Stormwater Best Management Practice

Mulching

Minimum Measure: Construction Site Stormwater Runoff Control
Subcategory: Erosion Control

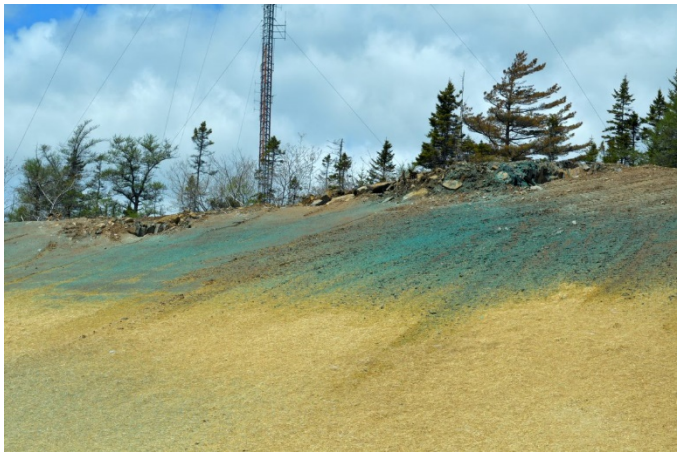
Description

Mulching is an erosion control practice that uses materials such as grass, hay, wood chips, wood fibers, straw or gravel to stabilize exposed or recently planted soil surfaces. Mulching is advisable and most effective when sites use it with seeding or vegetation. In addition to stabilizing soils, mulching can reduce stormwater velocity and improve infiltration. Mulching can also aid plant growth by holding seeds, fertilizers and topsoil in place; preventing birds from eating seeds; retaining moisture; and insulating plant roots against extreme temperatures.

For areas with steep slopes or highly erodible soils, several options provide greater stability than loose mulch, including mulch matting, netting, tackifiers and hydromulch. Manufacturers make mulch matting from coir, jute or other fibers, which they form into sheets that are more stable than loose mulch. Construction staff can apply netting over loose mulch to keep it in place while plants are growing; this not only helps keep the mulch in place, but it also reduces the need for reapplication. Mulch tackifiers, which manufacturers make from asphalt or synthetic materials, are an alternative to mats and netting for binding loose mulch. Hydraulically applied erosion control product, or hydromulch, is another soil stabilization method that uses mulch. Hydromulch application uses a large tank, typically 1,000 to 3,000 gallons in volume, mounted on a truck or trailer to spray a mixture of water, mulch and tackifier onto soils to stabilize them. Hydromulch adheres to the top layer of soil, creating a crust that allows water to infiltrate while holding soil in place (WSDOT, 2019).

Applicability

Mulch is applicable to most construction sites and can provide immediate, inexpensive erosion control. Sites often use mulch with seeding to help establish vegetation and stabilize soils, and mulch can be effective in areas where it is difficult to establish vegetation, such as areas with steep slopes. Mulches are also effective in areas where sensitive seedlings need moisture retention



Straw and hydroseed applied to a slope.

or insulation from extreme temperatures. On steep slopes and in critical areas, such as those near waterways, construction staff should use netting, anchoring or tackifiers to stabilize the mulch. Alternatively, construction staff can apply hydromulches to stabilize soils in critical areas and areas with steep slopes.

Siting and Design Considerations

When possible, construction staff should use natural mulches for erosion control and plant material establishment. Suitable materials include loose straw, wood bark, wood cellulose or agricultural silage. Where available, sites can use ground tree trimmings or stumps that would otherwise end up in landfills, providing a beneficial reuse option. In most cases, mulch materials should have weed-free certification in accordance with applicable state requirements. Sites can use inorganic mulches, such as pea gravel or crushed granite, as an alternative to using mulches with anchoring or hydromulch in unvegetated areas and areas with steep slopes.

Construction staff should uniformly apply mulch at a rate appropriate for the type of mulch and in accordance with manufacturer specifications to prevent erosion, washout and poor plant establishment. Depending on slopes,

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wind conditions and mulch type, mulch application may require netting, tacking or other stabilization to reduce loss from wind and water erosion. Construction staff should stabilize loose hay or straw with netting, disking, crimping or tackifier. Materials that are heavy enough to stay in place (for example, gravel, bark or wood chips on flat slopes) do not need stabilization. Construction staff should use jute, coir or other biodegradable material netting or matting for mulch stabilization and should choose the material based on the length of time it requires for vegetation establishment. Construction staff should avoid plastic netting wherever possible. Hydromulch application should take place in spring, summer or fall so the site can establish plants before the material deteriorates. Table 1 provides typical mulch application rates and requirements.

Table 1. Typical mulching materials and application rates.

Material	Rate (Tons per Acre)	Requirements	Notes
Organic Mulches			
Bark	5–8[a]	Air dry; shredded, hammermilled or chips	Apply with mulch blower, with chip handler or by hand; do not use asphalt tack
Hydraulically applied mulches	1.25–2.5[a,b]	Apply via high-pressure pumping from mixing tank, through a hose and nozzle apparatus	Do not apply during rain or wind events or immediately before a storm event
Straw	1–2[c]	Dry, unchopped, unweathered; avoid weeds	Spread by hand or machine; tack or tie down
Wood chips	5–8[a]	Air dry, add 12 pounds of nitrogen fertilizer per ton of wood chips	Apply with blower, with chip handler or by hand; not suitable for fine turf areas
Wood fiber or wood cellulose	½–1		Use with hydroseeder; can use to tack straw; do not use in hot, dry weather
Inorganic Mulches			
Rock	200–500[a]		Can be costly; does not promote plant growth
Nets and Mats			
Coir net	Cover area	Apply heavily and uniformly; use with organic mulch	Withstands water flow
Excelsior (wood fiber) mat	Cover area		Anchoring only a requirement in critical areas or at sites subject to high winds; decomposes slowly[d]
Fiberglass roving	½–1	Continuous fibers of drawn glass that a non-toxic agent binds together	Apply with compressed air ejector; tacking may be necessary; consider end of life removal/disposal
Jute net	Cover area	Heavy, uniform; woven of single jute yarn; use with organic mulch	Withstands water flow

[a] Recommended application rate data source is MPCA, 2019.
[b] Recommended application rate data source is WSDOT, 2019.
[c] Recommended application rate data source is MDT, 2015.
[d] Application notes are from USDA, 2011.

Limitations

Mulching, matting and netting might delay seed germination because the cover changes soil surface temperatures. Mulches themselves are subject to erosion, and stormwater may wash them away during a rain event; sites should not use mulches in areas of concentrated flow without additional erosion and sediment control practices that are effective at reducing concentrated flow conditions.

Hydromulches need time to dry, and construction staff should apply them at least 24 hours before a storm. For long-term mulch application, construction staff should apply hydromulches in layers, with enough time between applications to allow each layer to dry. Refer to manufacturer specifications to determine actual application rates and drying times.

Maintenance Considerations

When mulches stabilize and protection is no longer necessary, remove netting or matting and compost or dispose of it as appropriate. Inspect mulched areas often in accordance with any applicable permit requirements and, where applicable, stormwater pollution prevention plan specifications to identify areas where mulch has loosened or where there has been mulch removal, especially after rain. Reseed these areas, if necessary, and replace the mulch cover immediately. If using mulch binders, reapply them at rates that the manufacturer recommends. If washout, breakage or erosion occurs, repair, reseed and reapply mulch. Inspections and maintenance activities should continue until firm vegetation establishment occurs.

Effectiveness

Mulching is effective at reducing soil loss. Effectiveness varies according to the type of mulch, but for most mulches, it increases as the application rate increases. For example, applying 0.5 tons of hay mulch per acre reduces soil loss by 75 percent, and applying 2.0 tons per acre reduces soil loss by 98 percent. Applying wood chips at a rate of 6 tons per acre reduces soil loss by 94 percent, applying wood cellulose at a rate of 1.75 tons per acre reduces soil loss by 90 percent, and applying gravel reduces soil loss by 95 percent (MPCA, 2019).

Cost Considerations

Table 2 shows costs that relate to various types of mulch, including material and labor costs. The high variability reflects differences in regional markets and raw material availability. When more than one product may be suitable for a particular application, using a more locally sourced option may realize cost savings.

Table 2. Typical costs for mulching materials and labor per acre.

Material Type	Cost (Dollars per Acre)[a]
Hay, 1-inch application depth	$2,000–$4,000
Oat, 1-inch application depth	$2,500–$4,500
Wood chips, 2-inch application depth	$13,000–$18,000
Stone, 3-inch application depth	$80,000–$100,000
Pea gravel, 3-inch application depth	$65,000–$95,000
Hydromulch	$10,000–$17,000
Jute netting	$7,500–$11,000

[a] Cost data source is RSMeans, 2019.

Additional Information

Additional information on related practices and the Phase II MS4 program can be found at EPA's National Menu of Best Management Practices (BMPs) for Stormwater website

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References

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