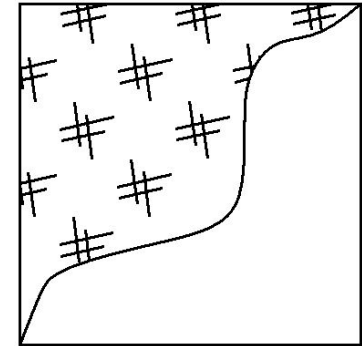


EC-9 STRAW MULCH

For assistance, contact the District Environmental Planners and the Roadside Program Administrator at ITD Headquarters Maintenance Section.

Refer to: ITD Standards and Specifications for Highway Construction, Sections 212, 621, and 711.



Standard Symbol

Definition and Purpose

Straw (wheat, rice, or barley) mulch consists of placing a uniform layer of straw and incorporating it into the soil with a studded roller or anchoring it with a plant based tackifier stabilizing emulsion.

Appropriate Applications

- Straw mulch is typically used for soil stabilization as a temporary surface cover on disturbed areas until soils can be prepared for revegetation and permanent vegetation is established.
- Also typically used in combination with temporary and/or permanent seeding strategies to enhance plant establishment.
- Straw can be crimped, rolled, or punched into the soil. Compaction is increased with this method and should be evaluated with overall project goals.

Limitations

- Availability of erosion control contractors and straw may be limited prior to the rainy season due to high demand.
- Straw mulch is not effective in windy or flat areas. Straw mulch is susceptible to movement with moderate to high winds. Sustaining winds that exceed 15 mph will blow or move straw mulch and may move it off the project site. Straw mulch should not be applied in winds that cause unwanted or excessive spreading of the mulch. Straw mulch shall not be applied in areas dominated by prevailing winds.

BMP Objectives	
<input type="checkbox"/>	Perimeter Control
<input checked="" type="checkbox"/>	Slope Protection
<input checked="" type="checkbox"/>	Borrow and Stockpiles
<input checked="" type="checkbox"/>	Drainage Areas
<input type="checkbox"/>	Sediment Trapping
<input type="checkbox"/>	Stream Protection
<input checked="" type="checkbox"/>	Temporary Stabilizing
<input checked="" type="checkbox"/>	Permanent Stabilizing

- There is a potential for introduction of weed-seed and unwanted plant material.
- When straw blowers are used to apply straw mulch, the treatment areas must be within 150 feet of a road or surface capable of supporting trucks.
- Straw mulch applied by hand is more time-intensive and potentially costly.
- May have to be removed prior to permanent seeding or soil stabilization.
- Application of straw mulch should be performed in calm conditions with wind speeds below 8 mph.
- When working in sandy soils, pushing the straw into the soils with shovels, discs, or other equipment has limited effectiveness. Other methods, such as the use of plant based tackifier, should be considered to secure the mulch in place.

Design Parameters

- Straw shall be derived from wheat, rice, or barley.
- Straw mulch shall not be applied in areas with moderate to high winds.
- A plant based tackifier is the preferred method for anchoring straw mulch to the soil on slopes. Specifically a guar or plantago based tackifier.
- Crimping, punch roller-type rollers, or track walking may also be used to incorporate straw mulch into the soil on slopes. These measures will help stabilize the straw by burying portions of the stems into the soil. Compaction is increased with this method and the tradeoffs of offsetting surface stability with long-term soil productivity should be considered. Track walking shall only be used where other methods are impractical.
- Placing straw onto the traveled way, sidewalks, lined drainage channels, sound walls, and existing vegetation shall be avoided.
- Straw mulch with plant based tackifier shall not be applied during or immediately before rainfall.
- Straw mulch shall be certified free of any Idaho noxious weeds and shall be certified by an accredited Idaho laboratory or national association such as the North American Weed Management Association.

Application Procedures

- When straw is used as mulch, the application rate should not be applied too deep or in a way that forms a physical barrier that reduces seed germination or establishment. Applying too much straw will restrict sunlight and growing space for establishing seedlings. The minimum acceptable depth is one (1) inch. Straw mulch shall be applied so that 15%-20% of the surface soil is visible through the straw after application.
- Generally, loose straw shall be applied as indicated in the project's special provisions or manufacturer's recommendation, either by machine or by hand distribution.
- If stabilizing emulsion will be used to anchor the straw mulch in lieu of incorporation, embankment or fill areas shall be roughened by rolling with a crimping or punching type

roller or by track walking, before placing the straw mulch. Track walking should only be used where rolling is impractical and shall be considered when applying duff.

- The straw mulch must be evenly distributed on the soil surface.
- The mulch shall be anchored in place by using a plant based tackifier or by “punching” it into the soil mechanically (incorporating).
- A plant based tackifier acts to glue the straw fibers together and to the soil surface. The plant based tackifier shall be selected based on longevity and ability to hold the fibers in place. Products such as guar and plantago are preferred and used with low quantities of straw mulch to bind the straw together.
- A plant based tackifier is typically applied at a rate of 125 pounds/acre. In windy conditions, the rates are typically 180 pounds/acre.
- Methods for holding the straw mulch in place depend upon the slope steepness, accessibility, soil conditions, and longevity. If the selected method is incorporation of straw mulch into the soil, then do as follows:
 - On small areas, a spade or shovel can be used.
 - On slopes with soils that are stable enough and of sufficient gradient to safely support construction equipment without contributing to compaction and instability problems, straw can be punched into the ground using a knife-blade roller or a straight bladed coulter, known commercially as a “crimper.”
 - On small areas and/or steep slopes, straw can also be held in place using degradable plastic netting or jute. The netting shall be held in place using 11 gauge wire staples, geotextile pins or wooden stakes (as described in EC-11 (Geotextiles, Plastic Covers, and Erosion Control Blankets/Mats).

Maintenance and Inspection

- Inspections shall be conducted as required by the NPDES permit or contract specifications.
- The key consideration in Maintenance and Inspection is that the straw needs to last long enough to achieve erosion control objectives.
- An unbroken, temporary mulched ground cover shall be maintained while disturbed soil areas are non-active. Any damaged ground cover shall be repaired, and exposed areas re-mulched.
- Reapplication of straw mulch and plant based tackifier may be required to maintain effective soil stabilization over disturbed areas and slopes.
- After any rainfall event, the Contractor is responsible for maintaining all slopes to prevent erosion.

Qualified Products List Criteria

All mulch products shall meet the State of Idaho State Department of Agriculture Seed Laboratory or the North American Weed Management Association (NAWMA) noxious weed-

free certification requirements prior to approval. Certification shall be one of the following two certifications:

1. Certified Noxious Weed Free Testing performed by the State of Idaho State Department of Agriculture Seed Laboratory, Boise, Idaho (208)332-8630. <http://www.agri.state.id.us/Categories/PlantsInsects/NoxiousWeeds/nwffs.php>

or

2. Certified Noxious Weed Free Testing performed by the North American Weed Free Forage Program. (<http://www.nawma.org/WFF/WFFStandards.pdf>)

All mulch products shall also meet the following criteria:

- Shall be degradable and free of chemical printing ink, germination inhibitors, herbicide residue, chlorine bleach, rock, metal, plastic, and other materials detrimental to plant life.
- May have up to 5 percent by weight of photodegradable material.
- Shall be suitable for spreading with a hydroseeder.
- Shall be manufactured in such a manner that when agitated in slurry tanks with water, the fibers will become uniformly suspended, without clumping, to form a homogeneous slurry.
- All dyes shall be non-toxic to plants, animals, and aquatic life and shall not stain concrete or painted surfaces.
- Shall be furnished with a Material Safety Data Sheet (MSDS) that demonstrates that the product is not harmful to plants, animals, and aquatic life.

Laboratory and field testing results supporting the manufacturer’s data shall be provided and meet the criteria in Table 1 below.

Table 1: Mulch Products, Qualified Products List Criteria

	Mulch Mixture
ASTM 7322 - Ability to Encourage Seed Germination and Plant Growth	200% min
ASTM 7367 - Water Holding Capacity	900% min
ASTM D 6818 - Wet Bond Strength	N/A
ASTM 7101 - EPA 2021.0 (96 hr LC50)	>100%
ASTM D 5338 - Plastic Aero Biodegradability	100%
ASTM D 2974 - Organic Material	90% min
ASTM D 6566 - Mass per Unit Area	N/A
ASTM D 6525 - Thickness	N/A
ASTM D 6567 - Ground Cover	N/A
ASTM 6459 - C Factor	0.15 max
EcoToxicity - EPA - 821 - R - 02-012 measuring acute toxicity of effluents. Test leachate from recommended application rate receiving 2 inches of rain per hour using static test for Non Observed-Adverse-Effect-Concentration (NOEC)	NOEC
Longevity	1-3 months