

**SECTION 32 18 13 – SYNTHETIC GRASS SURFACING SYSTEM**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. The Contractor, Subcontractors, and/or suppliers providing goods and services referenced in or related to this Section shall also be bound by the Related Documents identified in Division 01 Section “Summary.”

**1.2 SUMMARY**

- A. Section includes: Generally, installation of a synthetic grass carpet over a resilient shock pad with an infill consisting of a mix of a performance infill material and a stabilizing infill material.
  - 1. Procurement and installation of synthetic grass carpet surfacing.
  - 2. Procurement and installation of infill materials.
  - 3. Procurement and installation of a resilient shock pad.
  - 4. Pre and post installation testing of the synthetic grass surfacing system.
  - 5. Warranty and maintenance requirements for the synthetic grass surfacing system.
  - 6. All incidental work items required to complete the work as shown on the Drawings and as called-for in the Specifications.
- B. It is the Owner intent to meet the performance, safety, and durability requirements for the synthetic turf system as specified herein for the life of the synthetic turf surfacing system warranty period (8-years).

**1.3 REFERENCES**

- A. American Society for Testing and Materials (ASTM)
- B. European Standards (EN)
- C. National Federation of State High Schools (NFHS)
- D. Synthetic Turf Council Guidelines (STC)
- E. Connecticut Interscholastic Athletic Conference (CIAC)
- F. American Sports Builders Association (ASBA)

**1.4 DEFINITIONS**

- A. Most terms used within the documents are industry standard. Certain words or phrases shall be understood to have specific meanings as follows:
  - 1. Provide: Furnish and install a complete and fully operational system.

2. Furnish: Purchase and deliver to a specific location within the building or site.
3. Install: With respect to equipment furnished by others, install means to receive, unpack, erect or construct, move into position, mount, and connect, including removal of packaging materials.
4. Synthetic Turf Testing Agency (Testing Agency): Agency to perform testing on the synthetic turf system. Testing shall be done by a third-party testing agency.

## 1.5 SUBMITTALS

### A. Bid Submittals

1. Contractor to provide a list of at least five (5) successful synthetic turf field construction projects in the past 8 years.
2. Contractor to provide the name of the turf manufacturer and installer.
3. Contractor to provide the name of the infill materials supplier(s).
4. Contractor to provide the name of the resilient shock pad manufacturer.

### B. Pre-Manufacturing Submittals

1. Material Testing: Submit for approval test results for all material testing performed under “Quality Control Testing, Material Testing” herein. Provide copies of all Testing Agency reports. Testing shall be no more than 24 months old from date of submittal.
2. Product Data: Submit manufacturer's general specifications and installation instructions for all products in the Synthetic Grass Surfacing System, including certifications and other data as may be required, to show compliance with the Contract Documents.
  - a. Safety Data Sheets (SDS) sheets for all products and product components, as necessary. This shall include solvents and other products required as part of clean-up.
  - b. Submit manufacturer’s product data for the resilient shock pad demonstrating compliance with this specification. Include manufacturer’s written instructions and procedures for each product.
3. Material Samples: Submit two (2) samples for approval for all materials under 2.1 Materials including, but not limited to, the following:
  - a. Synthetic Grass Carpet Fiber: Provide samples for each color used for the field, markings.
  - b. Synthetic Grass Carpet Samples: Twelve-inch (12") square samples of unfilled synthetic grass carpet (rag) for each color used for the field. The samples shall be the manufacturer’s standard product that most closely resembles the specified system and is to be reviewed as the general product intended for use on the field. Manufacturer shall note any discrepancies

between the standard product sample submitted and the product to be manufactured for this project.

- c. Seaming Materials: Twelve-inch (12") long samples of all materials to be used for seaming of the synthetic grass turf system including, but not limited to, glue and seaming tape.
  - d. Synthetic Grass Surfacing Infill: One-pound samples of each, in separate containers:
    - 1) Performance infill material
    - 2) Stabilizing infill material
  - e. Resilient Shock Pad Sample: Twelve-inch (12") square samples of resilient shock pad.
4. Shop Drawings: Submit for approval the following:
- a. Seaming plan; Seams of the field shall not coincide with the subsurface drain system nor seams of pad.
  - b. Field Marking Layout for all sports shown on the Drawings showing any field lines, markings, boundaries on the appropriate field(s) and all specified colors. All markings shall be tufted in the factory or inlaid. Provide certification that field layouts meet all NFHS and CIAC sport marking requirements as installed in the field.
5. Warranties: Submit a draft copy of the warranties in Owner's name for all products furnished under this section for review and approval.
6. Testing Agency: Submit qualification of testing agency(s) for review and approval.
7. Installer Qualifications: Provide documentation that the designated supervisory personnel on the project are competent in the work to be performed and are trained and approved by the product manufacturers.
8. Surveyor: Submit name and qualifications of Professional Land Surveyor who will be responsible for layout and verification of the work of this section.
- C. Post-Installation Submittals
- 1. Material Testing: Submit for approval test results for all material testing performed under "Quality Control Testing, Post-Installation" herein. Provide copies of all testing agency reports.
  - 2. Warranty: Submit for approval final, executed warranty.
- D. Warranty Quality Control Submittals
- 1. Material Testing: Submit for approval test results for all material testing performed under "Quality Control Testing, Warranty" herein. Provide copies of all testing agency reports to the Owner and Landscape Architect for review and

approval for the entire warranty period.

1.6 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 contractor is responsible for all testing necessary to satisfy the conditions of this contract.
  - 1. Any material tested and found not in compliance with the contract will be rejected and replaced with material conforming to the specifications. This will be done at the sole expense of the Contractor.
  - 2. Any testing performed by the Owner above and beyond the testing required by these specifications, will be at the Owner's expense. The Contractor is responsible for the cost of all testing that fails. Contractor will bear the cost of all retesting as required by the Owner.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Contractor is required to coordinate material deliveries and storage on-site with Owner. Deliveries and storage of materials on-site shall not impact the function of the daily school activities and any functions the school may have planned throughout the school year. Contractor shall coordinate with the Board of Education to accommodate such activities.
- B. Schedule delivery to minimize on-site storage. Segregate differing materials and prevent contamination between materials.
- C. Packing and Shipping: Deliver products in original unopened packaging with legible manufacturers' identification. All materials shall be stored in a dry place out of the direct sunlight.
- D. Areas for loose material delivery and storage shall be adequately cleared, cleaned, and prepared to ensure new material is not contaminated by existing foreign materials and existing materials are not damaged.
- E. Prior to the installation of any materials and immediately upon delivery of the synthetic grass system and components to the project site, the Contractor shall inspect materials as follows:
  - 1. For damaged or defective items.
  - 2. Measure synthetic grass roll lengths, perforations, and uniformity.
  - 3. Adhesives and seaming tape shall arrive in sealed dry containers and be kept at an adequate temperature per manufactures requirements.
  - 4. Performance infill shall arrive in large sacks or bags without tears and loose material. Material shall be dry and loose within packaging. No performance infill shall be accepted that is bulked or solid.

- 5. Stabilizing infill may arrive loose or in large sacks, depending on the site conditions. Contractor is responsible for reviewing the site conditions and determining the method for delivery of the stabilizing infill based on the available material storage area provided by the Owner. Material shall arrive dry and shall not be accepted if bulked or solid.
  - 6. Infill materials shall be free of exposed metal particles.
  - 7. Infill shall remain free from contamination of site materials.
- F. Bulk Materials: Deliver materials in clean, washed, and covered trucks to eliminate contamination during transportation. On site stockpiling locations to be coordinated with the Owner. Stockpile only in areas free of debris and away from drainage routes. Cover all materials with plastic or geotextile if materials are to be stockpiled more than 48 hours or a rain event is forecasted.

1.8 QUALITY CONTROL TESTING

- A. All sampling/testing shall be the responsibility of Contractor. Contractor shall retain and pay for the services of a Synthetic Turf Testing Third-Party Agency to perform all sampling/testing in accordance with applicable standards.
- B. All testing shall be completed by an independent Synthetic Turf Testing Third-Party Agency as approved by Landscape Architect, unless otherwise noted. Testing must be for current materials with current date from independent testing laboratory as described herein.
- C. Certified copies of laboratory reports shall be submitted for all testing.
- D. Material Testing
  - 1. Manufacturer may provide previously tested systems that closely resembles the requirements for this project and not dated over two (2) years from bidding date.
  - 2. Provide testing data for the following that meets or exceeds the standards shown:
    - a. Synthetic Grass Yarn
 

1) Yarn Melting Point	-	235 degrees F
2) Breaking Strength	-	200 lbs/ft
3) Lead Content	-	<50 ppm
4) Artificial Weathering (5000hrs UVA)	-	<50% reduction
    - b. Synthetic Grass Infill Materials
 

1) Particle Size Analysis		
2) Lead Content	-	<50 ppm
3) Particle Shape		
4) Bulk Density		
    - c. Resilient Shock Pad
 

1) Thickness	-	>20 mm
2) Critical Fall Height (Head Injury Criteria)	-	<1000@.65m
3) G-Max Rating	-	<120 G
4) Vertical Deformation	-	<8.0 mm
5) Force Reduction	-	>55%
6) Water Infiltration	-	>100 in/hr

**Athletic Fields Improvements For  
Francis Walsh Intermediate School  
April 2024**

- |    |  |   |                                 |
|----|--|---|---------------------------------|
| 7) | Shock Absorption                           | - | 55%                             |
| 8) | Resistance to Bacteria, fungus & chemicals | - | No growth or detrimental effect |
| 9) | Water Absorption                           | - | <5% after 24h immersion         |
3. Any system material previously tested and found not in compliance with the contract may be rejected and Contractor shall submit a material found to be acceptable.
4. The approved testing results shall be referred to as the ‘manufacturers declaration’ for the remainder of this section.
5. Contractor shall provide owner with a written statement that no PFAS chemicals were used in the manufacturing of the synthetic turf, infill materials or resilient pad.
- E. Post-Installation Testing
1. Timing: Testing shall be completed on-site once the field is complete and the infill has had adequate time to settle, but no later than forty-five (45) days of the completion of installation.
2. Contractor shall submit to Architect a copy of all test results certified by the Synthetic Turf Testing Third-Party Agency. Provide testing data for the following:
- |    |  |   |                  |
|----|--|---|------------------|
| a. | Water Infiltration (minimum of 10 locations throughout field)- | - | >16 in/hr        |
| b. | Infill Depth Measurement (minimum of 50 locations)             | - | +/- 10%          |
| c. | Planarity/Surface Regularity                                   | - | <1/2”            |
| d. | G-Max Rating (Minimum of 16 locations)                         | - | <95 G’s          |
| e. | Head Injury Criteria (Minimum of 16 locations)                 | - | <900@1.4m        |
| f. | Shock Absorption   | - | 55%-70%          |
| g. | Vertical Deformation   | - | 4mm-11mm         |
| h. | Vertical Ball Bouncing   | - | 60cm-100cm       |
| i. | Ball Roll  | - | 4m-10m           |
| j. | Safety of Toys Part 3 (EN 71-3)                                | - | Pass (4 samples) |
| k. | Safety of Synthetic Turf Infill (ASTM F3188)                   | - | Pass (4 samples) |
3. Any material tested and found not in compliance with the contract may be rejected and Contractor shall rectify the issue to be acceptable. Any area/item not within conformance shall be retested at the Contractors expense after remedy is implemented until satisfactory results are achieved.
- F. Warranty Testing
1. Timing: Testing shall be completed on-site and annually for the warranty period.

Testing shall be scheduled with the Owner and Architect each year prior to start of the fall athletic season.

2. Contractor shall submit to the Architect and Owner a copy of all test results certified by the independent Synthetic Turf Testing Third-Party Agency. Provide testing data for the following that meets or exceeds the standards shown:
  - a. Infill Depth Measurement (minimum of 50 locations) - +/- 10%
  - b. Planarity/Surface Regularity - <1/2"
  - c. G-Max Rating (Minimum of 10 locations) - <95 G's
  - d. Head Injury Criteria (Minimum of 10 locations) - <900@1.4m
  - e. Safety of Toys Part 3 (EN 71-3) - Pass (4 samples)
  - f. Safety of Synthetic Turf Infill (ASTM F3188) - Pass (4 samples)
3. Any materials tested and found not in compliance with the warranty requirements shall be rectified at Contractors expense. Contractor shall rectify the issue to be acceptable and pass all warranty testing requirements. Any area/item not within conformance shall be retested at the Contractors expense after remedy is implemented until satisfactory results are achieved.

#### 1.9 RIGHTS AND INFRINGEMENT

- A. The Drawings and Specifications are not intended to be proprietary or in violation of any current or pending patents. The Contractor and subcontractors are responsible to provide the Owner and Landscape Architect with any violations contained here in prior to bidding. By bidding on the project, the Contractor and subcontractors shall hold the Owner, Construction Manager, and Design Consultants harmless from infringement of any current or future patent issued for the synthetic grass surfacing system.

#### 1.10 WARRANTY

- A. Synthetic Grass Surfacing System Warranty
  1. Manufacturer agrees to repair or replace synthetic grass surfacing that fails in materials or workmanship within the warranty period of 8 years. Contractor to provide written warranty to owner prior to installation.
    - a. Failures include but are not limited to the following:
      - 1) Deterioration and excessive wear.
      - 2) Deterioration from UV light.
      - 3) Excessive loss of shock attenuation.
      - 4) Seam separation, including game lines and markings.
  2. Warranty period starts at the date of substantial completion.
- B. Infill Material Warranty
  1. Infill material shall be warrantied for a minimum of eight (8) years against breakdown of material outside of project specifications, deterioration of infill coatings, and failure to adhere to EN 71-3 and ASTM F3188 testing.

- C. Resilient Shock Pad Warranty
1. Manufacturer shall provide a warranty for the resilient shock pad materials and installation as specified herein, for a minimum period of sixteen (16) years to the Owner from the date of Substantial Completion.
  2. Warranty shall include coverage for the following:
    - a. Drainage issues or failure to drain at rate of 75" per hour or greater.
    - b. Persistent depressions, or deformation of the pad material 10 mm or greater caused by the resilient pad materials.
    - c. Any failure in the physical properties of the resilient pad that negatively affect the aesthetics, playability, G-Max rating, HIC rating, or longevity of the synthetic grass surfacing system.
    - d. Costs for repair or replacement of the synthetic turf and infill materials above the resilient pad in affected areas in the event of product failure.
- D. The Warranties shall cover, in general, the usability of the Synthetic Grass System: accessories, use, characteristics, and suitability, of the installation to the minimums specified in this Section.
- E. All items covered by the warranty are to be replaced or repaired with new materials, including installation at the sole expense of the warranting material manufacturer/supplier over the life of the Warranty.
- F. Sports Field Synthetic Grass System Use: The materials utilized in the sports field synthetic grass system (carpet, infill, resilient pad, seaming, logo's, inlays, etc.) shall be guaranteed for the designated uses as follows:
1. Football, Rugby, Soccer, Baseball, Softball, Field Hockey, Lacrosse
  2. Marching Band
  3. Graduations and Ceremonies
  4. Physical Education and Intramural Sports Programs
  5. Physical Education exercises and activities
  6. Pedestrian traffic and other similar uses
  7. Pneumatic rubber-tired maintenance and service equipment, designed for use on athletic fields and golf courses.
- G. Warranty documents and terms of Warranty shall be in accordance with this Specification.
1. The use of the Manufacturers' standard or modified form of Warranty shall in no circumstance supersede the conditions set forth in this Specification Section, which shall be considered part of the Warranty.
- H. Adhesive Materials



1. The adhesive shall have the same warranty period as the synthetic grass system, eight (8) years. Warranty from the adhesive material manufacturer/supplier shall be submitted with the synthetic grass surfacing warranty for review and approval.

1.11 WARRANTY AND MAINTENANCE OBLIGATIONS

1. The Synthetic Grass Manufacturer/Supplier shall be required to provide testing, as described under Warranty Testing, and inspection plan for the lifespan of the warranty as part of this Contract and shall submit a schedule of visits at the time of completion.
  - a. Contractor shall make corrections as necessary to meet all testing requirements.
2. The Synthetic Grass Manufacturer/Supplier to return to the site once (1) per year for the duration of the warranty, no less than 8 visits.
3. The Synthetic Grass Manufacture/Supplier shall inspect any areas of concern and make repairs as necessary under warranty during each visit including, but not limited to, the following:
  - a. Nailer Board/Concrete Anchor Cub Repairs (general contractor)
  - b. Inlays, Numbers, Logo, and Seam Conditions
  - c. Fiber Conditions
  - d. Fiber Height
  - e. Infill Condition
  - f. Infill Height/ Compaction
    - 1) Sports Fields: Additional infill may be required by the Contractor to maintain the G-Max, HIC levels and required infill depths. Materials shall be provided and installed at no cost to the Owner to achieve acceptable performance and safety requirements under the warranty requirements.
4. Test results, field repairs, and field concerns shall be submitted to the Owner and the Landscape Architect in a Field Inspection Report and Testing Results for review.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Resilient Shock Pad

1. Commercially available panelized/modular resilient pad system designed for multi-sport uses. Resilient shock pad shall consist of prefabricated, interlocking units configured for installation beneath a synthetic turf surfacing system.
  - a. Rolled sheet goods shall not be accepted.

2. **Compatibility:** Resilient shock pad shall be compatible with the submitted synthetic grass surfacing and the infill material. The synthetic grass surfacing and resilient shock pad shall provide an acceptable system. The resilient shock pad shall be in all ways compatible with the specified synthetic grass surfacing and infill, and shall not affect the synthetic grass surfacing warranty, as well as the synthetic grass surfacing system shall not affect the resilient shock pad warranty.
3. The resilient shock pad shall be intended for installation on a gravel base and suitable for use in New England without the use of adhesives, seaming, or separation fabric.
4. **Load Capacity:** No permanent deformation under periodic loading (e.g. grooming equipment or ambulance).
5. Connectors, couplers, adhesive, and other fittings shall not be required to connect resilient shock pad panels. Material of construction and configuration shall be in accordance with the resilient pad manufacture's requirements or recommendations, whichever is more stringent.
6. **Warranty:** Minimum 16-year manufacturer's warranty.

**B. Synthetic Grass Surfacing Carpet**

1. All components and their installation method shall be designed and manufactured for use on outdoor athletic fields. The finished surface shall resist abrasion and cutting from normal use.
2. 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, heat degradation, and be non-allergenic and non-toxic. The entire system shall be constructed to maximize dimensional stability, to resist damage and normal wear and tear from its designated uses, and to minimize the ultra-violet degradation.
3. The system shall have the basic characteristics of flow-through drainage, allowing free movement of surface runoff through the synthetic grass surfacing system where such water may flow to the existing base and into the field drainage system.
4. Pile fibers shall resemble freshly grown natural grass in appearance, texture, and color (except as noted for markings and graphics). Streaks, discoloration, or different dye lots shall not be accepted.
5. Manufacturer is to guarantee that the synthetic grass fiber is adaptable to painted lines.
6. The synthetic grass surfacing systems shall be a proven athletic caliber yarn designed specifically for outdoor use and stabilized to resist the effect of ultraviolet degradation, heat, foot traffic, water, and airborne pollutants.
7. All adhesives used in bonding the system together shall be resistant to moisture, bacterial and fungus attacks, and resistant to ultra-violet rays at any location upon installation.

8. Fabric surface shall be constructed and installed in minimum widths of 15 feet with no longitudinal or transverse seams, except for inlaid lines within a finished roll assembly.
9. The Synthetic Grass System shall always remain free draining before, during, and after the infill materials are installed.
10. The synthetic grass surfacing system properties shall be as follows:
  - a. Denier - 9,000 (mono and slit-film)  
5,000 (thatch/rootzone/spikezone)
  - b. Microns - 300 (mono)  
100 (slit-film)
  - c. Pile Height - 2" or greater
  - d. Pile Weight (total) - 58 oz. or greater
  - e. Stitch Gauge - ½"

C. Drainage Holes

1. Synthetic grass carpeting shall have drainage holes in backing to provide vertical drainage as specified required to meet drainage requirements.
2. Size and spacing of perforations shall be as recommended by manufacturer to meet drainage requirements. Spacing of drainage holes shall be uniform in both directions.
3. Drainage holes shall be complete and full diameter for a minimum of 95% of each roll.

D. Markings and Lines

1. All field lining, marking, field boundary system with team area limits, etc. shall be same material (yarn, infill, and backing) as playing field system.
2. Lines, and markings to be installed in the synthetic grass surface carpet are to be tufted in the factory to the maximum extent practical. Those not tufted in the factory shall be inlaid in the field (shaving is not permitted).
3. A complete field lining, marking, and field boundary system with team area limits, etc. shall be provided with the initial installation. Layouts shall be accurately surveyed and marked prior to installation. Layouts shall include all incidental markings required by the NFHS or state athletic organization, whichever is applicable.
4. All markings shall be uniform in color, providing a sharp contrast with the synthetic grass field color and shall have sharp and distinct edging.

5. Lines shall be true and shall not vary more than 1/2" from specified width and location. Lines shall be confirmed on the as-built survey.

E. Adhesive Materials and Seaming Tape

1. If a hot melt welding method is used, the glue shall have an application temperature of 325 degrees F. with a melting point of 180 degrees F. Material shall be National Adhesive #34- 5372 or equal. Submission of all hot melts shall be 10 calendar days prior to installation.
  - a. Hot melt shall not be used to adhere synthetic turf carpet to concrete anchor curbing.
2. Bonding surfaces shall be clean, dry, and free from grease, oil, wax, weak oxide films, mold release agents, and other surface contaminants.
3. The adhesive shall be applied at the rate specified by the manufacturer.
4. The adhesive shall have the same warranty period as the synthetic grass system. Warranty from the adhesive material manufacturer/supplier shall be submitted with the synthetic grass surfacing warranty for review and approval.
5. Seaming tape shall be a 12" wide polypropylene or polyethylene fabric acceptable for use with the synthetic turf carpet system and the adhesive material.
6. Seaming tape shall meet FIFA Joint Strength >25N/100mm

F. Infill

1. Infill materials shall be uniformly filled to a depth which leaves no more than 1/2" of exposed pile after settlement. Infill quantities shall not be determined by weight per unit area.
  - a. Infill materials shall be installed at a ratio as to meet the requirements set forth under Section 1.8 Quality Control Testing, Post Installation Testing
  - b. Infill materials shall consist of a mixture a performance infill material and a stabilizing infill material.
2. Performance Infill: Acrylic Coated SBR Infill
  - a. Shall be free of all metal and produced of 100% recycled automobile or truck tires. The material shall have a size not to exceed 10 mesh nor smaller than 20 mesh.
    - 1) The fine particles shall not exceed 10% by volume. Rubber shall have no visible evidence of steel particles present in the final synthetic grass surfacing in-fill. The bulk density of the rubber materials shall not be less than 29.75 lbs/cubic feet.
      - a) Coating color: **GREEN**
      - b) Coated SBR infill shall be UV stabile and resistant to heat degradation.
3. Stabilizing Infill: Sand Infill
  - a. Sand shall comprise 100% passing the #16 sieve, no more than 80% passing the #30 sieve and no more than 0.5% passing the #50 sieve per ASTM E-1.
4. A combination of the performance infill and the stabilizing infill materials are to be used as the in-fill system
  - a. System over a resilient pad: The performance infill material shall be

between approximately 30-40% by weight and the stabilizing infill material shall be between 60-70% by weight. Manufacturer to provide infill ration based on pre-installation testing.

- G. Additional Field Materials (Attic Stock)
1. Sports Fields:
    - a. The Contractor shall supply and deliver an additional 15 lineal feet of full width (15') material, plus 5 linear feet of full width of each color used. Scraps left from the installation process are not acceptable.
    - b. The Contractor shall furnish additional performance infill material as specified for the sports field synthetic grass surfacing system sufficient to fill two (2) fifty (50) gallon containers. The additional infill materials shall be placed in fifty (50) gallon containers with lockable covers and wheels and clearly labeled "FIELD INFILL".
  2. Seaming Repair Kit: Provide a seam repair kit suitable for use by the Owner. Material shall be administered using a caulking gun or similar mechanism. Buckets with a trowel applicator are not acceptable.
- H. Field Maintenance Equipment
1. Contractor shall provide the following grooming equipment to the Owner.
    - a. Synthetic Grass Magnet:
      - 1) One (1) new and unused GreensGroomer Sportsfield Magnet® SFM or approved equal for each field. Synthetic grass magnet shall be a towable unit with a 72" draw bar situated on a frame that rides on 2 pneumatic 280/250-4 ribbed 4-ply tires with bearings. Measuring 72" wide x 5" long x 2" in height, the magnet provides 360 sq. inches of surface. Strength of the magnet is 670lbs Pull. The weight of the complete unit is 102lbs.
      - 2) All attachments and adaptors necessary for the connection of the magnet to the Owner's grooming vehicle.
    - b. Synthetic Grass Magnet:
      - 1) One (1) new and unused GreensGroomer Integrated Sports Turf Groomer or approved equal for each field. Synthetic Sports Turf Groomer shall be a towable unit with a 106" with draw-bar, 72" wide with 2 pneumatic tires and 16 Blue Super Duty Synthetic bristles attached to a polypropylene head (4-12"; 8-18"; 4-4") also included to rows of 14 tines, 3/16" diameter with 40deg tip bend and 7/8" spacing. The weight of the complete unit is 375lbs.
      - 2) All attachments and adaptors necessary for the connection of the magnet to the Owner's grooming vehicle.
    - c. GreensGroomer Replacement Brushes:
      - 1) One (1) new and unused GreensGroomer set of replacement brushes.
    - d. Synthetic Grass Hand Equipment:
      - 1) Rakes: The Contractor shall supply at the end of the Project one (1) new and unused plastic leaf hand rake for each field.
      - 2) Hand Brushes: The Contractor shall supply at the end of the Project one (1) new and unused push broom for each field.

- 3) Hand Shovel: The Contractor shall supply at the end of the Project one (1) new and unused 27-inch aluminum scoop shovel with fiberglass handle for each field.
- 4) Two (2) Gallon Bucket: The Contractor shall supply at the end of the Project two (2) new and unused five (5) gallon bucket with handle and lid for each field.
- 5) Four (4) Single-Prong Infill Depth Gauges: The contractor shall supply at the end of the Project four (4) new and unused single-prong depth gauge supplied by The Synthetic Turf Council or approved equal.
- 6) One (1) Three-Prong Infill Depth Gauge: The contractor shall supply at the end of the Project one (1) new and unused three-prong depth gauge supplied by Sports Laboratories or approved equal.

### PART 3 - EXECUTION

#### 3.1 GENERAL

- A. Verify site conditions before proceeding with demolition work. Field check the accuracy of the Drawings and inspect structures, utilities, and other site features prior to start of work and notify Engineer in writing, of any hazardous conditions and/or discrepancies.
- B. Weather Permitted Conditions: The Contractor shall not perform any work if the conditions for working are:
  1. Ambient air temperatures are below 45 degrees F.
  2. Material temperature falls below 45 degrees F.
  3. Rain is forecast or falling
  4. Conditions exist or are pending that will be unsuitable to the installation of the system.
- C. Drawings / Specifications: The Contractor shall perform all work in strict accordance to the Contract Drawings / Plans, Shop Drawings and manufacturer's specifications and instructions.
- D. Verification: The Contractor shall be responsible for the inspecting, verifying, and completing all installed work of this section.

#### 3.2 EXAMINATION

- A. Installer is responsible to review the planarity, pitch (slope), drainage capabilities, and conditions of the prepared stone base by means of string lines, and as built survey testing provided by the General Contractor, and other methods as they deem necessary.
- B. Acceptance of Prior Work-Field Base Stone: Upon completion of the base and drainage work, the Site General Contractor shall submit a letter, addressed to the Owner, signed by the Site General Contractor, Resilient pad Installer, and the

Synthetic Grass Surfacing Installer. The letter shall confirm Field Base Stone has been reviewed, including all testing data, and is acceptable for installation of the synthetic grass surfacing system. Any discrepancies, problems, and/or conflicts shall be addressed prior to issuance of the letter.

1. Continuing with the installation of the resilient shock pad over the field base stone without issuance of such letter shall be considered as an approval of the base by the resilient shock pad and Synthetic Grass Surfacing Installer.

### 3.3 PREPARATION

- A. The Contractor shall take special care to protect all field structures and utilities. Any damage shall be repair or replaced at the cost of the Contractor
- B. Layout: The Contractor shall be responsible for furnishing, setting and marking all lines, seams and markings for the field. The Contractor shall at all times maintain all necessary benchmarks and control points to locate all events and markings.
- C. Slope: The field shall be installed with a 0.5% slope unless otherwise noted in the Drawings, from the one sideline to the opposite sideline as depicted on the drawings.
  1. The finish profile field may not exceed grade shown on the Drawings.
  2. Contractor shall excavate at trench drain/anchor curb at field perimeter so top of resilient pad can be installed flush with top of concrete notch at trench drains. See Detail.
  3. All field base stone shall be touched up and laser graded prior to testing and installation of new turf.
  4. The contractor shall provide an as-built performed by a licensed surveyor shall be provided to the owners representative for approval prior to installation of the new turf.

### 3.4 INSTALLATION

- A. Resilient shock pad
  1. Prior to pad installation pad installer /manufacturer shall provide written acceptance of the prepared subgrade material and surface. Acceptance shall, at a minimum, include the following:
    - a. Permeability
    - b. Planarity
    - c. Suitability for synthetic turf system.
  2. Installer shall minimize disturbance and contact with the accepted field base to the greatest extent possible. Unnecessary storage of materials, foot or vehicular traffic, or other actives on the accepted field base is to be avoided. Installer

shall prepare a detailed installation plan that shall include the process by which the pad is to be installed while minimizing disturbance of the base.

- a. Failure to comply with these requirements will result in removal of the installed material and retesting of the base material for approval.
3. Install pad loose laid on gravel base in accordance with manufacturer's requirements.
4. Protect panels from damage or movement during the installation process. Damaged panels shall be rejected. Install panels and cover with turf promptly. Do not leave panels exposed overnight without ballasting. Contractor is responsible for material stability during construction and shall take all measures necessary to avoid shifting or displacement due to construction, weather, or temperature changes.
5. An interlocking panel design shall be used to hold adjacent panels in place.
6. Pads shall be cut and fit tightly to the edges of the field and all objects within the field. No gaps in the pad over ¼" are acceptable. Use largest size possible. Filler strips or piecemeal work are not acceptable.
7. Grade and planarity of installed Pad system shall comply Planarity/Surface Regularity of this specification. Care shall be taken to fix any disturbances of the stone base while installing the resilient pad.

**B. Synthetic Grass Surfacing Installation**

1. The synthetic grass carpet shall be staged and unrolled as necessary for a daily installation. No material will be allowed to be unrolled 24 hours prior to installation.
2. Installer shall minimize disturbance and contact with the accepted field base to the greatest extent possible. Unnecessary storage of materials, foot or vehicular traffic, or other activities on the accepted field base is to be avoided. Installer shall prepare a detailed installation plan that shall include the process by which the synthetic grass surfacing is to be installed over the resilient shock pad while minimizing disturbance of the base.
  - a. Failure to comply with these requirements will result in removal of the installed material and retesting of the base material for approval.
3. Synthetic grass surfacing shall be installed over the resilient pad. Care shall be taken so as not to damage installed resilient pad.

**C. Seams**

1. All panel seams spacing is to be held to a minimum of 15 feet unless prior approval of seaming diagram indicates a lesser panel.
2. Fabric surface shall be constructed and installed in minimum widths of 15 feet with no longitudinal or transverse seams, except for inlaid lines with a finished roll assembly. The seams shall be 15'-0" apart. No fitted pieces shall be allowed to true alignment.



3. All panel seams shall be securely sewn or glued and lay flat. Minimum of 5” of seaming tape and glue shall be on either side of the seam.
    - a. Ridges or tenting of seams is not acceptable.
    - b. Gaps greater than 1/8” are not acceptable.
  4. Sewn seams shall be sewn with high strength polyester fiber cord. Sewn seams shall be a butt-sewn with double loop lock stitch in such a manner as each loop is wide enough to extend outside of the nearest tufted row. Bagger type seam stitching is not permitted.
  5. Seams shall lay flat after infill.
  6. All seams shall be brushed thoroughly before infill materials are installed.
  7. All seams shall be fully fastened with no loose areas.
  8. Installer shall exercise caution to prevent gluing or adhesion of turf to resilient shock pad. Glue shall not be applied directly to pad in any instance.
  
  9. The synthetic grass surfacing system shall always remain free draining before, during, and after the infill materials are installed.
- D. Synthetic Grass System Edges and Termination
1. All edges and ends of the synthetic grass system shall be secured to the anchor curb by 100% adhesive.
    - a. Hot melt or nailing is not acceptable.
    - b. Final infill level shall be flush with adjacent anchor curb or track surfacing unless noted otherwise on plan.
  2. Edge termination and securing shall take place after all inlays and infill has been installed and the field as been adequately groomed.
- E. Lines and Markings
1. Lines and markings shall be tufted in the factory to the greatest extent possible during manufacturing.
  2. All lines, numbers, and field markings are to be tufted or in-laid with the specific-colored synthetic grass surfacing.
    - a. Shaving of the synthetic turf carpet fibers and adhering of the inlaid carpet to the field backing material shall not be permitted,
  3. All lines and markings shall be accurately set and surveyed to within 1/2" tolerance on the as-built survey.
  4. All lines and markings shall be installed and verified prior to any installation of in-fill material.
  5. All glued inlays shall have a 12" wide seaming tape, fully coated with adhesive. All inlays shall not have any adhesive applied to any exposed fibers.
  6. All in-laid areas shall be brushed thoroughly before infill materials are installed.
  7. All inlays shall be fully fastened with no loose areas. The Owner reserves the right to submit an inlay sample from the installed field for testing at any time.

Failure of inlays to meet the requirements of this document shall be Contractor's responsibility to remove, replace, and re-test to the Owner and Architects satisfaction. Any testing that fails to comply with the project requirements shall become the Contractors responsibility for cost.

8. Installer shall exercise caution to prevent gluing or adhesion of turf to resilient shock pad. Glue shall not be applied directly to pad in any instance.

F. Synthetic Grass Surfacing Infill

1. No in-fill materials shall be installed until the synthetic grass surfacing is fully installed with all lines and markings.
2. The synthetic grass surfacing shall be thoroughly brushed prior to any in-fill materials to remove any wrinkles and defibrillate the slit film.
3. Infill shall not leave more than ½" of exposed fiber on sports fields.
4. The in-fill materials shall be installed in layers not to exceed 0.50 lbs per sq ft per layer.
5. Infill material shall be 'worked into' the thatch/rootzone/spikezone layer. Contractor shall allow time and proper machinery to do so.

3.1 PROTECTION

- A. The Contractor shall take special care to protect all field and building structures and utilities. Any damage shall be repair or replaced at the cost of the Contractor.

3.2 TRAINING INSTRUCTION AND OWNERS' MANUALS

- A. Provide a 4 hour, at a minimum, on-site training instructional program for the Owner for each field. Prior to conducting maintenance training the Contractor shall put together and test all maintenance equipment. Equipment shall be fully functional and ready to use at the time of the training. The training shall include review and demonstration generally of the following, but not be limited to:
  1. Daily/Weekly fiber, infill, and seam inspections.
  2. Low infill hand grooming and infill placement.
  3. Seam repair.
  4. Field sweeping, grooming, and decompaction (with tines groomer if applicable). Including demonstration of hock-up, detachment, and use of all equipment with the Owner's equipment.
  5. Field plowing (if applicable).
  6. Protection for events.
  7. Procedure for Warranty claims.
- B. The training instruction will be summarized in the Owner's Manual and close- out documents.

- C. Training shall take place no later than fourteen (14) days after Substantial Completion is executed.

### 3.3 AS-BUILT FIELD LAYOUT DRAWING

- A. Contractor shall provide an As-Built Field Layout Drawing including verification of all field markings and layout dimensions, by licensed surveyor, to the Architect for review and approval.

### 3.4 CLEAN UP

- A. The site shall be kept clean and free of debris throughout the installation. Empty barrels, sacks, bags, and remnant materials shall be stored or disposed daily in a proper container or legal manner.
- B. After completion of the entire Project, the site shall have a general cleanup removing all debris remaining on the site that is not a part of the final Project.
- C. The equipment supply requirements for this Project shall be part of the total price and shall be the sole expense of the Contractor.
- D. All areas disturbed during this construction shall be restored to the satisfaction of the Owner at no additional cost to the Owner.
- E. All attic stock materials shall be placed in its appropriate location as determined by the Owner.

### 3.5 ACCEPTANCE

- A. Should any imperfections develop in the surface areas prior to the final acceptance of the work, they shall be removed and replaced with new materials. All such repair work shall be done at no additional cost to the Owner.
- B. Acceptance will be issued to the Contractor as described under “Substantial Completion” when all work under this section is found to be completed. The Owner or Architect will not be responsible for any additional acceptance requirements by the Contractor or subcontractors.

**END OF SECTION**

**SECTION 33 46 16 - FIELD SUBDRAINAGE SYSTEM**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section includes:
  - 1. Specification outlines installation of a full multi-component synthetic field drainage system on top of a prepared subgrade and perimeter trench drains.
  - 2. Testing, Inspections, monitoring, and reporting.
- B. Contractor shall coordinate work between all Contractors, sections, and trades required for the proper completion of the work.
- C. Contractor is responsible for all health and safety.

**1.2 REFERENCES**

- A. Reference herein to any technical society, organization, group or regulation are made in accordance with the following abbreviations and, unless otherwise noted or specified, all work under this Section shall conform to the latest edition as applicable.
- B. Code of Federal Regulations (CFR).
- C. American Association of State High and Transportation Officials (AASHTO).
- D. American Society for Testing and Materials (ASTM)
- E. European Standards (EN)

**1.3 SUBMITTALS**

- A. Sampling and Testing Laboratory: Submit name and qualifications of commercial sampling and testing laboratory for Architect's approval.
- B. Testing Agency: Submit name and qualifications of third-party in-field quality control Testing Agency for Architect's approval.
- C. Surveyor: Submit name and qualifications of Professional Land Surveyor who will be responsible for layout and verification of the work of this Section.
- D. Product Data: Submit manufacturer's product data demonstrating compliance with this specification. Include manufacturer's written instructions for each product.
  - 1. Flat Panel Drain
- E. Material Testing Data: Submit for approval test results for all material testing performed under the Article "Testing" herein. Failure to submit testing results shall in no way relieve Contractor from his obligation to meet the performance requirements of the field subdrainage system in all regards.
  - 1. Material testing data shall be no older than six (6) months from proposed material

placement date. Testing data older than six (6) months will be rejected.

**F. Samples**

1. Submit for approval samples of proposed materials. Failure to submit samples shall in no way relieve Contractor from his obligation to meet the performance requirements of the field subdrainage system in all regards. Submit the following (as necessary):

- a. Flat Panel Drains: Submit 12-inch long product sample.
- b. Field Base, Bottom Stone: Deliver to the Project Site one 2 gallon bucket of material in an air-tight container. Provide sample within 10 days of contract award. Sample shall be accompanied by adequate labelling indicating project name, source of supply, and identified as "Field Base, Bottom Stone".
- c. Field Base, Top Stone: Deliver to the Project Site one 2 gallon bucket of material in an air-tight container. Provide sample within 10 days of contract award. Sample shall be accompanied by adequate labelling indicating project name, source of supply, and identified as "Field Base, Top Stone".

G. Material Certificates: Submit certificates for Bottom Stone and Top Stone materials signed by material producer and Contractor, certifying that each material delivered to the project complies with, or exceeds the requirements specified herein.

**H. Quality Control Testing Results**

1. Submit results of all test results performed. Provide copies of all Testing Agency reports.
2. Failure to submit quality control testing results shall in no way relieve Contractor from his obligation to meet the performance requirements of the field subdrainage system in all regards.

I. Confirmation of Acceptance, Completed Base: Submit a signed written statement signed by the manufacturer of the synthetic grass surfacing materials and countersigned by the synthetic grass surfacing and resilient pad materials installers (if different), confirming that:

1. Based on the Progress Survey and visual inspections, all applicable areas and surfaces are satisfactory for the installation of the all-weather grass surfacing material.
2. No conditions exist that are in conflict with the Synthetic Grass Surfacing Material warranty requirements.

**1.4 DELIVERY, STORAGE AND HANDLING**

A. All deliveries are to be scheduled so as to avoid school drop-off and pick-up activities. No deliveries shall be allowed to enter the site during these times.

**B. Drainage Stone**

1. Schedule delivery to minimize on-site storage. Segregate differing stone materials and prevent from contamination with other materials.
2. Coordinate procurement of stone with the sampling and in-field testing required herein.

C. Geotextiles

1. Follow geotextile manufacturer's recommendations for packaging, transportation, and delivery to ensure materials are not damaged. Furnish the geotextile fabric in a wrapping that protects the fabric from ultraviolet radiation and from abrasion due to shipping and hauling.
2. Geotextile shall be stored on a prepared surface (not wooden pallets) and should not be stacked more than two rolls high. Storage shall be such that the geotextile is protected from puncture, dirt, grease, water, moisture, mud, mechanical abrasions, excessive heat or cold, or other damaging circumstances. Temporary storage at the Project Site shall be away from standing water such that crushing or flattening of roll goods does not occur.

D. Piping and Drains

1. Manufacturer shall package the pipe and other drainage materials in a manner designed to deliver the pipe to the Project Site neatly, intact, and without physical damage. Transportation carrier shall use an appropriate method to ensure the pipe is properly supported, stacked, and restrained during transport. Inspect materials delivered to site for damage; store with minimum of handling.
2. Unloading of the pipe and other drainage materials should be controlled so as not to collide with the other pipe sections or fittings, and care should be taken to avoid chipping or spalling, especially to the spigots and bells. For manhole sections, cone sections, bases, fittings and other precast appurtenances, utilize lifting holes or lifting eyes provided.
3. In cold weather conditions, use caution to prevent impact damage. Handling methods considered acceptable for warm weather may be unacceptable during cold weather.
4. Storage: Store materials on site in enclosures or under protective coverings. Do not store materials directly on the ground. Keep inside of pipes and fittings free of dirt and debris.

1.5 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 contractor shall perform all in-field testing specified in this Section and Owner or Landscape Architect reserves the right to determine the suitability of all materials to be used for in the work, and to reject any material not meeting these specifications.
- C. Sampling and Testing Laboratory: The Sampling and Testing Laboratory shall be a qualified commercial entity with a documented track-record of conducting sampling and laboratory testing in support of construction projects. Once approved, the Sampling and Testing Laboratory shall not be changed without Landscape Architect's approval.
- D. Testing Agency: The Testing Agency shall be a qualified commercial entity with a documented track-record of performing in-field testing and inspection services. The Sampling and Testing Laboratory may provide the services of the Testing Agency provided it meets the qualifications to do so. Once approved, the Testing Agency shall not be changed without Landscape Architect's approval.
- E. Surveyor: Engage a Land Surveyor licensed as a Professional Land Surveyor (PLS) in the state

where the project is located to perform layout and verification of the work of this Section.

- F. Material Certificates: Materials Certificates certify that the materials furnished conform to all applicable requirements of the Contract Documents. Materials Certificates shall be signed by a duly authorized and responsible agent for the organization supplying the material. Contractor shall be responsible for any testing, Materials Certificates, and inspections required. Materials Certificates shall also include the following information:
1. Project for which the material has been consigned.
  2. Name of Contractor to which material is supplied.
  3. Item number and description of material.
  4. Quantity of material represented by the certificate.
  5. Means of identifying the consignment, such as label, marking, lot numbers, etc.
  6. Date and method of shipment

1.6 TESTING, PRE-CONSTRUCTION

- A. All pre-construction sampling/testing shall be the responsibility of Contractor. Contractor shall retain and pay for the services of a third-party Sampling and Testing Laboratory and/or Testing Agency to perform all sampling/testing services in accordance with applicable standards and these specifications.
- B. Material Testing. (only submit on products proposed to be used)
1. Provide testing data for the following:
    - a. Field Base, Bottom Stone
    - b. Field Base, Top Stone
  2. Testing parameters:
    - a. Moisture-Dry Density Curve (Proctor Test-Modified): ASTM D1557
    - b. Gradation: ASTM D422
    - c. Resistance to Abrasion: ASTM C131
    - d. Soundness: ASTM C88
    - e. Chemical Testing: Contractor shall conduct chemical testing to demonstrate that such material is free of oils, hazardous materials, or other organic and non- organic constituents which may be considered contaminants. For each type/classification and source of earth material proposed, submit a letter signed by an authorized representative of the material supplier stating that such proposed earth material is free of oils, hazardous materials, or other organic and non- organic constituents which may be considered contaminants.
  3. Testing Frequency: One test for each type of material per source of supply.
  4. All required testing (sample and analysis) shall be submitted as part of one submittal or it will be rejected. Failure to include any of the above requirements will result in rejection.

1.7 TESTING, QUALITY CONTROL DURING CONSTRUCTION

- A. All quality control sampling/testing during construction shall be the responsibility of Contractor. Contractor shall retain and pay for the services of a third-party Sampling and Testing Laboratory and/or Testing Agency to perform all sampling/testing/inspection services in accordance with applicable standards and these specifications.

**B. Stone Base**

1. After installation, the stone base shall be reviewed and tested for the following:

a. Infiltration tests, double-ring infiltrometer, ASTM F1551/EN 12616 - Standard Test Method for Comprehensive Characterization of Synthetic Turf Playing Surfaces and Materials, as the prepared field base Stone layer of the field subdrainage system/base is completed. Alternative infiltration testing will not be considered valid.

1) Testing Frequency: Perform eight (8) tests for each field.

2) Testing criteria: Each test will be considered acceptable when an infiltration rate of no less than 16 inches per hour (16 in/hr) is demonstrated. Do not proceed with turf installation until all tests are considered acceptable.

2. Surface Regularity/Planarity

a. The planarity of the finished, prepared Field Base, Top Stone grade of the field shall conform to EN 13036 Surface Planarity as performed by an independent Certified Testing Agency.

b. Contractor shall conduct a field survey of the field stone base at 25 feet O.C. grid. Grades shall be checked using a dual plane laser operation survey instrument and shall be within 1/4 inch of required elevation. Correct irregularities in elevation beyond this tolerance.

**C. Compaction Testing**

1. Compaction Testing: ASTM D2922. (where applicable)

a. Field Base Bottom Stone: One test per 10,000 square feet of Bottom Stone installed (1 test/10,000 sf).

b. Prepared Field Base Top Stone: One test per 10,000 square feet of Top Stone installed (1 test/10,000 sf).

2. Additional compaction testing may be required when there is evidence of a change in the quality of moisture control or the effectiveness of compaction.

3. If testing indicates that compacted subgrade, backfill, or fill are below specified density, additional compaction and/or replacement of material shall be provided at no expense to Owner.

**D. Drainage Testing**

1. Field Base, Bottom Stone

a. Perform infiltration tests, double-ring infiltrometer, ASTM F1551/EN 12616 - Standard Test Method for Comprehensive Characterization of Synthetic Turf Playing Surfaces and Materials, as the Bottom Stone layer of the field subdrainage system/base is completed. Alternative infiltration testing will not be considered valid.



- 1) Testing Frequency: Perform one test for each 20,000 square feet (20,000 sf) of completed area.
  - 2) Testing criteria: Each test will be considered acceptable when an infiltration rate of no less than 30 inches per hour (30 in/hr) is demonstrated. Do not proceed with installation of subsequent layers until all tests are considered acceptable.
2. Field Base, Top Stone (completed field base)
- a. Perform infiltration tests, double-ring infiltrometer, ASTM F1551/EN 12616 - Standard Test Method for Comprehensive Characterization of Synthetic Turf Playing Surfaces and Materials, as the prepared field base Stone layer of the field subdrainage system/base is completed. Alternative infiltration testing will not be considered valid.
  - b. Testing Frequency: Perform one test for each 20,000 square feet (20,000 sf) of completed field area.
  - c. Testing criteria: Each test will be considered acceptable when an infiltration rate of no less than 20 inches per hour (20 in/hr) is demonstrated. Do not proceed with turf installation until all tests are considered acceptable.
- 1.8 SURFACE REGULARITY TESTING
- A. Subgrade
1. The planarity of the finished subgrade of the field shall conform to EN 13036 Surface Planarity as performed by an independent Certified Testing Agency. Planarity shall not be greater than 15 mm.
  2. Contractor shall also conduct a field survey at 25 feet o.c. grid. Grades shall be checked using a dual plane laser operation survey instrument and shall be within 1/4 inch of required elevation. Correct irregularities in elevation beyond this tolerance.
- B. Field Base, Bottom Stone
1. The planarity of the finished Field Base, Bottom Stone grade of the field shall conform to EN 13036 Surface Planarity as performed by an independent Certified Testing Agency.
  2. Contractor shall also conduct a field survey of all renovated athletic areas at 25 feet o.c. grid. Grades shall be checked using a dual plane laser operation survey instrument and shall be within 1/4 inch of required elevation. Correct irregularities in elevation beyond this tolerance.
- C. Prepared Field Base, Top Stone
1. The planarity of the finished, prepared Field Base, Top Stone grade of the field shall conform to EN 13036 Surface Planarity as performed by an independent Certified Testing Agency.
  2. Contractor shall also conduct a field survey of all renovated athletic areas at 25 feet o.c. grid. Grades shall be checked using a dual plane laser operation survey instrument and shall be within 1/4 inch of required elevation. Correct irregularities in elevation beyond this tolerance.

**PART 2 PRODUCTS**

**2.1 FIELD DRAIN (FLAT PANEL)**

- A. Composite, pre-fabricated high density polyethylene (HDPE), 3-dimensional high-flow, drainage core with internal support pillars, wrapped with a filtration geotextile filter fabric, 1.5-inches by 13-inches. HDPE minimum cell classification: 424420C, ASTM D3350.
- B. Couplers, tees, caps, and other fittings: As required to complete the system. Material of construction and configuration shall be in accordance with the drain manufacture’s requirements or recommendations, whichever is more stringent. HDPE minimum cell classification: 424420C, ASTM D3350.
- C. Geotextile Filter Fabric shall conform to the requirements in this section.

**2.2 FIELD BASE, BOTTOM STONE**

- A. Product resulting from the artificial crushing of rocks, boulders or large cobblestones, substantially all faces of which have resulted from the crushing operation. Material shall consist of sound, tough, durable, angular stones, free from soft, thin, elongated, laminated, friable, micaceous or disintegrated pieces, feldspar, limestone, marble, mud, dirt, organic matter, or other deleterious material. The presence of soft, thin, elongated, laminated, friable, micaceous or disintegrated pieces, feldspar, limestone, marble, mud, dirt, organic matter, or other deleterious material will be cause for rejection at Landscape Architect’s discretion.
- B. Gradation:

Gradation of Bottom Stone (#67)

Sieve	Percent Passing by Weight
1”	100
3/4”	90-100
3/8”	20-55
No. 4	0-10
No. 8	0-5

OR APPROVED EQUAL

**2.3 FIELD BASE, TOP STONE**

- A. Product resulting from the artificial crushing of rocks, boulders or large cobblestones, substantially all faces of which have resulted from the crushing operation. Material shall consist of sound, tough, durable, angular stones, free from soft, thin, elongated, laminated, friable, micaceous or disintegrated pieces, limestone, marble, mud, dirt, organic matter, or other deleterious material. The presence of soft, thin, elongated, laminated, friable, micaceous or disintegrated pieces, feldspar, limestone, marble, mud, dirt, organic matter, or other deleterious material will be cause for rejection at Landscape Architect’s discretion.

- B. Gradation:  
1. Gradation of Top Stone (#8)

Sieve	Percent Passing by Weight
1/2"	100
3/8"	85-100
1/4"	75-90
No. 4	10-40
No. 8	0-10
No. 16	0-5
No. 200	0-2

2.4 GEOTEXTILE

- A. Geotextile shall be free of defects, such as holes, tears and abrasions.
- B. Geotextile shall be free of chemical treatment or coating that significantly reduces its porosity.
- C. Geotextile shall be non-woven and meet the following minimum requirements:
  - 1. Grab Tensile Strength - >150 lbs
  - 2. Puncture Resistance - >75 lbs
  - 3. Water Flow Rate - > 30 gal/min per sq ft
  - 4. UV Resistance - 70% @ 500 hours

PART 3 EXECUTION

3.1 GENERAL

- A. Notify "Call Before You Dig" to request a utility mark-out for the Project Site prior to any earth disturbance. Provide written confirmation to Landscape Architect that such mark-out has been completed.
- B. Verify site conditions before proceeding with demolition work. Field check the accuracy of the Drawings and inspect structures, utilities, and other site features prior to start of work and notify Landscape Architect in writing, of any discrepancies or hazardous conditions.
- C. Take precautions for preventing injuries to persons or damage to property in or about the work. Protect structures, utilities, adjacent athletic facilities, walks, pavements and other improvements from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.
- D. Protect sub-grades and foundation soils against freezing temperatures or frost. Provide protective insulating materials as necessary.
- E. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

**3.2 PROGRESS SURVEY**

- A. Contractor shall retain and pay for the services of a Professional Land Surveyor licensed in the State of Connecticut who will be responsible for the verification of the work of this Section. Complete Progress Surveys for each of the following stages:
  - 1. Completed top stone elevations.
  - 2. Completed field subdrainage system elevations and drain locations and flat panel drain.
- B. Complete surveys to verify that the specified lines, grades, and cross sections of the project elements and/or systems as indicated on the Drawings have been achieved, or that the lines, grades, and cross sections of the system required to achieve final field elevations indicated on the Drawings have been achieved.
- C. Prepare Progress Survey depicting the area and elevations of each finished system for review by Architect and turf installer. Drawing shall be prepared based on a 20 foot grid with spot grades to the nearest 0.01 foot. In addition to spot grades and surface regularity testing, Contractor shall pull string lines at each inlaid line location and at 15 foot intervals to identify high and low spots. This includes all lines. Depict locations of string lines on Progress Survey.
- D. Survey shall be provided to Landscape Architect and Owner in paper and AutoCAD format for review.

**3.3 DEWATERING**

- A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrade and from flooding Project site and surrounding area.
- B. Protect subgrade from softening, undermining, washout and damage by rain or water accumulation.

**3.4 SUBGRADE**

- A. Formation: Form and shape subgrade to the specified lines, grades, and cross-sections indicated on the Drawings, or to the lines, grades, and cross-sections required to achieve final field elevations indicated on the Drawings. Refer to Section 31 20 00 – Earth Moving.
  - 1. All soft and yielding material and other portions of the subgrade which will not compact readily shall be removed and replaced with suitable material. Utilize Granular Fill, Processed Aggregate, or other Landscape Architect-approved material as required.
  - 2. Reconstruct sub-grades damaged by freezing temperatures, frost, rain, accumulated water or construction activities, as directed by Landscape Architect.
- B. Compaction: The entire area of the subgrade shall be uniformly and thoroughly compacted by use of compaction equipment consisting of rollers, compactors or a combination thereof.
  - 1. Earth-moving and other equipment not specifically manufactured for compaction purposes will not be considered as compaction equipment.
- C. Approval of Subgrade: Examine the subgrade of the field for horizontal and vertical conformance, compaction, and general suitability.
  - 1. Evidence of inadequate subgrade shall be brought to the immediate attention of Landscape

Architect.

2. Areas of potential ponding shall be corrected.
  3. Confirm planarity requirements of subgrade based on a 20 foot grid. Grid shall be laid-out and a level-set laser system used to determine elevation compliance.
    - a. Construction Tolerance: Re-grade areas that are not within 1/2-inch of required elevations.
- 3.5 FLAT PANEL DRAIN
- A. Install flat panel drains as indicated on the Drawings.
  - B. Install all drain components in accordance with the manufacturer's instructions.
- 3.6 DRAINAGE STONE, BOTTOM STONE AND TOP STONE
- A. Confirm placement of flat panel drains prior to initiating installation of Bottom Stone.
  - B. Installation
    1. Install each layer of stone as indicated on the Drawings.
    2. Bottom Stone: Install in two lifts, compacted to required density.
    3. Top Stone: Install in a single lift and compact to required density
    4. Maintain dozer, grader, or loader push distances below 75 feet to minimize segregation of course-graded fractions from fine-graded fractions, as well as not overwork the material.
    5. Installed layers shall be kept clean and uncontaminated. Less select materials shall not be permitted to become mixed with drainage stone. Materials spilled outside specified lines shall be removed and areas repaired.
    6. Portions of drainage layer which become contaminated, softened, or dislodged by passing of equipment, or otherwise damaged, shall be cleaned, replaced, and otherwise repaired to conform to the requirements of this specification.
  - C. Compaction
    1. Compact lifts using a 6 ton steel wheel roller or vibratory roller equivalent to a 6-ton static roller, or approved equivalent.
    2. Rolling shall begin at sides and progress to center of crowned areas, and shall begin on low side and progress toward high side of sloped areas. Rolling shall continue until material does not creep or wave ahead of roller wheels.
    3. Compaction Density: Compaction density shall be expressed as a percentage of maximum dry density at optimum moisture content according to ASTM D 1557 Method C.
      - a. Bottom Stone: Between 90% and 92%
      - b. Top Stone: Between 90% and 92%
  - D. Final Grading
    1. Utilize a laser-guided grader to complete fine grading of the finish surface of the field

subdrainage system. Laser control system shall control each side of the blade independently. Single post control systems are not acceptable.

2. Minimize movement of machinery or equipment over completed work. Repair any ruts or other deviations.
3. Surface Regularity: The planarity of the finished grade of the field sub-drainage system shall conform to EN 13036 Surface Planarity as performed by an independent Certified Testing Agency.
  - a. Deviations shall be measures below a straightedge using a graduated wedge (slip gauge). No deviation shall exceed 10mm.
4. Protection
  - a. Where the activities of Contractor have been determined by the Landscape Architect to have caused damage or contamination of the dynamic stone material the Contractor shall remove and replace all affected areas to the satisfaction of Landscape Architect.
  - b. Where weather conditions have created erosion of topping stone material or migration of fine material such that it concentrates in areas on the drainage stone surface (such as runoff causing migration of fines), these areas shall be cleaned of all fine material and replaced with new material.

3.7 DRAINAGE TESTING

- A. Complete post-installation drainage testing of the installed field subdrainage system/base.
- B. Provide test results to Owner and Architect for approval.

3.8 CLEAN UP

- A. Contractor shall remove all debris, residuals, and materials at the conclusion of the work.

**END OF SECTION**

**SITE LIGHTING PLAN LEGEND**

SYMBOL	NAME
---	LIMIT OF DISTURBANCE/CONTRACT LIMIT LINE
---	PROPERTY LINE
---	CONDUIT FOR LIGHTING
---	CONDUIT FOR SCOREBOARD
⊕	PROPOSED LIGHT FIXTURE
⊞	PROPOSED CONTROL BOX

**GENERAL SITE LIGHTING NOTES:**

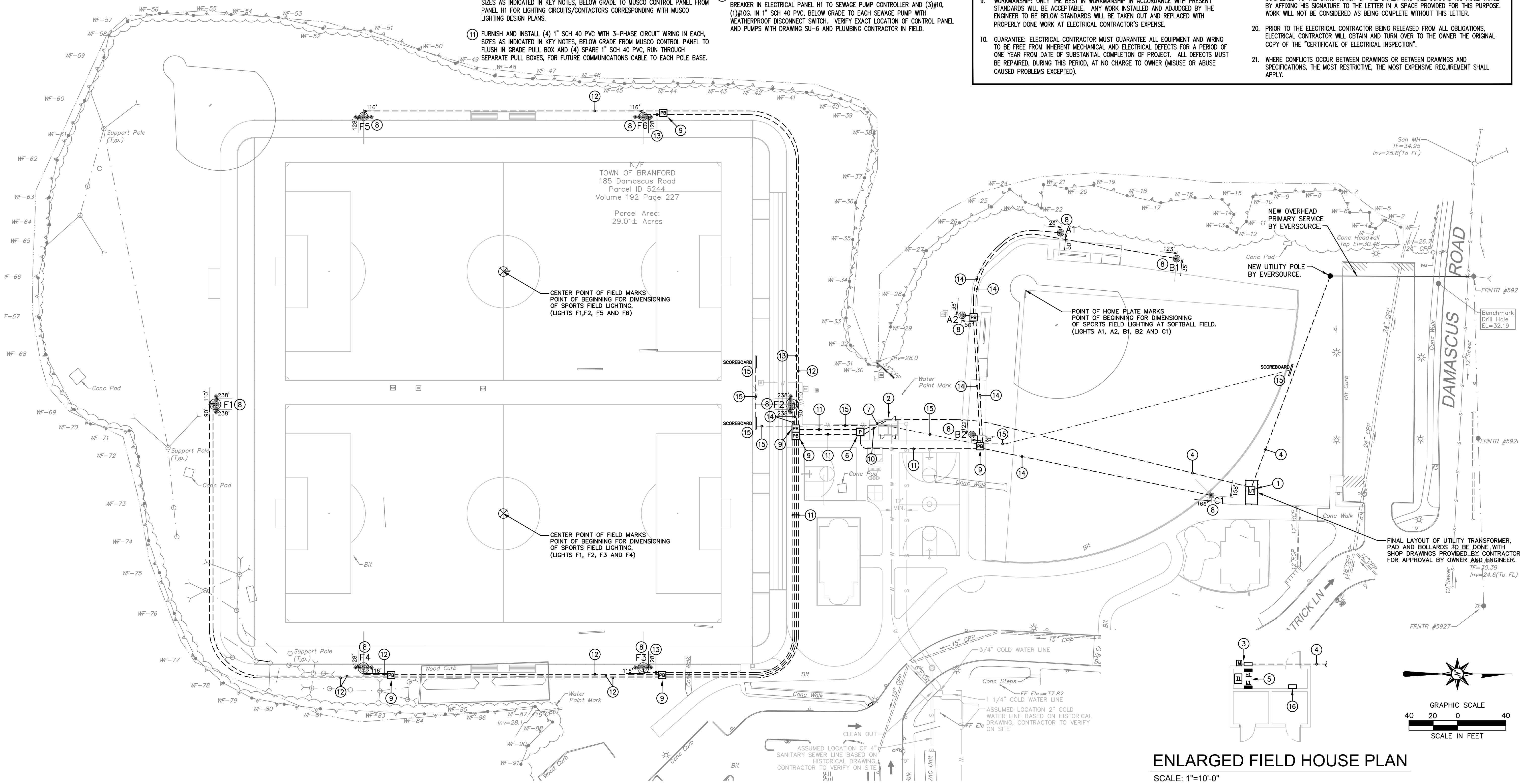
- UPON COMPLETION OF THE JOB, IT WILL BE THE ELECTRICAL CONTRACTOR'S RESPONSIBILITY TO TURN OVER A SET OF AS-BUILT DRAWINGS TO THE OWNER IN REPRODUCIBLE FORM. THESE DRAWINGS DO NOT HAVE TO BE MADE FROM SCRATCH. THE CONTRACT SITE LIGHTING PLAN MAY BE USED AS BACKGROUNDS WITH THE ACTUAL CIRCUIT CHANGES ADDED.
- THE ELECTRICAL LIGHTING DRAWINGS SHOW LIGHTING AND DEVICE LOCATIONS ONLY. WIRING SHOWN IS SCHEMATIC IN NATURE, INTENDED TO SHOW CIRCUITING AND CONTROL WIRING. REFER TO APPROVED MUSCO LIGHTING DESIGN PLANS FOR LIGHT FIXTURE, POLES, POLE-TOP MOUNTS, BASE AND CONTROL PANEL SPECIFICATIONS, REQUIREMENTS, WIRING DIAGRAMS AND DETAILS.
- ELECTRICAL CONTRACTOR SHALL INSTALL AND WIRE ALL LIGHT FIXTURES, LIGHTING CONTROLS, AS INDICATED ON SITE LIGHTING PLAN.

**DRAWING KEY NOTES:**

- PROPOSED LOCATION FOR NEW UTILITY PAD-MOUNT TRANSFORMER. EXACT LOCATION SHALL BE VERIFIED WITH EVERSOURCE. ELECTRICAL CONTRACTOR SHALL FURNISH AND INSTALL PAD PER EVERSOURCE REQUIREMENTS. REFER TO DRAWING SU-5 FOR ELECTRICAL RISER DIAGRAM.
- REFER TO ENLARGED FIELD HOUSE PLAN, THIS DRAWING, FOR BUILDING ELECTRICAL EQUIPMENT REQUIREMENTS AND LOCATIONS.
- FURNISH AND INSTALL MAIN SERVICE DISCONNECT SWITCH AND UTILITY METER ON EXTERIOR OF BUILDING. REFER TO DRAWING SU-5 ELECTRICAL RISER DIAGRAM FOR REQUIREMENTS.
- FURNISH AND INSTALL PRIMARY ELECTRICAL UNDERGROUND SERVICE FEEDER CONDUIT FROM UTILITY POLE TO UTILITY TRANSFORMER AND SECONDARY ELECTRICAL UNDERGROUND SERVICE FEEDER CONDUIT FROM UTILITY TRANSFORMER TO MAIN SERVICE DISCONNECT SWITCH. REFER TO DRAWING SU-5 ELECTRICAL RISER DIAGRAM FOR REQUIREMENTS.
- FURNISH AND INSTALL ELECTRICAL PANELS AND TRANSFORMER. REFER TO DRAWING SU-5 SCHEDULES AND ELECTRICAL RISER DIAGRAM FOR REQUIREMENTS.
- PROPOSED LOCATION OF MUSCO LIGHTING CONTROL PANEL ENCLOSURE. VERIFY EXACT LOCATION IN FIELD WITH CONTROL PANEL INSTALLER AND LANDSCAPE ARCHITECT.
- FURNISH AND INSTALL LIGHTING CONTROL PANEL AND 120V LIGHTING CONTROL CIRCUIT TO 20A/1P CIRCUIT BREAKER IN ELECTRICAL PANEL L1 WITH (2)#12, (1)#12G IN 1" SCH 40 PVC BELOW GRADE AS INDICATED ON APPROVED MUSCO LIGHTING DESIGN PLANS.
- FURNISH AND INSTALL POLE BASE, POLE, AND POLE MOUNTED LIGHT FIXTURES AS SPECIFIED ON APPROVED MUSCO LIGHTING DESIGN PLANS.
- FURNISH AND INSTALL NEW FLUSH IN GRADE PULL/SPICE BOX OF SIZE AS REQUIRED AND CONNECT TO CONDUITS AS INDICATED. VERIFY EXACT LOCATION IN FIELD.
- FURNISH AND INSTALL (12) 1" SCH 40 PVC WITH 3-PHASE CIRCUIT WIRING IN EACH, SIZES AS INDICATED IN KEY NOTES, BELOW GRADE TO MUSCO CONTROL PANEL FROM PANEL H1 FOR LIGHTING CIRCUITS/CONTRACTORS CORRESPONDING WITH MUSCO LIGHTING DESIGN PLANS.
- FURNISH AND INSTALL (4) 1" SCH 40 PVC WITH 3-PHASE CIRCUIT WIRING IN EACH, SIZES AS INDICATED IN KEY NOTES, BELOW GRADE FROM MUSCO CONTROL PANEL TO FLUSH IN GRADE PULL BOX AND (4) SPARE 1" SCH 40 PVC, RUN THROUGH SEPARATE PULL BOXES, FOR FUTURE COMMUNICATIONS CABLE TO EACH POLE BASE.
- FURNISH AND INSTALL (3)#6, (1)#6G, IN 1" SCH 40 PVC BELOW GRADE THRU MUSCO LIGHTING CONTROL PANEL FROM 20A/3P CIRCUIT BREAKER IN ELECTRICAL PANEL H1 TO POLE MOUNTED LIGHT FIXTURES CORRESPONDING WITH MUSCO LIGHTING DESIGN PLANS FROM MUSCO LIGHTING CONTROL PANEL, BELOW GRADE, STUBBED UP IN POLE BASE INTO POLE, AND (1) SPARE 1" SCH 40 PVC, RUN THROUGH SEPARATE PULL BOXES, FOR FUTURE COMMUNICATIONS CABLE STUBBED UP IN POLE BASE. VERIFY EXACT POLE LOCATION WITH SITE PLANS. REFER TO PANEL H1 SCHEDULED ON DRAWING SU-5 FOR POLE/CONTRACTOR NUMBERS FOR EACH CIRCUIT.
- FURNISH AND INSTALL (3)#8, (1)#8G, IN 1" SCH 40 PVC BELOW GRADE THRU MUSCO LIGHTING CONTROL PANEL FROM 20A/3P CIRCUIT BREAKER IN ELECTRICAL PANEL H1 TO POLE MOUNTED LIGHT FIXTURES CORRESPONDING WITH MUSCO LIGHTING DESIGN PLANS FROM MUSCO LIGHTING CONTROL PANEL, BELOW GRADE, STUBBED UP IN POLE BASE INTO POLE, AND (1) SPARE 1" SCH 40 PVC, RUN THROUGH SEPARATE PULL BOXES, FOR FUTURE COMMUNICATIONS CABLE STUBBED UP IN POLE BASE. VERIFY EXACT POLE LOCATION WITH SITE PLANS. REFER TO PANEL H1 SCHEDULED ON DRAWING SU-5 FOR POLE/CONTRACTOR NUMBERS FOR EACH CIRCUIT.
- FURNISH AND INSTALL (3)#10, (1)#10G, IN 1" SCH 40 PVC BELOW GRADE THRU MUSCO LIGHTING CONTROL PANEL FROM 20A/3P CIRCUIT BREAKER IN ELECTRICAL PANEL H1 TO POLE MOUNTED LIGHT FIXTURES CORRESPONDING WITH MUSCO LIGHTING DESIGN PLANS FROM MUSCO LIGHTING CONTROL PANEL, BELOW GRADE, STUBBED UP IN POLE BASE INTO POLE, AND (1) SPARE 1" SCH 40 PVC, RUN THROUGH SEPARATE PULL BOXES, FOR FUTURE COMMUNICATIONS CABLE STUBBED UP IN POLE BASE. VERIFY EXACT POLE LOCATION WITH SITE PLANS. REFER TO PANEL H1 SCHEDULED ON DRAWING SU-5 FOR POLE/CONTRACTOR NUMBERS FOR EACH CIRCUIT.
- FURNISH AND INSTALL (2)#10, (1)#10G, IN 1" SCH 40 PVC BELOW GRADE TO SCOREBOARD AND (2) SPARE 1" SCH 40 PVC BELOW GRADE TO SCOREBOARD FROM 20A/1P CIRCUIT BREAKER IN ELECTRICAL PANEL L1 AND (2) SPARE 1" SCH 40 PVC, RUN THROUGH SEPARATE PULL BOXES, FROM ADJACENT TO ELECTRICAL PANEL L1 BELOW GRADE STUBBED UP IN SAME LOCATION AT SCOREBOARD. VERIFY EXACT SCOREBOARD ELECTRICAL TERMINATION POINT AND DISCONNECT SWITCH LOCATION IN FIELD WITH SCOREBOARD INSTALLER AND EXACT SCOREBOARD LOCATION WITH SITE PLANS.
- FURNISH AND INSTALL (3)#10, (1)#10G, IN 3/4" O.D. PANEL FROM 20A/3P CIRCUIT BREAKER IN ELECTRICAL PANEL H1 TO SEWAGE PUMP CONTROLLER AND (3)#10, (1)#10G, IN 1" SCH 40 PVC, BELOW GRADE TO EACH SEWAGE PUMP WITH WEATHERPROOF DISCONNECT SWITCH. VERIFY EXACT LOCATION OF CONTROL PANEL AND PUMPS WITH DRAWING SU-6 AND PLUMBING CONTRACTOR IN FIELD.

**ELECTRICAL GENERAL NOTES**

- UPON COMPLETION OF THE JOB, IT WILL BE THE ELECTRICAL CONTRACTOR'S RESPONSIBILITY TO TURN OVER A SET OF AS-BUILT DRAWINGS TO THE OWNER IN REPRODUCIBLE FORM. THESE DRAWINGS DO NOT HAVE TO BE MADE FROM SCRATCH: THE CONTRACT SITE LIGHTING PLANS MAY BE USED AS BACKGROUNDS TO INDICATE ALL ACTUAL POLE/LIGHT, PULL BOXES, CONDUIT ROUTING AND ACTUAL CIRCUITS TO SITE LIGHTING FIXTURES.
- ALL ELECTRICAL WORK MUST BE PERFORMED IN ACCORDANCE WITH AND SHALL CONFORM TO ALL ASPECTS TO THE NATIONAL ELECTRICAL CODE (NEPA CODES & LOCAL BUILDING CODES).
- ALL PERMITS, LICENSES AND CERTIFICATES COVERING THE COMPLETE INSTALLATION OF ELECTRICAL WORK MUST BE OBTAINED AND PAID FOR BY ELECTRICAL CONTRACTOR. ELECTRICAL CONTRACTOR WILL BE RESPONSIBLE FOR PROVIDING ELECTRICAL PERMITS AS REQUIRED FOR ALL ELECTRICAL WORK DESCRIBED IN THE CONSTRUCTION DRAWINGS AND DOCUMENTS.
- ALL CORE-BORING OR BACKFILLING AND RESURFACING REQUIRED FOR THE ELECTRICAL WORK MUST BE PROVIDED BY ELECTRICAL CONTRACTOR.
- ALL CUTTING PATCHING AND REFINISHING OF WALLS, FLOORS AND CEILINGS, REQUIRED FOR THE ELECTRICAL WORK, MUST BE PROVIDED BY THE ELECTRICAL CONTRACTOR.
- THESE DRAWINGS ARE DIAGRAMMATIC ONLY; EXACT LOCATIONS OF ALL CONDUIT, ETC. MUST BE FIELD DETERMINED AND RUN TO AVOID OBSTRUCTIONS.
- SITE VISITATION - PRIOR TO SUBMITTING A BID FOR WORK, ELECTRICAL CONTRACTOR SHALL VISIT THE SITE TO INSPECT THE NATURE AND EXTENT OF THE EXISTING CONDITIONS AND EQUIPMENT, AND DETERMINE HOW THEY WILL AFFECT THE INSTALLATION OF ELECTRICAL WORK. NO ADDITIONAL PAYMENT, IN EXCESS OF THE CONTRACT PRICE, WILL BE AUTHORIZED FOR "EXTRA" WORK PERFORMED DUE TO EXISTING CONDITIONS WHICH ARE OBVIOUS UPON INSPECTION.
- ALL EQUIPMENT AND DEVICES MUST BE NEW & BEAR UL LABEL. ALL DEVICES MUST BE "SPECIFICATION" GRADE.
- WORKMANSHIP: ONLY THE BEST IN WORKMANSHIP IN ACCORDANCE WITH PRESENT STANDARDS WILL BE ACCEPTABLE. ANY WORK INSTALLED AND ADJUDGED BY THE ENGINEER TO BE BELOW STANDARDS WILL BE TAKEN OUT AND REPLACED WITH PROPERLY DONE WORK AT ELECTRICAL CONTRACTOR'S EXPENSE.
- GUARANTEE: ELECTRICAL CONTRACTOR MUST GUARANTEE ALL EQUIPMENT AND WIRING TO BE FREE FROM INHERENT MECHANICAL AND ELECTRICAL DEFECTS FOR A PERIOD OF ONE YEAR FROM DATE OF SUBSTANTIAL COMPLETION OF PROJECT. ALL DEFECTS MUST BE REPAIRED, DURING THIS PERIOD, AT NO CHARGE TO OWNER (MISUSE OR ABUSE CAUSED PROBLEMS EXCEPTED).
- ALL PROJECT SUBMITTALS TO BE APPROVED BY THE ENGINEER PRIOR TO INSTALLATION. SUBSTITUTIONS OF EQUIPMENT; SPECIFIED PRODUCTS MUST BE USED AS THE BASIS OF BID AND SHALL BE PROVIDED; WHERE 2 OR MORE MANUFACTURERS ARE LISTED, THE CHOICE IS AT THE ELECTRICAL CONTRACTOR'S OPTION. AN APPROVED EQUAL SHALL BE DETERMINED BY ENGINEER.
- ELECTRICAL CONTRACTOR SHALL PERFORM VOLTAGE DROP CALCULATIONS FOR BRANCH CIRCUITS LONGER THAN INDICATED AND SPECIFIED ON SITE LIGHTING PLAN AS PER NEC.
- ALL PENETRATIONS THROUGH FIRE RATED ASSEMBLIES MUST BE FIRE STOPPED USING FIRE RETARDANT SEALANTS APPROVED BY THE ENGINEER. ELECTRICAL CONTRACTOR MUST SEAL ALL ELECTRICAL PENETRATIONS THRU FIRE RATED PARTITIONS WITH FIRE RATED MATERIAL EQUAL TO DOW CORNING FIRESTOP 3-6548 SILICONE RTV FOAM AS A MINIMUM. MATERIAL SELECTION SHALL BE BASED ON RATING OF PARTITION PENETRATED.
- ELECTRICAL CONTRACTOR MUST FIELD VERIFY NAMEPLATE LOADS OF ALL EQUIPMENT (OWNER SUPPLIED) TO INSURE PROPER WIRE SIZING AND OVER-CURRENT PROTECTION AND SHALL NOTIFY ENGINEER OF DISCREPANCIES.
- ALL SUPPLEMENTARY STEEL REQUIRED FOR ELECTRICAL WORK SHALL BE PROVIDED BY ELECTRICAL CONTRACTOR.
- PROVIDE INSULATED GROUNDING CONDUCTOR IN ALL CONDUITS AND CABLE ASSEMBLIES TO COMPLY WITH NEC.
- ACCESS TO AND CLEARANCES AROUND ELECTRICAL EQUIPMENT SHALL CONFORM TO NEC ARTICLE 110. CONSULT ENGINEER WHERE SPACE APPEARS INADEQUATE DUE TO FIELD CONDITIONS. DO NOT COVER, OBSCURE OR BLOCK ACCESS TO EQUIPMENT, ACCESS PANELS OR MAINTENANCE AREAS WITH THE ELECTRICAL WORK.
- ALL PANEL DIRECTORIES, ASSOCIATED WITH THIS PROJECT, MUST BE "TYPED" AND COMPLETELY FILLED IN AT COMPLETION OF JOB IN ACCORDANCE WITH NEC 408.4. NO HAND-WRITTEN DIRECTORIES WILL BE ALLOWED.
- ELECTRICAL CONTRACTOR MUST PRODUCE A LETTER ATTESTING THAT WORK HAS BEEN COMPLETED TO THE SATISFACTION OF THE OWNER WHO WILL CONFIRM HIS ACCEPTANCE BY AFFIXING HIS SIGNATURE TO THE LETTER IN A SPACE PROVIDED FOR THIS PURPOSE. WORK WILL NOT BE CONSIDERED AS BEING COMPLETE WITHOUT THIS LETTER.
- PRIOR TO THE ELECTRICAL CONTRACTOR BEING RELEASED FROM ALL OBLIGATIONS, ELECTRICAL CONTRACTOR WILL OBTAIN AND TURN OVER TO THE OWNER THE ORIGINAL COPY OF THE "CERTIFICATE OF ELECTRICAL INSPECTION".
- WHERE CONFLICTS OCCUR BETWEEN DRAWINGS OR BETWEEN DRAWINGS AND SPECIFICATIONS, THE MOST RESTRICTIVE, THE MOST EXPENSIVE REQUIREMENT SHALL APPLY.



**ENLARGED FIELD HOUSE PLAN**  
SCALE: 1"=10'-0"

REVISIONS

No.	Date	Desc.
1	05/02/2024	REVISIONS TO SPORTS FIELD LIGHTING

Designed: J.C.W.  
Drawn: N.Y.Y.  
Reviewed: J.C.W.  
Scale: 1"=40'-0"  
Project No: 2201005  
Date: JANUARY 2024  
CAD File:

Title:  
**SITE UTILITY - LAYOUT PLAN**

Sheet No.

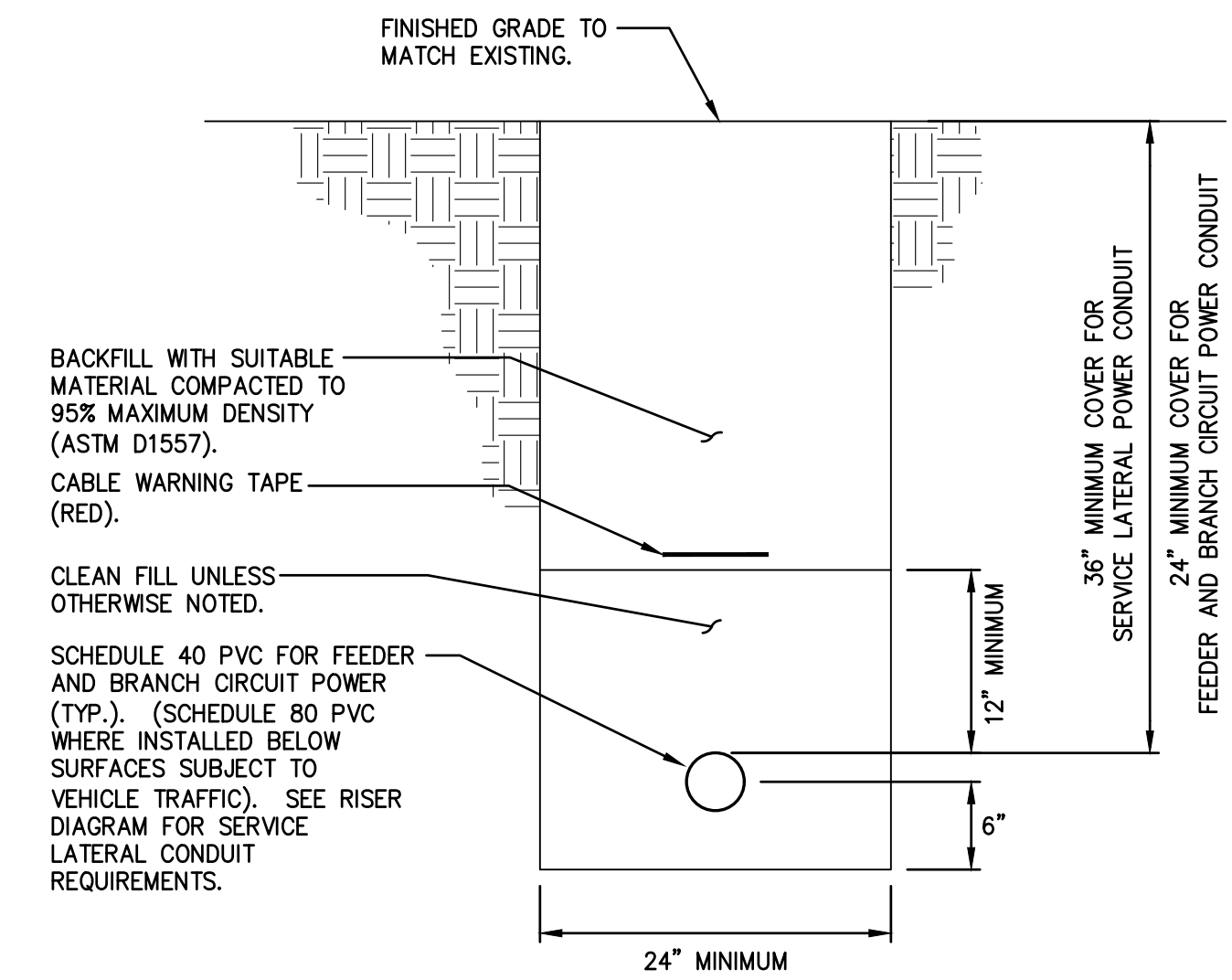
**SU-1**

5/27/2024 - WHEELER, G. (LJ0822) / D:\2024\1005\1051\PROJECT - FRANCIS WALSH INTERMEDIATE SCHOOL SITE IMPROVEMENTS\DWG\FRANCIS WALSH INTERMEDIATE SCHOOL SITE IMPROVEMENTS\DWG\SU-1 240431.dwg

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PANEL: H1										LOCATION: FIELD HOUSE									
VOLTAGE/PHASE/WIRE: 480/277V, 3ø, 4W					KAIC: 65K														
AMPS/MAINS: 250A / 200A MCB					MOUNTING: SURFACE														
FEED: SEE RISER DIAGRAM					BUS MATERIAL: COPPER														
OPTIONS: HPA=Handle Padlock Attachment, GFCI=New Ground Fault Circuit Breaker, LOD=Lock On Device																			
CIRCUIT BREAKER POS.	AMP	POLES	LOAD DESCRIPTION	PHASE			KVA	LOAD DESCRIPTION	PHASE			KVA	CIRCUIT BREAKER POS.						
				A	B	C			A	B	C								
1	20	3	FOOTBALL FIELD LIGHTING POLE F1 - CONTACTOR C1	3.83	7.7		3.83	FOOTBALL FIELD LIGHTING POLE F2 - CONTACTOR C2				3	20	2					
3				3.83		7.7	3.83					3		4					
5				3.83			3.83					3		6					
7	20	3	FOOTBALL FIELD LIGHTING POLE F3 - CONTACTOR C3	3.83	7.7		3.83	FOOTBALL FIELD LIGHTING POLE F4 - CONTACTOR C4				3	20	8					
9				3.83		7.7	3.83					3		10					
11				3.83			3.83					3		12					
13	20	3	SOCCER FIELD LIGHTING POLE F1 - CONTACTOR C5	3.83	7.7		3.83	SOCCER FIELD LIGHTING POLE F2 - CONTACTOR C6				3	20	14					
15				3.83		7.7	3.83					3		16					
17				3.83			3.83					3		18					
19	20	3	SOCCER FIELD LIGHTING POLE F5 - CONTACTOR C7	3.68	7.4		3.68	SOCCER FIELD LIGHTING POLE F6 - CONTACTOR C8				3	20	20					
21				3.68		7.4	3.68					3		22					
23				3.68			3.68					3		24					
25	20	3	SOFTBALL FIELD LIGHTING POLES A1,A2 - CONTACTOR C9	1.00	3.2		2.15	SOFTBALL FIELD LIGHTING POLE B1 - CONTACTOR C10				3	20	26					
27				1.00		3.2	2.15					3		28					
29				1.00			2.15					3		30					
31	20	3	SOFTBALL FIELD LIGHTING POLE B2 - CONTACTOR C11	1.98	3.9		1.96	SOFTBALL FIELD LIGHTING POLE C1 - CONTACTOR C12				3	20	32					
33				1.98		3.9	1.96					3		34					
35				1.98			1.96					3		36					
37			SPACE					SPACE						38					
39			SPACE					SPACE						40					
41			SPACE					SPACE						42					
43			SPACE					SPACE						44					
45			SPACE					SPACE						46					
47			SPACE					SPACE						48					
49	20	3	SEWAGE PUMP CTRL	2.00	7.5		5.46	PANEL L1				3	45	50					
51				2.00		7.1	5.05	VIA 30KVA XFMR - T1				3		52					
53				2.00			1.56					3		54					
MANUFACTURER: SQUARE D				44.9	44.5	41.0	Total KVA per Phase												
PANEL TYPE: NF				44.9	44.5	41.0	Total KVA per Phase for Panel												
				130.4	Total KVA for Panel														

PANEL: L1										LOCATION: FIELD HOUSE									
VOLTAGE/PHASE/WIRE: 208/120V, 3ø, 4W					KAIC: 42K														
AMPS/MAINS: 100A / 100A MCB					MOUNTING: SURFACE														
FEED: PANEL H1 VIA XFMR T1					BUS MATERIAL: COPPER														
OPTIONS: HPA=Handle Padlock Attachment, GFCI=New Ground Fault Circuit Breaker, LOD=Lock On Device																			
CIRCUIT BREAKER POS.	AMP	POLES	LOAD DESCRIPTION	PHASE			KVA	LOAD DESCRIPTION	PHASE			KVA	CIRCUIT BREAKER POS.						
				A	B	C			A	B	C								
1	30	2	WATER HEATER - FIELD HOUSE	4.75	5.3		0.50	LIGHTING - FIELD HOUSE				1	20	2					
3				4.75		5.0	0.20	FLUSH VALVE CONTROLS				1	20	4					
5	20	1	IRRIGATION SYSTEM	0.60		1.2	0.60	WATER COOLER/BFS (GFCI)				1	20	6					
7	20	1	MULTI USE SCOREBOARDS	0.14	0.2		0.07	SOFT BALL SCOREBOARD				1	20	8					
9	20	1				0.1	0.10	MUSCO LTG CTRL PANEL				1	20	10					
11	20	1										1	20	12					
13	20	1										1	20	14					
15	20	1										1	20	16					
17	20	1										1	20	18					
19	20	1										1	20	20					
21	20	1										1	20	22					
23	20	1										1	20	24					
25	20	1										1	20	26					
27	20	1										1	20	28					
29	20	1					0.36	RECPTS - MECH ROOM				1	20	30					
MANUFACTURER: SQUARE D				5.46	5.05	1.56	Total KVA per Phase												
PANEL TYPE: NQ				5.5	5.1	1.6	Total KVA per Phase for Panel												
				12.1	Total KVA for Panel														



**TYPICAL TRENCH DETAIL NOTES:**

1. THE CLEAN FILL SHALL PASS THROUGH A 3/8" MASH SCREEN AND SHALL NOT CONTAIN SHARP STONES. OTHER BACKFILL SHALL NOT CONTAIN ASHES, CONIDERS, SHELLS, FROZEN MATERIAL, LOOSE DEBRIS LARGER THAN 2" IN MAXIMUM DIMENSION.
2. WHERE EXISTING UTILITIES ARE LIKELY TO BE ENCOUNTERED, CONTRACTOR SHALL HAND DIG AND PROTECT EXISTING UTILITIES.
3. COORDINATE ROUTING OF CONDUITS WITH OTHER TRADES TO MAINTAIN REQUIRED SEPARATION WITH GAS, WATER, ETC. SERVICES.
4. CABLE WARNING TAPE SHALL BE 6" DETECTABLE TYPE AND INSTALLED ENTIRE LENGTH OF EACH TRENCH.

**DRY-TYPE TRANSFORMER SCHEDULE**

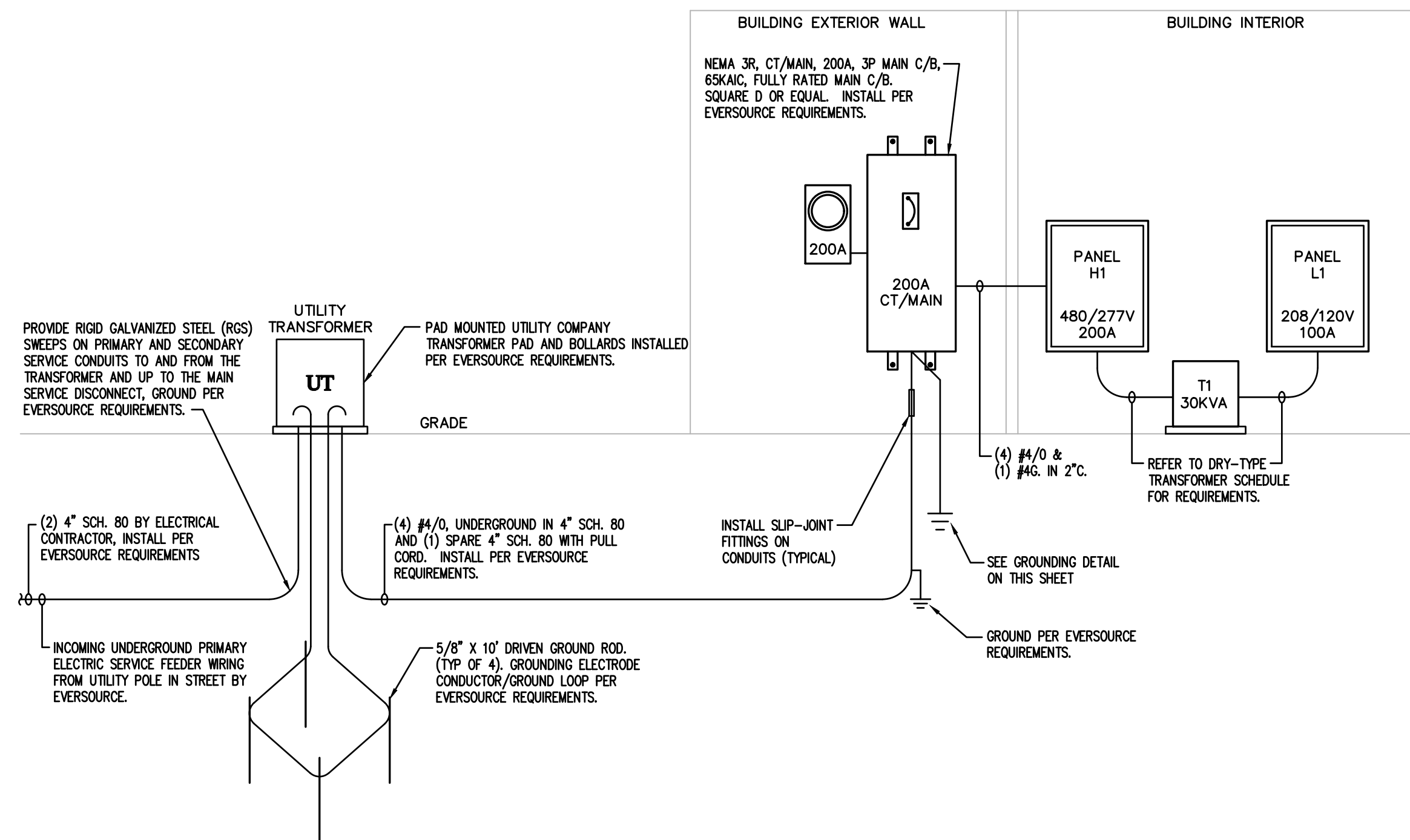
NO.	KVA	PRIMARY (V)	PRIMARY FEEDER	SECONDARY (V)	SECONDARY FEEDER	GEC	MOUNTING	REMARKS
T1	30	480	(3) #8, (1) #10 GND. IN 1" CONDUIT	208Y/120	(4) #2, (1) #8 GND. IN 1-1/4" CONDUIT	(1) #8 GND. IN 3/4" CONDUIT	FLOOR OR ABOVE HUNG CEILING	

**DRY-TYPE TRANSFORMER SCHEDULE NOTES:**

1. BIDS SHALL BE BASED ON THE DRY-TYPE TRANSFORMER SCHEDULE AND SPECIFICATIONS.
2. BOND GEC TO LOCAL BUILDING GROUNDING ELECTRODE BY EXOTHERMIC WELD OR APPROVED MECHANICAL MEANS PER NEC ARTICLES 250 & 450-10.
3. RETAP TRANSFORMER WINDINGS PRIOR TO COMPLETION OF CONSTRUCTION TO ACCOMMODATE PROPER SECONDARY VOLTAGES.
4. FINAL CONDUIT CONNECTIONS TO TRANSFORMERS SHALL BE WITH FLEXIBLE CONDUIT CONNECTIONS SUITABLE FOR ENVIRONMENTAL CONDITIONS.

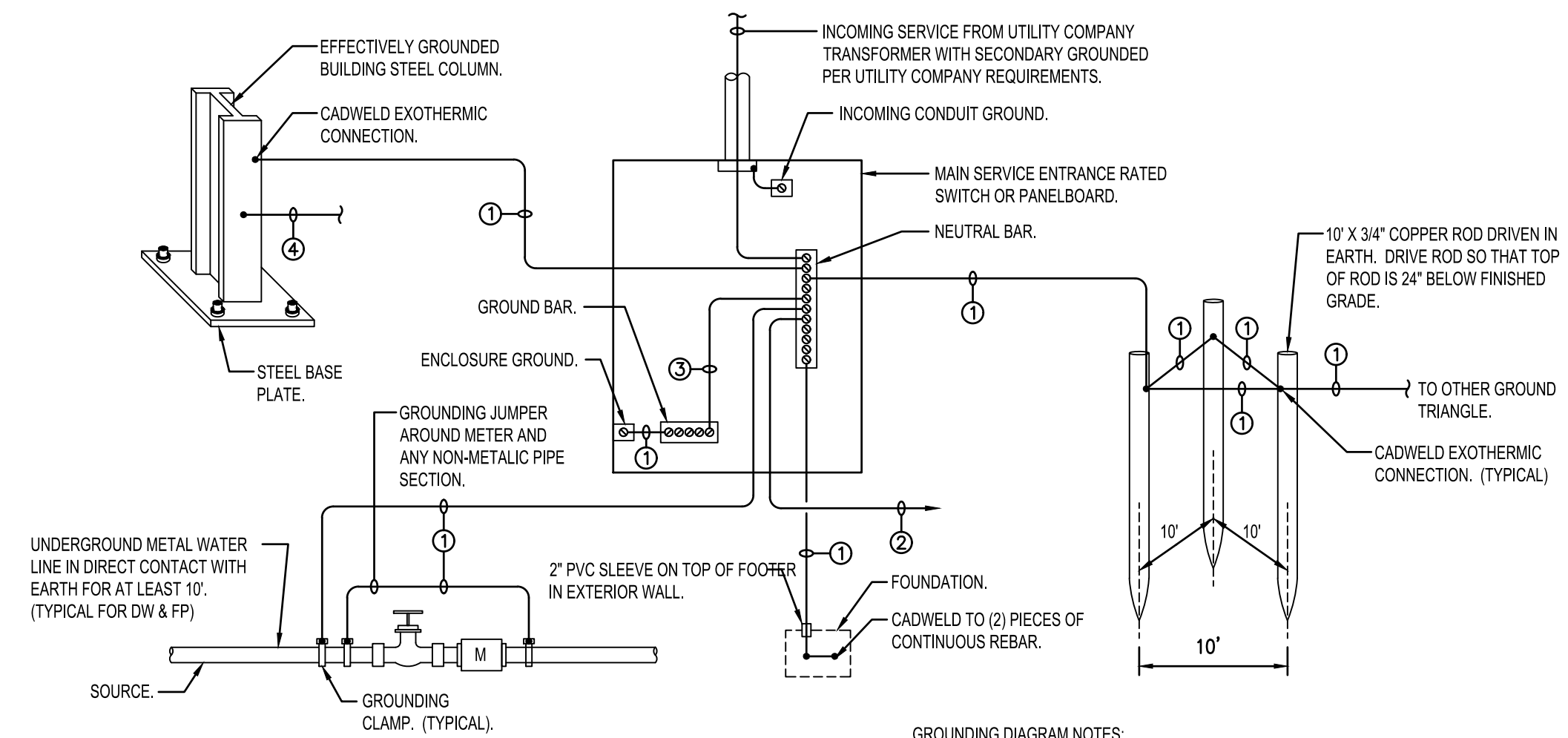
**TYPICAL TRENCH DETAIL**

NOT TO SCALE



**ELECTRICAL RISER DIAGRAM**

NOT TO SCALE



**GROUNDING DIAGRAM NOTES:**

- 1 THE GROUNDING ELECTRODE CONDUCTORS SHALL BE #30 COPPER.
- 2 #30 BONDING CONDUCTORS TO OTHER POINTS (INCLUDING GAS LINE) AND EQUIPMENT, AS REQUIRED BY NEC ARTICLE 250 AND AUTHORITY HAVING JURISDICTION.
- 3 MAIN BONDING JUMPER: SIZED AND INSTALLED PER NEC 250.28.
- 4 PROVIDE #8 BRAIDED COPPER BONDING JUMPERS AND BOND METAL ROOFS AWNINGS ETC. TO BUILDING STEEL.

**SERVICE GROUNDING ELECTRODE SYSTEM**

NOT TO SCALE



355 Research Parkway  
Meriden, CT 06450  
(203) 630-1406

**FRANCIS WALSH INTERMEDIATE SCHOOL**  
**SITE IMPROVEMENTS**  
185 DAMASCUS ROAD  
BRANFORD, CONNECTICUT 06405

REVISED: No. 1  
Date 05/02/2024  
Desc. REVISIONS TO SPORTS FIELD LIGHTING

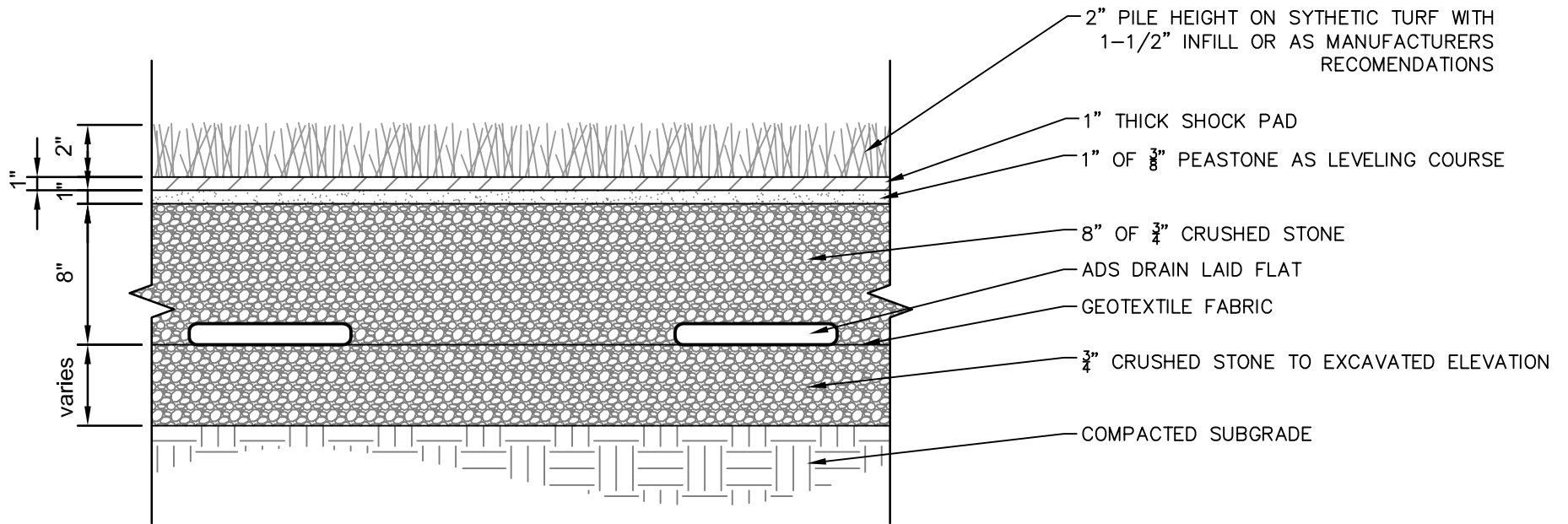
Designed J.C.W.  
Drawn N.Y.Y.  
Reviewed J.C.W.  
Scale NTS  
Project No. 2201005  
Date JANUARY 2024  
CAD File:

Title  
**SITE UTILITY - ELECTRICAL SCHEDULES & DETAILS**

Sheet No.

**SU-5**





## SYNTHETIC FIELD

SCALE N.T.S.



ARCHITECTURE  
ENGINEERING  
ENVIRONMENTAL  
LAND SURVEYING

### SYNTHETIC FIELD DETAIL

Designed JCW  
Drawn JCW  
Reviewed DJC  
Scale NTS  
Project No. 2201005  
Date 05/02/2024  
CAD File 11-DN220100501

# SK-1

