NRCS	**Michigan Technical Note** **USDA-Natural Resources Conservation Service**

AGRONOMY #40 rev. 1
Subject-Vegetative Filter Strip Design with the Revised Universal Soil Loss Equation 2 (RUSLE2) Model

Date: January 2010

GENERAL INFORMATION

Steps to Designing Vegetative Filter Strips using RUSLE 2
Inventory the filter strip location. Record the field RUSLE 2 slope, soil type, and the watershed affecting the planned filter strip area (this requires a field visit). Record the overland flow length for the watershed contributing water flow thru the filter strip per instructions in the NRCS Agronomy Technical Note No. 2. 2007, *Using RUSLE 2 for the Design and Predicted Effectiveness of Vegetative Filter Strips (VFS) for Sediment*, see "How to determine sediment delivery rate and sediment trapping efficiency."

1. Open **RUSLE 2.**

2. Check lower right corner for local Moses data base ex*: (Ionia FO 008.gdb).*

3. Select: Options; Template, Load and select the following template:
   - Advanced SCI ex*: (NRCS Advanced SCI 110606 appears in lower right corner).*

4. Open the profile icon. Select **default** to display the **Advanced** template.

5. Select the FO location from the drop down list.

6 Enter Average Slope Steepness (%).

7. Enter Slope length (horiz.) (ft).
   - Enter the full Overland flow length (OLF) in the slope length box.
   - ***Overland flow length****- is defined as the slope length from the point of the overland flow to the point where slope enters the concentrated flow on the upper edge of a Vegetative Filter Strip.* See NRCS Agronomy Technical Note No. 2. 2007.

9. At the **Contouring** folder use the drop down arrow to select rows up and down or absolute row grade.

10. At the **Strip/Barriers** folder use the drop down arrow, select **Filter Strip & Actual Width. Select the proposed filter strip choice** (for example, 30 ft. Cool season grass filter strip).

11. At the **Subsurface drainage** folder use the drop down arrow. S**elect** none or 100 percent drained.

12. **Open the SOIL tab at the bottom**.
    - Use the drop down arrow to select the county then the soil type. The **Topography tab - self populates slope steepness and percent slope for the overland flow length. Use the most erosive slope that has the most impact on the filter strip.**

13. **Open the Management tab at the bottom –** Use the drop down arrow to enter the Conservation Management System (CMS) for the Contributing Area.

14. **Suggestion:** Build local CMS rotations in the profile simple template and save the local crop rotation in the **C: Other Local Management Records folder**. Use the drop down arrow to select the local management CMS.

15. Use the **+ sign under Segment in the Management tab** to add a line for the Vegetative Filter Strip.

16. Use the drop down arrow on the added segment 2 to select from the **Strip/Barrier Management folder for** the vegetation type in the Vegetative Filter Strip. *Ex: Strip/Barriers management/cool season grass; not harvested*

17. Enter the width in feet of the filter strip under Seg. Length (horiz.) ft.

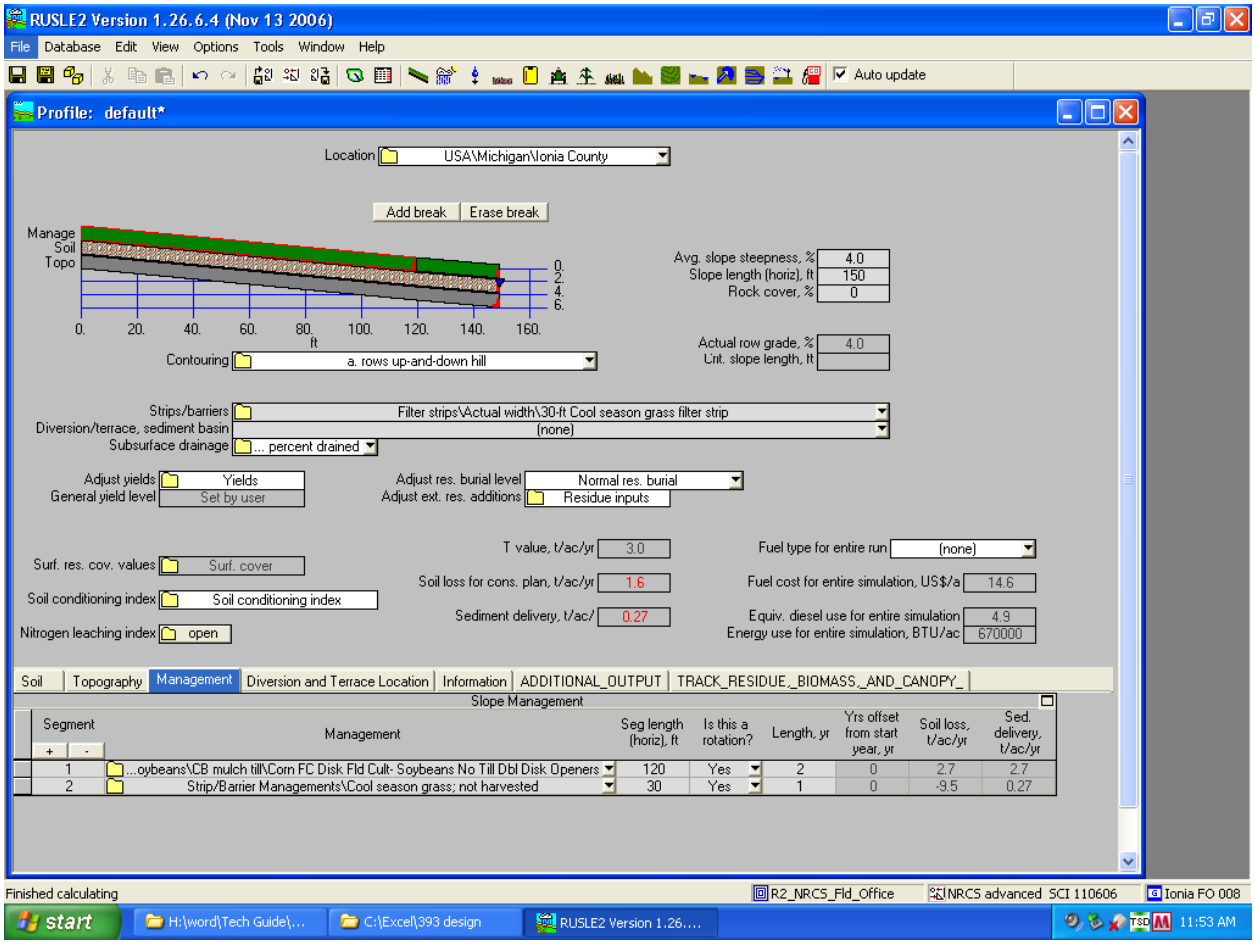
18. Adjust the slope length until it represents the **OLF length**. ***This should represent the slope and filter width combined.***

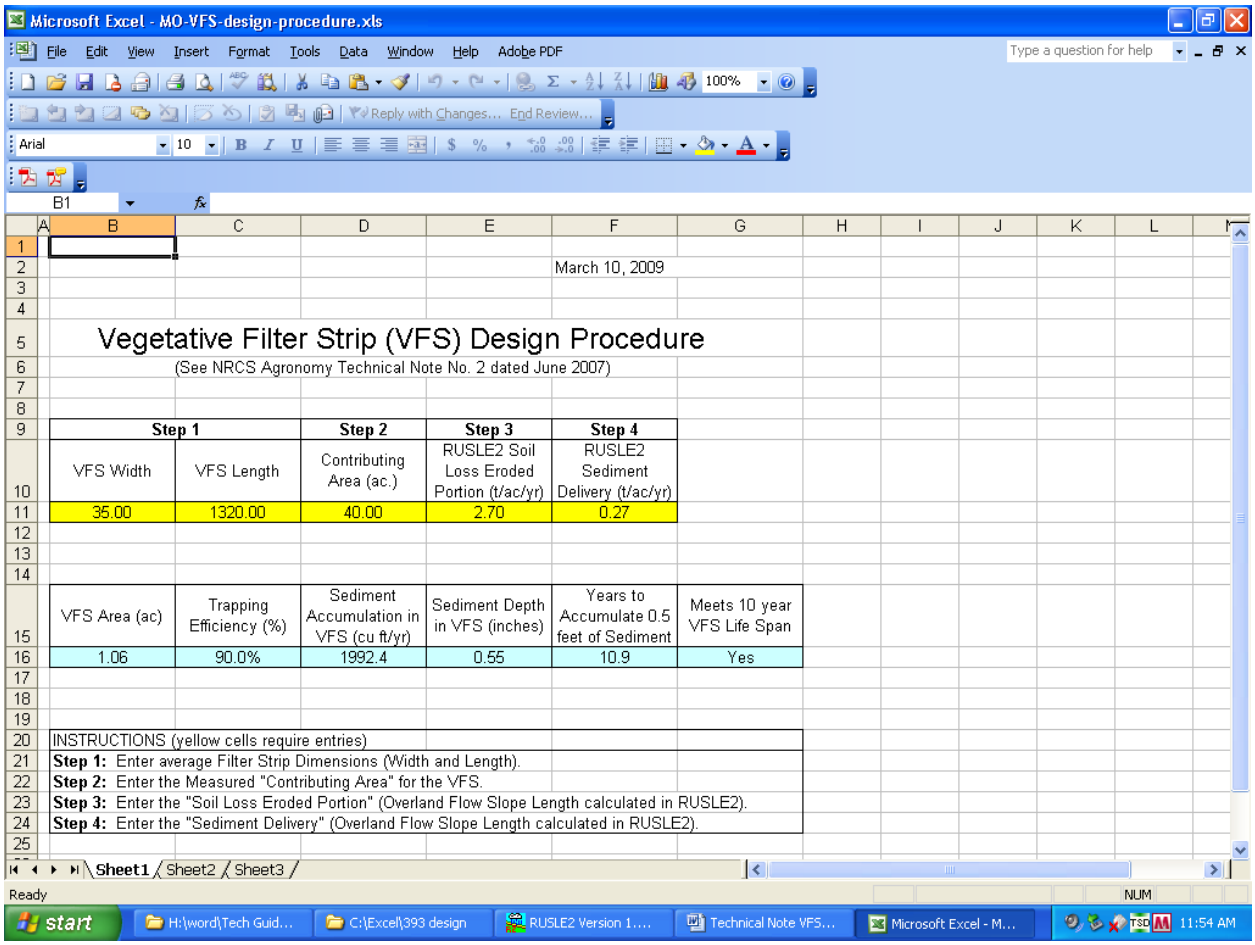
19. **Open Vegetative Filter Strip (VFS) Design Spreadsheet*: (No_40VFS_designprocedure.xls)**

    Step 1 Enter the VFS width and length (ft)
    Step 2 Enter Measured Contributing Area (ac)
    Step 3 Enter RUSLE 2 Soil loss for the eroded portion (cons. plan) (t/ac/yr)
    Step 4 Enter the RUSLE 2 Sediment Delivery (t/ac/yr)

    *****See the NRCS MI EFOTG Section 1/General Resource References/ Reference Material/Michigan Tech Notes Agronomy/No_40VFS_designprocedure.xls. This is an Excel spreadsheet to calculate if the VFS width will meet the 10 year minimum life specified in the general criteria for the MI NRCS 393 Filter Strip Standard.

Verify that the filter strip does not accumulate greater than ½ foot of sediment from the contributing area in a 10 year design life period.





Microsoft Excel - MO-VFS-design-procedure.xls

March 10, 2009

Vegetative Filter Strip (VFS) Design Procedure

(See NRCS Agronomy Technical Note No. 2 dated June 2007)

Step 1		Step 2	Step 3	Step 4
VFS Width	VFS Length	Contributing Area (ac.)	RUSLE2 Soil Loss Eroded Portion (t/ac/yr)	RUSLE2 Sediment Delivery (t/ac/yr)
35.00	1320.00	40.00	2.70	0.27

VFS Area (ac)	Trapping Efficiency (%)	Sediment Accumulation in VFS (cu ft/yr)	Sediment Depth in VFS (inches)	Years to Accumulate 0.5 feet of Sediment	Meets 10 year VFS Life Span
1.06	90.0%	1992.4	0.55	10.9	Yes

INSTRUCTIONS (yellow cells require entries)

Step 1: Enter average Filter Strip Dimensions (Width and Length).

Step 2: Enter the Measured "Contributing Area" for the VFS.

Step 3: Enter the "Soil Loss Eroded Portion" (Overland Flow Slope Length calculated in RUSLE2).

Step 4: Enter the "Sediment Delivery" (Overland Flow Slope Length calculated in RUSLE2).

After completing steps 1-4 adjust the VFS width in steps one to calculate a minimum 10 year VFS life span. This is the new design width for the VFS that meets the criteria in the 393 Standard. In this example the VFS has 10.9 years to accumulate ½ foot of sediment. This design meets the 10 year VFS life span design criteria in RUSLE 2.