Section 207 of the Standard Specifications is hereby deleted for this project and replaced with the following:

**DESCRIPTION**

**207.01** This work consists of excavating topsoil from onsite locations, stockpiling, maintaining, and preparing the subsoils for the placement of the topsoil at locations shown on the plans. It also includes creating seeding media by amending subsoils, and importing offsite topsoil or subsoil when shown on the plans.

Substitutions from this specification will not be allowed unless submitted in writing to the Engineer and approved by the Region or Headquarters Landscape Architect.

**MATERIALS**

**207.02 General.** Topsoil shall be salvaged onsite, imported, or produced as shown on the plans. Topsoil shall be free of refuse and litter along with noxious weed seed and reproductive plant parts, as listed in current State of Colorado A and B Noxious Weed List and local agency weed lists. Topsoil shall not include heavy clay, hard clods, toxic substances, pathogens, or other material which would be detrimental to growing native vegetation. If included on the plans, the Contractor shall conform to the Noxious Weed Management Plan in accordance with Section 217. All required amendments shall be thoroughly incorporated to parent material, onsite. All amendments shall conform to Section 212. Topsoil and parent material shall be free of clods, sticks, stones, debris, concrete, and asphalt in excess of 4 inches in any dimension for all material used within the designed clear zone for the project. Topsoil outside of the clear zone may contain rock larger than 4 inches in any dimension.

Topsoil shall be generated from one or more of the following as shown on the plans:

1. *Topsoil (Onsite).* Topsoil shall consist of the upper 6 inch layer of the A horizon, as defined by the Soil Science Society of America, or at the depths and locations shown on the Stormwater Management Plan (SWMP). It shall consist of loose friable soil, salvaged from onsite and stockpiled or windrowed within two working days of clearing and grubbing the vegetation.
2. *Topsoil (Wetland).* Wetland topsoil shall consist of moist, organic soil obtained from delineated wetlands, including any existing wetland vegetation and seeds. Wetland topsoil shall be extracted from the project site at locations shown on the plans or as directed, to a depth of 12 inches.
3. *Subsoil.* Subsoil shall consist of soil obtained from the B and C horizons, as defined by the Soil Science Society of America, excavated from Contractor selected locations, and shall meet the requirements of Table 207-1. The Contractor shall provide a Certified Test Report (CTR) in accordance with subsection 106.13, excluding lot, heat, and batch confirming that the subsoil conforms to Table 207-1.
4. *Topsoil (Offsite).* The Contractor shall submit a CTR for Topsoil (Offsite) for approval a minimum of 60 days prior to import in accordance with subsection 106.13. The Contractor shall include with the CTR a complete Soil Nutrient Analysis for the properties listed in Table 207-1 and Table 207-2 from an independent laboratory that participates in the National Association for Proficiency Testing (NAPT). If topsoil nutrient analysis is deficient, an Amendment Protocol shall be submitted by the Contractor for approval. The Amendment Protocol shall contain a complete list of amendments and associated quantities to produce topsoil that conforms to Table 207-2.

The Contractor shall submit a Certificate of Compliance (COC) for Topsoil (Offsite) for approval a minimum of 60 days prior to import that the source has controlled noxious weeds in accordance with the State of Colorado Noxious Weed Act 35-5.5-115.

**Table 207-1
PHYSICAL PROPERTIES OF BASE MATERIAL**

|  |  |  |
| --- | --- | --- |
| **Property** | **Range** | **Test** |
| Soil Ph (s.u.) | 5.6 - 8.8 | ASA Mono. #9, Part 2, Method 10-3.2 |
| Soil Electrical Conductivity (EC) (ds/m) | 0 - 8.0 | ASA Mono. #9, Part 2, Method 10-3.3 |
| Soil SAR (s.u.) | 0 - 10 | ASA Mono. #9, Part 2, Method 10-3.4 |
| Rock Content (%) | < 25  | USDA NRCS RockFragment Modifier Usage |
| Trace Contaminants (Arsenic, Cadmium, Copper, Mercury, Selenium, Zinc, Nickel, and Lead) | In accordance withTest Methods for the Examination of Composting and Compost (TMECC) 3745-560-130  | TMECC 04.06 or EPA6020/ASA (American Society of Agronomy) |
| Rock Content (%) greater than 3” diameter | < 25 | USDA NRCS RockFragment Modifier Usage |
| USDA Soil Texture | No more than 70% clay, silt, and sand by percentage volume of topsoil. | ASA Monograph #9, Part 1, Method 15-4orASA 1 43-5 |

Amendments to the base imported material shall have the quantities of material verified onsite prior to incorporation into parent material, either at the stockpiles or after placement of parent material. Topsoil amended at the stockpiles shall be distributed to the site within seven days.

**Table 207-2
TOPSOIL PROPERTIES**

|  |  |  |
| --- | --- | --- |
| **Property** | **Range** | **Test Methods** |
| Soil pH (s.u) | 5.6 - 8.0 | ASA Mono. #9, Part 2, Method 10-3.2 |
| Salt by Electrical Conductivity (EC) (mmhos/cm) | Max 1.60 | ASA Mono. #9, Part 2, Method 10-3.3 |
| Soil SAR (s.u.) | 0 - 10 | ASA Mono. #9, Part 2, Method 10-3.4 |
| Soil OM (%) | 3 - 5 | Methods of Soil Analysis, Part 3, Method 34 |
| Soil N (NO3-n, ppm) | > 20.0 | Methods of Soil Analysis, Part 3. Chemical Methods. Ch. 38 Nitrogen – Inorganic Forms |
| Soil P (ppm) | > 13.0 | ASA Mono. #9, Part 2, Method 24-5.4 or others as required based on soil pH |
| Soil K (ppm) | > 80 | ASA Mono. #9, Part 2, Method 13-3.5 |
| Rock Content (%) greater than 3” diameter | < 25 | USDA NRCS RockFragment Modifier Usage |
| Bioassay (% seedling emergence and relative vigor) | > 80 | TMECC 05.05-A or Approved Germination Test |
| Soil Texture  | No more than 70% clay, silt and sand by percentage volume of topsoil | ASA Mono. #9, Part 1, Method 15-4 |
| Physical contaminants (man-made inerts) (%) | < 1 | TMECC 03.08-C  |
| Trace Contaminants (Arsenic, Cadmium, Copper, Mercury, Selenium, Zinc, Nickel, and Lead)  | In accordance with TMECC 3745-560-130  | TMECC 04.06 or EPA6020/ASA |

The Contractor shall utilize a rod penetrometer for determining subgrade soil preparation and determining looseness of soil after ripping. The penetrometer shall have a psi pressure gage, and shall meet the following requirements:

1. Steel rod with a minimum diameter of ½ inch with graduations (tick marks) every 6 inches.
2. The rod shall be made of stainless steel or other metal which will not bend when weight is applied.
3. The end of the rod shall have a 30-degree cone tip.
4. The diameter of the cone at its tip shall be no more than 0.1 inch.
5. The top of the rod shall be a T-handled configuration.

**CONSTRUCTION REQUIREMENTS**

**207.03 Site Pre-vegetation Conference.** Prior to the start of Subgrade Soil Preparation, the Contractor shall request a Site Pre-vegetation Conference. The Engineer will set up the conference and will include: the Engineer or designated representative, the Superintendent or designated representative, the sub-contractor(s) performing the subgrade soil preparation and soil amendments, and the CDOT Landscape Architect representing the Region.

The Agenda of the Pre-vegetation Conference can be found in Appendix A of the Construction Manual and includes the following:

1. Final review of the Topsoil (Offsite) Amendment Protocol
2. Review of the Method Statement detailing the equipment which will be used for the subgrade soil preparation operations
3. Review of rod penetrometer which will be used to determine subgrade soil preparation of topsoil
4. Permanent Stabilization Phasing Plan (identify strategies and site management measures to protect decompacted, topsoil amended, seeded, and blanketed areas from foot, vehicle loads, and other disturbances).
5. Seeding. See subsection 212.03 for submittal requirements.
6. Meeting attendee sign-in log

**207.04 Topsoil Stockpiling.** Stockpiles of topsoil shall be created as shown on the plans or as approved by the Engineer. Stockpiles shall not be located in areas that will damage existing vegetation or trees that are not scheduled to be removed, areas critical to the project completion, or areas having historic or environmental significance. All Stockpiles of topsoil which are scheduled to remain in place for 14 days or more shall receive interim stabilization in accordance with subsection 208.04. If included on the plans, stockpiles shall be treated with herbicide, in accordance with Section 217, or as directed. All topsoil stockpiles shall be identified using white pin flags with “TOPSOIL” printed in black letters and shall have their locations shown on the SWMP Plans. Each individual stockpile shall require at least one flag, and one additional flag for each 10 cubic yards of salvaged topsoil.

Wetland stockpiles shall not be treated with herbicide. Weeds shall be hand pulled.

Wetland topsoil shall be placed within 24 hours from excavation, unless otherwise approved. Stockpiled wetland topsoil shall not be stockpiled for more than six months.

Topsoil may be placed in stockpiles or windrowed at the edge of the disturbance. Windrowed topsoil shall not be used as perimeter erosion control or extensively compacted. When topsoil is windrowed, all stockpile requirements still apply.

**207.05 Subgrade Soil Preparation.** Before placement of topsoil, the subgrade shall be ripped to a depth of 18 inches. Subgrade shall be mostly dry and friable. Subgrade shall crumble without sticking together, yet not be so dry and hard that it does not break apart easily.

Underground utilities shall be located prior to soil preparation.

Subgrade soil preparation equipment shall meet the requirements for either winged tip or parabolic shanks. Operation shall be performed to fracture the soil uniformly without lifting or furrowing the surface excessively. The Contractor shall submit a method statement at the Site Pre-vegetation Conference detailing the equipment proposed for subgrade soil prepartation.

1. Winged tip shanks (dozer equipment) shall be a minimum of 6 inches wide and have 2 inches of vertical profile change on the blade with a 40 - 60 degree sweep angle.
2. Parabolic shanks (agriculture design) shall be full parabolic, a minimum of 2 inches in width.

The Contractor shall calibrate the subgrade soil preparation equipment using a minimum 30 linear feet of the initial pass. The Contractor shall utilize the rod penetrometer to verify that that de-compaction was successfully done. The Contractor shall take measurements every 6 inches across a transect perpendicular to the direction of the tractor and spanning the width of the subgrade soil preparation. Depths of penetration shall confirm that a minimum of 12 inches can be achieved when maximum 30 pounds of pressure (approximately 300 psi at the tip of the rod) is applied to the T-handle of a rod penetrometer.

Existing subgrade shall be de-compacted to a depth of 18 inches. If multiple passes are needed, the subsequent passes shall be positioned so that the ripping equipment (subsoilers) from the previous pass are split by the subsequent pass. Following ripping, the Contractor shall remove all sticks, stones, debris, clods, and all other substances greater than 6 inches in diameter. The Contractor shall restrict motorized vehicle and foot traffic from passing over the ripped area since this would recompact the areas that received subgrade soil preparation.

The first 4 feet from the edge of pavement shall be ripped to a depth of 6 inches. If the project is going to use aggregate base course or recycled asphalt as a shouldering technique, those areas will not require subgrade soil preparation. Depth of soil ripping for the subgrade soil preparation shall be checked with the rod penetrometer.

The Contractor shall verify adequate de-compaction of the entire area to have topsoil placed using a rod penetrometer in the presence of the Engineer. Tests shall be performed at a minimum of ten random locations for each acre as selected by the Engineer. The test shall verify a depth of 12 inches of penetration into the soil can be achieved when maximum 30 pounds of pressure (approximately 300 psi at the tip of the rod) is applied to the T-handle of the rod. If this depth cannot be achieved for 80 percent of the penetrations, the Contractor shall re-rip the area at no additional cost to the Department.

**207.06 Placement of Topsoil.** Topsoil shall be placed at the locations shown on the plans to a thickness of 6 inches, without creating a compacted surface by the use of harrows, bulldozers, or other approved low ground pressure (less than 4 psi ground pressure) equipment.

The final grade shall be free of all materials greater than 4 inches in diameter within the designed clear zone for the project. Equipment not required for revegetation work will not be permitted in the areas of placed topsoil.

Soil amendments, seedbed preparation, and permanent stabilization mulching shall be accomplished within four working days of placing the topsoil on the de-compacted civil subgrades. If placed topsoil is not mulched with permanent stabilization mulch within four working days, the Contractor shall complete interim stabilization methods in accordance with subsection 208.04(e), at no additional cost to the Department.

**METHOD OF MEASUREMENT**

**207.07** Topsoil material will be measured by the actual number of cubic yards of topsoil placed and accepted.

Subgrade soil preparation will be measured by the square yards of subgrade which is ripped and accepted for adequate de-compaction.

**BASIS OF PAYMENT**

**207.08** The accepted quantities measured will be paid for at the Contract unit price for each of the pay items listed below that appear in the bid schedule.

Payment will be made under:

**Pay Item** **Pay Unit**

Topsoil (Onsite) Cubic Yard

Subsoil Cubic Yard

Topsoil (Offsite) Cubic Yard

Topsoil (Wetland) Cubic Yard

Subgrade Soil Preparation Square Yard

Amendments for Topsoil (Onsite) and Subsoil will be measured and paid for in accordance with Section 212.

Amendments for Topsoil (Offsite) will not be measured and paid for separately, but shall be included in the work.

Noxious Weed Management will be measured and paid for in accordance with Section 217.

Stockpiling or windrowing of topsoil and subsoil will not be measured and paid for separately, but shall be included in the work.

Testing of Subsoil and Topsoil (Onsite) will not be measured and paid for separately but shall be included in the work.

Rod penetrometer and associated verification testing of random locations will not be measured and paid for separately, but shall be included in the work.

The Site Pre-vegetation Conference will not be paid for separately, but shall be included in the work.

Additional passes with the ripping equipment to achieve the desired de-compaction will not be measured and paid for separately, but shall be included in the work.

Removing of clods, sticks, stones, debris, concrete, and asphalt in excess of 4 inches in any dimension for all material used within the designed clear zone for the project will not be measured and paid for separely, but shall be included in the work.