804.1 GENERAL

The establishment of permanent vegetative growth on roadsides is an integral part of road construction and is an erosion control measure for both the short term (construction) and the long term (maintenance).

Seeding and cover is a two-stage operation where the seed and fertilizer are applied to the finished grade, followed by the application of a cover material. Seeding establishes a permanent vegetative growth for long-term erosion protection and right-of-way enhancement. The applied cover material protects the finished grade for the short term and provides a favourable environment for seed to germinate.

Seed and cover is applied to all bare earth areas within the right-of-way, earth stockpile areas, earth borrow sites, earth disposal areas and all areas where construction activities will destroy existing vegetation.

Areas excluded from seeding and cover include areas which will be protected by other means such as sodding, compost seeding, reforestation, tree and shrub planting, rip-rap, gravel sheeting or rock protection. The designer is encouraged to review these other sections of the CDED Manual for a description of the warrants for use and design requirements.

The warrants for use of seed and cover in this guide extend from flat earth areas up to and including 2:1 earth slopes. For earth slopes with gradients in excess of 2:1 it is strongly recommended that the designer employ specific design solutions for these areas rather than using a standard treatment. The specific design solution should take into account soils, degree of slope, length and height of slope, surface drainage, water table, slope orientation and other factors that may be relevant. There are a variety of design products and technologies available for extreme steep earth slope establishment that are not described herein.

The application of topsoil prior to seeding on all contracts in Southern Ontario is required. The application of topsoil on all contracts in Northern Ontario is strongly recommended.

804.2 SEEDING

There are seven seed mix options available to the designer; these are:
804.2.1 **Standard Roadside Mix**

The standard roadside seed mix is the time-tested standard MTO Seed Mix and is the default selection for most seeding situations encountered across the province.

804.2.2 **Crown Vetch Mix**

Crown Vetch is a legume and is primarily used to re-vegetate slope areas where erosion and soil fertility may be a problem. Crown Vetch produces a mass of purple flowers in season and is a vigorous ground cover requiring minimal maintenance. Hardiness range is limited to Southern Ontario.

804.2.3 **Birdsfoot Trefoil Mix**

Birdsfoot Trefoil is also a legume and is also used to re-vegetate slopes where erosion and soil fertility may be a problem. Birdsfoot Trefoil is not as vigorous as Crown Vetch and produces a mass of yellow flowers in season. It is hardier in the northern parts of the province than Crown Vetch.

804.2.4 **Salt Tolerant Mix**

The salt tolerant mix is a mixture of several turfgrasses with a higher resistance to salt. The mix should be specified in areas such as medians, shoulder strips and shoulder ditches where salt is known to be in higher concentrations in the soil.

804.2.5 **Lowland Mix**

The lowland mix contains a mix of various turfgrass species and a legume that perform well in low areas and areas adjacent to waterbodies where the water table is high and there is intermittent surface water.

804.2.6 **Acidic Soil Mix**

As the name suggests, this seed mix is designed for use in areas of low fertility, medium to high acidity. It is suitable for low fertility soils in the northern areas of the province.

804.2.7 **Old Field Mix**

This mix is used to provide an accelerated successional cover to a mature field condition, and uses native species of aster and goldenrod to comprise the majority of the mix. Old Field should be selected where there will be fallow areas left alone with little or no maintenance, no mowing and the area will be self-sustaining. It is more suitable in rural areas than urban or suburban situations.

The designer should specify the Standard Roadside Mix as the default seed mix unless the MTO Regional Environmental Planner or Consultant Environmental Planner or the Consultant Landscape Architect has recommended another prescriptive mix.
After the seed and fertilizer has been applied by hydraulic seeder/mulcher, a temporary cover material is placed to protect the earth areas from erosion until the vegetation grows and to protect the germinating seeds from damage.

There are three types of cover materials available for selection by the designer:

804.3.1 Hydraulic Mulch or Straw Mulch

Hydraulic Mulch/Straw Mulch cover application is the default cover selection for most seeding situations where:

- the soils are not identified as highly erodable,
- seeding will not be applied during temperature extremes and
- the earth slopes vary from flat up to, and including, a 3:1 gradient.

Hydraulic mulches are processed fibres of wood, straw, cotton, cellulose pulp, or any combination of these materials and are applied to the earth areas by a hydraulic seeder/mulcher through a truck-mounted nozzle gun.

Straw mulch consists of chopped straw applied to the seeded area via a straw mulch blower and coated with a tackifier to hold it together. A straw mulch application requires several pieces of equipment and several people working and operating the equipment. While the Contractor has the option of selecting either hydraulic mulch or straw mulch, in almost all instances, the Contractor will select the hydraulic mulch because of its ease of application and cost advantages.

Hydraulic mulch, when properly applied at the specified rate, produces a thin ‘skin’ that adheres to the earth surfaces and provides a basic level of short-term protection for the earth surface and the germinating seeds. It is not recommended for use when seeding will be applied in temperature or weather extremes, such as summer droughts or late-season seeding when some over-winter protection will be required. In these instances an alternative cover application of Bonded Fibre Matrix or Erosion Control Blanket is suggested. Alternately, the designer may select another method of establishing vegetation such as sodding, compost seeding, turf reinforcement mats, reforestation planting or tree and shrub planting to establish control of the earth surfaces.

804.3.2 Erosion Control Blanket

For potential erosion problems based on soils/slope information, and/or earth slopes where the slope gradient is steeper than 3:1 but not steeper than 2:1, the designer may select either Erosion Control Blanket (ECB) or Bonded Fibre Matrix (BFM) as an alternative cover.
Erosion Control Blankets (ECBs) are a family of products that are supplied in rolls, they are machine woven mats with a variety of materials sandwiched between the two woven layers. Materials can be wood, coco or cotton fibre, straw, or any combination depending upon manufacturer. ECBs are unrolled over the seeded earth area and stapled in place. ECBs also provide a superior level of erosion control and greater protection for germinating seedlings when compared to the standard hydraulic mulch cover.

OPSS 804 provides a generic description for the basic level of Erosion Control Blanket, which will suit the majority of application needs on MTO projects. If the designer needs to provide a higher level of erosion control, then a mid or high range proprietary ECB should be specified in the contract by non-standard special provision (NSSP).

804.3.3 Bonded Fibre Matrix

For potential erosion problems based on soils/slope information, and/or earth slopes where the slope gradient is steeper than 3:1 but not steeper than 2:1, the designer may select either Bonded Fibre Matrix (BFM) or Erosion Control Blanket (ECB) as an alternative cover.

Bonded Fibre Matrix is a 100% biodegradable product consisting of stranded wood fibres held together by organic or mineral bonding agents. When BFM is mixed with water, applied to earth surfaces and allowed to dry it forms a viscous material that creates a high strength, porous, and erosion-resistant uniform cohesive mat. This mat is applied at a higher product rate than hydraulic mulch and provides greater protection for the germinating seedlings and superior erosion protection than regular hydraulic mulch.

The main differences between Bonded Fibre Matrix and Erosion Control Blanket are the means by which they cover the earth area and the method of application. Cost is not normally a determining factor. In order to help the designer select the appropriate cover application, the following chart should be reviewed.

<table>
<thead>
<tr>
<th>Cover Application</th>
<th>Cover Characteristics</th>
<th>Cover Application</th>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydraulic Mulch</td>
<td>• Exceptionally thin ‘skin’ applied to earth surface. Sets up when dry to form a uniform cohesive mat</td>
<td>• Applied via hydraulic seeder/mulcher</td>
<td>• Fast, efficient application for flat earth areas and gentle earth slopes • Cheap</td>
<td>• Light application can compromise erosion control • Remote areas can be ignored due to truck-mounted application • Less successful in temp/weather extremes • Less successful on erodable soils/steep slopes</td>
</tr>
<tr>
<td>Cover Application</td>
<td>Cover Characteristics</td>
<td>Cover Application</td>
<td>Pros</td>
<td>Cons</td>
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<tr>
<td>Erosion Control Blanket</td>
<td>• Rolled mats have some depth, matting and texture and are secured into the soil with staples</td>
<td>• Area must be seeded first and then the ECBs are manually rolled and stapled in place</td>
<td>• Consistent depth, texture and matting provides a more conducive germinating environment for seedlings</td>
<td>• Improper placement or lack of fine grading can result in ‘tenting’ and possible erosion of soil beneath the ECB</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Many choices of blanket including photo and bio degradable</td>
<td>• Blanket needs to be anchored and dug in at top of slope</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Longer protection than default cover</td>
<td>• Labour intensive installation</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>• Lower chances of product failure than default cover</td>
<td></td>
</tr>
<tr>
<td>Bonded Fibre Matrix</td>
<td>• Relatively thin ‘skin’ applied to earth surface. Sets up when dry to form a uniform cohesive mat</td>
<td>• Applied via hydraulic seeder/mulcher</td>
<td>• Fast, efficient application</td>
<td>• Light application can compromise erosion control</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• When properly applied can resist moderate to severe weather events</td>
<td>• Heavy application can inhibit seed germination</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Longer protection than default</td>
<td>• Remote areas can be ignored due to truck-mounted application</td>
</tr>
</tbody>
</table>

804.4 SPECIFICATIONS

The requirements for the application of seed and cover are described in OPSS 804. There are no applicable Ministry special provisions (MTO SPs).

Specific changes to the product selection for cover materials will require a non-standard special provision (NSSP) to override the appropriate sections of OPSS 804.

804.5 STANDARD DRAWINGS

There are no OPS or Ministry standard drawings applicable to this work.

804.6 TENDER ITEMS

As there are so many possible combinations from seven seed mixes and three cover types, it was decided to restrict the number of tender items for this work to three.

The cover type determines the tender item to be used. There are three tender items associated with this work:
804.6.1 Seed and Mulch

This item includes surface preparation, seeding and fertilizer application and the appropriate cover application of hydraulic mulch or straw mulch, at the Contractor’s discretion.

804.6.2 Seed and Erosion Control Blanket

This item includes surface preparation, seeding and fertilizer application and the appropriate cover application of erosion control blanket.

804.6.3 Seed and Bonded Fibre Matrix

This item includes surface preparation, seeding and fertilizer application and the appropriate cover application of bonded fibre matrix.

804.7 COMPUTATION

All of these tender items are Plan Quantity Payment (PQP) items and are measured in square metres from the design cross sections or scaled from the contract drawings for each different specified type of permanent seed mix and each type of specified cover material. The area measure is determined by the slope measure and the distance of all earth areas covered, plus the required 300 mm overlap application.

The designer should not be overly restrictive when calculating earth areas that require seeding and cover treatment after construction. Construction activities usually exceed the planned ‘area of construction’ and most contracts usually require fairly extensive seeding of areas outside the theoretical limits of construction.

804.8 SOURCES OF INFORMATION

The main sources of information are the design cross sections, field investigations, the Geotechnical Engineer, Environmental Planner and/or Landscape Architect. Specific recommendations for alternative seed mixes and/or alternative cover materials should be obtained from professionals with training and experience in the fields of erosion and sediment control, civil engineering, biology, horticulture and/or landscape architecture.

804.9 DOCUMENTATION

All seeding and cover applications should be detailed by station to station location and offset position on a Miscellaneous 1 Quantity Sheet in a separate column for each different seed mix type and each different cover application type.
As the tender item is determined by the type of cover material, each column with the same cover material application is sub-totalled independently and then all of the column sub-totals with the same cover material application are added together to give a total tender quantity for that item in square metres. This total is then transferred to the tender document against the appropriate tender item.

In addition to the Quantity Sheet documentation, it is recommended that if various seed mix and cover type combinations are used on one contract, the designer should delineate the various seed mix and cover application types on the contract drawings by using symbols and a supplemental legend.

Stations and quantity entries are recorded to the nearest whole number in metres. Station offsets are recorded in 0.1 of a metre.