Slide notes

We will now discuss information to help you understand the 2008 Standard Specifications for soil and vegetation establishment. This training will cover several sections of the 2008 Standards and Specifications.
The Landscape Operations Division has many responsibilities during project design and construction. The Technical Resources Team of the Landscape Operations Division evaluates new products, writes landscape specifications, and reviews landscape plans during project design. The three Regional Teams of the Landscape Operations Division work closely with Project Engineers and Contractors during construction. Every construction project with landscaping is assigned a Landscape Inspector from one of the Regional Teams. The Landscape Inspectors inspect and approve landscape materials of Section nine twenty of the 2008 Specifications. Their inspections affect approval and payment for permanent vegetation establishment. If you do not know who has been assigned to a project, please call the regional Team to find out.
Section 701
Topsoil and Subsoil

Section 701 Includes Three Tasks

Salvaging Soil...
  Digging and moving it to stockpiles

Placing Salvaged Soil...
  Taking it back and spreading it on the project

Placing Furnished Soil...
  Buying and bringing it to the project

Placing 4 in. layer of furnished topsoil over smoothly graded subsoil

Slide notes
The placement of soil layers is important for the survival of landscape plantings. As shown in the photo, topsoil is being placed over a previously spread layer of subsoil.

Section seven oh one involves three separate tasks: Salvaging soil, placing salvaged soil, and placing furnished soil.

Notes
Slide notes
For all soils the goal is to ensure. Conformance with state law, compliance with landscape material specifications, rapid growth of vegetation groundcover, long term success of landscape plantings, and preservation of the soil.

Notes
Section 920.01.01
Specifications for Salvaged Topsoil

<table>
<thead>
<tr>
<th>Property</th>
<th>Test Method</th>
<th>Test Value and Amendment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prohibited Weeds</td>
<td>—</td>
<td>Free of seed or visible parts of charlatan, Mimosa, grasses, Canada thistle, bell thistle, plantains, fritillaria, monk thistle, and common reed when inspected before transport.</td>
</tr>
<tr>
<td>Debris</td>
<td>—</td>
<td>1.5% or less by weight of cement, limestone, asphalt, mineral gravel or construction debris when inspected.</td>
</tr>
<tr>
<td>Grain Size</td>
<td>T 47</td>
<td>Passing by Weight Minimum %</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 in.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No. 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No. 10</td>
</tr>
<tr>
<td>Particle Size</td>
<td>T 108</td>
<td>% Passing by Weight</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Minimum</td>
</tr>
<tr>
<td>Sand</td>
<td>2.0 - 4.75</td>
<td>10</td>
</tr>
<tr>
<td>Silt</td>
<td>0.005 - 0.002</td>
<td>50</td>
</tr>
<tr>
<td>Clay</td>
<td>less than 0.002</td>
<td>5</td>
</tr>
<tr>
<td>Soil pH</td>
<td>D-4772</td>
<td>pH of 4.0 to 7.4. Apply limestone to soil with pH 4.8 to 6.1 per NMP. Apply sulfur or ferrous sulfate to soil with pH 7.4 to 7.5 per NMP.</td>
</tr>
<tr>
<td>Organic Matter</td>
<td>T 194</td>
<td>1.0 to 3.3% OM by weight. The Contractor shall test soil with 3.0 to 1.3% OM per NMP to achieve a minimal 2.9% OM.</td>
</tr>
<tr>
<td>Nutrient Content</td>
<td>0.012 - 0.30</td>
<td>Available for NMP for nitrate requirements and optimum fertility index values (AIV) for phosphorus and potassium.</td>
</tr>
<tr>
<td>Suitable Soils</td>
<td>EC (1:5 (w/v))</td>
<td>1.0 to 1.75 mm (200 mesh) or less. Apply gypsum to soil with 100 to 1000 ppm (0.75 to 1.25 mmole/100 g) per NMP.</td>
</tr>
<tr>
<td>Harmful Materials</td>
<td>—</td>
<td>Shall not contain substances that are harmful to human health, water quality, or plant growth. Included wastes such as soil, slag, sawdust, waste coal, or similar materials shall not be soil components.</td>
</tr>
</tbody>
</table>

Notes
Both the topsoil and the subsoil must meet materials clearance standards of Section nine twenty of the 2008 Specifications. Salvaged soils are the property of SHA, but furnished soils are selected and purchased by the Contractor. Only the soil of producers included in the Office of Materials Technology Qualified Products List may be used. For furnished soils to be approved, the soils must be tested, and the Nutrient Management Plan (NMP) must be completed before the soil is delivered to the project.
According to State law, a Nutrient Management Plan (NMP) is required whenever fertilizer is applied to State land. Contractor must comply. Gray Book is ‘default’ NMP.

Custom Plan – Landscape Operations Division develops custom NMP for seeding & sod (Section 705, 706, 707, 708).

Standard rates are used when custom NMP is not available.

Standard Rates - Typically used for temporary seeding, trees, shrubs and beds (Sections 704, 710, 711).

According to State law, a Nutrient Management Plan (NMP) is required whenever fertilizer is applied to State land.

The Maryland Department of Agriculture has approved the fertilizers and application rates of the 2008 Specifications. Because of this, the application rates of the 2008 Specifications are always legal when fertilizer is applied as specified.

However, to reduce costs and avoid excessive use of fertilizer, the Landscape Operations Division develops a custom Nutrient Management Plan when fertilizer is applied to large areas of turfgrass establishment, meadow establishment, and shrub seeding.

The standard specified rates of fertilizer are used for Temporary Seed and Tree and Shrub Establishment unless a Nutrient Management Plan is developed.

It is the Contractor’s responsibility to follow the requirements of the Nutrient Management Plan when applying fertilizer.

Notes
701 Topsoil and Subsoil

Nutrient Management Plan (NMP)

- Soil Testing, Part 1
  - 10 - 20 lbs. soil sent to Office of Materials Technology.
  - OMT tests for:
    - Soil pH
    - Organic Matter
    - Grading Analysis
    - Textural Analysis
    - Soluble Salts

- Soil Testing, Part 2
  - 1 pint sent to Univ. of Delaware
  - UDEL tests for:
    - Phosphorus & Potassium
    - Other Plant Nutrients
    - Harmful Materials

Slide notes
The Nutrient Management Plan is developed using tests conducted by both the State Highway Administration and the university of Delaware.
701 *Topsoil and Subsoil*

**Nutrient Management Plan (NMP)**

- NMP takes 30-45 days to complete
  - **Amendments**… To correct pH, OM, sol. salts
  - **Fertilizer**…… To optimize plant nutrients
- Timing depends on the soil
  - **Salvaged**…… Special Provisions in Contract docs
  - **Furnished**…… Memo to PE, ADE-Construction, and Landscape Operations Division
- Contractor submits Nutrient Mgt. Reporting Form within 24 hrs after applying fertilizer

**Slide notes**

For salvaged soils, the Nutrient Management Plan is included in the contract documents.

For furnished soils, the Nutrient Management Plan is sent to the project Engineer 30 to 45 days after the source of supply is sampled and tested.
The Maryland Noxious Weed Law does not allow certain weeds to be transported in Maryland. If the Contractor moves these weeds into or out of the project area, it is a violation of State law. Although there are several weeds of concern to SHA, the control of Canada thistle, Common Reed and Johnsongrass is most important during construction. The Landscape Inspector will assist with weed identification to ensure that soils with prohibited weeds are not transported during soil salvaging or soil placing operations.
701  Topsoil and Subsoil

Requirements and Recordkeeping

Salvaged Soils
- Soil volumes & NMP are in Contract documents

Furnished Soil
- Contractor selects source from OMT Eligibility List
- Soil testing & NMP are completed before delivery
- 1st load each day comes with documentation from approved source, recorded in sketchbook, confirmed by Landscape Operations Division

Slide notes
According to the Standard Specifications for furnished soil, the first load of soil delivered each day must be delivered with documentation from the approved source.

The Contractor submits the Nutrient Management Reporting Form within 24 hours after applying fertilizer.
Slide notes

There are several steps involved with the handling of soils on a State Highway project. Take a moment to review the steps involved with both salvaging soils and placing soils.

Notes
Temporary Seed and Temporary Mulch are included in most Contracts. These two operations are a strong tool against soil erosion, and are often used during construction.

Both Temporary Mulch and Temporary Seed are used any time of the year, as directed by the Engineer. And like Section seven oh one, both Temporary Seed and Temporary Mulch are paid 100% by the Project Engineer when all the materials are installed and approved.
Temporary Mulch (Performed any time of the year, 100% payment upon completion)

1. When area will be disturbed in less than 2 months
2. Complete 2 Operations for 100% Payment
   1. Apply straw mulch
   2. Apply wood cellulose fiber mulch binder

Slide notes
When the area will be disturbed again in less than 2 months, the Project Engineer should request Temporary Mulch.
Temporary Seed (Performed any time of the year, 100% payment upon completion)

1. When area will be disturbed in 2 to 12 months
2. Complete 5 Operations for 100% Payment
   1. Prepare soil
   2. Apply 15-30-15 fertilizer
      450 lbs per acre, do not apply if done in past three months
   3. Apply SHA Temporary Seed Mix
      125 lbs per acre, MD Orange tag
   4. Apply straw mulch
      4000 lbs per acre
      ¾ to 2 in. depth (blower) 1½ to 3 in. depth (by hand)
   5. Apply wood cellulose fiber mulch binder
      750 lbs per acre over the straw

Slide notes
Apply Temporary Seed when the area will be disturbed again within the next 2 to 12 months.

When an area will be disturbed in more than 12 months, the Project Engineer should request permanent vegetation such as Turfgrass Establishment.

Even though this item is temporary there are multiple steps required for proper installation and payment.
Turfgrass Establishment

- When area will not be disturbed for 12 months+
- Complete operations during Seeding Seasons
- Seeding Phase Acceptance + 80% Payment
- Establishment Phase Acceptance + 20% Payment

Successfully established turfgrass

Slide notes

Turfgrass Establishment involves growing grass from seed. This work is only performed during certain seeding seasons when the area will not be disturbed for at least 12 months.

Because of the importance of turfgrass groundcover, 80% of the Contract price is paid at the end of the Seeding Phase, when all operations are completed and all materials are applied. The final 20% is paid when the turfgrass meets specified standards for growth, color, and groundcover.

Notes
There are multiple steps in placing permanent seed and it starts with soil preparation.

Proper soil preparation is an important step in turfgrass establishment. The areas should be at the finished grade, free of weeds and debris, and tilled or tracked as specified.

Notes
705  Turfgrass Establishment

Soil Amendments

- Application rates are specified in NMP for
  - Limestone or Sulfur
  - Gypsum
  - Compost
- Soil amendments are applied & tilled into soil, never applied with seed.

- Areas Flatter than 4:1
  - 2 in. topsoil depth – Till amendments 2 in. into soil
  - 4 in. topsoil depth – Till amendments 3 in. into soil

- Areas 4:1 and Steeper
  - Apply amendments before or after tracking.

Slide notes

Any necessary amendments should be applied separately from the seed mixture. These amendments will be specified by the nutrient management plan. On flat areas of the site the amendments are tilled into the soil.

Notes
Fertilizers

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>LB PER 1000 FT²</th>
<th>LB PER ACRE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FERTILIZER AT SEEDING</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Topsoiled Areas</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-16-12 (83% UF with MAP &amp; SOP)</td>
<td>23.0a</td>
<td>1000a</td>
</tr>
<tr>
<td>38-0-0 (UF)</td>
<td>0 to 9.2ab</td>
<td>0 to 400ab</td>
</tr>
<tr>
<td>0-0-50 (SOP)</td>
<td>0 to 5.7ab</td>
<td>0 to 250ab</td>
</tr>
<tr>
<td><strong>Nontopsoiled Areas</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-16-12 (83% UF with MAP &amp; SOP)</td>
<td>23.0a</td>
<td>1000a</td>
</tr>
<tr>
<td>38-0-0 (UF)</td>
<td>8.0 to 17.2ab</td>
<td>350 to 750ab</td>
</tr>
<tr>
<td>0-0-50 (SOP)</td>
<td>0 to 5.7ab</td>
<td>0 to 250ab</td>
</tr>
</tbody>
</table>

Note: UF = Ureaform. MAP = Monoammonium Phosphate. SOP = Sulphate of Potash.

* The NMP will specify the application rates.
* When application of 20-16-12 (83% UF with MAP & SOP) is below 1,000 lb per acre, apply 38-0-0 and 0-0-50 per NMP.

Slide notes
Apply fertilizers as specified in section 705 or the nutrient management plan for the project.

Notes
Ensure to proper seed is being utilized by verifying the information on the Orange tag of the seed mix. Opened or partially used seed mix’s should not be accepted.
Seed additives are other seeds that must be added to the turfgrass seed mix. The use of Sericea Lespedeza was suspended in 2010.

200 pounds of SHA Turfgrass Seed Mix is applied in all areas where Turfgrass Establishment is required.

Seasonal seed additives are still required at specified rates.

Be sure to consult the Landscape Operations Division when seeding within 4 miles of a State airport. This is because S.H.A. special purpose seed mix and additives must be used on slopes and no seed additives may be used within these areas when seeding along State roads.
There are several methods to apply permanent seed to the ground. Additives are to be included in the seed mix as specified.
Straw mulch and the wood cellulose binder should be applied just as they were done for temporary seeding.

When all the seeding operations are completed, the Project Engineer is authorized to pay 80% of the Contract price for the Turfgrass Establishment.

Notes
Establishment Phase Inspection

- CPE & Landscape Operations Division complete Inspection Report
  - Turfgrass Height... at least 4 in. growth
  - Turfgrass Color... dark green
  - Turfgrass % Coverage...
    - Most areas: at least 95% cover
    - Tracked Areas 4:1 & Steeper
      at least 50% cover

Final Acceptance is not possible without sketchbook records and Inspection Report

Project Engineer provides Acceptance and 20% Payment

Slide notes

However, Final Acceptance for Turfgrass Establishment requires an Inspection Report. The Landscape Operations Division and Project Engineer complete the Inspection Report.

For areas flatter than four to one, the grass must be 4 inches in height, dark green color, and have at least 95% coverage of SHA seed mix species.

Notes
Slide 24 - Section 708 Turfgrass Sod Establishment

Section 708

Turfgrass Sod Establishment

Sod provides attractive and safe walking surface quicker than seeding

Installation Season Aug. 15 to May 31
Do Not Install Sod June 1 to Aug. 14

Slide notes
Turfgrass Sod is often specified in urban areas, channels and inlets.
Like Turfgrass Establishment, Turfgrass Sod Establishment is installed when the area will not be disturbed for at least 12 months.
The sod installation season is August fifteenth thru May thirty first. Sod is not installed in June, July or the first two weeks of August.
80% of the contract price is paid when the sod is installed, and the final 20% is paid when the sod meets the standards for Turfgrass Sod Establishment.

Notes
Section seven oh eight requires Maryland Certified Sod. Be sure to roll or tamp the sod and install staples where sod might move because of water flow. Sod must be watered within 4 hours after installation. The initial watering must wet the soil to a depth of 3 inches.

Notes

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________________________________________________________________________
When sod is installed, the Project Engineer is authorized to pay 80% of the Contract price.

However, just like Turfgrass Establishment, Final Acceptance for Turfgrass Sod Establishment requires an Inspection Report. The Landscape Operations Division and Project Engineer complete the Inspection Report together.

For acceptance, the sod must be rooted into the soil, 4 inches in height, dark green color, and 99% coverage of turfgrass.
Section 709

Soil Stabilization Matting

Careful Installation is Essential for Successful Establishment

Slide notes
There are 5 types of soil stabilization matting. However, because most types are used with Turfgrass Establishment, the payment for soil stabilization matting follows the split payment system used for Turfgrass Establishment.

Notes

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________
There are a few key points about soil stabilization matting that should be remembered for installation and payment:

Select Soil stabilization matting from the OMT Qualified Products List.
Perform all steps of vegetation establishment.
Install SSM with approved fasteners.
Key-in specified areas of matting.
Water SSM within 48 hrs to wet soil 2 in deep.

Notes
Most Type A is shaved wood, sometimes called excelsior.
Type A is installed on slopes and channel sides where it gives light to medium erosion protection.

Type B is a synthetic non-woven polymer matting. Type B is a permanent mat used in channel bottoms that gives medium to heavy turfgrass reinforcement and erosion protection.

Type C is a synthetic polymer lattice that is used for permanent root zone reinforcement in channels and slopes.

Type D is a woven mat made of coconut fiber. Type D is used in natural areas.

Type E is a lightweight mat made of straw, or straw and coconut fiber, or even lightweight excelsior. Type E is only used in flat or mildly sloping areas. It may be used as a substitute for straw plus wood cellulose fiber tackifier.
Type A
- Excelsior
- Slopes and Channel Sides
- Turfgrass

Type B
- Synthetic
- Permanent
- Channel Bottoms
- Turfgrass

Type C
- Synthetic
- Permanent
- High-Velocity Channels
- Cover with Soil & Type B
- Turfgrass

Slide notes
Type A is degradable, used on slopes and channels with Turfgrass Establishment where straw mulch would not be stable.
Type B is synthetic, used in channels and slopes with Turfgrass Establishment where permanent reinforcement is needed.
Type C is synthetic, used in high velocity channels and slopes for permanent reinforcement of Turfgrass Establishment.

Notes
Type D
- Extended Lifespan
- Coconut Fiber
- Natural Areas

Type E
- Low Erosion Risk Areas
- Use in Lieu of Straw and Binder
- Turfgrass

Slide notes
Type D is woven coconut fiber, used with Meadow Establishment, Liev Stakes, and Plugs (not turf). This degradable mat is installed in stormwater management ponds, along stream banks and wetlands.

Type E is lightweight, degradable, used with Turfgrass Establishment in flat areas. This mat is installed in areas as specified, or in lieu of Straw plus tackifier when approved by the project Engineer.

Notes
709 Soil Stabilization Matting

- Remove debris and grade soil
- Don’t install over debris or weeds
- Seedlings won’t grow through tented areas
- Use fasteners approved for matting
- Make sure edges are secure
- Soil smoothness is critical for Type B and C

Install SSM with Approved Fasteners

Type A, B, D, and E
- Share many aspects of installation
- Install over prepared and seeded soil

Type C is a ‘sandwich’
- Install over soil, then “infill” with soil
- Apply seed or specified cover

<table>
<thead>
<tr>
<th>FASTENER SELECTION</th>
<th>APPROVED FASTENERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATTING TYPE</td>
<td>FASTENER SHAPE</td>
</tr>
<tr>
<td>A and E</td>
<td>U-Shaped Staple</td>
</tr>
<tr>
<td></td>
<td>Circle-Tip Pin</td>
</tr>
<tr>
<td></td>
<td>Round Head Pin</td>
</tr>
<tr>
<td></td>
<td>T-Head Pin</td>
</tr>
<tr>
<td>B, C, D</td>
<td>Wood Peg</td>
</tr>
<tr>
<td></td>
<td>U-Shaped Staple</td>
</tr>
<tr>
<td></td>
<td>Fabric Pin</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FASTENER PLACEMENT</th>
<th>AREA OF MATTING</th>
<th>MAXIMUM DISTANCE BETWEEN FASTENERS In.</th>
</tr>
</thead>
<tbody>
<tr>
<td>A, B, C, D</td>
<td>Uppermost or Leading-Edge of Matting</td>
<td>6</td>
</tr>
<tr>
<td>A, B, C, D, E</td>
<td>Overlapping Edges of Matting</td>
<td>18</td>
</tr>
<tr>
<td>A, B, C, D</td>
<td>Center of Chance/Slit</td>
<td>18</td>
</tr>
<tr>
<td>A, B, C, D</td>
<td>Lowermost or Toe-Edge of Matting</td>
<td>18</td>
</tr>
<tr>
<td>A, B, C, D, E</td>
<td>Throughout Matting</td>
<td>24</td>
</tr>
<tr>
<td>B</td>
<td>In Folds Every 40 to 45 ft</td>
<td>12</td>
</tr>
<tr>
<td>C</td>
<td>In Folds Every 20 to 25 ft</td>
<td>12</td>
</tr>
</tbody>
</table>

Slide notes
Ensuring the fabric is tight to the ground is very important. Remove anything that may cause the material to tent and fasten with the approved staples.

Notes

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When installing soil stabilization matting, be sure to install the matting in channel bottoms first. Use one piece of matting when possible.

If you must use more than one piece of matting, be sure to avoid installing a longitudinal seam in channel bottoms. A longitudinal seam that runs down the channel is very vulnerable to blow out.
When channel bottoms can't be covered with one piece of matting, then the matting must be installed across the channel and overlapped like roof shingle. This method requires more time and effort, but is much more secure.

Always overlap securely so water can't flow under edges.
The 2008 Specifications require that certain edges of soil stabilization matting be keyed in. Keying in is the process of fastening an edge of the matting in a 6 inch deep trench into the soil.
Slide notes

The uppermost edge of all mats except Type E are keyed in.
The lowermost edge of Type B is also keyed in.
All edges of Type C and D matting are keyed in.
Please examine the diagrams carefully. There are two ways to do it.
The method on the left involves rolling the mat over the keyed in area. The method on the right involves securing a flap of matting over the keyed in area.
In both cases, it is difficult for water to run under the edge of the matting, and because the edge is buried it is also very difficult for the matting to be pulled out of the soil.

Notes
Both Type B and Type C matting must be installed with check trenches. Check trenches provide additional erosion protection for permanent synthetic mattings installed across the channel bottom. For Type B the check trench must be installed every 40 to 45 feet. For Type C the check trench must be installed every 20 to 25 feet.
**Vegetation Establishment**  
Thursday, May 30, 2013

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**Slide 38 - 709 Soil Stabilization Matting**

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**709 Soil Stabilization Matting**

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**Water the SSM**
- Make sure soil is wet 2 in. deep within 48 hours
  - Settles loose soil and presses mat down
  - Helps roots grow before the first rain
  - Improves erosion control performance
  - Shortens Establishment Phase time

---

**Installation Phase Acceptance**
- PE pays 80% of Contract price

**Establishment Phase & 20% Payment**
- Usually lasts 1-4 months
- Turf or other vegetation must meet standards
- SSM is secure at all points
- **Inspection Report must be completed**

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**Slide notes**

Watering the newly matted area is critical to successful establishment.

For soil stabilization matting, the Installation Phase Acceptance receives 80% Payment, and the Final Acceptance receives 20% Payment of the contract price.

The Landscape Operations Division and project Engineer will complete the Inspection Report for Final Acceptance.

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**Notes**

_________________________________________________________________
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Page 38 of 39
This concludes the vegetation establishment portion of the training. Please select the next module to continue the training.