

Cross Wind Trap Strip - Field (Acre) 589C

DEFINITION

Herbaceous cover resistant to wind erosion, established in one or more strips across the prevailing wind erosion direction.

PURPOSES

This practice may be applied as part of a Conservation Management System (CMS) to support one or more of the following purposes:

1. Reduce soil erosion from wind.
2. Entrap windborne sediment.
3. Induce soil deposition and entrap pollutants such as: phosphorus, other nutrients, pesticides, and organic material, before it is deposited downwind.
4. Protect growing crops from damage by windborne soil particles.
5. Provide food and cover for wildlife.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to cropland, or other land where crops are grown, wind erosion occurs, and/or:

1. A high risk of sedimentation in surface drainage ditches due to wind erosion after fall tillage buries all residue up to the ditch edge.
2. It can be part of a CMS to reduce soil loss to (T) or below if part of a plan to improve water quality.
3. To protect young seedlings from sand blasting and stand loss due to saltation and surface creep by the planting of annually seeded strips alone or in combination with permanent herbaceous wind barriers.

CRITERIA

General Criteria Applicable To All Purposes Named Above

Width of Trap Strips

Trap strips shall be wide enough to trap saltating soil particles and store windborne sediment originating upwind. Calculate soil loss using the Wind Erosion Prediction method currently available in the FOTG or FOCS to estimate the tons of soil loss before the trap strip is installed. Compute the tons of soil entrapped by the trap strip by calculating the soil loss from the contributing area times 80 percent. The contributing area is the area upwind from the field edge described by "L" used in the wind erosion prediction from the nearest stable border.

Determine design width and spacing by referring to Tables 1 through 4 as follows:

1. Determine the contributing area in acres.
2. Estimate the wind erosion rate in tons/acre/year from the contributing area.
3. Select the trap strip width based on length and deposition depth less than or equal to 2.4 inches/year.

The design accumulated deposition depth, in trap strips of 2.4 inches per year, is approximately 2 feet in 10 years.

Trap strip width must be 15 feet or wider, when vegetation or stubble in the strips will normally be one foot or more in height during periods when wind erosion is expected to occur. However, annually seeded and harvested trap strips of fall seeded wheat or rye should match the farmer's combine header width.

Vegetative Cover

Vegetation or its residue will be one foot or more in height during periods when wind erosion is expected to occur.

Trap strips may consist of perennial or annual plants growing or dead.

A minimum plant density of 75 to 100 stems per square foot is acceptable for most species to entrap saltation and surface creep. This density must be established and maintained.

Select plant species on the following criteria: ability to withstand snow drifting, ability to remain erect during wind erosion periods, tolerance to annual predicted sediment deposition, and adaptation to the soil condition on site. Follow the Critical Area Planting Standard (342) guidelines and MSU Extension Bulletin E-2107 Seeding Practices for Michigan Crops for planting specifications such as: seeding rate, depth, date, etc.

Grasses

1. Switchgrass
2. Big Bluestem
3. Little Bluestem
4. Orchardgrass
5. Smooth Bromegrass
6. Meadow Foxtail
7. Timothy
8. Tall Wheatgrass
9. Redtop
10. Perennial Ryegrass

Legumes (in mixture with above grasses)

1. Crown Vetch
2. Alfalfa (10 year life)
3. Alsike Clover
4. Ladino Clover

Annuals

1. Wheat
2. Rye
3. Winter Barley
4. Triticale
5. Spelt
6. Ryegrass and Sweetclover
7. Ryegrass
8. Sudangrass
9. Sorghum
10. Sorghum-Sudangrass hybrid

Other species must be approved by the State Resource Conservationist.

Apply fertilizer according to a recent soil test of the filter strip area. All required phosphorus and potassium will be incorporated, to prevent direct application into surface water (except where no-tilled). Delay Nitrogen application after emergence and establishment to minimize N loss via leaching or runoff.

Addition Criteria To Reduce Soil Erosion From Wind

Location of Trap Strips

Locate trap strips for this purpose as follows:

- At the windward edge of fields;
- Immediately upwind from areas within fields to be protected from erosion or deposition; or
- In recurring patterns interspersed between erosion-susceptible strips.

Direction and Width of Erosion-Susceptible Strips

When trap strips are installed in patterns alternated with erosion-susceptible crop strips, and the direction of the strips deviates from perpendicular to the prevailing wind erosion direction, the width of the erosion-susceptible strips shall be correspondingly reduced.

The effective distance between strips shall be measured along the prevailing wind erosion direction during those periods when wind erosion is expected to occur. It shall not exceed the width permitted by the soil loss tolerance (T) of the predominate soil used in planning the CMS.

The width of the strips shall be determined using the current Wind Erosion Prediction Method. Calculations shall account for the effect of other practices (residue management for example) in the CMS.

Additional Criteria To Induce Deposition And Reduce Transport Of Windborne Sediment And Sedimentborne Contaminants Downwind

Location of Trap Strips

Locate trap strips immediately upwind from areas to be protected from sediment deposition. There shall be no erosion exposed area located between the trap strip and the area to be protected from sediment deposition.

Additional Criteria To Protect Growing Crops From Damage By Windborne Soil Particles

Placement of Trap Strips

Establish trap strips immediately upwind from areas used for sensitive crops. There shall be no erosion

exposed area located between the trap strip and the crop to be planted.

Direction and Width of Strips Planted in Sensitive Crops

Reduce trap strip width when the predominate wind direction differs from perpendicular to the trap strip.

Measure the effective width along the prevailing wind erosion direction during those periods when sensitive crops are susceptible to wind erosion damage. Base strip width on the crop tolerance* to wind erosion table located in the Wind Erosion Prediction Section I-C of the Field Office Technical Guide (FOTG), or other accepted technical references.

- * Crop tolerance to wind erosion is the maximum rate of soil blowing that crop plants can tolerate without significant damage to abrasion, burial, or desiccation.

Determine width of crop strips using the latest wind erosion prediction method in the FOTG or FOCS WEQ prediction model to estimate wind erosion during specific cropstage periods. Calculations shall account for the effects of other practices in the CMS.

Additional Criteria To Provide Food And Cover For Wildlife

Vegetative Cover

Trap strips shall consist of vegetation that provides food and/or cover for the desired wildlife species and a minimum 30 feet width.

Annual food plots for pheasants or quail may be planted upwind to protect the cross wind trap strips (filter) from excess soil deposition.

Food plots will be consistent with design criteria found in the Interim Standard Wildlife Cover and Food Development.

Trap Strip Height

The minimum trap strip height designed for specific wildlife will provide adequate cover for those species.

PLANNING CONSIDERATIONS

Selection of plants for use in trap strips should favor species tolerant to herbicides used to adjacent crops or other land uses.

When trap strips are designed to enhance wildlife, plant species diversity within the strip should be encouraged. Trap strips that result in various plant heights within the strips will maximize wildlife use.

Drifting snow or grazing by wildlife may reduce the trapping capability of trap strips. In such cases, other conservation practices; including but not limited to residue management, cover crops, windbreaks, and vegetative barriers; may be used with or as alternatives to trap strips to achieve the conservation objective.

Planting of annual cover upwind in 10-20 foot strips will help accumulate wind borne sediment where it can be leveled annually or as needed. This will extend the design life of the permanent cross wind trap strip (filter).

PLANS AND SPECIFICATIONS

Specifications for establishment and maintenance of this practice shall be prepared for each field or treatment unit according to the Criteria, Planning Considerations, and Operation and Maintenance described in this standard.

Specifications will be recorded using the Cross Wind Trap Strip Filter Job Sheet, Conservation Plan Narrative Statement, or Schedule of Operations.

OPERATION AND MAINTENANCE

Headlands, where needed for turning, are required to prevent loss of trap strip function and design.

After establishment, fertilize trap strips with N as needed to maintain plant vigor.

Control noxious weeds by mowing or herbicides, according to MSU weed control guides or the most recent label.

Maintain a minimum height of 1 foot or taller and required species plant density throughout the year to ensure trap strips maintain function as designed.

Trap strips may be mowed and time allowed for regrowth to the planned height before periods when wind erosion or crop damage is expected to occur. However, when barriers are designed to enhance wildlife habitat, they shall not be mowed or pruned during nesting season.

Remove and spread excess windborne sediment deposited in trap strips over the surface of the field as determined appropriate, but before accumulation at the field strip interface reaches a 6-inch depth.

Establish and relocate trap strips as needed to maintain plant density and height.

When barriers are designed to enhance wildlife habitat, they shall not be mowed or pruned unless their height and width exceeds that required to obtain the wildlife objective. Mow according to the needs of the wildlife species and guidelines provided in the Interim Standard Wildlife Cover and Food Development.

Burning of warm season grasses is not allowed unless regrowth will obtain the minimum height criteria during the critical period to protect surface water quality.

Install surface drainage outlets where required to prevent concentrated flow from flushing out sediment in trap strip area.

TABLE 1. CROSS WIND TRAP STRIP (FIELD)

15 FOOT DESIGN TABLE

WIND EROSION CONTRIBUTING AREA

Erosion Rate (tons/ac/yr)	20	40	80	160	320	640	Acres
	(total tons)						
5	100	200	400	800	1600	3200	
4	80	160	320	640	1280	2560	
3	60	120	240	480	960	1920	
2	40	80	160	320	640	1280	
1	20	40	80	160	320	640	

80.0% SOIL TRAPPED BY FILTER

* Salt Factor=0.8 Erosion Rate (tons/ac/yr)	20	40	80	160	320	640	Acres
	(total tons)						
5	80	160	320	640	1280	2560	
4	64	128	256	512	1024	2048	
3	48	96	192	384	768	1536	
2	32	64	128	256	512	1024	
1	16	32	64	128	256	512	

TRAP STRIP WIDTH - 15 FT.

Trap Strip Length (ft)	20	40	80	160	320	640	Acres
	(total tons)						
660	1320	1320	2640	2640	5280		
1320	2640	2640	5280	5280			

TRAP STRIP ACRES

0.23	0.45	0.45	0.91	0.91	1.82
0.45	0.91	0.91	1.82	1.82	

DEPOSITION DEPTH IN TRAP STRIP

Erosion Rate (tons/ac/yr)	(inches/yr)					
	5	2.5	2.5	4.9	4.9	9.9
4	1.2	1.2	2.5	2.5	4.9	
	2.0	2.0	3.9	3.9	7.9	7.9
3	1.0	1.0	2.0	2.0	3.9	
	1.5	1.5	3.0	3.0	5.9	5.9
2	0.7	0.7	1.5	1.5	3.0	
	1.0	1.0	2.0	2.0	3.9	3.9
1	0.5	0.5	1.0	1.0	2.0	
	0.5	0.5	1.0	1.0	2.0	2.0
	0.2	0.2	0.5	0.5	1.0	

* Salt Factor - Includes soil loss by surface creep and saltation considered to be 100% trapped by filter.

TABLE 2. CROSS WIND TRAP STRIP (FIELD)

20 FOOT DESIGN TABLE

WIND EROSION CONTRIBUTING AREA

Erosion Rate (tons/ac/yr)	20	40	80	160	320	640	Acres
	----- (total tons)						
5	100	200	400	800	1600	3200	
4	80	160	320	640	1280	2560	
3	60	120	240	480	960	1920	
2	40	80	160	320	640	1280	
1	20	40	80	160	320	640	

80.0% SOIL TRAPPED BY FILTER

* Salt Factor=0.8 Erosion Rate (tons/ac/yr)	20	40	80	160	320	640	Acres
	----- (total tons)						
5	80	160	320	640	1280	2560	
4	64	128	256	512	1024	2048	
3	48	96	192	384	768	1536	
2	32	64	128	256	512	1024	
1	16	32	64	128	256	512	

TRAP STRIP WIDTH - 20 - FT.

Trap Strip Length (ft)	20	40	80	160	320	640	Acres

	660	1320	1320	2640	2640	5280	
	1320	2640	2640	5280	5280		

TRAP STRIP ACRES

0.30	0.61	0.61	1.21	1.21	2.42
0.61	1.21	1.21	2.42	2.42	

DEPOSITION DEPTH IN TRAP STRIP

Erosion Rate (tons/ac/yr)	(inches/yr)					
	5	1.8	1.8	3.7	3.7	7.4
4	0.9	0.9	1.8	1.8	3.7	
	1.5	1.5	3.0	3.0	5.9	5.9
3	0.7	0.7	1.5	1.5	3.0	
	1.1	1.1	2.2	2.2	4.4	4.4
2	0.6	0.6	1.1	1.1	2.2	
	0.7	0.7	1.5	1.5	3.0	3.0
1	0.4	0.4	0.7	0.7	1.5	
	0.4	0.4	0.7	0.7	1.5	1.5
	0.2	0.2	0.4	0.4	0.7	

* Salt Factor - Includes soil loss by surface creep and saltation considered to be 100% trapped by filter.

TABLE 3. CROSS WIND TRAP STRIP (FIELD)

25 FOOT DESIGN TABLE

WIND EROSION CONTRIBUTING AREA

Erosion Rate (tons/ac/yr)	20	40	80	160	320	640	Acres
	(total tons)						
5	100	200	400	800	1600	3200	
4	80	160	320	640	1280	2560	
3	60	120	240	480	960	1920	
2	40	80	160	320	640	1280	
1	20	40	80	160	320	640	

80.0% SOIL TRAPPED BY FILTER

* Salt Factor=0.8 Erosion Rate (tons/ac/yr)	20	40	80	160	320	640	Acres
	(total tons)						
5	80	160	320	640	1280	2560	
4	64	128	256	512	1024	2048	
3	48	96	192	384	768	1536	
2	32	64	128	256	512	1024	
1	16	32	64	128	256	512	

TRAP STRIP WIDTH - 25 FT.

Trap Strip Length (ft)	20	40	80	160	320	640	Acres
	(total tons)						
660	1320	1320	2640	2640	5280		
1320	2640	2640	5280	5280			

TRAP STRIP ACRES

0.38	0.76	0.76	1.52	1.52	3.03
0.76	1.52	1.52	3.03	3.03	

DEPOSITION DEPTH IN TRAP STRIP

Erosion Rate (tons/ac/yr)	(inches/yr)					
	5	1.5	1.5	3.0	3.0	5.9
4	0.7	0.7	1.5	1.5	3.0	
	1.2	1.2	2.4	2.4	4.7	4.7
3	0.6	0.6	1.2	1.2	2.4	
	0.9	0.9	1.8	1.8	3.5	3.5
2	0.4	0.4	0.9	0.9	1.8	
	0.6	0.6	1.2	1.2	2.4	2.4
1	0.3	0.3	0.6	0.6	1.2	
	0.3	0.3	0.6	0.6	1.2	1.2
	0.1	0.1	0.3	0.3	0.6	

* Salt factor - Includes soil loss by surface creep and saltation considered to be 100% trapped by filter.

TABLE 4. CROSS WIND TRAP STRIP (FIELD)

30 FOOT DESIGN TABLE

WIND EROSION CONTRIBUTING AREA

Erosion Rate (tons/ac/yr)	20	40	80	160	320	640	Acres
	----- (total tons)						
5	100	200	400	800	1600	3200	
4	80	160	320	640	1280	2560	
3	60	120	240	480	960	1920	
2	40	80	160	320	640	1280	
1	20	40	80	160	320	640	

80.0% SOIL TRAPPED BY FILTER

* Salt Factor=0.8 Erosion Rate (tons/ac/yr)	20	40	80	160	320	640	Acres
	----- (total tons)						
5	80	160	320	640	1280	2560	
4	64	128	256	512	1024	2048	
3	48	96	192	384	768	1536	
2	32	64	128	256	512	1024	
1	16	32	64	128	256	512	

TRAP STRIP WIDTH - 30 FT.

Trap Strip Length (ft)	20	40	80	160	320	640	Acres

	660	1320	1320	2640	2640	5280	
	1320	2640	2640	5280	5280		

TRAP STRIP ACRES

0.45	0.91	0.91	1.82	1.82	3.64
0.91	1.82	1.82	3.64	3.64	

DEPOSITION DEPTH IN TRAP STRIP

Erosion Rate (tons/ac/yr)	(inches/yr)					
	5	1.2	1.2	2.5	2.5	4.9
4	0.6	0.6	1.2	1.2	2.5	
	1.0	1.0	2.0	2.0	3.9	3.9
3	0.5	0.5	1.0	1.0	2.0	
	0.7	0.7	1.5	1.5	3.0	3.0
2	0.4	0.4	0.7	0.7	1.5	
	0.5	0.5	1.0	1.0	2.0	2.0
1	0.2	0.2	0.5	0.5	1.0	
	0.2	0.2	0.5	0.5	1.0	1.0
	0.1	0.1	0.2	0.2	0.5	

* Salt Factor - Includes soil loss by surface creep and saltation considered to be 100% trapped by filter.