

**NATURAL RESOURCES CONSERVATION SERVICE  
CONSTRUCTION SPECIFICATION**

**RESIDUE AND TILLAGE MANAGEMENT, NO-TILL**

**1. Scope**

The work consists of performing cultural operations to produce crops or hay in a manner that maintains acceptable yields and provides adequate residues on the soil surface from harvest until after planting the next crop. The crop residues will be distributed evenly across the production area and left undisturbed by full-width tillage operations from harvest until planting of the next crop. Plant crops in narrow slots, tilled strips, or residue free strips. The intent of this practice is to provide surface cover to control soil erosion, conserve soil moisture, reduce energy consumption, reduce air particulate matter, reduce weed competition, and improve soil quality. The annual Soil Tillage Intensity Rating (STIR) for soil disturbing activities shall be no greater than 10 for no-till seeding, 15 for strip till seeding, and 20 for direct seed. Practice design and application will be documented on the Cropland Field Management Record in the Revised Universal Soil Loss Equation, Version 2 (RUSLE2) and the Wind Erosion Prediction System (WEPS).

**NOTE: Specific program guidance may be more restrictive on a number of these criteria. Refer to the program manual for specific requirements.**

**2. Materials**

Assure that chemicals used in performing this practice are federally, state, and locally registered and applied strictly in accordance with authorized registered uses, directions on the label, and other federal, state, and local policies and requirements.

Store and dispose chemical containers properly and in a safe manner according to state and local ordinances or procedures.

Ensure that planters or drills are equipped to plant directly through untilled residue or in a tilled seedbed prepared in a narrow strip (not exceeding one-third of the full row-width) for each row through the use of planter attachments such as rotary hoes, sweeps, multiple coulters, or row cleaning devices.

Ensure that combines used to harvest small grains are equipped with devices that will chop and distribute the crop residues over approximately 80% of working width of the header.

Annual STIR values and Soil Condition Index (SCI) values are determined through the use of the RUSLE2 [http://fargo.nser1.purdue.edu/rusle2\\_dataweb/RUSLE2\\_Index.htm](http://fargo.nser1.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm) and WEPS <https://infosys.ars.usda.gov/WindErosion/nrcs/wepsnrcs.html>.

Tillage Equipment Pocket Identification Guide <ftp://ftp-fc.sc.egov.usda.gov/IA/intranet/Tillage.pdf> will serve as a visual guide to operation descriptions in RUSLE2.

**3. Cultural Operations**

**Managing for Soil Erosion Control.** Provide enough surface cover to accomplish sheet and rill erosion objectives as determined by the current approved sheet and rill erosion prediction method. In rainfall erosion areas, leave the soil undisturbed from harvest to planting except for nutrient injection. Approved implements are: no-till and strip-type fertilizer and manure injectors and applicators; similar implements that only disturb narrow strips or slots. Planting or drilling shall be accomplished in a narrow in-row seedbed or slot created by coulters, row cleaners, disk openers, in-row chisels, or rotary tillers. Planters

will be equipped to plant directly through untilled residue or in a narrow tilled strip along each row that is prepared prior or at seeding time.

In wind erosion areas, maintain the amount of residue needed to accomplish soil erosion protection objectives as determined by the current approved wind erosion prediction method. Leave the soil undisturbed from harvest to planting except for nutrient injection. Planting or drilling shall be accomplished in a narrow seedbed or slot created by coulters, row cleaners, disk openers, in-row chisels, or rotary tillers.

Crop residue and tillage management effects on soil erosion by wind and water can be determined by utilizing RUSLE2 for water and WEPS for wind. These programs will give values for the SCI and the STIR. The SCI is a tool incorporated into the erosion programs that estimates trends in soil organic matter, which are assumed to be an indicator of soil quality trends. It combines the effects of organic matter or the biomass factor, the field operations factors which stimulates breakdown of the biomass from tillage, and the erosion factor predicted from the wind or water erosion model. If the rating value is negative the system is predicted to have declining organic matter values. If the rating value is a positive number the system is predicted to have improving organic matter values. If the rating value is zero the system is considered to be maintaining it organic matter at the current level.

The amount of disturbance the tillage implement causes on soil affects soil health and is represented by the STIR value. This value is used to determine the upper limits of the amount of disturbance allowed in different tillage categories. No-till requires a STIR value less than 20 and will be typically below 15. Specific components of the STIR value include: operation speed of the tillage equipment, type of equipment, depth of tillage operation, and percent soil surface disturbed. Low STIR values decrease the likelihood of soil loss from wind or water erosion. Other benefits of low STIR value are improving soil health by increased organic matter, reduced carbon loss to the atmosphere, and improved soil conditions and infiltration rates.

Perform planting directly into old crop residues, annual cover crop, or chemically killed sods.

Follow fragile residue producing crops with non-fragile residue producing crops and follow low residue producing crops with high residue producing crops. Do not use fragile, low residue producing crops more than two consecutive years.

#### Residue Types

Nonfragile	Fragile
Alfalfa or legume hay	Canola/Rapeseed
Barley *	Dry beans
Corn	Dry peas
Flaxseed	Fall seeded cover crops
Forage Silage	Lentils
Grass Hay	Mustard
Millet	Potatoes
Oats	Safflower
Pasture *	Soybeans
Popcorn	Sugar Beets
Rye *	Sunflowers
Sorghum	Vegetables
Triticale *	
Wheat *	

\* If a combine is used with a straw chopper or otherwise cuts straw into small pieces in harvesting small grain, then the residue should be considered as being fragile.

**Managing for Available Soil Moisture.** In systems designed to maximize available soil moisture, crop stubble should be left standing during the winter period to increase the potential for snow catch. When shredding of stalks and stubble are included in the system, these practices should be conducted after primary snowfall periods to reduce evapotranspiration at the soil surface. The annual STIR value shall not exceed 20.

**Managing for Pest Reduction.** Maintain a diverse crop rotation that will disrupt life cycles and not provide carryover diseases. Manage chemical diversity to reduce the potential of resistance to applied chemicals.

Spot treat perennial weed populations with chemical applications during the period when plant translocation to the root system is most advantageous for complete control. Early detection and immediate treatment will eliminate the need for more costly eradication or control.

Managing insect populations requires early detection and control to keep populations below an economic loss threshold. Monitor border areas for potential population expansions and control prior to infestations of the cropping area where feasible.

Control of weeds can be accomplished primarily with herbicides, crop rotations, and cover crops.

Where cultivation is used for emergency weed control or spot tillage treatment is required for leveling ruts or similar operations, tillage shall be limited to the specific area of concern and to those operations which minimize burial of the crop residue.

**Managing for Wildlife Food and Cover.** Use an approved habitat evaluation procedure to determine residue height, amount, and time period. . Do not remove residue unless it is determined by the habitat evaluation procedure that removal would not adversely affect habitat values.

Determine the primary management purpose or objective when planning pest management activities. In a wheat-fallow cropping system, it has been determined that eliminating summer post harvest weed control applications have little or no detrimental effects on available soil moisture, but is very beneficial to pheasant populations.

#### 4. Other Requirements

Burning of residue is not allowed.

Partial removal of residue by means of haying or grazing shall be limited to the amount needed to meet the desired objectives.

Any make of rotary harrow is considered full-width tillage and is applicable to Conservation Practice 345, Residue and Tillage Management, Reduced Till, and will not be considered as a component of a Conservation Practice 329, Residue and Tillage Management No-Till.

The use of any vertical tillage tool is considered full-width tillage and is applicable to Conservation Practice 345, Residue and Tillage Management, Reduced Till, and will not be considered as a component of a Conservation Practice 329, Residue and Tillage Management No-Till, due to the fact it exceeds the STIR value of 20.

The owner, operator, contractor, or other persons shall conduct all work and operations in accordance with proper safety codes for the type of equipment and operations being performed with due regard to the safety of all persons and property.

**Planning and documentation requirements:**

- Identified problem
- Producer's objectives
- Location map—planning land unit, map, or sketch of the area planned
- Measured acres
- Cropping sequence and planned residue, kind, amounts, percent surface cover required, and orientation documented on either a RUSLE2 output or a WEPS run.
- Critical time periods to maintain residue
- Documentation of applied residue in pounds or percent by planning land unit