DelDOT Mulching / E&S Guidance (2017)

This is a very basic guidance document for designers to refer when considering the mulching and E&S aspects of their project. This is in no way all-encompassing for every location or situation, but should be sufficient for a first draft to begin further detailed discussions.

Mulching

As per the current 908 specification for temporary and permanent seeding, mulching is as per the Contractor's choice, unless it is specified on the plans. As of right now, we only specify blankets in certain areas. A good rule of thumb is to use the following:

- All permanent swales shall be mulched/matted with the appropriate blanket as per the matting matrix. The blanket should be shown with the centerline of the blanket matching the centerline of the swale. Depending on depth of flow, side slope angle, and length, the side slopes may need to be matted as well.
- All temporary swales should be matted with Erosion Control Blanket (ECB).
- Any slopes steeper than 3h:1v should be matted with ECB.
- Any slopes equal to or flatter than 3h:1v and have slope lengths greater than 50 feet should be studied for their erosion potential for possible matting. This would include but not limited to area draining to slope (volume, CN, Tc) and the slope location (is this slope easy to access or is it fairly isolated).

E&S (Standard Construction Detail #)

E&S is fairly site specific on what should be used in certain areas. Again these are just suggestions based on experience and not the end all be all for E&S on any specific project. Once any project reaches over 20 acres of open disturbance to a single discharge point, then a detailed E&S plan with calculations needs to be presented before the plans will be approved. The calculations would be based on a 2-year rainfall, bare earth condition.

- Silt Fence (E-2)

  Silt fence is used in areas where sheet flow runoff would leave an earthen active work zone. For a rule of thumb, you can start with the following:

  (Feet measurements shown in table are slope lengths.)

	SF	RSF	SSF
2:1 or steeper		≤ 50'	> 50'
3:1 to > 2:1	≤ 50'	>50', ≤100'	> 100'
flatter than 3:1	≤ 75'	>75', ≤150'	> 150'

SF – silt fence

RSF – reinforced silt fence

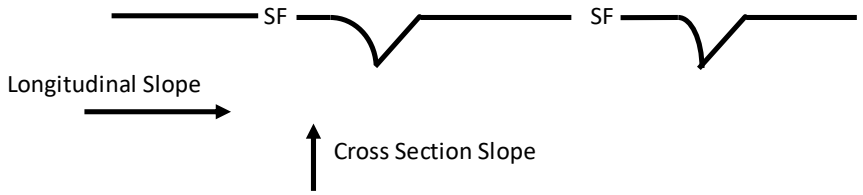
SSF – super silt fence

If silt fence is not needed in a particular area, than don't put it on the plans. This would especially include areas where runoff would have to travel up a hill during all phases of construction. If a boundary or LOC marker is needed, than consider the use of construction safety fence as an alternative. Another very important thing to consider is when looking at your site; look not only at the cross section slope, but the longitudinal slope. In some instances, silt fence at the bottom of a slope can become a detriment based on the fact that runoff now has a "manmade" channel to flow to the bottom of a hill. This can be helped in two different ways.

1. Every 50', curl the silt fence uphill for a few feet, so that a series of "breaks" will occur. Looking down the longitudinal slope, it would look like a series of shark fins. Diagram below.
2. Every 50', place a 4-foot length of compost filter log.

Also remember that the last contour line is not always your LOC as there needs to be some room to tie-in to original grade, especially on slopes where some room is needed for the dozer to vertically track the slopes.

When showing the silt fence on the plans, slightly curl the terminal ends uphill.



- Inlet Sediment Control (E-4)

  Every time a new inlet is installed/constructed or there is an existing inlet downstream of the disturbed area, there should be an inlet sediment control symbol shown. As per the existing specs, there is a difference between the item numbers for 'drainage inlet sediment control' and 'curb inlet sediment control'. The drainage inlet sediment control is the 'box' as shown in Standard Construction Detail E-4. The curb inlet sediment control is basically a bag that fits inside of the catch basin (a frame and grate are also needed for this to function properly). As to which item to use, really depends on the phase of construction and the condition of the basin at that time. This should be spelled out in the plans with a note or depending on site conditions, you could just use curb inlet sediment control in conjunction with a compost filter log as needed. The compost filter log would be used for inlets that have concentrated flows coming from earthen swales. If the inflow is only coming from one direction, than the log could be placed upstream of the bag similar to a check dam, but if the inflow is multidirectional, than show the log wrapped around the basin and overlapped by 1-foot.

- Check Dams (E-5 and E-9 – replace 'stone' with 'compost filter log')

  Check dams need to be placed in areas of concentrated flows (swales, ditches, etc.). We have mostly gotten away from using stone check dams and are using almost exclusively compost filter logs for their easier placement, maintenance, and eventual removal. The amount of check dams needed can be calculated fairly easy by doing the following:

  Start at the downstream end of the swale and place a compost filter log. For check dams, compost filter logs have a diameter of 18". Divide 1.5' by the slope (ft/ft) of your swale. This

will identify how many feet upstream to place the next compost filter log. Do this for the continuous swale run until the amount of linear distance for the next log placement is greater than the amount of swale you have left at the upstream end. Obviously, the steeper the slope the more / closer together the logs will become.

Example: A 350' swale with a continuous 2% slope. How many check dams are required?

- 2% slope = 2/100 = .02 ft/ft
- One check dam will be placed at the outfall point. (1)
- Spacing of check dams upstream in the swale = 1.5ft (check dam height) / .02 ft/ft = 75'
- Number of check dams needed = 350' (swale length) / 75' (check dam spacing) = 4.67
- Since they are no fractional check dams and a check dam is not required at the very beginning of the swale, round down to the nearest whole number = 4
- Final number of compost filter logs to show on the plans would = 1 + 4 = 5
    - Starting at outfall point and heading upstream = Outfall point, +75', +150', +225', +300' = 5 total check dams

The length of compost filter log needed, as a rule of thumb, would be the swale width + 4 feet. Also, when showing on the plans, show the ends of the log slightly curling upstream.

- Temporary Slope Drain (E-10)

  These should be placed anytime you are creating large areas of fill / embankments or have long runs of roadway where construction runoff could build-up and 'blow out' over the side of a slope. Blow outs could also happen at sags / low points. These come in very handy during construction before the final drainage configuration is installed. This is definitely dependent on drainage areas and site conditions. Also, don't forget to show a stabilized outfall at the outflow point. Ideally, you would like to have these flow into sediment basins and sediment traps, if possible.

- Sediment Trap (E-3)

  A rule of thumb we have been using is for areas that will have an open earthen disturbance of 1 acre or more during construction, should be highly considered for using a sediment trap. A lot of times, sediment traps will be used in conjunction with swales that have multiple check dams. The sizing of a sediment trap can be calculated as easy as 3600cf of trap is needed per acre of disturbance (this comes from the formula of 1" of runoff per acre). For road projects, the trap sizing can become quite large to fit within available right of way; hence further discussion of trap size can be discussed during the plan review process. Other aspects to consider are locating within a clear zone and/or utility conflicts. One problem we have been running into is that the sediment traps have to decrease in size during construction as embankments are being constructed to their final configuration; hence, double check the sediment trap can fit within the final ROW alignment. When showing on the plans, sediment traps require their own schedule and make sure to show a proper outlet. The outlet can be as simple as a compost filter log with scour protection to the eventual outfall location. The maximum depth is 4 feet and the length should be a minimum of 2x width.

- Stabilized Construction Entrance (E-14)

These should be shown where the Contractor would exit an active work zone to a paved surface.

- Waterway Construction (E-6, E-7, E-15, E-16, E-18, E-19)

  Whenever work is to be performed in an area that has concentrated active flow or even some larger ephemeral locations (stream, tax ditch, etc.) an E&S sequence needs to be thought out. For blocking the waterway and in very simplistic terms:

  1. The existing flow needs to be bypassed around the work area with a pump, pipe, or other stream diversion method.
  2. The 'dirty water' within the work zone, needs to get 'cleaned up' before it can be returned to the natural water course.

  The above Standard Construction Detail numbers cover almost all items needed for this type of E&S work.