NOTE TO CONSULTANTS: Edit with Track Changes turned on, any text in this section that appears in bold and italics then turn off the bold and italics for the final approved version. (Remove this Note).

PART 1- GENERAL

1.01 Description: Provide all labor, materials, and equipment necessary to perform the complete installation of the Synthetic Turf Base.

1.02 Related Sections: Coordinate related work specified in other parts of the Project Manual, including but not limited to following:

Section 31 05 16 - Earthwork for Athletic Fields
Section 32 11 33 - Mineral Aggregates
Section 32 18 23.29 - Synthetic Athletic Field Turf Surfacing

1.03 References: City of Seattle Standard Specifications for Road, Bridge and Municipal Construction (most recent edition)

1.04 Quality Assurance:

A. The Contractor is responsible for verifying the quality of the work and shall perform compaction and density tests on request of the Engineer to check compliance with these specifications. A copy of the test reports shall be furnished to the Engineer.

B. The Engineer's Testing Agency may perform compaction and density tests to check for compliance with these specifications.

C. The Engineer may require that an independent testing laboratory test imported materials at any time. If the material is found to be non-compliant with the Contract, the Contractor shall bear the cost of testing, removal of all non-compliant materials from the Project Site, and replacement of the materials with materials meeting the requirements of the Contract. If the materials tested are found to be compliant with the requirements of the Contract, the Owner will reimburse the Contractor for costs incurred by testing plus mark-ups as allowed for elsewhere in the Contract.

D. It is the responsibility of the Contractor to verify the accuracy of all survey information provided by the Owner prior to commencing excavations or filling operations. Commencement of these operations constitutes acceptance of the survey information as appropriate to meet the intent of the Contract.

E. Submittals: The Engineer shall approve in principle all products used in the execution of this section prior to their importation to the Project Site. Submit a particle gradation analysis in graph and table form for each product specified. Approval of the Engineer of an analysis does not constitute approval of the actual product, which may be subject to additional testing at any time per paragraph 1.04.C above.

PART 2- PRODUCTS

2.01 Prior to the importation of any materials, the Contractor shall provide the Engineer with a certified test lab reports indicating properties of each product. The Engineer shall be the final determining factor in establishing compliance with requirements. No material shall be brought onto the job site until the initial analysis has been approved in writing. During the course of importation of materials, the Contractor shall be responsible for continually checking the materials to insure that they continue to meet the Specifications.

2.02 Base Geo-textiles:

A. Base Geo-textile shall be a woven, non-biodegradable, highly permeable polypropylene fabric. Fabric shall possess the following properties;

Property	Test Method	Value/Units
Grab Tensile	ASTM D4632	200 lb.s
Grab Elongation	ASTM D4632	15%
Puncture	ASTM D4833	90 lb.s
Mullen Burst	ASTM D3786	400 psi
Permittitivity	ASTM D4491	.07 cm/sec

Base Geo-textile shall be supplied in minimum 15’ wide rolls of sufficient length to provide continuous cover of sub-grades receiving base sand with no more than a single interrupting seam or splice. GTF 200S Woven Polypropylene Fabric as manufactured by LINQ Industrial Fabrics, Inc., Somerville, SC (800) 543-9966, or approved equal.

B. Structural Geo-grid shall be a biaxial polymeric grid as follows (values given are for weakest axis);

Property	Value/Units
Initial Modulus	15,170 lbs./ft
Tensile Strength @ 2% Strain	280 lbs./ft
Tensile Strength @ 5% Strain	580 lbs./ft
Junction Efficiency	93%
Junction Strength	MD 98 lb TD 111 lb
Flexural Rigidity	250,000 mg-cm

Product supplied minimum roll width of 4 meters x 50 meters length per roll.

2.03 Edging: All edges of the Short Pile Synthetic Turf System shall be contained within 2”x 4”x12’ (dimensional or nominal) recycled plastic timbers as approved. Recycled plastic materials shall be thoroughly blended and homogenized within the full cross section of any extrusion. Recycled plastic edging shall be secured with grade 60 - #4 (4/8) deformed reinforcing steel.

2.04 Field Base Aggregates:

A. General:

1. Provide Aggregates with the specified properties.
2. Provide independent laboratory test results (supplier lab results will not be accepted) identifying performance to the properties specified in the units identified here.

B. Base Course Aggregate:

The Base Coarse Aggregate (Permeable Base Stone) shall be fully fractured, highly permeable gradation of aggregates for installation on prepared sub-grade to defined slopes and grades. Provide materials meeting the following property specifications:

1. Material shall contain less than 1/10 of 1% organic material by weight as measured by burn test.
2. All surfaces of individual particles shall be fractured. No worn or naturally occurring faces shall be present.
3. Permeability of a minimum 24” depth, compacted to 95% Proctor, shall be a minimum of 100 inches per hour.
4. Material shall meet or exceed the following sieve analysis:

Sieve Size	Percent Passing
1-1/4" square sieve	100
1” square sieve	90 to 100
¾” square sieve	80 to 100
½” square sieve	50 to 80
3/8” square sieve	40 to 60
No. 4 sieve	20 to 40
No. 8 sieve	15 to 30
No. 30 sieve	5 to 20
No. 100 (wet)	2 to 10
No. 200 (wet)	2 to 6

Modified Type 2 Aggregate, screened to meet the properties described, or Permeable Base Stone from Glacier Northwest, or approved equal.

C. Leveling Course Aggregate:

The Leveling Coarse Aggregate (Permeable Top Stone) shall be fully fractured, highly permeable gradation of aggregates for installation on prepared Base Aggregate to defined slopes and grades. Provide materials meeting the following property specifications:

1. Material shall contain less than 1/10 of 1% organic material by weight as measured by burn test.

2. All surfaces of individual particles shall be fractured. No worn or naturally occurring faces shall be present.
3. Permeability of a minimum 12" depth, compacted to 95% Proctor, shall be a minimum of 50 inches per hour.

Sieve Size	Percent Passing
½" square sieve	100
3/8" square sieve	90 to 100
No. 4 sieve	55 to 75
No. 8 sieve	30 to 50
No. 30 sieve	5 to 25
No. 100 (wet)	2 to 10
No. 200 (wet)	2 to 6

Modified Type 1 Aggregate, screened to meet the properties described, or Permeable Top Stone from Glacier Northwest, or approved equal.

PART 3- EXECUTION

3.01 Protection of Work In Progress:

It is the responsibility of the Contractor to protect all work in progress from damage due to extremes of cold, moisture, or drying, or mechanical damage from equipment traffic or foot traffic. Alert the Engineer to the presence or likelihood of conditions that may adversely affect the quality of the work, the physical structure of soils, or transport of site soils off-site.

A. Do not work frozen soils.

B. Protect soils from excessive moisture. During periods of prolonged precipitation, take aggressive steps to avoid over-saturation, erosion, or homogenization of soils by covering with protective plastic sheeting, collection and controlled dewatering, detention for sediment removal, and allowing excessively wetted soils to remain fallow until approved by the Engineer as appropriate for continued work.

C. Apply supplemental moisture to overly dry soils.

D. Do not operate heavy equipment near excavations where trench wall or cut-slope failure may result.

3.02 Inspection:

A. Prior to commencing the work of this Section, confirm that Section 31 05 16, Geo-textiles have been approved by the Engineer as satisfactorily installed.

B. Protect the approved work as installation of Field Base is commenced and completed.

3.03 Edging:

A. Prior to commencing installation of edging, perform a utility locate of installed and existing utilities including irrigation, drainage, and electrical. Verify that the installation of the edging will not result in damage to subsurface utilities.

B. Install recycled plastic timber edging in such a manner as to allow the finished Synthetic Turf System to conform to the finish grade lines and elevations as indicated in the Contract Drawings, generally 1/4" below finished grade of adjacent surfaces. Drill each length of timber a minimum of 4 places per timber, beginning 6" from each end and spaced equally a maximum of 4'-0 on center. The pre-drilled holes shall be sized to insure that a tight friction bond exists with the anchoring steel, at 3/8" to 1\2" diameter.

3.04 Base Course Aggregate:

A. Do not operate machinery directly on approved Geo-textile installation.

B. Place approved Base Course Aggregate in a manner that will minimize disturbance to the Geotextile installation. Use only approved transport methods for placement of materials. Thoroughly cover Geo-textile with sufficient Base Course Aggregate to evenly distribute compressive forces of placement operation.

C. Spread lift of Base Course Aggregate to the depth specified in the Contract Drawings. Place and mechanically compact in lifts not exceeding 9" at any one time. Perform compaction with a static roller of sufficient weight to insure proper compaction.

D. Perform testing indicating initial lift of Base Course Aggregate is at 95% of maximum density.

E. Provide complete compaction to the lines, grades, and slopes indicated on the Contract Drawings. Vertical tolerance for the Base Course Aggregate installation shall be ½" over 10' as measured from a string line.

3.05 Leveling Course Aggregate:

A. Place approved Leveling Course Aggregate in a manner that will minimize disturbance to the approved Base Course Aggregate installation. Use only approved transport methods for placement of materials.

B. Spread a single lift of Leveling Course Aggregate to the depth specified in the Contract Drawings, allowing for compaction. Perform compaction with a static roller of sufficient weight to insure proper compaction.

C. Provide complete compaction to the lines, grades, and slopes indicated on the Contract Drawings. Vertical tolerance for the Leveling Course Aggregate

installation shall be ¼" over 10' from any given point in any direction, as measured with a string line.

D. Coordinate approval of Leveling Course Aggregate installation with the requirements of Section 32 18 23.29 - Synthetic Athletic Turf System.

3.06 Disposal of Excess and Waste Materials: Remove from the Owner's property all waste materials, including unacceptable materials, trimmings, roll cores, trash and debris, and dispose of it off site in a legal manner. Provide dump receipts from an approved dumpsite.

END OF SECTION