

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

- A. The Contractor shall be responsible for removing any preexisting turf in the athletic field area per the procedure detailed in "Site Clearing-Turf Removal-Subgrade Preparation."
- B. This work shall consist of preparing a root zone mixture consisting of existing root zone and proposed new sand and performing blending as described in the paragraph below. The root zone mix will be evaluated by using ASTM F2396 test methods. A sand sample shall be submitted to a testing agent for adherence to specifications prior to blending operations. Through the blending process that uses the blecavator machine (reverse tilling) set to varying height controls, the existing organic material and sand can also be blended on-site to a desired depth of 6 inches (152.4 mm) at the construction site.
- C. The contractor shall perform blending operations within the areas delineated on the plans. The contractor shall prepare the soil using the blecavator, which is a heavy duty contra-rotating rotor with blades that dig into the ground throwing soil, debris, and rocks against a sorting screen mounted behind the rotor for separating rocks and debris. The fine soil is deposited over the top and leveled off. The rear packer roll on the blecavator firms up the finished areas ready for seeding. Within the area delineated on plans, the contractor shall be directed by the Engineer or Engineer, to perform blending for 6 inches (152.4 mm) depths of spread sand, in order to achieve a homogeneous blend of soil composition over the entire field within the limits of the full depth renovation areas.
- D. No heavy-duty equipment and vehicular traffic shall be allowed on the prepared areas. Only low ground pressure (LGP) equipment is to be used.

### 1.2 RELATED REQUIREMENTS

- A. Section 31 1005 - Athletic Field Site Preparation: Turf removal and subgrade preparation.
- B. Section 32 9219 - Seeding: Seeding of athletic fields.

### 1.3 REFERENCE STANDARDS

- A. ASTM F2396 - Standard Guide for Construction of High-Performance Sand-Based Rootzones for Athletic Fields; 2011.

### 1.4 SAMPLES/TESTS

- A. The Contractor shall furnish an outline of their approach to the project no less than 10 days prior to the start of construction.
- B. The Contractor shall furnish a Certified Laboratory Report showing the soils classification and nutrient analysis of representative samples of the sand that is proposed to be used, including the extent of lime and fertilizer required. Samples submitted for approval must be representative of the total volume to be furnished, taken in the presence of the Engineer, and delivered to a certified laboratory by the Contractor; all costs for such shall be borne by the Contractor.

- C. If the material does not conform to the above requirements, it shall be rejected and additional sources shall be found. Sampling and testing shall be accomplished as specified herein until an approved material is found, all at the Contractor's expense.
- D. To assure that materials fulfill specified requirements regarding textural analysis, organic matter content, pH, and fertility, depending on the approach, testing must be undertaken:
  - 1. Prior to blending using materials on site and supplied
  - 2. At time of delivery; on-site
  - 3. After blending
- E. For quality control, immediately following spreading on site, soil may be tested at the Engineer's discretion. Soil sampling shall also indicate if specified material was bleccavated uniformly to the minimum specified depth.

### 1.5 NOTIFICATION

- A. The Contractor shall notify the Engineer in writing at least 10 days in advance of the time he intends furnishing root zone mix sand or amendments stating the location and amount of such deposit, the name and address of the supplier and also shall furnish such facilities, transportation and assistance as the Engineer may require for collecting and forwarding samples.
- B. Any changes to the means and methods of the athletic field construction, and/or materials, must be approved by the Engineer.
- C. Completion of work is subject to adverse climatic conditions, which could affect the date of substantial completion. Any/all delays must be communicated with the Construction Manager as soon as possible
- D. No work can progress unless testing results are approved by the Engineer.

### 1.6 QUALITY CONTROL

- A. Root Zone Mix Sand: A one-gallon sample for every 2000 cu yds (1529 cu m) of root zone mix shall be tested by the Engineer's Testing Agent for approval. All costs shall be borne by the Contractor.
- B. Following re-installation of irrigation heads and prior to seeding, contractor shall notify the Engineer and provide the Engineer with compaction tests along the center line of the field as well as along the foul lines to ensure that the root zone mix has not been heavily compacted. Compaction test shall fall within the industry standards for fields and any areas of the field that exceed these standards shall be corrected at the contractor's expense prior to seeding.

### 1.7 QUALITY ASSURANCE

- A. Contractor Qualifications: A qualified Contractor whose work has resulted in successful athletic field construction and performance turf establishment
- B. Contractor Experience: The Contractor must have completed at least five (5) projects per year of similar scope over the past three (3) consecutive years.
  - 1. General Experience:
    - a) Five (5) years' experience of athletic fields construction, resurfacing and/or renovations similar to scope of project over the last three (3) consecutive years

- b) Provide reports of above said athletic fields projects as to the type of projects involved in, including but not limited to; start and end dates, adherence to target/ key performance indicators, scope of works completed along with contact persons and contact details for said clients.
  - c) Provide testimonies from previous clients, including but not limited to; quality of work, staff/employee interactions, tidiness of site, timekeeping and punctuality and overall client satisfaction levels.
2. Staff/Employees:
- a) Provide resumes for all staff/employees who will be responsible for carrying out scope of works, including but not limited to, full time and seasonal/short term employees.
  - b) Resumes will be required for all employees/staff involved in the project.
  - c) Resumes to include:
    - 1) Experience level relevant to the project needs/scope of work.
    - 2) Qualifications level relevant to the project needs/scope of work.
  - d) Must provide evidence that all staff/employees have at least three (3) years' experience of similar scope of work for project over the last three (3) consecutive years
  - e) Provide evidence of continued professional development of all/any employees involved in project for last three (3) consecutive years.
  - f) Shall have a supervisor on the site who is experienced in the construction of sports fields. Supervisor's name and experience shall be submitted to the Engineer for approval.
  - g) Shall have membership of one or more of the following Professional associations for a minimum of the last three (3) consecutive years.
    - 1) New England Sports Turf Managers Association (NESTMA)
    - 2) Sports Turf Managers Association (STMA)
3. Insurance / Certifications:
- a) Must be in possession of a suitable level of public liability insurance and any other relevant insurances required by the state and/or client.
4. Equipment:
- a) Must be in possession and provide a detailed list of a suitable level of tools/equipment/machinery and or equivalent required to carry out the scope of work for said project.
  - b) All equipment and or equivalent should be in a condition able to carry out scope of work. Any certificates proving this will be required as part of the submission.
  - c) The proposed equipment must be approved by the Engineer prior to commencing work on the Athletic Fields.
5. Additional:
- a) Provide a project plan identifying all key indicator/target points, which clearly shows an integrated approach to quality control and quality assurance.
  - b) Provide a detailed methodology of how the required works will be carried out., this should be inclusive and synced to the project plan.
  - c) Is required to submit samples, test results and/or certification of all material prior to delivery to the site. All materials are to be approved by the Engineer prior to their use. These certifications shall comply with specifications and scope of project and where applicable, with any standards that may be implied.

## 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws, as applicable.
  
- B. Bulk Materials:
  - 1. Do not dump or store bulk materials near structures, utilities, walkways, and pavements, or on existing turf areas or plants.
  - 2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
  - 3. Accompany each delivery of bulk fertilizers, lime, and soil amendments with appropriate certificates.
  - 4. Fertilizers, lime, and soil amendments must be stored in a secure, locked area, and must be protected from the elements.

## 1.9 SITEWORK CONSTRUCTION EQUIPMENT BY USE

- A. Excavation, Earth Moving, and Grading:
  - 1. Utilize Model 550 J Crawler Dozer as manufactured by John Deere equipment or equivalent, which meets the following specifications:
    - a) Laser T Guided Capability
    - b) Tier 3/Stage 3A emissions certified engine
    - c) Net power – 85 hp. at 2200 rpm
    - d) Maximum speed (forward and reverse) 5 mph
    - e) Track gauge – 5 ft.
    - f) Length of track on ground – 7 ft. 2 in.
    - g) Ground contact area – 4128 sq. in.
    - h) Maximum ground pressure – 5.8 psi
    - i) Number of track rollers – 6
    - j) Track pitch – 6.29 in.
    - k) Track shoes, each side – 40
    - l) Standard shoe type – single grouser
    - m) Blade width – 9 ft. 7 in.
    - n) Blade height – 3 ft. 2 in.
    - o) SAE blade capacity – 2/57 cu. yd.
    - p) Lade lift height – 2 ft. 7 in.
    - q) Digging depth – 20.6 in.
    - r) Blade tilt – 1 ft. 3 in.
    - s) Ground clearance – 14 in.
    - t) SAE operating weight – 18,252 lbs.
  - 2. Utilize Model Z Axis 50 U Series Mini Excavator as manufactured by Hitachi or equivalent, which meets the following specifications:
    - a) Net power – 40 hp. at 2,500 rpm
    - b) Weight – 10,758 lbs.
    - c) Speed – 1.7 to 2.8 mph
    - d) Track – rubberized 15 in.
    - e) Maximum ground pressure – 4.49 psi
    - f) Ground clearance – 13 in.
    - g) Front grading blade width – 78 in.
    - h) Grade ability – 30°

- i) Maximum digging reach – 236 in.
  - j) Maximum digging depth – 141 in.
  - k) Maximum cutting height – 222 in.
  - l) Maximum vertical wall – 111 in.
- B. Stripping of Existing Grass Surface:
- 1. Utilize Model FTM 2000 Koro Field Top Maker as Manufactured by Pols International, Stationsweg 36, 3214 VK Zuidland, Netherlands or equivalent that meets the following specifications:
    - a) Working width – 78 in.
    - b) Working depth – 1.75 in.
    - c) Weight – 2448 lbs.
    - d) Horsepower requirements – 70 hp.
    - e) Number of cutting blades – 64
    - f) Side conveyor extension
  - 2. Utilize Model 6425 Turf Tractor as manufactured by John Deere Equipment or equivalent, which meets the following specifications:
    - a) Engine power – 125 hp.
    - b) PTO power – 114 hp.
    - c) Wheelbase – 94.5 in.
    - d) Weight – 10,064 lbs.
    - e) Rear lift – 5,100 lbs.
    - f) Front tire – 10.00 – 16 low ground pressure high floatation turf tire
    - g) Rear tire – 16.9 – 30 low ground pressure high floatation turf tire
- C. Hauling of Stripped Material off Field:
- 1. Utilize Dircub Hydraulic Dump-box as manufactured by TYCROP Manufacturing or equivalent that meets the following specifications:
    - a) Bed size – 60 13/16" x 70 1/8" L
    - b) Unit Size – 68 1/8" W x 45 9/16" H
    - c) Weight – 956 lbs.
    - d) Payload: 3000 lbs.
    - e) Suspension – Low ground pressure (maximum 5 psi) 4 wheel4-wheel walking beam evenly distributing
  - 2. Utilize Model 4720 Turf Tractor as Manufactured by John Deere Equipment or equivalent that meets the following requirements:
    - a) Engine power – 58 hp.
    - b) PTO power – 56 hp.
    - c) Wheelbase – 71.5 in.
    - d) Weight – 3,860 lbs.
    - e) Rear lift – 2,500 lbs.
    - f) Front tire – 8.00 – 16 low ground pressure high floatation turf tire
    - g) Rear tire – 13.6 – 28 low ground pressure high floatation turf tire
- D. Loading, Backfilling, Power Raking Specifications:
- 1. Utilize Model 287 Compact Track and Multi Terrain Loader as manufactured by Caterpillar Inc, or equivalent that meets the following specifications:
    - a) Net Power – 82 HP
    - b) Operating Weight – 10,275 lb.
    - c) Maximum speed (forward and reverse) – 7 mph
    - d) Length of Track on Ground – 73 in.
    - e) Ground contact area – 2,610 sq. in.

- f) Maximum ground pressure – 3.8 psi
  - g) Ground clearance – 11 in.
  - h) Vehicle width – 77 in.
  - i) Clearance at maximum lift/dump – 94 in.
  - j) Quick connect accessory and implement capability
2. Utilize Model MX7H Hydraulic Power Angle Mounted Grading and Blending Implement as manufactured by Harley Rake or equivalent and meets the following specifications:
- a) Front attachment plate for track and multi terrain loader
  - b) Working width to cover multi terrain loader trucks
  - c) Aggressor pointed carbide teeth
  - d) Dual independently adjustable gauge wheels
  - e) Weight – 1050 lb.
  - f) Length – 64 in.
  - g) Width (overall) – 93 in.
  - h) Raking width – 84 in.
  - i) Raking width (full range) – 79 in.
  - j) Angle roll - 20°
  - k) Removable/reversible end plates
3. Utilize Model TD – 460 low ground pressure large area top dresser as manufactured by Tyco Manufacturing or equivalent, which meets the following specifications:
- a) Weight – 3,400 lbs.
  - b) Length – 167 in.
  - c) Height – 63 in.
  - d) Width – 89 in.
  - e) Hopper load capacity – 75 cu. ft.
  - f) Capability to spread wet or dry materials including soil mixes, sand, stone, gravel, Inorganic material, composted products, and wood chips.
  - g) Capability to perform as multifunctional trailer for material handling and relocation tasks with an unloading time of 30 seconds
  - h) Low ground pressure four-wheel walking beam suspension
  - i) Unlockable metering gate to float freely during bulk unloading operations
  - j) Removable metering gate for hauling construction and landscape materials
  - k) Independent control valves for adjusting the speed of floor conveyor belt and the finishing brush
  - l) 72" wide spread and distribution of material
4. Utilize Model BV150 Ground preparation machine as manufactured by BLEC USA or equivalent which meets the following specifications:
- a) Working width – 60 in.
  - b) Working depth – 9 in.
  - c) Gear box – single speed 540 RPM
  - d) No. of blades – 36
  - e) Overload safety – friction multi-plate clutch
  - f) Maximum working output/hr. 5300 sq. yd.
  - g) Maximum 1.5 mph working speed – 2.0 mph
  - h) 3 point3-point hitch – cat 2
  - i) Weight – 2,300 lbs.
  - j) Length – 71 in.
  - k) Height – 44 in.
  - l) Width – 82 in.
5. Utilize Model 5425 Turf Tractor as manufactured by John Deere Equipment or equivalent which meets the following specifications:
- a) Engine power – 81 hp.

- b) PTO power – 65 hp.
- c) Wheelbase – 85.7 in.
- d) Weight – 7,385 lbs.
- e) Rear lift – 3,374 lbs.
- f) Front tire – 7.50 – 16 low ground pressure high floatation turf tire
- g) Rear tire – 16.9 – 30 low ground pressure high floatation turf tire

E. Finish Grading:

- 1. Utilize Model 106 P Compact Motorized Cross Slope Dual Laser Grader as manufactured by Laser-Grader Manufacturing or equivalent that meets the following specifications:
  - a) Weight – 3,200 lbs.
  - b) Length – 11 ft. 6 in.
  - c) Height – 7 ft. 2 in.
  - d) Width (excluding blades) – 4 ft.
  - e) Front pusher blade width – 5 ft.
  - f) Mold board width – 6 ft.
  - g) Mold board height – 12 in.
  - h) Variable speed: 0 – 10 mph
  - i) Outside turning radius – 9 ft.
  - j) Inside turning radius – 5 ft.
  - k) Mold board functions –
    - l) Left and right manual raise and lower
    - m) Side shift and blade rotation
  - n) Grading tolerance - +/- 1/8 in. accuracy equipped with Trimble GCS 600 Grande Control System with two LR410 laser receivers monitored by dual LED grade displays as programmed through a CB420 control box providing the ability to calculate angle, slope, and cross slope
  - o) Trimble control package plumbed into hydraulics for “automatic” laser control
  - p) 6 wheel6-wheel drive via hydraulic wheel motors
  - q) Power steering
  - r) ROPS certified roll bar

F. Seedbed Preparation:

- 1. Utilize Model 13-550 Super Rake as manufactured by Smithco or equivalent that meets the following specifications:
  - a) Power – 16 hp.
  - b) Weight – 990 lbs.
  - c) Configuration – 3-wheel tricycle rear engine placement
  - d) Drive – direct drive hydrostatic
  - e) Speed – 0 – 9 mph
  - f) Tires – 10.50 x 12 turf tires
  - g) Length – 85 in.
  - h) Width – 74 in.
  - i) Height – 44 in.
  - j) Wheelbase – 47 in.
  - k) Equipped with center mounted sand cultivator
  - l) Equipped with rear mounted sand rake assembly
  - m) Equipped with rear mounted 6 ft. wide steel mesh drag mat

G. Seeding:

- 1. Utilize Model 1575 Over-seeder as manufactured by Redexim North America or equivalent that meets the following specifications:

- a) Weight – 2,293 lbs.
- b) Working width – 62.2 in.
- c) Working depth: 0.19 in. – 0.78 in.
- d) Seeding speed – 7.5 mph
- e) Seeding row spacing – 2.9 in.
- f) Disk quantity – 21
- g) Seed tray capacity – 7.9 cu. ft.
- h) Seeding density per 1,000 sq. ft.: 0.44 lbs. – 8.82 lbs.
- i) Water fillable back roller with scraper
- j) Individual seed planting
- k) Twin discs to contour with ground undulations
- l) Integrated seed spreading tray

**PART 2 PRODUCTS**

**2.1 SAND**

- A. Sand for Root Zone Mix: Conform to ASTM F2396.
  - 1. The following definitions shall apply to the work of this section.
  - 2. The following size distributions of mineral particles by diameter and sieve size shall apply to the following conventional names of soil types:

CONVENTIONAL NAME	RETAINED ON U.S. SIEVE NO. (MM)	DIAMETER
VERY COARSE SAND	#18	1 TO 2
COARSE SAND	#35	0.5 TO 1
MEDIUM SAND	#60	0.25 TO 0.5
FINE SAND	#140	0.10 TO 0.25
VERY FINE SAND	#270	0.05 TO 0.10
SILT	BY HYDROMETER	0.002 TO 0.05
CLAY	BY HYDROMETER	LESS THAN 0.002

**2.2 ROOT ZONE MIX**

- A. Mixing Materials: Mixing of the sand and existing soil mixture for the root zone, must be carried out by a mixing/blending unit conversant with industry standards. This blending unit must be calibrated to achieve the mix ration identified in this specification.
  - 1. As an alternative if a mix/blending unit is not available or space on site does not permit its use then the mixing/blending must be blended by an experienced operator, using suitable equipment.
- B. Physical performance Evaluation of the root zone mix will be in accordance with the guidelines set forth in ASTM F2396.

**2.3 IMPORTED ROOT ZONE MATERIAL**

- A. Imported Root Zone Material shall conform to the following:
  - 1. Organic Matter Content: Minimum of 3 to 5 percent.
  - 2. Infiltration rate shall be greater than 4 inches per hour.
  - 3. Soil shall not be compactable to more than 200 psi.
  - 4. The soils textural shall meet the following gradation:

5.

Description	Size (mm)	Percent
Sand	0.05 to 2.0	96 +/- 1.0
Silt	0.002 to 0.05	2 +/- 0.5
Clay	<0.002	1 +/- 0.5
Combined silt and clay (#140 and #270) shall not exceed 10 percent. No stone greater than 1/4-inch (6 mm).		

- a. This material should be applied and blended with the existing material onsite to create a homogenous blend. This blended material would then be spread across the entire footprint of the softball/soccer field and then graded in line with the Site Grading Drawings.

### PART 3 EXECUTION

#### 3.1 ROOT ZONE MIX RATIOS

- A. Upon approval of the sand component, the Contractor shall blend the components in the ratio of new sand and existing root zone to create the root zone mix required as determined by testing laboratory. This ratio of sand and organic material will be based on laboratory testing and performance guidelines established by these specifications.
- B. The root zone mix provided by the testing laboratory will establish the required mix ratio and specifications for approval or rejection by the Engineer of all quality control submittals during construction.
1. Performance Testing: ASTM testing procedures for sand based athletic fields shall be used for performance testing.

#### 3.2 PLACEMENT

- A. Root zone Mix Established by the Blending method:
1. The existing material should be installed over the graded subbase to the correct depth using identified equipment and then "rough" graded utilizing a dual-plane laser grader.
  2. The required amount of sand should then be applied to the existing material at the correct depth and then "rough" graded utilizing a dual-plane laser grader.
  3. All sport turf areas are to be reverse tilled to a depth of 6 inches (152.4 mm) depth with a reverse till (blecavator), conventional tilling is unacceptable. Fine grading shall be accomplished with a fully automated dual-plane LGP laser grader.
  4. Under no circumstances will loaded rubber-tired vehicles in excess of 1 ton be allowed on the gravel base or root zone mix prior to, during or after the spreading of the root zone mix.
  5. Finish grades shall be verified by the Contractor using laser operation survey instruments with a tolerance of +/- 1/4-inch (6 mm).
  6. The Contractor shall reverse till (blecavate) Root Zone Mix to the depths shown on the contract drawings, which depth shall be the minimum required depth after settlement. No compaction shall be required beyond that extent necessary to place sod.
  7. Root Zone Mix shall be graded to total depth of 7 inches (178 mm), but not less than required to meet finish grades after mixing with amendments and natural settlement in such a manner as to establish a loose, friable seedbed.
  8. Reinstall any removed irrigation components, visually inspect the system, stake the risers in an upright position prior to seeding.

**3.3 ADDITIVES**

- A. The Contractor shall apply Renovate Plus, Myco-Replenish and all necessary fertilizer and lime to the soil in accordance with the manufacturer and laboratory's recommendations and as required by the sodding specifications referenced elsewhere.

END OF SECTION