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SPECIAL CONDITIONS

1. The Contractor assumes all responsibilities for project delivery. The Work shall be conducted in one phase. All work shall be substantially complete and ready for certification of completion by **August 1, 2025**.
2. The Contractor is responsible for hiring, scheduling, and paying for all third-party testing requirements.
3. The Contractor shall coordinate with the utility owners to be aware of all utilities (public and private) located within the project area prior to construction including the underground utilities for sport field lighting, play clocks, irrigation etc which run through the project area. The Contractor is responsible for all utility locates, protective measures and relocations as needed. The Contractor is responsible for all damaged utilities and will need to repair per code at their expense.
4. The Contractor must maintain the operating irrigation system outside of the field demolished field area if the field irrigation is tied to the adjacent landscape irrigation.
5. If unforeseen subsurface conditions are found, this shall be documented by the third-party geotechnical engineer, estimated and quantified. Unforeseen subsurface condition remediation shall be paid for by the owner as an addition to the bid amount.
6. The Contractor shall maintain on file at the job site, copies of all permits and approvals for the project.
7. The contractor is responsible for all erosion control measures on site.
8. If traffic control is needed, it shall be provided by the contractor at their expense.
9. The contractor is responsible for establishing finish grades for all work and ensuring compliance with ADA accessibility laws.
10. The contractor is responsible for ensuring the field meets all National High School Federation rules and requirements for all sports.
11. The Contractor shall be responsible for obtaining all electrical permits for the play clock installation
12. The General Contractor shall be responsible for the vertical and horizontal layout of all work and control points required to construct all work in accordance with the drawings and specifications.
13. After reviewing the bid documents and prior to bidding, all Contractors must physically inspect the high school T&F facility to fully understand the existing conditions and scope of work required at each facility.
14. The contractor may stock pile and reuse the existing track base material to meet the full depth gravel base requirements.

SECTION 01 10 00

SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Work covered by the Contract Documents.
 - 2. Type of Contract.
 - 3. Work phases.
 - 4. Work under other contracts.
 - 5. Use of premises.
 - 6. Owner's occupancy requirements.
 - 7. Specification formats and conventions.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

- A. Project Identification: Butler High School Synthetic Turf and Track Renovations
 - 1. Project Location: 1810 Matthews Mint Hill Road, Matthews NC

- B. Owner: Charlotte-Mecklenburg Schools (CMS)
Owner's Representative:

Brandon Barnhill
Project Manager
CMS
brandon1.barnhill@cms.k12.nc.us

The work of this contract includes but is not limited to the construction of a new asphalt running track and field events, synthetic turf football field, chain link fencing, hardscape, site work, stormwater infrastructure, utility protection, erosion control, please review the plan documents to see all the work to be completed.

- 1. Contractor shall furnish all material, labor, tools, supplies, equipment, transportation, temporary construction of every nature, insurance, taxes, contributions and all services and facilities, unless specifically excepted, and install all materials, items and equipment required to complete the construction of the Project, as set forth in the Contract.
- 2. Coordination of owner provided and owner installed equipment. General Contractor shall coordinate all trades with owner's contractor for these items.
- 3. The General Contractor shall act as the Project Expediter and be responsible for coordinating the work and schedules of other trades.

1.4 TYPE OF CONTRACT

- A. Project will be constructed under a single prime contract.

1.5 WORK PHASES

- A. The Work shall be conducted in one phase. All work shall be substantially complete and ready for certification of completion by August 1, 2025

1.6 USE OF PREMISES

- A. All construction activities shall be coordinated with the Town of Davidson.
- B. Use of Site: Limit use of premises to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
 - 1. Limits: Confine construction operations to all fill and cut areas associated with the project and generally 10 feet outside of this for constructability.
 - 2. Driveways and Entrances: Keep all construction access and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

1.7 SPECIFICATION FORMATS AND CONVENTIONS

- A. Specification Format: The Specifications are organized into Divisions and Sections using the 50-division format and CSI/CSC's "MasterFormat" numbering system.
 - 1. Section Identification: The Specifications use Section numbers and titles to help cross-referencing in the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete because all available Section numbers are not used. Consult the table of contents at the beginning of the Project Manual to determine numbers and names of Sections in the Contract Documents.
 - 2. Division 01: Sections in Division 01 govern the execution of the Work of all Sections in the Specifications.
- B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
 - 1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.
 - 2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.
 - a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 23 00

ALTERNATES

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide all labor, materials, necessary equipment and services to complete the Alternates work, as indicated on the drawings, as specified herein or both. Contractors are responsible for payment of all applicable fees and taxes in association with their contract.

1.2 USE OF ALTERNATES

- A. Submit alternate/base bid proposals as described herein and in the "Bid Form" stating the total difference in cost to the stipulated Lump Sum Bid for adding or deducting the following alternates to that specified and/or shown on the drawings.
 - 1. Include all applicable omissions, additions, and adjustments of all other applicable trades as required.

PART 2 - PRODUCTS

2.1 SCHEDULE OF ALTERNATES

- A. **Alternate No. 1:** Provide a resilient underlayment pad and 2" pile height turf in lieu of the 2.25 pile height turf and no pad system. Adjust subgrade by the depth by 1 inch to accommodate the pad thickness.
- B. **Alternate No. 2:** T&F Loose Equipment
 - 1. Sportsfield Specialties products are the basis of design.
 - 2. Pole Vault:
 - a. One (1) Durazone National Pole Vault Landing Pad (21'-6" W x 24'-0" L x 30" H – 16'-10" behind vault box), Model PV2224HDZ (this includes the Vault Box Safety Collar)
 - b. One (1) All weather cover for this landing pad.
 - c. One (1) Adjustable Pole Vault Standards (5' to 17") with Angled Base Protector Pads, Model PVS0517
 - d. Two (2) pole vault cross bars.
 - 3. High Jump:
 - a. One (1) Durazone high jump landing pad (10' x 18' x 28"), Model HJ1810DZ.
 - b. One (1) All weather cover for high jump landing pad (10' x 18' x 28"). Model HJ1810AWC

- c. One (1) set of adjustable high jump standards (2' to 8" tall), Model HJS0208.
- d. Two (2) high jump cross bars (4m long), Model HJX.

END OF SECTION

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all Divisions of the Technical Specifications, apply to this Section

1.2 SUMMARY

- A. This Section includes requirements for temporary facilities and controls, including temporary utilities, support facilities, and security and protection facilities
- B. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- C. Temporary utilities include, but are not limited to, the following:
 - 1. Sewers and drainage.
 - 2. Water service and distribution.
 - 3. Sanitary facilities, including toilets, wash facilities, and drinking-water facilities.
 - 4. Heating and cooling facilities.
 - 5. Ventilation.
 - 6. Electric power service.
 - 7. Lighting.
 - 8. Telephone service.
- D. Support facilities include, but are not limited to, the following:
 - 1. Temporary roads and paving.
 - 2. Dewatering facilities and drains.
 - 3. Project identification and temporary signs.
 - 4. Waste disposal facilities.
 - 5. Field offices as required.
 - 6. Storage and fabrication sheds.
 - 7. Lifts and hoists.
 - 8. Temporary elevator usage.
 - 9. Temporary stairs.
 - 10. Construction aids and miscellaneous services and facilities.
- E. Security and protection facilities include, but are not limited to, the following:
 - 1. Environmental protection.
 - 2. Stormwater control.
 - 3. Tree and plant protection.
 - 4. Pest control.
 - 5. Site enclosure fence.
 - 6. Security enclosure and lockup.
 - 7. Barricades, warning signs, and lights.
 - 8. Temporary enclosures.
 - 9. Temporary partitions.
 - 10. Fire protection.

- F. Related Sections include the following:
 - 1. Division 1, of the Technical Specifications Section "Submittal Procedures" for procedures for submitting copies of implementation and termination schedule and utility reports.
 - 2. Division 1, of the Technical Specifications Section "Execution Requirements" for progress cleaning requirements.

1.3 DEFINITIONS

- A. Permanent Enclosure: As determined by Consultant, permanent or temporary roofing is complete, insulated, and weather tight; exterior walls are insulated and weather tight; and all openings are closed with permanent construction or substantial temporary enclosures.

1.4 USE CHARGES

- A. General: Cost or use charges for temporary facilities are not chargeable to Owner or Consultant and shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to, the following:
 - 1. Owner's construction forces.
 - 2. Consultant.
 - 3. Testing agencies.
 - 4. Personnel of authorities having jurisdiction.
 - 5. Occupants of Project
- B. Sewer Service: Pay sewer service use charges for sewer usage, by all parties engaged in construction, at Project site.
- C. Water Service: Pay water service use charges, whether metered or otherwise, for water used by all entities engaged in construction activities at Project site.
- D. Electric Power Service: Pay electric power service use charges, whether metered or otherwise, for electricity used by all entities engaged in construction activities at Project site.
- E. Communications: Pay all charge associated with communications.
- F. Streets, Sidewalks, and Temporary Easements: Pay all charges associated with the Work where charges will occur.

1.5 SUBMITTALS

- A. Implementation and Termination Schedule: Within 15 days of date established for submittal of Contractor's Construction Schedule, submit a schedule indicating implementation and termination of each temporary utility.

1.6 QUALITY ASSURANCE

- A. Standards: Comply with ANSI A10.6, NECA's "Temporary Electrical Facilities," and NFPA 241.
 - 1. Trade Jurisdictions: Assigned responsibilities for installation and operation of temporary utilities are not intended to interfere with trade regulations and union jurisdictions.
 - 2. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.7 PROJECT CONDITIONS

- A. Temporary Utilities: At earliest feasible time, when acceptable to Owner, change over from use of temporary service to use of permanent service.
 - 1. Temporary Use of Permanent Facilities: Installer of each permanent service shall assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.
- B. Conditions of Use: The following conditions apply to use of temporary services and facilities by all parties engaged in the Work:
 - 1. Keep temporary services and facilities clean and neat.
 - 2. Relocate temporary services and facilities as required by progress of the Work.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Provide new materials. Undamaged, previously used materials in serviceable condition may be used if indicated on the plans and/or specifications. Provide materials suitable for use intended.
- B. Chain-Link Fencing: Minimum 2-inch, 0.148-inch- thick, galvanized steel, chain-link fabric fencing; minimum 6 feet high with galvanized steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top rails.
- C. Portable Chain-Link Fencing: Minimum 2-inch 9-gage, galvanized steel, chain-link fabric fencing; minimum 6 feet high with galvanized steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top and bottom rails. Provide concrete or galvanized steel bases for supporting posts.
- D. Water: Potable.

2.2 EQUIPMENT

- A. General: Provide equipment suitable for use intended.
- B. Field Offices: Prefabricated or Mobile units with lockable entrances, operable windows, and serviceable finishes; heated and air conditioned; on foundations adequate for normal loading.
- C. Fire Extinguishers: Hand carried, portable, UL rated. Provide class and extinguishing agent as indicated or a combination of extinguishers of NFPA-recommended classes for exposures.
 - 1. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure and the requirements of the local Governing agency.
- D. Self-Contained Toilet Units: Single-occupant units of chemical or aerated recirculation or combustion type; vented; fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material.
- E. Drinking-Water Fixtures: Containerized, tap-dispenser, bottled-water drinking-water units, including paper cup supply.
- F. Heating Equipment: Unless Owner authorizes use of permanent heating system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
 - 1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.

- 2. Heating Units: Listed and labeled, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use for type of fuel being consumed.
- G. Electrical Outlets: Properly configured, NEMA-polarized outlets to prevent insertion of 110- to 120-V plugs into higher-voltage outlets; equipped with ground-fault circuit interrupters, reset button, and pilot light.
- H. Power Distribution System Circuits: Where permitted and overhead and exposed for surveillance, wiring circuits, not exceeding 125-V ac, 20-A rating, and lighting circuits may be nonmetallic sheathed cable.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.
- B. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Engage appropriate local utility company to install temporary service or connect to existing service. Where utility company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with utility company recommendations.
 - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
 - 2. Provide adequate capacity at each stage of construction. Before temporary utility is available, provide trucked-in services.
 - 3. If existing easements can not be used, the Contractor shall consult and coordinate with the Consultant and Owner to secure as necessary to obtain the temporary easement. Add provisions for work not in the Contract but served by temporary facilities if required.
- B. Sewers and Drainage: If sewers are available, provide temporary connections to remove effluent that can be discharged lawfully. If neither sewers nor drainage facilities can be lawfully used for discharge of effluent, provide containers to remove and dispose of effluent off-site in a lawful manner.
 - 1. Filter out excessive soil, construction debris, chemicals, oils, and similar contaminants that might clog sewers or pollute waterways before discharge.
 - 2. Connect temporary sewers to municipal system or private system indicated as directed by sewer department officials.
 - 3. Maintain temporary sewers and drainage facilities in a clean, sanitary condition. After heavy use, restore normal conditions promptly.
 - 4. Provide temporary filter beds, settlement tanks, separators, and similar devices to purify effluent to levels acceptable to authorities having jurisdiction.
- C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction until permanent water service is in use. Sterilize temporary water piping before use.
- D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking-water fixtures. Comply with regulations and health codes for type, number, location, operation, and maintenance of fixtures and facilities.
 - 1. Disposable Supplies: Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Maintain adequate supply. Provide covered waste containers for disposal of used material.

2. Toilets: Install self-contained toilet units. Shield toilets to ensure privacy. Subparagraph below may be excessive for small- and medium-size projects.
 3. Wash Facilities: Install wash facilities supplied with potable water at convenient locations as required. Dispose of drainage properly. Supply cleaning compounds appropriate for each type of material handled.
 4. Drinking-Water Facilities: Provide drinking-water.
- E. Heating and Cooling: Provide temporary heating and cooling as required by construction activities.
- F. Electric Power Service: Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period. Include meters, transformers, overload-protected disconnecting means, automatic ground-fault interrupters, and main distribution switchgear as required.
- G. Electric Distribution: Provide receptacle outlets adequate for connection of power tools and equipment.
1. Provide waterproof connectors to connect separate lengths of electrical power cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage ratio.
- H. Telephone Service: Provide temporary telephone service throughout construction period for common-use facilities used by all personnel engaged in construction activities.
1. At each telephone, post a list of important telephone numbers in Spanish and English.
 - a. Police and fire departments.
 - b. Ambulance service.
 - c. Contractor's home office.
 - d. Consultant's office.
 - e. Engineers' offices.
 - f. Owner Representative's office.
 - g. Principal subcontractors' field and home offices.

3.3 SUPPORT FACILITIES INSTALLATION

- A. General: If required, Comply with the following:
1. Locate field offices, storage sheds, sanitary facilities, and other temporary construction and support facilities for easy access.
 2. Maintain support facilities until approved by the Consultant to be removed.
- B. Temporary Roads and Paved Areas: If applicable/as needed, construct and maintain temporary roads and paved areas to avoid damage to the site. Locate temporary roads and paved areas in same location as permanent roads and paved areas. If applicable, extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.
- C. Traffic Controls: Provide temporary traffic controls at junction of temporary roads with public roads. Include warning signs for public traffic and "STOP" signs for entrance onto public roads. Comply with requirements of authorities having jurisdiction.
- D. Project Identification and Temporary Signs: Prepare Project identification and other signs in sizes indicated. Install signs where indicated to inform public and persons seeking entrance to Project. Do not permit installation of unauthorized signs. The General Contractor shall provide one construction sign. The construction sign shall be installed within the first two weeks of construction and shall be removed when the project is substantially complete. The sign shall be as follows:
- E. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Containerize and clearly label hazardous, dangerous, or unsanitary waste materials separately from other waste. Comply with "Construction and Demolition Waste Management Recycling.

- F. Common-Use Field Office: If required, provide an insulated, weather tight, air-conditioned and heated field office for use as a common facility by all personnel engaged in construction activities; of sufficient size to accommodate required office personnel and meetings.
- G. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment involved.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
- B. Storm water Control: Comply as indicated on the erosion control plan/measures before any earth disturbing activities start.
- C. Tree and Plant Protection: Comply with the plans and specifications for protection.
- D. Security Enclosure and Lockup: Install substantial temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.
- E. Barricades, Warning Signs, and Lights: Comply with standards and code requirements for erecting structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and public of possible hazard. Where appropriate and needed, provide lighting, including flashing red or amber lights.
- F. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weather tight enclosure for building exterior.
- G. Temporary Partitions: Erect and maintain dustproof partitions and temporary enclosures to limit dust and dirt migration and to separate areas from fumes and noise.
- H. Temporary Fire Protection: Until fire-protection needs are supplied by permanent facilities, install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.

3.5 OPERATION, TERMINATION, AND REMOVAL

- A. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage caused by freezing temperatures and similar elements.
 - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
 - 2. Prevent water-filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.
- B. Temporary Facility Changeover: Except for using permanent fire protection as soon as available. Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- C. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of

interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are the property of Contractor. Owner reserves right to take possession of Project identification signs.
2. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements in Division 1, of the Technical Specifications Section "Closeout Procedures."

END OF SECTION

SECTION 01 70 00

EXECUTION REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all Divisions of the Technical Specifications, apply to this Section.

1.2 SUMMARY

- A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. Field engineering and surveying.
 - 3. Progress cleaning.
 - 4. Starting and adjusting.
 - 5. Protection of installed construction.
 - 6. Correction of the Work.
- B. Related Sections include the following:
 - 1. Division 1, of the Technical Specifications Section "Project Management and Coordination" for procedures for coordinating field engineering with other construction activities.
 - 2. Division 1, of the Technical Specifications Section "Submittal Procedures" for submitting surveys.
 - 3. Division 1, of the Technical Specifications Section "Cutting and Patching" for procedural requirements for cutting and patching necessary for the installation or performance of other components of the Work.
 - 4. Division 1, of the Technical Specifications Section "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.
 - 5. Division 1, of the Technical Specifications Section "Construction Waste Management" method of disposal of construction waste.

1.3 SUBMITTALS

- A. Qualification Data: For land surveyor to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of Consultants and owners, and other information specified.
- B. Certificates: Submit certificate signed by land surveyor certifying that location and elevation of improvements comply with requirements.
- C. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.
- D. Certified Surveys: Submit two copies signed by land surveyor or professional engineer as required.

1.4 QUALITY ASSURANCE

- A. Land Surveyor Qualifications: A licensed professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.
 - 1. Before construction, verify the location and points of connection of utility services.
- B. Existing Utilities: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning site work, investigate and verify the existence and location of underground utilities and other construction affecting the Work.
 - 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; and underground electrical services.
 - 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to local utility, Owner, and Consultant that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify Consultant, Owner, adjacent property owners not less than two days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Consultant's and Owner's written permission.
- C. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- D. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- E. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Consultant. Include a detailed description of problem encountered, together with recommendations for modifications of the Contract Documents.

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Consultant promptly.
- B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.
 - 1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
 - 2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 - 3. Inform installers of lines and levels to which they must comply.
 - 4. Check the location, level and plumb, of every major element as the Work progresses.
 - 5. Notify Consultant when deviations from required lines and levels exceed allowable tolerances.
 - 6. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
 - 7. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and invert elevations.
 - 8. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
 - 9. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Consultant.

3.4 FIELD ENGINEERING

- A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
 - 1. Do not change or relocate existing benchmarks or control points without prior written approval of Consultant. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Consultant before proceeding.
 - 2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.
- B. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
 - 1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
 - 2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
 - 3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.
- C. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and site work.

3.5 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly.
 - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 - 2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg F.

3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations. Dispose of material accordance to Division 1, Section "Construction Waste Management".
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 1. Remove liquid spills promptly.
 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Cutting and Patching: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.
 1. Thoroughly clean surfaces and similar features before applying paint or other finishing materials.
- H. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.
- I. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration until Substantial Completion.
- J. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- K. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.6 STARTING AND ADJUSTING

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.
- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Manufacturer's Field Service: If a factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in Division 1 Section "Quality Requirements."

3.7 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.8 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 1 Section "Cutting and Patching."
 - 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Restore permanent facilities used during construction to their specified condition.
- C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION

SECTION 01 73 10

CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all Divisions of the Technical Specifications, apply to this Section.

1.2 SUMMARY

- A. This Section includes procedural requirements for cutting and patching.
- B. Related Sections include the following:
 - 1. Division 1, of the Technical Specifications Section "Selective Demolition" for demolition of selected portions of the building for alterations.
 - 2. Divisions 2 through 16, of the Technical Specifications Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.
 - a. Requirements in this Section apply to mechanical and electrical installations. Refer to Divisions 15 and 16 Sections for other requirements and limitations applicable to cutting and patching mechanical and electrical installations.

1.3 DEFINITIONS

- A. Cutting: Removal of existing construction necessary to permit installation or performance of other Work.
- B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.4 QUALITY ASSURANCE

- A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.
- B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
- C. Miscellaneous Elements: Do not cut and patch the following elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or those results in increased maintenance or decreased operational life or safety.
 - 1. Water, moisture, or vapor barriers.
 - 2. Membranes and flashings.
 - 3. Exterior curtain-wall construction.
 - 4. Equipment supports.
 - 5. Piping, ductwork, vessels, and equipment.
 - 6. Noise- and vibration-control elements and systems.

- D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
 - 1. If possible, retain original Installer or fabricator to cut and patch exposed Work listed below. If it is impossible to engage original Installer or fabricator, engage another recognized, experienced, and specified firm.
 - a. Processed concrete finishes.
 - b. Stonework and stone masonry.
 - c. Ornamental metal.
 - d. Roofing.
 - e. HVAC enclosures, cabinets, or covers.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections of the Technical Specifications.
- B. Existing Materials: Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
 - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of existing materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.
 - 1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 - 2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

3.3 PERFORMANCE

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut existing construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

- B. Cutting: Cut existing construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 2. Existing Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 4. Excavating and Backfilling: Comply with requirements in applicable Division 2 Sections where required by cutting and patching operations.
 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 6. Proceed with patching after construction operations requiring cutting are complete.
- C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections of the Technical Specifications.
1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
 4. Ceilings: Patch, repair, or re-hang existing ceilings as necessary to provide an even-plane surface of uniform appearance.
 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weather tight condition.

END OF SECTION

SECTION 01 77 00

CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all Divisions of the Technical Specifications, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Inspection procedures.
 - 2. Project As-Built Documents.
 - 3. Operation and maintenance manuals.
 - 4. Warranties.
 - 5. Instruction of Owner's personnel.
 - 6. Final cleaning.
- B. Related Sections include the following:
 - 1. Division 1, of the Technical Specifications Section "Payment Procedures" for requirements for Applications for Payment for Substantial and Final Completion.
 - 2. Division 1, of the Technical Specifications Section "Construction Progress Documentation" for submitting Final Completion construction photographs and negatives.
 - 3. Division 1, of the Technical Specifications Section "Construction Waste Management" method of disposal of construction waste.
 - 4. Division 1, of the Technical Specifications Section "Execution Requirements" for progress cleaning of Project site.
 - 5. Division 1, of the Technical Specifications Section "Project Record Documents".
 - 6. Division 1, of the Technical Specifications Section "Operation and Maintenance Data".
 - 7. Divisions 2 through 16, of the Technical Specifications Sections for specific closeout and special cleaning requirements for products of those Sections.

1.3 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: The Contractor shall, before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.
 - 1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
 - 2. Advise Owner of pending insurance changeover requirements.
 - 3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 - 4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 - 5. Prepare and submit Project Record Documents, "As-Built" drawings operation and maintenance manuals, Final Completion construction photographs and photographic negatives if required, damage or settlement surveys, property surveys, and similar final record information.
 - 6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.

7. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
 8. Complete startup testing of systems.
 9. Submit test/adjust/balance records.
 10. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 11. Advise Owner of changeover in heat and other utilities.
 12. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
 13. Complete final cleaning requirements, including touchup painting.
 14. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Consultant will either proceed with inspection or notify Contractor of unfulfilled requirements. Consultant will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Consultant, that must be completed or corrected before certificate will be issued. The Consultant's Substantial Completion list is composed by verification of the punch list submitted by the Contractor and any additional defects in the work observed by the Consultant.
1. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.
 2. Results of completed inspection will form the basis of requirements for Final Completion.

1.4 FINAL COMPLETION

- A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:
1. Submit a final Application for Payment according to Division 1, of the Technical Specifications Section "Payment Procedures."
 2. Submit certified copy of Consultant's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Consultant. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
 3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 4. Submit pest-control final inspection report and warranty.
 5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training videotapes if required.
- B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Consultant will either proceed with inspection or notify Contractor of unfulfilled requirements. Consultant will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
1. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.
 2. The Contractor shall take immediate steps to correct the stated deficiencies, and send a written notice to the Consultant, certifying the Project is complete, at which time the Consultant will re-inspect the Work. This review and additional reviews by the Consultant where the Work is not considered Substantial Completion or Final Completion will be considered an additional service from the Consultant. The Contractor will be charged for these additional services incurred by such failure including travel time, observation time, and administrative time at the Consultant's hourly rate, as well as all expenses associated with the distribution of a written notice stating the reasons for failure to reach final completion.
 3. In the event the Contractor is granted Substantial Completion by the Consultant and the Contractor fails to complete and/or correct all of the items listed in the Substantial Completion within 30 calendar days of the date of Substantial Completion, the liquidated damages shall start to accrue until all of the items on the Substantial Completion list are completed and/or corrected and have been approved by the Consultant.
 4. If the Consultant is required to make more than two inspections for the project to achieve Substantial Completion, the Contractor shall pay for the Consultant's time and expense.

1.5 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Preparation: Submit three copies of list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
 - 1. Organize list of spaces in sequential order, use the room number as indicated on the drawings and on the exterior areas include a location diagram indicating the defects.
 - 2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
 - 3. Include the following information at the top of each page:
 - a. Project name.
 - b. Date.
 - c. Name of Consultant.
 - d. Name of Contractor.
 - e. Page number.

1.6 PROJECT RECORD DOCUMENTS

- A. The Contractor shall provide Project Record Documents, O&M, "As-Built" Drawings, and Warranties as indicated in Division 1, of the Technical Specifications Section Project Record Documents. Use Division 1, of the Technical Specifications Section "Project Record Documents".

1.7 OPERATION AND MAINTENANCE MANUALS

- A. See Section "Operation and Maintenance Manuals" for additional information.

1.8 WARRANTIES

- A. Submittal Time: Submit written warranties on request of Consultant for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.
- B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period.
- C. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
- D. Provide copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
 - 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Remove snow and ice to provide safe access to building.
 - f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - h. Sweep concrete floors broom clean in unoccupied spaces.
 - i. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - j. Remove labels that are not permanent.
 - k. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
 - 1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
 - l. Wipe surfaces of mechanical and electrical equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - m. Replace parts subject to unusual operating conditions.
 - n. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - o. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - p. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
 - q. Leave Project clean and ready for occupancy.
- C. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION

SECTION 01 78 10

PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all Divisions of the Technical Specifications, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:
 - 1. As-Built Drawings in Auto CAD.
 - 2. Record Specifications.
 - 3. Record Product Data.
- B. Related Sections include the following:
 - 1. Division 1, of the Technical Specifications, Section "Closeout Procedures" for general closeout procedures.
 - 2. Division 1, of the Technical Specifications, Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
 - 3. Divisions 2 through 16, of the Technical Specifications, Sections for specific requirements for Project Record Documents of products in those Sections.

1.3 SUBMITTALS

- A. As-Built Drawings: Comply with the following:
 - 1. Number of Copies: Submit two sets of marked-up As-Built Drawings to the Consultant for the Consultant to prepare the Record Drawings.
- B. Record Specifications: Submit two copies of Project's marked up Specifications, including addenda and contract modifications.
- C. Record Product Data: Submit two copies of each Product Data submittal.
 - 1. Where Record Product Data is required as part of operation and maintenance manuals, submit marked-up Product Data as an insert in the manual instead of submittal as Record Product Data.

PART 2 - PRODUCTS

2.1 AS-BUILT DRAWINGS

- A. As-Built Drawings: Maintain one set of black-line white prints of the Contract Drawings and Shop Drawings.
 - 1. Preparation: Mark As-Built Drawings to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up As-Built Drawings.

- a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Accurately record information in an understandable drawing technique.
 - c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
 2. Content: Types of items requiring marking include, but are not limited to, the following:
 - a. Dimensional changes to Drawings.
 - b. Revisions to details shown on Drawings.
 - c. Depths of foundations below first floor.
 - d. Locations and depths of underground utilities.
 - e. Revisions to routing of piping and conduits.
 - f. Revisions to electrical circuitry.
 - g. Actual equipment locations.
 - h. Duct size and routing.
 - i. Locations of concealed internal utilities.
 - j. Changes made by Change Order or Construction Change Directive.
 - k. Changes made following Consultant's written orders.
 - l. Details not on the original Contract Drawings.
 - m. Field records for variable and concealed conditions.
 - n. Record information on the Work that is shown only schematically.
 - o. Clarification Drawings.
 3. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
 4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at the same location.
 5. Mark important additional information that was either shown schematically or omitted from original Drawings.
 6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
 7. Identify and date each As-Built Drawing; include the designation "PROJECT AS-BUILTS DRAWING" in a prominent location. Organize into manageable sets; bind each set with durable paper cover sheets. Include identification on cover sheets.
- B. Newly Prepared As-Built Drawings: Prepare new Drawings instead of preparing As-Built Drawings where Consultant determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.
 1. New Drawings may be required when a Change Order is issued as a result of accepting a substitution or other modification.
 2. Consult with Consultant for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. Integrate newly prepared As-Built Drawings into Record Drawing sets; comply with procedures for formatting, organizing, copying, binding, and submitting.

2.2 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 3. Record the name of the manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
 4. For each principal product, indicate whether Record Product Data has been submitted in operation and maintenance manuals instead of submitted as Record Product Data.
 5. Note related Change Orders, As-Built Drawings, and Product Data where applicable.

2.3 RECORD PRODUCT DATA

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
 - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 - 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 - 3. Note related Change Orders, As-Built Drawings, and Product Data where applicable.

2.4 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by other of the Technical Specifications Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

- A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.
- B. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Consultant's reference during normal working hours.

END OF SECTION

SECTION 01 78 20

OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all Divisions of the Technical Specifications, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 - 1. Operation and maintenance documentation directory.
 - 2. Operation and Maintenance manuals for the care and maintenance systems, subsystems, and equipment.
- B. Related Sections include the following:
 - 1. Division 1, of the Technical Specifications Section "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
 - 2. Division 1, of the Technical Specifications Section "Construction Waste Management" method of disposal of construction waste.
 - 3. Division 1, of the Technical Specifications Section "Closeout Procedures" for submitting operation and maintenance manuals.
 - 4. Divisions 2 through 50, of the Technical Specifications Sections for specific operation and maintenance manual requirements for products in those Sections.

1.3 DEFINITIONS

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 SUBMITTALS

- A. Final Submittal: Submit four copies of each manual in final form at least 15 days before final inspection. Consultant will return copy with comments within 15 days after final inspection.
 - 1. Correct or modify each manual to comply with Consultant's comments. Submit 3 copies of each corrected manual within 15 days of receipt of Consultant's comments.

1.5 COORDINATION

- A. Where operation and maintenance documentation include information on installations by more than one factory-authorized service representative, assemble and coordinate information furnished by representatives and prepare manuals.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

- A. Operations and Maintenance Manuals shall be organized in CSI format.
- B. Organization: Include a section in the directory for each of the following:
 - 1. List of documents.
 - 2. List of systems.
 - 3. List of equipment.
 - 4. Table of contents.
- C. List of Systems and Subsystems: List systems alphabetically.
- D. List of Equipment: List equipment for each system, organized alphabetically by system.
- E. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.
- F. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with the same designation used in the Contract Documents.

2.2 MANUALS, GENERAL

- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
 - 1. Title page.
 - 2. Table of contents.
 - 3. Manual contents.
- B. Title Page: Enclose title page to Include the following information:
 - 1. Name and address of Project.
 - 2. Name and address of Owner.
 - 3. Date of submittal.
 - 4. Name, address, and telephone number of Contractor and Subcontractors.
 - 5. Name and address of Consultant.
 - 6. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, model number, and serial number indexed to the content of the volume, and cross-referenced to of the Technical Specifications Section number in Project Manual.
 - 1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

Provide both hard copy and digital PDF copy.

- 1. Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
 - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other

- binders if necessary, to provide essential information for proper operation or maintenance of equipment or system.
- b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and indicate volume number for multiple-volume sets.
- 2. Dividers: Heavy-paper dividers with reinforced tabs for each section. Mark each tab to indicate contents.
- 3. If provided with the equipment, provide a Protective Plastic Sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.
- 4. Supplementary Text: Prepared on 8-1/2-by-11-inch, white bond paper.
- 5. Drawings: Attach reinforced, punched on drawings and bind in manual with associated text.
 - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
 - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 OPERATION AND MAINTENANCE MANUALS

- A. Content: In addition to requirements in this section, include operation and maintenance data required in individual specification sections including source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list & source information, maintenance service contracts, warranty, and bond information and the following information:
 - 1. System, subsystem, and equipment descriptions.
 - 2. Performance and design criteria if Contractor is delegated design responsibility.
 - 3. Operating standards.
 - 4. Operating procedures.
 - 5. Operating logs.
 - 6. Wiring diagrams.
 - 7. Control diagrams.
 - 8. Piped system diagrams.
 - 9. Precautions against improper use.
 - 10. Re-ordering information for parts.
 - 11. Standard printed maintenance instructions and bulletins.
 - 12. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 - 13. Identification and nomenclature of parts and components.
 - 14. List of items recommended to be stocked as spare parts.
- B. Descriptions: Include the following:
 - 1. Product name and model number.
 - 2. Manufacturer's name.
 - 3. Equipment identification with serial number of each component.
 - 4. Equipment function.
 - 5. Operating characteristics.
 - 6. Limiting conditions.
 - 7. Performance curves.
 - 8. Engineering data and tests.
 - 9. Complete nomenclature and number of replacement parts.
- C. Operating Procedures: Include the following, as applicable:
 - 1. Startup procedures.
 - 2. Routine and normal operating instructions.
 - 3. Regulation and control procedures.
 - 4. Instructions on stopping.
 - 5. Normal shutdown instructions.
 - 6. Seasonal and weekend operating instructions.
 - 7. Required sequences for electric or electronic systems.

8. Special operating instructions and procedures.
- D. Warranties and Bonds: Include copies of warranties and bonds for each piece of equipment and lists of circumstances and conditions that would affect validity of warranties or bonds. Also, include the Contractor's Warranty for the project.
 1. Include procedures required for notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

- A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- B. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
- C. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
 1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

END OF SECTION

SECTION 01 82 00

DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all Divisions of the Technical Specifications, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
 - 1. Demonstration of operation of systems, subsystems, and equipment.
 - 2. Training in operation and maintenance of systems, subsystems, and equipment.
- B. Related Sections include the following:
 - 1. Division 1, of the Technical Specifications Section "Project Management and Coordination" for requirements for pre-instruction conferences.
 - 2. Division 1, of the Technical Specifications Section "Photographic Documentation" for preparing and submitting demonstration and training videotapes.

1.3 SUBMITTALS

- A. Instruction Program: Submit two copies of outline of instructional program for demonstration and training, including a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.

1.4 QUALITY ASSURANCE

- A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
- B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Division 1 Section "Quality Requirements," experienced in operation and maintenance procedures and training.

1.5 COORDINATION

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations.
- B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

- C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Consultant.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment.
 - 1. Emergencies: Include the following, as applicable:
 - a. Instructions on meaning of warnings, trouble indications, and error messages.
 - b. Instructions on stopping.
 - c. Shutdown instructions for each type of emergency.
 - d. Operating instructions for conditions outside of normal operating limits.
 - e. Sequences for electric or electronic systems.
 - f. Special operating instructions and procedures.
 - 2. Operations: Include the following, as applicable:
 - a. Startup procedures.
 - b. Equipment or system break-in procedures.
 - c. Routine and normal operating instructions.
 - d. Regulation and control procedures.
 - e. Control sequences.
 - f. Safety procedures.
 - g. Instructions on stopping.
 - h. Normal shutdown instructions.
 - i. Operating procedures for emergencies.
 - j. Operating procedures for system, subsystem, or equipment failure.
 - k. Seasonal and weekend operating instructions.
 - l. Required sequences for electric or electronic systems.
 - m. Special operating instructions and procedures.
 - 3. Adjustments: Include the following:
 - a. Alignments.
 - b. Checking adjustments.
 - c. Noise and vibration adjustments.
 - d. Economy and efficiency adjustments.
 - 4. Troubleshooting: Include the following:
 - a. Diagnostic instructions.
 - b. Test and inspection procedures.
 - 5. Maintenance: Include the following:
 - a. Inspection procedures.
 - b. Types of cleaning agents to be used and methods of cleaning.
 - c. List of cleaning agents and methods of cleaning detrimental to product.
 - d. Procedures for routine cleaning
 - e. Procedures for preventive maintenance.
 - f. Procedures for routine maintenance.
 - g. Instruction on use of special tools.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a combined training manual.

- B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

- A. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
 - 1. Owner will furnish Contractor with names and positions of participants.
- B. Scheduling: Provide instruction at mutually agreed on times.
 - 1. Schedule training with Owner, through Consultant, with at least seven days' advance notice.
- C. Cleanup: Collect used and leftover educational materials and remove from Project site. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

END OF SECTION

SECTION 02 32 00

GEOTECHNICAL INVESTIGATIONS

PART 1 - GENERAL

1.1 SUMMARY

This Section includes the following: Report of Limited Subsurface Exploration

Butler High School Athletic Field & Track

Matthews, Mecklenburg County, North Carolina

ECS Project No. 08:13994-A

January 9, 2025

1.2 REPORT AND ANALYSIS

- A. All reports are made part of this section enabling the Contractor and all parties in the construction to have the same information available to the Owner and Consultants regarding the subsurface conditions.
- B. This information shall not be a substitute for the Contractor's personal investigation or judgment of actual conditions found on site. If the Contractor requires additional subsurface information, it may be obtained at the Contractor's expense with Owner's approval.
- C. Variations
 - 1. The nature of variations may not become evident until construction begins. Should subsurface conditions differ significantly from the information in the reports included at the end of this section, the Contractor shall immediately notify the Engineer verbally, followed by a written notification.
 - 2. No charge in the Contract Time or Contract Sum will be considered without an executed Change Order.
- D. Regardless of the thoroughness of the geotechnical explorations, possibilities exist that subsurface conditions will differ from those at boring locations or will not be as anticipated by the design professionals. Therefore, the Owner and the Consulting Engineers assume no responsibility for the accuracy of the information in the geotechnical reports and shall be held harmless for any claims by the Contractor, or others, because of errors in the reports.
- E. Contractor is responsible to follow all geotechnical recommendations in this report. A full understanding of the requirements must be incorporated into the contractors bid.
- F. All excavation for all project sites is to be considered and bid as "unclassified" and no allowances will be made for rock encountered or removal and replacement of unsuitable material.

END OF SECTION

SECTION 11 68 33

ATHLETIC FIELD EQUIPMENT

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Provide and install new baseball and softball athletic equipment as listed.

1.2 SUBMITTALS FOR REVIEW

- A. Shop Drawings: Shop Drawings shall be prepared showing all pertinent information regarding materials, assembly, and installation. Submit drawings showing sizes and details of all equipment component parts.
- B. Product Data: Submit manufacturer's technical product data for all equipment specified under work of this section.

1.3 QUALITY ASSURANCE

- A. Manufacturers have a minimum of 10 years' experience in the manufacture of the equipment and products specified.
- B. All sports equipment listed in this specification shall conform to the requirements of NFHS rules and regulations.

PART 2 - PRODUCTS

2.1 EQUIPMENT

- A. Provide and install two (2) Football Play Clocks, include all items for a turnkey installation including but not limited to electrical wires and connections, wireless operations, mounting hardware, mounting posts/system and items required for operation.
 - 1. Basis of Design – DAKTRONICS TI-2003 30" Digit Display , Amber digits
 - 2. Nevco
 - 3. Varsity
 - 4. Approved Equal
- B. Provide two (2) 8'x24' Regulation Size Round Faced Soccer Goal (white) with integrated or external wheels. Must be NFHS Approved
 - 1. Basis of Design - Sportfield Specialties
 - 2. Beacon Sports
 - 3. Kwik Goal
 - 4. Approved Equal
- C. Provide (2) sets of portable soccer field corner flags (red). International soccer corner flags with round high impact plastic rubber bases. Must meet NCAA and NFHS Standards
 - 1. Kwik Goal
 - 2. Beacon Sports

3. Sportfield Specialites
4. Approved Equal

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Place and/or install all athletic equipment in conformance with manufacturer's specifications.

END OF SECTION

SECTION 11 68 33.43

TRACK & FIELD EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. This section covers all labor and materials required to install a first-class track & field equipment.
- B. The SSC is responsible for the purchase & installation of all track & field equipment. The SSC is responsible for installation of synthetic surface in, around and on top of the specified equipment.

1.2 CODES AND STANDARDS

- A. Codes and standards follow the current guidelines set forth by the World Athletics, the National Collegiate Athletic Association and National Federation of State High School Associations. Where discrepancies are noted between these various governing bodies, the rules of the NFHS shall be enforced.

1.3 ABBREVIATIONS

- A. WA = World Athletics (formerly IAAF)
- B. IAAF = International Association of Athletics Federations
- C. NCAA = National Collegiate Athletic Association
- D. NFHS = National Federation of State High School Associations
- E. T&F = Track & Field
- F. SS = Synthetic Surface
- G. SSC = Synthetic Surfacing Contractor
- H. GC = General Contractor
- I. TBD = To Be Determined

1.4 RELATED WORK

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section. The following Sections are specifically related to this Section:
 - 1. 116833.43 Track and Field Equipment
 - 2. 321823.39 Track and Field Quality Control
 - 3. 321823.40 Track & Field Synthetic Surface
 - 4. 321823.41 Track and Field Line Markings
 - 5. 321823.42 Track and Field Event Materials

1.5 SUBMITTALS

- A. The following information must be submitted by the SSC prior to installation.
1. Standard printed specifications and diagrams or drawings depicting installation directions and dimensions for all in-ground/embedded sports equipment.
 2. Installation process and requirements for subbase (concrete or stone and asphalt) and any conditions that may limit the installation or affect quality of installation.
 3. Material safety data sheets on all products, as necessary.

1.6 QUALITY ASSURANCE

- A. The SSC shall only accept bids from those vendors or manufacturers that have been pre-approved or identified as approved equal.

PART 2 - PRODUCTS

2.1 SPORTS EQUIPMENT

- A. The following vendors/manufacturers are approved for bidding:
1. Sportsfield Specialties:
 - a. David Moxley at Cell 607-287-9460 or dmoxley@SportsfieldSpecialties.com
 2. UCS:
 - a. Mike Chappell at Cell 530-228-5826 or michaelc@ucsspirit.com
 3. Gill Athletics:
 - a. Mike Cunningham at cell 217-898-3038 or mcunningham@gillathletics.com
- B. Basis of Design: the manufacturer's product number listed in this specification establishes the minimum quality for each product. All items must come from the same manufacturer or vendor, mix & match is not allowed.
- C. T&F Inground/Embedded Equipment:
1. Sportsfield Specialties products are the basis of design.
 2. Pole Vault:
 - a. One (1) cast aluminum, white, pole vault box, Model # PVBCA.
 3. Long & Triple Jump:
 - a. Zero (0) adjustable 8" takeoff board systems including blanking lids, Model LJTJOB8BL. All locations will have painted lines as takeoff boards.
 - b. One (1) Custom size, weighted mesh sand pit cover, size is 20'-2" wide by 28'-0" long, Model # SPCVRMDCSTM.
 4. Discus:
 - a. One (1) eight pole discus cage with sleeves and with Hinged Net Stabilizer Extension Arms and with the optional Backup Net System, Model # DCHS8EA.
 - b. One (1) "L" shaped aluminum discus circle for a flat concrete pad, Model # V370.
 5. Shot Put:
 - a. One (1) "L" shaped aluminum shot put circle for a flat concrete pad, Model # V372.
 - b. One (1) aluminum shot put toe board for flat concrete pad, Model #V364.
- D. Communication & Power Junction Boxes:
1. Two (2) aluminum ComBoxes with black mat installed on covers, Model CBBM1830
- E. Ball Stopping System – not included in this project.
- F. **ADD ALTERNATE NO. 2:** T&F Loose Equipment:
1. Sportsfield Specialties products are the basis of design.

2. Pole Vault:
 - a. One (1) Durazone National Pole Vault Landing Pad (21'-6" W x 24'-0" L x 30" H – 16'-10" behind vault box), Model PV2224HDZ (this includes the Vault Box Safety Collar)
 - b. One (1) All weather cover for this landing pad.
 - c. One (1) Adjustable Pole Vault Standards (5' to 17") with Angled Base Protector Pads, Model PVS0517
 - d. Two (2) pole vault cross bars.
3. High Jump:
 - a. One (1) Durazone high jump landing pad (10' x 18' x 28"), Model HJ1810DZ.
 - b. One (1) All weather cover for high jump landing pad (10' x 18' x 28"). Model HJ1810AWC
 - c. One (1) set of adjustable high jump standards (2' to 8" tall), Model HJS0208.
 - d. Two (2) high jump cross bars (4m long), Model HJX.

PART 3 - EXECUTION

3.1 INSTALLATION REQUIREMENTS

- A. The installation of the in-ground/embedded sports equipment shall follow the directions/instructions of the manufacturer and/or vendor. Shop drawings must be submitted and approved prior to ordering and installation of equipment.
- B. Standard concrete with a minimum of 3000psi or as per the vendor's recommendation.

END OF SECTION

SECTION 32 12 16.36

ATHLETIC TRACK ASPHALT PAVING

PART 1 - GENERAL

1.1 SCOPE

- A. The track contractor and manufacturer shall read and approve all asphalt specifications and materials prior to construction and confirm that the asphalt specification and materials meet all manufacture requirements for the synthetic track surface.

1.2 SUMMARY

- A. The extremely strict tolerances for gradients and flatness, which are stipulated by the Sport Federations or Associations for the synthetic surfaces, mean that the construction of adequate asphalt and base is of supreme importance. Tolerances are required to be met not only by the newly completed facility, but also over its life, which might be two or three times the expected life of the synthetic surface.
- B. The contractor must review the ASBA guidelines for asphalt track surfacing and confirm that the proposed asphalt surface meets and/or exceed the ASBA guidelines.
https://sportsbuilders.org/page/asphalt_guidelines
- C. The track subgrade must be stabilized per the PVR requirements designated by the Geotechnical Engineer. All subgrade stabilization efforts are to be included in the contractor's cope of work. Refer to the geotechnical report for details for each project site.
- D. The asphalt and base should be designed/and or confirmed to be able meet the following criteria:
 - 1. It should be capable of supporting and transmitting to the existing ground the loads of all vehicles, machines and materials to be used in the construction, without causing deformation of the site, or exceeding the ground-bearing capacity.
 - 2. It should be capable of supporting and transmitting the loads on the synthetic surface from athletes and maintenance equipment, without permanent deformation of the asphalt or base.
 - 3. It should be sufficiently flexible to provide protection to the synthetic surface from the effects of sub-soil movement and frost heave.

1.3 REFERENCES

- A. North Carolina Department of Transportation Standard Specifications (NCDOT)
- B. Standard Specifications for Highway Materials and Methods of Sampling and Testing, American Association of State Highway and Transportation Officials (AASHTO)
- C. American Society of Testing Materials (ASTM)
- D. American Sports Builder Association (ASBA)

1.4 SUBMITTALS

- A. Complete asphalt material submittal is required to confirm all asphalt components meets NCDOT specifications and ASBA Guidelines at a minimum
1. Material/Pavement Course (**NO RAP, Recycle Asphalt Allowed**)
 2. Binder Course
 3. Course Aggregate
 4. Fine Aggregate
 5. Name and Address of all suppliers
 6. All applicable certificates to be signed by material producer and contractor certifying that each item meets and/or exceeds the specifications and that the proposed asphalt meets ASBA Guidelines.

PART 2 - PRODUCTS AND MATERIALS

2.1 HOT MIX ASPHALT

- A. Hot mix asphalt for surface courses shall consist of coarse and fine aggregates and mineral filler plant-mixed with bitumen binder.
- B. All hot mix asphalt shall be in accordance with applicable provisions of North Carolina Department of Transportation standards except herein as modified.
- C. The hot mix asphalt shall be plant-mixed and bituminous material for mixture shall be AC-1, 85-100 penetration grade or 60 – 70 penetration grade where required in warm climates. The asphaltic cement (AC-1) content shall be 4.0% - 6.0% (by weight) of the total composite mixture.
- D. Course aggregate (material retained on the 4.75mm sieve) shall be sound, angular crushed stone or grave (shale is not recommended).
- E. Fine aggregate (material passing the 4.75mm sieve and retained on the #200 (0.075mm) sieve) shall be sand, stone sand and stone screening class B quality or better and gradation FA-3.
- F. Mineral filler (Material passing the #200 (0.075mm) sieve) shall be dry limestone or dust.
- G. The aggregate shall have the following maximum limits of detrimental substances:

Soft fragments, AASHO Ti 89	2.00%
Coal and lignite, AASHO Ti 13	0.25%
Clay lumps, GHD 1	0.25%
Flat or elongated pieces (greater than five times the average thickness)	10.00%
Sulfur content computed as sulfide sulfur, ASTM E30	0.01%
Other local detrimental Substances	2.00%

- H. The gradation of the composite aggregate for the Asphalt Binder Course shall conform to or near the following:

Sieve	Total % Passing
3/4"	100
1/2"	90 – 100

3/8"	80
#4	45 – 70
#8	25 – 55
#30	(19)
#50	5 – 20 (12)
#100	5 – 16 (6.5)
#200	2 – 9 (3)

Note: The aggregate grain should be as close to the figures in brackets for the maximum density to the asphalt mixture.

- I. The gradation of the composite aggregate for the Asphalt Top Coat shall conform to or near the following:

Sieve	Total % Passing
1/2"	100
3/8"	90 – 100
#4	60 – 90 (70)
#8	35 – 65 (49)
#30	(22)
#50	6 – 25 (14)
#100	(8)
#200	2 – 10 (3)

Note: The aggregate grain should be as close to the figures in brackets to give maximum density to the asphalt mixture. A majority of the minus 200 material should consist of mineral filler. The increase in the amount of mineral filler has, in many instances, increased the toughness of the asphalt. This can be accomplished by using a resultant mineral aggregate having a minus 200 contents of about 7% - 8%.

- J. The asphalt "Binder Course" and "Top Coat" mixtures are the type IV mixes recommended by the Asphalt Institute. Asphaltic concrete mixtures may differ from the above provided specification, meet or exceed the present specifications. The synthetic surfacing contractor must be informed about proposed changes/deviations to the present specification. Determination of the job mix formula shall be based on attaining a mix having Marshall Stability (ASTM D1559, 75 blows each Side) of 750 lbs. or greater.
- K. Samples of the job mix from the asphalt plant shall be laboratory tested for Marshall Stability. A compacted specimen shall be retained for density (ASTM D2726) comparison with core samples from the installed pavement.
- L. No Recycle Asphalt Product is allowed in the surface course.

2.2 PRIME COATS AND TACK COATS

- A. The primer for application on asphalt surfaces (tack coat) shall be RC-1.

PART 3 - EXECUTION

3.1 HOT MIX ASPHALT PAVEMENT

- A. Mixing of hot mix asphalt should be undertaken in a mixing plant capable of effectively drying and heating the aggregate to the specified temperature, accurately proportioning and uniformly mixing coarse and fine aggregate, filler and binder to meet the specified requirements at all times. In general, batch-mixing plants are preferable to drum mixing plants, because of their greater capability to fine-tune the aggregate gradation.

For all types of mixing facilities:

1. Cold aggregates must be handled and stored in a manner that avoids contamination and minimizes degradation and segregation.
 2. Filler shall be stored and handled in a separate system from that which handles aggregate
 3. The bitumen storage and handling shall be arranged so that contamination of the bitumen by flushing liquids or other materials cannot occur.
 4. The bitumen storage tanks shall be capable of holding at least sufficient bitumen for one day's production.
 5. Heating of bitumen shall be accomplished by steam coils, electricity or other means that will allow no direct flame to come into contact with the heating tank.
 6. Discharge from the plant shall be so arranged as to minimize segregation.
 7. Asphalt, which has been stored for more than twenty-four hours or produced at temperatures not in accordance with those specified, shall not be used.
 8. The mix shall leave the mixing facility at a temperature between 285°F (140°C) and 325°F (163°C).
- B. The hot mix asphalt must be kept clean during hauling and covered if necessary during transit with canvas or other material that will retain the desired pavement temperatures. The mixtures must not be hauled in such a manner that segregation of the ingredients takes place or that a crust is formed on the surface, or that mixture will crumble or flatten out when dumped. Trucks that transport the mixture must have metal beds, and the beds must be clean, smooth and free of holes. Before loading, the truck bed is coated with a thin film of a release agent (oil or soap solution) that assists in preventing fresh hot mix asphalt from sticking to the surface of the bed. After the bed is coated, any excess release agent must be drained from the bed.
- C. The hot mix asphalt shall be spread with a self-propelled machine spreader having a floating screed assembly controlling the elevation of the strike-off. The use of road graders or towed spreaders will not be allowed. Means shall be provided to heat the screed uniformly over its full width. The screed shall be equipped with automatic screed controls to adjust automatically to place a uniform mat of desired thickness, grade and shape.
- D. Typical members of the paving crew should be: paving superintendent, paver operator, dump person, two screed people, and two people to lute and take care of joints and mat repairs. Co-ordination of the entire crew with the paving superintendent and screed people is essential to achieve all the desired goals.
- E. Self-propelled rollers are required as compaction equipment. Towed-type rollers should not be used. Hand-held or vibrating plate compactors can be used in small, inaccessible areas. Steel-wheeled non-vibrating rollers shall have a mass of 10 tons (9 metric tons). Steel wheeled vibrating rollers shall have a mass of 5 tons (4.5 metric tons). Pneumatic tired multi-wheeled rollers shall not be used.
- F. The hot mix asphalt shall be placed with a minimum delay after delivery. On no account shall hot mix asphalt be reheated.
- G. The day's work shall be organized so that each layer spread covers the full width of the pavement.
- H. Hot mix asphalt shall be spread to a depth consistent with the specified compacted thickness. Each layer shall be completed to a surface parallel to the finished surface of the pavement and at a depth below it equal to the compacted thickness of the subsequent layer or layers specified.

- I. Hot mix asphalt shall not be placed during rain, or when the air temperature in the shade and away from artificial heat is 40°F (5°C) or less, or while the surface is wet or when the pavement temperature does not comply with the table below.

Pavement surface temperature in shade	Minimum Laying Temperatures Binder Course	Minimum Laying Temperatures Top Coat
40°F – 50°F (5°C – 10°C)	302°F (150°C)	293°F (145°C)
50°F – 60°F (10°C – 15°C)	293°F (145°C)	284°F (140°C)
60°F - 77°F (15°C - 25°C)	284°F (140°C)	275°F (135°C)
Over 77°F (Over 25°C)	275°F (135°C)	266°F (130°C)

- J. Maximum laying temperature of the mixture shall be 325°F (163°C)
- K. The temperature of the mix shall be measured in the truck just prior to discharging into the paver hopper. A suitable stem type thermometer shall be used. The stem shall be inserted into the mix to a depth of approximately 8" (200mm) at a location at least 12" (300mm) from the side of the truck body. An average of at least two readings shall be adopted as the temperature of the mix.
- L. There are three acceptable types of sensing devices used with the automatic screed control system:
1. The Wand Sensor
 2. The Ultra Sonic Sensor
 3. The Laser Sensor
- M. The grade reference used with the above listed sensing devices can be either a fixed string-line tied between graded iron pins or on an existing surface, a previously placed surface, a curb line, etc. A string-line can be erected that will include roll down factors for true grade. The roll down is estimated to be about 25% of the un-compacted mat thickness. To calculate the exact position of the string-line, a survey crew is used to determine the existing grade at approximate intervals of 9 meters (30 feet). The existing grade is subtracted from the theoretical grade for calculation of lift thickness. A roll down factor of 25% of this thickness is added for the string-line grade. Once the string-line is erected, intermediate points of support may be placed under the string-line, especially on curves or in sudden changes of grade. Graded iron pins and intermediate supports should be placed so that they will not interfere with the travel of the machine spreader, but close enough to each other and to the path of the machine spreader that they can hold the string in a convenient position to be reached by the electronic sensors and by a short straight edge placed on the newly laid pavement to visual check on its level.
- N. The reference system that is best for the job depends on the existing pavement surface on which the mat is to be placed. If the surface on which the mat is to be placed has an appropriate longitudinal grade, so that the finished pavement is expected to have a constant thickness, then the surface on which the mat has to be placed, an adjoining existing surface, a previously placed surface, a curb line, etc. can be used as the reference system, since a constant roll down is expected. If the longitudinal grade is erratic, so that the finished pavement is expected to have a variable thickness, a string-line should be used as the reference system, to take in account the variable roll down.
- O. To maintain proper transverse grade, automatic screed controls use:
1. A dual sensing systems on both sides of the paver, using two grade references, one on each side of the paver or
 2. A single sensing system on a single side of the paver, using a single grade reference on a single side of the paver, in association with an automatic slope control system: in using the transverse slope control, no specific roll down factors can be applied to grade calculations for slope transfer.
 3. The Control System that is best for the job depends on the existing pavement surface on which the mat is to be placed. Dual Grade Control System is preferable if the surface on which the mat has to be placed has an unsatisfactory transverse grade. Single Grade Control System transfers the roll-down factors of the grade control side to the opposite side as equal factors, which may or may not be equal. Single Grade Control System is acceptable in situations where the surface on which the mat is to be placed has an appropriate transverse grade.

- P. The area to be surfaced with hot mix asphalt shall be cleared of all foreign or loose material with power blowers, power brooms or hand brooms.
- Q. Asphalt surfaces shall be primed prior to the installation of the binder course and topcoat. Prime asphalt surfaces at the rate of 0.05 gallons per square yard. Sprayers shall be capable of spraying the tack coat uniformly through jets in a spray bar at the desired rate of application. Each sprayer shall be fitted with a hand lance. Tack Coat shall be applied, not less than thirty (30) minutes nor more than two (2) hours before asphaltic concrete is placed. When spraying the tack coat, shields shall be used and all necessary precautions taken to protect curbs, gutters, channels, adjoining structures, surfaces and grassed areas. Any pools of tack coat, which may form in small depressions or surface irregularities, shall be brushed out over the adjacent area with brooms or rubber squeegees before the emulsion breaks. In dusty conditions, every precaution shall be taken to prevent freshly coated surfaces from being contaminated by dust or other foreign material.
- R. Uniformity of operations is essential in hot mix asphalt paving. Uniform, continuous operation of the paver produces the highest quality pavement. Paving too fast can result in the paver stopping frequently to wait for trucks to bring more mix. The smoothness of the pavement will suffer when the paver stops and starts up again. The paver speed should be matched to the quantity of HMA being delivered to the project to provide a uniform paver speed. The paver must be continuously supplied with enough mix, and at the same time, trucks should not have to wait a long time to discharge their loads into the paver hopper.
- S. Starting blocks equal to 1.25 times the thickness of the un-compacted mat are required to set the thickness and to null the screed. By using starting blocks the grade can be very close at the beginning of the operation.
- T. Blocks equal to 25% of the un-compacted thickness are used to start from a joint. The 25% additional thickness allows for proper roll-down or compaction while maintaining proper grade. Extended screeds will require multiple shims for each extension area.
- U. The screed must be initially heated at the start of each new paving operation. If not, the mix will tear and the texture will look open and coarse, as if the mix were too cold.
- V. If the mat being placed is uniform and satisfactory in texture, and the thickness is correct, no screed adjustments are required. But when adjustments are required, they should be made in small increments. Time should be allowed between the adjustments to permit the paver screed to complete reaction to the adjustments sequentially.
- W. The minimum un-compacted thickness of a hot mix asphalt course is equal to 1.25 times its minimum compacted thickness, which is equal to three times the nominal maximum size aggregate. When the mat falls below this thickness, it pulls, tears, cools rapidly and generally will not be able to achieve the proper density and pavement smoothness.
- X. There are places on many projects where spreading with a paver is either impractical or impossible. In these cases, hand spreading may be required. Placing and spreading by hand should be done very carefully and the material distributed uniformly so there will be no segregation of the mix. When the HMA is dumped in piles, it should be placed upon arrival on steel dump sheets outside the area in which it is to be spread and shall then be immediately laid to the required depth. The material should be deposited from the shovels into small piles and spread with lutes. In the spreading process, all material should be thoroughly loosened and evenly distributed. Any part of the mix that has formed into lumps and does not break down easily should be discarded. After the material has been placed and before rolling starts, the surface should be checked with templates or straightedges and all irregularities corrected.
- Y. Asphaltic concrete shall be spread in such a manner as to minimize the number of transverse and longitudinal joints in the pavement.
- Z. Transverse joints shall be constructed where the spreading operation is stopped for longer than 20 minutes. Transverse joints in adjoining spreader runs shall be offset by not less than 8 feet (2.44m). Transverse joints shall be offset from layer to layer by not less than 8 feet (2.44m). Transverse joints shall

be constructed at right angles to the direction of spreading and be cut to a straight vertical face for the full depth of the layer.

- AA. When the construction is ready to stop for the end of the day or for a period longer than 20 minutes, the following procedure is used to form a suitable transverse joint:
1. When the paver is placing the last load, it is shifted into low gear as it approaches the location of the proposed joint.
 2. As the hopper empties and the amount of material in the screed chamber decreases below normal operating level, the paver is stopped.
 3. The screed is raised and the paver moved out of the way.
 4. The mix is then removed from the end of the mat to form a clean, vertical edge.
 5. Heavy wrapping paper is placed on the existing surface along the edge of the joint.
 6. New material is finally placed on top of the paper and used to form a ramp, from the new surface to the existing surface.
- BB. When construction is ready to resume, the following procedure is used to form a suitable transverse joint:
1. The ramp of material is removed along with the board or paper.
 2. A straightedge is used to check the longitudinal grade of the mat. Because the paver was running out of material as it laid the last few feet of mat, it is possible that those last few feet taper slightly from the specified level of the mat. If this is the case, a new transverse edge must be cut behind the point where the taper begins.
 3. The vertical face of the mat is tack-coated.
 4. The paver is backed up to the edge of the mat and the screed rested on the mat surface.
 5. The screed is heated while it rests on the mat. This provides some heat to the material at the edge of the mat.
 6. The heated screed is raised and shims as thick as the difference between the compacted and the un-compacted mat (approximately 25% of the compacted thickness) are positioned under its ends.
 7. The truck with the first load of HMA is backed carefully to the hopper. During discharge of the mix from the truck bed to the paver, it is essential that the truck not bump the paver and cause it to move.
 8. The paver starts forward in a low gear.
 9. Once the paver has moved away, excess asphalt is cleaned off the surface of the mat and the smoothness of the joint is checked with a straightedge.
 10. If the joint is satisfactory, a 6" (150mm) width of the fresh mix is rolled transversely and the joint checked for smoothness. If the joint is satisfactory, transverse rolling is continued in 6" to 12" (150 to 300mm.) increments until the entire width of the roller is on the new HMA. If straight edging shows an uneven joint, the surface of the new mat must be scarified while still warm and workable. Scarification is done with the fine side of the lute. Excess material can then be removed or additional material added, and the joint rolled. During rolling, lumber should be placed along the edges of the mat to prevent the roller from driving off and distorting the longitudinal edge.
- CC. Longitudinal joints shall be offset from layer to layer by not less than 6" (150mm). Longitudinal joints shall be parallel to the centerline of the pavement. Alignment of the mat is dependent on the accuracy of the guideline provided for the paver operator and his alertness in following it. Attention to this detail is vital to the construction of a satisfactory longitudinal joint, since only a straight edge can be properly matched to make the joint
- DD. Hot joints are formed by two pavers operating in echelon. The screed of the rear paver is set to match the grade or thickness of the unrolled edge of the first mat placed. The advantages of a hot joint are that the two mats are automatically matched in thickness; the density on both sides of the joint is uniform because both sides are compacted together, and the hot mats form a solid bond. The disadvantage is that traffic cannot move in one of the lanes while the other is being paved. Both lanes are blocked simultaneously.
- EE. In building a cold joint, one lane is placed and compacted. At a later time, after the HMA in the first lane has cooled, the companion lane is placed against it and compacted. Special precautions must be followed to ensure a joint of good quality.
- FF. The following procedure is used to form a suitable longitudinal joint:

1. The exposed edge of the first lane shall be formed while hot to a straight line with a dense face, which shall lie between vertical and 45° to the vertical for the full depth of the layer.
 2. The unsupported longitudinal edges of spread material should be side tamped to raise the level of the asphaltic concrete slightly to secure maximum edge compaction from subsequent rolling.
 3. While placing the companion lane, the paver screed should be set to overlap the first mat by 1" to 2" (25 to 50 mm).
 4. The elevation of the screed above the surface of the first mat should be equal to the amount of roll-down expected during compaction of the new mat.
 5. The coarse aggregate in the material overlapping the cold joint should be carefully removed and wasted. This leaves only the finer portion of the mixture to be pressed into the compacted lane at the time the joint is rolled.
- GG. The placing of hot mix asphalt against abutting structures such as curbs, gutter manhole or adjoining pavement shall be carried out in the same manner as for longitudinal and transverse joints. Any spaces left unfilled between the spreader run and abutting edges shall be filled with sufficient material to the proper height prior to compaction.
- HH. After the paving mixture has been properly spread; it shall be thoroughly and uniformly compressed by rolling with power rollers.
- II. Hot mix asphalt shall be compacted uniformly to the standard specified as soon as it will support rollers without undue displacement. All rolling shall be completed while the mix is at a temperature above 185°F (85°C)
- JJ. The sub-soil shall be rolled and compacted by a roller to a minimum density at ninety-five percent (95%) as determined by the Modified Proctor Test (AASHTO T99).
- KK. Testing required to validate or control the mix supplied is the Paving Contractor's responsibility and will be included in the bid cost for providing these HMA items. Daily maximum theoretical specific gravity (Gmm) values must be made available to the Contractor's density technician for verifying in-place density within four hours of start of production. Asphalt content, gradation, and bulk specific gravity (Gmb) testing shall be performed on the first day of installation for each product used, then done a minimum of once every 400 tons of HMA supplied or every third day for low tonnages that when added together successively do not equal 400 tons. Acceptable average measures are made by use of a correlated nuclear density gauge, a correlated Pavement Quality Indicator or Pave Tracker (non-nuclear) or by cutting (4) cores per lift, per day and testing per AASHTO T-166, Method C. Additional testing shall be performed on any given day once 400 tons of asphalt is placed on that day.
- LL. Testing required to validate or control the mix supplied is the Paving Contractor's responsibility and will be included in the bid cost for providing these HMA items. Daily maximum theoretical specific gravity (Gmm) values must be made available to the Contractor's density technician for verifying in-place density within four hours of start of production. Asphalt content, gradation, and bulk specific gravity (Gmb) testing shall be performed on the first day of installation for each product used, then done a minimum of once every 400 tons of HMA supplied or every third day for low tonnages that when added together successively do not equal 400 tons. Acceptable average measures are made by use of a correlated nuclear density gauge, a correlated Pavement Quality Indicator or Pave Tracker (non-nuclear) or by cutting (4) cores per lift, per day and testing per AASHTO T-166, Method C. Additional testing shall be performed on any given day once 400 tons of asphalt is placed on that day.
- MM. Testing required to validate or control the mix supplied is the Paving Contractor's responsibility and will be included in the bid cost for providing these HMA items. Daily maximum theoretical specific gravity (Gmm) values must be made available to the Contractor's density technician for verifying in-place density within four hours of start of production. Asphalt content, gradation, and bulk specific gravity (Gmb) testing shall be performed on the first day of installation for each product used, then done a minimum of once every 400 tons of HMA supplied or every third day for low tonnages that when added together successively do not equal 400 tons. Acceptable average measures are made by use of a correlated nuclear density gauge, a correlated Pavement Quality Indicator or Pave Tracker (non-nuclear) or by cutting (4) cores per lift, per

day and testing per AASHTO T-166, Method C. Additional testing shall be performed on any given day once 400 tons of asphalt is placed on that day.

- NN. Testing required to validate or control the mix supplied is the Paving Contractor's responsibility and will be included in the bid cost for providing these HMA items. Daily maximum theoretical specific gravity (Gmm) values must be made available to the Contractor's density technician for verifying in-place density within four hours of start of production. Asphalt content, gradation, and bulk specific gravity (Gmb) testing shall be performed on the first day of installation for each product used, then done a minimum of once every 400 tons of HMA supplied or every third day for low tonnages that when added together successively do not equal 400 tons. Acceptable average measures are made by use of a correlated nuclear density gauge, a correlated Pavement Quality Indicator or Pave Tracker (non-nuclear) or by cutting (4) cores per lift, per day and testing per AASHTO T-166, Method C. Additional testing shall be performed on any given day once 400 tons of asphalt is placed on that day.

The average sub-lot (daily or 400 tons; whichever is less) in-place density measure for surface course mixtures shall be 94.0% of Gmm with no value less than 92.5% of Gmm. Base and leveling installation of asphalt shall meet local DOT specifications for in-place density measures or average of 92.0% of Gmm, whichever is greater. Surface course longitudinal joints shall be measured directly upon the joint, centered upon by core or density gauge, and shall meet the mat density requirements. Base and leveling course longitudinal joint density measures shall achieve between 95% - 102% of maximum achievable individually, with an average of 98% on any given day.

Process Control testing shall be in accordance with state standards for frequency and methods where the work being performed is done with a minimum of testing meeting the above QC requirements. Process Control Voids and minus #200 gradation shall target mix design with no test outside plus / minus 1.0% and VMA shall target the asphalt mix design value or greater, with no test value less than minimum allowed minus 0.3%.

Print outs of ingredients used shall be supplied for each run of asphalt; data logger Or computer screen shot. Print outs shall be supplied daily with the final load of asphalt ticket.

- OO. The exact number of passes of a roller that will be required to obtain adequate density will be determined on a test strip using a nuclear density gauge to measure the density of the mat after each pass, until maximum achievable density is indicated by the test results. The rolling pattern used on the test strip should be the same that will be used on the remainder of the job. The number of rollers and/or the rate of production will be adjusted accordingly.
- PP. The speed of rollers at all times shall be slow enough to avoid displacement of the mix and shall not be greater than 3 mph (5 km/h).
- QQ. Steel wheel rollers shall be operated with minimum wetting of rollers.
- RR. The driving roll shall be nearer the spreader.
- SS. Vibratory mechanisms shall be disengaged before stopping or reversing direction.
- TT. Rollers shall not remain stationary on asphaltic concrete while it is still warm. Roller wheels shall be kept free from any buildup.
- UU. The roller shall pass over the unprotected end of the freshly laid mixture only when a transverse joint has to be made.
- VV. Initial (breakdown) rolling shall be performed with a static steel-wheeled roller. Transverse joints shall be rolled first, then the longitudinal joint and the outside edge. Breakdown rolling shall continue longitudinally, commencing on the lower side and proceeding to the higher side of the spreader run. The roller shall overhang the unsupported edges of the run by about 4-inch (100mm). Each longitudinal pass shall overlap the previous pass by about 4-inch (100mm) and adjacent passes of the roller shall be of different lengths.

- WW. Secondary rolling to obtain required density before the mixture cools to 1850F (850C) shall be performed as soon as possible after initial rolling and shall be performed with a static or a vibratory steel wheeled roller. Rolling shall be carried out longitudinally commencing on the lower side and proceeding to the higher side of the spreader run. Each roller pass shall overlap the previous pass and adjacent passes shall be of different lengths.
- XX. Final rolling for the improvement of the surface while the mixture is still warm enough to permit removal of any roller marks shall be performed with static steel wheeled roller.
- YY. When paving in echelon, the edge of the run common to adjacent spreaders shall be left unrolled for a width of 8 inch (200mm) until the longitudinal joint has been constructed. This strip shall be rolled together with the edge of the adjacent spreader run. Rolling shall commence before the temperature of the material along the edge of the first spreader run has fallen below 95 0C (203 0F).

3.2 ACCEPTANCE OF PAVING WORK – REMEDY WORK

- A. Each successive layer shall not be commenced until the underlying layer has been approved following inspection and/or testing.
- B. Acceptance of paving work as far as compaction and stability specifications is concerned will be based on tests to be performed on core samples taken from each layer shortly after application. Test results shall be submitted to synthetic surfacing contractor.
- C. Should a section of the work be not acceptable on the basis of inadequate compaction and/or the mixture became loose and broken, mixed with dirt or in any way defective, it shall be removed and replaced with fresh mixture which shall be immediately compacted to conform with the surrounding area.
- D. Areas of one (1) square inch or more showing excess of bitumen shall be removed and replaced.
- E. On completion of placement and compaction, pavement courses shall comply with the tolerances itemized in the following table.

Item	Characteristic	Tolerance
Top Coat	Level	+2mm/-2mm from design levels
	Thickness	+5mm/-0mm from design levels
	Flatness	3mm maximum departure from a 3m straight-edge in all directions
Binder Course	Level	+4mm/-4mm from design levels
	Thickness	+5mm/-0mm from design levels
	Flatness	4mm maximum departure from a 3m straight-edge in all directions

- F. Surface shape of each layer of pavement shall be such that water cannot accumulate at any point and the surface shall free drain to drainage channels.
- G. The whole surface of each layer of pavement should be checked for levels by a local surveyor, and for flatness with a 10 foot straightedge in all directions; the surface shall also be flooded and inspected for ponding, "bird baths", ridges, etc. After testing, all high and low areas shall be marked on the leveling course surface.
- H. Low areas shall be remedied by cutting out the course to full depth (or to a minimum depth of 3/4" – 1" (20 - 25 mm)) and replacing with the correct hot mixture. The repaired area shall be thoroughly compacted to

the specified tolerance. First the area must be fully tack coated. No filling by using sand mix shall be allowed. Sand asphalt lacks sufficient internal strength. No tar emulsions such as 'jet shield' or similar products shall be applied to the surface. Nor shall any other type of asphalt or tar leveling or sealing product (hot or cold) be coated on the surface. Under specific conditions and with synthetic surfacing contractor's prior approval, a polyurethane underlayment material as recommended by the manufacturer can be used for correcting small low areas. Extensive use of Polyurethane underlayment is no substitute for proper installation and leveling of the asphalt. The depth of the underlayment layer must be limited to 1/4" (6 mm) or less.

- I. High areas shall be remedied by cutting out the course to full depth (or to a minimum depth of 3/4" – 1" (20 - 25 mm)) and replacing with the correct hot mixture. The repaired area shall be thoroughly compacted to the specified tolerance. In some cases it is practical to repair high areas and ridges by heating with a "hot iron" or a butane torch and scraping them off. These areas must be rolled smooth afterwards.

3.3 CURING OF HOT MIX ASPHALT INSTALLATIONS

- A. The asphalt-leveling course will have to cure a minimum of twenty eight (28) days prior to installation of the synthetic surface in order to allow the escape of surface volatiles, oils. Etc.

3.4 DISCLAIMER

- A. The above recommendations are provided for general guidance only. The responsibility for warranties and/or performance guarantees for the proper preparation of the asphalt and stone base rest with the asphalt manufacturer and/or the asphalt sub-contractor in the event of base failure and not with the synthetic surfacing contractor. The General Contractor, Architect, and/or Asphalt Sub-Contractor will be notified by the synthetic surfacing contractor of any evident defects or installation conditions, which could result in unsatisfactory performance. The responsibility for remedying defective work rests with the General Contractor and/or the Asphalt Sub-Contractor. The synthetic surfacing contractor must be provided with the respective tests results in advance of visiting the project site if relevant commentary is expected. The Owner can obtain written confirmation from the synthetic surfacing contractor, based on site observations and test results supplied by the contractor that the bituminous concrete pavement appears satisfactorily finished and adequately cured to permit the installation to begin. (Written confirmation from synthetic surfacing contractor of satisfactory completed and adequately cured asphalt pavement can be obtained by the Owner, based on synthetic surfacing contractor's site observations, and test results supplied by the contractor) The synthetic surfacing contractor will not be held responsible for any delays past expected substantial completion dates, caused by the incorrect installation of the asphalt and/or stone base. As such, no liquidated damages and or penalties will be imposed on upon the synthetic surfacing contractor. Any subsequent visits to re-inspect the corrected asphalt and or stone base will be at the Sub-Contractor's, General Contractor's or Owner's expense.

END OF SECTION

SECTION 32 12 18

TRACK STONE BASE COURSE

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Provide crushed stone base (with prime) constructed on the compacted subgrade where shown on the Drawings, as specified herein, and as needed for a complete and proper installation of the track asphalt surfacing.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Section 32 12 16.36 – Athletic Track Asphalt.

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. The track subgrade must be stabilized per the PVR requirements designated by the Geotechnical Engineer. All subgrade stabilization efforts are to be included in the contractor's cope of work. Refer to the geotechnical report for details for each project site.

1.3 SUBMITTALS

- A. Certificates, signed by materials producer, stating that materials meet the specified requirements.

PART 2 - PRODUCTS

2.1 COARSE AGGREGATE

- A. Furnish a coarse aggregate (retained on No. 4 sieve) consisting of hard, durable particles of stone, reasonably free from soft, thin, elongated or laminated pieces and deleterious substances.
- B. Furnish aggregate with an abrasion loss of less than 65% as measured by the Los Angeles Abrasion Test.

2.2 FINE AGGREGATE

- A. Furnish a fine aggregate consisting of material produced by stone crushing operations.
- B. Liquid limit shall not exceed 25 and the plasticity index shall not exceed 6 when tested in accordance with AASHTO T-89 and T-90, respectively.

2.3 COMPOSITE MIXTURE

- A. Produce in one crushing operation or by blending the fine and coarse aggregate in proper proportions.
- B. After the materials have been mixed, laid down, and initial compaction operations begun, the composite mixture shall conform to NCDOT Standards for crushed aggregate base course for asphalt paving.

2.4 PRIME ASPHALT

- A. Use prime complying with requirements of North Carolina Department of Transportation Standard Specifications for Prime or Tack Coat, latest revisions and supplements.

PART 3 - EXECUTION

3.1 PREPARATION OF SUBGRADE

- A. Proofroll all areas to receive crushed stone paving.
 - 1. Make not less than three passes over the full area, using a 35 to 50 ton rubber tired roller.
- B. Remove all soft, unstable or unsuitable material that will not compact readily.
 - 1. Remove to full depth of unsuitable material, or to a depth of 30", whichever is less.
 - 2. Replace with satisfactory materials.
- C. Fill all holes, ruts or depressions which develop in the subgrade with approved on-site material, bringing subgrade to indicated line and grades.
- D. Compact subgrade using suitable construction procedures to provide not less than 95% Standard Proctor Maximum Dry Density.
- E. Seal roll the subgrade surface with a steel wheel roller, sealing the surface against excessive water infiltration.

3.2 PLACING AND MIXING OF PAVING MATERIAL

- A. Place aggregates using spreader boxes or other approved spreaders uniformly on one operation.
- B. Take care to avoid segregation of the fine from the coarse aggregate during handling, spreading or shaping operations.
- C. Mix, while at proper moisture, with motor grader or other equipment and maintain to required section and grade until thoroughly compacted.

3.3 ROLLING AND COMPACTING

- A. Perform using 3-wheel steel wheel roller weighing not less than 10 tons, tandem roller weighing at least 8 tons, or other rollers approved by the Engineer.
- B. Start rolling at edges and proceed toward the center, continue rolling until aggregates are firmly keyed or set.

- C. When initial compaction is completed, should voids remain, place fine aggregates on the surface in an amount only sufficient to fill the voids.
- D. Broom, wet and roll until coarse aggregate is set, bonded and thoroughly compacted for full width and depth.

3.4 ALLOWABLE TOLERANCES

- A. Thickness tolerance: Provide the compacted thicknesses shown on the Drawings within a tolerance of minus 1/2".
 - 1. 1. Depth measurements will be made by digging through the base at intervals no closer than 250', nor greater than 500' apart.
 - 2. 2. Where thickness is less than depth specified minus 1/2", it shall be corrected as directed by the Engineer.
- B. Smoothness tolerance: Provide the lines and grades shown on the Drawings within a tolerance of 3/8" in 10', parallel to the center line of the roadway nor more than 1/2" from a template conforming to the cross sections shown on the plans.
- C. Deviations: Correct by removing materials, replacing with new materials, and reworking or recompacting as required.

3.5 PLACING PRIME COAT

- A. Allow base course to season sufficiently to permit uniform penetration.
- B. Do not apply to wet surfaces or when the temperature is below 60°F in the shade and falling, or below 55°F in the shade and rising.
- C. Clean surfaces of all dust, dirt, clay, etc. using mechanical brooms, etc.
- D. Apply prime material, using pneumatic mounted distributors, at a rate of 0.25 to 0.30 gallon per square yard.
- E. Permit no traffic on primed surfaces until bituminous material has penetrated and dried sufficiently that it does not pick up under traffic.

3.6 MEASUREMENT AND PAYMENT

- A. No separate measurement or direct payment will be made for this work and all costs for same shall be included in the price bid for the work to which it pertains.

END OF SECTION

SECTION 32 13 13
CONCRETE PAVING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Track Curbs
 - 2. Track Events
 - 3. Sidewalks

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For each exposed product and for each color and texture specified.
- C. Other Action Submittals:
 - 1. Design Mixtures: For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1.3 QUALITY ASSURANCE

- A. Ready-Mix-Concrete 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.
- B. ACI Publications: Comply with ACI 301 (ACI 301M) unless otherwise indicated.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

- A. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, fabricated from as-drawn steel wire into flat sheets.
- B. Deformed-Steel Welded Wire Reinforcement: ASTM A 497/A 497M, flat sheet.
- C. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420); deformed.
- D. Plain-Steel Wire: ASTM A 82/A 82M, as drawn.
- E. Deformed-Steel Wire: ASTM A 496/A 496M.

- F. Dowel Bars: ASTM A 615/A 615M, Grade 60 (Grade 420) plain-steel bars [; zinc coated (galvanized) after fabrication according to ASTM A 767/A 767M, Class I coating]. Cut bars true to length with ends square and free of burrs.
- G. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified.

2.2 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of same type, brand, and source throughout Project:
 - 1. Portland Cement: ASTM C 150, portland cement
 - a. Fly Ash: ASTM C 618
 - b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
 - 2. Blended Hydraulic Cement: ASTM C 595,
- B. Normal-Weight Aggregates: ASTM C 33,
- C. Water: Potable and complying with ASTM C 94/C 94M.
- D. Air-Entraining Admixture: ASTM C 260.
- E. Chemical Admixtures: Admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.
- F. Color Pigment: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable,[free of carbon black,] nonfading, and resistant to lime and other alkalis.

2.3 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, [Class 3, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) dry] [or] [cotton mats].
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable.
- D. Evaporation Retarder: Waterborne, monomolecular, film forming, manufactured for application to fresh concrete.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.
- F. White, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 2, Class B, dissipating.

2.4 RELATED MATERIALS

- A. Joint Fillers: [ASTM D 1751, asphalt-saturated cellulosic fiber] [or] [ASTM D 1752, cork or self-expanding cork] in preformed strips.

- B. Slip-Resistive Aggregate Finish: Factory-graded, packaged, rustproof, nonglazing, abrasive aggregate of fused aluminum-oxide granules or crushed emery aggregate containing not less than 50 percent aluminum oxide and not less than 20 percent ferric oxide; unaffected by freezing, moisture, and cleaning materials.

2.5 CONCRETE MIXTURES

- A. Prepare design mixtures, proportioned according to ACI 301 (ACI 301M), with the following properties:
 - 1. Compressive Strength (28 Days): 4000 psi
 - 2. Maximum Water-Cementitious Materials Ratio at Point of Placement: .50
 - 3. Slump Limit: 4 inches
 - 4. Air Content: 4-1/2 percent plus or minus 1.5 percent.
- B. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.
- C. Synthetic Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than 1.0 lb/cu. yd.
- D. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions.

2.6 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M[and ASTM C 1116/C 1116M]. Furnish batch certificates for each batch discharged and used in the Work.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

- A. Proof-roll prepared subbase surface below to identify soft pockets and areas of excess yielding.
- B. Remove loose material from compacted subbase surface immediately before placing concrete.

3.2 EDGE FORMS AND SCREED CONSTRUCTION

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
- B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.3 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

3.4 JOINTS

- A. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.
- B. Joints for any concrete track events, shall be determined by the synthetic track manufacturer.
- C. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.
- D. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.
- E. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, to match jointing of existing adjacent concrete paving:
- F. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces.

3.5 CONCRETE PLACEMENT

- A. Moisten subbase to provide a uniform dampened condition at time concrete is placed.
- B. Comply with ACI 301 (ACI 301M) requirements for measuring, mixing, transporting, placing, and consolidating concrete.
- C. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
- D. Screed paving surface with a straightedge and strike off.
- E. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

3.6 FLOAT FINISHING

- A. General: Do not add water to concrete surfaces during finishing operations.
- B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.
 - 1. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of traffic.
- C. Slip-Resistive Aggregate Finish: Before final floating, spread slip-resistive aggregate finish on paving surface according to manufacturer's written instructions.
 - 1. Cure concrete with curing compound recommended by slip-resistive aggregate manufacturer. Apply curing compound immediately after final finishing.

2. After curing, lightly work surface with a steel wire brush or abrasive stone and water to expose nonslip aggregate.

3.7 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
- B. Comply with ACI 306.1 for cold-weather protection.
- C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete but before float finishing.
- D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- E. Curing Methods: Cure concrete by [moisture curing] [moisture-retaining-cover curing] [curing compound] [or] [a combination of these].

3.8 PAVING TOLERANCES

- A. Comply with tolerances in ACI 117 and as follows:
 1. Elevation: 3/4 inch (19 mm).
 2. Thickness: Plus 3/8 inch (10 mm), minus 1/4 inch (6 mm).
 3. Surface: Gap below 10-foot- (3-m-) long, unleveled straightedge not to exceed 1/2 inch (13 mm).
 4. Joint Spacing: 3 inches (75 mm).
 5. Contraction Joint Depth: Plus 1/4 inch (6 mm), no minus.
 6. Joint Width: Plus 1/8 inch (3 mm), no minus.

3.9 REPAIRS AND PROTECTION

- A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Architect.
- B. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.
- C. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION

SECTION 32 13 73

PAVEMENT JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Expansion and contraction joints within cement concrete pavement.
 - 2. Joints between cement concrete and asphalt pavement.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For each type and color of joint sealant required.
- C. Product certification and test reports.
- D. Compatibility and Adhesion Test Reports: From sealant manufacturer.

1.3 QUALITY ASSURANCE

- A. Preconstruction Compatibility and Adhesion Testing: Submit samples of materials that will contact or affect joint sealants to joint-sealant manufacturers for testing according to AASHTO M153 for Type I, II, or III; or be a bituminous type that meets AASHTO M213 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in other Part 32 articles.
- B. Products: Subject to compliance with requirements, provide one of the products listed in other Part 32 articles.

2.2 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer based on testing and field experience.
 - 1. Primers: Product recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

- B. Colors of Exposed Joint Sealants: As indicated by manufacturer's designations and coordination with architect.

2.3 COLD-APPLIED JOINT SEALANTS

- A. Type NS Silicone Sealant for Concrete: Single-component, low-modulus, neutral-curing, nonsag silicone sealant complying with ASTM D 5893 for Type NS.
 - 1. Available Products:
 - a. Crafcro Inc.; RoadSaver Silicone.
 - b. Dow Corning Corporation; 888.
 - c. NCDOT approved equal
- B. Type SL Silicone Sealant for Concrete and Asphalt: Single-component, low-modulus, neutral-curing, self-leveling silicone sealant complying with ASTM D 5893 for Type SL.
 - 1. Available Products:
 - a. Crafcro Inc.; RoadSaver Silicone SL.
 - b. Dow Corning Corporation; 890-SL.
 - c. NCDOT approved equal.

2.4 HOT-APPLIED JOINT SEALANTS

- A. Sealant for Concrete and Asphalt: Single-component formulation complying with ASTM D 6690.
 - 1. Available Products:
 - a. Koch Materials Company; Product No. 9005.
 - b. Koch Materials Company; Product No. 9030.
 - c. Meadows, W. R., Inc.; Sealtight Hi-Spec.
 - d. NCDOT approved equal.

2.5 JOINT-SEALANT BACKER MATERIALS

- A. General: Provide joint-sealant backer materials that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by joint-sealant manufacturer based on field experience and laboratory testing.
- B. Type L – A closed-cell expanded polyethylene foam backer rod. Use in roadway and bridge joints with Type NS silicone only.
- C. Type M – A closed-cell polyolefin foam backer rod which has closed-cell skin over an open-cell core. Use in roadway and bridge joints with both silicon sealant types
- D. Backer Rods for Cold-Applied Sealants: ASTM D 1622, 2lbs/cf minimum; ASTM D 1623 25 psi minimum; ASTM C 509 0.5% by volume maximum.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions.
- B. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience.

- C. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- D. Install backer materials to support sealants during application and at position required to produce optimum sealant movement capability. Do not leave gaps between ends of backer materials. Do not stretch, twist, puncture, or tear backer materials. Remove absorbent backer materials that have become wet before sealant application and replace them with dry materials.
- E. Install sealants at the same time backings are installed to completely fill recesses provided for each joint configuration and to produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
- G. Clean off excess sealants or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

END OF SECTION

SECTION 32 18 23.29

SYNTHETIC TURF SYSTEM

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. This specification is for synthetic turf for Butler High School Football Field. Scope of work to include all labor, material, equipment, transportation and services to install complete new vertical draining in-filled synthetic turf surfacing system.
- B. It is the intent that the bidding general contractor employ one of the sports field manufacturers (see B.2) and a qualified sport field contractor to coordinate the installation of the synthetic turf. It is the general contractor's contract responsibility to furnish all labor, materials, testing, tools and equipment necessary to install, in place, all synthetic turf as indicated on the drawings and specified herein. It is acceptable for the turf manufacturer to act as the bidding general contractor as long as they are licensed for general contracting work in North Carolina under the correct classifications.
 - 1. Turf Systems: Hybrid Slit Film/Monofilament Turf System with SBR Rubber and Sand Infill.
 - 2. Approved Sport Turf Manufacturers:
 - a. Shaw Sports Turf
 - b. AstroTurf
 - c. SprinTurf
 - d. Hellas
 - e. FieldTurf
 - 3. The installation of all new materials shall be performed in strict accordance with the manufacturer's written instructions and in accordance with approved shop drawings.
 - 4. Additional requirements can be found within this specification.
- C. Pricing Package
 - 1. Base Bid - Provide a synthetic turf field system as defined in specifications installed on an aggregate base with associated drainage.
- D. Provide equipment and materials and do the work necessary to construct the synthetic field system, as indicated on the Drawings and as specified. Work shall include but shall not be limited to:
 - 1. Subgrade and Base Construction
 - a. Subgrade stabilization per the Geotechnical requirements
 - b. Excavation, trenching, grading, backfilling, compaction to achieve subgrade as Needed
 - c. Gravel base construction
 - d. Install collector drains
 - e. Install panel drains
 - f. Laser grading
 - g. Disposal of spoil materials off site.
 - h. Grade elevation verification of finish stone grade and acceptance prior to gravel install.
 - 2. Curb, Fencing and Netting
 - a. Install curbing with integrated fencing and netting
 - b. Provide expansion joints
 - c. Disposal of trench spoils
 - d. Install post, fabric and netting
 - 3. Synthetic Turf Field
 - a. PT Wood Nailer board
 - b. Synthetic Turf

- c. Infill material
- d. Inlays and lines
- e. Related finish work
- 4. As-built Drawings
 - a. Complete set of construction as-builts in CAD

1.2 RELATED WORK

- A. Review all Construction Documents for the following work-related items to be included in the project
 - 1. 321313 Concrete Paving
 - 2. 322200 Resilient Underlayment
 - 3. 323113 Chain Link Fencing

1.3 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. Drawings and the general provisions of the Contract, including General and Supplementary Conditions and other Division I Specification Sections, apply to this section.
 - 2. Installation shall comply with rules and/or regulations for field play set forth by the Nation Federation of High School Sports (NFHS) and the NCAA. Contractor to provide shop drawing striping plans for all fields prior to construction to ensure compliance.
 - 3. American Society for Testing and Materials (ASTM): Latest standard test methods for the products used for the synthetic turf product system, RCRA testing approved by the EPA. And, European Committee for Standardization of International Playing Surfaces EN 1177 for Head Injury Criteria.
 - a. Testing for Wheelchair Accessibility is required – (F1951-0)
 - b. Standard Test Methods for Laboratory Compaction Characteristics of Testing for Water Permeability of Synthetic Turf Systems and Permeable Bases (F1551) is required.
 - c. Additional Testing Required as per Section 3.13 for the Synthetic Turf System.

1.4 SUBMITTALS

- A. Provide one (1) 12" x 12" boxed sample of proposed synthetic turf carpet and infill, and physical color samples of all color inlays requested.
- B. Signed public welfare and safety affidavit of heavy metal and containment free synthetic turf system.
- C. Digital .pdf copies of all third-party ASTM product data and testing documents stated in the specifications section demonstrating that proposed system meets or exceeds all specified requirements Submit to Owner for approval. All testing shall be paid for by the Contractor.
- D. List of all company litigation in the last 10 years pertaining to synthetic turf construction. Includes litigation history for all associated subcontractors.
- E. Affidavit signed by an authorized representative of the Synthetic Turf Manufacturer attesting that the Sports Field Contractor is accepted and certified by the STM.
- F. Copy of standard eight (8) year warranty against workmanship and materials on the proposed synthetic turf
- G. Submit a list of all material providers, including relevant contact information.
- H. Provide both a delivery and installation schedule.

- I. Provide a list and contact information of all subcontractors.
- J. The turf manufacturer shall submit a signed statement for the safety of their product regarding lead, heavy metals and other chemicals used in manufacturing of the product.
- K. Submit all compaction test results of the subgrade and gravel layer to conform with drawings and specification requirements.
- L. Prior to Final Acceptance, the Contractor shall submit one (1) digital .pdf copy of Maintenance Manuals, which will include all necessary instructions for the proper care and preventative maintenance of the synthetic turf system, including painting and striping.
- M. Provide testing results that show the provided turf system and specified infill meets Wheelchair Accessibility – (F1951-0) requirements.
- N. Base stone gradation testing, base and finish courses.
- O. All required submittals listed within this specification. Please refer to each section for additional requirements and submittals.

1.5 SHOP DRAWINGS

- A. Shop drawings shall be prepared and contain all pertinent information regarding installation. These drawings shall be submitted to the Owner for approval prior to the manufacturing and shipment of materials.
- B. Submit drawings for.
 - 1. Seaming plan
 - 2. Logos, layout and field striping details and dimensions
 - 3. Manufacture installation details
 - 4. Any proposed details that may deviate from plan documents

1.6 QUALITY ASSURANCE AND WARRANTY

- A. Manufacturer / Installer's Experience.
 - 1. The Sports Field Base Contractor/Installer must have installed and/or provided a minimum of twenty (20) synthetic turf football in the last three (3) years in the state of North Carolina. The Contractor shall employ only qualified, experienced supervisors and technicians skilled in the installation of this system.
- B. Hold Harmless Clause
 - 1. The turf manufacture and sport field contractor shall indemnify the School District and design team consultants from any potential patent and/or trademark infringements, litigation and or trade secret issues identified during the bid and construction process.
- C. Warranty
 - 1. The Contractor shall submit its Manufacturer's Warranty that guarantees the usability and playability of the synthetic turf system for its intended uses for a minimum eight (8) year period commencing with the date of Final Acceptance. The warranty coverage shall not be prorated nor limited to the amount of usage. The warranty submitted must have the following characteristics:
 - a. Must provide full coverage for eight (8) years from the date of Final Acceptance.
 - b. Must warrant materials and workmanship.
 - c. Must warrant that the materials installed meet or exceed the product specifications.
 - d. Must have a provision to repair or replace such portions of the installed materials that are no longer serviceable to maintain a serviceable and playable surface.

- e. Must be a warranty from a single source covering workmanship and all self-manufactured or procured materials.
 - f. Guarantee the availability of replacement material for the synthetic turf system installed for the full warranty period.
 - g. The Sports Field Contractor may be required, upon the request of the Owner, to provide a list of three (3) clients for which they have completed after-the-sale warranty work.
 - h. Any issues with type of shoe requirements for multi-sport play must be stated in the Warranty.
 - i. The 8-year warranty must also be supported by a 3rd party insured warranty from an A-rated domestic insurance carrier. The value of the policy shall be no less than \$5,000,000 per occurrence, no deductibles allowed, with a total annual policy aggregate of \$10,000,000 renewed per each year of use. Only true 3rd party policies will be accepted. Companies submitting policies that are letters of credit or not truly a 3rd party insurance policy will not be accepted. Submit three (3) copies of the actual insurance policy.
 - j. The 8-year warranty shall cover the following designated uses and associated wear characteristics for each sport use below
 - 1) NFHS Football
 - 2) NFHS Lacrosse
 - 3) Sport Camps
 - 4) General Recreation
 - 5) Special Events
 - 6) Wheelchair Access
 - 7) Pneumatic tire vehicle access
 - 8) Maintenance in accordance with manufacture recommendations
- D. Maintenance
- 1. The Contractor shall supply the Owner with a digital pdf of a written maintenance manual for proper care of the finished product. The maintenance manual shall specify any use limitations for the field (e.g. heavy vehicle traffic, etc.)
- E. System Performance Characteristics
- 1. G-Max (shock attenuation) must test below 110 at installation.
 - 2. The various Gmax Values should not vary each year by more than 10% above or below the average at time of installation for any individual drop.
 - 3. Lifecycle Gmax Values: The maximum Gmax Value throughout the warranted lifecycle of the synthetic turf playing surface is not to exceed 1365G.
 - 4. The depth of the infill material shall be measured at each test location
 - 5. Critical Fall Height (HIC) greater than 1.3M
 - 6. All testing shall be performed by a certified third-party independent lab and paid for by the Contractor.
 - 7. After the Contractor installs the system, he must guarantee that the field will meet the following performance criteria
 - a. The completed turf system shall allow a minimum percolation rate of 20 inches per hour. ASTM F2898 Permeability of Synthetic Turf Sports Field Base Stone and Surface System by Non-Confined Area Flood Test Method.
 - b. Relative Abrasiveness (to ASTM F 1015). The system has an Abrasiveness Index of 20.2
 - c. Shock Absorbency (to ASTM F355, ASTM F 1936) Less than 135 G-Max for 8- year warranty.
 - d. Flammability (to ASTM D 2859).

1.7 COMPLETION AND ACCEPTANCE

- A. Punch list shall be scheduled at least 10 days before the Substantial Completion Date.
- B. Owner shall be notified of the Punch List date 10 days before planned occurrence in writing.
- C. All items to be installed and in working order prior to Punch List request.

- D. After Punch List items are corrected, the contractor shall notify the owner for "Substantial Completion" 10 days prior.

PART 2 - PRODUCTS

2.1 SYNTHETIC TURF PRODUCT

- A. The turf field shall be a rubber and sand infilled fiber slit film/monofilament synthetic grass system for the playing field. Provide all ASTM/EIN/EPA test as applicable with the turf submittal.
- B. BASE BID Turf product specifications for 2.25" Pile Height.

<u>Turf Requirements:</u>	<u>Description</u>
1. Turf Type	Dual Fiber (Slit Tape/Mono Hybrid) with Thatch
2. Base Turf Color	Field Green
3. Pile Height	2.25"
4. Exposed Fiber Height	Per Manufacturer Specifications
5. Pile Yarn	UV Resistant Polyethylene
6. Slit Tape Fiber	XP Blade + or Equal
7. Mono Fiber Type	Ridged
8. Face/Pile Weight	48 oz per SY Min.
9. Primary Backing	6 oz/SY Min.
10. Primary Backing UV Stabilizer	1000 hours of QUV A testing
11. Secondary Backing	20 oz/SY Min.
12. Total Carpet Weight	74 oz/SY Min.
13. Machine Gauge	1/2" Max.
14. Tuft Bind	Min. 8lbs without infill, 10lbs with infill
15. Grab Strength	> 200 lbs. avg.
16. Grab Tear Width	> 200 lbs. avg.
17. Pill Burn Test	Pass
18. Infill	SBR 70% Sand 30%
19. Infill Rubber Granule Comp	SBR Rubber
20. Infill Rubber Spec. Gravity	1.1 min to 1.2 max
21. Infill Rubber Ash Content	Between 5% and 15%
22. Infill Rubber Sieve Analysis	10 / 20 Mesh (2.0mm - 0.85mm)
23. Infill Sand Granule Shape	Semi-rounded to rounded angularity
24. Infill Sand Sieve Analysis	20 / 40 Mesh (0.85mm - 0.425 mm)
25. Infill per SF	Min. 6.0 lbs.
26. Infill Depth	+/- 1.5"
27. Fabric Width	15'-0
28. Yard Denier Slit Film	6,000 Min.
29. Yard Denier Mono	10,000 Min.
30. Breaking Strength	18 lbs./sf
31. Yarn Melting Point	246 degrees
32. Permeability of Backing	Min. 30 Inches per Hour

- C. **ALTERNATE BID (WITH SHOCK PAD)** Turf product specifications for 2.00" Pile Height.

<u>Turf Requirements:</u>	<u>Description</u>
1. Turf Type	Dual Fiber (Slit Tape/Mono Hybrid) with Thatch
2. Base Turf Color	Field Green
3. Pile Height	2.0"
4. Exposed Fiber Height	Per Manufacturer Specifications
5. Pile Yarn	UV Resistant Polyethylene
6. Slit Tape Fiber	XP Blade + or Equal
7. Mono Fiber Type	Ridged

8.	Face/Pile Weight	48 oz per SY Min.
9.	Primary Backing	6 oz/SY Min.
10.	Primary Backing UV Stabilizer	1000 hours of QUV A testing
11.	Secondary Backing	20 oz/SY Min.
12.	Total Carpet Weight	74 oz/SY Min.
13.	Machine Gauge	3/8"
14.	Tuft Bind	Min. 8lbs without infill, 10lbs with infill
15.	Grab Strength	> 200 lbs. avg.
16.	Grab Tear Width	> 200 lbs. avg.
17.	Pill Burn Test	Pass
18.	Infill	SBR 50% Sand 50%
19.	Infill Rubber Granule Comp	SBR Rubber
20.	Infill Rubber Spec. Gravity	1.1 min to 1.2 max
21.	Infill Rubber Ash Content	Between 5% and 15%
22.	Infill Rubber Sieve Analysis	10 / 20 Mesh (2.0mm - 0.85mm)
23.	Infill Sand Granule Shape	Semi-rounded to rounded angularity
24.	Infill Sand Sieve Analysis	20 / 40 Mesh (0.85mm - 0.425 mm)
25.	Infill per SF	Min. 5.0 lbs.
26.	Infill Depth	+/- 1.5"
27.	Fabric Width	15'-0
28.	Yard Denier Slit Film	6,000 Min.
29.	Yard Denier Mono	10,000 Min.
30.	Breaking Strength	18 lbs./sf
31.	Yarn Melting Point	246 degrees
32.	Permeability of Backing	Min. 30 Inches per Hour

- D. Logos and lettering to be provided as shown in the plan set.
- E. All vendors must submit a turf spec sheet prior to final approval after bid.
- F. The Secondary Backing of high-grade polyurethane shall be applied to the Primary Backing. The tuft bind shall be a minimum average of 8 lbs. without infill and 10 lbs. with infill.
- G. Turf products with permeable backing do not require perforations.
- H. All perforations shall be unobstructed.
- I. Turf products with a coated or non-drain thru backing must include perforations in the backing.
- J. All turf carpet and infill material shall be provided by a single source and documented accordingly.
- K. All inlaid lines will be tufted in the factory to a practical extent. All widths of lines per NFHS and UIL rules.
- L. All seams shall be flat, tight, and permanent with no separation or fraying.
- M. Carpet rolls shall be 15-foot widths.
- N. The finished surface shall function as a grass field with similar natural playing grass field characteristics.
- O. The use of all conventional athletic shoes shall be allowed and identified in the warranty specifications.
- P. All components and their installation methods shall be designed and manufactured for use on outdoor athletic fields. The materials as hereinafter specified should be able to withstand full climatic exposure in all climates, be resistant to insect infestation, rot, fungus, mildew, ultraviolet light and heat degradation, and shall have the basic characteristics of flow-through drainage, allowing free movement of surface runoff through the synthetic turf fabric where such water may flow to the existing base and into the field drainage system.

- Q. The finished playing surface shall appear as mowed grass with no irregularities and shall afford excellent traction for conventional athletic shoes of all types. The finished surface shall resist abrasion and cutting from normal use.
- R. Sew or glue seam turf as recommended by the synthetic turf manufacturer.

2.2 INFILL (BASE BID, SAND AND SBR RUBBER)

- A. Infill should be a combination of SBR and Sand.
- B. The crumb rubber shall have a specific gravity range from 1.1 minimum to 1.2 maximum as determined by ASTM D 297 (including any modifications made by ASTM in the future).
- C. The crumb rubber shall have an ash content of between 5 and 15% as determined by ASTM D 297 (including any modifications made by ASTM in the future).
- D. The crumb rubber shall not contain more than .01% (of the total weight of crumb rubber) liberated fiber (no more than 0.6 lbs per ton) tested per ASTM D 5603.
- E. The infill materials shall conform to the synthetic turf vendor's standard specifications and warranty.
- F. All sand infill to have clean rounded particles and meet manufacturer's requirements.

2.3 RESILIENT UNDERLAYMENT PAD (ALTERNATE No.1)

- A. Brock YSRXD - Basis of Design
- B. See specification 322200 Resilient Underlayment Pad
- C. Install per manufactures recommendations.

2.4 GEOTEXTILE

- A. Geotextile Filter Fabric for the Subgrade and Collector Drainage: Non-woven polypropylene geotextile fabric shall be chemically and biologically inert. The subgrade shall be covered in its entirety with a geotextile fabric meeting the following specifications. The geotextile shall be woven from high-tenacity long-chain synthetic polymers composed of at least 95 percent by weight of polyolefins or polyesters and pass a minimum of 135 gpm. They shall form a stable network such that the filaments or yarns retain their dimensional stability relative to each other, including selvages
- B. Geotextile for the subgrade shall have minimums:
 - 1. Mass/Weight of 4.5oz oz/yd²
 - 2. Flow rate 135 gal/min/ft²
 - 3. Permivity 1.8 cm/sec
 - 4. Tensile Strength 120 lbs
 - 5. Elongation 50%
 - 6. Trapezoid Tear Strength 50lbs
 - 7. Apparent Opening Size 70 US Sieve
 - 8. UV Resistance 70/500 % hours

2.5 DRAINAGE PIPE

- A. Perforated pipe shall be double wall high-density polyethylene pipe (HDPE) and shall conform to all associated AASHTO requirements.
- B. HDPE Perforated pipe shall Class have 2 slotted perforations in accordance with associated AASHTO requirements.
- C. Solid wall pipe shall be high-density polyethylene pipe (HDPE) and shall conform to associated AASHTO requirements.
- D. Inline structures only are to be used for collector drains. Risers with fittings are not allowed.
- E. Collector basins/cleanouts to be Nyloplast or approved equal with solid grates
- F. Panel Drains and Fittings shall be 1"x12" wide composite pipe.
 - 1. Advanedge
 - 2. MultiFlow
 - 3. J-Drain
 - 4. Approved Alternate

2.6 STONE BASE COURSE

- A. Stone Base Courses: The following gradation of stone is a typical and recommended specification. The Synthetic Turf Base Contractor is required to focus on achieving the planarity, porosity and compaction requirements to provide a sound crushed stone base for synthetic turf installation. The free-draining base aggregate base layer shall consist of a consistent depth of open graded material. Base drainage aggregate used must achieve a 95% minimum overall compaction rate.
- B. Material shall conform to the AASHTO and NCDOT #57 and #78 classifications. Local or regional stone specifications that meet, sieve, compaction and porosity requirements are permitted, but must be approved by the designer prior to construction.
- C. The stone base shall conform to the turf vendor's standard specifications subject to the Designer's approval and meet the following requirements using ASTM Method C136: The open graded aggregate material shall conform to the following criteria:

#78 Finish Stone	
Sieve Size	% Passing by Weight
3/4"	100
1/2"	98-100
No. 4	20-45
No. 8	0-15

#57 Free Draining Base Stone	
Sieve Size	% Passing by Weight
1-1/2"	100

3/4"	95-100
1/2"	25-60
No. 4	0-10
No. 8	0-5

- D. All stone shall be angular. Rounded or river stone is not acceptable.
- E. In no instance, shall multiple quarry sources be used within a single playing field area. Bridging Characteristics:
 - 1. a) $\frac{3 < \text{D50 base stone}}{\text{D50 top stone}} < 6$ b) $\frac{\text{D85 top stone}}{\text{D15 base stone}} < 2$
- F. All stone shall be angular. Rounded will not acceptable.
- G. The stone material shall be AASHTO#57 and #78. Material must be clean. NCDOT approved gradations will be accepted as long as they meet the AASHTO baseline specification.
- H. In no instance, shall multiple quarry sources be used within a single playing field area.
- I. All stone shall be angular. Rounded or river stone is not acceptable.
- J. Stone shall not come from multiple source locations.
- K. Permeability for base stone shall be greater than 50"/hr.
- L. Permeability for combined stone sections shall be greater than 30"/hr. 3rd Party Testing Required.

2.7 PRESSURE TREATED WOOD NAILER

- A. A PT wood nailer 2" x 4", or equivalent nailing strip shall be used and installed around the entire perimeter of the field.
- B. PT wood nailed shall be ground contact rated.
- C. Submittal Required

2.8 FIELD CONCRETE CURB

- A. All new concrete field curb dimensions shall be per plan
- B. Anchor attachments shall be approved by the manufacture for concrete setting.
- C. Concrete curbing shall have appropriate control and construction joints installed per specifications
- D. Concrete shall 4000 PSI minimum.
- E. Field curb shall be designed to contain all infill within the curb line.

PART 3 - EXECUTION

3.1 GENERAL

- A. The installation shall be performed in full compliance with approved shop drawings.
- B. Only factory-trained technicians skilled in the installation of synthetic turf systems shall undertake the placement of the system.
- C. The surface to receive the synthetic turf shall be inspected and certified by the manufacturer as ready for installation of the synthetic turf system and must be perfectly clean as installation commences and shall be maintained in that condition throughout the process.
- D. The turf system shall be fibrillated only after the infill material is installed with a machine specifically designed to do so. All contactors shall be familiar and understand all drawings and specifications for the work prior to beginning construction.
- E. All work shall be protected from inclement weather conditions.
- F. Verification of Conditions: Examine areas and conditions under which all work of this Section is being performed. Do not proceed with any work until unsatisfactory conditions have been corrected. Commencement of work implies acceptance of all areas and conditions.
- G. Site shall be secure to limit unauthorized personnel access and measures taken to protect all workers.
- H. Unanticipated Conditions: Notify the designer and owner immediately upon finding evidence of previous structures, filled materials that penetrate below designated excavation levels, or other conditions which are not shown, or which cannot be reasonably assumed from existing surveys and geotechnical reports. Secure the Engineer's instruction before proceeding with further work in such areas.
- I. The Project Superintendent shall thoroughly inspect all materials delivered to the site both for quality and quantity to assure that the entire installation shall have sufficient material to maintain proper mixing ratios.

3.2 INSTALLATION LIMITATIONS

- A. Site conditions exist, or are pending, that will be unsuitable for the installation of the turf system.

3.3 SUBGRADE AND EARTHMOVING

- A. Establish required lines, levels, contours and datum. Contractor responsible for work shall coordinate and ensure that the final grades of subgrade, stone base and playing surface meet the established design requirements.
- B. Maintain all benchmarks and other elevation control points. Re-establish, if disturbed or destroyed, at no additional cost to the Owner.
- C. Locate all utilities before grading. Coordinate with the Owner.
- D. If groundwater levels are sufficiently high, provide pumps in sumps as required maintaining groundwater at a minimum depth of two feet below excavation bottom at all times. Maintain dry conditions until completion and acceptance of the base, prior to synthetic turf placement.
- E. Monitor groundwater during construction.

- F. Prevent surface water from infiltrating and damaging the subgrade and stone base.
- G. There shall be no ponding on site at any time.
- H. For all excavation requirements procedures refer to geotechnical report and Earthmoving specification.
- I. For all structural fill requirements and procedures refer to geotechnical report and Earthmoving specification.

3.4 GEOTEXTILE FABRIC

- A. The geotextile shall be laid smooth without wrinkles or folds on the prepared subgrade in the direction of construction traffic.
- B. Adjacent geotextile rolls shall be overlapped. Overlaps shall be in the direction as shown on the plans and in accordance with the manufacturer's requirements. The lateral seam shall have a minimum overlap of 24"
- C. Dimensions to be a minimum width of 10' and minimum continuous length of 150'
- D. Attached to subgrade per manufacture specifications/recommendation.

3.5 SUBGRADE SLOPES AND FINAL GRADES

- A. Final subgrade grades shall conform to the proposed grades. The measured grades shall not deviate more than 0.04 feet from the planned grades and not vary more than 0.04 feet in 25 feet in any direction. Laser grading is required.
- B. A North Carolina signed and sealed survey of the finished subgrade base is required for review and approval prior to turf installation.
- C. If the subgrade base does not meet the specification requirements, rework and resurvey will be required.

3.6 SUBSURFACE COLLECTOR PIPE DRAINAGE

- A. All subsurface laterals shall be designed by contractor's engineer, and installed per manufacture recommendations
- B. Install geotextile fabric per plan documents.
- C. Only perform trenching, drainage pipe installation and backfilling operations that can be completed in one day. Exposed trenches that collapse due to rain or other occurrences shall be widened and filled as specified or refilled with subgrade materials, compacted, and retrenched.
- D. Lay perforated collector pipe in accordance with pipe manufacturer's recommendations.
- E. Contractor to back fill trenches with clean washed drainage stone that matches the existing turf stone composition.
- F. Collector drains shall be installed per the slopes designed by the contractors' engineer. Pipes shall be installed, connected and fully mudded into any and all catch basins, or drop boxes designed.

- G. All panel drains shall be attached to form a continuous drain. Refer to manufacture specifications regarding connection procedures and requirements for panel drain field connections.
- H. All pipes shall be installed per slopes and grades shown on contractors approved plans, shop drawings, and permitted drawings.
- I. Remove all spoils associated with trenching offsite at contractor's expense.

3.7 TURF NAILER

- A. A pressure treated wood 2" x 4", or equivalent nailing strip shall be used.
- B. Specifications and shop drawings for nailer and anchors shall be submitted Synthetic Turf Manufacturer (STM) for review and approval prior to contractor installation.
- C. After installation of the concrete curbing the contractor shall install the nailer, prior to final placement of the top stone rock for synthetic turf base.
- D. Nailer shall be installed using concrete anchors as specified by the Synthetic Turf Manufacturer (STM)
- E. Nailer shall be anchored at both end of board, and every 15" along entire length of product installed.
- F. Nailer shall be installed to an approved dimension below grade, as specified by the synthetic turf carpet supplier. Contractor shall verify finish grade of nailer with turf contractor.
- G. Any anchors that do not fully drive into concrete shall be removed and new anchor installed adjacent on either side of the previous anchor that failed to install fully

3.8 CONCRETE CURBING

- A. Clean existing concrete surfaces thoroughly before placing abutting fresh concrete.
- B. Concrete curbing for synthetic turf shall be per plan details. Finish shall be medium broom.
- C. Concrete curbing shall have appropriate control, expansion and construction joints installed per details.
- D. All curbing adjacent to walls and buildings shall have expansion joints.
- E. Every fence post embedded in the curb shall either have a control joint or expansion joint where required.

3.9 SUBGRADE ESTABLISHMENT

- A. The subgrade shall be excavated to create a positive slope towards the subsurface drainpipes at greater than 0.5% for the synthetic turf fields.
- B. No work shall be completed in this section until subgrade is 100% completed and accepted by the Landscape Architect and Owner or their representative.
- C. Following rough grading of the subgrade, the exposed soil shall be moisture conditioned to near the optimum moisture content and compacted to at least 90 percent relative compaction (modified proctor) to produce a firm non-yielding surface.

- D. Subgrade after compaction and inspection shall be covered with an approved geotextile fabric between all drain line locations. Fabric shall be non-woven, and be approved.
- E. Loaded trucks shall not be permitted to drive over fabric surface until the base aggregate has been placed accordingly.
- F. All aggregate layers to compacted to a minimum 95% of maximum dry density compaction rates.
- G. Final subgrade grades shall conform to the existing field grades shown on the drawings. The measured grades shall not deviate more than 0.04 feet from the planned grades and not vary more than 0.04 feet in 25 feet in any direction. Laser grading is required.
- H. A North Carolina signed and sealed survey of the finish subgrade is required for review and approval prior to turf installation.
- I. If the subgrade does not meet the specification requirements, rework and resurvey will be required.

3.10 SITE PREPARATION

- A. The Contractor shall strip all debris and organic matter from areas to be graded for the synthetic turf base.
- B. All drain line spoils shall be removed from subgrade and all subgrade areas shall be rolled and compacted to 90% and compaction test results submitted to Synthetic Turf Contractor, Owner and Engineer/Landscape Architect for approval and for the records.

3.11 COMPACTED FILL

- A. Place and compact approved fill material in accordance with the specifications and drawings.
- B. No fill shall be compacted during periods of rain or on ground that is saturated or has standing water. Soil that has been over-saturated by rain or any other means shall not be used until the moisture content is within limits required by the Owner and Engineer

3.12 PERMEABLE BASE AND TOP STONE

- A. Finished surface shall be proof rolled with a vibratory smooth double drum roller to provide a non-yielding, smooth, flat surface. Compaction must be to 95%-modified proctor. Modified proctor testing per current ASTM standards is required. Submit testing procedure to geotechnical engineer for approval.
- B. Final crushed rock base grades shall conform to the existing field grades shown on the drawings. The measured grades shall not deviate more than 0.04 feet from the planned grades and not vary more than 0.04 feet in 25 feet in any direction. Laser grading is required.
- C. A North Carolina signed and sealed survey of the finish stone base is required for review and approval prior to turf installation.
- D. If the stone base does not meet the specification requirements, rework and resurvey will be required.

3.13 PERMABILITY TESTING REQUIREMENTS

- A. Base stone (including finishing stone) shall be tested via ASTM D3385 Infiltration Rate of Soils in the field using a Double Ring Infiltrometer (EN12616). Provide ten test locations on each field to be determined by

the designer. Permeability for combined stone sections shall be greater than 30"/hr. 3rd Party Testing Required.

- B. The finished turf system must collectively drain vertically a minimum of 20" of rain per hour with no signs of visible ponding. The finish turf surface with infill shall be tested using ASTM F2898 Permeability of Synthetic Turf Sports Field Base Stone and Surface System by Non-Confined Area Flood Test Method. 3rd Party Testing Required.
 - 1. The field shall be tested at the completion of the project. There shall be 10 test locations on each field determined by the designer. If one location fails to meet the requirement, the entire field will need to be remediated and retested. It is the contractor's responsibility to fully remediate the field within 30 days of the failing test results or be subjected to a full turf and infill replacement.

3.14 SYNTHETIC TURF

- A. Synthetic turf shall be loose laid across the field, stretched, and attached to the perimeter edge detail. Turf shall be of sufficient length to permit full cross-field installation.
- B. Turf panels shall either be glued or sewn together.
- C. Glued Seams: Panels glued together at the seams using the latest state of the art procedures approve by the manufacturer. Seams shall be adhered using reinforcing tape and high-grade adhesive approved by the manufacturer. All seams shall be transverse to the field direction, i.e., run perpendicularly across the field. Seams shall be flat, tight, and permanent with no separation or fraying.
- D. Sewn Seams: Utilizing standard state of the art sewing procedures, each roll shall be attached to the next. Each seam will be stitched using cord as approved by the manufacturer. When all of the rolls of the playing surface have been installed, the sideline areas may be installed at right angles to the playing field turf

3.15 REPAIR MATERIALS, GROOMER AND SWEEPER

- A. Upon Final Acceptance, the turf Contractor shall provide to the Owner the following items at the quantities specified.
- B. 100 SF attic stock of base field green turf
- C. 100 SF attic stock of base field lime/green turf.
- D. 50 LF white line turf
- E. 20 LF of seaming tape and epoxy
- F. Provide four (4) 55-gallon garbage cans with lids filled with SBR Rubber
- G. Provide four (4) 55-gallon garbage cans with lids filled with Sand
- H. Integrated groomer and sweeper combination machine.
- I. Pull behind magnet
- J. Provide specifications for the type of field utility vehicle tires allowed on the field. Includes this provision in the warranty.

3.16 MAINTENANCE TRAINING

- A. The Sports Field Manufacturer will be responsible for training the Owners selected personnel regarding the maintenance and upkeep of the field upon completion. The Sports Field Contractor is responsible for scheduling this event and obtaining written confirmation and acceptance of the scheduled time from the owner.

3.17 REQUIRED PERFORMANCE G-MAX AND HIC TESTING

- A. Before Final Acceptance the Sports Field Manufacturer shall, as specified, hire an independent testing laboratory to perform G-max and HIC testing (ASTM 355, 1936 method, and HIC EN 1177) testing at a minimum of 10 locations.
- B. The Owner reserves the right to have the field tested for shock attenuation at its own cost at any time it deems necessary. If at any time the G-max ranges reach unacceptable levels, it is the responsibility of the Sports Field Contractor to bring the field back into the required ranges at no cost to the Owner.
- C. At any time, should the Sports Field Contractor fail to provide an independent third party Gmax test that confirms an average Gmax value of 200G and a HIC critical fall height greater than 1.3 meters, then the Sports Field Contractor will be solely responsible for the remove and dispose of the existing field surface, and the full installation of a new synthetic turf playing surface that meets all the specifications of the original bid documents and is independently tested to be safe by the original Gmax-Shock Attenuation requires as listed within this section.
- D. Submit a pdf copy of the test report findings to the Owner at the completion of each test.

END OF SECTION

SECTION 32 18 23.39

TRACK & FIELD QUALITY CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. General provisions of Contract, including General and Supplementary Conditions and other Division-1 Specifications Sections, apply to this Section.

1.2 SUMMARY

- A. This section covers all labor and materials required to provide survey and certification of key construction elements and the final track & field facility. The GC/SSC is responsible for completing all survey work.

1.3 CODES AND STANDARDS

- A. The survey work must be completed by a licensed surveyor or engineer.
- B. Codes and standards follow the current guidelines set forth by World Athletics (formerly IAAF), the National Collegiate Athletic Association (NCAA) and National Federation of State High School Associations (NFHS). Where discrepancies are noted between these various governing bodies, the rules of the NFHS shall be enforced.

1.4 ABBREVIATIONS

- A. WA = World Athletics
- B. IAAF = International Association of Athletics Federations
- C. NCAA = National Collegiate Athletic Association
- D. NFHS = National Federation of State High School Associations
- E. T&F = Track & Field
- F. SS = Synthetic Surface
- G. SSC = Synthetic Surfacing Contractor
- H. SSM = Synthetic Surfacing Manufacturer
- I. GC = General Contractor

1.5 RELATED SECTIONS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section. The following Sections are specifically related to this Section:
1. 116833.43 T&F Equipment
 2. 321823.39 T&F Quality Control
 3. 321823.40 T&F Synthetic Surface
 4. 321823.41 T&F Line Markings
 5. 321823.42 T&F Event Materials

1.6 SUBMITTALS

- A. The following information must be submitted by the GC/SSC, this is the typical order of construction:
1. The GC/SSC MUST identify and mark on the survey submittal all areas out of tolerance with the Bid Documents: design elevations in the color black, elevations higher than the design elevations in the color red and the elevations below the design elevations in the color green.
 2. The GC/SSC MUST identify the elevations, the slope percentage, (mark on the survey submittal with slope arrows with % of slope value, i.e. 1.0% slope) all slopes (lateral, radial and in the direction of running & throwing), as identified in these Bid Documents.
 3. Athletes run counterclockwise around the oval and all elevations are in relation to this direction.
 4. Immediately after installation of new precast channel drain or concrete curb inside of lane 1 and before the installation of the outside or infield concrete curbs:
 - a. Survey the new precast channel drain or concrete curb with elevations at:
 - 1) 1 point at each point-of-curvature (PC) plus 1 point centered on each straight between each PC plus 3 points equally spaced on each turn, total number of elevation points for the 400m oval = 12.
 - 2) The right-hand edge of the concrete surrounding the precast channel (in the direction of running) or the concrete curb.
 5. After installation of the oval's outside and infield border curbs:
 - a. At the outside concrete curb, survey the left-hand edge of the concrete curb with elevations at:
 - 1) Perpendicular to the elevation points taken at the precast channel drain, listed above in item Submittals, 4., a.
 - 2) All sprint chute corners; identify cross slope perpendicular to channel drain & slope in the direction of running.
 - b. Provide verification that the 400 meter oval fits between the installed channel drain or concrete curb and the outside concrete curb as per the drawings, prior to installing T&F aggregate & asphalt subbase.
 6. After installation of all jumping events:
 - a. Survey all jumping events with elevations as follows:
 - 1) 4 corners of all long/triple jump sand pits (at the nearest edge of sand).
 - 2) 4 corners of all long/triple jump take-off board trays, flush with the surrounding concrete.
 - 3) 4 corners of all pole vault boxes (at the top of flange) and the nearest edge of surrounding concrete (concrete should be 1/2" lower).
 - 4) 4 corners of the new high jump area
 - b. Survey all jumping events with dimensions to determine:
 - 1) The takeoff boards are centered on the sand pit.
 - 2) The takeoff boards are parallel to the nearest edge of the sand pit.
 - 3) The takeoff boards (not the tray) are the correct distance from the sand pit.
 - 4) The long axis of the pole vault box is parallel to the runway lines.
 - c. Survey the concrete subbase for all jumping events with elevations to determine the events meet the NFHS Rules and Bid Documents:
 - 1) Long/triple jump: runway's lateral slope and slope in the direction of running, elevations at the long jump board nearest the sand pit; elevations at 130' from that long jump board.
 - 2) Pole vault: runway's lateral slope and slope in the direction of running, elevations at

- the vault box; elevations at 130' from the zero line.
7. After installation of the shot put event:
 - a. Survey the shot put with elevations as follows:
 - 1) 4 corners of the 12' x 12' concrete pad.
 - 2) 1 spot elevation in the center of the circle.
 - 3) Spot elevations along both sector lines at 20', 30', 40', 50', 60' & 70'.
 8. After installation of the discus event:
 - a. Survey the discus with elevations as follows:
 - 1) 4 corners of the 12' x 12' concrete pad.
 - 2) 1 spot elevation in the center of the circle.
 - 3) Spot elevations along both sector lines at 50', 100', 150', 200' & 250'.
 9. After installation of the oval's asphalt subbase survey as follows:
 - a. Elevations at the inside edge of Lane 1, inside edge of Lane 5 and outside edge of lane 8, at:
 - 1) All spot elevations to align with elevations listed above in item 4., a.
 - 2) All sprint chute corners.
 - 3) In the chute(s), the right-hand side of lane 1 & outside edge of the outer lane at the start lines for the 110 meter & 100 meters, provide lateral slope and slope in the direction of running to the finish line.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 32 18 23.40

TRACK & FIELD SYNTHETIC SURFACE

PART 1 - GENERAL

1.1 SUMMARY

- A. This section covers all labor and materials required to install a first-class track & field surface. The SSC is responsible for installing:
 - 1. All T&F SS labor & materials.
 - 2. All T&F line markings and certification.

1.2 CODES AND STANDARDS

- A. Codes and standards follow the current guidelines set forth by the World Athletics, the National Collegiate Athletic Association and National Federation of State High School Associations. Where discrepancies are noted between these various governing bodies, the rules of the NFHS shall be enforced.

1.3 ABBREVIATIONS

- A. WA = World Athletics (formerly IAAF)
- B. NCAA = National Collegiate Athletic Association
- C. NFHS = National Federation of State High School Associations
- D. T&F = Track & Field
- E. SS = Synthetic Surface
- F. SSC = Synthetic Surfacing Contractor
- G. SSM = Synthetic Surfacing Manufacturer
- H. GC = General Contractor
- I. SBR = Styrene Butadiene Rubber
- J. EPDM = Ethylene Propylene Diene Monomer
- K. UV = Ultra-Violet
- L. PU = Polyurethane
- M. MDI = Methylene Diphenyl Isocyanate
- N. TDI = Toluene Diisocyanate Isocyanate
- O. SY = Square Yard

- P. RAP = Reclaimed Asphalt Pavement

1.4 RELATED WORK

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section. The following Sections are specifically related to this Section:
1. 116833.43 Track and Field Equipment
 2. 321823.39 Track and Field Quality Control
 3. 321823.40 Track & Field Synthetic Surface
 4. 321823.41 Track and Field Line Markings
 5. 321823.42 Track and Field Event Materials

1.5 SUBMITTALS

- A. The following information must be submitted by the SSC prior to installation.
1. On-site Project Forman/Manager/Superintendent Qualifications:
 - a. Name and cell number.
 - b. This person will be on-site during all SS operations.
 - c. Once the installation of the SS begins, no substitution of this person is allowed.
 - d. This person must have completed a minimum of 5 facilities which are certified to meet NCAA rules & regulations in the past 3 years utilizing the product specified in these specifications.
 2. WA certificate and full laboratory report for the specified T&F SS product. This product must be listed on current WA website, Certified Track Surfacing Products.
 3. Standard printed specifications of the SS system that is being installed and notify the Design Team of any deviations between this technical specification and the SSC specification.
 4. Submit a letter stating those items listed below in Item 1.08 have been completed and meet the rules of NFHS.
 5. Installation process and requirements for subbase (stone, asphalt and concrete) and any conditions that may limit the SS installation or affect quality of installation.
 6. Temperature/climatic conditions limiting quality of installation.
 7. Standard specification and application for recommended subbase primers, crack filler, patching and leveling material.
 8. Two product samples (one for the Owner & one for the Design Team), a minimum of 6" x 6" in size, the same color, same texture, same thickness, etc. of the SS being installed. This must be a representative sample of the product. This sample must be submitted and approved by the Owner & Design Team, prior to installation. During installation of the SS or at completion of the project this sample may be used as a comparison to judge the quality of the installed product. Separate SS samples are required for each color being installed.
 9. Material safety data sheets on all individual components of the product being installed.
 10. Provide a letter stating the SSC reviewed and accept the concrete and asphalt specification, if included in the project. Prior to installing the SS, the SSC must accept the installation of the concrete and asphalt as acceptable to receive the SS.
 11. Provide a letter from the SSM approving the SSC as a certified/acceptable installer of their SS, if the SSM is different than the SSC.
 12. Written notice and acceptance that all embedded track equipment is installed as per the Contract Documents and as per the rules of the sport.
- B. The following information shall be submitted after completion of the specified work:
1. SSC's and SSM's standard Warranty, for installation and material respectively, noting any exceptions to the Warranty information included in this Specification Section.
 2. Provide a "Care and Maintenance" manual for the Owner's use in maintaining the SS.
 3. From a licensed surveyor or registered engineer, a letter stating the location of all new line markings and elevations conform to the rules and regulations of the NFHS. This letter must state each event is certified.

1.6 QUALITY ASSURANCE

- A. The SSC shall coordinate, ensure and provide all necessary information to the other sub-contractors that are working on the site. For example:
 - 1. The use of curing agents in concrete.
 - 2. Slopes & tolerances for subbase, concrete curbs and precast channel drains.
 - 3. No vehicles allowed on the asphalt wearing layer.
 - 4. No RAP in the wearing course of asphalt.
 - 5. Etc.
- B. SSC must ensure all existing or finished products by all contractors are properly protected throughout the construction of this facility. For example:
 - 1. The asphalt contractor must take great care NOT to damage the installed concrete curbs & precast channel drains when milling or installing or rolling the aggregate & asphalt, if included in this project.
 - 2. The installed junction boxes/ComBoxes are NOT damaged by adjacent construction, if included in this project.
 - 3. The existing synthetic turf or natural grass infield is NOT damaged by adjacent construction.
- C. Prior to installation, or during installation or at completion of installation of the SS, if the Owner has any question or doubt about the quality or formulation of the material, the SSC shall have the product tested. If the product meets these specifications, then the Owner shall pay for the cost of the testing; if the product does not meet these specifications or the SSM's specifications, then the SSC shall pay for the testing. Any material failing to meet specifications will be replaced with new material at the SSC's expense.
- D. Slopes & Tolerances as listed below or as per the current the NFHS rule book:
 - 1. Track Oval
 - a. Maximum lateral inclination of the oval 2:100 or 2% (outside to inside running lane)
 - b. Maximum downward inclination in the direction of running 1:1000 or 0.1%
 - c. When feasible, it is recommended that there be an obstacle-free zone on the inside and on the outside of the track at least 1 meter in width
 - 2. Throwing Events (Shot Put, Discus & Javelin)
 - a. Maximum downward inclination of the javelin runway is not stated, assume 1:1000 or 0.1%
 - b. Maximum downward inclination from the throwing area to the landing area 1:100 or 1%
 - c. Circles shall be level
 - d. Throwing sector shall be 34.92 degrees (Acceptable range 34.78° to 35.05° degrees is allowed)
 - 3. High Jump
 - a. Maximum downward inclination in the approach 1:100 or 1%
 - 4. Pole Vault
 - a. Maximum lateral inclination of the runway 2:100 or 2%
 - b. Maximum downward inclination in the direction of running & jumping 1:1000 or 0.1%
 - c. Calculate the slope by comparing the elevation at the start of the runway to the elevation at the zero line; intermediate measurements are not considered.
 - 5. Long & Triple Jump
 - a. Maximum lateral inclination of the runway 2:100 or 2%
 - b. Maximum downward inclination in the direction of running & jumping 1:1000 or 0.1%
 - c. Calculate the slope by comparing the elevation at the start of the runway to the elevation at the take-off board; intermediate measurements are not considered.
 - 6. Depressions or bumps cannot exceed 1/8" under a 10' straight edge.

1.7 SPECIAL PROJECT CONDITIONS

- A. The SSC will provide a project manager / superintendent / crew chief on-site daily through the completion of the SSC's portion of the contract.

- B. This on-site person shall remain on-site through the completion of the project. Substitution of this person is not permitted.
- C. The SSC must provide a technician that will serve as a consultant to the Owner & Design Team during the Asphalt Paving, first reviewing the asphalt specification, accepting the specification as correct, and then, providing daily review and guidance of the construction of the Asphalt Paving which will directly affect the tolerances and longevity of the SS installation, if asphalt paving is included in the project. If the SSC does not provide these documents or services, then it is assumed the SSC accepts full responsibility for this work.
- D. Prior to installing any concrete, the SSC must verify if any curing compounds or agents or patching materials are allowed or acceptable.

1.8 SPECIFIC SCOPE OF WORK

- A. The SSC shall verify all horizontal dimensions and vertical elevations prior to performing any work, as well as the following items below:
 - 1. The new 400-meter oval and all line markings will accurately fit onto the subbase of the track oval, the chutes, runways and D-area.
 - 2. The slopes, tolerances and elevations meet the required tolerances of these specifications and the rules of the NFHS.
 - 3. No bird baths or areas exceed the allowable limits as specified.
- B. The SSC shall provide all labor, materials and equipment to perform the following work as designated in these specifications:
 - 1. The installation of all SS materials and line markings including the certification letter.
 - 2. Provide technical assistance and approve the Asphalt Paving or Concrete base work as required in the specifications.
 - 3. Review and approve installation of all T&F event inground/embedded equipment before any SS is installed as specified and shown on the project drawings.
 - 4. Brush, blow, clean, wash down, etc. all areas to receive SS, as often as necessary during the installation of the SS.
 - 5. Repair all damaged areas, clean-up all glue, and remove excess SS, primers and similar products. All trim cuts shall be neat and clean; on all curves & straights the trim-out shall follow the adjoining object for accuracy and neatness, i.e., concrete curb or painted line, etc.

1.9 WARRANTY/GUARANTEE

- A. Warranty period to be five years on the BASE BID's new SS.
- B. Warranty shall cover all labor and materials to remove and dispose of existing materials and replace with new material, including labor, during the warranty period.
- C. Warranties / Guarantees specified in this section shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and are in addition to and run concurrent with other warranties/guarantees made by the GC/SSC under requirements of the Contract Documents.
- D. The following are inclusive of the term "Track & Field Synthetic Surface" for provisions of the guarantee:
 - 1. All slopes & tolerances as required in this specification.
 - 2. SS product as specified and represented by the SSC and SSM.
 - 3. All materials and products specified.
 - 4. All line markings installed in accordance with the Contract Documents and the rules of the sport.
- E. SSC Guarantee: Provide in writing a "Full System Guarantee" agreement. The President/Principal(s) of both the SSC and the SSM (if different) shall sign this document and it shall include the following:

1. All work executed under this section will be free from defects of material and workmanship for the specified period from date of Substantial Completion/Acceptance of the Owner.
 2. Any defects will be remedied on written notice at no additional cost to the Owner.
 3. The warranty shall not be prorated.
 4. All material shall be guaranteed to the extent that the surfacing:
 - a. Has been manufactured, applied and will perform in accordance with these specifications, the SSC and SSM specifications and industry standards.
 - b. Will hold fast and/or adhere to the primer, asphalt, concrete, edging, filler, patches or overlay materials.
 - c. Is Ultra-Violet resistant, will not bubble, blister, fade, crack, or wear excessively during the warranty period.
 5. One replacement of high stress areas or Owner designated areas during the warranty period at no cost to the Owner; High stress areas are estimated at 150 square yards.
 6. One restriping of the T&F Line Markings during the warranty period at no cost to the Owner.
- F. The SSC shall, in the presence of the Owner, inspect the SS each year until the end of the warranty period, or at any time requested by the Owner. Any defects in workmanship or materials (at no fault of the Owner) shall be repaired at the expense of the SSC to the satisfaction of the Owner.
- G. The Warranty does not cover any defect, failure, damage caused by or connected with abuse, neglect, deliberate acts, acts of God, casualty or loads exceeding the SSC's "Care and Maintenance" manual.

PART 2 - PRODUCTS

2.1 TRACK & FIELD SYNTHETIC SURFACE

- A. The T&F SS shall be as per the SSM's specifications and utilizing the same materials as the WA certified product, plus the following requirements and where discrepancies exist, they shall be brought to the attention of the Owner & Design Team prior to Bidding and Installation.
- B. The following SSC and their SS product are approved for bidding, only World Athletic approved products are allowed.
1. Beynon Sports Surfaces, Kenny Smith, cell # 336-848-9112.
 - a. BASE BID – BSS 200: Sealed (Impermeable/Non-porous) base mat with structural spray wearing layer.
 2. Hellas Construction, Danny Williamson, cell # 828-399-1519.
 - a. BASE BID – epiQ V300: Sealed (Impermeable/Non-porous) base mat with structural spray wearing layer.
 3. Rekortan, Drew Shoaf, cell # 336-596-3233.
 - a. BASE BID – Spurtan BSS (Impermeable/Non-porous) base mat with structural spray wearing layer.
- C. Colors:
1. SSC to provide their standard Black color, NO accent colors at the 4x100m relay exchange zones.
- D. Thickness:
1. SSC to provide the thickness of their product as certified by WA.
- E. BASE BID – MATERIALS :
1. All materials must be approved by the SSM & SSC and must be compatible with each other. All materials must meet the SSM's standard specifications, brochures and website information plus these specifications.
 2. Each SSC must bid and install their WA approved product at the WA approved thickness.
 3. Primer:
 - a. SSC approved PU primer for asphalt, concrete and T&F SS.
 4. SBR Rubber:

- a. The rubber granules are recycled SBR rubber, cleaned, processed and chopped. Granules containing any trace of fiber or steel are unacceptable.
 - b. Rubber shall be graded to 1-4mm in size with less than 4% dust.
5. EPDM Granules:
 - a. The colored, virgin synthetic rubber granules must be EPDM granules containing a minimum of 20% EPDM.
 - b. The granules should be 0.5mm to 1.5mm in size.
 - c. Color must be the SSM's standard red.
6. Polyurethane Binder:
 - a. The single component, 100% polyurethane and moisture cured.
 - b. The binding agent is based on MDI/TDI; TDI shall be less than 0.5%.
 - c. The binder must have no solvents and no extenders (plasticizer).
7. Polyurethane Sealer:
 - a. The two-component, pigmented PU coating shall contain no solvents, TDI or heavy metals.
8. Polyurethane Structural Spray – Water Based
 - a. The water based, single component, 100% solids, pigmented PU spray coating must be mixed with the same color EPDM granules.
9. All layers of EPDM granules and PU Structural Spray must match in color.
10. The same components and materials utilized in the SSM's WA approved product must be used in this installation.

PART 3 - EXECUTION

3.1 INSPECTION AND ACCEPTANCE

- A. Examine all surfaces and contiguous elements to receive work of this section and correct, as part of the Work of this Contract, any defects affecting installation.
- B. Commencement of work will be construed as complete acceptability of surfaces and contiguous elements.

3.2 INSTALLATION REQUIREMENTS

- A. The following installation requirements must be met by the SSC:
 1. Installation by SSC approved project manager/superintendent, applicators and technicians. Local laborers may be hired for non-technical work, only.
 2. Upon arrival, the GC and/or SSC shall have the subbase clean and free of dirt, oil, grease or any other residue. This is the responsibility of the GC if one is present, if not then the SSC has this responsibility. Once the SSC begins installation, it is the SSC's responsibility to clean the areas to receive the SS.
 3. Apply SS in dry weather when pavement and atmospheric temperatures are 50 degrees or above and are anticipated to remain above 50 degrees for 24 hours after SS installation.

3.3 BASE BID – INSTALLATION

- A. Sealed (Impermeable/Non-porous) Base Mat with Structural Spray Layers
 1. The SSC shall only install the PU system after the subbase has been checked for moisture content, excess moisture can affect the quality of installation and longevity. No PU shall be installed if rain or inclement weather is imminent.
 2. Each SSC must bid and install their WA approved product at the WA approved thickness.
 3. Primer:
 - a. Install the primer to ensure the PU adheres to the subbase and each layer adheres to the previously installed layer, as needed.
 - b. This primer may be spray applied or rolled applied.

- c. All products must be installed on the primer within 24 hours.
- 4. Base Layer:
 - a. The SBR granules & PU binder are mixed in a mechanical mixer.
 - d. The material is paved in place using a heated mechanical screed paver, specifically designed for this type of work, at a depth of 11-12mm thick or as required by their WA certificate.
 - e. The Binder should be a minimum of 20% by weight.
- 5. Seal Coat:
 - a. The sealer is applied by squeegee or notched trowel to the top of the paved in place base mat, sufficient material so the base mat is impermeable/non-porous.
- 6. Structural Spray Coats:
 - a. Minimum of two spray applications, each spray layer must be in the opposite direction of the first spray layer for uniform & non-streaking coverage.
 - b. Total spray applications shall be approximately or minimum of 3.1lbs/sy or as required by their WA certificate.
- 7. All installation methods & practices must meet industry standards and meet the standard installation methods as identified in the SSC's specifications, brochures and website.

3.4 TIMING, LIMITATIONS, AND CONDITIONS AFFECTING INSTALLATION

- A. Weather and Climate: If in the opinion of the SSC or the Owner, weather and climatic conditions are having or will have an adverse effect on installation; work shall be delayed until the adverse condition has passed.
- B. Adjacent and Concurrent Construction: Installation shall not take place until the completion of the adjacent or concurrent construction operations which generate dust, airborne abrasives, or any other by-product that, in the opinion of the Owner or SSC, would be harmful to the SS material. Under specific direction of the Owner, the SSC may be allowed to cover the track material with an approved covering if such harmful construction operations must occur after the SS material has been installed.

END OF SECTION

SECTION 32 18 23.41

TRACK & FIELD LINE MARKINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. This section covers all labor and materials required to install the T&F line markings. The SSC is responsible for the layout and installation of all painted line markings and their certification.

1.2 CODES AND STANDARDS

- A. Codes and standards follow the current guidelines set forth by the World Athletics, the National Collegiate Athletic Association and National Federation of State High School Associations. Where discrepancies are noted between these various governing bodies, the rules of the NFHS shall be enforced.

1.3 ABBREVIATIONS

- A. WA = World Athletics (formerly IAAF)
- B. IAAF = International Association of Athletics Federations
- C. NCAA = National Collegiate Athletic Association
- D. NFHS = National Federation of State High School Associations
- E. T&F = Track & Field
- F. SS = Synthetic Surface
- G. SSC = Synthetic Surfacing Contractor
- H. GC = General Contractor
- I. UV = Ultra-Violet

1.4 RELATED WORK

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section. The following Sections are specifically related to this Section:
 - 1. 116833.43 Track and Field Equipment
 - 2. 321823.39 Track and Field Quality Control
 - 3. 321823.40 Track & Field Synthetic Surface
 - 4. 321823.41 Track and Field Line Markings
 - 5. 321823.42 Track and Field Event Materials

1.5 SUBMITTALS

- A. The following information must be submitted by the SSC and approved by the Owner prior to installation.
 - 1. The submittal must verify the new line markings will meet the rules of the NFHS and the 400m oval's line markings will fit properly on the T&F synthetic surface.
 - 2. A drawing and list depicting the colors of all line markings and labels of the events. Also, all symbols and markings clearly identified, illustrated, and their colors stated. The recommended NFHS colors shall be used.
 - 3. ***Review and submit this specification section, as a submittal, plus any modifications.***
 - 4. Installation process and requirements for line markings and any conditions that may limit the installation or affect quality of installation.
 - 5. Material safety data sheets on all products, as necessary.
- B. The following information shall be submitted at the completion of the specified work.
 - 1. Upon completion of all line markings, the SSC shall submit to the Owner five color diagram/drawings depicting and identifying all line markings: 1) a key to the color codes, 2) a chart for all symbols, and 3) labels for all events. This can be the same submittal for the approved line markings.
 - 2. From a licensed surveyor or a registered engineer, a letter stating all new line markings and elevations conform to the rules and regulations of the NFHS for all events.

PART 2 - PRODUCTS

2.1 PAINT

- A. The paint must be approved by the SSC and/or SSM.
- B. Temporary reference markings must be removed at the completion of the project or within the following 14 days; i.e. chalk.
- C. Paint shall be UV stable.

PART 3 - EXECUTION

3.1 SUMMARY

- A. General line markings of the 400 meter T&F events shall be spray applied, using only paint, primers and finishes supplied and guaranteed by the SSC & SSM.
- B. No line markings shall be installed if the weather conditions are not proper, i.e., too windy, cold, wet or blowing dust, blowing dirt, etc.
- C. All line markings must be reviewed and verified with the Owner & Design Team prior to installation.
- D. The line striper must NOT make any changes to the approved line marking submittal without the written approval from the Owner & Design Team.
- E. The SSC must verify the 400 meter oval will accurately fit on the new T&F SS, prior to resurfacing or installing the T&F SS.
- F. One restriping of the T&F Line Markings during the warranty period, at no cost to the Owner.

3.2 LINE MARKINGS

- A. Paint – all markings to receive sufficient paint to fully cover the SS, no SS shall be visible under the installed paint. All paint shall be crisp with clean edges, no excessive overspray from working too fast or in excessive wind.
- B. Track Oval
 - 1. The measure line is not painted.
 - 2. Oval is 400.001 meters.
 - 3. Track oval will NOT utilize a regulation curb, 20 cm rule is utilized.
 - 4. Radius to the measure line shall be determined by the SSC.
 - 5. Lane lines are measured right hand side to right hand side, in the direction of running.
- C. Painted Line Precedence
 - 1. Lane lines to take precedence over other markings.
 - 2. Numbers and letters to be broken at all lane lines.
 - 3. Waterfall starting lines take precedence over straight starting lines and waterfall lines should be painted first.
 - 4. Straight starting lines to taper at waterfall starting lines and maintain a 1/2" unpainted gap. If no gap is present between the two painted lines, then thin (1/4") black line will be painted to identify the leading edge of the 2" wide waterfall start line.
- D. Straightaway Chute Extensions
 - 1. Lines to be solid, not dashed.
 - 2. Break chute extension lines 2" either side of track oval lines.
- E. Assembly Lines – not to be painted.
- F. 55 Meters and 55 Meter Hurdles (55 Meters – Winter track outdoor on 400m oval)
 - 1. Both directions on the home straight and one direction on the back straight
 - 2. Event label
 - a. 55
 - b. Approximately 3" high
 - c. The color is white
 - d. Located in the outside lane and is above/past the starting line
 - 3. Color of the starting line is white
 - 4. Hurdle tick marks
 - a. Boys are Green
 - b. Girls are Orange
 - c. Hurdle tick marks are small triangles and pointing in the direction of running
 - d. Two tick marks per lane with each tick mark adjacent to the lane line
- G. 100 Meters
 - 1. Both directions on home straight and one direction on the back straight
 - 2. Event label
 - a. 100
 - b. Approximately 3" high
 - c. The color is white
 - d. Located in the outside lane and is above/past the starting line
 - 3. Color of starting line is white
- H. 100 Meter Hurdles
 - 1. Both directions on home straight and one direction of the back straight
 - 2. Event label
 - a. 100
 - b. Approximately 3" high
 - c. The color is white
 - d. Located in the outside lane and is above/past the starting line

3. Color of the starting line is white
 4. The hurdle tick marks are yellow
 - a. Hurdle tick marks are small triangles and pointing in the direction of running
 - b. Two tick marks per lane with each tick mark adjacent to the lane line
- I. 110 Meter Hurdles
1. Both directions on home straight and one direction on the back straight
 2. Event label
 - a. 110
 - b. Approximately 3" high
 - c. The color is white
 - d. Located in the outside lane and is above/past the starting line
 3. Color of the starting line is white
 4. The hurdle tick marks are blue
 - a. Hurdle tick marks are small triangles and pointing in the direction of running
 - b. Two tick marks per lane with each tick mark adjacent to the lane line
- J. 200 Meters
1. All in lanes
 2. Both turns (normal & reverse)
 3. Event label
 - a. 200
 - b. Approximately 3" high
 - c. The color of the label to be white
 - d. Located in lane 2 and is above/past the starting line
 4. Color of the main starting line is white and the reverse starting line is black
- K. 300 Meter Hurdles (300 Meters – Winter track outdoor on 400m oval)
1. All in lanes
 2. Event label
 - a. 300
 - b. Approximately 3" high
 - c. The color is white
 - d. Located in lane 2 and is above/past the starting line
 3. Color of the starting line is white
 4. The hurdle tick marks are red, when the T&F SS is red, then tick marks are black
 - a. Hurdle tick marks are small triangles and pointing in the direction of running
 - b. Two tick marks per lane with each tick mark adjacent to the lane line
- L. 400 Meters
1. All in lanes
 2. Event label
 - a. 400
 - b. Approximately 3" high
 - c. The color is white
 - d. Located in lane 2 and is above/past the starting line
 3. Color of the starting line is white
- M. 500 Meters, 600 Meters & 1000 Meters (North Carolina Winter track outdoor on 400m oval)
1. Waterfall start
 2. Event label
 - a. 500, 600 & 1000
 - b. Approximately 3" high
 - c. The color is white
 - d. The waterfall start line label is in the outside lane and the labels are above/past the start line
 3. Special note: if the radius of the 400m oval is 104.432', then the 500 Meter start line can use the 100m straight start line
- N. 800 Meters

1. Waterfall start and one turn stagger
 2. Event label
 - a. 800
 - b. Approximately 3" high
 - c. The color is white
 - d. The 1 turn stagger start line label is in lane 2, the waterfall start line label is in the outside lane, and the labels are above/past the start line
 3. Color of the 1 turn stagger start line is white with a green insert, 2" by approx. 16" green insert centered
 4. The color of the waterfall start line is white
- O. 1600 Meters
1. Waterfall start
 2. Event label
 - a. 1600
 - b. Approximately 3" high
 - c. The color is white
 - d. Located in the outside lane and is above/past the start line
 3. Color of the start line is white
- P. 1-mile Run
1. Waterfall start
 2. Event label
 - a. Mile
 - b. Approximately 3" high
 - c. The color is white
 - d. Located in the outside lane and is above/past the start line
 3. Paint three 1" wide by 3" long tick mark on the infield side of lane 1
 - a. Tick marks are for $\frac{1}{4}$ mile, $\frac{1}{2}$ mile and $\frac{3}{4}$ mile splits, labels not painted
 4. Color of the start line is white
- Q. 3200 Meters
1. Waterfall start
 2. Event label
 - a. 3200
 - b. Approximately 3" high
 3. The color is white
 4. Located in the outside lane and is above/past the start line
 5. Color of the start line is white
- R. 4 x 100 Meter Relay
1. All in lanes or 2 turn stagger
 2. Event label
 - a. 4x100
 - b. Approximately 3" high
 - c. The color is white
 - d. Located in lane 2 and is above/past the start line
 3. Color of the start line is white, same starting line as the 2 turn staggered starting line for the 400 meters
 4. The relay exchange zone markers are yellow
 - a. Exchange zone markings are approximately 36" wide by 36" tall triangles, triangles point into the 30 meter long exchange zone and the zone markings are included in the 30 meter long exchange zone
 5. 10m from the end of the relay exchange zone is a 2" by 16" white line, centered in the lane, for the 3rd exchange (1st exchange uses the 300m start lines and the 2nd exchange uses the 200 meter start lines)
 - a. If the radius of the 400m oval is 104.432', then only lane 1 will have the 10m (2" by 16") painted line, lanes 2-8 this line is not painted because it will conflict with the 100 Meter straight start line.

- S. 4 x 200m Meter Relay
1. All in lanes or 4 turn stagger
 2. Event label
 - a. 4x200
 - b. Approximately 3" high
 - c. The color is white
 - d. Located in lane 2 and is above/past the start line
 3. Color of the start line is white with a red insert, 2" by 16" red insert centered
 4. The relay exchange zone markers are red (contrasting from the red track surface)
 - a. Exchange zone markings are approximately 36" wide by 36" tall triangles, triangles point into the 30 meter long exchange zone and the zone markings are included in the 30 meter long exchange zone
 5. 10m from the end of the relay exchange zone mark is a 2" by 16" white line, centered in the lane, for 1st exchange only (the 2nd exchange uses the 400m start lines and 3rd exchange uses the 200 meter start lines)
- T. 4 x 400 Meter Relay
1. 3 turn stagger
 2. Event label
 - a. 4x400
 - b. Approximately 3" high
 - c. The color is white
 - d. Located in lane 2 and is above/past the start line
 3. Color of the start line is white with a blue insert, 2" by 16" blue insert centered
 4. The relay exchange zone markers are blue
 - a. Exchange zone markings are approximately 36" wide by 36" tall triangles, triangles point into the 20 meter long exchange zone and the zone markings are included in the 20 meter long exchange zone
 - b. The first exchange of the baton shall use the staggered triangles
 - c. The second and third exchange of the baton shall use triangles in a straight line, 10 meters before the finish line; and the end of this exchange zone shall use the painted triangle in lane one (same as used in the first exchange) and triangles in lanes two thru five are in a straight line 10 meters past the finish line and parallel to the finish line or paint a straight line in lieu of the triangles
- U. 4 x 800 Meter Relay
1. Waterfall Start and 1 Turn Stagger
 2. Event label
 - a. 4x800
 - b. Approximately 3" high
 - c. The color is white
 - d. Located in lane 2 and is above/past the start line
 3. Color of the start line is white with a green insert, 2" by 16" green insert centered (use same start line as the 800 meter run)
 4. The relay exchange zone markers are blue (same triangles as the 4x400m relay)
 - a. The exchange of the baton shall use the triangles in a straight line, 10 meters before the finish line; and the end of this exchange zone shall use the painted triangle in lane one and triangles in lanes two thru five are in a straight line 10 meters past the finish line and parallel to the finish line or paint a straight line in lieu of the triangles
- V. Break Lines
1. One turn break line on the back straight is a solid line, curved and the color is green; painted from the outside lane to the inside of lane two
 2. Provide 2" by 4" green tick marks, not-to-exceed every 4 meters, on the inside of lane 5 from the box alley start to the break line in turn #1; these tick marks will indicate the location of the not-to-exceed 15cm tall cones
- W. Finish Lines
1. Locations:

- a. Common finish line is 10m prior/before the point of curvature (PC) on the home straight and the reverse direction on the home straight the finish line is 10m prior/before the PC. On the back straight the finish line is 10m prior/before the PC
 - b. Reverse 200 meter finish line is 10m prior/before the PC
 2. 2" wide and white in color
 3. The intersection of all finish lines with the lane lines shall be alternating black marks as per the current NCAA Rule Book
 4. No lean lines are to be provided
- X. Staggered Alleys
 1. Provide one 1 turn staggered alley start line and the color is white for the staggered start lines
 - a. Normal 1 turn stagger in turn 1, label painted as – 1 Turn or 1600/3200
 - b. Staggered alley start line painted in lane 5 to outside lane
- Y. Long/Triple Jump
 1. Runway lines
 - a. 2" wide lines
 - b. White in color
 - c. 48" wide runways (inside edge to inside edge of line)
 2. Takeoff Boards
 - a. Each painted takeoff line (8" x 48") to be painted & labeled adjacent to board: 8, 12, 24, 36 & 32; labels are approx. 6" to 12" tall
 - b. Paint two additional takeoff lines (8" x 48") per sand pit at a distance from the sand with painted label for distance from sand, TBD
 - c. Paint one blanking lid per sand pit the color white, not included in this project
 3. Distance Marks
 - a. Provide 1.5" long by $\frac{3}{4}$ " wide white lines outside the runway on the right hand side (direction of running) every foot beginning at 20 feet from the 8 foot long jump board and extending the length of the runway or 130' whichever is shorter
 - b. Every 5 and 10 foot line to be 2" long by $\frac{3}{4}$ " wide
 - c. Every 10 foot line to be labeled below the line facing the athlete
- Z. Pole Vault
 1. Runway lines
 - a. 2" wide lines
 - b. White in color
 - c. 48" wide runways (inside edge to inside edge of line)
 - d. Terminate runway lines at zero line
 2. Zero line
 - a. 1/2" wide line and 24' long centered on back edge of box (not flange); should extend a minimum of 1 foot past the standards
 - b. White in color
 3. NCAA Marks (as per the current NCAA Rule Book)
 - a. Provide seven runway markings in the center of the runway as per the dimensions and pattern in the current NCAA Rule Book
 4. Distance Marks
 - a. Provide 1.5" long by $\frac{3}{4}$ " wide white lines outside the runway on the right hand (direction of running) side every foot beginning at 20 feet from the zero line and extending the length of the runway or 130' whichever is shorter
 - b. Every 5 and 10 foot line to be 2" long by $\frac{3}{4}$ " wide
 - c. Every 10 foot line to be labeled below the line facing the athlete
- AA. High Jump
 1. No painted lines are required for this event.
- BB. Shot Put
 1. Dividing lines
 - a. 2" wide lines, outside the circle
 - b. White in color

- c. Extend 2.46' (75cm) from outer edge of throw circle or to the edge of the concrete pad
 - d. The 2" line is painted toward the top half of the circle, in the direction of throwing and not in the circle
 - 2. Sector lines (34.92 degrees)
 - a. 2" wide white lines
 - b. White in color
 - c. Paint sector lines on the concrete pad and synthetic turf
 - d. Paint sector arc at 30', 40', 50', 60' & 70' with distance label along the right hand side
- CC. Discus
 - 1. Dividing lines
 - a. 2" wide lines, outside the circle
 - b. White in color
 - c. Extend 2.46' (75cm) from outer edge of throw circle or to the edge of the concrete pad
 - d. The 2" line is painted toward the top half of the circle, in the direction of throwing and not in the circle
 - 2. Sector lines (34.92 degrees)
 - a. 2" wide lines
 - b. White in color
 - c. Paint sector lines on the concrete pad only
 - d. Contractor to inlay 2" x 2" black square/tick mark at 1) intermediate tick marks at 100' and 2) the end of both sector lines, 205' from the throwing circle
- DD. Lane Numbers
 - 1. The numbers are a block style, approximately 24" to 30" high and the numbers will NOT have a color shadow
 - 2. The color of the numbers will be white
 - 3. Paint the following numbers:
 - a. There is 1 set of numbers 1 foot before the common finish line, facing the runners
 - b. There is 1 set of numbers in turn one, 1 foot above/past the 400M staggered start lines
 - c. There is 1 set of numbers at the end of turn one or the beginning of the back straight, 1 foot above or past the 300M staggered start lines
 - d. There is 1 set of numbers in turn two, 1 foot above/past the 200M staggered start lines
 - e. Paint a set of numbers at the very end of each chute (approximately 12" from the end/edge of SS), in the chute & not in the oval lanes, if possible
- EE. Letters & Logos
 - 1. The SSC shall paint the word 'BUTLER BULLDOGS' on the home straight and centered on the home bleachers, using the SSC's standard fonts and colors:
 - a. Size of the font should be 24" to 30" tall.

END OF SECTION

SECTION 32 18 23.42

TRACK & FIELD EVENT MATERIALS

PART 1 - GENERAL

1.1 SUMMARY

- A. This section covers all labor and materials required to install high quality track & field event special materials. The SSC is responsible for installing:
 - 1. Sand for the long and triple jump sand pits.
 - 2. Decomposed granite rock dust in the shot put landing area.

1.2 CODES AND STANDARDS

- A. Codes and standards follow the current guidelines set forth by World Athletics (formerly IAAF), the National Collegiate Athletic Association and National Federation of State High School Associations. Where discrepancies are noted between these various governing bodies, the rules of the NFHS shall be enforced.

1.3 ABBREVIATIONS

- A. WA = World Athletics
- B. IAAF = International Association of Athletics Federations
- C. NCAA = National Collegiate Athletic Association
- D. NFHS = National Federation of State High School Associations
- E. T&F = Track & Field
- F. SS = Synthetic Surface
- G. SSC = Synthetic Surfacing Contractor
- H. GC = General Contractor

1.4 RELATED WORK

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section. The following Sections are specifically related to this Section:
 - 1. 116833.43 Track & Field Equipment
 - 2. 321823.39 Track & Field Quality Control
 - 3. 321823.40 Track & Field Synthetic Surface
 - 4. 321823.41 Track & Field Line Markings & Certification
 - 5. 321823.42 Track & Field Event Materials

1.5 SUBMITTALS

- A. The following information must be submitted by the SSC prior to installation.
 - 1. Installation process and requirements for the special materials and any conditions that may limit the installation or affect quality of installation.
 - 2. Material safety data sheets on all products, as necessary.
 - 3. SSC to supply technical data sheet on the particle size analysis and physical properties of the sand and rock dust.

1.6 QUALITY ASSURANCE

- A. The physical make-up of these products varies across the country; therefore, the SSC shall use his best efforts to supply the Design Team with a product that best meets the specifications listed below.

PART 2 - PRODUCTS

2.1 SAND FOR LONG & TRIPLE JUMP SAND PITS

- A. All sand for the long/triple jumps sand pits shall follow the specifications outlined by the United States Golf Association (USGA) guidelines for Bunker Sand.
- B. GC may wish to contact the local golf course or country club and the green superintendent should be able to tell you where to find this high-quality sand.
- C. The sand shall be washed and sized to meet the USGA Bunker Sand and as follows:
 - 1. Total sand content shall be $\geq 95\%$
 - 2. Total combined silt and clay content shall be $\leq 5\%$
 - 3. Screen Number 10 (2.0mm): $< 3\%$ Retained
 - 4. Screen Number 18 (1.0mm): $< 10\%$ Retained
 - 5. Screen Number 35 (0.5mm) and Screen Number 60 (0.25mm): $> 60\%$ Combined Retained
 - 6. Screen Number 100 (0.15mm): $< 20\%$ Retained (recommend $< 25\%$ Retained)
 - 7. Screen Number 270 (0.05mm): $< 5\%$ Retained
- D. Sand shall be white in color (as white as possible for that region of the country), free of trash, organic matter, clay, silt, rocks, etc.
- E. Sand shall have the following technical data:
 - 1. Water permeability or filtration rate with a minimum of 20 inches/hour
 - 2. Bulk density of 1.55 grams per cubic centimeter
 - 3. Penetrometer Reading of 1.8 to 2.2 kg/cm²
 - 4. Sand shape of high sphericity and rounded

2.2 ROCK DUST FOR SHOT PUT

- A. The shot-put landing area shall consist of a Decomposed Granite (DG) or similar hard & durable material.
- B. The DG material must be firmly compacted, yet porous to allow vertical drainage.
- C. The material shall be compacted to at least ninety (90%) percent of Standard AASHTO Density with discing, sprinkling, and rolling as necessary.
- D. All material aggregate larger than one-quarter inch in diameter that comes to the surface during discing shall be removed prior to compacting operations.

- E. The color should be gray or similar.
- F. The material shall be sized as follows:
 - 1. Screen Number 3/8 – 100% Passing
 - 2. Screen Number 4 – 100% Passing
 - 3. Screen Number 8 – 86% Passing
 - 4. Screen Number 16 – 65% Passing
 - 5. Screen Number 30 – 45% Passing
 - 6. Screen Number 50 – 35% Passing
 - 7. Screen Number 100 – 25% Passing
 - 8. Screen Number 200 – 15% Passing

PART 3 - EXECUTION

3.1 INSPECTION AND ACCEPTANCE

- A. Examine all surfaces and contiguous elements to receive work of this section and correct, as part of the Work of this Contract, any defects affecting installation.
- B. Commencement of work will be construed as complete acceptability of surfaces and contiguous elements.

3.2 INSTALLATION REQUIREMENTS

- A. The following installation requirements must be met by the SSC:
 - 1. These materials should be one of the last items installed on the facility to maintain the physical properties. Keep newly installed materials clean and free from debris.
 - 2. All new sand and rock dust must be watered and compacted during installation. At final walk-through these materials must be flush to the top of the surrounding area.
 - 3. Contractor to provide one (1) additional cubic yard of sand & rock dust for future settling; Owner to store additional materials.
 - 4. Do not install these materials until drainpipe and filter fabric are installed and drains are connected to storm system.
 - 5. Upon completion of installation, test materials to demonstrate satisfactory operation acceptable to Owner, via watering or rainstorm. The SSC shall clean or replace unsuitable or contaminated materials at his expenses.

END OF SECTION

SECTION 33 22 00

RESILIENT UNDERLAYMENT (ALTERNATE NO. 1)

SUMMARY: This document defines requirements for the installation and operating performance of an athletic field synthetic base underlayment material needed for a professional-grade synthetic turf field. Defined are the primary system requirements for insuring quality, environmental compatibility, optimum safety of the playing surface (impact attenuation/surface playability) and high-capacity subsurface drainage of the installed playing field.

Specifications listed are defined per applicable ASTM standard test methods, or other national or internationally recognized testing standards. All other specifications and tolerances listed shall be defined under standard ANSI and/or ISO drawing and specification rules.

Notes: This specification requires prior installation of stabilized subsurface base, including a perimeter foundation-grade concrete curb and high-capacity trenched storm drain system.

This document does not create any warranty, express or implied. Limited warranties will be established by separate documents provided by the vendors of the respective materials and the installation contractor.

PART 1 - SPECIFICATION REFERNECES

1.1 RELATED SPECIFICATION SECTIONS

- A. Section 321823.40: Synthetic Turf System

PART 2 - TESTING REFERENCES

- 2.1 American Society for Testing and Materials (ASTM), International Standards Organization (ISO), European Committee for Standardization (EN), German Institute for Standardization (DIN), Cradle to Cradle Products Innovation Institute (C2CPII), Environmental Protection Agency (EPA):

ASTM D3575, Suffix T	Standard Test Methods for Flexible Cellular Materials Made from Olefin Polymers – Tensile strength and elongation
ASTM D3575, Suffix D	Standard Test Methods for Flexible Cellular Materials Made from Olefin Polymers – Compression deflection
TSM5725G (modi- fied)	Toyota Method for determination of Coefficient of Linear Thermal Expansion
DIN 53428	Testing of cellular materials - Determination of the resistance to liquids, vapours, gases and solid materials
EN 12616	Surfaces for sports areas - Test methods for the determination of vertical water infiltration and horizontal water flow rates
ASTM D4716	Standard Test Method for Determining the (In-plane) Flow Rate per Unit Width and

	Hydraulic Transmissivity of a Geosynthetic Using a Constant Head – TRI procedure using characteristic flow equation
ASTM F355, Missile E	Standard Test Method for Impact Attenuation of Turf Playing Surface Systems, Other Protective Sport Systems, and Materials Used for Athletics, Recreation and Play
ASTM F355, Missile A	Standard Test Method for Impact Attenuation of Playing Surface Systems, Other Protective Sport Systems, and Materials Used for Athletics, Recreation and Play
ASTM F3146	Standard Test Method for Impact Attenuation of Turf Playing Systems Designated for Rugby
ASTM F3189	Standard Test Method for Measuring Force Reduction, Vertical Deformation, and Energy Restitution of Synthetic Turf Systems Using the Advanced Artificial Athlete
ASTM F1936	Standard Specification for Impact Attenuation of Turf Playing Systems as Measured in the Field
ASTM F925	Test Method for Resistance to Chemicals of Resilient Flooring
EN 14030:2010 ISO 12960:1998	Resistance to Acid and Alkaline Liquids
ISO 13438:2004	Resistance to Oxidation (Accelerating Aging)
ASTM G22	Determining the Resistance of Plastics to Bacteria
ASTM G21	Determining Resistance of Synthetic Materials to Fungi
ISO 14001:2004	Environmental Management Systems
ISO 9001:2008	Quality Management Systems
C2CPII	Cradle to Cradle Product Innovation Institute
EPA 6010B 7470A, 7471A	Heavy Metals, Mercury
EPA 8260B	Volatile Organics
EPA 8270C	Semi-Volatile Organics

2.2 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. Drawings and the general provisions of the Contract, including General and Supplementary Conditions and other Division I Specification Sections, apply to this section.
 2. Installation shall comply with rules and/or regulations for field play set forth by the National Federation of High School Sports (NFHS). Contractor to provide shop drawing striping plans for all fields prior to construction to ensure compliance.
 3. American Society for Testing and Materials (ASTM): Latest standard test methods for the products used for the synthetic turf product system, RCRA testing approved by the EPA. And, European Committee for Standardization of International Playing Surfaces EN 1177 for Head Injury Criteria.
 - a. Testing for Wheelchair Accessibility is required – (F1951-0)

- b. Standard Test Methods for Laboratory Compaction Characteristics of Testing for Water Permeability of Synthetic Turf Systems and Permeable Bases (F1551) is required.
- c. Additional Testing Required as per Section 3.13 for the Synthetic Turf System.

PART 3 - SYNTHETIC TURF UNDERLAYMENT DESCRIPTION

3.1 GENERAL REQUIREMENTS FOR UNDERLAYMENT SYSTEM

- A. A white impact energy absorbing sub-base drainage system designed specifically for use with synthetic turf is required. The specified material must have physical, drainage and performance properties that meet the following requirements:
 - 1. Minimum material nominal thickness 25 mm – material thickness must be within ± 1.5 mm
 - 2. Tensile Strength > 80 psi (ASTM D3575, Suffix T)
 - 3. Tensile Elongation > 15% (ASTM D3575, Suffix T)
 - 4. Compression Strength > 20 psi @ 25% strain (ASTM 3575, Suffix D)
 - 5. Linear Thermal Expansion < 0.10 mm /m /° C (TSM5725G - modified)
 - 6. Water Absorption $\leq 1\%$ (vol.) after 24 hrs (DIN 53428)
 - 7. Water Permeability > 3000"/hr (EN 12616)
 - 8. Lateral Transmissivity at 0.005 gradient ≥ 1.05 gpm/ft (ASTM D4716 – TRI Environmental method using characteristic flow equation)
 - 9. Head Injury Criterion (HIC) < 1000 from a 0.85 m drop height (ASTM F3146, Procedure A)
 - 10. Gmax < 100 G's (ASTM F355, Missile A)
 - 11. Shock Absorption > 60% (AAA; ASTM F3189)
 - 12. Vertical Deformation < 10.0 mm (AAA; ASTM F3189)
 - 13. Resistance to Chemicals ≤ 2 (ASTM F925)
 - 14. Resistance to Acid and Alkaline Liquids: <1% average tensile strength loss, 100-year model (EN 14030:2010 / ISO 12960:1998)
 - 15. Resistance to Accelerated Aging (Oxidation) < 10% average tensile strength loss, 100-year model: 56 days at 110 °C (ISO 13438:2004)
 - 16. Resistance to Bacteria - no growth (ASTM G22)
 - 17. Resistance to Fungi - no growth (ASTM G21)
- B. Impact Safety Requirements for installed Surface System of Infilled Synthetic Turf and Underlayment:
 - 1. Surface system must provide average HIC < 700 from a 1.3 m drop height upon initial testing of installed field (ASTM F355, Missile E)
 - 2. Surface system must provide field-average Gmax of < 100 g upon initial testing of installed field (ASTM F1936)
 - 3. Surface system must provide average HIC <1000 from a 1.3 m drop height during warranty period of artificial turf (ASTM F3146, Procedure A)
 - 4. Surface system must provide maximum average Gmax of field of 120 g during warranty period of artificial turf (ASTM F1936)
 - 5. Surface system must provide critical fall height of 1.6 m or higher upon initial testing of the field (ASTM F3146, Procedure A)

PART 4 - QUALITY ASSURANCE AND GUARANTEES

- 4.1 Product must be made in ISO accredited facility in the United States of America according to the Federal Trade Commission Made in USA Standard.
- 4.2 Shock pad must be all white in color to avoid excessive thermal movement due to sunlight exposure during installation.

- 4.3 Material must be manufactured in an ISO 9000:2015 certified facility.
- 4.4 Product must be of a homogenous material composition, with a documented chain of custody of all raw materials. Variable content material will not be accepted.
- 4.5 Manufacturer must provide documentation of material content and pre-approved standard OSHA SDS sheet.
- 4.6 Manufacturer must demonstrate successful athletic field shock pad installation in the United States of at least 40 million square feet (approx. 500 fields) over a minimum period of 10 years.
- 4.7 Manufacturer must demonstrate a minimum of 50 fields that have had the turf replaced over the original shock pad and are on their "second turf cycle" over original shock pad.
- 4.8 Material must be covered by a pre-approved and binding 25-year limited product and performance warranty issue by a company in the United States of America. Warranty shall include the provision that manufacturer will deliver to the Owner and install new panels to replace the non-conforming panels. The installation shall include the temporary removal and repair or replacement of the artificial turf and infill over the affected area.
- 4.9 Warranty must specify static and dynamic load limits in pounds per square inch. Warranty must not specify monetary limits of liability. Warranty must allow owner a notice period of at least 30 days for non-compliance claims.
- 4.10 Warranty must include guarantee for surface system HIC < 700 from a 1.3 m drop height according to ASTM F355 (Missile E) upon initial testing of installed field and HIC <1000 from a 1.3 m drop height according to ASTM F355 (Missile E) for warranty period of artificial turf.
- 4.11 Warranty must include guarantee for surface system Gmax < 120 g according to ASTM F1936 for warranty period of artificial turf.
- 4.12 Product must be designed to freely drain and not designed to hold or retain water. Any product that intentionally holds or retains water will not be accepted.
- 4.13 Underlayment system seams should be mechanically locked into place by hand without cutting, splicing, use of additional materials, glue, fasteners, or secondary processes and equipment.
- 4.14 Material must be installed according to manufacturer's instructions, without exceptions.
- 4.15 Manufacturer must provide written procedures to selected turf supplier or contractor for the installation of turf on top of underlayment.

- 4.16 Product is to be shipped as flat panels on pre-packaged pallets. Rolled products are not acceptable.
- 4.17 As part of a Buy American requirement, shock pad must be of a raw material 100% sourced in the USA and the pad produced in a factory within the continental United States.

PART 5 - ENVIRONMENTAL COMPATIBILITY

- 5.1 Material must be manufactured in an ISO 14001:2015 certified facility.
- 5.2 Product must be Cradle to Cradle™ Certified Bronze (or higher) by the Cradle to Cradle Products Innovation Institute.
- 5.3 Product material must not contain concentrations of metals, volatile organic compounds (VOCs), or semi-volatile organic compounds (SVOCs) at concentrations greater than EPA Regional Screening Levels or Department of Toxic Substances Control Human Health Risk Assessment (HHRA) Note 3 thresholds. (EPA 6010B, EPA 7470A EPA 7471A, EPA 8260B, EPA 8270C).
- 5.4 Product material must not contain leachable concentrations of metals, VOCs, or SVOCs (using the synthetic precipitation leaching procedure) greater than maximum contaminant levels (MCLs) or Regional Water Quality Control Board Environmental Screening Levels for groundwater and surface water - fresh water aquatic habitat. (EPA 60108, EPA 7470A EPA 7471A, EPA 8260B, EPA 8270C).
- 5.5 Manufacturer must provide a product lifetime recycle / reuse program within the United States of America.
- 5.6 Additional Requirements for California
- A. Product must not contain a chemical on the current California Proposition 65 Safe Drinking Water and Toxic Enforcement Act of 1986.
 - B. Product must not contain concentrations of substances at hazardous waste levels per California Code of Regulations, Title 22, Division 4.5, Chapter 11 – Identification and Listing of Hazardous Waste.

PART 6 - SUBMITTALS

- 6.1 General: Bidding contractor must identify performance base system with bid package. If a non-specified product is identified, the proposed alternate product must be submitted and pre-approved by the design architect/engineer 10 days prior to the bid opening. If bidding contractor does not identify a manufacturer, the Township/School District will assume that the specified product is included in the bid package and will not consider substitutions.
- 6.2 Product Data: Submit 8.5" x 11" product sample and typical properties sheet.
- 6.3 Shop Drawings: Submit cross-sectional view showing product installation in relation to sub-base and

synthetic turf (including edge attachment).

- 6.4 Test Data: Submit all applicable test data for compliance to specifications. All testing to be performed following applicable ASTM or other internationally recognized standards and procedures.
- 6.5 Installation: Submit copy of product installation instructions. Submit copy installation recommendations.
- 6.6 Warranty: Submit copy of product 25-Year warranty coverage as specified in 4.8 - 4.11.

PART 7 - PRODUCTS

- 7.1 Description: Resilient Molded Expanded Polypropylene Base System
- 7.2 Product: Brock PowerBase YSRXD or pre-approved equal
- 7.3 Contact Information:
Brock USA LLC
3090 Sterling Circle
Boulder, CO 80301
Telephone: (303) 544-5800
sales@brockusa.com
www.brockusa.com
- Ronnie Pascale
National Director of Sales
Telephone: (804) 366-1368
rpascale@brockusa.com
- 7.4 Manufacturing/Ordering Information:
Brock USA LLC
3090 Sterling Circle
Boulder, CO 80301
Telephone: (303) 544-5800
sales@brockusa.com
- 7.5 Product format: Interlocking panels
Size: approximately 73.5 x 49.0 inches (1867 x 1245 mm) overall dimensions
Area: Nominal net coverage per panel 24.15 ft² (2.24 m²)
Thickness: 1.00" (25.4 mm) ± .06" (1.5 mm)
Panel Weight: approximately 5.2 lbs. / panel

PART 8 - PRODUCT SUBSTITUTIONS

- 8.1 Product substitutions are allowed only in accordance with pre-bid substitution request procedures outlined

in the contract documents. No substitutions will be allowed after the bid date. Bidding contractor must identify performance base system with bid package. If a non-specified product is identified, the proposed alternate product must be submitted and pre-approved by the design architect/engineer 10 days prior to the bid opening. If bidding contractor does not identify a manufacturer, the Township/School District will assume that the specified product is included in the bid package and will not consider substitutions.

PART 9 - INSTALLATION

- 9.1 Per manufacturer's recommendation - obtain written installation instructions and procedures from the manufacturer.

PART 10 - SURPLUS MATERIALS

- 10.1 Surplus materials to be determined by the Owner prior to order and delivery of product to the installation site. Surplus quantities to be identified in writing by the General Contractor at the time of order placement.

PART 11 - PROJECT COMPLETION

- 11.1 Upon completion of installation, a walk-through will be conducted to inspect the quality of work and ensure all details meet specifications.
- 11.2 A punch list of unacceptable or incomplete items will be documented and agreed upon for completion prior to final project closeout and acceptance.

PART 12 - APPROVALS

- 12.1 Finished synthetic base installation workmanship must be approved in advance by the turf manufacturer. Approvals to be based on a physical inspection performed at the site prior to installation of any synthetic turf material.
- 12.2 Any approvals sought after turf installation will be declined. Any associated repair or replacement costs associated with rework of the synthetic base will be the responsibility of the turf supplier/installer.

END OF SECTION

SECTION 32 31 13

GALVANIZED CHAIN LINK FENCING AND GATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Galvanized Chain-link fences and gates
- B. Related Sections:
 - 1. 32 13 13 Concrete Paving
 - 2. 11 68 33 Athletic Field Equipment
 - 3. 32 18 23.29 Synthetic Turf System

1.3 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Chain-link fence shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated according to ASCE/SEI 7:
 - 1. Minimum Post Size: Determine according to ASTM F 1043 for framework up to 6 feet high, and post spacing not to exceed 10 feet.
 - 2. Minimum Post Size and Maximum Spacing: Determine according to CLFMI WLG 2445, based on mesh size and pattern specified and on the following:
 - a. Wind Loads: 105 mph.
 - b. Exposure Category: B.
 - c. Fence Height: Varies
 - d. Material Group: IA, ASTM F 1043, Schedule 40 steel pipe or stronger if warranted to meet wind load requirements. Contractor to verify prior pipe material prior to bid and installation.
- B. Fence posts, footers and fabric not structurally designed for wind/privacy screen applications. Any wind/privacy screens installed after construction will be at the owner's discretion and risk.
- C. Fence system shall meet all applicable ASTM standards. Including but not limited to
 - 1. F 567 - Practice for Installation of Chain Link Fence
 - 2. F 669 - Specification for Strength Requirements of Metal Posts and Rails for Industrial Chain Link Fence
 - 3. F 900 - Specification for Industrial and Commercial Swing Gates
 - 4. F 1083 - Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures
 - 5. F 1234 - Specification for Protective Coatings in Steel Framework for Fences

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components, and finishes for chain-link fences and gates.
 - 1. Fence, rails, and fittings.

2. Chain-link fabric, reinforcements, and attachments.

- B. Samples for Initial Selection: For components with factory-applied color finishes.
- C. Product Certificates: For each type of chain-link fence from manufacturer.
- D. Product Test Reports: For framing strength, according to ASTM F 1043.
- E. Field quality-control reports.
- F. Operation and Maintenance Data: For the following to include in emergency, operation, and maintenance manuals:
- G. Warranty: Sample of special warranty.
- H. Other Informational Submittals:
 - 1. Record drawings.

1.5 QUALITY ASSURANCE

- A. In general, conform to standards of the CHAIN LINK FENCE MANUFACTURERS INSTITUTE (CLFMI). Manufacturer:
- B. Company specializing in commercial quality chain link fencing with five years' experience.
- C. Installer: Company specializing in commercial quality chain link fence installation with three years' experience and approved by manufacturer.
- D. Windscreen shall be installed on all new outfield fences See Specification 11 68 33 Athletic Field Equipment

1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify layout information for chain-link fences and gates shown on Drawings in relation to property survey and existing structures. Verify dimensions by field measurements.
- B. The owner has acknowledged the risk of adding windscreen to all chain link fences. The designer shall be held harmless of all fence failure due to windscreen installation.

1.7 WARRANTY

- A. All material and workmanship shall be warranted for a period of one (1) year after final acceptance.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements.

- B. The types of fencing required for the project are as indicated below, subject to detailed material requirements which follow.

1. All fencing materials shall be galvanized
2. All material shall be new, and products of recognized reputable manufacturers. Used, re-rolled or re-galvanized materials are not acceptable.
3. Like items of materials provided hereinafter shall be the end products of one manufacturer in order to achieve standardization for appearance, maintenance, and replacement.
4. Fencing Fabric Wire shall conform to the following:
 - a. Fabric shall be premium grade helically wound and woven steel core wire in accordance with ASTM standards.
 - b. Material specifics shall be as follows:

	Core (inches)	Wire (uncoated) (gauge)	Wire Breakload (lbf)	Mesh Size
Fence Fabric	0.148	9	1290	2"

- c. All fencing is to be knuckle – knuckle (no barbs top or bottom)

5. Galvanized framework shall be steel pipe high strength – Type II: Cold formed and welded steel pipe complying with ASTM F1043, 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 Galvanized.
6. Schedule of pipes sizes shall be as follows:

Application	Height (feet)	Outside Dimensions (inches)	Wall Thickness (inches)	Weight (lbs/foot)
Terminal/Corner Posts	ALL	4.00	0.160	6.56
Line Posts	Under 5'-0"	1.900	0.120	2.28
	5'-0"to 8'-0	2.875	0.160	4.64
All Rails and Braces	(all heights)	1.660	0.111	1.84

8. Post tops shall be provided with secured post caps that fit tightly and cannot be removed by hand.
9. 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.
10. Provide top rail with pass-through fittings at line posts and rail end cups and brace bands at terminal or gate posts.
11. 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.
 - a. Where the chain link fence is in line with the Protective Ball netting, special boulevard clips shall be used to allow for the field side of the ball net post and the chain link fence post to be flush with each other. This means the posts will not be lined up center to center but rather will be offset from each other to have a flush fabric condition on the field side.
12. 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.
13. 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.

- a. Where the chain link fence is in line with the Athletic Ball Netting, special boulevard clips shall be used to allow for the field side of the ball net post and the chain link fence post to be flush with each other. This means the posts will not be lined up center to center, but rather will be offset from each other (see Project Drawings and Details).
- b. 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.
- c. 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.
- d. 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 Galvanized
- e. 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.
- f. Other hardware required shall be fabricated from steel, and galvanized in accordance with ASTM A123 and/or ASTM A153.
- g. All threaded bolts are to be turned away from secured areas, especially field of play

C. Chain Link Swing Gates:

1. All gates to be heavy duty commercial grade.
2. 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 a minimum of 10 mils per ASTM 1043. Coating before fabrication will not be allowed.
3. Chain link fabric for gates shall match fabric for fencing.
4. Gate posts shall be steel pipe – type II finished to match fence posts:

Double Leaf Gates	Post Size (inches)	Weight (lb/ft.)
8' and wider	4.00	5.79
Single Gates	Post Size (inches)	Weight (lb/ft.)
4'-6' wide	2.875	4.64
All gate frames	1.66	1.84

5. All gate leaves greater than 6' for double gates shall have no flat wheel kits installed on the nonplaying field side, with spring suspension, 400 lb capacity minimum.
6. Gate hinges shall be heavy-duty offset type. Install gate with 90-degree malleable heavy duty hinges. 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.
7. All gates should open outward away from the field of play.
8. All gates shall be equipped with a positive closure latch and padlock fitting.
9. Lockable latches are required on all walk and double gates.

10. All threaded bolts are to be turned away from secured areas, especially field of play.

2.2 CAST-IN-PLACE CONCRETE

- A. Materials: Portland cement complying with ASTM C 150, Type I aggregates complying with ASTM C 33, and potable water for ready-mixed concrete complying with ASTM C 94/C 94M. Measure, batch, and mix Project-site-mixed concrete according to ASTM C 94/C 94M.
 1. Concrete Mixes: Normal-weight concrete with not less than 4000-psi compressive strength (28 days), 3-inch slump, and 1-inch maximum size aggregate.
- B. Materials: Dry-packaged concrete mix complying with ASTM C 387 for normal-weight concrete mixed with potable water according to manufacturer's written instructions.

2.3 SHOP DRAWINGS

- A. Contractor to provide full shop drawings and specifications for approval of all fencing, gates and components. Drawings to include all details, layouts, post locations and clear widths of all gates.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for a verified survey of property lines and legal boundaries, site clearing, earthwork, pavement work, and other conditions affecting performance of the Work.
 1. Do not begin installation before final grading is completed unless otherwise permitted by owner's representative.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of 500 feet or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

3.3 INSTALLATION, GENERAL

- A. Install chain-link fencing to comply with ASTM F 567 and more stringent requirements indicated.
 1. Install fencing on established project boundary lines inside property line as shown on Drawings.

3.4 CHAIN-LINK FENCE INSTALLATION

- A. Post Excavation: Drill or hand-excavate holes for posts to diameters and spacings indicated, in firm, undisturbed soil.
- B. Post Setting: Set posts in concrete at indicated spacing into firm, undisturbed soil.

1. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.
 2. Where the chain link fence is in line with the Athletic Ball Netting, special boulevard clips shall be used to allow for the field side of the ballnet post and the chain link fence post to be flush with each other. This means the posts will not be lined up center to center, but rather will be offset from each other. (see Project Drawings and Details).
 3. Concrete Fill: Place concrete around posts to dimensions indicated and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.
 - a. Exposed Concrete: Extend 2 inches above grade; shape and smooth to shed water.
 - b. Concealed Concrete: Top 2 inches below grade to allow covering with surface material.
 - c. Posts Set into Concrete in Sleeves: Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with non-shrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions, and finished sloped to drain water away from post.
 - d. Posts Set into Voids in Concrete: Form or core drill holes not less than 5 inches deep and 3/4 inch larger than OD of post. Clean holes of loose material, insert posts, and fill annular space between post and concrete with non-shrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions, and finished sloped to drain water away from post.
 4. Mechanically Driven Posts: Drive into soil to depth shown on details. Protect post top to prevent distortion.
- C. Terminal Posts: Locate terminal end, corner, and gate posts per ASTM F 567 and terminal pull posts at changes in horizontal or vertical alignment of 30 degrees or more.
- D. Line Posts: Space line posts uniformly on center per detail.
- E. Post Bracing and Intermediate Rails: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Diagonally brace terminal posts to adjacent line posts with truss rods and turnbuckles. Install braces at end and gate posts and at both sides of corner and pull posts.
1. Locate horizontal braces at mid-height of fabric on fences with top rail and at two-third fabric height on fences without top rail. Install so posts are plumb when diagonal rod is under proper tension.
- F. Top Rail: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Run rail continuously through line post caps, bending to radius for curved runs and terminating into rail end attached to posts or post caps fabricated to receive rail at terminal posts. Provide expansion couplings as recommended in writing by fencing manufacturer.
- G. Intermediate and Bottom Rails: Install and secure to posts with fittings.
- H. Chain-Link Fabric: Apply fabric to outside of enclosing framework. Leave 2 inches between finish grade or surface and bottom selva unless otherwise indicated. Pull fabric taut and tie to posts, rails, and tension wires. Anchor to framework so fabric remains under tension after pulling force is released.
- I. Tension or Stretcher Bars: Thread through fabric and secure to end, corner, pull, and gate posts with tension bands spaced not more than 15 inches o.c.
- J. Tie Wires: Use wire of proper length to firmly secure fabric to line posts and rails. Attach wire at one end to chain-link fabric, wrap wire around post a minimum of 180 degrees, and attach other end to chain-link fabric per ASTM F 626. Bend ends of wire to minimize hazard to individuals and clothing.
1. Maximum Spacing: Tie fabric to line posts at 12 inches o.c. and to braces 24 inches o.c.
- K. Fasteners: Install nuts for tension bands and carriage bolts on the side of the fence opposite the fabric side.

3.5 GATE INSTALLATION

- A. Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach fabric as for fencing per manufacturer requirements. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubricate where necessary.

3.6 ADJUSTING

- A. Gates: Adjust gates to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding. Lubricate hardware and other moving parts.

END OF SECTION