Section 816. TURF ESTABLISHMENT

816.01 Description. Furnish and place topsoil and/or compost, fertilizer, seed, sod, mulch, turf mulch blankets, mulch anchor, net for mulch, water, and weed control. Construct according to state and federal guidelines including but not limited to The MDOT Erosion and Sedimentation Control Plan and the National Pollution Discharge Elimination System (NPDES).

Mulch Anchor. A glue type material sprayed over mulch to hold it in place. Tackifiers, mulch tackifier, adhesives, mulch adhesive, binders and mulch binder are all terms that are sometimes used to refer to mulch anchor pay item materials.

Broadleaf Weed. Those weeds described by the Engineer that are to be the target weeds controlled by spraying. Examples of broadleaf weeds include, but are not limited to the following: dandelion, dock, clovers, bindweed, thistles, ragweed, lambsquarter and wild carrot.

Compost. A mature/stabilized, humus-like material derived from the aerobic decomposition of yard clippings, leaves and brush materials less than four inches in diameter.

Dormant Seeding. Seeding done in late November and December when plant growth has ended for the season. The seed is placed on unfrozen ground and mulched to lie dormant over winter and germinate the following spring.

Friable. Friable soil is easily crumbled or pulverized.

Friable Condition. A soil in a “friable condition” is a surface that is in a crumbled, pulverized, worked-up, loosened, or cultivated state, free of lumps and clods detrimental to seeding and sodding operations.

Humus. A brown or black material formed by the decomposition of vegetable or animal matter, the organic portion of soil essential to the fertility of the earth.

Hydroseeding. Spraying seed combined with water onto the prepared seed bed. Use a spray solution free of mulch.

Mulch. A material placed over seeding to improve the germination of seed by conserving moisture, moderating the soil temperature, and protecting the seed and soil from water and wind erosion.
816.01

Peat. Organic matter consisting of undecomposed or slightly decomposed plant material accumulated under conditions of excessive moisture. If the organic remains are sufficiently fresh to identify plant form, it is considered peat; if decomposition has gone as far as to make recognition of the plant form impossible, it is muck.

Target Weed. Weeds that the Engineer has identified for removal either by spraying or other methods.

816.02 Materials. Use materials meeting the following.

Compost .................................................. 917
Topsoil .................................................. 917
Fertilizer .................................................. 917
Seed ..................................................... 917
Sod ....................................................... 917
Mulch ..................................................... 917
Mulch Anchoring ......................................... 917
Mulch Netting ........................................... 917
Mulch Blankets ......................................... 917
Weed Control ............................................ 917
Water ..................................................... 911

816.03 Construction.

A. Topsoiling. Prepare the foundation, furnish, place, and spread humus bearing topsoil and/or compost. Use topsoil either from within the grading limits or from off-site sources. Supply compost from a source listed on the Qualified Product List.

1. Preparation of Earth Bed. Seven to ten days before preparing earth bed, spray and kill all existing vegetation with Glyphosate (non-selective herbicide), including areas previously mulched or rye seeded for temporary erosion control. Bring the earth bed to the required grade and trim. Just before placing topsoil or compost, harrow all earth beds, including areas previously mulched or rye seeded for temporary erosion control. Harrow into a friable condition with a disk, a spring tooth drag or a spike tooth drag a minimum of three inches deep. All soil impressions left by equipment used to complete this work must be horizontal across the face of the slope.

2. Placing Topsoil. Cover all areas to be seeded or sodded with topsoil and/or compost. However, topsoil placement is not required on slopes constructed of topsoil, muck or peat.
Spread topsoil and/or compost on the prepared areas at least three inches deep. Pulverize all large clods and lumps. Rake out rocks more than two inches in diameter, roots, litter and all foreign matter. Dispose of this material according to subsections 205.03.A.3 and 205.03.P.

Incorporate all topsoil and/or compost placed on the conditioned earth bed into the upper two inches of the earth bed. Do not work topsoil and/or compost when wet.

3. **Surplus Excavated Topsoil or Salvaged Topsoil.** The Engineer will direct the stockpiling of surplus topsoil or salvaged topsoil within the right of way. Leave the stockpile with an aesthetically pleasing appearance.

B. **Chemical Fertilizer Nutrient.** Furnish and place fertilizer on the areas required. In areas to be sodded, uniformly apply granular fertilizer before sod is laid. Uniformly apply granular fertilizer on the prepared seed/sod bed and incorporate into the upper 1 to 2 inches of the topsoil and/or compost by light disk ing or harrowing. Apply granular fertilizer free from lumps.

Constantly agitate fertilizer applied by the hydroseeding method. Do not disk or harrow after placing. Apply fertilizer mixed with seed within one hour after mixing.

1. **Class A.** Evenly apply 228 pounds of chemical fertilizer nutrient per acre of prepared seed bed.

2. **Class B.** Evenly apply 120 pounds of chemical fertilizer nutrient per acre of prepared seed bed.

3. **Class C.** Evenly apply 80 pounds of chemical fertilizer nutrient per acre of established turf.

C. **Seeding.** Prepare the seed bed, furnish and sow the specified mixture of seed. Select seed for each species from the Qualified Products List. Sow seed after topsoil has been placed according to subsection 816.03.A and approved by the Engineer. Do not broadcast or hydroseed during windy conditions or conditions that would prevent the proper placing of the seed. See Tables 816-1 and 816-2 for turf and specialty seed mixtures and rate of seeding.
1. Permanent Seeding.

a. **Sowing.** Sow the seed following or in conjunction with fertilizing while the seed bed is in a friable condition. Just before seeding, harrow the topsoil and/or compost 3 inches deep or more. Harrow with a disk, a spring tooth drag, a spike tooth drag, or other equipment designed to prepare the soil to a friable condition and meeting the approval of the Engineer. Harrow horizontally across the face of the slope. Areas where seed mixture Turf Loamy to Heavy (THM) is specified, grade the seed bed to a Class A slope as specified in subsection 205.03.N.

Sow seed before applying mulch. Sow or resow the seed mixture, providing uniform coverage, at the rate specified in Tables 816-1 and 816-2. Sow with either mechanical drills, hydroteers, or by broadcasting. Seed areas with 1:4 slopes or flatter with mechanical drills. Hydroseeding may be used on slopes steeper than 1:4. The Engineer will determine the effectiveness of the seeding equipment. Empty the hydroseeder tank within one hour of adding the seed and fertilizer. Dispose of seed that remains mixed with the water for longer than one hour. Broadcast in areas to be resown or in areas that are unaccessible to a drill or hydroseeder.

The Engineer will visually inspect areas sown by broadcast or hydroseed for uniformity of application. Resow areas that do not have an average of two seeds per square inch. All costs associated with this reseeding will be borne by the Contractor.

b. **Setting the Seed.** Lightly compact or rake areas sown by hydroseed or broadcast methods to incorporate the seed into the uppermost $\frac{1}{2}$ inch of the topsoil surface. Immediately after setting the seed, mulch according to subsections 816.03.E and 816.03.F.

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**Table 816-1 General Roadside Seed Mix Selection Guide**

<table>
<thead>
<tr>
<th>Symbol for Turf Seed Mixture</th>
<th>Soil Type</th>
<th>General Location</th>
<th>Seeding Rate</th>
<th>Salt Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>TDS (Turf Dry Sandy)</td>
<td>Dry sandy to sand loam</td>
<td>Rural or urban</td>
<td>220 lb/acre</td>
<td>Low to medium</td>
</tr>
<tr>
<td>THV (Turf Heavy Soil)</td>
<td>Heavy</td>
<td>Rural</td>
<td>220 lb/acre</td>
<td>Medium to high</td>
</tr>
<tr>
<td>TUF (Turf Urban Freeway)</td>
<td>All types</td>
<td>Urban freeways, bvlvs., service roads, city streets</td>
<td>220 lb/acre</td>
<td>Low to high</td>
</tr>
<tr>
<td>TGM (Turf Medium to Heavy Soil)</td>
<td>Medium to heavy</td>
<td>All</td>
<td>220 lb/acre</td>
<td>Low</td>
</tr>
<tr>
<td>THM (Turf Loamy to Heavy)</td>
<td>Loamy to heavy</td>
<td>Residential and business turf</td>
<td>220 lb/acre</td>
<td>Low to medium</td>
</tr>
</tbody>
</table>
### Table 816-2 Specialty Seed Mix Selection Guide

<table>
<thead>
<tr>
<th>Symbol for Seed Mixture</th>
<th>Soil Type</th>
<th>General Location</th>
<th>Seeding Rate</th>
<th>Salt Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mixture for Upland Areas</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ES (Environmental Seeding)</td>
<td>All</td>
<td>Upland areas</td>
<td>110 lb/acre</td>
<td>—</td>
</tr>
<tr>
<td><strong>Temporary Seeding Mixtures</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CR (Cereal Rye, less than 6 mos.)</td>
<td>All</td>
<td>All</td>
<td>70 lb/acre</td>
<td>—</td>
</tr>
<tr>
<td>TSM 6/24 (Temporary seeding, 6–24 mos.)</td>
<td>All</td>
<td>All</td>
<td>100 lb/acre</td>
<td>—</td>
</tr>
<tr>
<td>TSM 24+ (Temporary seeding, 24+ mos.)</td>
<td>All</td>
<td>All</td>
<td>200 lb/acre</td>
<td>—</td>
</tr>
</tbody>
</table>

2. **Temporary Seeding.** Place temporary seed only for erosion control or temporary soil stabilization. Do not temporarily seed slopes 1:3 or steeper after top-soiling; permanently seed these slopes. Secure the Engineer’s approval for all temporary seeding. Sow temporary seed according to subsection 816.03.C.1. Before contract completion, replace temporary seeding by permanent seeding as called for on the plans or as directed by the Engineer.

3. **Dormant Seeding.** Dormant seeding will be permitted only in limited areas to complete a project. Dormant seed according to the requirements for permanent seeding. Secure the Engineer’s approval for all dormant seeding.

4. **Seasonal Limitations.**
   a. **Permanent Seeding.** Seed only during the following periods.
      - **Southern Lower Peninsula.** South of the north boundary of Township 20 North; April 15 through October 10.
      - **Northern Lower Peninsula.** North of the north boundary of Township 20 North; May 1 through October 1.
      - **Upper Peninsula.** May 1 through September 20.
   b. **Dormant Seeding.** Dormant seed only during the following periods:
      - **Southern Lower Peninsula.** South of the north boundary of Township 20 North; after November 15 but not on frozen ground.
Upper Peninsula and Northern Lower Peninsula. North of the north boundary of Township 20 North; after November 1, but not on frozen ground.

c. Temporary Seeding. Follow the same seasonal limitations as for permanent and dormant seeding.

5. Inspection. The Engineer will inspect the seeded turf to ensure that the end product is well established, weed free, in a growing and vigorous condition, and contains the species called for in the seeding mixture.

If the Engineer requires weed control, complete this work according to Subsection 816.03.J. If hay mulch is used, the Engineer will not pay for weed control.

D. Sodding. Prepare the topsoil surface, furnish and place the sod, and dispose of all surplus material. Grade areas to be sodded to Class A slopes according to subsection 205.03.N.

Just before laying sod, harrow the topsoil a minimum of 3 inches deep with a disk, spring tooth drag, spike tooth drag or other equipment designed to condition the soil. Secure the Engineer’s approval of harrowing equipment. Harrow horizontally across the face of the slope.

Thoroughly water the earth bed before laying the sod and water the sod immediately after it is laid according to subsection 816.03.I. Sod which has been allowed to dry out at any time will be rejected. Lay sod within 24 hours after cutting and properly protect until placed. Do not handle sod with pitch forks nor dump from vehicles. Do not place frozen sod, nor place sod on frozen soil. Do not place sod in the months of June, July or August unless approved by the Engineer.

Place sod according to Standard Plan R-100 Series. Stagger the short ends of the sod strips and lay parallel to the flow of water on slopes and in ditches. Place strips with tight joints. Lay sod starting at the base of the slope and working upward. Turn edges of sodded areas into the ground and cover with a layer of earth or shoulder material. Thoroughly compact this material to allow the surface water to flow over the edge of the sod. Butt the edges of sod firmly against, and level with, paved surfaces.

When the sod may be displaced during sodding operation, work from ladders or tressed planks. Firmly compact sod by tamping immediately after it is placed. Tamp to a smooth, even surface free from bumps.
and depressions. Where Class A slopes are specified, finish the surface to a lawn-like appearance. On slopes steeper than 1:3, peg the sod with wooden pegs. Space pegs not more than 2 feet apart in any direction and drive flush with the surface of the sod.

E. **Mulching.** Furnish, spread and anchor mulch materials. Place mulch on a given area within one day after seeding.

Do not mulch during winds that prevent proper placing and anchoring of the mulch.

Place mulch loose or open enough to allow some sunlight to penetrate and air to circulate, but thick enough to shade the ground, conserve soil moisture, and prevent or reduce water or wind erosion.

Maintain the mulched areas and repair all areas damaged by erosion, traffic, fire or other causes before final or partial acceptance. Replace mulch that is displaced. Except as provided by subsection 107.11 or section 208, all costs associated with this repair or replacement work will be borne by the Contractor.

Spread mulch over the surface to a uniform thickness at 2 tons per acre. However, where dormant seeding has been permitted, place the mulch at 3 tons per acre. When hay mulch is permitted according to subsection 917.15.A, apply at 1.5 times the rate required for straw mulch. After seed germinates and turf is established, apply herbicide according to subsection 816.03.J to control weeds. All costs associated with herbicide application to hay mulched areas will be borne by the Contractor.

F. **Mulch Anchoring.** Select mulch anchoring materials (tackifier) from the Qualified Products List. Spray mulch anchoring immediately after mulch is placed. Do not spray when wind would prevent the proper placement of adhesive. Protect all traffic, signs, structures, and other objects from being marked or disfigured by the tackifier material. Immediately remove overspray. Apply tackifiers at the following minimum rates per acre:

1. **Latex-Base.** Mix 15 gallons of adhesive, or the manufacturers recommended rate whichever is greater, with a minimum of 250 pounds of recycled newsprint and 375 gallons of water.

2. **Recycled Newprint.** Mix 750 pounds of recycled newsprint with 1500 gallons of water.
3. **Wood Fiber.** Mix 750 pounds of wood fiber with 1500 gallons of water.

4. **Guar gum.** Mix 50 pounds of dry adhesive and a minimum of 250 pounds of recycled newsprint with 1300 gallons of water.

5. **Other Tackifiers.** Mix 100 pounds of dry adhesive, or the manufacturer’s recommended rate which ever is greater, and a minimum of 250 pounds of recycled newsprint with 1300 gallons of water.

G. **Mulching Netting.** Place netting over mulch and secure with net anchors, staples, or pins.

Spread the net over the mulch so that a worker can walk between adjacent widths of net. Pull the edges of adjacent widths of net together and hold in place with net anchors. Space net anchors not more than 2.5 feet apart along the edges, joints, and centerline of the net according to the manufacturer’s recommendation. Do not place the net in direct contact with the ground. Butt the ends of each width of net together and hold in place by net anchors at each corner and at the center of the net.

Do not permit traffic over the net after it is placed, except to repair it. Replace torn or damaged net with undamaged material.

H. **Mulch Blankets.** Furnish, install and anchor blankets. Select mulch blankets from the Qualified Product List. Place mulch blankets within one day after seeding. Overlap blanket side edges two inches. Shingle lap blanket ends 6 inches. Place staples or pegs along all joint edges and along blanket centerlines at a maximum spacing of two feet. However, in waterways shingle lap blankets with an overlap of 12 inches on the downslope edge. Place blankets on backslopes at right angles to the roadbed. On foreslopes, lay the first strip adjacent to the road parallel to the road, with the remainder of the strips placed either parallel or at right angles to the road. When blankets are installed from the top of the slope, do not allow them to free fall down the slope.

Use net anchors (pins or staples) according to subsection 917.13.D.2.

Place and anchor blankets according to the manufacturer’s directions if those requirements are greater than these minimum requirements.
1. **High Velocity Blankets.** Use high velocity blankets on slopes 1:2 or steeper and on ditch bottoms (12 inches up the slope). High velocity blankets may be substituted for mulch blankets at no increase of cost.

2. **Mulch Blankets.** Use Mulch blankets on slopes flatter than 1:2, next to shoulders and behind curbs. Place mulch blankets with the netting on top and mulch fibers in contact with the soil. These blankets may only be used on ditch bottoms with slopes up to 1.5 percent.

I. **Water.** Furnish and apply water at the following rates. Use a minimum of 27 gallons of water to establish each square yard of sod. Thoroughly water the earth bed with a minimum of 3.5 gallons per square yard before laying the sod. Within eight hours after the sod has been placed, spray 6 gallons of water per square yard; apply 3.5 gallons per square yard five additional times at three to four day intervals. The Engineer may require additional applications based on the season and weather conditions.

Water seeded areas, at 3.5 gallons per square yard when required. Continue watering regularly so that seed/seedlings do not dry out.

J. **Weed Control.** Weed control will be as directed by the Engineer. Have a commercial herbicide applicator, licensed in the State of Michigan and certified by the Michigan Department of Agriculture in the appropriate category, apply herbicides. Use application procedures and materials according to federal, state and local regulations.

Spray target weeds in the newly seeded turf when the new turfgrass is sufficiently established to withstand a herbicide application.

Furnish and apply herbicide(s) when directed by the Engineer. Select the herbicide(s) and the rate at which it will be used. Secure the Engineer’s approval for the work and the herbicide(s) before application of the material.

Before spraying, the Engineer will inspect and approve the spraying equipment. Show that the equipment and operators can apply an even and controlled application within the specified target area. Use equipment meeting all federal, state and local safety requirements.

Control target weeds within 14-21 days after spraying. Apply additional weed control if the first application was not successful. Preserve and protect all property next to the roadway from injury. Repair all damages arising from any act or omission in the performance of the work. All
costs associated with this additional application or repair will be borne by the Contractor.

**816.04 Measurement and Payment.**

<table>
<thead>
<tr>
<th>Contract Item (Pay Item)</th>
<th>Pay Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compost Surface, Furn, LM</td>
<td>Cubic Yard</td>
</tr>
<tr>
<td>Compost Surface, Furn, ___ inch</td>
<td>Square Yard</td>
</tr>
<tr>
<td>Topsoil Surface, Salv, LM</td>
<td>Cubic Yard</td>
</tr>
<tr>
<td>Topsoil Surface, Salv, ___ inch</td>
<td>Square Yard</td>
</tr>
<tr>
<td>Topsoil Surface, Furn, LM</td>
<td>Cubic Yard</td>
</tr>
<tr>
<td>Topsoil Surface, Furn, ___ inch</td>
<td>Square Yard</td>
</tr>
<tr>
<td>Fertilizer, Chemical Nutrient, Cl</td>
<td>Pound</td>
</tr>
<tr>
<td>Seeding, Mixture</td>
<td>Pound</td>
</tr>
<tr>
<td>Sodding</td>
<td>Square Yard</td>
</tr>
<tr>
<td>Mulch</td>
<td>Square Yard</td>
</tr>
<tr>
<td>Mulch Anchoring</td>
<td>Square Yard</td>
</tr>
<tr>
<td>Mulch Netting</td>
<td>Square Yard</td>
</tr>
<tr>
<td>Mulch Blanket</td>
<td>Square Yard</td>
</tr>
<tr>
<td>Mulch Blanket, High Velocity</td>
<td>Square Yard</td>
</tr>
<tr>
<td>Water, Sodding/Seeding</td>
<td>Unit</td>
</tr>
<tr>
<td>Weed Control</td>
<td>Acre</td>
</tr>
</tbody>
</table>

A. Compost.

1. **Compost Surface, Furn LM** will be measured loose and trucked onto the jobsite.

2. **Compost Surface, Furn** will be measured in place and trucked onto the jobsite.

B. Topsoil.

1. **Topsoil Surface, Salv, LM** will be measured loose measure.

2. **Topsoil Surface, Salv** will be measured in place.

3. **Topsoil Surface, Furn, LM** will be measured loose measure and trucked onto the jobsite.

4. **Topsoil Surface, Furn** will be measured in place and trucked onto the jobsite.
C. **Fertilizer, Chemical Nutrient, Cl** will be measured by pounds of chemical nutrient contained in the fertilizer applied. The following formula will be used to determine the weight of chemical fertilizer nutrient for payment: Total weight of fertilizer applied multiplied by the sum of percentages of nutrients contained in the fertilizer used equals the weight of chemical fertilizer nutrients.

D. **Sod. Sodding** will be measured in place.

E. **Mulching Materials.**

1. Payment for **Mulch** includes furnishing and spreading straw mulch or marsh hay mulch at the rate specified on the plans. There will be no adjustment of compensation when hay is permitted. When dormant seeding is allowed, **Mulch** will be paid for at 1.5 times the contract unit price bid for mulch. For straw mulch, marsh hay mulch or hay mulch when permitted, the Contractor must furnish the Engineer with tickets in triplicate at the time of delivery showing the number of bales in each load and weight of each load. The mulch must be weighed on scales according to subsections 104.01E and 109.01.G.

2. **Mulch Blanket High Velocity** will be either high velocity excelsior mulch blankets or high velocity straw mulch blankets and will be measured in place. Payment includes furnishing, placing, and anchoring the blankets.

3. **Mulch Blanket** will be either excelsior mulch blankets, straw mulch blankets, high velocity excelsior mulch blanket or a high velocity straw mulch blanket and will be measured in place. Payment includes furnishing, placing, and anchoring the blankets. **Mulch Blanket, High Velocity** that is substituted for **Mulch Blanket** will be paid for at the unit price bid for **Mulch Blanket**.

4. **Mulch Anchoring** will be measured in place. Payment for **Mulch Anchoring** includes furnishing and spraying the tackifier at the required rate over the mulched area. Any mulch that has blown away or displaced for any reason that is attributable to the Contractor’s failure to take proper precautions must be replaced and anchored as directed by the Engineer at the Contractor’s expense.
5. **Mulch Netting** will be measured in place. Payment for Mulch Netting includes furnishing, placing, and anchoring netting. When the Contractor elects to use the dormant seeding method mulch netting is required in addition to the mulch adhesive. Any additional costs incurred by the Contractor in electing to place dormant seeding will be borne by the Contractor.

F. **Water, Sodding/Seeding.** Water will be measured in 1000 gallon units.

G. **Weed Control** will be measured in place.

H. **Seeding, Mixture** will be measured, by weight, in pounds of seed applied.