DIVISION 800

ROADSIDE DEVELOPMENT AND EROSION CONTROL

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800.00 GENERAL COMMENTS

Introduction

The highway right-of-way is largely a disturbed environment, lacking a natural soil profile and subject to unusual runoff, strong winds and abnormal air turbulence, pollutants, wide temperature variations and other extremes. Seeding, sodding, erosion control and landscaping are used to deal with this disturbed environment and help to permanently stabilize it as soon as possible.

Plants and seeds are living things in contrast to concrete, steel, stone and asphalt which are the inanimate materials used in the major part of road construction. Plants change in shape, size, color and texture from season-to-season and year-to-year while the inanimate materials remain virtually constant.

Seeding and landscaping involve living materials used to stabilize the right-of-way, protect the concrete and steel construction and provide other functions to help safely direct the motorist. It is understandable that survival of these living materials is important to the entire roadway system.

These living materials need to be of the quality specified, properly installed and maintained so they produce the desired results of stabilizing the right-of-way to protect the construction and provide a complete roadway system.

General Inspection

Inspection personnel assigned to erosion control work should review project plans, specifications, special provisions, and road standards pertaining to erosion control. The right-of-way contracts should be reviewed for special treated areas not mentioned on the plans. For seeding, fertilizing, and mulching, a pre-measurement using slope distances of the project is needed before the contractor starts. Both the contractor and inspector need to know the quantities of seed, fertilizer, and mulch required on the project.

Attention should be given to the erosion control plan and proposal notes for the special items and conditions involved with each individual project.

Material delivered to the project and damaged due to improper storage or handling should be rejected, even though it may have been previously accepted.

The testing requirements for seed and fertilizer are outlined in the *Materials Sampling Guide*.

The inspector is to observe the following operations:

- Application of seed, fertilizer, and mulch.

Record the quantities of these materials used in the project records. Record the drill settings for each type of seed mix.

All revisions made to the seed mixtures, fertilizer, or rate of fertilizer application should be approved by the Construction Division or the Roadway Design Division (Roadside Development Section).

SSHC Subsection 802.02, Paragraph 1.a. tells the contractor to submit the plant purchase orders 90 days before the planting season. If a landscaping contract is awarded with less than 100 calendar days before the planting season begins, a minimum of 60 days will be allowed.

Equipment

Proper equipment in good working condition and operated at a reasonable speed must be used to get the best results. Where possible, the equipment should be operated on the contour or parallel to the slope.

Equipment for preparation of the seed bed includes a disc, field cultivator, spike tooth harrow, spring tooth harrow, and a slope harrow. Other equipment may be approved for use provided that it achieves the desired results.

A heavy disc, such as a Rome disc, may be required in areas of heavy vegetation. A slope harrow may be required in areas of light soil, where equipment tracks damage the seed bed.

Equipment for applying seed and fertilizer consists of a hydro-seeder, gravity seeder, end gate cyclone seeder, cyclone seeder, and a native grass seed drill. The cyclone seeder (hand seeder) is usually used to spread seed and fertilizer in small areas or areas inaccessible to field equipment.

The mulch crimper needs to be looked at. The blades, when new, are serrated. Some serration should be left. The serrations allow the mulch to be tucked into the soil rather than cut. When in doubt, just have an area crimped and see how it does.

The mulch blower should not chop the hay or straw so badly that all we have is very short pieces. Most machines are adjustable for the length of straw or hay.

Equipment should be checked for proper rate of application of seed and fertilizer by measuring a representative area and weighing the required amount of seed to be applied. All seeders must be cleaned when changing seed mixtures, particularly when changing from Type A to Type B.

Contract Administration

Both the Project Manager and the inspector should review the construction period shown on the proposal form.

From March 1 to June 30 and from August 1 to freeze-up, working days should be charged whenever it is possible to perform a seeding contract controlling operation.

Erosion Control

Normal grading operations require the following erosion control:

- Install “Silt Fence” before grading begins.
- “Temporary Silt Checks” must be installed as soon as rough grading establishes ditches. The Contractor should also construct earth-berm dikes, dams, sediment basins, temporary slope drains and other erosion control features as shown in the plans or as necessary to control erosion and siltation.
- When final grading begins “Temporary Silt Checks” need to be removed.
- When final grading is complete, the area should be cover crop seeded and TSC’s reinstalled.
- As soon as possible after final grading and pavement is complete, permanent ersosion checks should be installed and the area should be permanently seeded.

** If permanent erosion checks are available and installed immediately after final grading, the TSC do not need to be reinstalled.

801.00 REMOVING AND RESETTING TREES

801.01 REMOVING AND RESETTING TREES CHECKLIST

SSHC References: *Section 801*
Section 802

Other References: Equipment manufacturer recommendations
Special Provisions
Special Plan

Inspection Equipment: Tree Caliper

General Comments:

1. Make sure the location for resetting the trees is accessible by the mechanical tree spade.
2. Obtain from the contractor the equipment manufacturer's size rating for the tree spade and be sure the trees to be moved are within the allowable sizes for that machine. There may be size differences between evergreen trees and deciduous trees.
3. The size is usually called out as a caliper dimension - This should be the diameter of the tree trunk at 300 mm (12 inches) above the ground for trees over 100 mm (4 inches) in diameter.
4. After the trees have been properly set in their new location, make sure they are well watered. This watering and any required maintenance procedures in the Special Provisions are the most important part of keeping these plants alive.

802.00 FURNISHING AND PLANTING OF PLANT MATERIALS

802.01 FURNISHING AND PLANTING OF PLANT MATERIALS CHECKLIST

SSHC References: *Section 802*
Special Provisions

Other References: American Standard for Nursery Stock (current edition)
Approved Products list

Inspection Equipment: Tree calipers
Tape measure

General Comments:

1. The "American Standard for Nursery Stock" tells the characteristics each type of plant should have for its size and is used in determining if the plants are acceptable.
2. Preconstruction conference should be well in advance of the project starting date. Roadside Development Section personnel should be asked to attend.

MATERIAL REQUIREMENTS:

1. Contractor planting operation must occur within the specified planting seasons.
2. Confirm that the plant material sources have been approved by Roadside Development.
3. Be sure all plant material is healthy and in good growing condition before allowing it to be planted.
   a. no serious injuries
   b. no dry roots
   c. no broken root balls
   d. no insect pests or diseases
4. If plants must be stored, inspect the storage area to see if it meets the specifications.
5. Be sure products used meet the specifications.
   a. Approved planting fertilizer is pressure-formed pellets 20-10-5 @ 21 grams or 14-3-3 @ 16 grams.
   b. Establishment period fertilizer shall be liquid urea with 28 to 32 percent nitrogen.
   c. Wood mulch, approved by Roadside Development Section.
   d. Wood stakes or metal stakes are the appropriate sizes.
   e. Guying material - approved by Roadside Development.
   f. Absorbent polymer on approved product list.

g. Pre-emergent chemical is Dathal.
h. Post-emergent chemical is Roundup.

CONSTRUCTION METHODS:

1. Planting area tilled and drilled according to the plans, details and specifications.
2. Bare roots plants are the most delicate to handle. Their roots must be kept moist at all times, in storage; when delivered to the project site, they should be coated with the absorbent polymer slurry and protected from sun, wind and cold so they do not get dry before planting. If it is obvious the roots have been allowed to dry out before getting planted, these plants should be rejected.
3. Planting procedures are called out in the specifications. If you have specific questions, contact Roadside Development.
   a. B&B material-set ball into hole onto undisturbed soil at same depth it was grown.
   b. Plumb and partially backfill plants - no rocks or clods in backfill.
   c. Twine cut away from trunk and burlap pulled back on B&B plants.
   d. Properly placed fertilizer tablets in backfill, correct number for size of plant.
   e. Backfilling completed properly - check for exposed roots on bare root plants after first watering and initial soil settlement. Make sure these are covered with soil immediately.
   f. Plant material thoroughly watered at time of planting.
   g. Properly pruned branches.
   h. Trees staked and properly guyed.
   i. Water basin constructed to hold at least the minimum amount of water called for in Table 802.01.
   j. Applied proper pre-emergent chemical.
   k. Be sure mulch covers all tilled area to the specified depth.
4. During the establishment period, check the project regularly to see that all procedures are being accomplished. This is the most critical time in the project to keep plants from being stressed before going into winter. Establishment procedure items are:
   a. Pruning
   b. Protect against pests and diseases
   c. Regular watering
   d. Replacing mulch
   e. Adjust stakes and guys
   f. Control weeds
   g. Remove dead plant material

6. Make sure the contractor notifies you when he/she will be watering or doing other establishment work so you can check and document that it has been done properly. Be sure the contractor realizes this documentation is to his/her benefit also. If the project is not properly maintained, the contractor can be required to maintain the project for a second growing season.

BASIS OF PAYMENT:

1. Partial payment criteria and percentages are indicated in Table 802.02. (Check Special Provisions for possible changes.)
2. Inspection dates are approximately:
   July 15 - to check establishment procedures
   September 1 - count of plants in acceptable growing condition
   June 1 - to final out project
3. Check Special Provision for other inspections that may be required.

803.00 SEEDING

803.01 SEEDING CHECKLIST

SSHC Reference: *Section 803 -- Seeding Special Provisions*

Other References: Project seeding Record CDR-61, Section 804, Section 805

Inspection Crew:

Seeding Procedures:

1. Give the seeding quantities to the contractor and Roadside Development.
2. The seed will be mixed at the seed company and tagged with department furnished tags.
3. Fertilizer is usually furnished bulk and must have the bulk fertilizer form DR125 (Appendix 1). If it is delivered mixed and bagged it still needs the form. If it is delivered bagged in its separate components, the label on the bag will be enough.
4. Native grass drill must have either press wheels or drag chains (this is important -- the press wheels firm the seed bed and drag chains make sure the seed is covered)

4A. Other seeding equipment -- hydro-seeder - big squirt gun -- must have agitation. Brillion -- seed box that drops seed between two corrugated rollers

5. Mulching equipment like cultipacker, crimper, mulch stabilizer, and mulch spreader should be inspected to confirm proper operation.
6. Tillage equipment -- many shapes, sizes and descriptions, (common -- disc and field cultivator
7. Soil preparation -- the PM must release the area to be seeded -- no preparation is to begin until the finish grade has been approved!
8. Does maintenance have to fix and regrade areas? Notify the maintenance superintendent -- ahead of time! (*SSHC Subsection 803.03*)
9. Is there a heavy weed growth that needs to be mowed? (*SSHC Subsection 803.05*)
10. Mulch -- does the contractor have the proper mulch (some projects are specified prairie hay only)

11. Does the mulch have the noxious weed inspection certificate (*SSHC Subsection 805.02*)

12. Has the mulch been weighed in? (*SSHC Subsection 805.04*)

13. Seed bed preparation and seeding procedures:
for drilled seed:

    a. Fertilize
    b. Disc
    c. Or disc and then fertilize
    d. Harrow - several discings & harrowings may be necessary to produce a firm seed bed
    e. Seed
    f. Mulch
    g. Crimp mulch

    for hydro-seeding and broadcast seeding

    a. Fertilize
    b. Disc
    c. Or disc and then fertilize
    d. Harrow - several discings & harrowings may be necessary to produce a firm seed bed except if too steep to operate equipment on
    e. Seed
    f. Harrow seed into the soil unless too steep
    g. Mulch & crimp or hydro mulch

    for Brillion seeding --

    a. Same as for drilled seed (unless it is hydro-mulched)

    General

    b. Some hydro-seeding is done on very steep slopes that must be left in a roughened condition by the grader, or there is no way to make a seed bed.

    c. "Rule of Thumb" --

       Whatever is seeded in a day must also be mulched and crimped in that same day."
       Exceptions -- unexpected rain -- pay attention to the weather reports and conditions

d. Inspection tip for mulch

Establish a 1 hectare (2 ½ acre) or small 0.4 hectare (1 acre) plot for mulch. Mulch and crimp this area and use it for a reference

e. Send in the project seeding record to Roadside Development upon completion of seeding

f. Please remind the seeding contractors to do a good job of cleaning out the seeding drills when changing from Type “A” to Type “B”. Type ”A” has taller grasses than we want on our shoulder areas.

g. Changing from Type “B” to Type “A” does not require a clean out.

803.02 PERMANENT SEEDING DATES

The normal periods for permanent seeding are from March 1 to June 30 and from August 1 to December 31 or freeze up. These dates may be modified by the Special Provisions.

803.03 PREPARATION OF SEED BED

Before seeding operations commence, care should be taken to properly prepare the area to be seeded. Areas around culvert headwalls and wingwalls, shoulders, flumes, sign posts, guardrail, and other structures require special attention. The seed bed shall be worked to a depth of at least 50 mm (2 inches) deep.

803.04 SEED

The seed is mixed at the seed company and overseen by Roadside Development.

The following items should be noted when inspecting hydroseeding:

A fanning motion or horizontal motion of the seeding nozzle insures uniform application of the seed. Do not use an up and down motion; it results in seed application too heavy near the seeder and too thin at the far reach of the spray.

The seeder tank must be cleaned when changing seed mixtures.

@ The seed measurements should be discussed at the preconstruction conference and a date established as to when they would be provided to the contractor. The Department normally will buy any excess seed. Pay for what we want and get.

804.00 FERTILIZER

DR Form 125 is required for all bulk fertilizer and bulk blended and then bagged material.

"Fertilizer Grade" refers to the percentages of nitrogen (N), phosphoric acid (P_20_5) and potassium (K_2O) present. The contractor must furnish corresponding scale ticket from an approved scale for fertilizer used in the work.

804.01 FERTILIZER CHECKLIST (See Seeding Checklist)

804.02 EXAMPLE CALCULATIONS

Our fertilizers are specified in amounts of actual ingredients. A typical specification might read:

N_2 = 32 or 40 kg/ha (26 to 35 lb/acre)
P_2 = 103 or 108 kg/ha (90 to 95 lb/acre)

Typically, the contractors will furnish a 16-48-0 or an 18-46-0 material. These numbers are expressed as a percentage of the total mass. The first number represents the percentage of nitrogen relative to the total mass, the second number is the percent of phosphorous and the third is potassium.

In order for the contractor to furnish the 36 kg/ha of N_2 (nitrogen) he/she would apply 225 kg (bulk) material - this would also give us the 108 kg/ha of P_2 (phosphorus) when using 16-48-0 fertilizer.

Required: 36 kg/ha of N_2
Required Fertilizer: 16-48-0 (16% N_2)
36 kg/ha = (.16) x (Unknown Bulk Quantity)
225 kg/ha = Bulk Quantity
kg/ha of P_2 = (.48) x 225
= 108

NDR specified sulpher coated urea fertilizer is typically a 36-0-0 or a 37-0-0 material and is specified at 67 kg/ha (60 lb/acre):

Required: 67 kg/ha
Required Fertilizer: 36-0-0 36% N_2
67 kg/ha = (.36) x (Unknown Bulk Quantity)
186 kg/ha Bulk with 36-0-0
67 kg/ha = (.37) x (Unknown Bulk Quantity)
181 = kg/ha Bulk with 37-0-0

NDR specified urea formaldehyde fertilizer is a 38-0-0 material and is usually specified at 85 kg of N_2/ha (35 lb of N_2/Acre).

Required: 85 kg/ha of N_2
38% N_2 in the fertilizer
85 kg/ha = (.38) x (Unknown Bulk Quantity)
224 kg/ha = Bulk Quantity

Curve Ball

The contractor wants to use an 11-52-0 to satisfy the 36 or 40 kg N_2 and the 103 or 108 kg/ha requirement for P_2. How much 11-52-0 should be applied? (Our application rates state minimum = 36 or 40 & 103 or 108).

Required: 36 kg/ha N_2
103 kg/ha P_2
Contractor's fertilizer is 11% N_2 or 52% P_2.
36 kg/ha - (.11) x (Unknown Bulk Quantity)
327 kg/ha = Bulk Quantity to get N_2 and
(.52) x (327 kg/ha) = 170 kg/ha P_2

This would be an excess of P_2 (327 x 52% = 170 kg of P_2), but this is what must be applied to satisfy the minimum N_2 requirement.

Slider

The contractor wants to use the 11-52-0 to satisfy the P_2 requirement. How much 33-0-0 will have to be added to the mixture to satisfy the N_2 requirement.

Required: P_2 = 103 kg/ha
N_2 = 36 kg/ha
Fertilizers: 11-52-0
33-0-0
P_2: 103 kg/ha = (.52) x (Unknown Bulk Quantity)
198 kg/ha = Quantity of 11-52-0.
But now how much N_2 are we short?
(.11) x (198) = 21.78 kg/ha of N_2
Therefore,
(36 - 21.78) kg/ha N_2 missing

14.22 kg/ha = .33 (Unknown Quantity of Bulk 33-0-0 fertilizer)
43 kg/ha = Bulk Quantity of 33-0-0 that must also be added.

Required $\frac{14.22}{}$ = 43.09 kg of 33-0-0 to satisfy the N_2 when furnished N_2 = 33% of bulk.

Now what is the applicable rate per ha?

198.07 kg of 11-52-0
\+ 43.98 kg of 33-0-0
= 241.16 kg of the mixture per ha

Split-Ball

At 241.6 kg/ha - the bulk spreader has 3990 kg of mixture on the load. How many hectares will this do?

SO 3990 kg = 16.51 hectares
241.6 kg/ha

Fast-Ball

The load (3990 kg total) is a blend of the 11-52-0 and 36-0-0 (Quick Release Nitrogen) and 37-0-0 (Slow Release Nitrogen) in the right proportions. Now how many hectares can the load do?

Add the per unit weights of the two components.
241.6 kg (the contractor's 11-52-0 plus the supplemental nitrogen in the 33-0-0) + 181 kg of sulpher coat quick release nitrogen requirement = 422.6 kg/ha

Then 3990 = 9.44 hectares of coverage
422.6

804.03 APPLICATION OF FERTILIZER

The fertilized area shall be disced prior to seeding. Harrowing may also be required.

805.00 MULCH

All permanent seeding with prepared seed beds are required to be mulched. The mulch shall be “blown" and "crimped in" as soon after seeding as possible. Machine printed weight tickets are required for all mulch used. The inspector should receive the weight ticket and obtain a count of the bales at the time the material is delivered to the job site. The average bale weight can then be calculated.

As soon as possible, the mulch should be applied to the specified areas at the required rate. A straw mulching machine capable of spreading mulch uniformly is used for applying mulch. Areas inaccessible to a straw mulching machine should be mulched by hand.

Immediately after mulch material has been applied, it should be anchored with a mulch stabilizer operated on the contour.

All areas seeded in a day are to be mulched in the same day. All mulch applied in a day is to be crimped in the same day.

805.01 MULCHING CHECKLIST (See Seeding Checklist)

805.02 EXAMPLE CALCULATION

Example of area to be mulched at the rate of 5 Mg/ha:

Measured area is 2.6 ha, the average mass per bale is 360 kg.
Compute as follows: 5 Mg/ha x 2.6 ha = 13 Mg of mulch required for the area.

Number of bales required: $\frac{13\ \text{Mg}}{360\ \text{kg/bale}}$ = 36.1 bales (say 36)

805.03 WEEDS

The mulch shall be free of noxious weeds and shall be certified as such by the County Weed Control Authority.

There is no form for this certification. This certification is done by letter.

805.04 ACCEPTABLE MULCH

Mulch shall either be dry cured native (prairie) hay or threshed grain straw.

There is a lot of go-down wheat that may be offered for mulch. If it has not been threshed, we do not want it. There are also many CRP acres that have been authorized for haying. Many of these CRP acres were planted in brome grass. Brome grass is not native (prairie) hay and cannot be used on our projects.

806.00 SODDING

806.01 SODDING CHECKLIST

SSHC Reference: *Section 806 Sodding*

Other References: Your New Sod Door Hanger
- See Construction Engineer

Inspection Crew: Construction Technician

Inspection Equipment: NA

Sodding Procedures:
(General Comments)
Roadside Development
(402) 479-4537

1. Are the sodding dates in conformance with the Specifications? (*SSHC Subsection 806.01*, Para. 2.)
2. Has Roadside Development been notified where the sod is coming from?
3. Has the contractor obtained the proper fertilizer? (urea-formaldehyde fertilizer is BLUE.)
4. What preemergent is the contractor going to use and at what rate should it be applied? (*SSHC Subsection 806.02*, Para. 6.)
5. Where is the contractor's water source and what is the watering plan - (adequate watering is the key to sodding success.)
6. Is the finish grade approved for sod to be laid on? (Make sure the Project Manager has approved the finish grade.)
7. Has the soil next to the adjoining surfaces been properly lowered? (*SSHC Subsection 806.03*, Para. 5)
8. Distribute the "Your New Sod" door hanger.
9. Apply the pre-sodding fertilizer (*SSHC Subsection 806.02*, Para. 5.) to the prepared seed bed.
10. Enforce the watering requirement (*SSHC Subsection 806.03*, Para. 11.)

(402) 479-4537

11. Sometimes rejected sod may be overseeded (contact Roadside Development for the mixture).

806.02 SOD PLACEMENT

The suggested sequence for placement of sod is:

SHAPE SOD BED

Ditch channels should be shaped in order to obtain a relatively level, flat-bottom ditch which will drain without water ponding. The depth should be a minimum of 150 mm (6 inches) below adjacent ground. Many ditch failures result because the ditch bottom is not level, causing a concentration of flow on one side of the ditch.

APPLY FERTILIZER

Presodding - Two kinds - Inorganic which is typically a 16-48-0 or a 18-46-0 and is available at most any fertilizer dealer and urea-formaldehyde - a 38-0-0 material that is blue in color.

These fertilizers are applied to the prepared sod bed prior to sodding.

Post Sodding - The 16-48-0 or the 18-46-0 applied at the completion of the watering period.

PLACE SOD

Note the quality of sod, making sure it is free of objectionable material (tree roots, brush, stones, etc.) also that it is free of noxious weeds and relatively free of all other weeds and grasses other than bluegrass.

Sod can be placed until the ground freezes at the construction site or at the sod farm.

FINISH SOD

Smooth disturbed areas along the edges of the sod. Be sure that no ridge of dirt remains along side the sod ditch, and that the disturbed area is properly shaped and sloped to allow water to run onto the sod.

WATER

Water the sod within one hour after laying, and sooner on hot days, and thereafter as specified. The amount of water required for sodding varies depending upon soil type, soil moisture, and local weather conditions at the time of sodding. Watering is to saturate the soil. Sod should be watered with a spray, and not much pressure. Too much pressure disturbs the sod and has a tendency to wash the dirt away from its edges.

TAMP

Tamp or roll sod as specified if necessary to secure bonding.

807.00 EROSION CONTROL

807.01 EROSION CONTROL CHECKLIST

SSHC Reference: *Section 807 -- Erosion Control & Special Provisions*

Other References: Approved Products List

Inspection Crew: Construction Technician

Inspection Equipment: NA

General Comments:

1. Has the finish grade been accepted for this area? (*SSHC Subsection 807.03*, Para. 1)
2. Is the material on the approved products list? (*SSHC Subsection 807.02*, Para. 1)
3. Does the contractor have the right pins? (*SSHC Subsection 807.02*, Para. 2)
4. Does the contractor have the right fertilizer? (Special Provisions)
5. Is the seed bed properly prepared? (*SSHC Subsection 807.03,* Para. 4)
6. Does the seed have the department tags for this project? (*SSHC Subsection 803.02,* Paragraphs 3 & 4)
7. Usual work sequence:
   a. Soil preparation including the slots for the erosion checks
   b. Fertilize
   c. Install filter fabric for check slots and soil fill
   d. Seed and rake the seed into the soil
   e. Install erosion control material
   f. Some erosion control materials come with the filter fabric attached. When this material is used, direct seed into the erosion control material and then soil is spread over the seed
8. Questions -- call 402-479-4537, Roadside Development.

807.02 FILTER FABRIC

@ Cut the fabric so that the excess material lies under the outlet so that the water falls on a double layer. this is shown on the plans.

The filter fabric detail should show the fabric covering the area above a box culvert opening and the boxes wings.

The bale check includes the necessary filter fabric so do not include this quantity when calculating the pay quantity for filter fabric. Pay limits will be added to the plan detail.

@

808.00 EROSION CHECKS

808.01 EROSION CHECKS CHECKLIST

SSHC Reference:		*Section 808 -- Erosion Checks & Special Provisions*
Other References:		Approved Products List
Inspection Crew:		Construction Technician
Inspection Equipment:		NA
General Comments:	1.	Work generally performed in conjunction with erosion control after an area is final graded.
	2.	Make sure that the center bale is lower than the outside bales
	3.	The erosion control material for the erosion checks must match the erosion control material used in the ditch. Is the material on the approved products list?
	4.	Work performed similar to erosion control
	5.	Seed is never to be placed under the filter fabric - only on top of the filter fabric
	6.	Some erosion control materials have the filter fabric attached. When this occurs, the seed is directly seeded onto the erosion control material and then soil is spread over the seed
	7. a.	"Temporary Silt Checks" (TSC) are to be installed as soon as rough grading begins. TSC should be placed as shown in the plans or as directed by the engineer.
	b.	Temporary Silt Checks (TSC) have to be removed in order for final grading to be completed. However, once final grading is complete, the TSC's need to be reinstalled.
	c.	The contractor does not have to reinstall TSC if instead the permanent erosion checks are available and will be installed immediately after finish grading.
Roadside Development (402) 479-4537	8.	Questions -- call 402-479-4537, Roadside Development

808.02 PLACEMENT

The suggested sequence of work for special ditch control is as follows:

Shape

Shape the ditch and prepare the seed bed approximately 3/4 inch (20 mm) deep. If ditches are unstable and equipment leaves them in a rough condition, the seed bed must be @ prepared by hand. The ditches should be shaped so that the ditch drains without water ponding and has a minimum depth of 6 inches (150 mm). Minor irregularities in ditch alignment must be corrected so the completed ditch will follow the ditch line constructed during the grading operation. This may not be possible in cases of severe washing of the ditch bottom. All rocks and clods more than 1½ inch (40 mm) in diameter, and all sticks and other materials, which prevent contact of the special ditch control materials with the seed bed, shall be removed.

@ The vegetation on new slopes may take more than one construction season to be effectively established and bale checks and silt fence should not be removed until they are no longer needed. It would be unacceptable to hold the contract open until the vegetation was established.

The only time that steel rebar should be used is when the stake must penetrate shale – then the PM needs to let Maintenance know this was allowed.

Check Slots

Install check slots as required. Take care that all check slots are carefully and properly installed. The success of the ditch may be dependent on proper installation of the check slots.

Finish

Smooth disturbed areas adjacent to ditch control. Make sure that no ridge of dirt remains along side the ditch, and that material excavated from the ditch channel is properly shaped and sloped to allow water to run onto the special ditch control material. This area should be raked.

Fertilize

Fertilizer should be applied at the proper rate with a mechanical spreader. A cyclone seeder may be used to secure a uniform rate of application.

Seed

Seed mixture and rate of application are specified. Seed may be applied in the same manner as fertilizer.

Special Ditch Control Material

Special ditch control materials must be applied without tension and in the direction of the flow of water since there may be some settling of low or filled portions of the ditch and some shrinkage of the material. Do not stretch the material. Install staples as specified.

809.00 SILT FENCING

The purpose of silt fence is to filter the soil from the runoff from our projects. Most of the time most of the silt will be left on our side of the fence. We may not catch all of the silt, but we can catch a large portion of it.

1. Q. - When do I have the silt fence installed?

   A. - Before any soil is disturbed on the project.

2. Q. - But the silt fence is in the way of construction.

   A. - Adjust the installation to fit the situation or adjust the location.

3. Q. - When do I have the silt fence installed around an area inlet?

   A. - As soon as there is something for the water to run into - even before the grate is set.

4. Q. - The silt fence is to be placed where no water will ever reach it.

   A. - Take the fence to the water.

5. Q. - I took the fence to the water, but have lots of it we cannot use.

   A. - Take it off the contractor's hands in the usual method. (Material furnished but not used on project -- CO/SA.)

6. Q. - There is no silt fence on this project and I can see the need for it.

   A. - Change Order.

7. Q. - The high porosity silt fence is allowing too many fine's to pass.

   A. - Install a low porosity fence on the downstream side of the high porosity silt fence.

8. Q. - There is no room on the downstream side of the silt fence.

   A. - Use a low profile, either low or high porosity silt fence, on the upstream side.

9. Q. - The contractor tore holes in the silt fence when he/she cleaned it out.

   A. - Repair work is on the contractor and is to be done immediately. Silt fence clean out is paid as equipment rental items. Make sure the equipment is capable of doing the work. A backhoe works usually but may require a CO/SA to add to the contract.

10. Q. - We did everything like we should and we still had some silt get away.

A. - Hari-kari is not required. The erosion process is a natural one. We are just trying to slow it down and keep our "dirt" at home. Take photographs of what did and did not work and send them in. We will pass on the good and redesign the bad.

809.01 SILT FENCING CHECKLIST

SSHC Reference:	*Section 809 -- Silt Fencing & Special Provisions*
Other References:	Silt Fence Guideline & Approved Products List
Inspection Crew:	Construction Technician
Inspection Equipment:	None

Silt Fencing Procedures:

General Comments:

1. Silt fencing is a first item of business -- before any soil is disturbed.
2. Does the contractor have the right material? (*SSHC Subsection 809.02*, Para. 1.)
3. Is the material on the approved products list?
4. Does the silt fence location need to be adjusted to function better?
5. Silt fences only work when they are:
   a. installed correctly
   b. kept clean
   c. kept repaired
6. Questions -- call 402-479-4537, Roadside Development

Roadside Development
(402) 479-4537:

809.02 SILT FENCE

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At bridge approaches and on other steep slopes, the contractor should place extra rows of silt fence if necessary. The Plan requirements are only a guide and should be adjusted by the project manager to fit the actual field circumstances.

The bay portion of the silt fence is shown partially buried on some details and is not correct. The silt fence should be shown on top of the slope.

@ The objective is to place the silt fence so that silt will not leave our ROW. Design depends on site visits and preliminary survey data. However, erosion control has not been the focus in past surveys. Therefore placement of silt fence and other erosion control items may have not been optimal. If there is a better place – site the fence there; if more is needed, get it placed; the bottom line is do whatever is necessary to provide erosion control – in the long run it is really cheaper.

The District should remove silt fences and bail checks when the ground cover is established.

If the silt fence is properly installed and some subsequent construction activity damages the silt fence, is additional payment authorized?

It will depend on the circumstances. If the fence had to be installed at a location where subsequent activity was necessary and caused the fence to be removed and replaced, then additional payment is justified. However, if the contractor was negligent and did not use reasonable caution and his neglect resulted in damage to the silt fence, then no additional payment is authorized to replace the fence.

@

810.00 SLOPE PROTECTION

810.01 SLOPE PROTECTION CHECKLIST

SSHC Reference: *Section 810 -- Slope Protection & the Special Provision*

Other References: None

Inspection Crew: Construction Technician

Inspection Equipment: Yard stick, meter stick and small balance scale

Procedures and General Comments:

1. The mulch must be prairie hay and certified as noxious weed free (*SSHC Subsection 810.02*)

2. The seed will be mixed at the seed company and tagged with department supplied tags

3. All areas possible are to have the seed drilled. The drilled seed will establish much faster than broadcast seed. The percentage of the area to be drilled is given in the Special Provisions.

4. Hay buster machines have proven to be satisfactory for the mechanical application of the mulch

@ 5. Sampling for the proper weight of mulch per yd^2 or m^2. Use the meter stick or yard stick -- which ever applies -- and gather all the hay in a square before crimping -- and weigh this on the scale -- the results are approximate. Use them as a guide and not as an absolute

6. Best hay information -- Establish a test plot with the exact amount of hay per yd^2 or m^2 -- crimp -- and use this plot for a visual comparison

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7. Questions -- call 402-479-4537, Roadside Development

811.00 SLOPE PROTECTION NETTING

811.01 SLOPE PROTECTION NETTING CHECKLIST

SSHC References:		*Section 811 Slope Protection Netting*
Other Reference:		Approved Products List & Plans
Inspection Crew:		Construction Technician
Inspection Equipment:		NA
Procedures & Comments:	1.	The slope protection must be complete before the netting is installed.
	2.	Is the netting on the approved products list? (*SSHC Subsection 811.02*)
	3.	Are the pins the right length and wire size? (*SSHC Subsection 811.02*)
	4.	Potential problem is inadequate pinning.
Roadside Development (402) 479-4537	5.	Questions - call Roadside Development (402) 479-4537.

812.00 COVERCROP SEEDING

812.01 COVERCROP SEEDING CHECKLIST

SSHC References: *Section 812 Covercrop Seeding*

Other References: None

Inspection Crew: Construction Technician

Inspection Equipment: None

Procedures & Comments:

1. Covercrop seeding is intended to reduce erosion and siltation.
2. This cannot happen unless the covercrop seeding is done in a timely manner.
3. This does not mean to wait and have the permanent seeder put in the covercrop and then overseed with the permanent seed.
4. The covercrop seed should be done at least 45 days in advance of the permanent seeding to be of any use!
5. Covercrop will not be used as a matter of course on "overlay" project, but could be added by change order if the need ever arose.
6. Piper Sudan has been removed from the covercrop lists.
7. Questions - call Roadside Development (402) 479-4537.

812.02 WATER POLLUTION CONTROL (SOIL EROSION)

While this section addresses soil erosion on all projects, *Construction Manual Subsection 1100.30* addresses the additional requirements of a storm water discharge permit. Coverage under the Nebraska Department of Natural Resources permit is required for all projects which disturb more than 2 hectares (5 acres) and are administered by the NDR.

The primary objective is to control soil erosion during construction with reasonable and economical construction practices.

While the contract documents indicate locations of erosion control devices (silt fence, ditch checks, and silt basins), their actual location should be determined in the field in order to fit existing conditions.

The erosion control devices should not be limited to those which are included in the contract documents. The Project Manager should authorize adding any device that will be most effective in controlling erosion.

The primary method for temporary erosion control is cover crop seeding.

Cover crop seeding requires seed bed preparation covering, and compacting as described in *SSHC Section 803*.

The installation of the perimeter silt fence for ditch checks should be installed prior to any soil disturbing activities occurring on the project or as soon as any ditches are created.

Also install silt fence to protect wetlands.

812.03 TEMPORARY WATER POLLUTION CONTROL (SOIL EROSION)

Limitation of exposed surface area - 75,000 m² (90,000 sy) plus an equal amount for clearing and grubbing. These figures do include the roadbed until it is surfaced or the base course has been placed. (*SSHC Subsection 204.02,* Para. 2)

APPROXIMATE LENGTH OF AUTHORIZED OPEN GRADING AREAS

ROW Width x Length to Equal 69,700 m² - 750,000 sq. ft.

Row Width (Metric/English)	Project Length (Metric)	Project Length (English)	Station (English)	Station (Metric)
20m/66’	3,485 m (3.5 km)	11,364’	114 Stations	35
30m/100’	2,323 m (2.33 km)	7,500’	75 Stations	23.3
45 m/150’	1,515 m (1.5 km)	5,000’	50 Stations	15
60 m/200’	1,143 m (1.2 km)	3,750’	38 Stations	12
75 m/250’	917 m (0.90 km)	3,000’	30 Stations	9
90 m/300’	758 m (0.8 km)	2,500’	25 Stations	8

These figures are for level terrain. Large cuts and fills shorten the lengths given above.

These figures may be adjusted up or down to allow for soil conditions, season of the year, contractors operating performance or other considerations.

812.04 CONTRACTOR REQUIREMENTS

The contractor's responsibility is to insure that soil erosion is minimized and to prevent eroded soil from leaving the construction project onto adjacent property. Timely installation of silt control devices, such as silt fence and ditch checks, will help to prevent this damage from occurring. The most effective erosion control practice is cover crop seeding which shall be done as the grading progresses. This may require the erosion control contractor to mobilize and seed more than once.

The contractor's schedule (sequence of operation) and proposed method for accomplishing the required erosion control must be submitted to the Project Manager at the

preconstruction conference and be approved before clearing and grubbing or excavation begins.

The contractor's erosion control work plan should include the following:

- Materials to be used.
- Equipment to be used.
- Location and timing of silt fence and silt basins and other temporary erosion control measures outlined in the Plans.
- Schedule for placement of cover crop seeding and fertilizing.

If the temporary erosion control is to be performed by a subcontractor, the subcontractor should be involved in developing the work plan.

Damage due to siltation on private property shall be corrected by the contractor with no expense to the contracting authority.

813.00 PEAT MOSS

813.01 PEAT MOSS CHECKLIST

SSHC References:	*SSHC Section 813* -- PEAT MOSS
General Comments:	Although peat moss is not used often, it is a very important item when specified. The peat moss adds trace elements that some plants need and can help hold water in the planting soil and help loosen heavy clay in some cases. Make sure that the peat moss is well mixed with the backfill before it is placed in the planting hole so it gets distributed evenly throughout the planting hole.

CHAPTER NOTES:

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