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PART 1 - GENERAL

1.01 Description:

A. Provide all labor, materials, and equipment to perform the following work of the Contract, including incidentals related to that work and coordination and support of other work specified elsewhere in the Contract Documents:

1. Placement of Geo-textile fabrics
2. Import and Placement of Base Aggregate and Leveling Course Aggregate
3. Import and placement of Cinder Track Surface.
4. Removing materials from the site which are in excess of that required.
5. Coordinate Earthwork operations with other work of the project.

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

Section 31 20 00 - Earthwork
Section 32 11 23 -Mineral Aggregates

1.03 References: This section references the latest revisions of the following documents. They are a part of this section as specified and modified. In case of conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail. Other references are as follows:

A. Seattle Standard Plans and Specifications for Road, Bridge and Municipal Construction (most recent edition).

B. City of Seattle Title 22.802: Stormwater, Grading and drainage Control Code (most recent edition).

C. R.C.W. - Chapter 39.04.180 Public Works/Trench Excavations - Safety Systems Required.

D. R. C. W. - Chapter 49.17 WISHA.

E. WAC 296-155 - Safety Standards for Construction Work.

F. WAC 296-155-660.

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 verify 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.

1.05 Submittals:

A. Health and Safety Plan - Prepare and submit a Worker Health and Safety Plan. Although certain requirements are identified here and elsewhere in these specifications, it is the sole responsibility of the Contractor to provide a safe work environment and adequate protection to individuals under their employ. Maintain a copy of the Health and Safety Plan in a conspicuous location on the Job Site and reinforce the requirements of the document at weekly Job Site Safety Meetings.

B. Safety Products - Submit for the Engineer’s approval, the manufacturer’s product data for each worker safety product specified.

C. Bulk Materials - 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.

1.06 Existing Conditions: Documentation regarding existing conditions, in addition to the current survey supplied in the Contract Drawings, includes the following;

A. Project Site Record Drawings - Complete archival documentation of previous improvements made by the Owner at the project site may be reviewed during regular business hours at the offices of the Park Engineer, located at 800 Maynard Ave., Seattle WA. Ph. (206) 684-7034 to arrange review of these documents. Copy services are available for a fee unless other arrangements are made.

B. Geotechnical and Soils Reports - The Owner shall provide updated geotechnical and/or soils reports in anticipation of this project if they are available. Those reports will be attached in their entirety, for informational purposes only, following this Section.

C. Other Available Information - Other information regarding utilities belonging to jurisdictions other than the Owner may be obtained through the Seattle Public Utilities (SPU) and/or King County - Metro.

1.07 Manufacturer's Qualifications: The Contractor shall cause the materials that are to be furnished under this section to be the product of firms that are regularly engaged in the manufacture of the specified materials.

PART 2 - PRODUCTS

2.01 General:

A. Prior to the importation of any materials, the Contractor shall provide the Engineer with a certified test lab report of the sieve analysis of each aggregate product. The Engineer shall be the final determining factor in establishing compliance with sieve requirements. No material shall be brought onto the job site until the initial sieve analysis has been approved in writing.

B. 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 Safety, Monitoring, & Response Equipment:

A. General: The Contractor shall provide barricades, safety guards, temporary fencing, signage and/or other methods to secure trenches, open excavations, and other unsafe conditions resulting from this construction. Undertake work in full compliance with all applicable regulatory requirements.

B. Monitoring Equipment:

1. Contractor shall require workers engaged in trenching deeper than 36" below existing finished grade or in the presence of landfill materials to wear monitors or badges capable of detecting methane gas. Monitors shall emit an audible alarm if methane gas in excess of 10% of the lower explosive limit (LEL) is detected. Monitors shall be used in accordance with the manufacturer's directions.
2. Contractor shall have a portable hand-held methane monitor capable of indicating percent of LEL on site at all times during trenching and grading. Contractor's personnel shall be familiar with operation of the monitor and capable of obtaining accurate readings.

C. Personal Protective Gear: Contractor shall have Tyvek® suits and latex gloves, or gloves offering greater protection, on site and available for use by workers during trenching and grading work. In the event that buried refuse is encountered, workers shall use Tyvek suits and latex (or better) gloves for personal protection.

2.03 Geo-textiles & Geo-grid:

A. Geotextile: Base Geotextile 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.

2.07 Track 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

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

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

2.08 Cinder Surfacing:

A. General: Red Cinder Surfacing for the track.

B. Type: Provide red cinder produced from coal mining, reconstituted with clay and loam or pumice through process of crushing, screening and mixing, meet following gradation requirements.

Sieve Size		Percent Passing
3/4" square sieve		100
3/8" square sieve		100
1/4" square sieve		95.6
No. 4 sieve		88.4

No. 8 sieve		70.5
No. 16 sieve		66.4
No. 30 sieve		56.3
No. 50 sieve		40.7
No. 100 sieve		27.2
No. 200 sieve		20.7

C. Composition: Cinder content as follows:

Silica SiO2	45-60%
Alumina AL2O3	15-30%
Ferric Oxide Fe2O2	5-15%
Calcium Oxide CaO	1-10%
Magnesium Oxide MgO	1-5%

D. Red cinder shall be manufactured by Palmer Coking Coal Company in Black Diamond, WA. 360-886-2841, 425-432-4700, or approved equal.

PART 3 - EXECUTION

3.01 Safety Monitoring & Response: In addition to all current State and Local Safety Requirements;

A. Contractor shall require workers engaged in trenching deeper than 36” below existing finished grade or in the presence of landfill materials to wear monitors capable of detecting methane gas. Monitors shall emit an audible alarm if methane gas in excess of 10% of the lower explosive limit (LEL) is detected. Monitors shall be used in accordance with the manufacturer's directions.

B. Contractor shall have a portable hand-held methane monitor capable of indicating percent of LEL on site at all times during trenching and grading. Contractor's personnel shall be familiar with operation of the monitor and capable of obtaining accurate readings. Contractor shall periodically inspect trenches using the monitor. Inspections shall be done at least at the start of work each day and at mid-day. In the event that a monitor(s) worn by a worker(s) detect methane, the portable detector shall be used to confirm the presence of methane and determine the actual percentage of the LEL.

C. In the event that methane gas in excess of 10% of LEL is found to be present, the Contractor shall stop work in the affected area and allow the methane to dissipate. As the contractor's option, fans may be used to speed dissipation of the methane. Work shall not resume in the affected area until the methane gas level has decreased below 10% of LEL.

D. When working in the presence of landfill materials (exposed refuse), workers shall wear Tyvek suits and latex gloves or other approved protection.

E. Maintain conformance to Contractor's Health and Safety Plan.

3.02 Protection of Existing Facilities:

A. Utilities: The Contractor shall protect from damage private and public utilities. Verify the locations of underground utilities minimum 48 hours prior to excavation.

B. Pavement: The Contractor shall protect from damage all pavement or paved areas including curbs and walks intended to remain. Contractor shall be responsible for replacement if damage occurs to pavement or curbs.

C. Access Streets and Roadways: Provide wheel cleaning stations to clean wheels and undercarriage of trucks before leaving site, as necessary to prevent dirt from being carried onto public streets. If streets are fouled, they must be cleaned immediately in conformance with City of Seattle and all governing requirements and regulations.

D. Repair and or replacement of damaged facilities to the Engineer's satisfaction will be accomplished at the Contractor's expense.

3.03 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.

3.04 Survey Control:

A. General:

1. Contractor Responsibilities: It is the responsibility of the Contractor to construct the improvements to the lines and grades as defined in the Contract Drawings. Further, it is the responsibility of the Contractor to anticipate and alert the Engineer immediately to any conflicts of dimension, either vertical or horizontal, that may result in accumulated error.

2. Qualifications: Secure the services of a State Licensed Land Surveyor to establish the primary lines and grades required for the layout of the work. Coordinate the work of the project surveyor with establishment of baselines, hubs, and/or temporary benchmarks to be provided by the Owner.

B. Horizontal Control: The Owner shall provide initial horizontal control by establishment of baselines defined by points as described on the layout drawings. A minimum of three initial points will be provided. The Contractor shall request establishment of initial horizontal control through the Engineer a minimum of 72 hours prior to need. Once established, it is the responsibility of the Contractor to protect the baseline hubs for the duration of need.

C. Vertical Control: The Owner shall provide initial vertical control by establishment of temporary and permanent benchmarks within or adjacent to the Project Limit. A minimum of two vertical control points will be provided. The Contractor shall request establishment of initial vertical control through the Engineer a minimum of 72 hours prior to need. Call the **SPR Inspection Request Line @ (206) 684-7034 or by email at parksconstruction.inspection@seattle.gov** to make arrangements for survey work. Once controls are established, it is the responsibility of the Contractor to protect the temporary and permanent benchmarks. Report damage or disturbance of permanent survey points directly to the Engineer, and the **office of the SPR Survey Crew Chief, (206) 684-4954.**

3.05 Compaction:

A. General: Control soil compaction during construction providing minimum percentage of density specified for area classification. Do not allow equipment traffic to overly compact areas beyond specified percentages. Remediate over-compaction as directed by the Engineer including ripping, regrading and re-compaction or over-excavation and in-kind replacement per plan.

B. Percentage of Maximum Density Requirements: Compact soil to not less than the following percentages for maximum density for soils which exhibit a well-defined moisture density relationship (cohesive soils) determined in accordance with ASTM D698; and not less than the following percentages of relative density; determined in accordance with ASTM 4253, for soils which will not exhibit a well defined moisture density relationship (cohesionless soils).

1. Base Coarse - 95%
2. Leveling Coarse - 95%
3. Cinder Surfacing - 95%

C. Moisture Control:

1. Where sub-grade or lift of soil material must be moisture conditioned before compaction, uniformly apply water to surface of sub-grade, or layer of soil material, to prevent free water appearing on surface during or subsequent to compaction operations.

2. Before compaction, moisten or aerate each layer as necessary to provide optimum content. Compact each layer to required percentages of maximum dry density or relative dry density for each area classification.
3. Do not perform compaction operations on excessively wetted soils.

3.06 Sub-grade Geo-textiles:

A. Inspection: Prior to commencing installation of Sub-grade Geo-textiles, secure the approval of the Engineer that sub-grades and trenches have been cut and/or filled and compacted to the requirements of the Contract.

B. General:

1. This specification refers to the structural geo-grid and woven geotextile materials collectively as “the geo-textiles”.
2. Install structural geogrid on the approved sub-grade as indicated, and the woven geo-textile immediately on the approved structural geogrid.
3. Install all geo-textiles without wrinkles, folds, or excessive tension. Anchor ends and long runs with inert weights such as tires, sand bags, or precast concrete blocks. Do not anchor fabric with soil unless explicitly approved by the Engineer.
4. Place geo-textiles five feet beyond the horizontal layout indicated to allow placement of specified covering materials to the design layout limit. Cut and remove excess following placement of those materials.

C. Definitions:

1. Course(s): Completed installation of fabric across the latitudinal width of the finished surface.
2. Longitudinal Seam(s): Seams created which run in the longest parallel axis of the finished field surface, within a single installed course of fabric.
3. Transverse Seam(s): Seams running across the east-west width of the finished field surface, between courses.

D. Install Geo-textile as follows;

1. Install individual courses of fabric across the width of the field sub-grade and adjacent areas identified as receiving geotextile.
2. Begin at area of the lowest Synthetic Turf Base Aggregate sub-grade elevation.
3. Lay fabric smooth over the full contour of the cross-section, including trenches, without wrinkles, folds, or excessive tension.
4. Install fabric with no more than one longitudinal seam per course. Overlap fabric a minimum of 36” at each longitudinal seam. Offset longitudinal seams in adjacent courses of fabric a minimum of 50’. Install the fabric of the upslope side of each longitudinal seam above that of the down-slope side.
5. There shall be no longitudinal seams within 20’ of any trench or abrupt change in grade.

6. Overlap adjacent courses of fabric 18” (transverse seam). Run the upslope course 18” over the down slope course.
7. Install two initial courses of fabric for the Engineer’s inspection and approval prior to continuing fabric installation.

3.07 Cinder Placement:

A. General:

1. The cinder surface shall produce a uniform density and thickness to meet a tolerance of one-eighth inch (1/8") in ten feet (10') measured in any direction.
2. Check with straight edge and laser level to achieve elevations and gradients indicated on the plans and in this specification.
3. The finish cinder surface shall be properly graded, compacted to 95 % of standard proctor.

B. Placement of Cinder: Place 2” cinder and compacted to 95 percent density. Spread material over entire surface. Blade to an even smooth grade, then compact the material by rolling over the entire surface twice in each direction (perpendicularly) with a roller weighing approximately 600 pounds per roll. Achieve finished surface within 1/8” in 10’ of grades indicated. Note: Significant shrinkage occurs during compacting of the material. Add material as necessary to achieve designated finish stabilized grade.

C. Moisture Control:

1. Where sub-grade or lift of soil material must be moisture conditioned before compaction, uniformly apply water to surface of sub-grade, or layer of soil material, to prevent free water appearing on surface during or subsequent to compaction operations.
2. Before compaction, moisten or aerate each layer as necessary to provide optimum content. Compact each layer to required percentages of maximum dry density or relative dry density for each area classification.
3. Do not perform compaction operations on excessively wetted soils.

3.08 Disposal of Excess and Waste Materials: Remove from the Owner's property, all waste materials, including unacceptable excavated material, trash and debris, and dispose of it off site in a legal and timely manner. Provide dump receipts from an approved dumpsite if directed.

END OF SECTION