Erosion control protects water quality, maintains the structural integrity of the roadway, protects germinating seed, and helps counties comply with NPDES Phase II regulations. It is among the most important goals of an IRVM program. Permanent vegetation is the long-term solution, but short-term erosion control is necessary to protect exposed soil while vegetation matures.

**Types of erosion**

Soil erosion can occur by a number of processes. Those of greatest concern to a roadside manager are splash, sheet and rill erosion on slopes, and channel erosion in concentrated flow areas.

- **Splash erosion** occurs when raindrops dislodge exposed soil particles. These particles settle in soil pores and when dry, form a crust, reducing infiltration during subsequent rains.

- **Sheet erosion** occurs in heavier rains on uniformly smooth soil surfaces. Dislodged particles become suspended and are transported downslope.

- **Rill erosion** occurs when slight differences in soil surface elevation cause runoff to concentrate and form a pattern of cuts or rills. It is more likely to occur than sheet erosion since slopes are rarely uniformly smooth.

- **Channel erosion** occurs in concentrated flow areas and is caused by downward scour due to flow shear stress. Many, if not all roadsides are conduits for concentrated flow.

**Planning for erosion control**

Erosion control objectives should be considered in the planning stage of each roadside project. Many factors affect a site’s erosion potential. Some also affect how quickly vegetation will establish and provide stabilization. The following interconnected factors should be analyzed to determine what, if any, erosion control practices are necessary:

- Time of year (How long will soil be exposed?)
- Soil type and fertility
- Slope length, grade and aspect
- Off-site surface flow onto project area
- Type of seed mix (Warm season establishes slower than cool season.)
- Weather forecast

Other considerations: the consequences of failure and the presence of sensitive areas (e.g., wetlands, sensitive waterways and critical habitats for threatened and endangered species).
**EROSION CONTROL**

General short- and long-term erosion control techniques are outlined below. The erosion control industry has many useful websites with up-to-date technical specifications and guidelines. A list is provided at the end of the chapter. Take advantage of these resources and other educational opportunities to stay abreast of this rapidly evolving industry.

**Soil Preparation**

Strike a balance between an ideal seedbed and maximum erosion control. Firm, friable soil surfaces – recommended for seeding – can be susceptible to erosion. Loose, rough soil surfaces provide better infiltration and slow runoff.

Surface roughening practices, such as **directional tracking** and **grooving**, slow runoff by creating depressions or grooves perpendicular to the flow. On steep slopes, these practices must be used in conjunction with other methods, preferably hydroseeding.

**Directional tracking**

Driving a bulldozer or other tracked vehicle up and down a slope leaves depressions perpendicular to the slope. (Driving a tracked vehicle across the slope can increase erosion.) Tracking may not be appropriate on clayey soil since compaction can inhibit vegetation establishment, and severe compaction can even prevent no-till drills from penetrating the soil. Concerns regarding compaction decrease when hydroseeding or broadcasting during the dormant season, since freezing and thawing will loosen the soil.

**Grooving**

Pulling a disk or ripper behind a tractor or dozer, or back-dragging a toothed bucket with a loader across a slope creates a series of ridges and grooves. Grooving can be more effective than tracking because the depressions are usually deeper and the soil is left in a looser state. Many implements can be used.

SUDAS (Statewide Urban Design and Specifications) specifies grooves be no more than 15 in. apart and 3 in. deep, though groove depth is subject to debate. Deep grooves improve erosion control, but increase the likelihood of seed becoming buried too deeply to germinate. Seeding method will help determine appropriate groove depth. One-step hydroseeding is best over deeper grooves since mulch keeps seed near the surface. If seed is not incorporated in a slurry when planted, lighter grooving is recommended.
**Mulch**

Mulch helps prevent splash erosion and holds seed in place by absorbing rainfall impact and binding soil particles together. Mulching is accomplished by blowing on straw or by hydromulching.

**Straw**

Dry cereal straw – free of noxious weed seed – can be applied alone or on top of seed to provide short-term erosion protection, conserve moisture and suppress weeds. Typically oats or wheat straw is used – blown on at a rate of 1 to 1½ tons per acre. Straw applied evenly at the correct rate will allow approximately 50% of the soil to be visible. If applied too heavily, seed germination may be affected. Some bale processors can be adjusted to make shorter or longer mulch – longer is better.

To keep straw mulch on site, it must be crimped or tacked in place. Areas accessible to ground-driven equipment can be crimped. Crimpers (a.k.a. mulch tuckers or mulch discs) are mounted on a 3-point and pulled with a front-wheel assist tractor. Test runs are necessary to ensure the crimper wheels go in to the soil at least three inches – enough to anchor the straw. Properly anchored straw mulch will stand up straight and look similar to oats mowed high.

Tacking is accomplished by adding tackifier to water in a hydroseeder and applying evenly until the straw is wet, but not running off. This dries and acts as a glue to hold the straw in place. Tackifier rates vary with brand and are provided on the bottle in lbs. per acre. If too much tack is added, the mixture will get slimy and prevent the pump from priming.

Some IRVM programs use prairie hay – harvested from plots or plantings – in place of straw mulch. Application method and rates are similar to straw, though rates may vary depending on the dominant species in the hay. Fewer bales will be necessary because the hay weighs more than straw.
Hydromulch
Hydromulches are applied with or on top of seed to conserve soil moisture and, depending on type, prevent splash, sheet or rill erosion. None are suitable to withstand the shear stress of concentrated-flow situations.

Common types of hydromulch

Cellulose (paper)
Made from recycled newspaper, magazines and corrugated cardboard, cellulose is the least expensive hydromulch. Its advantages over wood fiber mulch include: greater water retention, quicker mixing and better pumpability. Cellulose may be the least effective at controlling erosion since it does not have long, interlocking fibers. Be aware of the “paper mache” effect which reduces moisture and airflow to seed, and occurs when cellulose is applied too heavily or with too much tackifier.

Wood fiber
Wood fiber mulch is produced from milled wood, typically aspen. It is more expensive than cellulose and does not hold as much moisture, but it has more loft and the interlocking fibers provide greater erosion control.

Wood/cellulose blend
Blended mulch usually consists of 50-70% wood fiber and 30-50% paper products. It falls in the middle of the two previous mulches in terms of cost, water retention, pumpability and erosion protection.

BFM (Bonded Fiber Matrix)
BFM is a wood fiber mulch – usually with elongated fibers – containing various adhesives, binders and synthetic fibers. BFM mulches retain their strength much longer than traditional mulches.

MBFM (Mechanically Bonded Fiber Matrix) and FGM (Flexible Growth Media)
These mulches contain elongated wood fibers and crimped synthetic fibers along with various adhesives and binders. The crimped fibers provide a strong, mechanical, fiber-fiber-soil bond. No cure time is required to provide erosion protection.

Hydromulch application
Hydromulch is mixed with water and often a tackifier in a truck- or trailer-mounted tank. Spraying the slurry on to the site is called “hydromulching.” When “hydroseeding,” seed and amendments are added to the slurry. The terms are often used interchangeably. Recommended hydromulching rates are shown in Table 1 (page 39) and discussed in Chapter 3 – Seeding.
**Tackifiers** bind mulch fibers to each other and to the soil, enhancing erosion protection. Tackifiers can be purchased separately or be pre-blended in the mulch. Organic and synthetic tackifiers are available. All products have different recommended rates. See manufacturer recommendations before application.

Tackifying agents are preblended in BFM, MBFM and FGM products and undergo a chemical process known as “cross-linking” which prevents rainfall from rewetting and dissolving the tackifier after it is applied.

**Amendments** are added to the slurry to accelerate seed germination and establishment, and improve poor soils. Amendments include water soluble fertilizer, water-storing polymers and plant growth stimulants. Refer to the manufacturer for recommended rates. Peat moss and compost screenings can also be added as a soil amendment, though little research exists on rates.

Synthetic fibers can be added as an amendment to increase the mechanical bond of traditional wood fiber and blended mulches.

*Figure 1*
Compost Blanket

Typically used on poor soil, a compost blanket is a 1-4 in. layer of compost applied with a blower truck. The compost is a blend of coarse and fine material. If seed is applied with the blanket, the layer should not exceed 2 in.; establishing roots may not penetrate the underlying soil if the blanket is deeper. Be sure the compost is well-cured; if applied while still “hot,” vegetation may not establish.

A compost blanket should not be used where overland flow is expected. The blanket will absorb rainfall, but overland flow can erode the compost. If the blanket must be used in areas with overland flow, till in the compost.

When applied correctly, compost blankets are very effective at preventing erosion and promoting seed growth. Specialized equipment is necessary to properly apply compost blankets, so a contractor is typically hired. Due to the expense, a guarantee should be requested to ensure the job is done correctly.

Rolled Erosion Control Products (RECPs)

RECPs are arguably the best way to stabilize most channel areas. They are also used to stabilize slopes. Because RECPs need vegetation to function properly, site conditions must be conducive to vegetation establishment. In extremely poor soils or deep shade, riprap or erosion stone may be the best option. Temporary and permanent rolled products are available.

Manufacturers of RECPs provide specs for their products online. Most manufacturers also provide software to help determine the appropriate product for a given site. A list of virtually all RECPs on the market and their specifications is in the Geosynthetics Specifiers Guide.

Types of RECPs

Erosion control blankets (ECBs)

Erosion control blankets are temporary, degradable, rolled products made of natural or polymer fibers mechanically, structurally or chemically bound together to form a continuous matrix. Blankets are usually classified as netless, single-net or double-net.

Netless blankets consist of fibers stitched together with a biodegradable thread. Because there is no net, this product is typically used in intensively mowed areas and areas where animals could become entangled in netted products.
Single- and double-net blankets consist of one or two polymer or jute nettings interwoven with natural fibers – typically straw, coir (coconut) and/or excelsior. In general, netless and single-net are used on slopes or in low-flow channels. Double-net can be used on slopes and in higher-flow channels.

Turf reinforcement mat (TRMs)
TRMs are permanent, non-degradable, rolled products made of synthetic materials. These three-dimensional mats provide immediate erosion protection, enhance vegetation establishment and offer long-term functionality by permanently reinforcing vegetation. TRMs are typically used in high-flow ditch channels, and on very steep slopes where unreinforced vegetation may not provide adequate erosion protection.

SUDAS classifies TRMs by material and by their performance in channel and slope applications. Refer to Table 1 for more information.

Selecting the appropriate RECP

Slope applications
Manufacturers’ general application guidelines are the easiest way to select a product. A link to an example of these guidelines is provided here. Slope length and grade are used as criteria. Product longevity (determined primarily by material weight) must also be considered when using degradable products. Time of year, soil fertility, aspect, seed mix and other factors affect how quickly vegetation establishes. A product may be appropriate for a specific slope length and grade, but if installed over a seeding in poor soil, it may deteriorate before vegetation establishment.

Manufacturer software is also used to select products for slope protection. Links to examples are provided below. Slope length and grade, surface condition of the soil and the soil erodibility (K) factor for the soil type (found in the NRCS soil survey for each county) are entered in the program which then suggests multiple appropriate products. Growing conditions and seed mixes determine the appropriate functional longevity.

Software examples:
North American Green • Profile Products • American Excelsior
Check Dams
Check dams should be constructed of clean rock, permeable plastic berms or similar products. Unlike silt fence, check dams do not cause water to dam up; they let water pass through – slowing its velocity and dissipating its energy.

Sedimentation can occur on the upstream side. If it becomes too great the check dam will function as a waterfall and the project may begin to fail. Monitor and excavate the upstream side if necessary.

Plastic berms should not be placed in areas susceptible to filling with debris (e.g., corn stubble from a field waterway). One heavy rain can cause these berms to fill with stubble, creating a dam.

Improper check dam design is not uncommon and can cause project failure. Follow current design specs, and account for the individual characteristics of each site.
Erosion and sediment control web sites

Iowa Construction Site Erosion Control Manual

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Finn Corporation - Hydroseeders

Epic Manufacturing

TurboTurf Hydroseeding

Tensar North American Green

American Excelsior

Western Excelsior Erosion and Sediment Control Products

Nilex
**Channel applications**

When stabilizing a concentrated flow area with temporary RECPs, estimate the amount of flow and time it will take for vegetation to establish. Then use manufacturer specs to select a blanket with the appropriate strength and longevity.

For large-scale projects, especially in high-flow situations, further analysis may be necessary:

1. Determine channel dimensions, including width and grade of the channel bed and slopes of each side of the channel.
2. Determine the amount of flow, in cubic feet per second (CFS). Flow determination for a given rain event can be done with complex mathematical formulas (performed by engineering staff) or by observing the channel’s watershed and making an educated guess. When protecting channels at culvert outlets, design protection to withstand maximum discharge.
3. Consider the consequences of failure to decide whether the project requires protection against a two-year storm, five-year storm, ten-year storm, etc. According to CPESC (Certified Professional in Erosion and Sediment Control) guidelines, when using permanent RECPs (TRMs), projects are usually designed to withstand the ten-year frequency, 24-hour duration rainfall event. This is about 4 in. in northern Iowa and 5 in. in the southern part of the state.
4. Enter channel dimensions and flow into the manufacturer’s software, available at their website, to determine an appropriate blanket.

![Figure 2: Erosion Control Product Profile](image-url)
Installing RECPs

Erosion control blanket installation

- Provide good blanket-to-soil contact by creating a smooth soil surface.
- Trench the top of the blanket to a depth of 6 in. and staple at the bottom of the trench. Any blanket overlap should be at least 6 in.
- Refer to the manufacturer’s specs for recommended stapling patterns. In the absence of instructions, staple in a staggered pattern using 3-ft. centers on a slope and 2-ft. centers on a channel.
- In channel applications, center a blanket in the channel bottom to avoid having a seam under the area of maximum flow. At 25-33 ft. intervals, place a check strip of staples 2-4 in. apart across the blanket.
- Install additional staples in uneven ground to ensure good soil contact especially in low points.

RECPs are often maintenance-free after vegetation has established. Until then, inspect after every runoff event, adding staples where erosion has occurred. Routine maintenance is easier than repairing and reseeding the large ruts and gullies that can form under improperly installed or maintained RECPs.

TRM installation

- When used in areas saturated for long durations, provide subsurface drainage to prevent erosion under the mat.
- Anchor mats with 6 in. staples. Use 8 in. staples or stakes in high-flow and loose-soil situations.
- For slope stabilizations, anchor mats with high performance duckbill anchors or ScourStop anchors.
- Seed should be drilled or hydroseeded (not broadcast) to prevent small seed from floating up through holes in the mat and washing away during high-flow events.
• In high-flow situations, BFMs can be used under the mat. Laying sod underneath will provide instant erosion control.
• In slope stabilizations, soil can be placed over the mats. In concentrated flow areas, the top layer of soil will wash away unless straw or excelsior blanket is placed on top.
• TRMs can be infilled with BFMs and FGMs in both channel and slope applications.

Other

Flow Transition Mats
Flow transition mats are a “green” alternative for riprap or concrete in the transition area between flow outlets and channel flow. The semi-rigid, plastic mats – approximately 4 ft. x 4 ft. x ½ in. – are designed with holes which allow vegetation to grow. The mats are installed on top of a TRM in areas of high scour, such as culvert outlets. Flow transition mats can provide better protection than riprap and installation is an easy, one-man job.

• When placing transition mats over fill, make sure area is well-compacted to prevent failure from settling.
• Use subsurface drainage in areas with long durations of saturation.
• For best results, place sod underneath the TRM.
• If not using sod, high-flow events can cause erosion before vegetation establishes. To help minimize erosion, install a staple check strip in the TRM directly downstream of the transition mat.
• Check mats after every runoff event during the first two seasons to make sure anchors are still tight.
Table 1: EROSION CONTROL OVERVIEW

<table>
<thead>
<tr>
<th>Max. slope</th>
<th>Benefits</th>
<th>Limitations</th>
<th>Rate/ A</th>
</tr>
</thead>
<tbody>
<tr>
<td>4:1 3:1 2.5:1 2:1 1.5:1</td>
<td>Can be used to help prep soils on very steep slopes Can use the same equipment being used to complete construction</td>
<td>More time consuming than grooving Can excessively compact soil, especially heavy clay soils Need access to a tracked vehicle</td>
<td>n/a</td>
</tr>
<tr>
<td>Soil Preparation*</td>
<td>More erosion protection than directional tracking Less soil compaction than directional tracking</td>
<td>More risk involved for operator on steep slopes since machine has to be driven along slope contours</td>
<td>n/a</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mulch</th>
<th>Benefits</th>
<th>Limitations</th>
<th>Rate/ A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Straw</td>
<td>Can be applied on slopes and small projects inaccessible to equipment</td>
<td>Time-consuming for large projects.</td>
<td>2000 lb</td>
</tr>
<tr>
<td>Tacked</td>
<td>Good for large projects</td>
<td>Not practical for slopes greater than 3:1</td>
<td>1500-2000 lb</td>
</tr>
<tr>
<td>Crimped</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hydromulch</th>
<th>Benefits</th>
<th>Limitations</th>
<th>Rate/ A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper</td>
<td>Most economical hydromulch Flows through machine and hoses better than other mulches</td>
<td>Provides least amount of erosion control Can “paper mache” if applied too heavily or with too much tackifier, hampering seed germination</td>
<td>1500-2000 lb</td>
</tr>
<tr>
<td>Wood</td>
<td>Wood fibers interlock better than paper mulch</td>
<td>More expensive than paper mulch</td>
<td>1500-3000 lb</td>
</tr>
<tr>
<td>Wood/Paper blend</td>
<td>Pumps better than 100% wood More economical than 100% wood</td>
<td>Less erosion protection than 100% wood</td>
<td>1500-3000 lb</td>
</tr>
<tr>
<td>BFM**</td>
<td>Longer fibers protect better than traditional wood fiber mulch Contains cross-linking tackifying agents Lasts longer than wood or paper mulch</td>
<td>Needs to dry and cure to provide protection Requires more water to flow through machine properly</td>
<td>3000-4000 lb</td>
</tr>
<tr>
<td>MBFM**</td>
<td>Immediate erosion protection, even in light rains Contains cross-linking tackifying agents Lasts longer than wood or paper mulch</td>
<td>Most expensive type of hydromulch Requires more water to flow through machine properly</td>
<td>3000-4000 lb</td>
</tr>
<tr>
<td>Compost blanket</td>
<td>Enhances seed germination and plant growth Excellent at absorbing and holding rainfall.</td>
<td>Water may get under blanket if not applied 5-10 feet back from the top of the slope May rill during severe storm events Not many available contractors Can kill seed if compost is not fully cured</td>
<td>1-4&quot; deep</td>
</tr>
</tbody>
</table>
### Rolled Erosion Control Products (RECPs)

**Erosion Control Blankets** – Type of netting, number of nets and weight of material all contribute to performance.

<table>
<thead>
<tr>
<th>Typical Applications</th>
<th>Benefits</th>
<th>Limitations</th>
<th>Longevity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Netless Excelsior</td>
<td>3:1 or flatter slopes Very low-flow channels in sensitive areas</td>
<td>Has no net to entangle wildlife or get caught in mowing equipment</td>
<td>Limited to gentle slopes and low-flow channels</td>
</tr>
<tr>
<td>Straw</td>
<td>2:1 or flatter slopes Low-flow channels</td>
<td>Best for seed germination</td>
<td>Does not conform well to uneven surfaces</td>
</tr>
<tr>
<td>Straw/Coir blend</td>
<td>1:1 or flatter slopes Low-flow channels</td>
<td>Good seed germination</td>
<td>Does not conform well to uneven surfaces</td>
</tr>
<tr>
<td>Coir</td>
<td>1:1 slopes Medium to high-flow channels</td>
<td>Excellent longevity</td>
<td>More costly than straw and excelsior</td>
</tr>
<tr>
<td>Excelsior</td>
<td>3:1 to 1:1 slopes Low to high-flow channels</td>
<td>Many styles and weights available</td>
<td>More costly than straw</td>
</tr>
</tbody>
</table>

**Turf Reinforcement Mats (TRMs)**

<table>
<thead>
<tr>
<th>Type</th>
<th>Typical Applications</th>
<th>Benefits</th>
<th>Limitations</th>
<th>Longevity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 1</td>
<td>1:1 or flatter slopes Shear stresses ≤ 7 lbs/ft²</td>
<td>Provides for more infiltration and natural aesthetics than rip rap or concrete</td>
<td>Least resistant to UV degradation of all TRMs</td>
<td>Permanent</td>
</tr>
<tr>
<td>Type 2</td>
<td>1:1 or flatter slopes Shear stresses ≤ 10 lbs/ft²</td>
<td>Provides for more infiltration and natural aesthetics than rip rap or concrete</td>
<td>Ineffective in areas not conducive to vegetation (i.e. areas with heavy shade or very poor soil)</td>
<td>Permanent</td>
</tr>
<tr>
<td>Type 3</td>
<td>1:1 or flatter slopes Shear stresses ≤ 12 lbs/ft²</td>
<td>Provides for more infiltration and natural aesthetics than rip rap or concrete</td>
<td>Ineffective in areas not conducive to vegetation</td>
<td>Permanent</td>
</tr>
<tr>
<td>Type 4</td>
<td>1:1 or flatter slopes Shear stresses ≤ 15 lbs/ft²</td>
<td>Provides for more infiltration and natural aesthetics than rip rap or concrete</td>
<td>Most resistant to UV degradation of all TRMs</td>
<td>Permanent</td>
</tr>
</tbody>
</table>

**Other**

<table>
<thead>
<tr>
<th>Flow Transition Mat</th>
<th>Culvert outlets</th>
<th>Allows more infiltration and provides a more natural aesthetic than riprap or concrete.</th>
<th>Needs to be installed on top of a TRM</th>
<th>Permanent</th>
</tr>
</thead>
</table>

* Soil preparation methods are not stand-alone practices. To obtain desired results on steeper slopes, directional tracking and grooving must be used in conjunction with other methods, preferably hydroseeding.

** Used on 3:1 and flatter slopes when slope length exceeds 40-50 ft. See Figure 1.

*** Performance/longevity determined by length of fibers in addition to weight and netting characteristics.
SEDIMENT CONTROL

Containing eroded soil on the project site will be the responsibility of some IRVM programs. Basic sediment control products likely to be used on county rights-of-way are described below.

**Wattles, Sediment Logs and Filter Socks**

Wattles and sediment logs are tubes of straw, coir or excelsior fibers encased in burlap or degradable plastic netting and anchored by wooden stakes. Both filter sediment and slow water flow. Wattles and logs containing densely packed material – especially straw – are good as slope interrupters. Excelsior logs are more porous and less likely to float, so are better suited for ditch checks. Both are good for perimeter applications and inlet protection.

Filter socks are degradable tubes filled with compost, generally used for perimeter control or at intervals along a slope to capture sheet flow. To enhance sediment control, polyacrylamide (PAM) may be added to the compost. PAM captures clay particles creating cleaner runoff.

Wattles, logs and filter socks are usually easy to install and can be put on bare soil or over erosion control blankets.

Excelsior sediment log over excelsior blanket (top). Filter socks (bottom) conform well to soil, reducing the potential for rills to form under the sock.

**Silt Fence**

Silt fences are geotextile barriers trenched in to the ground and supported by posts. They are useful on perimeters and in channels with relatively low flow. Silt fences filter out small amounts of sediment as runoff passes through the fabric. They need to be kept clean to function properly and must be removed after final stabilization, but are easy to install and relatively low cost.

This silt fence was not backfilled properly and was placed in a channel in which the flow was too high.

Silt fences are not effective in high-volume flows and should not be used as a check dam. During moderate or heavy rains, a silt fence check dam will concentrate water from the entire channel, along with the water’s energy. This concentration either goes around the outside of the fence or over the top at the lowest point. It can also go underneath the fence, causing erosion.

Silt fences are ineffective when improperly installed, and improper installation is common. To avoid the problems inherent with these practices, follow up-to-date specifications such as those found here:

Iowa SUDAS • Iowa DOT
Check Dams
Check dams should be constructed of clean rock, permeable plastic berms or similar products. Unlike silt fence, check dams do not cause water to dam up; they let water pass through – slowing its velocity and dissipating its energy.

Sedimentation can occur on the upstream side. If it becomes too great the check dam will function as a waterfall and the project may begin to fail. Monitor and excavate the upstream side if necessary.

Plastic berms should not be placed in areas susceptible to filling with debris (e.g., corn stubble from a field waterway). One heavy rain can cause these berms to fill with stubble, creating a dam.

Improper check dam design is not uncommon and can cause project failure. Follow current design specs, and account for the individual characteristics of each site.
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Epic Manufacturing

TurboTurf Hydroseeding

Tensar North American Green

American Excelsior

Western Excelsior Erosion and Sediment Control Products

Nilex
Comments

Straw mulch

We use wheat straw. It seems to be longer than oats straw and is typically the same price. I have worked with a local contractor who brings up Kansas wheat straw. We have also used Iowa Certified weed seed free straw at a little higher price. Wes Gibbs, Jones County, 2011

With oats or wheat straw, I’ve used seed-bearing stalks to my advantage; it can work as a good cover crop. Ben Hoskinson, Mahaska County, 2011

We always use 1.5 tons/acre of straw mulch. Ole Skaar, Roadside Development, IaDOT, 2011

To apply straw mulch, I use a small bale blower with a gas motor. It chops up the bales. It’s labor intensive and you have to remove the strings from each bale, so I usually only tackle small projects with it. The big round bale blowers (I don’t have one) are less labor intensive and can cover a lot more area in less time but you have to have a mode of transportation for the bales and a large tractor to run it. I generally mulch at 1000 to 1500 lbs. per acre. Ben Hoskinson, Mahaska County, 2011

We use an agricultural-type bale processor (no cannon) which can be a little sporadic on the rate at which it discharges. I don’t insist on 1.5 T per acre if it looks like we are getting adequate coverage, but if it takes 1.5 T to get the job done, that’s what we do. Just be sure you aren’t blanketing over your seed. You should be able to see the ground through the mulch. Wes Gibbs, Jones County, 2011

Our mulch tucker / cultipacker combo is 8 ft. wide and weighs 1600 lbs. We pull it with a 95 HP tractor – you might be able to go a little smaller as long as you have sufficient weight in front to balance it when in the “up” position. Wes Gibbs, Jones County, 2011

If harvested in the fall just after the seed heads have matured, prairie hay bales will carry enough seed to plant a new site. Some seed supplement may need to be used. I think prairie hay works better than straw. It is just reedy enough that it lays out and kind of locks together. Straw is a lot lighter and doesn’t lay down as well. Ben Hoskinson, Mahaska County, 2011

We have a couple organic farmers in the county. When I need straw, I buy it from them. They usually have a field in their rotational plan that will be in oats. I support the concept and like to help them in this small way. Linn Reece, Hardin County, 2011

Hydromulch

An important factor that can get overlooked when dealing with sheet erosion is the additional overland flow that may be coming from the roadway. This can really affect hydrosedded areas, and increased rates of hydromulch may be needed. This doesn’t seem to be an issue when using blankets – which makes sense since blankets are appropriate for protection against channelized flow.

Jim Uthe/James Devig, Dallas County, 2010
I use a wood/paper blend which I think works the best. The wood I’ve used by itself doesn’t have enough substance. I also use FGMs or BFMs as a supplement to the wood/paper or as a stand alone.

*Ben Hoskinson, Mahaska County, 2010*

In an 1100-gallon load of tack, I like to add 2-3 bales of hydromulch, preferably wood fiber. The stringier the better. This seems to act as an additional binder and the dye helps you keep track of where you are spraying. I like to get out and visually inspect the treated areas to make sure things are sticking together. *Wes Gibbs, Jones County, 2011*

SUDAS section 7E-5 deals with mulching to prevent sheet erosion, but I feel they are overly cautious. For instance they don’t recommend hydromulching on slopes steeper than 6:1. I recommend looking at manufacturer specs for available products. *Jim Uthe, Dallas County, 2011*

**Rolled erosion control products**

We do not use straw or straw/coir blankets in channels. Those materials don't absorb water like excelsior, so the blankets float if rain causes any flow. You might get them to work with sediment logs or lots of staples, but that isn't cost effective. Nothing beats good wood excelsior.

*Ole Skaar, Roadside Development, IaDOT, 2011*

I had heard at one time that forbs germinate better under straw than excelsior, but I'm starting to become a skeptic on that claim. For instance, I just inspected a project where we used Curlex-2 and there were just as many partridge pea seedlings in the blanketed areas.

*Jim Uthe, Dallas County, 2011*

If you’re doing a lot of RECP installations, get a staple gun. It’s worth the money! And if you need to cover a lot of surface area, I suggest the 16 ft. rolls (vs. the more common 8 ft. rolls). They’re still fairly easy to handle and they cut your installation time and labor almost in half.

*Wes Gibbs, Jones County, 2011*

TRMS can stabilize very steep slopes, but in a typical county roadside setting it may be cheaper to buy more right-of-way, grade it to a gentler slope, and stabilize by hydroseeding or seeding/mulching.

*Jim Uthe, Dallas County, 2011*

We used double-net, straw/coconut blankets for concentrated flow areas with success, but due to the cost we’re switching to double-net straw. They seem to allow just as good germination as the straw/coconut blend and are almost $20 cheaper per 100 ft. roll. They seem to provide adequate protection in a typical ditch bottom, but don’t last as long.

Single-net straw blankets are available, but they only work in low-flow channels and are much more difficult to unroll than double-net. Double-nets are only about $7-10 more.

*Jim Uthe/James Devig, Dallas County, 2010*
Other

ScourStop can be used as a riprap alternative for channel protection if flow occurs only during larger rain events. The channel needs to dry out at times so vegetation can establish.

*Ole Skaar, Roadside Development, IaDOT, 2011*

Sediment Control

If a rain event is relatively small, silt fences will function properly. But small rain events typically cause little to no erosion. Silt fences may be good for PR but they create a point of failure for the project. A roadside is essentially a headwater stream. Stream dynamics show that flow = area * velocity. When the water from a flat, six-foot wide channel is concentrated into a width of typically less than a foot at the low point of a silt fence, the water’s velocity increases substantially, thus erosion is caused instead of prevented. *Jim Uthe, Dallas County, 2011*

Rock check dams should mostly be below ground. The “waterfall” problems can be eliminated if the check dam doesn’t extend more than 3-4” above ground. *Wes Gibbs, Jones County, 2011*