of treads and landings. Handrails shall be continuous the full length of the stairs and shall extend in the direction of the stair run not less than 12 inches beyond the bottom riser. Ends shall be returned or shall terminate in newel posts or safety terminals. Handrails shall be extruded anodized aluminum.

6. Aisles:
 - a. Aisles with seating on both sides to have 34-inch high handrail with intermediate rail at approximately 22 inches above tread. Aisles with seating on one side shall have 34-inch high handrail attached to guardrail system. Handrail shall be mounted to provide clearance from guardrail system in accordance with building code.
 - b. Pre-fabricated anodized aluminum handrails with continuous rounded ends are discontinuous to allow access to seating through a space 22 inches (min.) to 36 inches (max.).
 - 1) Handrails shall connect to decking / riser surface without penetration of the deck system. Any attachment which must have holes drilled through the decking or intermediate step members is not acceptable.
 - 2) If half steps are required, these steps shall be constructed of the same materials as the treads and risers of the grandstands. Ends shall be completely closed and attached with same mechanical fasteners as used for seat brackets. Extruded aluminum contrasting aisle nosing shall be mechanically fastened to the leading edge of each step.
7. Aluminum Decking System:
 - a. Bleachers: rise per and tread depth per plans.
 - b. Each seat 17 inches above its respective tread.
 - c. Decking Arrangement interlock decking home grandstand - per section plans
 - d. The seats shall be 2 x 10 flat designed extruded aluminum alloy, 6063-T6 with clear anodized 204R1, AA-M10C22A31, Class II finish. Seats shall have serrations on top side to allow for safety of occupants.
 - e. The intent of the product design is to reduce deflection of aluminum deck and to minimize fluid drainage below spectator seating.
 - f. All individual deck members shall be locked together longitudinally at all treads, front walk and cross walk locations.
 - g. This design, in ambient conditions, allows for expansion and contraction without damage or deformation of the aluminum deck.
 - h. The locking design does not allow any fluids to pass to the ground under the spectator seating.
 - i. The system shall cause the deck planks to react together at all treads and cross walks to live load and form the appearance of a single tread system. By design, this system forms a solid, overlapping tread and riser installation.
 - j. The nose extrusion at aisles shall allow for a 1" extruded aluminum contrasting nose piece to be flush mounted on the leading edge and shall capture the vertical riser plank in an extruded pocket. The heel extrusion shall have a .70" vertical lip at the rear of the plank to allow for placement of vertical riser plank.
 - k. These extrusions shall be such that the attachment of the seat brackets, step brackets, mid-aisle rails and all other components is accomplished without deck penetrations at aisle locations.
 - l. The system shall allow for seat and aisle reconfiguration at any time without evidence of its previous configuration.
 - m. (Home Side Only) A secondary gutter placed below footboard butt joints shall consist of doubling the stringers at these locations and placing a galvanized formed gutter between the stringers placed approximately 12" apart. The gutter starts at the top of the stand and terminates at a collector box just below row #1. Transferring the water from the collector box to the site drainage location will be the responsibility of the general contractor. Home stand only
 - n. Entry stairs to be a minimum 2 x 11 mill finish aluminum with inset extrusion to accept contrasting nosing member.

- o. Ramp planks to be interlocking to resist deflection of live loads.
 - p. Open ends of planks to be covered with anodized aluminum end caps, securely fastened to the plank.
 - q. Joint sleeves: Dual joint sleeves to be inserted at each butt joint of each load bearing aluminum plank, and to penetrate 6 inches into each plank at the joint.
8. Guard railing: To be at all sides of bleacher, entry stairs, ramps portals and landings.
- a. Vertical rail risers to be (Home and Visitor are aluminum painted black) Bleachers are galvanized steel angle 3" x 3" x ¼ (50 ksi) for steel to steel connection and fastened with 3/8" galvanized hardware
 - b. Horizontal railing to be anodized aluminum with aluminum cast end plugs at ends of straight runs and/or elbows at corners. (Home and visitor to be painted black)
 - c. All guards shall be secured to vertical rail members with hot dipped galvanized fasteners and clamps (Clamps and stretcher bars on home and visitor to be painted black)
 - d. Railings shall be placed at a minimum of 42" above walkways, entrances and adjacent seat boards.
 - e. The barrier material shall include 6 - gauge black vinyl coated chain link fencing, fastened in place with hot dipped galvanized tension bars and aluminum ties. Home and visitor along the back, at the press box and film platforms to be black finished vertical picket rails.
9. Ramps:
- a. Slope: 1 in 12.
 - b. Guardrails to be 42 inches above ramp with two-line anodized aluminum rail and in filled with 6- gauge black vinyl coated chain link fence (2" mesh) and 2 x 6 extruded aluminum toe board.
 - c. Handrail: Ramps to have handrail extensions. The handgrip portion of handrails shall not be less than 1 1/2 inches or more than 2 inches in cross-sectional dimension or the shape shall provide an equivalent gripping surface. The handgrip portion of handrails shall have a smooth surface with no sharp corners. The top of handrails and handrail extensions shall be placed not less than 34 inches or more than 38 inches above the ramp surface. Handrails shall be continuous the full length of the ramp and shall extend in the direction of the ramp not less than 12 inches beyond the end of the ramp. Ends shall be returned or shall terminate in newel posts or safety terminals. If returned, rail must be smooth with no external fittings.
 - d. Termination: Ramps shall end with smooth transition onto level concrete pad at benchmark elevation. Aluminum plate with end closures required.
10. Handicap provision:
- a. Quantity of wheelchair spaces: as shown on drawings and in full compliance with ADA Standards set forth in International Building Code Accessibility Regulations
 - b. Riser area adjacent to wheelchair spaces to have intermediate construction so 4-inch sphere cannot pass through opening.
 - c. Guardrail: Area directly behind handicap areas shall have two-line anodized aluminum rail attached to the riser members. These rails shall be pre-fabricated to match the appearance of the mid-aisle handrails. A toe rail shall be attached to the base of the rail.
- B. Substructures:
- 11. Structural shapes meet one of the following ASTM specifications: A36, A36/A572 grade 50, A572 grade 50, A529-50, or A500 grade B.
 - 12. Shop connections are seal welds.

13. After fabrication, all steel is hot-dipped galvanized to ASTM-A-123 specifications. There are areas on the home side that have Duplex Coating see plan and initial product listing at the front of these specifications.
 14. All hardware shall be hot-dipped galvanized to ASTM A-123, mechanically galvanized or aluminum (aluminum applies to pop rivets, drive rivets, wire ties).
 15. A minimum of 3/8" galvanized connection hardware to be used on the substructure
- C. Extruded Aluminum:
16. Seat Planks and Railing are extruded aluminum alloy, 6063-T6 with clear anodized 204R1, AA-M10C22A31, Class II finish.
 17. Riser planks are extruded aluminum alloy, 6063-T6 with Dur-Kyn painted finish, per location on plans.
 18. Tread, stair and ramp planks are extruded aluminum alloy 6063-T6 mill finish
 19. Joint Sleeve Assembly to be inserted in flat plank to maintain true alignment in joining together two plank pieces. Extruded aluminum alloy, 6063-T, mill finish.
- D. Accessories:
20. Channel End Caps: Aluminum alloy 6063-T6, clear anodized 204R1, AA-M10C22A31, Class II. Mechanically fastened.
 21. Cast End Plugs: Aluminum 319 alloy, cast finish. (Required at termination ends of railing)
 22. Hardware:
 - 1) Bolts, Nuts: Hot-dipped galvanized or mechanically galvanized.
 - 2) Hold-down Clip Assembly: Aluminum alloy 6005A-T6, mill finish.
 - 3) Structural Hardware: Equal to or greater than hot dipped galvanized ASTM-A307. No connections utilizing high strength bolts are classed as slip critical.
 - 4) Aisle Nose and Stair Nose: Aluminum alloy, 6063-T6, slip-resistant black painted finish. Mechanically fastened.
- E. Design Load:
1. Live Load: 100 psf gross horizontal projection.
 2. Lateral Sway Load: 24 plf seat plank.
 3. Perpendicular Sway Load: 10 plf seat plank.
 4. Live Load of Seat and Tread Planks: 120 plf.
 5. Handrails and Guardrail: Designed to resist a single concentrated load of 200# applied in any direction at any point along the top. Per the International Building Code.
 6. Wind load: Per State and Local Building Code.
 7. Liveload deflection of structural members shall be limited to L/200 of the span.
- F. All manufactured connections to be shop welded.
1. Manufactured by certified welders conforming to AWS Standards.

1.01 2.03 PRESS BOX WITH STEEL FRAME CONSTRUCTION

- A. Product Description: Steel Frame Construction.
- B. Press box Dimensions: Home stand is (10) feet wide x (36) feet long – sloped front design, per plans.
- C. Press box to be constructed with interior ships ladder access to the filming platform
- D. Special Inspections- third party inspection to be completed and documented at the fabrication facility in accordance with Delaware Regulations.
- E. Press Box Support Structure:
1. Structural shapes meet one of the following ASTM specifications: A36, A36/A572 grade 50, A572 grade 50, A529-50, or A500 grade B.
 2. Shop connections are seal welds.
 3. After fabrication, all steel is hot-dipped galvanized to ASTM-A-123 specifications.

- F. Press Box: All materials shall be new and shall comply with ASTM specifications.
1. Floor
 - a. Main support to be a galvanized steel floor frame sized to support structure and metal belly pan for support of insulation.
 - b. Floor to be INTERLOCK Aluminum Decking System, extruded aluminum alloy 6063-T6. Attach Decking System to steel floor frame with mechanical fasteners at end of plank and at intermediate supports. Wood/plywood base decking has proven to deteriorate over time and is not an acceptable alternative.
 - c. Insulation: Kraft faced fiberglass building insulation thickness in compliance with 2015 energy conservation code. Batt or roll as manufactured by Owens-Corning Fiberglass Corp., or equal.
 - d. Wall Structure Steel Framing
 - 1) 4 inch x 4 inch x 11 gauge square tubing with maximum span of 14 feet on front wall and maximum span of 6 feet on back wall and 4 inch x 2 1/2 inch x 14 gauge steel "cees" with maximum spacing of 5 feet for all walls with siding. Spans greater than these require engineered calculations for design.
 - 2) Insulation: Kraft faced fiberglass building insulation R-11, 3 1/2 inches thick. Batt or roll as manufactured by Owens-Corning Fiberglass Corp., or equal. Insulation shall be in accordance with the 2015 International Energy Conservation code.
 - 3) Interior Finish
 - (a) 1/2 inch vinyl coated gypsum panels, Gold Bond vinyl-surfaced
 - (b) Cove Base: Vinyl 4 inches x.080 color to be medium gray.
 - 4) Exterior Finish
 - (a) 26 - gauge prefinished R-Panel paneling as manufactured by MBCI, Signature 200 color series, color to be determined. Vinyl clad siding is not an acceptable product.
 - (b) Wall panels are attached with #12 TEK screws - 6" O.C. at the top and bottom of the panels. Lap screws are placed at each end of the panels, at the intermediate supports, and at the mid-point between supports (TEK #14). All fasteners to be painted same color as exterior paneling.
 - e. Roof Structure
 - 1) 4 inch x 4 inch x 11 gauge square tubing with maximum spacing of 6 feet on center and 4 inches x 2 1/2 inches x 14 gauge steel "cees" with maximum spacing of 2 feet on center.
 - 2) Roof: 1/8 inch four way steel plate roof, continuous welded seams coated with acrylic metal primer as manufactured by Coronado and 36 mils of acrylink roof coating as manufactured by Isothermal Protective Coatings, or equal. Plate is welded on both sides of rafters with 1-1/2 inch long 1/8 inch fillet welds on 12 inch centers. Plywood sheathing will not be accepted.
 - 3) Insulation: Kraft faced fiberglass building insulation, R-19 (minimum) 6 inches thick. Batt or roll as manufactured by Owens-Corning Fiberglass Corp., or equal.
 - 4) Cornice: 26 gauge steel prefinished- color to be determined.
 - 5) Ceiling: 24 inch x 24 inch x 5/8 inch acoustical ceiling tile architectural revealed edge style wind clips and other components as manufactured by USG, or equal.
 - f. Exterior Doors
 - 1) Full flush steel construction with honeycomb core. 18 gauge skin sheets. Dimensions: 3 feet 0 inches x 6 feet 8 inches. Color: White.
 - 2) Steel door frame (16 gauge) complete with 1/2 inch threshold and weather-stripping.

- 3) Exterior Hardware (Prior to completed fabrication check with the district to verify what core lock system they use): Yale 546F Exterior Trim, or equal. Handles shall be lever type that allows operation without tight grasping or twisting of the wrist. All exterior hardware must accommodate this.
- 4) Interior Hardware: Yale 2100 Exit Device, or equal. Handle shall be panic bar that allows for opening without any grasping, twisting or turning.
- g. Interior Walls
 - 1) Framing to be steel galvanized studs (25 gauge) 1 1/4 inch x 3 5/8 inch at maximum 2 feet on center.
 - 2) Finishes to be consistent with all other interior finishes.
 - 3) A 24" x 56" interior window in each wall.
- h. Windows
 - 1) Frame: Extruded aluminum single hung, horizontal sliding unit, thermal break.
 - 2) Sash: Tilt toward inside for easy cleaning.
 - 3) Glazing: Clear tempered panes.
 - 4) Dimensions of each unit: Dependent on compartment size. At interior wall locations or structural support locations the dimension between windows shall be no greater than 6 inches.
 - 5) Finish: Electrostatically applied acrylic enamel.
- i. Work Bench
 - 1) 18 inch deep clear anodized aluminum countertop with a radius front edge.
 - 2) Support using 4" x 2" x 14 ga. Steel "cee" on 4" x 4" x 11 ga. Sq. tubing welded to steel.
 - 3) Shelf brackets do not provide proper support and are not acceptable.
- j. Painting: Materials equal to. Coronado or equal.
 - 1) Surfaces: Exterior Door(s), Door Frame(s)
 - (a) Primer: Applied by Door Manufacturer.
 - (b) Finish: 2 coats acrylic latex semi-gloss enamel applied by press box manufacturer.
 - 2) Surfaces, Exterior Siding
 - (a) Primer: Applied by Siding Manufacturer.
 - (b) Finish: Applied by Siding Manufacturer.
 - (c) Touchup: If applicable
 - 3) Surfaces: Wall and Roof Structure
 - (a) Primer: Coronado DTM Industrial 180-11 acrylic metal primer applied after welding, or equal.
- k. Caulking: Sonneborn NP1 - Polyurethane sealant, All temperature, UV resistant, or equal. Silicone products are not acceptable.
- l. Electrical Work:
 - 1) Submittal drawing shall indicate devices and circuitry.
 - 2) Fixtures: Recessed Edgelit LED panel light fixture for use in grid ceiling systems.
 - 3) Wiring to be in nonmetallic Panduit, or equal. N.E.C. breaker box to be 100 amp service mounted on wall with 2 inch rigid conduit to be stubbed out at back wall of press box ready for service line to be connected.
 - 4) Service line to Press Box (By Electrical Contractor)
 - 5) Electrical outlet(s) installed per NEC shall be standard duty.
 - (a) All outlets shall be surface mounted on wall.
 - 6) Sound, Telephone, Clock, Field Communication: Empty double outlet boxes per N.E.C. with 3/4 inch conduit stubbed out bottom of Press Box. Electrical

- contractor is responsible for re-connecting all electric, telecommunications and audio visual wiring, conduit and equipment to the press box.
- 7) Outlet boxes to be flush mounted into wall. Any wiring completed on-site will be responsibility of such contractor for inspections. Quantity per plans.
 - 8) Provide wall mounted PTAC heat/air conditioning units as required per plans.
 - 9) Provide in each room an emergency combination exit/flood light with battery back-up. Also provide exterior emergency light with remote heads.
 - 10) Provide (2) wall mount exterior lights with photocell
- m. Provide fire extinguishers at each exit door (2) total.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. All work performed by technicians experienced in bleacher seating. Project references may be required to verify the quality of finished projects.
- B. Installation with proven experience in the northeast region. Requirement for a minimum of (3) installer references in for this project of similar size and scope.
- C. Project is only to be installed as per approved shop drawings.

3.02 EXAMINATION

- A. Verify that foundation, floor slab, mechanical and electrical utilities, and placed anchors are in correct position

3.03 ERECTION

- A. Provide for erection and wind loads. Provide temporary bracing to maintain structure plumb and in alignment until completion of erection and installation of permanent bracing. Locate braced bays as indicated.
- B. Do not field cut or alter structural members without approval.

3.04 CLEAN-UP

- A. Clean up all debris caused by work of this section removed from site.
- B. Upon completion of the work and final inspections, bleacher manufacturer installer shall broom clean the stand removing all loose debris.

END OF SECTION

SECTION 26 00 00

GENERAL PROVISIONS – ELECTRICAL

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary and other conditions, if any) and Division 1 as appropriate, apply to the work of this Section.

1.2 DESCRIPTION OF WORK

- A. Provide all materials, equipment, labor, services and all appurtenances required to completely install and satisfactorily operate the various systems. The items listed below are for general guidance only and do not necessarily include the entire requirements for the project.
 - 1. Coordination with other trades
 - 2. Electrical service
 - 3. Communications raceway system
 - 4. Related work as herein described or otherwise defined under the heading "Related Work".
- B. Wherever the term "provide" is used, it shall be understood to mean both "furnish" and "install".

1.3 RELATED WORK

- A. Equipment specified in sections of Divisions 1 thru 23 that require electric power supply.
- B. Work related to this trade as defined on the following contract drawings:

Architectural/Structural

Civil

1.4 SITE CONDITIONS

- A. Attention of all bidders is called to the necessity for a careful inspection of the site, its present condition and encumbrances, the extent of the work, the protection to be afforded to adjacent properties or structure, availability of utilities, the extent and nature of the material required to be excavated and the amount of fill and removal. He shall also determine local or site limitations which will affect construction.

1.5 PERMITS, INSPECTIONS AND ORDINANCES

- A. All work shall be executed and inspected in accordance with local and state ordinances, rules and regulations and the requirements of public utilities having jurisdiction. The contractor shall secure and pay for all permits, inspections and connections required.

- B. The Electrical Contractor shall furnish a certificate of inspection to the Owner at the time of completion.
 - C. Requirements of the following organization shall be considered minimum:
 - 1. National Electrical Code
 - 2. National Electrical Safety Code
 - 3. OSHA
 - 4. Local City and County Codes
 - D. Reference to technical societies, trade organizations and governmental agencies are in accordance with the following:
 - 1. ANSI - American National Standards Institute
 - 2. ASTM - American Society for Testing Materials
 - 3. IEEE - Institute of Electrical and Electronics Engineers, Inc.
 - 4. NEC - National Electrical Code
 - 5. NEMA - National Electrical Manufacturer's Association
 - 6. NFPA - National Fire Protection Association
 - 7. MSS - Manufacturer's Standardization Society
 - 8. IES - Illuminating Engineers Society
 - 9. ETL - Engineering Testing Laboratories
 - 10. EIA - Electronic Industries Association
 - 11. OSHA - Occupational Safety and Health Administration
 - 12. Federal Specifications
 - 13. UL - Underwriters Laboratories, Inc.
- 1.6 QUALITY ASSURANCE
- A. Provide adequate supervision of labor force to assure that all aspects of the contract documents are fulfilled.
- 1.7 COORDINATION
- A. As a requirement of this project, the Electrical Contractor shall furnish coordination for his equipment and layouts with other subcontractors furnishing equipment and services for Divisions 1 thru 23. Any and all contractors who install their equipment or furnish services prior to coordination,

any contractor who changes their equipment or services after coordination has occurred, without notifying associated subcontractors, shall be held responsible for making all required changes with no additional cost to the Owner. Or delay in construction time. This coordination will include conduit layout to allow access to equipment for maintenance.

- B. The drawings and specifications reflect the type, number and size of services required for the equipment the design is based upon. Should the supplying subcontractor elect to furnish an alternate piece of equipment requiring difference services and/or space conditions, he shall inform the subcontractor furnishing those services and be held responsible to pay for all required changes as part of this contract.

1.8 SUBMITTALS

A. Shop Drawings:

- 1. Shop drawings shall be submitted in accordance with Division 1 of these specifications except where herein modified.

NOTE: Submittals will only be reviewed once and resubmittals will be reviewed once. Any other submittals will be billed to the Contractor at the Engineer's standard rates.

- 2. Shop drawings comprising complete catalog cuts, performance test data for electrical equipment as required by other sections of Division 26 shall be submitted for review checking. The Contractor shall review these shop drawings for conformance to contract documents prior to submission and affix contractor's signature to each submittal certifying that this review has been done. By approving and submitting shop drawings, product data, wiring diagrams and similar materials, the Electrical Contractor represents that he and/or his subcontractor has determined and verified materials, field measurements and field construction data that relates to the work, and has checked and coordinated this information with all of the Divisions 1 thru 23 subcontractors.
- 3. All shop drawing submittals shall have the following identification data, as applicable, contained therein or permanently adhered thereto:
 - a. Project name
 - b. Project number
 - c. Sub-Contractor's, Vendor's and/or manufacturer's name and address.
 - d. Product identification.
 - e. Identification of deviation from the contract documents.
 - f. Applicable contract drawings and specification section number.
 - g. Shop drawing title, drawing number, revision number, and date of drawing and revision.
 - h. Resubmit revised or additional shop drawings as requested.
 - i. Wherever shop drawings or vendor's standard data sheets indicate work to be done "by others", it shall be the responsibility of the Contractor making the submission to identify by

name, the Contractor who is to do this work. If the Contractor named is other than the Contractor making the submission, the shop drawing submission must be reviewed by the named Contractor and bear his mark of approval, prior to submission to the Architect/Engineer.

- j. The Contractor shall keep a copy of approved shop drawings at the job site.
- k. No equipment shall be ordered, fabricated, etc., before approval of shop drawings.

1.9 SUBSTITUTIONS

- A. Whenever a material, article, piece of equipment or system is identified in the following specification or indicated on the drawings by reference to manufacturers' or vendors' names, trade names, catalog numbers or the like, it is so identified for the purpose of establishing the basis of the Bid.
- B. Substitution approval must be obtained and included as an addendum item prior to the submission of the bid. An approved substitution shall not be considered as an approval for the contractor or an equipment vendor to deviate from the written portion of the specifications unless so stated in the addendum.
- C. The drawings illustrate the space allocated for equipment and the Contractor shall install the equipment accordingly. If changes are required in the building or arrangement due to substitution of equipment, the Contractor making the substitution must pay for the necessary modifications.
- D. The listed equivalent or substituted manufacturers along with the bidding related contractor shall be completely responsible to comply with all requirements on all contract documents. This shall include, but shall not be limited to space requirements, code clearances, the type, horsepower, capacities, number and size of services required from other trades, including all required ancillary items furnished and installed by other trades. If the manufacturer or related bidding contractor does not comply with these requirements, then they shall be responsible for any and all additional costs associated with the changes required by other trades.

1.10 INTERPRETATION OF SYSTEMS

- A. The interpretation of the Architect will be final in the event there is a lack of understanding of the full scope or requirements of the systems under this contract.

PART 2 – PRODUCTS

2.1 MATERIAL

- A. All material shall be new and of good quality. Material shall conform to all accepted trade standards, codes, ordinances, regulations, or requirements governing same, and shall be approved before being installed.
- B. The Architect reserves the right to require the Contractors to submit samples of any or all articles or materials to be used on the project.
- C. Where any device or equipment is herein referred to in the singular number, such as "the panel", this reference shall be deemed to apply to as many such devices or equipment as are required to complete the installation as shown on the drawings or specified.

- D. All materials and equipment used in the work shall comply with the standards of recognized authorities such as UL, NEMA, IEEE, ETL, IES and EIA in every instance where such standards have been established for the particular type of materials to be installed.
 - E. All similar pieces of equipment or materials of the same type or classification used for the same purpose shall be of the same manufacturer.
 - F. All manufactured equipment shall have factory applied finishes.
- 2.2 CONCRETE
- A. Concrete shall be in accordance with Section 03300, or ACI-613.
 - B. The 28-day minimum compressive strength shall be 3000 psi.
- 2.3 WARRANTY
- A. Wherever in the specification sections of this division, reference is made to a specific warranty period, this warranty shall be in addition to and not a limitation of other rights the Owner may have against the Contractor under the contract documents.

PART 3 – EXECUTION

3.1 INSPECTION

- A. Prior to performing the work, examine areas and conditions; check and verify all dimensions, under which the work is to be installed and notify the Architect in writing of conditions and dimensions detrimental to the proper and timely completion of the work. Do not proceed until authorization is given by the Architect.

3.2 LAYING OUT WORK

- A. The Contractor is responsible for the accuracy of all lines, elevations, and measurements, grading and utilities and must exercise proper precaution to verify figures shown on drawings before laying out work and will be held responsible for any error resulting from his failure to exercise such precaution.

3.3 WORKMANSHIP

- A. Install all work neat, trim, parallel and plumb with building lines in accordance with standard trade practice acceptable to the Architect.

3.4 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Protect all equipment and materials from damage during transportation, storage and installation.

3.5 PROTECTION

- A. Protect all work, equipment and materials during construction up to the time of acceptance by the Owner.
- B. Arrange and design the protection to prevent damage from infiltration or dust, debris, moisture, chemicals and water. Cap or plug electrical raceways.

3.6 EXCAVATION

- A. The excavation shall be of the open-trench method and to the depths and widths as may be necessary. The Contractor shall do all excavation required in connection with his work. Bottoms of trenches shall be excavated to a uniform grade. All materials excavated shall be deposited on the side of the trenches and beyond the reach of slides. Excavated material shall not be piled where it will interfere with traffic.
- B. No conduits shall be bedded directly on rock. They shall be cushioned by a 6-inch layer of crushed stone or gravel of selected grade, of size to pass through a 3/4" mesh sieve. Not less than 30% shall be fine which will pass through a 3/8" mesh sieve.
- C. Where excavation is required through tree root areas, roots shall be saw cut, treated with pruning paint and covered with burlap. Burlap shall be wet and shall be protected and maintained in a moist condition during entire period of exposure. Backfill shall be carefully placed and hand-tamped to a minimum of 6" above roots.
- D. Bidder shall base his estimate upon the presumption that all excavation required in the performance of this Contract will be earth. If rock is encountered, Contractor will be reimbursed for the additional work required to remove same based upon the unit cost established in the proposal.
- E. All detached boulders or loose stone not exceeding 1 cubic yard, all topsoil, sand, gravel, clay, rubbish, walls or other subgrade construction, and all other materials of every name and nature which can be removed without breaking up with pneumatic breakers shall be considered earth excavation.
- F. All rocks, attached boulders, boulders exceeding 1 cubic yard, walls or other subgrade construction and materials which cannot be removed without breaking up with pneumatic equipment shall be considered rock excavation.
- G. Before commencing any rock excavation for which extra compensation is to be paid, a rock contour drawing shall be prepared by the Contractor and checked by the Architect. The width shall be based on 2'-0". This rock contour drawing and width allowance will be used to compute the quantity of rock for which the Contractor will be reimbursed at the unit price established.

3.7 SHORING AND PUMPING

- A. The Contractor shall provide all shoring, bracing or sheet piling necessary to maintain the banks of his excavation and shall take out same as the work progresses and filling in has been accomplished. Shoring shall be in accordance with OSHA Standards.
- B. The arrangement of shoring must be such as to prevent any movement of the trench banks and consequent strains on the conduits. Shoring shall be provided to prevent damage to work installed by other trades.
- C. The Contractor shall do all pumping required to keep his excavations free of water. The water shall be conveyed in piping or watertight troughs a sufficient distance that it will flow from the site and not affect other work being performed.

3.8 BACKFILLING

- A. After work in trenches has been completed, they shall be filled with good, clean, fine earth in 8"

layers and shall be pneumatically tamped before the next layer of material has been filled in. The backfill shall be free of excavated rock, cinders, stones, brickbats or other debris.

- B. Wherever rock is removed, the Contractor shall secure and fill select clean earth to a minimum depth of 3'-0" above the top of the conduit. Unless otherwise indicated, no rock shall be deposited in the trench fill. This clean earth fill shall be procured other than from the site unless permission for earth borrow from the site is granted by the Architect. If site borrow is permitted, the topsoil removal, relocation and finished grading will be accomplished as directed by the Architect.
- C. Under no circumstances shall excavated material be left where it will interfere with the Owner's or other Contractor's operations.
- D. All earth and other materials taken from the trenches and not required for backfilling shall be deposited where directed, or removed from the premises as directed by the Architect.
- E. Any rock removed from the excavation shall be removed from the project site by the Contractor.
- F. Trenches which pass under wall footings or within 18" of column footings shall be backfilled with clean concrete. To secure adequate foundation support, the method and depositing of the concrete fill shall be as directed by the Architect. To prevent the concrete from adhering to the conduits, necessary conduit protection shall be applied.

3.9 GUARANTEE

- A. All work shall be guaranteed to be free from defects for a period of two years of operation from date of acceptance by the Owner unless otherwise specified in Division 1.
- B. Guarantee shall be extended on an equal time basis for all non- operational periods due to failure within the guarantee period.

END OF SECTION

SECTION 26 01 10

RACEWAYS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary and other conditions, if any) and Division 1 as appropriate, apply to the Work specified in this Section.
- B. Refer to Section 260000 for General Provisions - Electrical.

1.2 DESCRIPTION OF WORK

- A. Types of raceways in this section include the following:
Polyvinyl chloride conduit (Exterior Underground Only)

1.3 REFERENCE STANDARDS

- A. Refer to Section 260000 for a general description of requirements applying to this Section.

1.4 QUALITY ASSURANCE

- A. Refer to Section 260000 for a general description of requirements applying to this Section.

1.5 WARRANTY/GUARANTEE

- A. All work and materials are subject to the general warranty as described in the General Conditions of the Contract and in Division 1, GENERAL REQUIREMENTS.

1.6 COORDINATION

- A. The drawings and details there upon are scheme and/or diagrammatic in nature, and indicate the need and intent of the design. These are to be used for general guidance only. It shall be the responsibility of the Electrical Contractor to coordinate, with other Division Subcontractors, the installation of all raceways, raceway supports, junction boxes and required fittings. This coordination will include conduit layout to allow access to equipment for maintenance.
- B. This coordination shall be carried out prior to actual installation; this shall be done to eliminate the possibility of conflicts between trades on items such as access, clearances and maintenance issues that may arise after completion of construction.
- C. Should the coordination not be carried out prior to installation, and a conflict exists, the installing contractor shall remove and reinstall the equipment as required to clear the conflict at no additional cost to the Owner and no delay in project completion.

PART 2 – PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. Polyvinyl Chloride Conduit:

1. Raceway: Heavy wall, rigid non-metallic, schedule 40 with bell type end, designed for above ground exposed applications, direct earth burial, and concrete encasement.
2. Fittings: Polyvinyl chloride, heavy duty, glue type, designed for Schedule 40 application.
3. Subject to compliance with requirements, provide products of one of the following:

Allied Tube & Conduit

Carlson

Queen City Plastics, Inc.

Scepter Electric Systems

PART 3 – EXECUTION

3.1 INSTALLATION OF ELECTRICAL RACEWAYS

- A. Install electrical raceways in accordance with manufacturer's written instructions, applicable requirements of NEC and NECA "Standard of Installation", and complying with recognized industry practices.
- B. Coordinate with other work as necessary to interface installation of electrical raceways, wireways and required components.
- C. Raceways used for distribution, feeders, or branch circuits shall be a minimum size of 3/4" or equal equivalent cross-sectional area. Raceways used for control and signal shall be a minimum size of 1/2" or equal equivalent cross-sectional area.
- D. Complete the installation of electrical raceways before starting the installation of cables/wires within the raceway.
- E. Furnish and install one (1) nylon or fiberglass pull cord in each empty raceway. Each empty raceway shall be cleaned, capped, and tagged as to its termination location.
- F. Refer to Section 260000 for excavation, shoring and pumping, concrete and backfilling requirements.

3.2 CLEANING

- A. Upon completion of installation of raceways, inspect interiors of raceways; remove burrs, dirt and construction debris.

END OF SECTION

SECTION 26 01 20

WIRES AND CABLES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. This section is a Division 26 Basic Materials and Methods section and is part of each Division 26 Section making reference to wires and cables specified herein.

1.2 DESCRIPTION OF WORK

- A. Electrical wire and electrical cable work is indicated by drawings and specifications.
- B. Arrange for and coordinate with the Utility Company and pay any and all costs in conjunction with the 25KV primary service from the point of connection to 25KV pad-mounted transformer.
- C. Types of wire, cable and connectors in this section include, but not limited to the following:
 - Copper conductors.
 - Tap type connectors.
 - Split-bolt connectors.
- D. Refer to other sections of Division 26 for, but not limited to, raceways, connections used in conjunction with wire and cable work.
- E. Applications for wire, cable and connectors required for project are as follows unless otherwise indicated:
 - 1. Primary Service Circuitry.
 - 2. Power Distribution Circuitry.
 - 3. Appliance and Equipment Circuitry.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Wire and Cable
 - Anaconda Wire and Cable Co.
 - Advance Wire and Cable, Inc.
 - American
 - Cerro Wire and Cable Co.

Electrical Conductors, Inc.

General Cable Corp.

Rome Cable Corp.

Southwire Company

Triangle PWC,, Inc.

The Okonite Co.

General Electric Co.

Connectors

Burndy Corp.

Eagle Electric Mfg. Co., Inc.

Gould, Inc.

Ideal Industries, Inc

Joslyn Mfg. and Supply Co.

O-Z/Gedney Co.

Pyle National Co.

Thomas and Betts Co.

2.2 WIRE, CABLE AND CONNECTIONS

- A. Except as otherwise indicated, provide wire, cable and connectors of manufacturer's standard materials, as indicated by published product information; designed and constructed as recommended by manufacturer, and as required for the installation. Minimum wire and cable size is #12 AWG for power and branch circuits and #14 AWG for control and signal/communication circuits unless otherwise indicated.
- B. Wire: Provide factory fabricated wire of sizes, ratings, materials and types indicated for each service. Where not indicated, provide proper selection as determined by Installer to comply with project's installation requirements and NEC standards. Select from the following types, materials, conductor configurations, insulation and coverings:

UL Type: THHN

UL Type: TW

UL Type: THW

UL Type: THWN

UL Type: TF

UL Type: XHHW

Material: Aluminum (Primary Service Entrance Only)

Copper

Conductors: Solid (AWG 14 to AWG 10 only).

Conductors: Concentric-lay-stranded (standard flexibility)

Outer Covering: Nylon

Outer Covering: Thermoplastic

- C. Connectors: Provide factory fabricated metal connectors of sizes, ratings, materials, types and classes as required for each service. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements and NEC standards. Select from the following types, classes, kinds and styles.

Type: Pressure

Type: Crimp

Type: Threaded

Class: Insulated

Class: Non-insulated

Kind: Copper (for CU to Cu connection).

Style: Butt connection

Style: Elbow connection

Style: Combined "T" and straight connection

Style: "T" connection.

Style: Split-bolt parallel connection

Style: Tap connection

Style: Pigtail connection

- D. 25KV Cable: Provide factory fabricated and tested primary service cable; underground residential distribution (URD) type cable, size #1/0 AWG solid aluminum conductor with 25KV cross-linked polyethylene insulation (XLP) with tinned or coated copper wire full size concentric neutral as approved by the Utility Company.

- E. 25KV Terminations: Provide 25KV terminations for 25KV #1/0 AWG solid aluminum cable as approved by the Utility Company in quantities required by the Utility Company.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Install electrical cables, wires and connectors, in compliance with manufacturer's written instructions, applicable requirements of NEC and NECA's "Standard of Installation", and in accordance with recognized industry practices.
- B. Coordinate cable and wire installation work with electrical raceway and equipment installation work, as necessary for proper interface. Pull conductors together where more than one is being installed in a raceway. Use pulling compound or lubricate, where necessary; compound must not deteriorate conductor or insulation. Use pulling means including fish tape, cable or rope which cannot damage raceway. Rope must be used as pulling means when pulling wires or cables into plastic conduit and duct. Keep conductor splices to a minimum and install in junction boxes only. No splices shall be permitted within conduit. Install splices and tapes which have mechanical strength and insulation rating equivalent or better than conductor. Use splice and tape connectors which are compatible with conductor material.
- C. Installation of 25KV primary service cable with the Utility Company.
- D. Deliver 25KV cable terminations to the Utility Company for installation and connection.

3.2 FIELD QUALITY CONTROL

- A. Prior to energization, test cable and wire for continuity of circuitry and also for short circuits. Correct malfunctions when detected.
- B. Subsequent to wire and cable hook-ups, energize circuitry and demonstrate functioning in accordance with requirements.
- C. Test 25KV cable after installation using D.C. high potential (Hi-Pot) testing. All testing shall be performed in accordance with cable manufacturer's recommended specifications. Keep a complete record of all tests and submit to the Engineer upon completion. Testing shall be performed by an independent cable testing company or service.

END OF SECTION

SECTION 26 01 30

MANHOLES

PART 1 – GENERAL

1.1 DESCRIPTION OF WORK

- A. Extent of manholes and manhole installation work is indicated by drawings and specifications.
- B. Types of manholes in this section shall include the following:
 - 1. Precast concrete
 - 2. Poured in place
 - 3. Polymer Concrete

1.2 SUBMITTALS

- A. Submit manufacturer's data on manholes including, but not limited to, roughing-in drawings, construction details and structural support data.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with requirements, provide manholes with frame and cover, and cable accessories of one of the following:
 - 1. Manholes - A.C. Miller Concrete Products, Inc.
 - Gillespie Precast, LLC
 - Quazite
 - 2. Frame and Cover - Neenah Foundry Co.
 - Quazite

2.2 STANDARD MANHOLES

- A. Manholes shall be a precast concrete box with interior dimensions of 48" wide x 48" long x 48" deep with 6" walls, floor and top.
- B. Floor shall be provided with a ground rod hole, pulling irons and a 12" diameter x 12" deep sump.
- C. Top shall be a precast 6" slab with a circular opening suitable for a manhole frame opening of 32-1/2."
- D. The precast 6" top slab shall be sealed where it joins the manhole. The entire exterior surface of the manhole shall be coated with a bitumastic type waterproof coating prior to installation.

2.3 MANHOLE FRAME AND COVER

- A. Frame and cover shall be a round, heavy duty, cast iron frame and solid cover with machined horizontal bearing surfaces. Total weight to be approximately 365 pounds.
- B. Frame and cover dimensions shall be as follows:
 - 1. Overall frame size = 38-1/2"
 - 2. Clear opening size = 32-1/2"
 - 3. Overall frame height = 4"
- C. Cover shall have the word, "Electric", cast into it.
- D. Frame and cover shall be similar in manufacture to Neenah Foundry Company Model No. R-1792-HL.

2.4 GROUND ROD AND CLAMP

- A. Ground rod shall be a rigid steel rod with a heavy duty, uniform, non-porous copper coating. Rod to be 3/4" dia. x 10'-0" long. Clamp to be cast of high copper content bronze alloy.
- B. Ground rod assembly to consist of the following:
 - 1. Ground rod - Blackburn Cat. No. W5810
 - 2. Ground Clamp - Blackburn Cat. No. J-JR.

PART 3 – EXECUTION

3.1 INSTALLATION OF MANHOLES

- A. Install manholes in accordance with manufacturer's written instructions and complying with applicable portions of NEC and NECA's "Standard of Installation."
- B. Manholes shall be oriented in accordance with duct bank requirements as indicated on the electrical site plan. The depth of the manhole shall be as required to allow the frame and cover to set level with finished grade.
- C. Manholes shall not be set in an area or at an elevation which will allow surface water or runoff to enter manhole through the cover. Should this occur, this Contractor will be required to raise the frame and cover and regrade the area.

3.2 FIELD QUALITY CONTROL

- A. Contractor shall inspect the conduit entrances into the manhole looking for broken ducts and/or rough edges and repairing the findings. Contractor shall also check that conduit entrances are sealed to keep out ground water.

- B. All manholes shall be cleaned of dirt and construction debris. All spare conduits shall have a nylon pull cord installed for future use.

END OF SECTION

SECTION 26 01 35

ELECTRICAL BOXES & FITTINGS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. This section is a Division 26 Basic Materials and Methods section, and is a part of each Division 26 section making reference to electrical wiring boxes and fittings specified herein.

1.2 DESCRIPTION OF WORK

- A. Types of electrical boxes and fittings in this section include the following:

Outlet boxes.

Junction boxes.

Pull boxes.

Conduit bodies.

Bushings.

Locknuts.

PART 2 – PRODUCTS

2.1 INTERIOR METALLIC OUTLET BOXES

- A. Provide galvanized flat rolled sheet steel interior outlet non-gangable wiring boxes, of types, shapes and sizes, including box depths, to suit each respective location and installation; construct with stamped knockouts in back and sides and with threaded screw holes with corrosion-resistant screws for securing box covers and wiring devices.
- B. Provide outlet box accessories as required for each installation, including mounting brackets, wallboard hangers, extension rings, fixture studs, cable clamps and metal straps for supporting outlet boxes, which are compatible with outlet boxes being used and fulfilling requirements of individual wiring situations. Choice of accessories is Installer's option.
- C. Manufacturer: Subject to compliance with requirements, provide interior outlet boxes of one of the following:

Appleton Electric Co.

Bell Electric/Square D Co.

Pass and Seymour, Inc.

RACO, Inc.

Steel City/Midland-Ross Corp.

2.2 WEATHERPROOF OUTLET BOXES

- A. Provide corrosion resistant cast-metal weatherproof outlet wiring boxes, of types, shapes and sizes, including depth of boxes, with threaded conduit ends, cast-metal face plates with spring-hinged waterproof caps suitably configured for each application, including face plate gaskets and corrosion-resistant fasteners.

- B. Manufacturer: Subject to compliance with requirements, provide weatherproof outlet boxes of one of the following:

Arrow-Hart Div., Crouse-Hinds Co.

Bell Electric/Square D Co.

Harvey Hubbell, Inc.

O-Z/Gedney Co.

Slater Electric Co.

- C. Refer to Section 260140 – WIRING DEVICES for exterior receptacle outlet boxes.

2.3 JUNCTION PULL BOXES

- A. Provide galvanized code-gauge sheet steel junction and pull boxes, with screw-on covers; of types, shapes and sizes, to suit each respective location and installation; with welded seams and equipped with stainless steel nuts, bolts, screws and washers.

- B. Manufacturers: Subject to compliance with requirements, provide junction and pull boxes of one of the following:

Adalet-PLM Div., Scott and Fetzer Co.

Appleton Electric Co.

Arrow-Hart Div., Crouse-Hinds Co.

Bell Electric/Square D Co.

GTE Corporation

Keystone Columbia, Inc.

O-Z/Gedney Co.

Slater Electric Co.

Spring City Elect. Mfg. Co.

2.4 CONDUIT BODIES

- A. Provide galvanized cast-metal conduit bodies, of types, shapes, and sizes, to suit respective locations and installation, construct with threaded-conduit-entrance ends, removable covers, and corrosion-resistant screws.
- B. Manufacturers: Subject to compliance with requirements, provide conduit bodies of one of the following:

Appleton Electric Co.

Crouse-Hinds Co.

Gould, Inc.

Killark Electric Mfg. Co.

O-Z/Gedney Co.

Spring City Electrical Mfg. Co.

2.5 BUSHINGS, KNOCKOUT CLOSURES AND LOCKNUTS

- A. Provide corrosion-resistant punched-steel box knockout closures, conduit locknuts and insulated malleable iron conduit bushings, offset connectors, of types and sizes to suit respective uses and installation.
- B. Manufacturers: Subject to compliance with requirements, provide bushings, knockout closures, locknuts and connectors of one of the following:

Appleton Electric Co.

Burndy Corp.

Crouse-Hinds Co.

Gould, Inc.

O-Z/Gedney Co.

RACO, Inc.

Steel City/Midland-Ross Corp.

Thomas and Betts Co., Inc.

PART 3 – EXECUTION

3.1 INSTALLATION OF ELECTRICAL BOXES AND FITTINGS

- A. Install electrical boxes and fittings, complying with manufacturer's written instructions, applicable requirements of NEC and NECA's "Standard of Installation", and in compliance with recognized

industry practices to ensure that products fulfill requirements.

- B. Coordinate installation of electrical boxes and fittings with wire/cable and raceway installation work.
- C. Provide weatherproof outlets for interior and exterior locations exposed to weather or moisture.
- D. Provide knockout closures to cap unused knockout holes where blanks have been removed.
- E. Install boxes and conduit bodies in those locations to ensure ready accessibility of electrical wiring.
- F. Fasten boxes rigidly to substrates or structural surfaces to which attached, or solidly embed electrical boxes in concrete or masonry.
- G. Provide electrical connections for installed boxes.
- H. Pull boxes and junction boxes shall be furnished and installed in all conduit runs at intervals not exceeding 100 feet maximum.
- I. Identify each circuit in all pull boxes and junction boxes whether the box contains one or more circuits.

END OF SECTION

SECTION 26 01 40

WIRING DEVICES

PART 1 – GENERAL

1.1 DESCRIPTION OF WORK

- A. The extent of wiring device work is indicated by drawings, schedules and specifications. Wiring devices are defined as single discrete units of the electrical distribution system which are intended to carry but not utilize electric energy.
- B. Types of electrical wiring devices in this section include the following:

Receptacles.

Device plates.

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's data on electrical wiring devices.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products of one of the following (for each type of wiring device):

Legrand Co.

Hubbell, Inc.

Leviton Mfg. Co.

Lutron Electronics Co., Inc.

Cooper Wiring Devices

Square D Co.

Eaton Corp.

Siemens

2.2 FABRICATED WIRING DEVICES

- A. Provide factory fabricated wiring devices, in types, styles, colors, and electrical ratings for applications indicated and complying with NEMA Standards Pub. No. WD 1. Where types and grades are not indicated, provide proper selection as determined by Installer to fulfill wiring requirements, and complying with NEC and NEMA Standards for wiring devices. Color selection to

be verified by Contractor with Architect/Engineer.

2.3 RECEPTACLES

- A. All duplex receptacles shall be extra heavy duty, hospital grade, 20 amperes, 125 volts, 2 pole, 3 wire grounding type with green hexagonal equipment ground screw, with metal plaster ears, side wiring, NEMA configuration 5-20R, tamper-proof. Hubbell Cat. #HBL5362TR, #HBL8300SG, or approved substitute.
- B. All ground fault receptacles shall be extra heavy duty duplex, tamper resistant, hospital grade, 20 amperes, 125 volts, 2 pole, 3 wire grounding type with green hexagonal equipment ground screw, integral ground fault circuit interrupter, UL rated Class A, Group 1, with metal plaster ears, side wiring, NEMA Configuration 5-20R, self-testing with red and green LED indicator lights. Device shall include solid state ground-fault sensing and signalling, with a 5 milliamperere ground fault trip level, plus or minus 1 milliamperere. Hubbell Cat. #GFR5362SG, #GFR8300SG, #GFRST83NAP1, or approved substitute.
 - 1. Whether indicated or not on the floor plans, the Electrical Contractor shall furnish and install GFI protected devices in kitchen areas on countertops near sinks, water coolers, refrigerators, on rooftop equipment, on exterior walls; and as indicated by the N.E.C., it shall be the discretion of the Electrical Contractor to provide GFI receptacles or GFI circuit breaker. Receptacles protected by GFI circuit breakers shall be permanently labeled on the faceplate as GFCL.

2.4 DEVICE PLATES

- A. Provide switch and receptacle outlet wall plates for wiring devices, of types, sizes, and with ganging and cut outs required by the devices being installed. Construct with metal screws for securing plates to devices; screw heads colored to match finish of plates; plates colored to match wiring devices to which attached. Provide device plates possessing the following additional construction features: **Receptacle outlet plates to be permanently marked with panel designation and circuit number on front side of plate.**
 - 1. Metal Plates to be stainless steel of non-corrosive and non-magnetic 302 alloy, .032" nominal thickness. Plates shall have brushed satin finish.
 - 2. Non-Metallic Plates to be a thermoplastic, virtually indestructible, molded polycarbonate material offering resistance to impact, scratches, discoloration and be self-extinguishing. Plates shall have no-line smooth finish.
- B. Weatherproof device plates shall have spring-hinged waterproof cap suitably configured for each application, including face plate gaskets and corrosion-resistant fasteners. Boxes and devices shall be recessed, weatherproof with smoke gray opaque in-use covers. Intermatic Cat. #WP1000(H)GRC.

PART 3 – EXECUTION

3.1 INSTALLATION OF WIRING DEVICES

- A. Install wiring devices as indicated, in compliance with manufacturer's written instructions, applicable requirements of NEC and NECA's "Standard of Installation", and in accordance with recognized industry practices to fulfill project requirements.

- B. Coordinate with other work, including painting, electrical box and wiring work, as necessary to interface installation of wiring devices with other work.
- C. Install wiring devices only in electrical boxes which are clean, free from building materials, dirt and debris.
- D. Provide electrical connections for wiring.
- E. Delay installation of all wiring devices until wiring work is completed.

3.2 PROTECTION OF WALL PLATES AND RECEPTACLES

- A. At time of Substantial Completion, replace those items which have been damaged, including those burned and scorched by faulty plugs.

3.3 GROUNDING

- A. Provide electrically continuous, tight grounding connections for wiring devices.

3.4 TESTING AND COMMISSIONING

- A. Prior to energizing circuitry, test wiring devices for electrical continuity and proper polarity connections. After energizing circuitry, test wiring devices to demonstrate compliance with requirements.
- B. All areas where energy control devices are specified shall be verified for full coverage and accurate operation. If any area is determined by the Owner, Architect, or Engineer to have inadequate coverage or operation, Contractor shall provide additional energy control devices to remedy the coverage or operation issue. For bidding purposed, own 5 extra devices fully installed. After successful commissioning, uninstalled devices shall be handed over to the Owner for spare devices. Device types shall be as required for commissioning, or as selected by Owner for space devices as applicable.

END OF SECTION

SECTION 26 01 60

PANELBOARDS

PART 1 – GENERAL

1.1 DESCRIPTION OF WORK

- A. Extent of panelboard load-center and enclosure work, including cabinets and cutout boxes, is indicated by drawings and schedules.
- B. Types of panelboards and enclosures in this section include the following:
Lighting and Appliance Panelboards.

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's data including specifications, installation instructions and general recommendations, for each type of panelboard required. Include data substantiating that units comply with requirements.
- B. Shop Drawings: Submit dimensioned drawings of panelboards and enclosures showing layouts of enclosures and required individual panelboard devices, including by not necessarily limited to, circuit breakers, contactors, and accessories, including wiring diagrams of contactors.

1.3 COORDINATION

- A. The drawings are scheme and/or diagrammatic in nature, and indicate the need and intent of the design. These are to be used for general guidance only. It shall be the responsibility of the Electrical Contractor to coordinate, with other Division Subcontractors, the installation of all raceways, raceway supports, junction boxes and required fittings. This coordination will include conduit layout to allow access to equipment for maintenance.
- B. This coordination shall be carried out prior to actual installation; this shall be done to eliminate the possibility of conflicts between trades on items such as access, clearances and maintenance issues that may arise after completion of construction.
- C. Should the coordination not be carried out prior to installation, and a conflict exists, the installing contractor shall remove and reinstall the equipment as required to clear the conflict at no additional cost to the Owner and no delay in project completion.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products of one of the following (for each type of panelboard and enclosure):
Cutler Hammer, Inc. (Eaton)

Square D Company

Siemens

2.2 PANELBOARDS

A. General:

1. Panelboards shall comply with the following industry standards:

a. UL Listing/Approval

b. UL Standards:

Panelboards - UL67

Cabinet & Boxes - UL50

c. National Electric Code

d. NEMA Standard -PBI

2. Interiors:

a. All interiors shall be completely factory assembled. They shall be so designed that switching and protective devices can be replaced without disturbing adjacent units and without removing the main bus connectors, so that circuits may be changed without machining, drilling and tapping.

b. Branch circuits shall be arranged using double row construction. A nameplate shall be provided listing panel type and rating.

c. Unless otherwise noted, full size insulated neutral bars shall be included. Bus bar taps for panels with single pole branches shall be arranged for sequence phasing of the branch circuit devices. Neutral bussing shall have a suitable lug for each outgoing feeder requiring a neutral connection. A ground bus will be included in all panelboards.

3. Boxes: Boxes shall be a minimum 20 inches wide and manufactured from galvanized steel. Provide minimum gutter space in accordance with the National Electric Code.

4. Trim:

a. Switching device handles shall be accessible. Panel access doors shall not uncover any live parts. Doors shall have flush type cylinder lock and catch except doors over 48" in height shall have auxiliary fastenings top and bottom of door in addition to the flush type cylinder lock and catch. Panelboard trim clamps shall be of the indicating type. Upon removal of screws behind door, the panel interiors become service accessible via piano hinged trim front.

b. Panel access door hinges shall be concealed. All locks shall be keyed alike; directory frame shall be welded metal and having a transparent cover shall be furnished with each door.

- c. All exterior and interior steel surfaces of the trim shall be properly cleaned, primed with a rust inhibiting phosphatized coating and finish with a gray ANSI 61 paint. Trims for flush panels shall overlap the box for a least 3/4 inch all around. Surface trims shall have the same width and height as the box. Trims shall be mountable by a screwdriver and without the need for special tools.
5. Main Bus and Branch Circuits: All main bus bars shall be full size copper, sized in accordance with U.L. standards to limit the temperature rise on any current carrying part to a maximum of 50 degrees C above an ambient of 40 degrees C maximum.
- B. Lighting and Appliance Panelboards:
1. Provide switching and protective devices in quantities, ratings, types indicated, with anti-turn solderless pressure type lug connectors approved for copper conductors. Circuit breakers shall be the bolt-on, molded case, thermal magnetic type, with toggle handles that indicate when tripped. Where multiple pole circuit breakers are indicated, provide with common trip so overload on one pole will trip all poles simultaneously.
 2. Panelboards for use at 240 volts AC maximum shall incorporate circuit breakers as shown rated at 10,000 A.I.C. symmetrical at 240 volts.
 3. Panelboards for use at 480/277 volts AC maximum shall incorporate circuit breakers as shown rated at 14,000 A.I.C. symmetrical at 480 volts.

PART 3 – EXECUTION

3.1 INSTALLATION OF PANELBOARDS

- A. Install panelboards and enclosures where indicated in contract documents and, in accordance with the equipment manufacturer's written instructions, applicable requirements of NEC and NECA's "Standard of Installation", and in compliance with recognized industry practices to ensure that products fulfill requirements.
- B. Anchor enclosures firmly to walls and structural surfaces, ensuring that they are permanently and mechanically secure.
- C. Provide all required electrical and grounding connections within the panelboards and enclosures.
- D. The Electrical Contractor shall furnish and install on the door within each enclosure, a circuit labeling identification system for all electrical panelboards. The system must satisfy the NEC Article No. 110-22. The directories shall be typed, NOT handwritten. Directories shall indicate room numbers as indicated on contract documents and room numbers as physically labeled in the field.

END OF SECTION

SECTION 26 01 80

OVERCURRENT PROTECTIVE DEVICES

PART 1 – GENERAL

1.1 DESCRIPTION OF WORK

- A. Extent of overcurrent protective device work is indicated by drawing schedules and specifications.
- B. Types of overcurrent protective devices in this section include the following:
 - 1. Molded case circuit breaker.

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's data on overcurrent protective devices, including: voltages and current ratings, interrupting ratings, current limitations, internal inductive and non-inductive loads, time-current trip characteristic curves, and mounting requirements.
- B. Shop Drawings: Submit layout drawings of overcurrent protective devices, showing spatial relationships of units to associated electrical equipment, and connections to electrical power supplies.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include the following:
 - 1. Circuit-Breakers
 - Cutler-Hammer, Inc. (Eaton)
 - Square D Co.
 - Siemens

2.2 CIRCUIT BREAKERS

- A. Except as otherwise indicated, provide circuit breakers and ancillary components, of types, sizes, ratings and electrical characteristics indicated, which comply with manufacturer's standard design, materials, components, and construction in accordance with published product information, as required for a complete installation.
- B. Molded-Case Circuit Breakers: Provide factory assembled, molded-cased circuit breakers of frame size indicated; 120/208 volts, and 277/480 volts 60 Hertz, one, two, or three poles with a short circuit symmetrical ampere interrupting rating as indicated by the panel schedule and/or as

shown by the single line riser diagram. Provide circuit breakers with permanent thermal instantaneous magnetic trips in each pole with ampere ratings as indicated. Construct with overcenter, trip-free, toggle type operating mechanisms with quick-make, quick-break action and positive handle trip indication. Construct devices for mounting and operating in any physical position and operating in an ambient temperature of 40 degrees C. Provide circuit breakers with mechanical screw type connector lugs, AL/CU rated.

PART 3 – EXECUTION

3.1 INSTALLATION OF OVERCURRENT PROTECTIVE DEVICES

- A. Install overcurrent protective devices as indicated in contract documents, in accordance with the manufacturer's written instructions and with recognized industry practices to ensure that protective devices comply with requirements. Comply with NEC Standards for Installation of overcurrent protective devices.
- B. Coordinate with other work, including electrical wiring work, as necessary to interface installation of overcurrent protective devices with other work.
- C. Fasten circuit breakers without causing mechanical stresses, twisting or misalignment being exerted by clamps, supports, or cabling.

3.2 ADJUST AND CLEAN

- A. Inspect circuit-breaker operating mechanisms for malfunctioning and, where necessary, adjust units for free mechanical movement.

3.3 FIELD QUALITY CONTROL

- A. Prior to energization of overcurrent protective devices, test devices for continuity of circuitry and for short-circuits. Correct malfunctioning units, and then demonstrate compliance with requirements.

END OF SECTION

SECTION 26 05 20

ROADWAY & PARKING AREA LIGHTING

PART 1 – GENERAL

1.1 DESCRIPTION OF WORK

- A. Extent of roadway and parking area lighting work is indicated by drawings and schedules.
- B. Applications of roadway and parking area lighting in this section include the following:
 - Private roadways.
 - Automobile parking lots.
 - Pedestrian walkways.
- C. Excavation and backfilling for roadway and parking area lighting poles, standards and foundations are specified in applicable Division 26 General Provisions sections.
- D. Concrete for embedding poles, and for pole foundations and footings are specified in applicable Division 26 General Provision sections.

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's data on roadway and parking area lighting units, including certified dimension drawings of components including, but not necessarily limited to, fabricated poles and standards, and hardware.

PART 2 – PRODUCTS

2.1 GENERAL

- A. Provide concrete bases, standards and luminaries of sizes, types and ratings indicated; complete with but not necessarily limited to anchor bolts, housings, lamps, lampholders, reflectors, ballasts, starters, lighting brackets and wiring; wired and connected in place, tested and left in satisfactory operating condition. See schedule on the drawings for types of standards and luminaries. Type letters are keyed with fixture letters indicated at the outlets on the drawings.
- B. Material: Extruded aluminum.
- C. Configuration: Anchor base type with handhole and cover.
- D. Metal Lighting Standard Accessories: Provide accessories for metal lighting standards, including anchor bolts, as recommended by standard manufacturer of sizes and materials needed to fulfill loading and erection application requirements.
- E. Manufacturers: Subject to compliance with requirements, provide products of one of the following (for each type of roadway and parking area lighting unit): As specified under "PRODUCTS".

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Install roadway and parking area lighting units as indicated, in accordance with manufacturer's written instructions, applicable requirements of NEC, NESC and NEMA standards, and with recognized industry practices to ensure that lighting units fulfill requirements.
- B. Use belt slings or rope (not chain or cable) to raise and set finished poles and standards to protect finishes.
- C. Set poles and standards plumb. Support adequately during backfilling, or anchoring to foundations.

3.2 ADJUST AND CLEAN

- A. Clean standards and luminaries of dirt and debris upon completion of installation.
- B. Protect standards and luminaries from damage during remainder of construction period.

3.3 FIELD QUALITY CONTROL

- A. Upon completion of installation of roadway and parking area lighting fixtures, and after building circuitry has been energized, apply electrical energy to demonstrate capability and compliance with requirements. Where possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units, and proceed with retesting.
- B. At the time of Substantial Completion, replace lamps in lighting fixtures which are observed to be noticeably dimmed after Contractor's testing, as judged by Architect/Engineer.

3.4 GROUNDING

- A. Provide tight equipment grounding connections for each lighting fixture installation.

END OF SECTION

SECTION 26 56 68
EXTERIOR ATHLETIC LIGHTING**PART 1 GENERAL**

1.01 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 Sussex Tech 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. Field #2: Track & Field Stadium
 2. Field #2: Stadium Bleachers
 3. Field #3: Secondary Turf Field
- D. The primary goals of this sports lighting project are:
1. **Guaranteed Light Levels:** Selection of appropriate light levels impacts 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.
 3. **Cost of Ownership:** 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.
 - a. Control and monitoring system shall provide contractor control of all existing circuits. Key switches shall be provided to provide field-level control of existing circuit groups.
 - b. **Entertainment Features** (to be included if the alternate is taken): Incorporation of theatrical light shows enhance the presentation and enjoyment of players and spectators. Control system shall incorporate pre-programmed light shows such as "chase", "wave", and "score." Control system shall incorporate the ability to initiate these shows locally. System shall be able to time light shows to customer-supplied music.
 - c. **Accent Lighting:** To allow for custom lighting effects, including team colors, lighting for special occasion, and theatrical effects, all poles should be equipped with RGB accent luminaires to illuminate the structures in various custom colors. Colors should be selectable via an onsite device.

1.02 ONFIELD 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 manufacturers will provide a guarantee that light levels will be sustained over the life of the warranty period. Lighting calculations shall be developed, and field measurements taken on the grid spacing with the minimum number of grid points specified below.

- B. Manufacturers will provide lumen maintenance data of the LED luminaires used per TM-21-11 and will Incorporate the lumen maintenance projections into the lighting designs to ensure target light levels are achieved throughout the guaranteed period of the system. Per IES guidelines, lumen maintenance hours should be reported based on the 6x multiplier of testing hours.

| Area of Lighting | Average Target Illumination Levels | Maximum to Minimum Uniformity Ratio | Grid Points | Grid Spacing |
|--|---|--|--------------------|---------------------|
| Stadium Football | 75fc | 2:1 | 72 | 30' x 30' |
| Stadium Soccer | 70fc | 2:1 | 96 | 30' x 30' |
| Track | 30fc | 3:1 | 44 | 30' x 30' |
| Stadium Home Bleachers All Lights | 15fc | 7:1 | 90 | 10' x 10' |
| Stadium Home Bleachers Dedicated Lights | 6fc | 4:1 | 90 | 10' x 10' |
| Stadium Visitor Bleachers All Lights | 20fc | 3:1 | 45 | 10' x 10' |
| Stadium Visitor Bleachers Dedicated Lights | 10fc | 2:1 | 45 | 10' x 10' |
| Multipurpose Field | 50fc | 2:1 | 96 | 30' x 30' |

- C. Color Temperature: The lighting system shall have a minimum color temperature of 5700K and a CRI of 75.
- D. Playability: Lighting design and luminaire selection should be optimized for playability by reducing glare on field and providing sufficient uplight.
1. Aiming Angles: To reduce glare, the luminaire aiming should ensure the top of the luminaire field angle (based on sample photometric reports) is a minimum of 10 degrees below horizontal.

2. Glare Control Technology – Luminaires selected should have glare control technology including, but not limited to external visors, internal shields and louvres. No symmetrical beam patterns are acceptable.
3. Aerial lighting – Adequate illumination must be provided above the field in order to see the ball in flight. It is recommended that a lighting analysis be performed above the field of play to evaluate the visibility of the ball over its typical trajectory to ensure the participants will adequately see the ball. Calculation planes should be evaluated up to the maximum anticipated height for the level of play.
4. Mounting Heights: To ensure proper aiming angles, minimum mountings heights shall be as described below. Higher mounting heights may be necessary for luminaire with lesser glare control to meet field angle requirements of section 1.2.C.1.

| # of Poles | Pole Designation | Pole Height |
|------------|------------------|-------------|
| 8 | F1-F4, S1-S4 | 80' |

1.03 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 levels taken at 3 feet above grade.

| Property Line Spill (116 grid points) | Average | Maximum |
|--|---------|------------|
| Maximum Horizontal Footcandles (at 3ft above grade) | 0.1 fc | 1.83 fc |
| Max Vertical Footcandles (at 3fc above grade) | 0.3 fc | 5.15 fc |
| Max Candela (at 5 ft above grade) | | 150,000 cd |

- C. Environmental glare impact scans must be submitted showing the maximum candela 150' from the playing surface.
- D. Spill Scans: Spill scans must be submitted indicating the amount of horizontal and vertical footcandles with meter aimed at the brightest bank of lights along the specified lines. Light levels shall be provided in 30-foot intervals along the boundary line at 3 ft above grade with all luminaires on. Spill Values may not take into account foliage, bleachers, or other objects that would block light spillage.
- E. Sample Photometry: 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 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.

- F. Field Verification: Lighting manufacturer shall supply field verification of environmental light control using a meter calibrated within the last 12 months:
- G. Spill verification: Illumination levels shall be taken in accordance with IESNA LM-5-04. The light sensing surface of the light meter should be held 36 inches above the playing surface with the sensing surface horizontal (for horizontal readings) or vertically pointed at the brightest light bank (for max vertical readings)

PART 2 – PRODUCT

2.01 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, 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 Section 2.4 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 in the enclosure. Integral drivers are not allowed.

- b. 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.
 - 5. Wire harness complete with an abrasion protection sleeve, strain relief and plug-in connections for fast, trouble-free installation.
 - 6. All luminaires, visors, and cross-arm assemblies shall withstand 150 mph winds and maintain luminaire aiming alignment.
 - 7. Control cabinet to provide remote on-off control and monitoring, and entertainment features of the lighting system. See Section 2.3 for further details. Entertainment features are to be included only if the alternate is taken.
 - 8. 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. Enhanced corrosion protection package: Due to potentially corrosive environment this project, manufacturers must provide documentation that their products meet the following enhanced requirements in addition to the standard durability protection specified above:
 - 1. Exposed carbon steel horizontal surfaces on the crossarm assembly shall be galvanized to no less than a five (5) mil average thickness.
 - 2. Exposed die cast aluminum components shall be Type II anodized per MIL-STD-8625 and coated with high performance polyester.
 - 3. Exposed extruded aluminum components shall be Type II anodized per MIL-STD-8625 and coated with high performance polyester.
- E. Safety: All system components shall be UL listed for the appropriate application.

2.02 ELECTRICAL

- A. Electric Power Requirements for the Sports Lighting Equipment:
 - 1. Electric power: to be confirmed.
 - 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 129.80kw.

2.03 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. Contactor control of lights: To minimize wear on drivers and other electrical components and prevent lights from turning on due to communication loss, circuits must be controlled via contactor switching, not dimming driver output to zero.
- D. Dimming: System shall provide for 4-stage dimming (high-medium-low-blackout). Dimming will be set via scheduling options (Website, app, phone, fax, email) or via an onsite user interface tablet or device. Onsite user interface tablet to be provided is alternate is taken.
- E. 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. The 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.

- F. 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).
- G. Management Tools: Manufacturer shall provide a web-based database and dashboard tool of actual field usage and provide reports by facility and user group. The dashboard shall also show 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.

- H. Communication Costs: Manufacturer shall include communication costs for operating the control and monitoring system for a period of 25 years.
- I. Communication with luminaire drivers: Control system shall interface with drivers in electrical components enclosures by means of powerline communication.
- J. Entertainment Features (Field #2: Track & Field Stadium only): Control System shall store four (4) preprogrammed light shows per field with option for two (2) customized preprogrammed lighting scenes or effects. Programming will additionally include four (4) minutes of custom programming with lights synchronized to music supplied by custom. Shows shall be initiated by a manufacturer-provided touchscreen user interface on the control system network.

2.04 STRUCTURAL PARAMETERS

- A. Wind Loads: Wind loads shall be based on the 2021 International Building Code. Wind loads to be calculated using ASCE 7-16, 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 (Pennoni Report dated July 25,2024).

PART 3 – EXECUTION

3.01 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 New Jersey for soils other than specified soil conditions.
2. Additional materials that are required to achieve alternate foundation.
3. Excavation and removal of materials other than normal soils, such as rock, caliche, etc.

3.02 DELIVERY TIMING

- A. Delivery Timing Equipment On-Site: The equipment must be on-site 10-12 weeks from receipt of approved submittals and receipt of complete order information.

3.03 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. These levels will be specifically stated as "guaranteed" on the illumination summary provided by the manufacturer.
 2. The contractor/manufacturer shall be responsible for conducting initial light level testing and an additional inspection of the system, in the presence of the owner, one year from the date of commissioning of the lighting.
 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, uniformity ratios, upright for aerial visibility, and offsite candela readings 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.

3.04 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. The warranty shall guarantee specified light levels. The manufacturer shall maintain specifically funded financial reserves to assure fulfillment of the warranty for the full term. The warranty does not cover weather conditions events such as lightning or hail damage, improper installation, vandalism or abuse, unauthorized repairs or alterations, or products 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. The manufacturer is responsible for removal and replacement of failed luminaires, including all parts, labor, shipping, and equipment rental associated with maintenance. Owner agrees to check fuses in the event of a luminaire outage.

PART 4 – DESIGN APPROVAL

- 4.01 PRE-BID SUBMITTAL REQUIREMENTS (NON-MUSCO)
- A. Design Approval: The owner / engineer will review pre-bid submittals per section 4.1.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. Bidders are required to bid only the 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: <ul style="list-style-type: none"> a. Field Name, date, file number, prepared by b. 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. c. Pole height, number of fixtures per pole, horizontal and vertical aiming angles, as well as luminaire information including wattage, lumens, and optics. d. Height of light test meter above field surface. e. 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 luminaries, 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 footcandles. Lighting design showing glare along the boundary line in candela. 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 | Photometric Report | Provide the 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. |
| F | 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 the warranty period. |
| G | 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 Delaware, if required by the owner. (May be supplied upon award). |
| H | Control & Monitoring System | Manufacturer of the control and monitoring system shall provide written definition and schematics for automated control system and entertainment packages (entertainment packages to be included if the alternate is taken). They will also provide ten (10) references of customers currently using the proposed system in the state of Delaware. |
| I | 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 Delaware. |
| J | Warranty | Provide written warranty information including all terms and conditions. Provide ten (10) references of customers currently under specified warranty in the state of Delaware. |
| K | 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 New Jersey. Reference list will include project name, project city, installation date, and if requested, contact name, and contact phone number. |
| L | Product Information | Complete bill of material and current brochures/cut sheets for all products being provided. |
| M | Delivery | Manufacturer shall supply an expected delivery timeframe from receipt of approved submittals and complete order information. |
| N | Non-Compliance | Manufacturer shall list all items that do not comply with the specifications. If in full compliance, tab may be omitted. |
| O | Environmental Light Control Design | Environmental glare impact scans must be submitted showing the maximum candela 150' from the playing surface |

SECTION 32 12 16.1
TRACK & TENNIS BITUMINOUS CONCRETE PAVEMENT

PART 1 GENERAL

1.01 GENERAL REQUIREMENTS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 00 00 - GENERAL REQUIREMENTS, which are hereby, made a part of this Section of the Specifications.
- B. Examine all other Sections of the Specifications for requirements, which affect work of this Section whether or not such work is specifically mentioned in this Section.
- C. Coordinate work with trades affecting, or affected by, work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.02 DESCRIPTION OF WORK

- A. Work Included: Perform all work required to complete the work of the Section, as indicated. Such work includes, but is not limited to, the following:
 - 1. Construction of dense graded crushed stone base course for all new paved areas.
 - 2. Rough grading and compaction of base material.
 - 3. New bituminous concrete running track and field event areas and tennis courts.

1.03 RELATED WORK

- A. Cast-In-Place Concrete
- B. Cement Concrete Pavement
- C. Athletic Equipment
- D. Earthwork
- E. Resilient Track Surface
- F. Chain Link Fence and Gates

1.04 REFERENCES

- A. Work shall conform to codes and standards of the following:
 - 1. ASTM – American Society of Testing Materials
 - 2. AASHTO – American Association of State Highway and Transportation Officials
 - 3. State of Delaware Department of Transportation (DelDOT) Standard Specifications for Road and Bridge Construction.
 - 4. Delaware Interscholastic Athletic Association (DIAA).
 - 5. International Association of Athletics Federations (IAAF).
 - 6. American Sports Builders Association (ASBA)
 - 7. National Federation of State High Schools (NFHS)

1.05 QUALITY ASSURANCE

- A. Codes and standards: Perform site improvement work in compliance with applicable requirements of governing authorities having jurisdiction.
- B. Qualifications of workers: Use adequate numbers of skilled workers who are trained in the necessary crafts and who are completely familiar with the specified requirements and methods needed for proper performance of the work of this Section.
- C. Track paving crew shall have a demonstrated history of successfully paving running tracks. Crew leaders and all laborers shall have paved at least five (5) running tracks in the last three (3) year period.
- D. Layout and Grading: After staking and layout out the work, and before beginning final construction, obtain the Landscape Architect's/Civil Engineer's approval of layout and grades. Contactor shall make minor adjustments as determined by the Landscape Architect/Civil Engineer.
- E. The Contactor and his Subcontractors shall inspect all subbases for unstable, unsuitable or improperly prepared areas. Do not begin work over unacceptable areas. Beginning work means the Contractor and his Subcontractors accept the subbase, previous work and conditions and shall be held responsible for any corrections required to properly implement the Construction Documents.

1.06 SUBMITTALS

- A. Product Information: Provide manufacturer's data showing installation and limitations in use. Supply Certificates of Compliance for all materials required for fabrication and installation. Work includes but is not limited to the following items:
 - 1. Bituminous Concrete – mix data for binder course and surface course
 - 2. Resumes of track and tennis paving foreman and crew
 - 3. List of five (5) track references of paving crew

1.07 JOB CONDITIONS

- A. Environmental Requirements: The Subcontractor shall verify site conditions to assure that the requirements for installation procedures conform to the following:
 - 1. Weather Limitations: Apply prime and tack coats when ambient temperature is above 50 deg F (10 deg C) and when temperature has not been below 35 deg F (1 deg C) for 12 hours immediately prior to application. Do not apply when base is wet or contains an excess of moisture.
 - 2. Construct hot-mixed asphalt surface course when atmospheric temperature is above 40 deg F (4 deg C) and when base is dry. Base course may be placed when air temperature is above 30 deg F (minus 1 deg C) and rising.
 - 3. After final rolling of bituminous concrete pavement, no vehicular traffic of any kind shall be permitted until it has cooled for 24-hours.
 - 4. Other applicable DelDOT Standards.
- B. Site Information: Data on indicated grades, utilities and other existing conditions are not intended as representations or warranties of accuracy.

- C. Existing Utilities: Locate existing utilities in areas of work. If utilities are to remain in place, provide adequate means of protection during installation of site improvements.
- D. Protection: The Contractor shall use all means necessary to protect the materials of this Section before, during and after installation. In the event of damage, make all repairs and replacements necessary to approval of the Landscape Architect/Civil Engineer and at no additional cost to the Owner. All work shall be executed in such a manner as to prevent any damage to existing streets, curbs, paving to remain, existing fencing, existing plant materials, and adjoining properties.
- E. The Contractor shall remove all debris, construction equipment and scrap material from areas within the limit of work prior to inspection for acceptance.
- F. The Drawings indicate, in general, the alignment and finished grade elevations. The Landscape Architect/Civil Engineer, however, may make minor adjustments to grades and alignments as are found necessary.

PART 2 PRODUCTS

2.01 GENERAL

- A. Use locally available materials and gradations that exhibit a satisfactory record of previous installations.

2.02 DENSE GRADED CRUSHED STONE (AGGREGATE BASE COURSE)

- A. Course Aggregate: Sound, angular crushed stone, crushed gravel, or properly cured crushed blast furnace slag, complying with ASTM D 692-88.
- B. Fine Aggregate: Sharp-edged natural sand or sand prepared from stone, properly cured blast furnace slag, gravel, or combinations thereof, complying with ASTM D 1073.
- C. The Contractor shall submit to the Landscape Architect/Civil Engineer a sieve analysis by an independent recognized testing laboratory of the material he intends to utilize. No material shall be placed until approved by the Landscape Architect/Civil Engineer in writing.
- D. Dense Graded Crushed Stone for all new pavement shall consist of two (2) lifts with a minimum finished after rolling and compaction of twelve (12") inches.

2.03 400 METER RUNNING TRACK (INCLUDING FIELD EVENT AREAS) AND TENNIS COURTS, BITUMINOUS CONCRETE PRODUCT MIX REQUIREMENTS:

- A. Provide plant-mixed, hot-laid asphalt-aggregate mixture complying with ASTM D 3515 and applicable Delaware Department of Transportation standards.
- B. Bituminous concrete for the 400-meter running track (including field event areas) and tennis courts shall conform to 2.03.A above, and shall consist of two (2) courses of bituminous concrete with a minimum finished pavement depth after rolling of three (3") inches.
 - 1. Binder course shall be a DelDOT approved 12.5mm mix design, 1.75 inches in thickness consisting of one lift Binder Course bituminous concrete.
 - 2. Surface course shall be a DelDOT approved 9.5mm mix design, 1.25 inches in thickness consisting of one course of Dense Mix bituminous concrete.

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- C. Reclaimed Asphalt Pavement (RAP) may be used in Binder Course. The maximum amount of RAP shall be limited to a maximum of 15%, or as approved by the Landscape Architect/Civil Engineer. The maximum amount of RAP for surface courses shall be 0%.
- D. Bituminous concrete for the 400-meter track (including field event areas) and tennis courts, shall comply with American Sports Builders Association’s Asphalt Guidelines.

2.04 BITUMINOUS MATERIALS

- A. Asphalt Cement: ASTM D 3381 for viscosity-graded material; ASTM D 946 for penetration-graded material.
- B. Prime Coat: Cut-back asphalt type, ASTM D 2027; MC-30, MC-70 or MC-250.
- C. Tack Coat: Emulsified asphalt; ASTM D 977.

PART 3 EXECUTION

3.01 GRADING AND PREPARATION OF EXISTING BASE COURSE (SUBGRADE)

- A. Areas to be paved will be compacted and brought approximately to subgrade elevation before work of this Section is performed. Final fine grading, filling, and compaction of subgrade to receive paving, as required to form a firm, uniform, accurate, and unyielding subgrade at required elevations and to required lines, shall be done under this Section.
- B. Existing subgrade material which will not readily compact as required shall be removed and replaced with satisfactory materials. Additional materials needed to bring subgrade to required line and grade and to replace unsuitable material removed shall be material conforming to this Section.
- C. Subgrade of areas to be paved shall be re-compacted as required to bring top 8 inches of material immediately below bituminous concrete pavement to a compaction of at least 95% of maximum density, as determined by ASTM D 1557, Method D. Subgrade compaction shall extend for a distance of at least 1 foot beyond pavement edge.
- D. Excavation required in pavement subgrade shall be completed before fine grading and final compaction of subgrade are performed. Where excavation must be performed in completed subgrade or subbase subsequent backfill and compaction shall be performed as directed by the Landscape Architect/Civil Engineer. Completed subgrade after filling such areas shall be uniformly and properly graded.
- E. Areas being graded or compacted shall be kept shaped and drained during construction. Ruts greater than or equal to 2 inches deep in subgrade, shall be graded out, reshaped as required, and re-compacted before placing dense graded crushed stone base course materials and pavement.
- F. Materials shall not be stored or stockpiled on subgrade.
- G. Disposal of debris and other material excavated and/or stripped under this Section, and material unsuitable for or in excess of requirements for completing work of this Section shall be legally disposed off-site, unless otherwise directed by the Landscape Architect/Civil Engineer or Owner.
- H. Prepared subgrade will be inspected by the Landscape Architect/Civil Engineer. Subgrade shall be approved by the Landscape Architect/Civil Engineer before installation of bituminous

concrete pavement. Disturbance to subgrade caused by inspection procedures shall be repaired under this Section of the specification.

3.02 DENSE GRADED CRUSHED STONE BASE COURSE

- A. Dense graded crushed stone base course for paving 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 shall follow the State of Delaware Department of Transportation Standard Specifications for Road and Bridge Construction.
- B. Compaction of dense graded crushed stone base course shall be to 95% of maximum density as determined by ASTM D 1557, Method D. Stone greater than 2-1/2 inches shall be excluded from aggregate base course materials.
- C. Width of dense graded crushed stone base course shall be greater than or equal to the width of pavement surface, if continuous lateral support is provided during rolling, and shall extend at least 2 x base thickness beyond edge of the course above, if not so supported.
- D. Dense graded crushed stone material shall be applied in lifts less than or equal to 6 inches thick, compacted measure. Each lift shall be compacted to project specified density with compaction verified by performance of on-site field density testing.
 - 1. Material shall be placed adjacent to wall, manhole, catch basin, and other structures only after they have been set to required grade and level.
 - 2. Rolling shall begin at sides and progress to center of crowned areas, and shall begin on low side and progress toward high side of sloped areas. Rolling shall continue until material does not creep or wave ahead of roller wheels.
 - 3. Surface irregularities which exceed ½ inch measured by means of a 10-foot long straightedge shall be replaced and properly compacted.
- E. Subgrade and base course shall be kept clean and uncontaminated. Less select materials shall not be permitted to become mixed with dense graded crushed stone base course. Materials spilled outside pavement lines shall be removed and area repaired.
- F. 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.

3.03 BITUMINOUS PAVING

- A. Bituminous paving mixture, equipment, methods of mixing and placing, and precautions to be observed as to weather, condition of base, etc., shall conform to DelDOT Specifications and as noted below.
- B. Bituminous binder and surface courses shall each be applied individually, in single lifts of full thickness as indicated on the Drawings.
- C. Adjacent concrete work, etc., shall be protected from stain and damage during entire operation. Damaged and stained areas shall be replaced or repaired to equal their original condition.
- D. Deliveries shall be timed to permit spreading and rolling all material during daylight hours, unless artificial light, satisfactory to Landscape Architect/Civil Engineer, is provided. Loads which have been wet by rain or otherwise will not be accepted. Hauling over freshly load or rolled material will not be permitted.

- E. Placing and rolling of mixture shall be as nearly continuous as possible. Rolling shall begin as soon after placing as mixture will bear the operation without undue displacement. Delays in rolling freshly spread mixture will not be permitted. Rolling shall proceed longitudinally, starting at edge of newly placed material and proceeding toward previously rolled areas. Rolling overlap on successive strips shall be greater than or equal to ½ width of roller rear wheel. Alternate trips of roller shall be of slightly different lengths. Corrections required in surface shall be made by removing or adding materials before rolling is complete. Skin patching of areas where rolling has been complete will not be permitted. Course shall be subjected to diagonal rolling, crossing lines of the first rolling while mixture is hot and in compactable condition. Displacement of mixture or other fault shall be corrected at once by use of rakes and application of fresh mixture or removal of mixture, as required. Rolling of each course shall be continued until roller marks are eliminated. Roller shall pass over unprotected edge of course only when paving is to be discontinued for sufficient time to permit mixture to become cold.
- F. In places not accessible to roller, mixture shall be compacted with hand tampers. Hand tampers shall weigh at least 50 lbs. and shall have a tamping face less than or equal to 100 square inches. Mechanical tampers capable of equal compaction will be acceptable in areas, which they can be employed in the work.
- G. Portions of pavement courses which become mixed with foreign material or are in any way defective shall be removed, replaced, replaced with fresh mixture, and compacted to density of surrounding areas. Bituminous material spilled outside lines of finished pavement shall be immediately and completely removed and the areas restored. Such material shall not be employed in the work.
- H. Joints shall present same texture, density, and smoothness as other sections of the course. Continuous bond shall be obtained between portions of existing and new pavements between successive placements of new pavement. New material at joints shall be thick enough to allow for compaction when rolling. Compaction of pavement, base, and subgrade at joints shall be such that there is no yielding of new pavement relative to existing pavement when subjected to traffic.
- I. Contact surfaces of previously constructed pavement (if greater than or equal to seven days since binder placed), manholes, and similar structures shall be thoroughly cleaned and painted with a thin uniform coating of bitumen immediately before fresh mixture is placed. Tack coat shall be applied at rate which will leave asphaltic residue of 5 to 7 gal./100 sq. yd. after evaporation of vehicle. Base surface shall be dry and clean tack coat is applied. Bituminous paving material shall not be placed until vehicle has completely evaporated from tack coat. Adjoining new paving shall be placed before tack coat has dried or dusted over.
- J. Earth or other approved material shall be placed along pavement edges in such quantity as will compact to thickness of course being constructed, allowing at least 1 foot of shoulder width to be rolled and compacted simultaneously with rolling and compacting surface. Pavement edge shall be trimmed neatly to line before placing earth or other approved material along edge.
- K. After final rolling, vehicular traffic shall not be permitted on pavement until it has cooled and hardened, and in no case less than six hours.
- L. Variations in smoothness of finished surface shall be less than or equal to the following tolerances when tested with a 10 foot straightedge, applied both parallel to and at right angles to centerline of paved area.
 - 1. For track and tennis binder courses – 1/4 inch in 10 feet.

2. For track and tennis surface courses – 1/8 inch in 10 feet.
 3. At joint with existing pavement, and at other locations where an essentially flush transition is required, pavement elevation tolerance shall not exceed 0.01 feet.
 4. At other areas pavement elevation tolerance shall not exceed ± 0.05 feet.
 5. Irregularities exceeding these amounts or which retain water on surface shall be corrected by removing defective work and replacing with new material conforming to this Specification.
- M. The Contractor shall check the final surface for depressions by applying water in the presences of the Landscape Architect/Civil Engineer. Minor depressions (less than 1/8" in depth) need not be corrected, however, in cases where the variation in the surface course exceeds 1/8", the entire area affected shall be removed and replaced with new surface course at the expense of the Contractor.

END OF SECTION

**SECTION 32 15 40
STONE DUST PAVING****PART 1 - GENERAL****1.1 GENERAL REQUIREMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Examine all other Sections of the Specifications for requirements, which affect work of this Section whether or not such work is specifically mentioned in this Section.
- C. Coordinate work with that of all other trades affecting, or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.2 WORK INCLUDED

- A. Perform all work required to complete the work of the Section, as indicated. Such work includes, but is not limited to, the following:
 - 1. Provide crushed aggregate screenings/stone dust (CAS) paving, complete as shown for the shot-put throwing area.
- B. Related Sections include:
 - 1. Earthwork
 - 2. Cast-in-place Concrete
 - 3. Precast Concrete Curb
 - 4. Natural Grass Athletic Field Surface

1.3 REFERENCES

- A. Work shall conform to codes and standards of the following:
 - 1. ASTM - American Society for Testing and Materials
 - 2. State of Delaware Department of Transportation Standard Specifications for Road and Bridge Construction.
 - 3. AASHTO - American Association of State Highway and Transportation Officials
 - 4. Americans with Disabilities Act (ADA).

1.4 QUALITY ASSURANCE

- A. Codes and standards: Perform site improvement work in compliance with applicable requirements of governing authorities having jurisdiction.
- B. Qualifications of workers: Use adequate numbers of skilled workers who are trained in the necessary crafts and who are completely familiar with the specified requirements and methods needed for proper performance of the work of this Section.
- C. Layout and Grading: After staking and laying out the work, and before beginning final construction, obtain the Landscape Architect's/Civil Engineer's approval of layout and grades. Contractor shall make minor adjustments as determined by the Landscape Architect/Civil Engineer.
- D. The Contractor and his Subcontractors shall inspect all subbases for unstable, unsuitable or improperly prepared areas. Do not begin work over unacceptable areas. Beginning work means the Contractor and his Subcontractors accept the subbase, previous work and conditions and shall be held responsible for any corrections required to properly implement the Construction Documents.

- E. Submit certified documentation of successful experience of no less than three (3) years in the installation of similar crushed stone paving in comparable scale projects.
- F. Testing Agency: Selected by Owner and paid for by the Contractor.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Protect crushed stone from contamination with foreign materials. Isolate stockpiles to prevent mixing of different aggregate grades. Prevent contamination with organic materials.

1.6 SEQUENCING AND SCHEDULING

- A. Acceptance: Do not install work under this section prior to acceptance of the subgrade preparation under another section.
- B. Coordination: Coordinate with other trades to insure a proper installation schedule.

1.7 MAINTENANCE

- A. Service: Immediately repair all damage to the work as the result of weather or traffic conditions. Report all damage resulting from work of other trades after acceptance of work. Repair to match adjacent undisturbed work.

1.8 SUBMITTALS

- A. Product Data: Manufacturer’s current catalog cuts and specifications for decomposed granite (crushed aggregate screenings, CAS).
- B. Samples: Half (1/2) a pound for each size and color range of decomposed granite/crushed aggregate screenings.

PART 2 - PRODUCTS

2.1 CRUSHED AGGREGATE SCREENINGS (CAS)

- A. Crushed Aggregate Screening, or Stone Dust, shall consist of crushed limestone. All materials shall be well graded and free from unsuitable materials. All processing shall be completed at the source.
- B. Gradation:

| Sieve Size Designation | Percent Passing by Weight |
|------------------------|---------------------------|
| ¼ inch | 100 |
| #10 | 55-75 |
| #40 | 20-40 |
| #200 | 7-15 |
- C. The Plasticity Index of the material passing the #40 mesh sieve shall not exceed 5.0.

2.2 EQUIPMENT

- A. Compaction Equipment: Power roller weighing not less than five (5) tons.

2.3 ACCESSORIES

- A. Water: Fresh, clean, potable water as available from the Owner or transported as required.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that the adjacent paving or surfacing has been installed and accepted under another Section prior to commencement of work.
- B. Confirm elevation of throwing circles so that final CAS grade matches that elevation.

3.2 PREPARATION

- A. Compaction: Compact subgrade to a minimum of 95% compaction.

3.3 INSTALLATION

A. Stone Dust Paving

1. If the dump truck delivering the CAS is able to back-up to the prepared base, it is advisable to dump the first load at the entrance, spread by grading the CAS onto the base in a pushing mode and continue in this manner so the delivery vehicles reverse over the graded CAS to dump but do not actually travel directly onto prepared base
2. Lines and Levels: Install all crushed aggregate screenings work true to grade, properly coinciding with adjacent work and elevations. Provide a finished surface uniform in texture and appearance. Do not permit finished work to vary more than 1/8" in 10' from true profile and cross section.
3. Moisture Content: Add water to provide a uniformly distributed moisture to obtain the required compaction.
4. Compacting: Thoroughly compact each lift to a minimum of 95% Compact each area with at least four (4) passes of compacting equipment. After compacting, screed smooth.
5. Grading: When surface areas have been rolled and it becomes necessary to add a thin layer of material to bring the surface to grade, the previously rolled or compacted area shall be raked to provide a bond with the added material.
6. Damaged or Defective Installation: Repair and replace in accordance with these Specifications at no additional cost to the Owner.

3.4 PROTECTION

- A. Protect the paving against traffic, injury or defacement, or damage and subsequent construction operations until Final Acceptance.

END OF SECTION

SECTION 32 18 23.13**INFIELD MIX****PART 1 - GENERAL****1.01 GENERAL REQUIREMENTS**

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 010000 – GENERAL REQUIREMENTS, which are hereby, made a part of the Section of the Specifications
- B. Examine all other Sections of the Specifications for requirements that affect work of this Section whether or not such work is specifically mentioned in this Section.
- C. Coordinate work with that of all other trades affecting, or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.02 WORK INCLUDED

- A. Perform all work required to complete the work of this section, as indicated. Such work includes, but is not limited to the following:
 - 1. Furnishing and installing base material for infield and warning track from off-site sources as required completing the work.
 - 2. Furnishing and installing infield mix from off-site sources as required to complete the work
 - 3. Furnishing and installing warning track from off-site sources as required completing the work.
 - 4. Furnishing and installing batter's box fortification
 - 5. Furnishing and installing pitcher's circle fortification
 - 6. Furnishing and installing infield conditioner
 - 7. Furnishing and installing all line whiting for baseball and softball fields

1.03 RELATED WORK UNDER OTHER SECTIONS

- A. Site Athletic Equipment
- B. Cement Concrete Pavement
- C. Chain Link Fences and Gates
- D. Natural Grass Athletic Field Surface

1.04 SUBMITTALS

- A. Submit manufacturer's product data for each type of material and/or equipment required.
 - 1. Source and sieve information for Infield and Warning Track Base Material
 - 2. Source and sieve information for Infield Mix
 - 3. Source and sieve information for Warning Track Mix
 - 4. Pitcher's and Batter's Box Fortification
 - 5. Infield Conditioner

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver manufactured products in manufacturer's original, unopened, and undamaged containers with labels intact and legible.
- B. Store and handle manufactured products to prevent damage and deterioration.

1.06 PROJECT CONDITIONS

- A. General: The Contractor shall visit and accept the site as he finds it, and shall inform himself of the character and the type of site. The Contractor shall walk the site with the Landscape Architect prior to commencing work to determine the full scope of work.
- B. Damage or loss to site improvements shall be at the risk of the Contractor from and after the date of Contract execution, and no such damage or loss shall relieve the Contractor from any obligation under the Contract.
- C. Do not begin equipment work before completion of final grading and surfacing.

PART 2 – PRODUCTS

2.01 BASE MATERIAL

- A. Base Material for Skinned Infield and Warning Track shall be a mason sand and shall conform to the following analysis:

| Sieve Size | Percent Passing (%) |
|------------|---------------------|
| #4 | 100 |
| #8 | 95 – 100 |
| #16 | 70 – 100 |
| #30 | 40 – 75 |
| #50 | 10 – 35 |
| #100 | 2 – 14 |
| #200 | 0 – 2 |

2.02 SKINNED INFIELD MIX

- A. Skinned Infield Mix shall be equivalent to DuraEdge Classic Infield Mix as provided by DuraEdge Products, Inc., 149 South Broad Street, Grove City, PA 16127, (724) 870-4250.
- B. Skinned Infield Mix shall be clean, dry clay mixed with washed mason-type sand resulting in a weed-free mixture that is reddish brown in color having a yield of 1.35 tons per cubic yard when placed loose or 1.5 tons per cubic yard when compacted 85% - 90% on a Standard Proctor Test (ASTM D 689-07). The material shall possess the following particle size analysis:
 - a. Total sand content shall be 70-75 percent.
 - b. The combined amount of sand retained on the medium, coarse and very coarse sieves shall be greater than or equal to 50 percent.
 - c. The combined amount of silt and clay shall be 25-30 percent.
 - d. The ratio of silt divided by clay, otherwise known as SCR, shall be 0.5-1.0.
 - e. No particles greater than 3 millimeters.
 - f. Equal to or less than 5 percent of particles shall be retained on the 2-millimeter sieve.

2.03 WARNING TRACK

- A. Warning Track Mix shall be equivalent to DuraEdge DuraTrax Warning Track Mix as

provided by DuraEdge Products, Inc., 149 South Broad Street, Grove City, PA 16127, (724) 870-4250.

- B. Warning Track Mix shall be clean, crushed brick mixed with #10 limestone resulting in a mix that is reddish brown in color, having a yield of 1.3 tons per cubic yard and possessing the following particle size analysis:

| Sieve Size | Percent Passing (%) |
|------------|---------------------|
| 3/8" | 100 |
| #4 | 90 – 100 |
| #8 | 60 – 78 |
| #16 | 42 – 55 |
| #30 | 20 – 40 |
| #50 | 8 – 20 |
| #100 | 5 – 12 |
| #200 | 0 – 5 |

2.04 INFIELD CONDITIONER

- A. Calcined Clay for skinned infield conditioner shall be equivalent to Turface Pro League Heritage Red as manufactured by Profile, (800) 207-6457.
- B. Final Color to be selected by Landscape Architect from manufacturer’s standard colors.

2.05 CLAY FORTIFICATION

- A. Clay Fortification shall be DuraPitch Premium Mound Clay as provided by DuraEdge Products, Inc., 149 South Broad Street, Grove City, PA 16127, (724) 870-4250.

2.06 LINE MARKING

- A. Whiting shall be a fine dry white powder prepared from natural chalk or olitic calcium carbonate, and shall be free from grit or deleterious impurities.
- B. Whiting shall show the correct microscopical characteristics of the kind required and shall comply with the following requirements:

| | | Minimum | Maximum |
|----|--------------------------------|---------|---------|
| 1. | Calcium Carbonate CaCo3 | 95.0% | ----- |
| 2. | Fe 0 and Al 0 | | ----- |
| | 1.0% | | |
| 3. | Water Soluble Matter | ----- | 0.5% |
| 4. | Matter Insoluble in Dilute Hcl | ----- | 4.0% |
| 5. | Passing 100 Mesh Sieve | 100.0% | ----- |
| 6. | Retained on 200 Mesh Sieve | ----- | 1.0% |
| 7. | Retained on 325 Mesh Sieve | ----- | 6.0% |

PART 3 – EXECUTION

3.01 INSPECTION

- A. Obtain the written approval of the Landscape Architect for subgrade prior to installing the stone dust and spreading of the infield mix material. By spreading the infield mix material prior to receiving the written approval of the Landscape Architect, the

Contractor assumes acceptance of the subgrade condition and the responsibility to repair deficiencies resulting from incorrect grades at his sole cost.

3.02 PREPARATION

- A. Remove loose material and debris from base surface before installing Infield Mixes.
- B. Proper base preparation is essential in the performance of the Infield Mix. Base material should be leveled or laser graded to ensure Infield Mixes are at a uniform depth of 4" across entire field.
- C. Pre-soak base material with water prior to installing Infield Mix and allow to dry. Once dry, compact base to 95% compaction.
- D. Locate and layout all infield areas for softball field, including the pitcher's circle, as well as all field markings. Obtain Landscape Architect's acceptance of layout prior to installation.

3.03 INSTALLATION

- A. Infield mix and Warning Track shall be installed per manufacturer's specifications to a depth of 4".
- B. Provide ½" of Infield Conditioner over infield mix after leveling and settlement.
- C. Install Clay Fortification as follows:
 - 1. Excavate areas to receive fortification – batter's boxes and pitcher's circle – to a minimum 4.5" depth in areas shown on drawings.
 - 2. Thoroughly tamp and level subgrade and install packing clay. Maintain a uniform depth.
 - 3. Place material in lifts of 2 inches and compact with a 1-ton vibratory roller until an optimal compaction between 90 percent and 95 percent is achieved. Scarify the surface to facilitate bonding of the next lift and repeat until finish grade elevation is achieved.
 - 4. Cover with ½" Infield Conditioner and rolled to insure firm surface.
 - 5. Cover area with tarp or other impermeable cover for a period of not less than 24 hours.
- D. Lines marked on skinned area of softball field shall be carefully laid out and marked on the surface with specified whitening using a line marking machine.

3.04 CLEANING

- A. Perform cleaning during installation of the work and upon completion of the work. Remove from site all debris and equipment. Repair all damage resulting from installation.

END OF SECTION

**SECTION 32 18 23.26
NATURAL GRASS ATHLETIC FIELD SURFACING****PART 1 - GENERAL****1.01 GENERAL REQUIREMENTS**

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS, which are hereby, made a part of this Section of the Specifications.
- B. Examine all other Sections of the Specifications for requirements that affect work of this Section whether or not such work is specifically mentioned in this Section.
- C. Coordinate work with trades affecting, or affected by, work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.02 SCOPE OF WORK

- A. Refer to the Drawings for the extent and details of this work.
- B. The work of this Section consists of athletic field construction and related work as shown on the Drawings or required herein and includes, but is not limited to the following:
 - 1. Screening stripped and stockpiled topsoil
 - 2. Providing and incorporating all soil amendments as required to complete the work of this Section
 - 3. Spreading, compacting and laser grading of all amended topsoil for athletic field construction
 - 4. Seeding of prepared athletic field surface
 - 5. Athletic field turf grass maintenance and guarantee

1.03 RELATED WORK

- A. Athletic Equipment
- B. Earthwork
- C. Site Preparation
- D. Infield Mix
- E. Chain Link Fence and Gates

1.04 SUBMITTALS

- A. To be included with the Bid:
 - 1. Provide Proof of Experience Criteria as outlined in QUALITY ASSURANCE below. Contractor shall provide project name, project start and completion date, contact name, address and telephone number for each project to enable such data to be validated prior to Contract Award.
- B. To be provided during the project:
 - 1. Product information on field construction and laser controlled hydraulically operated grading system and equipment.
 - 2. Amended Topsoil:
 - a. Contractor shall submit source information and sieve analyses for approval of all amendment materials he intends to use as components of the Amended Topsoil prior to blending operations.
 - 3. Seed:

- a. Submit seed grass mix data and name of supplier for approval.
4. All material testing requirements and results (refer to Material Testing section of this specification).
5. Fertilizer recommendations for the approved soils and product information on all soil additives for approval.
6. Survey (10' grid) of the finished grades of the amended topsoil prior to sodding operations.
7. Submit a draft 12-month maintenance plan for review and approval based on the final amended soil composition including the recommended timing for cultural maintenance operations for the first year. A Certified Sportsfield Manager certified through the Sports Turf Managers Association shall provide plan. Maintenance plan shall include, but may not be limited to, the following:
 - a. Pest Management
 - b. Fertilization
 - c. Core Aeration
 - d. Deep Tine Aeration
 - e. Dethatching Procedures

1.05 MATERIALS TESTING (SUBMITTALS TO BE PROVIDED DURING THE PROJECT)

- A. Testing of the subgrade materials (for compaction testing) and amended topsoil shall be performed and evaluated in accordance with the current standards of the Association of Official Agriculture Chemists and American Society of Testing and Materials (ASTM) Test Methods described in these specifications for putting green and sports turf root zones by an Approved Soil Testing Laboratory with A2LA Accreditation in these procedures.
1. The cost of all testing shall be borne by the Contractor. The Owner reserves the right to perform its own testing of all materials.
 2. All testing reports and recommendations shall be submitted to the Owner's Representative for review prior to use of or spreading of materials.
 3. Approved Soil Testing Laboratories:

A. McNitt & Seren Soil Testing, LLC
306 Ravendale Road
Pennsylvania Furnace, PA 16865
(610) 360-5985

Turf & Soil Diagnostics
35 King Street
Trumansburg, NY 14886
1-855-769-4231

- B. Amended Topsoil Testing and Analysis:
1. Sampling shall be taken in several locations within the stockpile. The outer 6 inches of the piles should be pulled back and a sampling tube (PVC is adequate) inserted into the pile. Withdraw the sample and place it in a large container, such as a 5-gallon pail. A minimum of 6 samples should be removed from different sections and levels in the pile. Once all the samples are taken, the composite sample should be spread on a tarp, mixed thoroughly, and split in half. Discard half. Split the remaining material in half, and discard half again. Continue doing

this until you have a one-gallon sized sample.

- a. Testing shall consist of fertility, particle size and organic matter analysis.
- b. Amended Topsoil analysis shall show recommendations for soil additives to correct soils deficiencies as necessary, and for additives necessary to accomplish particular agricultural, horticultural, or sportsturf management objectives noted.
- c. All tests shall be performed in accordance with the current standards of the Association of Official Agricultural Chemists.
- d. All reports and fertility program recommendations shall be submitted to the Owner’s Representative for approval prior to spreading.
- e. Organic Matter Analysis (ASTM F1647, method A)
- f. Proctor Testing per ASTM D698 or D1557

C. Compaction Testing:

- 1. Provide compaction test results (ASTM D698) for the subgrade following rough grading procedures and on the amended topsoil following fine grading procedures to the Owner’s Representative for approval. Testing shall be conducted and paid for by the Contractor by a testing agency approved by the Owner’s Representative.
 - a. Obtain appropriate Proctor Test results as described above for the subsoil and amended topsoil mix.
 - b. Complete one (1) compaction test for every 15,000 sf of area within the athletic field limits. Final locations of testing shall be determined by the Owner’s Representative.

1.06 QUALITY ASSURANCE

- A. Work under this Section shall be completed by skilled workers who are completely familiar with the specific requirements and methods needed for the proper completion of the work of this Section.
- B. Experience: Natural Grass Athletic Field construction shall be performed by an experienced specialty firm, which shall have constructed at least ten (10) outdoor natural grass athletic fields of 30,000 s.f. or greater of the general type and installation process herein specified within the last 4-year period. Key staff and equipment operators must have a minimum of three (3) years of outdoor natural grass athletic field construction experience. All experience must have been from one company (either general contractor or the sub-contractor). Combining work to meet the experience criteria will not be allowed.
- C. All seed shall comply with all Federal, State and local laws and regulations requiring inspection for plant disease and insect control.

1.07 PRODUCT HANDLING

- A. Delivery and storage:
 - 1. Deliver all items to the job site in their original containers with all labels intact and legible at time of Owner’s Representative’s inspection.
 - 2. Immediately remove from the site all materials which are not true to name, and all materials which do not comply with the specified requirements.
 - 3. Use all means necessary to protect materials before, during and after installation, and to protect the work and materials of all other trades.

4. Repair and Replacement: in the event of damage, immediately make all repairs and replacements necessary to the approval of the Owner’s Representative and at no additional cost to the Owner.
5. Contamination: Immediately remove from the site all materials that have been contaminated. In the case of contamination of stockpiled items, remove entire stockpile from site immediately.

1.08 JOB CONDITIONS

- A. Utilities: Determine location of underground utilities and perform work in a manner which will avoid possible damage. Hand excavate as required.
- B. Excavation: When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify the Owner’s Representative before spreading Amended Topsoil.

PART 2 - PRODUCTS

2.01 ATHLETIC FIELD CONSTRUCTION EQUIPMENT

- A. Tractors and other Vehicles:
 1. All vehicles trafficking the subgrade, amended topsoil, or finished athletic field shall be Low Ground Pressure (8 lbs per square inch – maximum) tracked vehicles or be equipped with special flotation tires designed to minimize compaction of the athletic profile and surface.
- B. Laser Grader:
 1. The finished athletic field amended topsoil shall be graded to the specified tolerances with a machine equivalent to Laser-Grader by P. Ronci Machine Company or LeeBoy 635B Motor Grade and meeting the following requirements:
 - a. Remote laser controlled, via the use of a GPS positioning survey system, hydraulically operated dual slope grading apparatus with self-correcting blade not exceeding 6 feet in width and dual angle sensors adequate to calculate the cross-slope of the blade.
 - b. The tolerance of the machine shall be able to grade to +/- 1/8” accuracy with processed material.
 - c. Maximum machine weight of 3300 lbs
 - d. Maximum ground tire compression of 550 lbs per tire
 2. Dozers and rear mounted box style graders will not be permitted.

2.02 AMENDED TOPSOIL

- A. Existing Topsoil stockpiled from on-site stripping shall be triple screened, amended and utilized for athletic field areas at a minimum depth of eighteen (18”) inches.
- B. The Contractor shall submit representative samples of Existing Topsoil that was stockpiled from on-site stripping, to a Soil Plant Testing Laboratory for Testing and Analysis. Refer to Section 1.02 MATERIALS TESTING. Testing of materials shall include proposed amendment materials. Soil analysis tests shall include recommendation for soil additives to correct soil deficiencies as necessary, and for additive to accomplish particular objectives noted.

- C. Amended Topsoil shall consist of the existing stripped and triple-screened topsoil, washed screened sand (if deemed a requirement by Soil Plant Testing Laboratory), and organic matter. Materials shall meet requirements set forth below:
1. Topsoil (if additional is required, although not anticipated due to the volume of available topsoil that will be generate on-site):
 - a. Topsoil shall be natural, fertile, friable loam or sandy loam typical of cultivated topsoils of the locality, containing not less than 3.5% or more than 8% by weight of decayed organic matter (humus), as determined by ASTM F-1647. Topsoil shall be taken from a well-drained, arable site, free of sub-soil, large stone, earth clods, sticks, stumps, clay lumps, roots or other objectionable extraneous matter or debris. Topsoil shall also be free of Quackgrass rhizomes, *Agropyron Repens*, and nut-like tubers of Nutgrass, *Cyperus Esculentus*, and all other primary noxious weeds. Topsoil shall not have a pH factor less than 6.0 or greater than 7.0. Topsoil shall not be delivered or used for planting while in frozen or muddy condition. Topsoil shall conform to particle size distribution with a maximum three eights (3/8”) inches largest dimension, as determined by pipette method in compliance with ASTM F-1632:

| | |
|-------|----------|
| Sand: | 40 – 60% |
| Silt: | 30 – 40% |
| Clay: | 5 – 20% |
 2. Washed Screened Sand (if deemed required by Soil Plant Testing Laboratory):
 - a. Washed Screened Sand for Amended Topsoil shall be concrete sand meeting the requirements of ASTM C-33 with the following addenda: The sand shall have a fineness modulus of 2.5 to 3.2 and a coefficient of uniformity of less than 4.
 3. Organic Matter (Compost):
 - a. Organic Matter for Amended Topsoil shall be STA Certified Compost, meeting the requirements of *Delaware Erosion and Sediment Control Handbook*, Appendix A-3, “Compost Material Properties”. Verification of the STA Certified Compost shall be submitted to the Landscape Architect/Civil Engineer for approvals prior to incorporation into the existing topsoil.
 - b. Organic Matter shall be added in sufficient quantity to bring the organic content of the Amended Topsoil to 6-8%.

2.03 LIME

- A. Lime shall be an approved agricultural limestone containing no less than fifty percent (50%) of the total carbonates and twenty-five percent (25%) total magnesium with a neutralizing value of at least one hundred percent (100%). The material shall be ground to such a fineness that forty percent (40%) will pass through a number 100 U.S. Standard Sieve, and ninety-eight percent (98%) will pass through a number 20 U.S. Standard Sieve. The lime shall be uniform in composition, dry and free flowing and shall be delivered to the site in the original, un-opened containers, each bearing the manufacturer’s guaranteed analysis – submit to the Owner’s Representative for approval.

Any lime, which becomes caked or otherwise damaged making it unsuitable, will be rejected.

1. Soil pH: The amount of lime or sulfur required to change pH should be based on a soil test. Spread ground limestone as recommended by the soil test over the athletic field surface. Do not exceed one hundred fifty (150) pounds of lime per one thousand (1,000) square feet. When using pelletized limestone materials, apply at the same rate as for ground limestone for rapid pH change and at one half (1/2) the rate for normal applications. Do not apply sulfur during mid-summer stress period and do not exceed five (5) pounds per one thousand (1,000) square feet per year. On sandy soils, apply sulfur as a split application.

2.04 FERTILIZER

- A. All fertilizer products shall be uniform in composition, dry and free flowing and shall be delivered to the site in the original un-opened containers, each bearing the manufacturer's guaranteed analysis – submit to the Owner's Representative for approval. Any product, which becomes caked or otherwise damaged making it unsuitable for use, will be rejected.
- B. Contractor shall have the amended topsoil mix tested for soil fertility by an approved soil testing laboratory (at the Contractor's expense). A complete fertilization program for the installation maintenance period shall be recommended by the soil-testing laboratory for approval by the Owner's Representative.
- C. Continue with the application of recommended fertilization program until all turf areas are in acceptable condition and are approved in writing by the Owner's Representative.
- D. Costs for the fertilization program shall be borne by the Contractor until final acceptance by the Owner's Representative.
- E. Prior to seeding, apply fertilizer supplements and a commercial turfgrass starter fertilizer at a rate determined by the approved soil testing laboratory.

2.05 SUPERPHOSPHATE

- A. Superphosphate shall be composed of finely ground phosphate rock as commonly used for agricultural purposes, and containing not less than twenty percent (20%) available phosphoric acid. The superphosphate shall be delivered to the site in the original, un-opened containers each bearing the manufacturer's guaranteed analysis – submit to the Owner's Representative for approval. Any superphosphate, which becomes caked or otherwise damaged making it unsuitable for use, will be rejected.

2.06 WATER

- A. Owner provided water shall not be utilized for anything other than this project and shall not be used for purposes unrelated to the construction of the field.
- B. Water for settling the installed amended topsoil, establishing and irrigating the proposed field will be in the form of hoses and/or temporary irrigation system provided at no additional cost to the Owner.

2.07 HERBICIDES, PESTICIDES AND FUNGICIDES

- A. Herbicides, pesticides and fungicides may be used subject to the approval of the Owner and the Owner's Representative, if they are handled and applied by a state licensed operator.

2.08 SEED

- A. Grass seed shall be clean, new crop seed, composed of a mixture of varieties, mixed in proportion by weight and tested for minimum percentages of purity and germination. Submit proposed mixture to the Owner’s Representative for approval.
- B. Athletic Field Seed Mix:
 - 1. Seed shall be fresh, clean seed from the latest year’s crop. The seed shall meet requirements of DNREC’s permanent Seed Mix #7 of the *Delaware Erosion & Sediment Control Handbook*.
 - 2. The seed mix shall consist of Tall Fescue (150 lb/Ac), Kentucky Bluegrass (three cultivars at 20 lb/Ac), and Perennial Ryegrass (20 lb/Ac).
- C. Hydroseed Mix:
 - 1. All work will be carried out by an approved spraying machine specifically used for this work. The Contractor shall submit to the Owner’s Representative for approval, prior to the start of work, a certified statement as to number of pounds of fertilizer, amount and types of grass seed (shall match Athletic Field Seed Mix), and processed fiber, per one hundred (100) gallons of water.
 - 2. Hydromulch: Shall be Terra-Sorb GB, or an approved equal. Add Terra-Sorb to the hydroseed tank at the amount of 60 pounds per acre.

PART 3 - EXECUTION

3.01 SCREENED TOPSOIL

- A. All topsoil that was stripped and stockpiled shall be triple-screened to a maximum stone size of 3/8 in.

3.02 SUBGRADE VERIFICATION

- A. The slope of the subgrade shall conform to or be slightly greater than the general slope of the finish grade. Confirm that the subgrade slopes without settlement or pockets promoting the collection of water.
- B. Provide subgrade compaction tests. Subgrade compaction results shall not exceed 93% of maximum compaction as performed in laboratory testing. If requested by the Owner’s Representative, proof-roll the subgrade in the presence of the Owner’s Representative.
- C. Move no heavy objects over the subgrade after preparation.
- D. Subsequent to completion of the subgrade preparation by General Contractor, the General Contractor and Athletic Field Contractor shall verify that the subgrade is with the specified slope tolerances and is not over-compacted. The General Contractor shall provide written verification to the Owner and Owner’s Representative. Commencement of work by the Athletic Field Contractor prior to written verification constitutes acknowledgement that the subgrade meets the specified grade and compaction tolerances.

3.03 AMENDED TOPSOIL INSTALLATION

- A. Notify Owner’s Representative 48 hours prior to spreading of approved Amended Topsoil for approval of subsurface grades. The slope of the subgrade shall conform or be slightly greater than the general slope of the finish grade. Confirm that subgrade slopes to drainage system without settlement or pockets promoting collection of water.

- B. Loosen and mix subgrade material four inches to six inches (4"-6") deep. Remove stones over two (2") inches, sticks and rubbish. Move no heavy objects over athletic field area after preparing subgrade surface.
- C. Apply the Amended Topsoil at athletic fields over the complete subgrade to the depths and finished grades shown on the drawings. Material shall be installed in a moist condition with approved field construction equipment and shall be fine graded with a laser controlled hydraulically operated grading machine with a tolerance of ¼ inch in 25 feet in either direction plus or minus of elevations shown on the drawings when compacted. Contractor shall move the material from the approved stockpiles in such a manner that contaminated materials are not tracked onto the field from tracks or tires. Any contamination or over compacted conditions will require immediate action by the Contractor to satisfy the intent of the specification.
- D. Compaction of soil: Operate the irrigation system one full cycle. Fill in low spots to finish grade with Amended Topsoil as appropriate and water thoroughly. The process shall be repeated as necessary to bring the field to finish grade within the tolerances described. Finish grades shall be verified by survey instruments. If a light roller is used to obtain field grade, the surface shall be scarified before laying of sod. Field compaction shall not exceed the bulk density as performed in laboratory testing.
- E. Provide the Owner's Representative with a laser level topological survey using a 10-foot grid pattern for review. By seeding and/or sodding prior to receiving the written approval of the Owner's Representative, the Contractor assumes acceptance of the finish grade condition and the responsibility to repair deficiencies resulting from incorrect grades at his sole cost. Obtain the written approval of the Owner's Representative for finish grade of athletic field surfaces prior to seeding and/or sodding operations.
- F. Soil pH: Spread ground limestone as recommended by the soil testing laboratory evenly over the athletic field surface. Do not exceed one hundred (100) pounds of lime per one thousand (1,000) square feet. The rate is based on an incorporation depth of four (4") inches. When using pelleted limestone materials, apply at the same rate as for ground limestone for rapid pH change and at one half (1/2) the rate for normal applications.
- G. Prior to seeding, apply a commercial turfgrass starter fertilizer at a rate determined by the Approved Soil Testing Laboratory.

3.04 FERTILIZING

- A. Athletic Field Contractor to have Amended Topsoil Mix tested for soil fertility by the Approved Soil Testing Laboratory, and a complete fertilization program will be recommended by the testing laboratory for the installation maintenance period and be reviewed and approved by the Owner and Owner's Representative.
- B. Continue with application of recommended fertilization program until all turf areas are in acceptable condition and are approved in writing by the Owner's Representative.
- C. The cost of the fertilization program shall be borne by the Athletic Field Contractor until final acceptance by the Owner's Representative.

3.05 SEEDING

- A. Schedule for Seeding: Sow grass seed between March 1 and April 30, or between August 1 and October 31, except as otherwise approved in writing by the Landscape Architect.

- B. If seeding out of season as described above, the Contractor is still obligated by all conditions and responsibilities described under 3.06 TURF MAINTENANCE AND INSPECTION until final acceptance of the athletic field.
- C. Natural Grass Athletic Field as indicated in the Drawings shall be double slice seeded. The second seed application shall be installed perpendicular to the first slice seed application.
- D. Before seed is sown, scarify soil and rake until surface is smoother, friable, and of uniformly fine texture. Slive seed evenly at Seed Mix’s approved rate, applying seed in two half rate applications at 45-degree angles, lightly rake, roll with two hundred (200) pound roller and water with fine spray. Method of seeding may be varied at discretion of Contractor with the written approval of the Landscape Architect. It is the Contractor’s responsibility to establish a smooth, uniform turf composed of approved grasses.
- E. Following slice seeding operations of the Natural Grass Athletic Field, hydroseed on top of slice seed.

3.06 TURF MAINTENANCE AND INSPECTION

- A. Maintenance of the athletic field turfgrass shall begin immediately after seeding operations, and generally consist of watering, weeding, mowing and edging, fertilization, aerification, reseeding, disease and insect pest control, repair of all erosion, and any other procedure consistent with good horticultural practice, necessary to insure normal, vigorous and healthy turfgrass growth.
- B. Maintenance shall also include all temporary protection fences, barriers, signs and all other work incidental to proper maintenance.
- C. The Contractor shall be responsible for maintenance to establish a uniform stand of the approved grasses until acceptance. After seed has germinated, all areas and parts of areas shall be re-seeded, repeatedly, until all areas are covered with a satisfactory growth of grass.
- D. At the time of the first cutting, mow turf not less than one (1") inch high with sharp reel type mowing units. Turf shall be maintained at one inch (1") high. Do not remove more than one third (1/3) of the grass blade during a mowing which should result in no visible clippings left after a mowing.
 - 1. The athletic field will not be considered acceptable, and the Athletic Field Contractor’s maintenance responsibilities will continue, until the entire athletic field exhibits uniform, healthy and vigorous turfgrass growth. A minimum of ten (10) mowings must be completed before final acceptance.
 - 2. The machine used to mow the field shall have a deck no larger than 72” and utilize low ground pressure tires to minimize compaction at the field.
- E. Watering: Athletic Field Contractor shall provide at his cost daily, and if necessary continuous watering of all grass areas during a normal 8 hour working day. The growing medium shall be maintained in a continuous moist condition, satisfactory for good germination and growth of grass, as specified until acceptance. The Athletic Field Contractor is responsible for providing all equipment, hoses, etc. for watering throughout the project and until final acceptance of athletic field turf by the Landscape Architect.
- F. Full and complete written records for the maintenance of the athletic fields are to be furnished to the Owner, by the Contractor at least ten (10) days prior to the end of the contractual maintenance period, to familiarize him with the maintenance requirements for proper care and development of the turfgrass.

3.07 INSPECTION AND ACCEPTANCE

| | | |
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| Summit Campus Middle and High School | | Appoquinimink School District |
|---|--|-------------------------------|

- A. The Owner’s Representative shall inspect the athletic field turf for acceptance upon written request by the Athletic Field Contractor. The request shall be received at least ten (10) days before the anticipated date of inspection.
- B. Final acceptance will not be granted until all seeded areas are in satisfactory condition.
- C. If the turfgrass is in satisfactory condition, the Athletic Field Contractor's care and maintenance responsibilities will end. If the grass stand is unsatisfactory, the Athletic Field Contractor's maintenance responsibilities shall continue until an acceptable stand of grass is achieved. The Athletic Field Contractor shall fertilize the turf and/or treat pests if, in the Owner’s Representative's opinion, it is needed in order to achieve an acceptable athletic field.

3.08 POST CONSTRUCTION MAINTENANCE PROGRAM

- A. Once the Owner accepts the athletic field seeded areas per section 3.07, a one (1) year post construction maintenance program shall commence. The contractor shall provide a formal written plan to the owner’s representative prior to commencement of the work. The contractor shall provide the Owner a minimum of 48 hours notice prior to performing any work.
- B. General Contractor shall engage a professional landscape maintenance company to perform the following work
- C. Growing Season:
 - 1. Late April/Early May
 - a. Soil test for development of annual fertilizer program
 - b. Core aeration (3/4” equivalent to Toro ProCore) 4-5” depth remove and dispose of cores)
 - c. Overseed (injection) 70/20/10 tall fescue/rye/blue 4 x lbs. /1,000 SF
 - d. Topdress with 2mm sand topdressing
 - e. Fertilize (macros and micronutrients) per soil test
 - f. Apply granular lime per soil test
 - g. Apply herbicide
 - i Apply pre-emergent crabgrass preventer at manufacturer’s recommended rates in high use areas.
 - 2. June:
 - a. Overseed (broadcast) 70/20/10 tall fescue/rye/blue 4 x lbs. /1,000 SF
 - b. Fertilize (macros and micronutrients) per soil test
 - c. Apply Liquid Organic Fertilizer – Holganix 66 GC liquid compost mix (or similar) @7-14 oz//1,000 SF
 - d. Apply BioPro H30 wetting agent (or similar) at manufacturer’s recommended rates
 - 3. July:
 - a. Apply liquid herbicide
 - i Apply post-emergent crabgrass control at manufacturer’s recommended rates as needed.
 - ii Apply post-emergent broadleaf control at manufacturer’s recommended rates as needed
 - iii Include crop oil surfactant to increase efficacy
 - b. Apply granular Grub Control at manufacturer’s recommended rates
 - c. Fertilize (macro and micronutrients) per soil test

4. Mid-August/Early September
 - a. Slice seed with 70/20/10 tall fescue/rye/blue 4 x lbs. /1,000 SF
 - b. Core aeration (3/4" similar to Toro ProCore) 4-5" depth (remove and dispose of cores)
 - c. Topdress with 2mm sand topdressing
 - d. Fertilize (macro and micronutrients) per soil test
 - e. Apply Liquid Organic Fertilizer – Holganix 66GC (or similar) liquid compost mix @ 7-14 oz./1,000 SF
 - f. Apply Bio Pro H30 (or similar) liquid compost mix @ 7-14 oz./1,000 SF
5. Late October/Early November:
 - a. Slice seed (2x at 90 degree angle) with 70/20/10 tall fescue/rye/blue 4 x lbs. /1,000 SF
 - b. Fertilize (macro and micronutrients) per soil test

3.09 CLEAN UP

- A. Absolutely no debris may be left on the site. Excavated material shall be removed as directed. Repair any damage to site or structures to restore them to their original condition, as directed by the Owner’s Representative, at no cost to the Owner.

END OF SECTION

SECTION 32 18 23.29
INFILLED SYNTHETIC TURF SYSTEM

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 010000 - GENERAL REQUIREMENTS, which are hereby, made a Landscape Architect / Civil Engineer of this Section of the Specifications.
- B. It is the intent of this Section to specify an Infilled Synthetic Turf System that provides high-quality playing surfaces for high school football, soccer, field hockey, lacrosse, and other multi-purpose uses. The finished surfaces shall be immediately firm, consistent and stable while providing long-term durability, safety and shock attenuation. The Infilled Synthetic Turf System Vendor's attention is called to the testing requirements related to G-Max rating per ASTM F355-A. A G-Max rating of less than 90 or in excess of 150 and a HIC Critical Fall Height of less than 1.4-meters at any time from acceptance through the end of the Warranty Period is unacceptable.
1. It should be noted that trapped fibers in seams and/or beneath carpet fibers within the general carpet will not be accepted. The Contractor shall provide the appropriate amount of time to infill the carpet while brushing up fibers and laying infill in thin lifts to ensure all fibers are upright to the surface and are not caught beneath infill or other fibers.
 2. A Field Line Layout Drawing is provided as part of the Construction Documents. It is the responsibility of the Infilled Synthetic Turf Vendor and/or Installer (preparing the shop drawings) to review the Field Line Layout prior to submitting the turf shop drawings for review. The Field Line Layout will provide field line and logo dimensions, colors, and order of priority for when field lines from different sports intersect (note it is not by sport, but by importance of the line). If it appears that the Field Line Layout was not reviewed prior to submitting the shop drawings, they will be rejected without review until the shop drawings are coordinated with the Field Line Layout.
- C. Note the requirements within regarding PFAS and provide documentation required.
- D. Examine all other Sections of the Specifications for requirements that affect work of this Section whether or not such work is specifically mentioned in this Section.
- E. Coordinate work with trades affecting, or affected by, work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.02 DEFINITIONS

- A. General Contractor: the entity who holds the project contract with the Owner. The General Contractor is responsible for all coordination of the work within this specification. If problems arise during construction, the General Contractor will be responsible for construction and monetary implications in regards to the Project Contract.

- B. Base Contractor: the site contractor or specialty athletic field contractor meeting the listed experience criteria and performing the subgrade preparation directly below and around the limits of the turf field area; overseeing the installation of the concrete turf anchor at the perimeter of the field; installing all geotextile fabric and drainage in and around the field; installing the base stone and finishing stone materials within the field area; and providing a finish grade on the finishing stone layer to a tolerance of 1/8" in 10'.
- C. Infilled Synthetic Turf Vendor: the entity that procures and is responsible for the installation of all Infilled Synthetic Turf System components. The Infilled Synthetic Turf Vendor also provides and services the warranty.
- D. Infilled Synthetic Turf Installer: a specialty athletic synthetic turf installation contractor meeting the listed experience criteria. This contractor will be responsible for performing the installation of the synthetic turf underlayment, carpet and components.
 - 1. If the Infilled Synthetic Turf Installer is not a direct employee of the Infilled Synthetic Turf Vendor, it is assumed that the Infilled Synthetic Turf Installer is under contract to the Infilled Synthetic Turf Vendor and that the Infilled Synthetic Turf Vendor is responsible for all work undertaken by the Infilled Synthetic Turf Installer.
- E. Independent Testing Company: a specialty testing company focusing on testing of athletic surfaces. Acceptable companies include, but may not be limited to:
 - 1. Firefly Sports Testing – East, Jeff Gentile, 603-715-5453
 - 2. Labosport USA – Thierry Levy, 706-529-9474
 - 3. Sports Labs North America – Kieran O'Donnell, 423-541-5526

1.03 WORK INCLUDED

- A. For a full description refer to PART 3 - EXECUTION of this Specification. The following is brief summary of the proposed work:
 - 1. Furnish and install free draining base and drainage materials as specified within.
 - 2. Provide all inspections and certifications of subgrade and subsequent layers as specified within.
 - 3. Provide drainage testing by means of a Dual Ring Infiltrometer (DRI) as specified within.
 - 4. Install synthetic turf system and underlayment per specifications and drawings
 - 5. All testing requirements on finished surface
 - 6. Cleanup
 - 7. All warranty, training, and closeout requirements

1.04 RELATED WORK UNDER OTHER SECTIONS

- A. Carefully examine all of the Contract Documents for requirements that affect the work in this section. Other specification sections which directly relate to the work of this section include, but are not limited to, the following:

1. Site Preparation
2. Cast-in-Place Concrete
3. Athletic Ball Netting System
4. Earthwork
5. Chain Link Fence
6. Resilient Track Surface
7. Athletic Storm Drainage System

1.05 REFERENCES

A. References herein to any technical society, organization, group or body are made in accordance with the following abbreviations and, unless otherwise noted or specified, all work under this Section shall conform to the latest edition as applicable:

1. American Society for Testing and Materials (ASTM).
2. American Sports Builders Association (ASBA).
3. Consumer Products Safety Commission (CPSC).
4. Synthetic Turf Council (STC).
5. Delaware Interscholastic Athletic Association (DIAA)

1.06 QUALITY CONTROL

A. Experience:

1. Base Contractor: Shall have successfully (quality and timely) installed Free Draining Stone Base and drainage systems for at least nine (9) outdoor synthetic turf athletic field bases of 50,000 s.f. or greater of the type and installation process herein specified within the last 3-year period.
 - a. The Base Contractor’s Site Foreman shall have installed at least five (5) outdoor synthetic turf athletic field bases and drainage systems in the last 3-year period.
2. Infilled Synthetic Turf Vendor: Shall have successfully (quality and timely) supplied at least forty (40) outdoor athletic field systems of 50,000 s.f. or greater of similar type and installation process herein specified within the last 3-year period.
 - a. All installation operations shall occur under the full-time on-site direction and supervision of a qualified technical supervisor directly employed by the Infilled Synthetic Turf Vendor. Installation supervisors shall have a minimum of five (5) years experience in the installation of Infilled Synthetic Turf Systems and shall have supervised the installation of at least ten (10) outdoor athletic field systems of 50,000 s.f. or greater of similar type and installation process herein specified within the last 3-year period.
3. Infilled Synthetic Turf Installer: Shall have successfully (quality and timely) laid

at least fifteen (15) outdoor athletic field systems of 50,000 s.f. or greater of similar type and installation process herein specified within the last 3-year period. References shall be provided with bids so that the installer's experience record can be verified.

- a. All installation operations shall occur under the full-time on-site direction and supervision of a qualified technical supervisor directly employed by the Infilled Synthetic Turf Vendor.
- b. All installation operations shall be performed by personnel fully familiar with the materials and their application. Installation Foreman shall have installed at least ten (10) outdoor athletic field systems of 50,000 s.f. or greater of similar type and installation process herein specified within the last 3-year period.

B. Source Limitations:

1. Obtain Infilled Synthetic Turf System including tufted synthetic turf yarn and carpet backings from a single Tufted Synthetic Turf Manufacturer. Provide additional system components including anchoring materials, seaming products, binders and adhesives, resilient underlayment and infill materials meeting the criteria of this Specification Section from single sources.

C. Inspection and Acceptance:

1. All inspections and acceptance shall be provided in writing to the Landscape Architect / Civil Engineer.
 - a. Subgrade - Both the Base Contractor and the Infilled Synthetic Turf Installer (if the Turf Installer is not a direct employee of the Turf Vendor, then a representative of the Turf Vendor shall also be present) shall inspect the subgrade to verify their acceptance of installation and condition. Commencement of subsequent installation in a given work area indicates acceptance of underlying substrates and systems. Refer to Section 31 00 00, EARTHWORK, for requirements of subgrade preparation.
 - b. Drainage System - Both the Base Contractor and the Infilled Synthetic Turf Installer (if the Turf Installer is not a direct employee of the Turf Vendor, then a representative of the Turf Vendor shall also be present) shall inspect the drainage system to verify their acceptance of installation and condition. Commencement of subsequent installation in a given work area indicates acceptance of underlying substrates and systems.
 - c. Free Draining Base Stone - Both the Base Contractor and the Infilled Synthetic Turf Installer (if the Turf Installer is not a direct employee of the Turf Vendor, then a representative of the Turf Vendor shall also be present) shall inspect the free draining base stone layer to verify their acceptance of installation and condition. Commencement of subsequent installation in a given work area indicates acceptance of underlying substrates and systems.
 - d. Free Draining Finishing Stone – Both the Base Contractor and the Infilled Synthetic Turf Installer (if the Turf Installer is not a direct

employee of the Turf Vendor, then a representative of the Turf Vendor shall also be present) shall inspect the free draining finishing stone layer to verify his acceptance of installation and condition. Commencement of subsequent installation in a given work area indicates acceptance of underlying substrates and systems.

e. The Base Contractor and Infilled Synthetic Turf Vendor/Installer and associated subcontractors shall comply with the drawings, specifically notes regarding sequencing, existing condition investigations and proposed grade tolerances.

2. The General Contractor and associated subcontractors shall comply with the drawings, specifically notes regarding sequencing, existing condition investigations and proposed grade tolerances.

D. Planarity and Grade:

1. Free Draining Finishing Stone - Deviation in planarity shall not exceed 1/8" beneath a 10' straightedge. Deviation from a straight grade between levels on drawings shall not exceed 1/8". Refer to testing requirements in Part 3 of this specification.

E. Protection: Heavy equipment or vehicles (with the exception of tracked or low ground pressure (LGP) vehicles) of any kind should not be allowed on the athletic field area subsequent to the completion of the athletic field base and drainage system.

F. Restoration of Damage: The Infilled Synthetic Turf Installer shall exercise care in the execution of his work and avoid damage or defacement of the adjacent or surrounding areas by using suitable protective means. Damage or defacement that occurs shall be remedied at the Infilled Synthetic Turf Vendor's cost to the satisfaction of the Owner.

1.07 SUBMITTALS

A. Submit the following in accordance with the Conditions of the Contract, or prior to issuance of a contract if requested by the Landscape Architect / Civil Engineer.

1. Base Contractor:

a. Base Contractor's Site Forman's resume showing compliance with QUALITY CONTROL – Experience section of this specification with contact names, addresses and telephone numbers to enable such data to be validated prior to the award of the project.

2. Infilled Synthetic Turf Vendor:

a. Submit a signed statement from the Infilled Synthetic Turf Vendor that the Drawings and Specifications have been reviewed by a qualified representative of the Infilled Synthetic Turf Vendor and all major materials suppliers, and that they are in agreement that the materials and installation methods to be used for the Drainage Base and Infilled Synthetic Turf System are proper and adequate for use as a high quality

- playing surface for multi-purpose collegiate athletic field use.
- b. The Vendor’s recent reference list showing compliance with QUALITY CONTROL – Experience section of this specification with contact name, address and telephone number to enable such data to be validated.
 - c. Infilled Synthetic Turf Vendor’s Installation Supervisor’s resume showing compliance with QUALITY CONTROL – Experience section of this specification with contact names, addresses and telephone numbers to enable such data to be validated.
 - d. Infilled Synthetic Turf System Installer’s Foreman’s showing compliance with QUALITY CONTROL – Experience section of this specification with contact names, addresses and telephone numbers to enable such data to be validated.
 - e. Provide a sample written 8-year labor and materials warranty from the Infilled Synthetic Turf Vendor.
 - f. Provide a sample written Third Party Warranty.
 - g. A signed letter on company letterhead holding the Owner, Landscape Architect / Civil Engineer and all other project consultants harmless for any violation of patent rights or infringement.
 - h. Sample warranty for resilient underlayment (pad).
 - i. Cut Sheets for all materials required under this Section including third party ASTM certified lab reports.
 - j. Material Safety Data Sheets (MSDS) for all materials required under this Section.
 - k. **HEAVY METALS:** The Infilled Synthetic Turf Vendor shall submit a signed letter, on company letterhead, stating the company’s specific manufacturing and procurement practices that address Health and Human Safety concerns. The letter shall certify, through the independent testing of all Infilled Synthetic Turf System components installed as part of the Project, that their system’s lead and other heavy metal content complies with the United States Consumer Product Safety Commission’s (CPSC) most stringent requirement for lead content in children’s toys (below 100 ppm), is safe for the environment and for use by people of all ages. Copies of the testing reports shall also be provided in conjunction with the certification. Installation of the field shall not commence until the written certification is received. Adjustments to the project schedule to accommodate testing laboratory schedules will not be granted.
 - l. **PFAS:** The Infilled Synthetic Turf Vendor shall submit a signed letter, on company letterhead, stating that the Vendor and their suppliers do not use PFAS (as defined in EPA Method 537 and California Proposition 65) in or as part of their manufacturing process for their turf fibers, primary backings, and urethane coatings or the assembly of any components of the system or system as a whole. PFAS must be non-detectable at analytical detection limits that are suitable to meet state regulatory standards for solids as defined below. Alternatively, PFAS must be non-detectable at analytical detection limits that are suitable to meet state regulatory standards for liquid as defined below using a leaching test (e.g., EPA Method 1312). If an Infilled Synthetic Turf Vendor is unable to provide this information, they will be rejected for not meeting this requirement.

Required detection limits - solids:

PFDA: 0.03 ug/kg
 PFHpA: 0.05 ug/kg
 PFHxS: 0.03 ug/kg
 PFNA: 0.03 ug/kg
 PFOS: 0.2 ug/kg
 PFOA: 0.07 ug/kg

Required detection limits – liquid:

PFDA: 0.003 ug/L
 PFHpA: 0.003 ug/L
 PFHxS: 0.003 ug/L
 PFNA: 0.003 ug/L
 PFOS: 0.003 ug/L
 PFOA: 0.003 ug/L

3. Shop Drawings:

- a. The Base Contractor and the Infilled Synthetic Turf Vendor shall coordinate and provide details that illustrate the scope of work, including but not limited to materials, cross sections, subsurface and penetration details.
- b. The Infilled Synthetic Turf Vendor shall provide an underlayment and seaming plan at 1"=20'-0". The seaming plan shall include all tufted lines.
- c. The Infilled Synthetic Turf Vendor shall supply shop drawings (including details) at an approved scale indicated method of attaching synthetic turf carpet to existing concrete turf anchor.
- d. The Infilled Synthetic Turf Vendor shall provide a striping plan at 1" = 20'-0" which demonstrates compliance with applicable requirements for the layouts shown on the Drawings and in these Specifications. The striping plan shall indicate all tufted and inlaid field markings.

4. Product Samples and Information (Infilled Synthetic Turf Vendor to submit):

- a. Provide color samples of polyethylene slit film fiber for approval.
- b. Provide a minimum 12-inch by 12-inch sample of slit film polyethylene fiber carpet.
- c. Provide a 12" x 12" sample of Resilient Underlayment
- d. Provide a letter describing the proposed materials and method(s) of attachment for the carpet panels.
- e. Provide sieve analysis of infill materials for approval.
- f. Provide a 1-quart sample of the SBR rubber infill mix at the Landscape Architect / Civil Engineer's approved mix ratio.
- g. Provide information regarding future requirements for painting of field surface.
- h. Provide technical specifications on all installation equipment to be utilized.

5. Letter of certification that the existing synthetic turf carpet has been

recycled/repurposed and all associated Chain of Custody documentation.

6. Delivery slips for all Infilled Synthetic Turf System materials delivered to the site.
 - a. Note that delivery slips for new infill materials shall be supplied to the Landscape Architect/ Civil Engineer to confirm the ration of infill mixture installed within the field.
7. Provide an as-built field layout drawing prior to infilling with verification and certification that the field layouts meet the requirements of NCAA and the project documents.
8. Provide Field Maintenance Training and a comprehensive written Maintenance Manual to the Owner.

1.08 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle products in exact accordance with the Manufacturer's requirements and specifications.
- B. Products delivered to the site that are not in compliance with the requirements of this Section shall be removed from the site immediately at no cost to the Owner.

1.09 PROJECT CONDITIONS

- A. Weather Limitations: No part of the construction shall be conducted during a rainfall or when rainfall is imminent, or unless both ambient and materials temperatures are at least 40 degrees F and rising.
- B. After a rainfall, sufficient time shall be given to allow surfaces and infill materials to dry before resuming work. Surfaces and materials shall be dry, as well as clean. Adhesives should not be applied within 12 hours after rainfall, or when rainfall is forecasted.
- C. Do not apply Infilled Synthetic Turf System materials or components over wet, frozen, or muddy base.

1.10 WARRANTY

- A. Warranty: The Infilled Synthetic Turf Vendor shall guarantee all self manufactured and procured Infilled Synthetic Turf System materials and workmanship against damage by climatic conditions or proper and normal use (including the use of cleats) for a minimum period of eight (8) years from the official date of Substantial Completion. In addition, the Infilled Synthetic Turf Vendor shall guarantee all self manufactured and procured materials and/or workmanship including such defects as premature decrease in infill height, premature decrease in pile height or weight (stipulated as more than 10% decrease), UV degradation, splitting of fiber, fading, seam rupture, dislodgement, inadequate drainage or

inadequate air transmission. The guarantee shall be in writing and shall be signed by the Infilled Synthetic Turf Vendor stating that any defects, including the need to remove and replace self manufactured and/or procured materials will be repaired at no cost to the Owner within 7 days written notice of the Owner.

- B. Provide the manufacturer’s standard Third Party Insured Warranty. The Owner shall be named as an additional insured party.

1.11 PERFORMANCE TESTING ON FINAL SURFACE

- A. Performance Testing by an Independent Testing Company as specified within will be completed and the results verified as acceptable prior to substantial completion.

- 1. Drainage Testing (at each field):

- a. Upon completion of fine grading, complete a Dual Ring Infiltrometer Testing (ASTM D3385-9), (or other pre-approved method) by an Independent Testing Company coordinated and paid for by the Contractor. Five (5) tests per field shall be performed in locations determined by the Landscape Architect/Civil Engineer and/or Owner. Each test location shall have a permeability rate in excess of ten (10) inches per hour.
- b. If preliminary results in the field do not yield ten (10) inches per hour, the Landscape Architect/Civil Engineer and/or Owner may ask for additional locations to be tested. The Base Contractor and the Infilled Synthetic Turf Vendor shall provide written verification to the Landscape Architect/Civil Engineer that that the base and subsurface drainage system are functioning properly. Commencement of subsequent work prior to written verification constitutes acknowledgement that the systems are functioning properly.

- 2. GMAX (at each field): The Infilled Synthetic Turf System Vendor shall have G-Max testing performed by an approved and certified Independent Testing Company prior to requesting Substantial Completion. Testing shall consist of shock attenuation per ASTM F-355-A and F-1936 current edition and shall include the depth of infill as the test location as well as the temperature on the day of testing. The Owner and Landscape Architect/Civil Engineer shall be provided with copies of all testing.

- a. Testing locations shall be performed in accordance with ASTM Test Method F-1936 current edition. Tests shall also be taken at four (4) random spots. Locations to be selected by the Landscape Architect/Civil Engineer or Owner.
- b. At no time shall the G-Max be less than 85 nor exceed 150 at any one point of the field.
- c. In cases where the result of a test falls outside the specified values, additional tests shall be taken in 10-foot increments in four (4) opposite directions (north, south, east and west) from the failing test point and each subsequent failing test point until all tests fall within the specified values. The failing area shall be marked off, repaired and retested by the Infilled Synthetic Turf System Vendor until all tests fall within the specified values.

- d. G-Max testing during the remainder of the warranty period will be performed by and at the discretion of the Owner. Results of these tests will be provided to the Base Contractor and Infilled Synthetic Turf Vendor, if specifically requested.
 - e. If any tests fall within 5% of the maximum specified value, the Owner, at his discretion may require one additional set of tests at any time during the calendar year to be paid for by the Infilled Synthetic Turf Vendor.
- 3. HIC Testing (at each field): Testing shall be in accordance with EN-1177 and critical fall height shall not be less than 1.4-meters.
 - 4. Artificial Athlete (at each field): Testing shall be in accordance with EN-14808/14809 and shall be completed in 6 locations over the field area. Vertical deformation shall be 4-11 mm, shock absorption shall be 55-70%, and energy restitution 25-50%.
 - 5. Infill Depth (at each field): Infill depth testing by means of an infill depth gauge capable of measuring 0-2 inches per ASTM WK51663 using a Constant Ground Pressure 3-Prong Gauge. A minimum of 40 test locations shall be taken at random and documented in the test results provided to the Landscape Architect / Civil Engineer and Owner.
 - a. If the results of the depth gauge show the infill height to be on average lower than the depth specified, additional infill will be added to meet the specification and the field will be re-tested to show compliance.

1.12 PATENT RIGHTS AND INFRINGEMENT

- A. There are various established performance criteria throughout this specification and request for products and services. There may exist patent coverage for some means and methods of achieving those performance criteria. Bidders are responsible for ascertaining that means and methods of the products and services that they are providing are not being provided in violation of any such patent rights. Bidder's responsibilities are as follows:
 - 1. To hold harmless, the Owner, the Landscape Architect / Civil Engineer and all Project Consultants, as to any violation to include dollar amounts that could be owed as a result of damages for infringement including potential treble damages as provided for under U.S. Patent Law.
 - 2. Any and all costs that the Owner, the Landscape Architect / Civil Engineer and all Project Consultants would incur in replacing materials and services which are determined to infringe patent rights.
 - 3. All administrative, legal and other costs that would be incurred as a result of an infringement.
- B. If any product or services proposed to be provided by the Bidder are known by the Bidder to be subject to any existing claims of infringement, Bidder shall notify the Owner and the Landscape Architect / Civil Engineer of such claim and provide evidence of financial ability to perform on the above hold-harmless requirements.

PART 2 - PRODUCTS

2.01 GENERAL

A. This specification covers the installation of a new outdoor multi-purpose Infilled Synthetic Turf System comprised of tufted synthetic turf with an infill mixture (as specified herein) filled into the pile with a resilient underlayment (as specified herein) for added performance and player safety. The installed system after infilling shall have a permeability rate in excess of ten (10) inches per hour. The tufted synthetic turf is comprised of polyethylene parallel slit film fibers tufted into a coated/backed carpet as specified herein and meeting F.D. Doc FF1-70 and ASTM D-2859 flammability requirements, with an abrasion index of less than 25 per ASTM F1015 and meeting the following values for Static Coefficient of Friction per ASTM F1551.

- | | | |
|----|------------------------------|--------------|
| 1. | Dry Surface Static Friction | 1.06 minimum |
| 2. | Dry Surface Sliding Friction | 0.96 minimum |
| 3. | Wet Surface Static Friction | 1.00 minimum |
| 4. | Wet Surface Sliding Friction | 0.83 minimum |

2.02 FREE DRAINING INFILLED SYNTHETIC TURF FIELD BASE AND DRAINAGE MATERIALS

A. Geotextile Fabric

1. Shall be a needle-punched woven geotextile composed of polypropylene fibers, which are formed into a stable network such that the fibers retain their relative position. Fabric shall be inert to biological degradation and resistant to naturally encountered chemicals, alkalis, and acids.
2. Geotextile Fabric - Shall be a non-woven product equivalent to Mirafi 140N as manufactured by Ten Cate and as specified in Earthwork - 31 20 00.

B. Free Draining Base Stone

1. Shall be double washed durable crushed rock consisting of the angular fragments obtained by breaking and crushing solid or shattered natural rock, and free from a detrimental quantity of thin, flat, elongated or other objectionable pieces. A detrimental quantity will be considered as any amount in excess of 15% of the total weight. Thin or elongated pieces are defined as stones whose average width exceeds four (4) times their average thickness. Elongated stones shall be considered to be stones whose average length exceeds four (4) times their average width. The Free Draining Base Stone shall be uniformly blended according to the gradation requirements for the respective stone sizes for the following:

| <u>Sieve Designation</u> | <u>% Passing by Weight</u> | |
|--------------------------|----------------------------|---------|
| | Minimum | Maximum |
| 1 in. | 100 | -- |
| 3/4 in. | 90 | 100 |
| 1/2 in. | 30 | 60 |
| 3/8 in. | 25 | 45 |
| No. 4 | 5 | 30 |
| No. 10 | 0 | 10 |

2. The material shall also meet the Los Angeles Abrasion Test ASSHTO T96 of not more than 45% loss and the Sodium Sulfate Soundness ASSHTO T104 of not more than 12%.
3. Free Draining Base Stone shall bridge with selected Free Draining Finishing Stone material to prevent loss of Free Draining Finishing Stone material into Free Draining Crushed Stone layer.
4. Free Draining Base Stone shall drain at a rate of not less than twenty (20") inches per hour after compaction.
5. Based upon the type and source of Free Draining Base Stone and Free Draining Finishing Stone submitted, other criteria may be required for approval.

C. Free Draining Finishing Stone:

1. Shall be inert angular crushed rock derived from a stone quarry that is hard, durable and free of deleterious materials and shall not consist of natural or crushed sand. Materials that break up when alternately frozen and thawed or wetted and dried shall not be used. The Free Draining Finishing Stone shall be uniformly blended according to the target gradation requirements for the respective stone sizes for the following:

| <u>Sieve Designation</u> | <u>% Passing by Weight</u> | |
|--------------------------|----------------------------|---------|
| | Minimum | Maximum |
| 1/2 in. | 100 | -- |
| 3/8 in. | 85 | 100 |
| No. 4 | 60 | 90 |
| No. 8 | 35 | 75 |
| No. 16 | 10 | 55 |
| No. 30 | 0 | 40 |
| No. 60 | 0 | 15 |
| No. 100 | 0 | 8 |
| No. 200 | 0 | 2 |

2. The material shall also meet the Los Angeles Abrasion Test ASSHTO T96 of not more than 45% loss and the Sodium Sulfate Soundness ASSHTO T104 of not more than 12%. A submittal of testing reports shall be provided showing compliance.
3. Installed Free Draining Finishing Stone shall drain at a rate of no less than the existing field as confirmed by Dual Ring testing after compaction.

4. Based upon the type and source of Free Draining Finishing Stone submitted, other criteria may be required for approval.

2.03 RESILIENT UNDERLAYMENT

A. Resilient Underlayment

1. Resilient underlayment shall be equivalent to SP-17 as manufactured by Brock USA, 2840 Wilderness Place, Boulder, CO 80301, (303) 544-5800.
2. Product must carry a sixteen (16) year warranty and cover the cost of turf replacement in the event of product failure. Manufacturer must guarantee as part of the standard warranty that the G-Max shall not exceed 1345 for the life of the turf.
3. If Contractor wishes to provide an equivalent, he shall provide information prior to the bid to the Landscape Architect/Civil Engineer showing equivalent performance characteristics of the underlayment.
 - a. The following performance criteria shall be met for the resilient underlayment:
 - (i) Underlayment shall be a minimum 17 mm thick.
 - (ii) Gmax of underlayment shall be between 75-135 throughout warranty period. Manufacturer must guarantee as part of the standard warranty that the G-Max will not exceed 135 for the life of the turf. Provide maximum average G-Max of field of 100 upon initial testing (ASTM F355-A).
 - (iii) Underlayment HIC (EN-1177)/(ASTM F355-16, E) not to exceed 1,000 from 1.4m drop for full turf system. The HIC of the pad alone must be below 1,000 from 0.6m drop height)
 - (iv) System must meet minimum critical fall height of 1.4m at installation with specified turf system.
 - (v) Product shall drain at greater than 300 inches per hour.
 - (vi) Warranty shall be 16 years or more and cover the cost to replace or repair the turf in affected area in the event of product failure.
 - (vii) When tested with the Deltec field tester, vertical deformation must remain between 6-12mm for the turf/pad system combined. Vertical deformation of less than 4 mm for sub-base without turf overlay when tested with Deltec Club Field Tester. Acceptable resistance to Bacteria (ASTM G22-76), fungus (ASTM G21-96) and chemicals – ASTM F925^{SEP}
 - (viii) Supplier must provide documentation that product meets human health screening levels and total threshold limit concentration using EPA Method 3052 and Title 22 (CAM 17) metals using EPA Method 6020/7471A and for hexavalent chromium using EPA Method 7196A.
 - (ix) Manufacturer must prove absence of heavy metals in production material, and a controlled chain of custody for all materials used.
 - (x) All material used in the artificial system must meet environmental and human health standards established in this specification. Documentation of chain of custody for materials may be required.
 - (xi) Product must be of a homogeneous material composition. Variable material content will not be accepted. Material must contain a minimum of 55% virgin Code 5 food grade expanded

Polypropylene by volume. Material must not absorb water. Open cell foams not acceptable.

2.04 INFILLED SYNTHETIC TURF SYSTEM (FIELDS)

A. Tufted Synthetic Turf:

1. Synthetic Turf Carpet shall be a dual fiber system comprised of monofilament and parallel slit film fibers.
 - a. Parallel Slit Film Fiber: Yarn shall be UV resistant designed for use in outdoor infilled synthetic athletic turf applications. The Parallel slit film shall be equivalent to TenCate XP Blade+ and shall comply with the following approved system requirements.
 - b. Monofilament Fiber: Yarn shall be a UV resistant polyethylene monofilament, designed for use in outdoor infilled synthetic athletic turf applications and shall comply with the following approved system requirements. Monofilament shall be shaped monofilament equivalent to TenCate Monoslide products.
2. Tufting of the fibers (for the dual fiber system) in a single needle is preferred and is required for systems with a stitch gauge of 1/2" or greater.
3. Minimum requirements for the approved turf systems are as follows:

| | |
|------------------------------|---|
| Green Field Colors | Minimum two (2) different fiber colors for slit film fibers and two (2) different colors for monofilament fibers shall be selected by the Landscape Architect/Civil Engineer from the Manufacturer's Standard Colors. Refer to Drawings for alternating colored carpet panels at the Track & Field. |
| Line / Logo Colors | Shall be selected by the Landscape Architect/Civil Engineer from the Manufacturer's Standard Colors |
| Pile Denier | 8,000 denier minimum per ASTM D 1907 |
| Pile Height | 2.00" minimum per ASTM D 5823 |
| Stitch Gauge | 3/8" preferred, 1/2" max. per ASTM D-5793 |
| Face Weight | 46 oz. minimum per s.y. per ASTM D-5848 |
| Fiber Thickness | Slit film – 100 microns minimum per ASTM D 3218 Monofilament – 260 microns minimum |
| Tuft Bind | 10 lbs. minimum without fill per ASTM D 1335 |
| Grab Tear Strength (Average) | 200 lbs. minimum per ASTM D-5034 |
| Stitch Count | 2.4 per inch minimum per ASTM D-5793 |
| Elongation to Break | >50% per ASTM D-2256 |
| Break Load | >25 lbs. per ASTM D-2256 |

- B. Reflective Fiber Technology: Fibers shall include additives which reflect light and reduce the ambient temperature of the turf system, if available to the manufacturer.

- C. Primary Carpet Backing:
1. Shall be equivalent to Multilayer Thiobac PRO K29 as manufactured by TenCate Grass North America, Dayton, TN. Vendor shall provide information on the layers used in the primary backing.
 2. If necessary, additional fabric layers or other provisions shall be made to accept butt-sewn seams. Additional layers or provisions shall not compromise the integrity of the system.
- D. Secondary Backing shall be high quality polyurethane specifically formulated for outdoor synthetic turf carpet. The Secondary Coating shall be heat treated to hold the yarn in place and shall meet the following requirements:
1. Weight 20 oz. per s.y. minimum
- E. Rolls shall be a minimum of 15 feet wide. Rolls shall be of sufficient length to cover from sideline to sideline without head seams.
- F. Seams
1. The Infilled Synthetic Turf System Vendor/Installer shall provide **glued seams at all panel connections and all inlaid lines.**
 2. The Infilled Synthetic Turf Installer is informed that all seams shall be flat and indiscernible upon installation. Shearing of the fiber pile will not be permitted as a means of achieving a flat seam. Infilling shall not commence until the Field Consultant is satisfied that all seams are flat and all trapped fibers are freed from the stitch.
 3. If an alternative method of seaming is proposed, information shall be provided to the Landscape Architect/Civil Engineer for consideration prior to the bid.
- G. Inlaid Lines
1. The Infilled Synthetic Turf Installer may install and secure the inlaid lines using seaming tape and glue or the shear and hot melt system.
 2. If the Infilled Synthetic Turf Installer plans to use seaming tape and glue, the components shall meet the following requirements:
 - a. Tape for securing inlaid lines and reference tick marks in the tufted synthetic turf shall be high quality coated cordura tape made specifically for Infilled Synthetic Turf applications with a minimum roll width of 12 inches.
 - b. Adhesives for bonding tufted synthetic turf shall be one part moisture cured polyurethane obtained from a single manufacturer and be equivalent Nordot 34-G as manufactured by Synthetic Surfaces, Scotch Plains, NJ (908) 233-6803. Adhesive shall be modified with amendments as recommended by the manufacturer for installation during adverse weather conditions.

- c. The installer will take all precautions not to get glue on the resilient underlayment. In the event that glue goes onto the underlayment, that piece will be removed and replaced.
- 3. If the Infilled Synthetic Turf Installer plans to use the shear and hot melt system, the Infilled Synthetic Turf Installer shall submit the machine and glue specifications for review.
- H. Line paint for games and field markings shall be latex semi-gloss enamel as recommended by the Infilled Synthetic Turf Contractor.
- I. If the Infilled Synthetic Turf Vendor or Installer intends to modify any of the above criteria, it is required that all modifications be approved in writing, by the Landscape Architect / Civil Engineer, prior to submitting a bid.

2.05 INFILLED SYNTHETIC TURF SYSTEM (BATTING CAGES)

A. Tufted Synthetic Turf:

- 1. Synthetic Turf Carpet shall be a dual fiber system comprised of parallel slit film fibers and a thatch:
 - a. Parallel Slit Film Fiber: Yarn shall be UV resistant designed for use in outdoor infilled synthetic turf applications. The Parallel slit film shall be equivalent to TenCate XP Blade+ and shall comply with the following approved system requirements.
 - b. Thatch: Yarn shall be a UV resistant polyethylene, designed for use in outdoor infilled synthetic turf applications and shall comply with the following approved system requirements. Thatch shall be equivalent to TenCate 6 Ply TXT Thatch products.

2. Minimum requirements for the approved turf systems are as follows:

| | |
|------------------------------|--|
| Green Field Colors | Minimum two (2) different fiber colors for slit film fibers shall be selected by the Landscape Architect/Civil Engineer from the Manufacturer’s Standard Colors. |
| Line / Logo Colors | Shall be selected by the Landscape Architect/Civil Engineer from the Manufacturer’s Standard Colors |
| Pile Denier | 8,000 denier minimum per ASTM D 1907 |
| Pile Height | 1.50” minimum per ASTM D 5823 |
| Stitch Gauge | 3/8” preferred, 1/2” max. per ASTM D-5793 |
| Total Weight | 74oz. minimum per s.y. per ASTM D-5848 |
| Tuft Bind | 10 lbs. minimum without fill per ASTM D 1335 |
| Grab Tear Strength (Average) | 200 lbs. minimum per ASTM D-5034 |
| Stitch Count | 2.4 per inch minimum per ASTM D-5793 |

| | |
|---------------------|--------------------------|
| Elongation to Break | >50% per ASTM D-2256 |
| Break Load | >25 lbs. per ASTM D-2256 |

- B. Reflective Fiber Technology: Fibers shall include additives which reflect light and reduce the ambient temperature of the turf system, if available to the manufacturer.
- C. Primary Carpet Backing:
 - 1. Shall be equivalent to Multilayer Thiobac PRO K29 as manufactured by TenCate Grass North America, Dayton, TN. Vendor shall provide information on the layers used in the primary backing.
 - 2. If necessary, additional fabric layers or other provisions shall be made to accept butt-sewn seams. Additional layers or provisions shall not compromise the integrity of the system.
- D. Secondary Backing shall be high quality polyurethane specifically formulated for outdoor synthetic turf carpet. The Secondary Coating shall be heat treated to hold the yarn in place and shall meet the following requirements:
 - 1. Weight 20 oz. per s.y. minimum
- E. Rolls shall be a minimum of 15 feet wide.
- F. Seams
 - 1. The Infilled Synthetic Turf System Vendor/Installer shall provide **glued seams at all panel connections and all inlaid lines.**
 - 2. The Infilled Synthetic Turf Installer is informed that all seams shall be flat and indiscernible upon installation. Shearing of the fiber pile will not be permitted as a means of achieving a flat seam. Infilling shall not commence until the Synthetic Turf Consultant is satisfied that all seams are flat and all trapped fibers are freed from the stitch.
 - 3. If an alternative method of seaming is proposed, information shall be provided to the Landscape Architect/Civil Engineer for consideration prior to the bid.
- G. If the Infilled Synthetic Turf Vendor or Installer intends to modify any of the above criteria, it is required that all modifications be approved in writing, by the Landscape Architect / Civil Engineer, prior to submitting a bid.

2.06 INFILL MATERIALS (FIELDS)

- A. The Infilled Synthetic Turf Vendor shall provide a signed letter on company letterhead stating that their system (with the resilient underlayment) using the infill mix ratio below will meet performance requirements set forth in this specification. In the event that the Vendor does not believe they can meet the performance criteria within this specification, the Vendor shall provide a request to the Landscape Architect/Civil Engineer prior to the date questions are due with a requested alternative mix ratio.
- B. Infill Materials shall be uniformly filled to a depth which leaves no more than 1/2" of exposed pile after settlement, and consists of a homogeneous non-compacting mixture of silica sand and resilient granules meeting the following criteria:

1. The sand:rubber content shall be 60%:40% by weight +/-2%.
2. Silica sand shall meet the following criteria:
 - a. Infill sand shall be high quality clean grains of rounded silica sand (SiO₂) equivalent to:
 - (i) Granusil 4095
Unimin Corporation, New Cannan, CT

203-966-8880
20/40 HC
 - (ii) Oglebay Norton, Brady, TX

915-597-0721
20/40 Oil Frac
 - (iii) US Silica, Ottawa, IL
800-243-7500
 - b. Angular or sub-angular particles will not be accepted. Sand shall have 100% passing the #16 sieve, no more than 80% passing the #30 sieve and no more than 0.5% passing the #50 sieve per ASTM E-11 and also meet the following requirements:
 - (i) Hardness 7.0 Mohs
 - (ii) Moisture Content <0.1% per ASTM C-566
 - (iii) Specific Gravity 2.65 g/cm³ per ASTM C-128
 - (iv) Aerated Bulk Density 92-102 lb/ft² per ASTM C-29
 - (v) Compacted Bulk Density 98-110 lb.ft² per ASTM C-29
3. Resilient granules shall meet the following criteria:
 - a. SBR Rubber - Granules shall be processed recycled rubber derived from passenger tires. Rubber shall containing no dust or contaminants and shall work to hold the infill sand in suspension. Color to be black.
4. Samples of the free draining, homogenously blended infill (and separate sand and resilient granules) shall be submitted to the Landscape Architect / Civil Engineer for review. Samples shall also be sent by the Infilled Synthetic Turf Vendor to an independent testing laboratory to confirm that the infill is free draining and meets (or exceeds) the drainage requirements set forth in this specification. Copies of the testing reports shall be submitted to the Landscape Architect / Civil Engineer for review. The Infilled Synthetic Turf Vendor is responsible for costs associated with infill testing.

2.07 INFILL MATERIALS (BATTING CAGES)

A. Infill Materials shall be uniformly filled to a depth which leaves no more than 1/2” of exposed pile after settlement, and consists of a homogeneous non-compacting mixture of silica sand meeting the following criteria:

1. Silica sand shall meet the following criteria:

a. Infill sand shall be high quality clean grains of rounded silica sand (SiO₂) equivalent to:

(i) Granusil 4095
Unimin Corporation, New Cannan, CT

203-966-8880
20/40 HC

(ii) Oglebay Norton, Brady, TX

915-597-0721
20/40 Oil Frac

(iii) US Silica, Ottawa, IL
800-243-7500

b. Angular or sub-angular particles will not be accepted. Sand shall have 100% passing the #16 sieve, no more than 80% passing the #30 sieve and no more than 0.5% passing the #50 sieve per ASTM E-11 and also meet the following requirements:

- (i) Hardness 7.0 Mohs
- (ii) Moisture Content <0.1% per ASTM C-566
- (iii) Specific Gravity 2.65 g/cm³ per ASTM C-128
- (iv) Aerated Bulk Density 92-102 lb/ft² per ASTM C-29
- (v) Compacted Bulk Density 98-110 lb.ft² per ASTM C-29

2. Samples of the free draining infill shall be submitted to the Landscape Architect / Civil Engineer for review. Samples shall also be sent by the Infilled Synthetic Turf Vendor to an independent testing laboratory to confirm that the infill is free draining and meets (or exceeds) the drainage requirements set forth in this specification. Copies of the testing reports shall be submitted to the Landscape Architect / Civil Engineer for review. The Infilled Synthetic Turf Vendor is responsible for costs associated with infill testing.

2.08 INFILLED SYNTHETIC TURF MAINTENANCE EQUIPMENT

A. Provide one (1) Synthetic Sports Turf Groomer with Spring Tine Rake for routine maintenance of field as manufactured by GreensGroomer WorldWide, Inc., PO Box 34151, Indianapolis, IN 46234. (888) 298-8852.

B. Provide one (1) LitterKat Synthetic Turf Sweeper with Tow Magnet as manufactured by GreensGroomer WorldWide, Inc., PO Box 34151, Indianapolis, IN 46234. (888) 298-8852.

PART 3 - EXECUTION

3.01 GENERAL

- A. The substrate to receive the Infilled Synthetic Turf System shall be inspected and certified by the Base Contractor and the Infilled Synthetic Turf System Installer (if the Infilled Synthetic Turf Installer is not a direct employee of the Infilled Synthetic Turf Vendor, then a representative of the Infilled Synthetic Turf Vendor shall also be present and provide certification) as ready for the installation of the Infilled Synthetic Turf System and must be perfectly clean as installation commences and shall be maintained in that condition throughout the process.
- B. All installation operations shall be performed by personnel fully familiar with the materials and their application, under the full time direction and supervision of a qualified technical supervisor directly employed by the Infilled Synthetic Turf System Vendor. Refer to QUALITY CONTROL – Experience section of this specification.

3.02 BASE INSTALLATION

- A. Geotextile Fabric:
 - 1. Install geotextile Fabric over excavated and prepared subgrade and the bottom and sides of the excavated drainage system and perimeter trenches in accordance with Manufacturer’s recommendation. Provide 1/3 minimum overlap at all seams.
- B. Synthetic Turf Field Underdrains:
 - 1. Flat drains shall be installed in accordance with the details on the Contract Drawings and manufacturer’s instructions and recommendations.
 - 2. All flat drains will direct-connect to the perimeter drain pipe with appropriate fittings.
- C. Free Draining Base Stone:
 - 1. Install to the depth as shown in the Project Details. The material shall be fine graded and suitably rolled and compacted to achieve a tolerance of 1/4" in 25’.
 - 2. The Free Draining Base Stone layer shall be inspected by the Base Contractor by means of a laser level on a 25-foot grid pattern.
 - 3. The Base Contractor shall verify that the Free Draining Base Stone layer and Subsurface Drainage System are functioning properly prior to installing the Free Draining Finish Stone later. Provide written verification to the Landscape Architect.
 - a. If the base materials fail to drain at the specified rates, they shall be repaired or removed and replaced at no cost to the Owner until they achieve the specified requirements.
- D. Free Draining Finishing Stone:
 - 1. Free Draining Finishing Stone shall be fine graded and suitably rolled and compacted to achieve a tolerance of 1/8” in 10’.

- a. Fine grading operations shall be completed using a hydraulically controlled laser grading apparatus. The use of a drag behind or box grader shall not be allowed.
 - b. The Free Draining Finishing Stone Layer shall be tested to ensure a 95% maximum dry density per a standard proctor test. Contractor to complete testing and provide results to Owner's Representative.
2. The Free Draining Finishing Stone layer shall be inspected by an Independent Testing Company for planarity and drainage. All testing results will be submitted to the Landscape Architect/Civil Engineer and the Infilled Synthetic Turf Vendor for review and approval.
- a. Planarity Testing
 - (i) Upon completion of fine grading, complete a 3-meter straight edge planarity test across the field by an Independent Testing Company to show compliance with the 1/8" in 10' tolerance.
 - (ii) The Base Contractor shall be responsible for fixing all deficiencies in the base to provide a base that meets the specified tolerance.
 - b. Drainage Testing
 - (i) Upon completion of fine grading, complete a Dual Ring Infiltrometer Testing (ASTM D3385-9), (or other pre-approved method) by an Independent Testing Company coordinated and paid for by the Contractor. Five (5) tests per field shall be performed in locations determined by the Landscape Architect/Civil Engineer and/or Owner. Each test location shall have a permeability rate in excess of ten (10) inches per hour.
 - (ii) If preliminary results in the field do not yield ten (10) inches per hour, the Landscape Architect/Civil Engineer and/or Owner may ask for additional locations to be tested. The Base Contractor and the Infilled Synthetic Turf Vendor shall provide written verification to the Landscape Architect/Civil Engineer that the base and subsurface drainage system are functioning properly. Commencement of subsequent work prior to written verification constitutes acknowledgement that the systems are functioning properly.
 - c. If the base materials fail to drain at the specified rates, they shall be repaired or removed and replaced at no cost to the Owner until they achieve the specified requirements.
- E. The Base Contractor and the Infilled Synthetic Turf Vendor shall verify that the Subsurface Drainage System, Free Draining Crushed Stone layer and Free Draining Finishing Stone layer are functioning properly prior to work performed by Infilled Synthetic Turf Vendor begins. Provide written verification to the Landscape Architect/Civil Engineer.

3.03 INFILLED SYNTHETIC TURF SYSTEM INSTALLATION

- A. Upon final written certification from the Base Contractor and Infilled Synthetic Turf Vendor that the field base is working correctly, the Infilled Synthetic Turf System installation shall commence.
- B. Resilient Underlayment
 - 1. Installation shall be performed by manufacturer’s technicians and shall comply with the manufacturer’s guidelines for the complete placement of the panelized, polypropylene resilient underlayment.
 - 2. Deviation in the straightness of the line can be caused by displacement of panels from vehicles traffic and incorrect fitting. Before beginning each new row, the installers are to check the seam lines and outside edge of the installed area to ensure that it is straight and true. If at any time there is a noticeable deviation in straightness, corrective action is to be taken by carefully adjusting the panels before proceeding with further panel installation. This may require removing the panels that have deviated and reinstalling correctly.
 - 3. Cutting of Resilient Underlayment panels within the playing area will not be permitted. Cutting of Resilient Underlayment shall occur only as needed at the field perimeter and occur per manufacturer’s installation requirements and instructions.
 - 4. Upon completion of Resilient Underlayment installation, the Resilient Underlayment shall be inspected for planarity and grade and all deviations shall be corrected by tamping with a hand operated vibratory plate compactor.
- C. Tufted Synthetic Turf Rolls shall be manufactured to maximize tufting of permanent athletic field lines and installed perpendicularly across the field. Turf rolls shall be of sufficient length to permit full cross-field (sideline – sideline) installation. No head or cross seams will be allowed. Once all playing surface rolls have been installed, install sideline rolls perpendicularly to playing surface rolls and glue entire panel to turf anchor and anchor by stainless steel screws or ramset at a maximum of 18-inch intervals directly to the turf anchor shelf. Rolls shall be installed so that tufted lines are placed as shown on the approved Shop Drawings.
- D. Tufted Synthetic Turf shall be installed with no wrinkles, ripples or bubbles. Shearing of fibers, slits in the fabric or driven spikes or staples to relieve such defects will not be permitted.
- E. All Tufted Synthetic Turf seams shall be glued as stated above. Seams shall be flat, tight, and permanent with no separation or fraying. Tufted Synthetic Turf Yarn pile that is trapped between seams shall be freed from the seams by hand or other approved method to an upright position prior to brushing and infilling. Extreme care shall be taken to prevent carpet pile from becoming trapped underneath the infill. If necessary, the Landscape Architect / Civil Engineer may direct the Infilled Synthetic Turf Installer to completely remove and reinstall the infill.
- F. All inlaid lines and other field markings shall be adhered with high strength tape and glued as specified. Inlaid seams shall be flat, tight, and permanent with no separation or fraying.

Yarn pile that is trapped or glued between inlay seams shall be freed from the seams by hand or other approved method to an upright position prior to brushing and infilling.

- G. Contractor to provide an As-Built Field Layout Drawing prior to infilling with verification and certification that the field layouts meet the requirements of the project documents.
- H. Upon completion of seaming and inlaying and prior to infilling, the entire field shall be brushed with a motorized rotary nylon broom to free trapped or tangled fibers. The blended infill materials shall be spread evenly by using a drop spreader in multiple applications at uniform rates until the specified infill depth (after settlement) is achieved. Between applications the infill materials shall be brushed in multiple directions with a static nylon groomer.
- I. Refer to PERFORMANCE TESTING ON FINAL SURFACE for testing requirements following infill installation completion.
- J. Upon completion, the Infilled Synthetic Turf Vendor/Installer shall deliver assembled maintenance equipment to the Owner.

3.04 FIELD LAYOUT

- A. Field layouts shall be in accordance with each sport’s governing body rules, the Drawings and the Approved Shop Drawings.
- B. Football Field:
 - 1. Field shall be marked in accordance with DIAA/NFHS Football Rules and Interpretations, latest edition.
 - 2. Color to be white.
 - 3. Football field shall have 4-inch wide factory tufted five-yard lines, 8-inch goal lines, 12-inch wide factory tufted football sidelines and end lines, and factory tufted coach’s boxes per the Contract Documents and approved Shop Drawings. To the extent feasible, additional boundary lines and markings shall be tufted in the factory.
 - 4. Field shall have white inlaid short line extensions, hash marks, inbound lines, three-yard lines, line to gain and down indicator reference points per the Contract Documents and approved Shop Drawings.
 - 5. Custom Ten-yard numerals shall be inlaid.
 - 6. Layout shall begin from the center of the 50-yard line which shall be verified between the installed football goal post locations. Perimeter dimensions are taken to the inside of the line.
- C. Soccer Field shall be marked in accordance with DIAA/NFHS Soccer Rules and Interpretations, latest edition and shall have 4” wide Yellow lines (refer to Field Line Layout Drawings). The maximum amount of lines shall be tufted in the factory and the remainder inlaid per the Contract Documents and approved Shop Drawings.
- D. Field Hockey Field shall be marked in accordance with NFHS Field Hockey Rules and Interpretations and shall have 3” Black inlaid lines. The maximum amount of lines shall be tufted in the factory and the remainder inlaid per the Contract Documents and approved Shop Drawings.

- E. Girl's Lacrosse Field shall be marked in accordance with NFHS Girl's Lacrosse Rules and Interpretations, latest edition and shall have 2" wide Gray inlaid lines. The maximum amount of lines shall be tufted in the factory and the remainder inlaid per the Contract Documents and approved Shop Drawings.
- F. Boy's Lacrosse Field shall be marked in accordance with NFHS Boy's Lacrosse Rules and Interpretations, latest edition and shall have 4" wide light blue inlaid lines. The maximum amount of lines shall be tufted in the factory and the remainder inlaid per the Contract Documents and approved Shop Drawings.
- G. The following shall be provided and installed in the field:
 - 1. One (1) midfield logo at each field as indicated on the plans and details using standard fiber colors to be selected by the Owner.
 - 2. Track and Field to receive Custom End Zone Lettering, as shown on the plans and details using standard fiber colors to be selected by the Owner.
 - 3. Secondary Turf Field to receive Custom Sideline Lettering, as shown on the plans and details using standard fiber colors to be selected by the Owner.
 - 4. All logos shall be laid out in the field for Owner's review prior to installation.
 - 5. Electronic files for the logo will be provided to the awarded bidder in order for the turf vendor to prepare shop drawings and submittals for review. Internet downloads and scans of the drawings shall not be used to fabricate turf logos.
- H. Provide As-Built drawing including verification of field layout dimensions in accordance of with CONTRACT CLOSEOUT.

3.05 ACCEPTANCE

- A. Should any imperfections develop in the substrate or surface prior to the final acceptance of the work, they shall be properly repaired with the removal and replacement of materials as required.
 - 1. All such repair work shall be done at no additional cost to the Owner.

3.06 CLOSE OUT

- A. Infilled Synthetic Turf System Vendor shall provide the Landscape Architect / Civil Engineer and Owner with three (3) copies of the approved Standard Warranty, Third Party Insured Warranty, and Testing Results.
- B. Infilled Synthetic Turf System Vendor shall train the Owner's designated personnel in the proper maintenance and care of the field and provide the Landscape Architect / Civil Engineer and Owner with three (3) copies of the Standard Maintenance Manual. Training shall at a minimum address:
 - 1. Use and maintenance of equipment including when/how often to use the particular pieces of machinery, how fast/slow to operate machinery, etc.
 - 2. How to clean stains/markings from the field.
 - 3. Snow removal (plow versus snowblowing, etc.)

4. What to do if a problem is encountered in the field – who to call/contact.
5. Any small repairs that can be done by the Owner (if any) without affecting the warranty.
6. How to inspect a field and what to look for as well as how often this should be done.
7. Maintenance Log Information – discuss the importance in respect to warranty.

3.07 CLEAN UP

- A. Infilled Synthetic Turf System Vendor shall provide the labor, supplies and equipment as necessary for final cleaning of surfaces and installed items.
- B. All useful and usable remnants of new materials shall become the property of the Owner. A minimum of 1,000 square feet of tufted synthetic turf shall be provided including at least one 15 foot by 15 foot section, per field.
- C. One (1) 50 gallon drum of sand and one (1) 50 gallon drum of SBR rubber shall be provided to the Owner for storage, per field.
- D. 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.

3.08 POST CONSTRUCTION FIELD MAINTENANCE PROGRAM

- A. Subsequent to Final Completion, provide the Owner with one (1) year of Post Construction Field Maintenance Services including but not limited to:
- B. A complete inspection of the entire field area to include:
 1. Inspection of seams, penetrations and connections.
 2. Inspection of Carpet Pile for premature fading, excessive fibrillation, wear and/or decreased height and weight.
 3. Inspection of the Infill for depth and consistency. Infill shall be top dressed as necessary to meet the height requirements of these specifications.
 4. Inspection of the Infill for consistency of feel and excessive hardness or softness.
 5. Immediate repair or replacement to correct deficiencies noted during inspection.
 6. Complete brushing of the field with a motorized rotary broom to redistribute and level the Infill and rejuvenate the Carpet Pile.
 7. Provide G-Max testing.
- C. Provide a Complete Field Service Report of all observations and activities to the Owner and Landscape Architect / Civil Engineer.
- D. Post Construction Field Maintenance shall be performed a minimum of two (2) times during the first full year after Final Completion. Timing of the Post Construction Field Maintenance shall be performed at the discretion and approval of the Owner and with at least fourteen (14) days prior notice to the Owner.

3.09 EMERGENCY SERVICE

- A. Provide the Owner with a 24-hour emergency response time for all field repair issues.

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END OF SECTION

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| 32 18 23.29 - 26 | | INFILLED SYNTHETIC TURF SYSTEM BP1A- Issued for Bid – 09/08/2025 |
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**SECTION 32 18 23.33
RESILIENT TRACK SURFACE**

PART 1 GENERAL

1.01 GENERAL REQUIREMENTS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 010000 – GENERAL REQUIREMENTS, which are hereby, made a part of this Section of the Specifications.
- B. Examine all other Sections of the Specifications for requirements, which affect work of this Section whether or not such work is specifically mentioned in this Section.
- C. Coordinate work with trades affecting, or affected by, work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.02 WORK INCLUDED

- A. Contractor shall furnish a track surface as specified herein and in accordance with the drawings, manufacturer's specifications and directions of the Landscape Architect/Civil Engineer.
- B. Resilient track surface work includes, but is not limited to:
 - 1. Provide a 10 mm paved-in-place black EPDM or SBR rubber base mat with a two component 3 mm seal coat finished with embedded EPDM granules and light encapsulation for a 400-meter track (42" lanes – 8 lane oval) and "D" areas.

1.01 RELATED WORK

- A. Site Preparation
- B. Cast-in-Place Concrete
- C. Athletic Ball Netting System
- D. Athletic Equipment
- E. Track Bituminous Concrete Pavement
- F. Infilled Synthetic Turf System
- G. Athletic Storm Drainage System

1.02 REFERENCES

- A. ASBA - American Sports Builders Association
- B. ASTM - American Society for Testing Materials
- C. IAAF – International Amateur Athletic Association
- D. NFHSA – National Federation of State High School Associations
- E. DIAA – Delaware Interscholastic Athletic Association

1.03 QUALITY ASSURANCE

- A. Experience: Track surfacing shall be performed by an experienced specialty firm which shall have laid at least ten (10) track surfaces of the type and installation process herein specified within the last three-year period. The applicator of the system must be authorized by the manufacturer.

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- B. Guarantee: The Contractor shall guarantee all materials and workmanship against damage by climatic conditions or proper and normal use (including the use of running spikes) for a minimum period of five (5) years from the official date of substantial completion.
- C. The Contractor shall inspect the bituminous pavement construction to verify their acceptance of condition. Commencement of track surfacing installation in a given work area indicates acceptance of underlying substrates.
- D. Security: Contractor shall be responsible for the proper protection and watching of the works at all times to ensure both uncured and cured surfacing is not subject to casual damage or vandalism.
- E. Restoration of Damage: Contractor shall exercise care in the execution of his work and avoid damage or defacement of adjacent or surrounding areas by using suitable protective means. Damage or defacement which occurs shall be remedied at Contractor's cost to the satisfaction of the Owner.
- F. Planarity and Grade: Deviation in planarity of the finished surface shall not exceed 1/8" beneath a 10' straightedge. Deviation from a straight grade between levels on drawings shall not exceed 1/8".
- G. Thickness: The finished thickness shall be a minimum of 1/2" (13mm). For purposes of this specification, surface thickness is defined as the dimension from the top of the bituminous concrete to the lowest point in the finished surface texture of the resilient track surface.
- H. Heavy equipment or vehicles of any kind should not be allowed on the surface for a minimum of four weeks, after which time, only where protected by a sufficient crossing mat.

1.04 SUBMITTALS

- A. General: Submit the following with the Form for General Bid in accordance with Conditions of the Contract and Division 1 Specification Section.
 - 1. A recent reference list of at least ten (10) tracks of the type and installation process specified herein with contract name, address and telephone number to enable such data to be validated at the time of the submission of bids.
 - 2. A written five (5) year labor and materials warrantee from both the Contractor and Manufacturer.
 - 3. A general statement of the method by which the surface is laid, including method of mixing and chief items of equipment used.
 - 4. Statement of method by which small repairs or retexturing may be achieved.
 - 5. Statement indicating the name of the registered engineer, land surveyor or certified track builder who will layout the track, and a copy of his/her registration.
 - 6. A certificate from the surfacing manufacturer that the Contractor is authorized to apply the specified materials.
 - 7. Written certification from a licensed engineer, land surveyor, or Certified Track Builder (CTB) that the bituminous base layout and elevations comply with the drawing and specifications prior to laying the resilient track surface.
 - 8. A certificate from the manufacturer of all binder materials that they have been produced specifically for use in outdoor running track surface construction.
 - 9. Stamped certification from an IAAF approved testing laboratory that each item used in the construction of the running surface has been tested and meets the requirements of the IAAF and ASTM for running track surface construction.

10. Written certification from a licensed engineer, land surveyor, or Certified Track Builder (CTB) that the track and field events layout and elevations comply with the drawing and specifications and the requirements of the DIAA and NFHS.
- B. General: Submit the following in accordance with Conditions of the Contract and Division 1 Specification Section.
1. Shop drawings which illustrate the scope of work, including layout of all track events, materials and colors.
 2. A set of maintenance instructions for the surface.
 3. Samples of the proposed surface for use as a control for site work.
 4. Samples of 1/2" thickness as follows: two (2) samples minimum 4"x 4", two (2) samples minimum 12"x 12".
 5. These samples should be representative in every way of the composition, strength and texture of the material to be produced on-site and may be tested for comparison with submitted test data and to establish a datum performance for subsequent site quality control purposes.
 6. Statement of the curing conditions necessary to achieve full cure of site samples within three days.
 7. Color samples of line paints.
 8. Delivery slips for all track surfacing materials delivered to the site.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle products in exact accordance with the manufacturer's requirements and specifications.

1.06 PROJECT CONDITIONS

- A. Weather Limitations: No part of the construction shall be conducted during a rainfall or when rainfall is imminent. No part of the construction shall be conducted unless both ambient and materials temperatures are at least 50 degrees Fahrenheit and rising.
- B. Bituminous and resilient track surfaces shall be dry, as well as clean prior to work. Binder should not be applied within 12 hours after rainfall, or when rainfall is forecast. After a rainfall, sufficient time shall be given to allow the surface to dry before resuming work.
- C. The facilities shall not be used for a minimum period of one week after completion of the track.

PART 2 PRODUCTS

2.01 GENERAL

- A. This specification covers the installation of a new, high performance resilient track surfacing system for new asphalt surfaces. This track system utilizes specially compounded, pigmented, binders and select rubber granules to provide strength, flexibility and to prevent ultra violet degradation. The system is intended to provide a durable, resilient, spike resistant surface for recreational and competitive high school use.

2.02 MATERIALS

- A. The resilient track surface shall be a durable, resilient, textured, all-weather surface consisting of a polyurethane-bound pigmented EPDM or SBR rubber base mat with a flood coat and

embedded wearing course equivalent to BSS-300 as manufactured by Beynon Sports Surfaces, Hunt Valley, MD (410) 771-9473 and which meets the following requirements.

1. Urethane Primer:
 - a. A urethane-based tack coat interface that has been pre-tested and is certified by the manufacturer to be compatible with the bituminous base and the resilient track surface.
2. Paved Mat Surface:
 - a. 100% MDI (methylene diphenyl isocyanate) Polyurethane Binders containing no clay or mineral fillers.
 - b. Base Material:
 - 1) Base Mat Granulate: A mixture of uniformly-graded SBR rubber granulars bound with polyurethane binders containing no mineral fillers. The SBR rubber granules shall have a particle size grading of 1 mm to 3 mm. Color shall be black.
 - 2) Polyurethane Base Mat Binding Agent: Single component, solvent free MDI-based polyurethane binder, specially formulated and compatible with SBR rubber granules.
3. Wearing Material:
 - a. The base material shall be sealed with a self-leveling two component polyurethane compound containing no solvents, TDI or mercury. Colors shall be Navy Blue and Gray at the jump runways and relay transition zones.
 - b. A mixture of uniformly graded EPDM rubber granules shall be integrated into the polyurethane seal (embedded) coat. EPDM granules shall have a particle size grading of 1 mm to 3 mm. The application of EPDM dust is not allowed. Color to be Navy Blue and Gray; refer to Track Striping Plan for intended color transitions.
4. Encapsulation
 - a. Provide light encapsulation final seal of the surfacing with water-based polyurethane structural spray product equivalent to BEYPUR 160.
 - b. The encapsulation spray shall be color matched to the Wearing Materials.
5. Minimum Physical properties of the Surface:

| | |
|--|------------------------------|
| a. Thickness | 1/2" (13mm) |
| b. Base Mat Color | Black |
| c. Wearing Course Color | Navy Blue and Gray |
| d. Elongation (ASTM D-412) | 28% |
| e. Tensile strength (ASTM D-412) | 36.2 PSI |
| f. Abrasion Resistance (ASTMD-501) 1,000 cycles | 0.25-0.425 grams loss after |
| g. Resilience (ASTM D-2632) | 37%-44% |
| h. Tear Resistance (ASTM D-624) | 50-75 psi |
| i. Chalking (ASTM D-822) in weatherometer | No change after 1,000 hrs. |
| j. Hardness (ASTM D42240) | Shore A @ 30 to 50 |
| k. Coefficient of Friction (ASTM D-1894) | Dry 0.70-0.75, Wet 0.80-0.95 |

PART 3 EXECUTION

3.01 GENERAL

- A. Surface Inspection: Prior to the application of the resilient track surface, the bituminous concrete pavement base shall be inspected for conformity to planarity requirements. The

surface shall not deviate more than 1/8" in 10' from the specified grade when checked with a 10' straightedge. This surface shall also be flooded with water to verify the drainage. Any areas found not to be in conformance with the above requirements shall be repaired and allowed to cure prior to the application of the synthetic surface with compatible materials as approved by the manufacturer.

- B. The bituminous concrete pavement base surface shall be clean and free from contamination by oils, grease, diesel, gasoline, hydraulic fluid, anti-freeze or other chemical agents or excessive amounts of dust, dirt or organic matter before layering the surface or it will be cleaned to the satisfaction of the Landscape Architect/Civil Engineer by pressure-washing or replacement of the contaminated bituminous concrete.
- C. At least twenty-one (21) days shall have elapsed between completion of the bituminous concrete pavement base and commencement of the synthetic surfacing work. If no rain has fallen since completion of the bituminous concrete, the Contractor shall provide for hosing down the bituminous concrete once during the period, not less than two (2) days before commencement of the synthetic surfacing.
- D. No surfacing work will proceed when there is moisture on any of the surfaces to be coated. Surfacing shall be laid only on completely dry sub-surfaces.
- E. All machinery and tools shall be clean and serviceable and hold no accumulations of cured material. Machinery and tools will be cleaned at the end of each day's work, and at appropriate intervals during the workday.
- F. Installation shall not take place if adjacent or concurrent construction generates excessive dust, abrasives or any other by-product that, in the opinion of the Landscape Architect or Owner's Representative, and/or Installer would be harmful to the track material until completion of such works.
- G. If, in the opinion of the Installer of the synthetic material, the weather and/or climatic conditions are detrimental to the proper installation of the surfacing materials, work shall be delayed until conditions are acceptable. Preferred installation temperature is 50 degrees Fahrenheit and rising. Installation shall be executed only in dry conditions.

3.02 INSTALLATION

- A. Urethane Paved Mat System
 - 1. After Track Engineer's, Land Surveyor's or CTB's written approval of the bituminous base, a urethane tack coat shall be applied in accordance with the manufacturer's recommendations to areas which will be surfaced within a two (2) day period at a rate of 0.03 gallons per square yard. Allow tack coat to dry thoroughly before surfacing. After significant rainfall or other instances of surface flooding, reapply tack coat to ensure proper adhesion.
 - 2. The base mat shall consist of a minimum of twenty (20%) percent polyurethane binder and a maximum of eighty (80%) percent SBR rubber granules as determined by the overall weight of the mixture. The mixture shall be prepared in a clean and dry mechanical mixer until a homogenous mixture is obtained. A mechanically operated finisher with an electronically heated finishing screed-bar shall apply the blended materials. All joint work shall be troweled flush with the adjacent base mat. All joints shall have their edges primed with the base mat, binding agent prior to application of the adjacent base mat.
 - 3. After the initial cure is complete, the base mat shall be sealed with a thickened two-component polyurethane, squeegee applied. EPDM granules shall be integrated into the polyurethane to achieve full depth of the flood and chip system. The resilient embedded

textured finish shall be a dense matrix of exposed EPDM granules. Color shall be Navy Blue and Gray.

3.03 QUALITY CONTROL

- A. The Landscape Architect/Civil Engineer reserves the right to make any and all tests it may deem necessary to determine the physical properties, thickness and quality of the synthetic materials being installed. The Contractor shall supply samples of ingredients or mixed materials whenever requested to do so. Contractor shall supply trays 1/2" deep, not less than 12"x12" and coated with release agent for the purpose of sampling.
- B. During the course of the work, Contractor shall maintain at the site, accurate weighing scales for the purpose of checking batching ratios.
- C. Samples taken from the site and submitted to accelerated curing in accordance with the Contractor's statement shall be expected to achieve ninety (90%) percent of the performance of the control specimens submitted.
- D. Following completion of the embedded rubber layer the Landscape Architect/Civil Engineer will test for the required surface depth using a SMG – Sportplatzmaschinenbau GBMH surface depth gauge. The track and events areas will be checked in no less than 100 locations at the center of the inner and outer lanes, as well as the center of the oval. If at least 20% of the readings do not meet the specified depth, additional layers of rubber and binder will be applied until the proper depth has been achieved.

3.04 MEASUREMENTS AND MARKINGS

- A. Wait forty-eight (48) hours after completion of track surface before applying line paint.
- B. All work of this section shall conform to DIAA specifications.
- C. The Contractor shall supply all labor, materials and equipment necessary to perform the following:
 - 1. Locate and establish all radius points.
 - 2. Establish and set all necessary control points.
 - 3. Lay out all lines and markings to within 1/2 inch (13 mm) tolerance.
 - 4. Prepare all necessary drawings.
 - 5. Provide all computations and measurements in organized form.
 - 6. Establish all locations on the curves using a transit or Theodolite capable of reading direct to 20 seconds.
 - 7. Identify all markings, where appropriate, by painting the identification directly onto the track surface in 4 inch (10.16 cm) letters just below or in front of each mark in the right hard portion of the lane.
 - 8. Paint all the large 3 feet (91.4 cm) high lane numbers, 4 sets in custom font, as shown in Drawings.
 - 9. All lines shall receive sufficient paint to assure complete opacity and uniformity of color.
 - 10. Paints shall be used directly from original containers and shall be thinned only when hot weather dictates some thinning for purposes of smooth application.
 - 11. Amount of paint used shall be as recommended by the manufacturer.
 - 12. Competent, experienced and fully qualified personnel shall make all measurements.
 - 13. Upon completion of the track markings, a licensed professional engineer, registered land surveyor or certified track builder shall furnish an acceptable letter of, or certificate of, accuracy to the owners attesting to the accuracy of the track markings and measurement and shall include copies of the computations, calculations and drawings that were used to

obtain this accuracy. The engineer or surveyor should affix his stamp to the drawing and the certificate.

14. The marking shall include all the events and marks required or recommended for the following track events:

- a. 100 meter dash (2)
- b. 200 meter dash
- c. 400 meter run
- d. 800 meter run
- e. 1500 meter run
- f. 3000 meter run
- g. 5000 meter run
- h. One mile run
- i. Two mile run
- j. 75 meter hurdles (boys/girls)
- k. 100 meter hurdles (girls)
- l. 110 meter high hurdles (boys)
- m. 300 meter hurdles
- n. 400 meter intermediate hurdles (lines to be dotted in)
- o. Shuttle hurdles (boys/girls)
- p. 400 meter relay
- q. 800 meter relay
- r. 1600 meter relay
- s. 3200 meter relay
- t. Practice starts at the far end of each straightaway
- u. Long/Triple Jump
- v. Pole Vault

- D. Coordinate all line markings with Landscape Architect/Civil Engineer and Owner prior to installation.

3.05 CLEAN UP AND MAINTENANCE

- A. Upon completion of the work, the Contractor shall remove all containers, surplus materials and debris. The site will be left in a clean orderly manner acceptable to the Owner and Landscape Architect/Civil Engineer.
- B. Upon completion of the work, provide the owner with maintenance requirements for the track surface.

END OF SECTION

SECTION 32 18 23.53
TENNIS COURT SURFACING

PART 1 - GENERAL

2.01 GENERAL REQUIREMENTS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 00 00 – GENERAL REQUIREMENTS, which are hereby, made a part of this Section of the Specifications.
- B. Examine all other Sections of the Specifications for requirements that affect work of this Section whether or not such work is specifically mentioned in this Section.
- C. Coordinate work with trades affecting, or affected by, work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

2.02 WORK INCLUDED

- A. Perform all work required to complete the work of the Section, as indicated. Such work includes, but is not limited to, the following:
 - 1. Tennis Court Surfacing

2.03 RELATED WORK UNDER OTHER SECTIONS

- A. Athletic Equipment
- B. Bituminous Concrete Pavement
- C. Chain Link Fence and Gates
- D. Loam and Seed

2.04 REFERENCES

- A. Work shall conform to codes and standards of the following:
 - 1. American Sports Builders Association (ASBA).
 - 2. United States Tennis Association (USTA)

2.05 SUBMITTALS

- A. Manufacturer's product data shall be submitted for all surfacing and repair materials and application methods. The submittal shall include information on all materials proposed as well as the typical layer section of materials including acrylic binder, cushioned filler coats as required, finish coatings and line paints.

2.06 QUALITY ASSURANCE

- A. An experienced specialty firm that shall have surfaced a minimum of fifteen (15) courts in the last year shall perform court surfacing. Firm shall submit references.

PART 2 - PRODUCTS

3.01 COURT SURFACING MATERIAL

- A. The surfacing shall be a minimum four coat, 100% acrylic latex-type system containing no asphalt or tar emulsions and no vinyls, alkyds, or non-acrylic resins equivalent to "Plexipave Plexi Hardcourt System", as manufactured by California Products Corp., Andover, MA 01810 or "Laykold Color Flex System as manufactured by Advanced Polymer Technology Corp. 109 Conica Lane PO Box 160, Harmony, PA 16037.
- B. Tennis court surfacing system shall be a flexible option for use over bituminous concrete pavement.
- C. No color finish system shall be approved as an equal that does not contain factory mixed compositions requiring the addition of water only, on the site. The materials shall be delivered to the site in sealed, properly labeled containers.
- D. Colors (up to two (2)) for the surfacing shall be selected by the Owner's Representative from among the manufacturer's standard range of colors. The filler coats shall have the same color as the final finish coat. The filler coats shall provide uniformity of texture and depth of color to provide a non-slippery and non-shining playing surface of uniform color for not less than three years of intensive use as a recreational surface.
- E. The manufacturer shall guarantee the material for one year from date of finished application against chalking, checking, fading, discoloration, or other adverse effects from ultraviolet rays of the sun; from weather moisture, or from weather temperatures. The Contractor and the manufacturer shall provide jointly such written assurances as are satisfactory to the Owner's Representative that their materials and application will provide this performance.

PART 3 – EXECUTION

4.01 COURT SURFACING INSTALLATION

- A. Final Surface Inspection. Prior to surfacing, the bituminous concrete pavement shall be allowed to cure for a minimum of 14 days. The surface shall be flooded with water and allowed to drain. Any depressions holding water deeper than 1/16 in. shall be adjusted and leveled in accordance with recommendations of the manufacturer of the surfacing material specified hereinafter. Start of color surfacing application shall constitute acceptance of the surface to receive color surfacing.
- B. Application of the color finish course shall occur only after the surface is thoroughly dry. The color finish material shall be applied to the surface course areas in multiple applications in the selected and approved colors as selected by the Owner's Representative so as to form a true, uniform surface texture and color. Application work shall be performed by skilled mechanics in a workmanlike manner in accordance with the manufacturer's standard printed instructions; however, no work shall be performed when rain is imminent or when the temperature is below 55 degrees F.

- C. Apply multiple Filler Coats in accordance with the manufacturer's directions for a total thickness of 1/16 in. If the surface is not covered to a uniform, even texture, free of all porosity, another filler coat shall be applied to attain uniformity. The first coat shall be applied lengthwise on the surface, and the second coat, crosswise. Dilution rate shall not exceed 1 part water to 2 parts Filler Coat.
- D. Prior to applying the Finish Coat, a final, careful inspection of the entire surface shall be made to remove any ridges, loose, or foreign particles.
- E. Finish Coat shall be squeegee applied as directed by the manufacturer at a rate of not less than 0.04 gallons of material per square yard (30 gallons per 800 square yards). The application shall be made lengthwise on the surface and shall produce a uniform color throughout when viewed from a distance of 25 ft. from any edge of the court at midday. Dilution rate shall not exceed 1 part water to 1 part Finish Coat.

4.02 TENNIS COURT LINES

- A. Tennis court playing lines shall not be more than 2" wide, accurately located and marked in accordance with the United States Tennis Association (USTA). At no time shall the playing lines vary more than 1/4" from exact dimensions.
- B. In addition to the 78 foot tennis court lines, each tennis court shall have two (2) pickle ball courts painted dark gray, totaling ten (12) pickle ball courts. Refer to the Drawings for the layouts of these courts.

END OF SECTION

**SECTION 32 31 13
CHAIN LINK FENCES AND GATES****PART 1 - GENERAL****1.01 GENERAL REQUIREMENTS**

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 – GENERAL REQUIREMENTS, which are hereby, made a part of this Sections of the Specifications.
- B. Examine all other Sections of the Specifications for requirements that affect work of this Section whether or not such work is specifically mentioned in this Section.
- C. Coordinate work with that of all other trades affecting, or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.02 DESCRIPTION OF WORK

- A. Work Included: Perform all work required to complete the work of the Section, as indicated. Such work includes, but is not limited to, the following:
 - 1. Chain Link Fence Framework
 - 2. Chain Link Fence Fabric
 - 3. Chain Link Fence Single and Double Swing Gates
 - 4. Chain Link Fence Backstop
 - 5. Cantilever Gate
 - 6. Fence Guard
 - 7. Windscreen

1.03 RELATED WORK

- A. Site Preparation
- B. Earthmoving
- C. Cast-in-Place Concrete
- D. Athletic Ball Netting Systems

1.04 REFERENCES

- A. Work shall conform to codes and standards of the following:
 - 1. ASTM – American Society of Testing Materials
 - 2. State of Delaware Department of Transportation Standard Specifications for Road

and Bridge Construction.

1.05 LAWS, ORDINANCES, PERMITS AND FEES

A. The Contractor shall:

1. Give necessary notices, obtain all permits and pay all Government taxes, fees and other costs in connection with this work, file all necessary plans, prepare documents and obtain all necessary approvals of the local Building Departments having jurisdiction.
2. Obtain all required certificates of inspection for this work and deliver same to Owner's Representative before request for acceptance and final payment for the work.
3. Include in the work, with no additional cost to the Owner, labor, materials, services, apparatus, drawings (in addition to the Contract Drawings and Documents) in order to comply with all applicable laws, ordinances, rules and regulations, whether or not shown on the Drawings and/or specified.

1.06 QUALITY ASSURANCE

- A. Source: For each type of product required for the work of this Section, provide products of one manufacturer and source for consistency.
- B. Codes and Standards: Perform site improvement work in compliance with applicable requirements governing authorities having jurisdiction. Workmanship and finish shall be equal to the best practice of modern shops for each item of work.
- C. Qualifications of Workers: Use adequate numbers of skilled workers who are trained in the necessary crafts and who are completely familiar with the specified requirements and methods needed for proper performances of the work of this Section.
- D. The work of this Section shall be completely coordinated with the work of other Sections. Verify dimensions and work of other trades that adjoin materials of this Section before installing items specified.

1.07 SUBMITTALS

- A. Shop Drawings: Supply shop drawings at an approved scale for location, installation and erection of all parts of the work under this Section including but not limited to the following:
 1. Chain Link Fence Framework
 2. Chain Link Fence Fabric

3. Chain Link Fence Single and Double Swing Gates
 4. Cantilever Gate
 5. Chain Link Fence Backstop
- B. Product Information: Provide manufacturer’s data showing installation and limitations in use. Supply Certificates of Compliance for all materials required for fabrication and installation. Work includes but is not limited to the following items:
1. Chain Link Fence Framework
 2. Chain Link Fence Fabric
 3. Chain Link Fence Single and Double Swing Gates
 4. Chain Link Fence Backstop
 5. Cantilever Gate
 6. Fence Guard
 7. Windscreen
- C. Material Selection and Samples: Submit samples showing the complete range of colors, textures and finishes available for all components required for construction. Work includes but is not limited to the following:
1. Provide a 12” x 12” sample of fence fabric
 2. Provide a 12” section of each type of fence or gate pipe required

PART 2 - PRODUCTS

2.01 CHAIN LINK FENCE AND GATES

- A. The types of fencing required for the project are as indicated below, subject to detailed material requirements which follow.
- B. All fencing materials shall be black.
- C. All material shall be new, and products of recognized reputable manufacturers. Used, re-rolled or re-galvanized materials are not acceptable.
- D. Like items of materials provided hereinafter shall be the end products of one manufacturer in order to achieve standardization for appearance, maintenance and replacement.
- E. Fencing Fabric Wire shall conform to the following:
 1. Fabric shall be premium grade helically wound and woven steel core wire in accordance with ASTM F668 for Class 2B vinyl fabric. Color to be black.
 2. Material specifics shall be as follows:

| | Core (inches) | Wire (gauge) | Zinc (oz/S.F.) | Mesh Size |
|------------------------------------|------------------|-----------------|-------------------|--------------|
| Chain Link Fence (Backstops) | 0.192 | 6 | .30 | 1-3/4" |
| Chain Link Fence (Athletic Fields) | 0.148 | 9 | .30 | 1-1/4" |
| Chain Link Fence (General Site) | 0.148 | 9 | .30 | 2" |

3. Selvages: Fence fabric shall be knuckled selvage at top and bottom.

F. Powder coated framework shall be steel pipe – Type II: Cold formed and welded steel pipe complying with ASTM F 1043 , Group IC, with minimum yield strength of 50,000 psi (344 MPa), sizes as indicated. Protective coating per ASTM F 1043, external coating Type B, zinc with organic overcoat, 0.9 oz/S.F. (275 g/m²) minimum zinc coating with chromate conversion coating and verifiable polymer film. Internal coating Type B, minimum 0.9 oz/S.F. (275 g/m²) zinc or Type D, zinc pigmented, 81% nominal coating, minimum 3 mils (0.08 mm) thick. Color to be black.

1. Schedule of pipe sizes shall be as follows:

| Application | Height (feet) | Outside Dimensions (inches) | Weight (lbs/foot) |
|-------------------------|------------------|--------------------------------|----------------------|
| Terminal / Corner Posts | 6' or less | 2.375 | 3.67 |
| | +6ft – 8ft | 2.875 | 4.64 |
| | +8ft – 12ft | 4.00 | 9.11 |
| | +12ft – 30ft | 6.625 | 19.92 |
| Line Post | 6ft or less | 1.90 | 2.28 |
| | +6ft – 8ft | 2.375 | 3.12 |
| | +8ft – 12ft | 2.875 | 4.64 |
| | +12ft – 30ft | 6.625 | 19.92 |
| Rails and Braces | (all heights) | 1.66 | 1.84 |

2. Post tops shall be provided with post caps which fit securely and exclude moisture.

3. Top Rails shall have lengths no less than eighteen feet (18'-0") and shall be fitted with minimum six inches (6") long outside sleeved or internally swaged couplings for connecting the lengths into a continuous run. Provide top rail with pass-through fittings at line posts and rail end cups and brace bands at terminal or gate posts.

4. Middle and Bottom Rails shall be properly secured to line posts with steel boulevard clamps, and to terminal, corner, gate or pull posts with rail end cups and brace bands.

5. Brace Rails shall be provided for each terminal post with fabric height of six feet or more. Extend brace to each adjacent post at approximate mid-height of fabric and secure with rail end cups and brace bands.

G. Fence fittings and accessories shall be fabricated of steel or cast iron and shall conform to minimum requirements of ASTM F-626, and as below. Following fabrication and

galvanizing, all fence fittings shall receive a 10 to 14 mil thick fusion bonded vinyl coating to match fabric color. With the exception of field painting for nuts and bolts, no painted fittings will be accepted.

1. Stretcher Bars shall not be less than three sixteenth's (3/16") of an inch by three quarter's of an inch (3/4") and not less than 2 inches shorter than the nominal height of the fabric with which they are to be used. One stretcher bar shall be provided for each end and gate post, and two for each corner and pull post.
2. Fabric connectors shall be provided in sufficient number for attaching the fabric to all line posts at intervals not exceeding twelve inches (12"); and not exceeding twelve inches (12") when attaching fabric to top or bottom rail. Connectors shall be galvanized with a min. 0.8 oz/S.F. coating of zinc.
3. Unless designated otherwise on the details, tie wires shall be fabricated from rolled 9 gauge wire stock which has been cut to required lengths for hand-twisted connections at the site. Color to be black.
4. Tension Bands shall be provided in sufficient number for attaching the fabric and stretcher bars to all terminal posts at intervals not exceeding twelve inches (12"). Tension bands shall have a minimum thickness after galvanizing of 0.078 inch; and minimum width of three quarters of an inch (3/4") for posts four inches (4") O.D. or less; and 0.108 inch thickness by seven eighths of an inch (7/8") for posts larger than four inches (4") O.D. Brace bands shall be formed from flat or beveled steel and shall have a minimum thickness of 0.108 inch after galvanizing; and a minimum width of three quarters of an inch (3/4"). Attachment bolts shall be five sixteenths of an inch (5/16") by one and one quarter of an inch (1 1/4") galvanized carriage bolts with nuts, ASTM A-307, Grade A.
5. Other hardware required shall be fabricated from steel, and galvanized in accordance with ASTM A123 and/or ASTM A153.

H. Chain Link Swing Gates:

1. Fabricate chain link swing gates in accordance with ASTM F 900 using galvanizing two inch (2") steel tubular members weighing 2.60 lb/ft. Fusion or stainless steel welded connections forming rigid one-piece unit. Frames shall be thermally fused after fabrication with minimum 10 mils per ASTM 1043. Coating before fabrication will not be allowed.
2. Chain link fabric for gates shall match fabric or fencing.
3. Gate posts shall be steel pipe – type II finished to match fence posts:

| | Post Size (inches) | Weight (lb/ft.) |
|-----------------------|-----------------------|--------------------|
| Double Leaf Gates | 2.875 | 5.79 |
| 8ft wide or less | 2.875 | 5.79 |
| Greater than 8ft wide | 4.00 | 9.11 |

4. Gate hinges shall be heavy-duty offset type. Install gate for 180-degree outward operation. Hinges shall have large bearing surfaces for clamping in position. The hinges shall not twist or turn under the action of the gate. The gates shall be capable of being opened and closed easily by the person.
5. All gate hinge posts shall be terminal posts.
6. All gates shall be equipped with a positive closure latch and padlock fitting.
7. Double gates shall be equipped with a drop rod to hold the inactive leaf. Provide gate stop pipe to engage center drop rod. Provide locking device and padlock eyes

as an integral part of the latch, requiring one pad lock for locking both leaves.

2.02 CANTILEVER GATE

A. Cantilever gates shall be single and double cantilever slide gates with all materials powder coated black. Refer to Drawings for style, quantity, and locations.

B. Fencing Fabric Wire shall conform to the following:

1. Fabric shall be premium grade helically wound and woven steel core wire in accordance with ASTM F668 for Class 2B vinyl fabric. Color to be black.
2. Material specifics shall be as follows:

| | Core (inches) | Wire (gauge) | Zinc (oz/S.F.) | Mesh Size |
|------------------|------------------|-----------------|-------------------|--------------|
| Chain Link Fence | 0.148 | 9 | .30 | 1-1/4" |

3. Selvages: Fence fabric shall be knuckled selvage at top and bottom.

C. Cantilever gates shall be as detailed per approved Shop Drawings.

2.03 FENCE GUARD

A. Fence Guard shall be furnished and installed at all new Baseball and Softball Fencing. Refer to Drawings and Details.

B. Fence Guard shall include the following:

1. Fence Guard shall be 5 1/12" high x 2 3/4" wide coming in 8' long sections and be equivalent to Safety Top Cap as manufactured by Pexco Athol of Athol, MA, 800-755-7528.
2. Color to be white in fair territory at Softball; Yellow in fair territory at Baseball. Color shall be black everywhere else.

2.04 FENCE WINDSCREEN

A. Windscreens shall be vinyl coated polyester mesh windscreen, Model VCP6DG as manufactured by Sportsfield Specialties, Inc., 41155 State Highway 10, Delhi, NY 13753, (607) 746-1460.

B. Height of windscreens shall be custom, as described in the Project Drawings.

C. Color to be selected by Owner from manufacturer's standard colors.

D. Gate panels shall have individual sections of windscreen.

E. Windscreen shall receive custom printed graphics. Contractor shall carry costs for printed graphics on 25% of the proposed Windscreen. Graphic files will be provided to the Contractor upon request.

PART 3 EXECUTION

3.01 CHAIN LINK FENCE AND GATES

- i. General: Unless modified herein, installation of fencing shall meet the requirements of ASTM F567. Erect fencing in straight lines between angle points by skilled mechanics experienced in this type of construction.
- ii. Post Holes: Post holes for line posts shall be excavated to a minimum size of fifteen inches by sixty inches (15"x60"). For fences six feet (6'-0") and taller post holes shall be excavated to a minimum size of eighteen inches by forty-eight inches (18"x48"). Post holes for terminal or gate posts shall have a minimum diameter of eighteen inches (18"), by respective depths as specified.
 1. Backfill concrete to within six inches (6") of finished grade and crown top to shed water.
 2. Set posts and sleeves with plumb vertical alignment.
- iii. Space posts in the fence line equally with the maximum spacing shown on Drawings.
- iv. Provide corner or pull posts at maximum intervals of two-hundred fifty feet (250'-0") O.C., and for any change in direction of 15-degrees or more, and for any abrupt change in grade, with bracing in both directions.
- v. Hanging Fabric:
 1. Fasten chain link fence fabric to terminal posts, and gate posts with tension bars and connector bands.
 2. Fasten chain link fence fabric on field / track side.
 3. Fence fabric shall be secured to all rails and to posts that are not terminal, or gate with wire ties at specified spacing. Tie down wire shall be woven through the fence fabric, completely around the rail and wire shall be twisted securely with three twists on the rail side of the fence and the tails of the wire cut off to preclude untwisting by hand. Twisted tie wire ends shall be turned under at horizontal rails and turned down at vertical rails to reduce potential for human contact.
 4. Stretch fabric as tightly as possible without pulling the material out of shape. Top of fabric shall be parallel with top rail.
- vi. Testing of Fence Fabric: Each fence panel shall be constructed such that it will pass the following test. Deflection of fence fabric shall be no greater than 2 inches (2") when a force of 30 pounds is applied in the center of the panel, perpendicular to the plane of the fence fabric. Fabric shall return to original position when force is released.
- vii. Gates: Install gates in conformance with specification and detail requirements. Test swing and latch and adjust as necessary for proper operation.

END OF SECTION

SECTION 33 40 10
ATHLETIC STORM DRAINAGE SYSTEM

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 00 00 - GENERAL REQUIREMENTS, which are hereby, made a part of this Section of the Specifications.
- B. Examine all other Sections of the Specifications for requirements, which affect work of this Section whether or not such work is specifically mentioned in this Section.
- C. Coordinate work with that of all other trades affecting, or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.
- D. Provide all facilities, labor, materials, tools, equipment, appliances, transportation, supervision, and related work necessary to complete the work specified in this section, and as shown on the Drawings

1.02 WORK INCLUDED

- A. Athletic field storm drainage piping, fittings and accessories, and bedding
- B. Infilled synthetic turf underdrain system
- C. Channel and Slot Drains
- D. Cleanouts
- E. Track Drainage Manholes

1.03 RELATED WORK UNDER OTHER SECTIONS

- A. Carefully examine all of the Contract Documents for requirements which affect the work in this section. Other specification sections which directly relate to the work of this section include, but are not limited to, the following:
 - 1. Cast-in-place Concrete
 - 2. Bituminous Concrete Paving
 - 3. Infilled Synthetic Turf System
 - 4. Resilient Track Surface

1.04 REFERENCES

- A. References herein to any technical society, organization, group or body are made in accordance with the following abbreviations and, unless otherwise noted or specified, all work under this Section shall conform to the latest edition as applicable:
 - 1. ASTM American Society for Testing and Materials
 - 2. ACI American Concrete Institute
 - 3. ANSI American National Standards Institute
 - 4. AASHTO American Association of State Highway and Transportation Officials
 - 5. The State of Delaware Department of Transportation Standard Specifications for Road and Bridge Construction
- B. All work shall comply with the pertinent standards of the latest editions of the following Codes and Specifications, unless designated otherwise herein:
 - 1. American Society for Testing and Materials (ASTM), 1916 Race Street, Philadelphia, PA 19101.
 - 2. American National Standards Institute (ANSI), 1430 Broadway, New York, NY 10018.

3. American Association of State Highway and Transportation Officials (AASHTO), 341 National Press Building, Washington, D.C. 20004.

C. The following standards and definitions are applicable to the work of this Section to the extent referenced herein:

1. ASTM A48 Standard Specification for Gray Iron Castings
2. ASTM C32 Standard Specification for Sewer and Manhole Brick
3. ASTM C55 Standard Specification for Concrete Brick
4. ASTM C62 Standard Specification for Building Brick
5. ASTM C76 Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
6. ASTM C139 Standard Specification for Concrete Masonry Units for Construction of Catch Basins and Manholes
7. ASTM C270 Standard Specification for Mortar for Unit Masonry
8. ASTM C443 Joints for Circular Concrete Sewer and Culvert Pipe, using Rubber Gaskets.
9. ASTM C 478 Standard Specification for Precast Reinforced Concrete Manhole Sections
10. ASTM C923 Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals
11. ASTM D1557 Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures using 10 lb. (4.54 kg) Rammer and 18 inch (457 mm) Drop.
12. ASTM D2729 Polyvinyl Chloride (PVC) Sewer Pipe and Fittings.
13. ASTM D2321 Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
14. ASTM D3350 Standard Specification for Polyethylene Plastics Pipe and Fittings Materials

1.05 SCHEDULING

A. The Contractor shall submit to the Landscape Architect/Civil Engineer, for approval by the Owner, a progress schedule as specified in the GENERAL CONDITIONS. All schedules shall be reviewed by the Contractor with the Owner for compliance with street opening and Town Engineering Department requirements.

1.06 SUBMITTALS FOR REVIEW

A. Product Data: Provide data indicating pipe and pipe accessories, manholes, catch basins, outlet control structures, clean-outs, frames, grates and covers, and all other pertinent information and equipment to be used.

1.07 SUBMITTALS FOR INFORMATION

A. Manufacturer's Instructions: Indicate special procedures required to install products specified.

B. Certificates: Certify that products meet or exceed specified requirements.

1.08 SUBMITTALS AT PROJECT CLOSEOUT

A. Accurately record actual locations, both horizontally and vertically, of pipe runs, connections, catch basins, all manholes, stormwater treatment system structures,

stormwater detention/recharge systems, and other stormwater infrastructure.

- B. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.09 REGULATORY REQUIREMENTS

- A. All work under this Section of the Specifications shall be installed in accordance with the Laws, Ordinances, Rules and Regulations of all Local, State and Federal authorities having jurisdiction, the Rules and Regulations of the National Board of Fire Underwriters, and the Public Utility Companies.

1.10 COORDINATION

- A. Coordinate work under provisions of the applicable Sections of these Specifications.

1.11 EXAMINATION OF CONDITIONS

- A. The Contractor shall fully inform himself of existing conditions of the site before submitting his bid, and shall be fully responsible for carrying out all site work required to fully and properly execute the work of the Contract, regardless of the conditions encountered in the actual work. No claim for extra compensation or extension of time will be allowed on account of actual conditions inconsistent with those assumed, except those conditions described in the GENERAL CONDITIONS.

1.12 DELIVERY, STORAGE AND HANDLING

- A. All materials furnished under this section shall be delivered to the job adequately protected from damage during transit. Pipes shall not be dropped. All pipes shall be examined before laying and no piece shall be installed which is found to be defective.
- B. Pipe and other appurtenances, which are defective from any cause, including damage caused by handling, and determined by the Engineer irreparable shall be unacceptable for installation and shall be replaced at no cost to the Owner.
- C. Storage and handling of pipes, pre-cast structures and other storm drainage appurtenances shall be in accordance with the manufacturer's recommendations, subject to the approval of the Engineer.

PART 2 - PRODUCTS

2.01 ATHLETIC FIELD STORM DRAIN PIPE MATERIALS

- A. High Density Corrugated Polyethylene Pipe: Pipe shall have a full circular cross section with an outer corrugated pipe wall and a smooth inner wall. Pipe shall be Hancor “HI-Q” pipe, ADS N-12, Prinsco “Goldflo” dual-wall pipe, or approved equal. Pipe manufactured for this specification shall comply with the requirements for test methods, dimensions and markings found in AASHTO Designations M252, and M294. Pipe shall be made from virgin PE compounds which conform to the applicable current edition of the AASHTO Material Specifications for cell classification as defined and described in ASTM D 3350.

- 1. Joints and Fittings: Standard 45 Degree “Y” connections, tees, bends, and other fittings shall be fabricated to sizes shown on the drawings. Coupling Bands shall be per manufacturer’s specifications. Couplers shall cover not less than one corrugation on each section of pipe. Fittings shall be made from virgin PE

compounds which conform to the applicable current edition of the AASHTO Material Specifications for cell classification as defined and described in ASTM D 3350.

- 2.02 FLAT PANEL DRAIN PIPES (WITHIN INFILLED SYNTHETIC TURF SYSTEM PROFILE)
- A. Flat Panel Drains shall be perforated pipes equivalent to the 12” AdvanEDGE pipe by ADS-Pipe, the 12” Multi-Flow drain by Multi-Flow Drain Systems, or approved equal.
 - 1. All fabric shall be removed from the pipes prior to installation.
 - 2. All fittings and couplings shall be manufactured by the same approved manufacturer to ensure proper connections between systems.
- 2.03 CHANNEL DRAIN – TYPE 1 (NEUTRAL)
- A. Channel drain around the inside edge of the track shall be ACO Sport Model 4030 (12.26” depth) Channel Drain System as manufactured by ACO Polymer Products, or approved equal. It is intended that the channel drain is neutral.
 - B. The channel drain system bodies shall be manufactured from polymer concrete minimum properties as follows:
 - 1. Compressive strength: 14,000psi.
 - 2. Flexural strength: 3,000psi.
 - 3. Water absorption: 0.1%
 - C. Channel Profile shall include positive interlocking tongue and groove connections that can be sealed to provide watertight connections. Each pre-cast polymer concrete one meter unit shall be an open U-shaped channel to accept a grate 4.84” wide.
 - D. Grates shall be ADA black plastic, polypropylene, as manufactured by ACO Polymer Products, or approved equal.
 - E. Channel drain in-line catch basins shall be Part No. 05620 as manufactured by ACO Polymer Products, or approved equal.
- 2.04 SLOT DRAIN
- A. Slot Drain shall be System 2000 Channels Part 00784 (straight) and Part 00786 (radius) as manufactured by ACO Polymer Products, or approved equal.
 - B. The slot drain system bodies shall be manufactured from polymer concrete minimum properties as follows:
 - 1. Compressive strength: 14,000psi.
 - 2. Flexural Strength: 3,000psi.
 - C. Channel Profile shall include positive interlocking tongue and groove connections that can be sealed to provide watertight connections. Each pre-cast polymer concrete one meter unit shall have a 0.5” longitudinal evacuation slot.
 - D. Slot drain in-line catch basins shall be Part No. 05620 as manufactured by ACO Polymer Products, or approved equal.
- 2.05 CHANNEL DRAIN – TYPE 2 (SLOPED)
- A. Channel drain in front of the varsity baseball and softball dugouts shall be ACO Sport Model 4000 Channel Drain System as manufactured by ACO Polymer Products, or approved equal. It is intended that the channel drain utilize both neutral and sloped bodies.

- B. The channel drain system bodies shall be manufactured from polymer concrete minimum properties as follows:
 - 1. Compressive strength: 14,000psi.
 - 2. Flexural strength: 3,000psi.
 - 3. Water absorption: 0.1%
- C. Channel Profile shall include positive interlocking tongue and groove connections that can be sealed to provide watertight connections. Each pre-cast polymer concrete one meter unit shall be an open U-shaped channel to accept a grate 4.84" wide.
- D. Grates shall be ADA black plastic, polypropylene, as manufactured by ACO Polymer Products, or approved equal.
 - 1. Channel drain in-line catch basins shall be Part No. 05620 as manufactured by ACO Polymer Products, or approved equal.

2.06 CLEANOUT

- A. Cast iron frames and covers shall conform to ASTM A48, latest issue, Class 30.
 - 1. Provide concrete collars as shown on the Drawings

2.07 TRACK DRAINAGE MANHOLES

- A. Track Drainage Manholes shall be equivalent to the 12" Nyloplast Custom Drain Basin by ADS-Pipe.
 - 1. Each basin shall have a 24" sump below the outlet invert.
 - 2. Provide a round ductile solid iron cover meeting H-20 load requirements.
 - 3. Provide a concrete collar at all basins.

2.08 BEDDING AND COVER MATERIALS

- A. Bedding: Crushed stone as specified in Section EARTHWORK.
- B. Cover: Gravel as specified in Section EARTHWORK.

PART 3 - EXECUTION

3.01 GENERAL:

- A. The bedding for the Pipe shall be shaped to conform reasonably close to the lower 10% of the pipe and recesses excavated for bells of bell and spigot pipes. All pipe shall be laid to the specified line and grade, with a firm bearing throughout each length and with bell ends uphill.
- B. Drainage pipe shall be backfilled with gravel having no stone greater than 3 inches unless otherwise noted on plans.
- C. The joint of reinforced concrete pipe shall be thoroughly cleaned and wetted with water before being joined. Reinforced concrete pipe shall be joined using a flexible water tight rubber gasket conforming to ASTM C443 and the filling the joint be completed with cement mortar. Any alternative joint design must be pre-approved by the Landscape Architect/Civil Engineer. The invert shall be kept smooth and free of obstructions.
- D. The drain trench shall be excavated to the depth designated on the plans or, if directed, to a stratum of impervious material.
- E. The excavation shall proceed in advance of the actual drain construction only to the extent the Landscape Architect/Civil Engineer direct.
- F. Where rock is encountered in the excavation, no part of any rock remaining in the trench shall come within six inches of any portion of the pipe.

| | | |
|---|--|-------------------------------|
| Summit Campus Middle and High School | | Appoquinimink School District |
|---|--|-------------------------------|

- G. Joints shall be grouted or sealed when using reinforced concrete pipe and corrugated plastic pipe shall be firmly joined with an approved coupling.
- H. The Contractor shall be responsible for keeping the backfill material clean and free of objectionable material from a line one inch below the flow line of the pipe to the top of the trench.
- I. Existing drainage infrastructure is to be field cored with the proper equipment approved and satisfactory to the Landscape Architect/Civil Engineer. Contractor shall confirm the invert of the proposed tie-in prior to beginning drainage excavations.
- J. Removal and disposal of the existing drain pipe within the trenching area of proposed pipe shall be included in contract unit price per foot of kind of pipe at no additional compensation to the Contractor.
- K. Removal and disposal of the existing drain pipe outside of the trenching area of proposed pipe shall be excavated and completely removed then backfilled and compacted with the proper material.

3.02 EXAMINATION

- A. Verify that trench cut and excavation base is ready to receive work and excavations, dimensions and elevations are as indicated on drawings.

3.03 PREPARATION

- A. Hand trim excavations to required elevations. Correct over excavation with coarse aggregate.
- B. Remove large stones or other hard matter which could damage piping or impede consistent backfilling or compaction.

3.04 BEDDING

- A. Excavate pipe trench in accordance with Section 02200 for work of this Section. Hand trim excavation for accurate placement of pipe to elevations indicated.
- B. Place bedding material at trench bottom, level materials in continuous layer not exceeding 6 inches compacted depth
- C. Maintain optimum moisture content of bedding material to attain required compaction density.

3.05 INSTALLATION - PIPE

- A. Install pipe, fittings and accessories in accordance with applicable standards and manufacturer's instructions. Seal joints watertight.
- B. Place pipe on bedding to depths indicated on drawings. Notch under pipe bells and joints, where applicable to provide for uniform bearing under entire length of pipe.
- C. Lay pipe to slope gradients noted on drawings with maximum variation from true slopes of 1/8 inch per foot.
- D. Install bedding at sides and over top of pipe. Provide top cover to minimum compacted thickness as indicated on drawings. Compact to 95%.
- E. Refer to EARTHWORK Section for trenching, bedding, backfilling and compaction requirements. Do not displace or damage pipe when compacting.

3.06 INSTALLATION - SYNTHETIC TURF FIELD UNDERDRAINS

- A. Underdrains shall be installed in accordance with the details on the Contract Drawings and the manufacturer's instructions and recommendations

- B. Reminder to remove all fabric from the pipes prior to installation.

3.07 CHANNEL DRAINS AND SLOT DRAINS

- A. Channel drains, grates, and in-line catch basins shall be installed in accordance with the details on the Contract Drawings and the manufacturer's instructions and recommendations.
- B. Where the channel drain transitions to a slot drain, there shall be an in-line catch basin and the top elevation of the slot drain shall be ½" lower than the top elevation of the channel drain. Refer to drawings for locations of additional in-line catch basins and drain elevations.
- C. The top elevations of the channel drains shall be uniform and as indicated on the Drawings. Prior to encasing the channel drains with concrete, Contractor shall provide to the Landscape Architect/Civil Engineer a shop drawing for review providing spot elevations every 39.37" (at the joint where the channel drain and slot drains meet. Any channel drain drains out of tolerance to the design grade shall be modified prior to encasing with concrete.

3.08 CLEANOUTS

- A. Cleanouts shall be installed in accordance with the details on the Contract Drawings and the manufacturer's instructions and recommendations.

3.09 CLEANING

- A. At the completion of the work, clean all piping, structures, as well as open drainage courses through and to which water from this construction is directed to the satisfaction of the Landscape Architect/Civil Engineer.

3.10 PROTECTION

- A. Protect finished work under provisions of applicable sections of these specifications.
- B. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.

END OF SECTION