When Unpredictable Weather Calls, Curlex® Answers

Case Study – Curlex® Erosion Control Solutions

Introduction

A 60-acre (24-hectare) project involving utility upgrades, road resurfacing, and sidewalk installation began in early spring in an area of Wisconsin that experienced sporadic precipitation events. Therefore, the appropriate selection and placement of erosion control Best Management Practices (BMPs) was paramount to both the visual appeal and overall success of the project (see Figure 1).

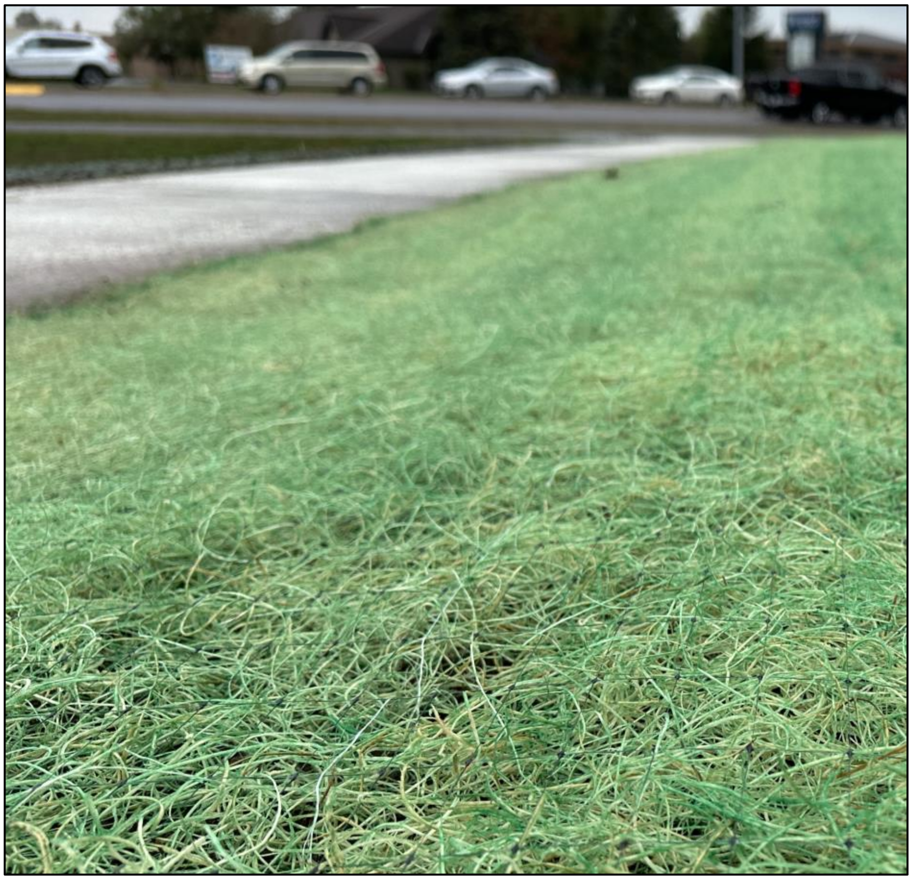

Figure 1. An erosion control blanket (ECB), Curlex® II QuickGRASS®, installed on a newly constructed section of the project area.

Project Scope

The original project area was expanded to its final size after an adjoining property owner requested street and utility work on their commercial lot to be completed at the same time. Developers needed to consider two wetland areas contained within the site and a nearby impaired river in their planning efforts. Essentially, they needed to ensure that any disturbed soil would not exit the site while simultaneously fulfilling construction objectives.

850 Avenue H E | Arlington, TX 76011
Phone 1-800-777-SOIL | Fax 817-385-3585 | www.Curlex.com | Form#350/W1223R1223

Initial Plan

Several different BMPs were installed in an attempt to help hasten vegetative growth and prevent erosion of the predominantly SP/ML soils (described as poorly graded/gravelly sand alongside low-plasticity inorganic silts according to the Unified Soil Classification System). Straw erosion control blankets (ECBs) and Curlex® ECBs (manufactured by American Excelsior Company®) were used on roadside slopes; blown straw and hydraulic mulch were applied to shallow-sloping areas and curbsides. Wisconsin DOT #10, #40, and #70 seed mixes were used across the project area. The #10 mix contains primarily Kentucky bluegrass, red fescue, and perennial ryegrass and is intended for areas composed of average loam, heavy clay, or moist soils. This mix was chosen for the flat graded inland areas. The #40 mix, containing primarily Kentucky bluegrass, red fescue, and hard fescue, is designed to yield a lawn-type turf, making it the right choice for the curbside areas. The #70 mix is suited for loamy soils and contains five species of grasses. Four of these are native to Wisconsin, and all form deep root systems. These characteristics made the mix suitable for the sloped areas surrounding the site's sediment retention ponds.

Unforeseen Challenges

The site experienced uncharacteristic drought-like conditions during the spring and summer months. Such conditions made the site's soils more susceptible to erosion. After several high-precipitation events during the late spring and early fall, it was clear that several of the selected BMPs did not meet the expectations of the initial plan.

Initial Results (Blown Straw)

The blown straw installations failed to protect the areas on which they were applied and created more problems than they solved (see Figure 2).

Straw fibers lay flat and form bridges over irregularities in the soil. They are hollow and float during hydraulic events. When exposed to sheet flow, the blown straw fibers' characteristics can lead to erosion and partial or complete loss of the seed bed. In this case, sediment was deposited directly onto the sidewalk, which was an eyesore, and its cleanup was an unplanned expense.

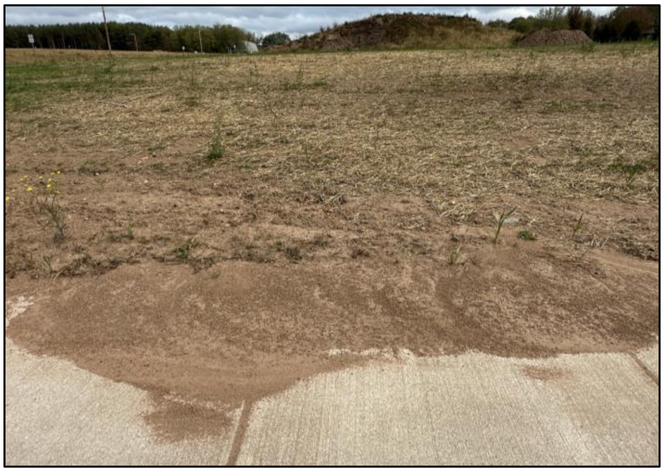

Figure 2. Failed blown straw installation that led to sediment being deposited onto the sidewalk.

Initial Results (Hydraulic Mulch)

The hydraulic mulch was not applied to the curbside areas until mid/late September. Within several days of its initial application, the site experienced two rainfall events. These events led to a partial washout of the hydraulic mulch material (see Figure 3). The washed-out areas saw rills, uneven vegetative growth, and instances of severe erosion (see Figure 4). Some of the eroded sediment washed into the street and reached nearby stormwater drains before site personnel were able to clean up the area. Expenses due to cleanup, buying new BMPs to replace the failed hydraulic mulch, and the re-installation of the new BMPs were all additional unplanned costs to the project.

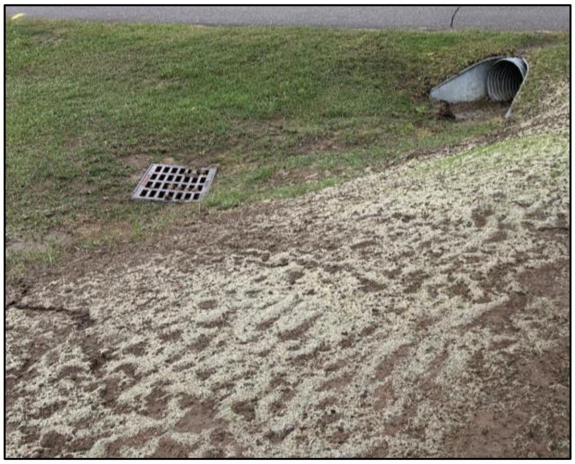

Figure 3. Partial washout of a hydraulic mulch application near a stormwater drain.

The project could not afford to risk further sediment and nutrient contamination being transported into the stormwater drains, wetlands, or the nearby impaired river. Potential harmful contaminants could include phosphorus, malachite green, and chemicals from fertilizer.

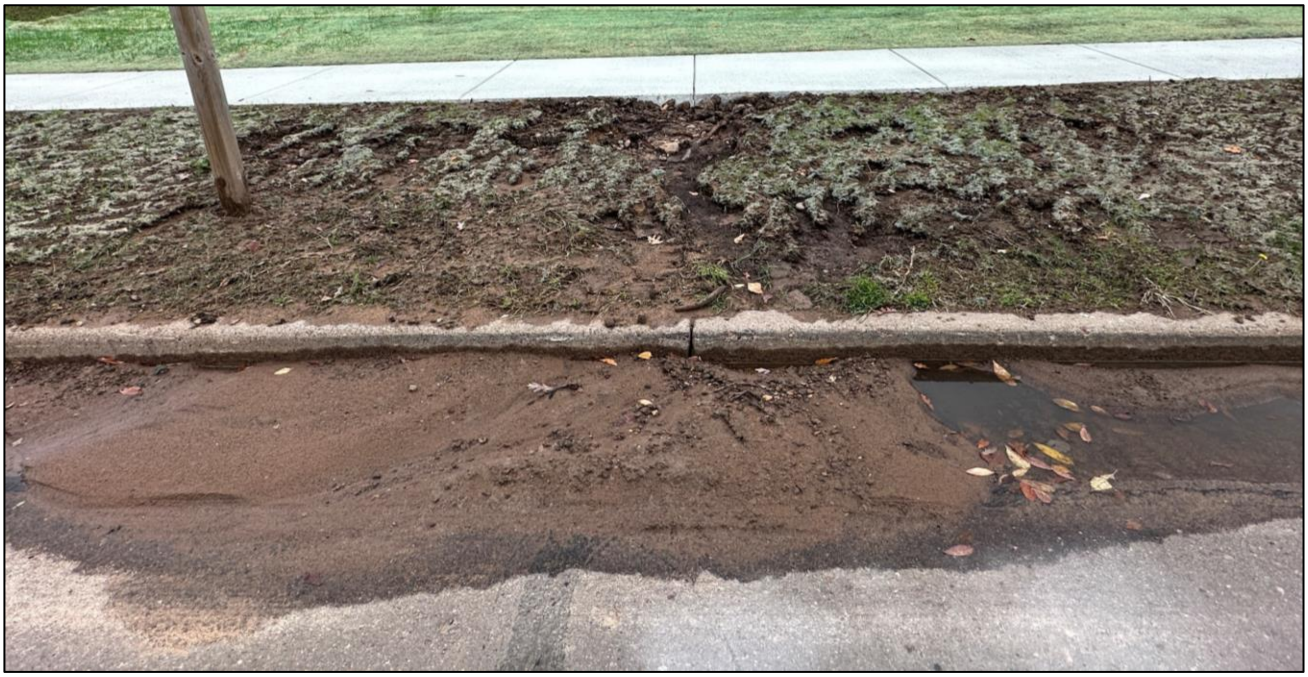

Figure 4. Severe failure of a hydraulic mulch application.

Initial Results (Straw ECBs)

Straw ECBs did offer more erosion protection than the blown straw and hydraulic mulch installations. However, the straw ECBs did not fully protect the slopes from soil loss and seed migration during the precipitation events (see Figure 5). Some of the straw blankets had to be replaced by higher-performing ECBs, which added to the list of unplanned project expenses.

Depending on its Manning's *n* value, an ECB's fiber type can either have an increasing or decreasing effect on the energy of sheet flow. Manning's *n* is a measure of a product's hydraulic roughness, and a higher Manning's *n* helps decrease energy, slow water flow, increase water infiltration, and keep the underlying seed and soil in place. Straw fibers have a lower Manning's *n* than other ECB fibers, such as aspen excelsior.

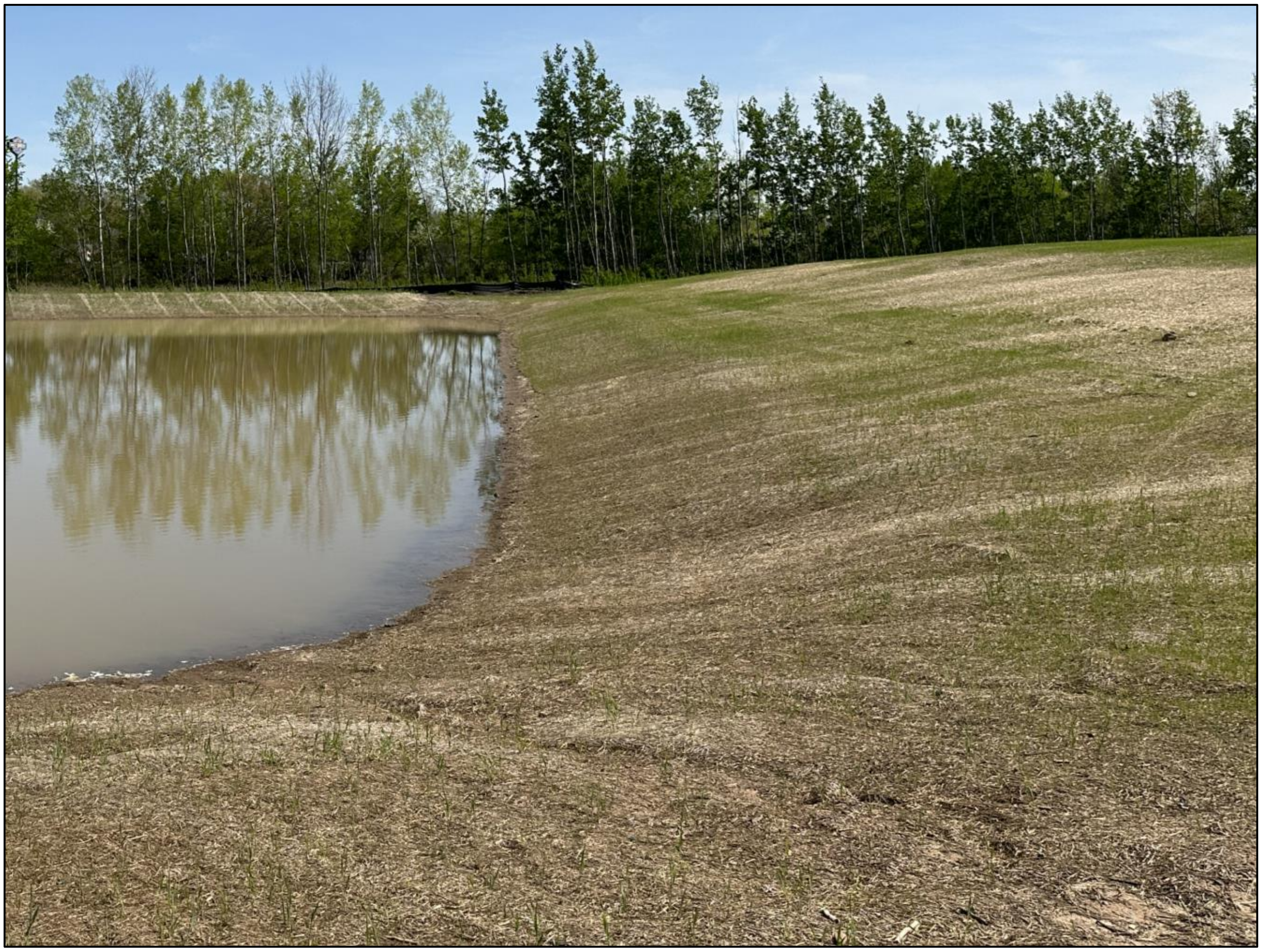

Figure 5. Evidence of seed migration from a straw ECB installation surrounding an on-site sediment retention pond.

Initial Results (Curlex ECBs)

In contrast to the other BMPs, even when installed on steeper slopes, the Curlex ECBs saw minimal soil erosion and seed migration after the same precipitation events that the other BMPs were exposed to (see Figure 6). Just imagine how much money could have been saved if the Curlex ECBs would have been installed across the site. Material and installation costs would only have been incurred once, cleanup costs would have been virtually eliminated, and the stormwater drains, nearby wetlands, and impaired river would not have been exposed to the level of contamination they received from the failures of the other BMPs that were chosen based on material cost and not project cost.

Engineered Curlex fibers are made from Great Lakes aspen trees. Curlex expands and contracts with moisture, allowing the curled and barbed fibers to form a “Velcro-like” connection that conforms to irregularities in the soil. Curlex fibers also have a high Manning’s *n* value that helps dissipate energy from hydraulic forces (such as sheet flow) for increased water infiltration and enhanced soil and seed bed protection during hydraulic events.

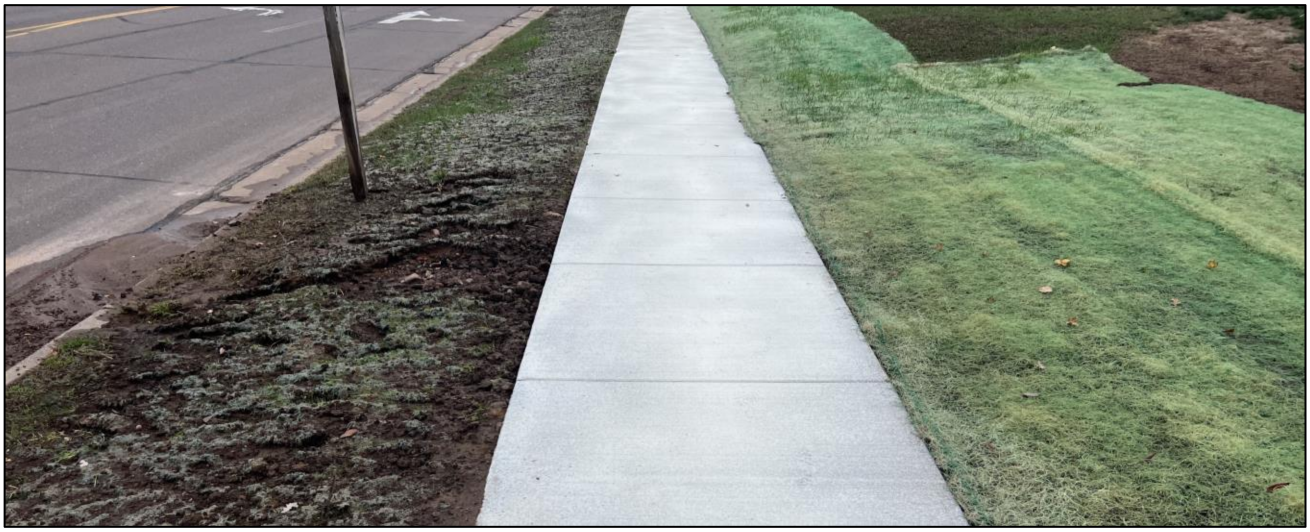

Figure 6. Curlex II QuickGRASS installed opposite the hydraulic mulch installation shown in Figure 4.

Key Takeaways

Utilizing BMPs that cost less upfront without considering their inferior performance capabilities ended up costing much more after they failed. Doing it right the first time by specifying and properly installing higher-performing products may cost a few more pennies per square yard upfront, but it keeps the project clean and operational, helps prevent costly rework and potential nonconformance fines over the lifetime of the project, better protects our soil and water resources, and saves everyone money.

The New Plan

Two Curlex ECB products were installed in the remaining new development areas as well as the locations where the blown straw, straw ECB, and hydraulic mulch BMPs had previously failed.

Curlex® II QuickGRASS® (see Figure 7) was used on most of the flatter and shallow-sloping curbside and inland areas following the failures of the other BMPs. Curlex fibers' ability to create a "greenhouse effect" when exposed to moisture fosters favorable seed germination and establishment conditions. Curlex® II FibreNet™ was installed on many of the roadside slopes near the sediment retention ponds and wetlands (see Figure 8). It provides all the features and benefits of other Curlex products while encasing the Curlex fiber matrix between two layers of 100% biodegradable jute netting with non-welded slip joints.

Figure 7. Curlex II QuickGRASS installation.

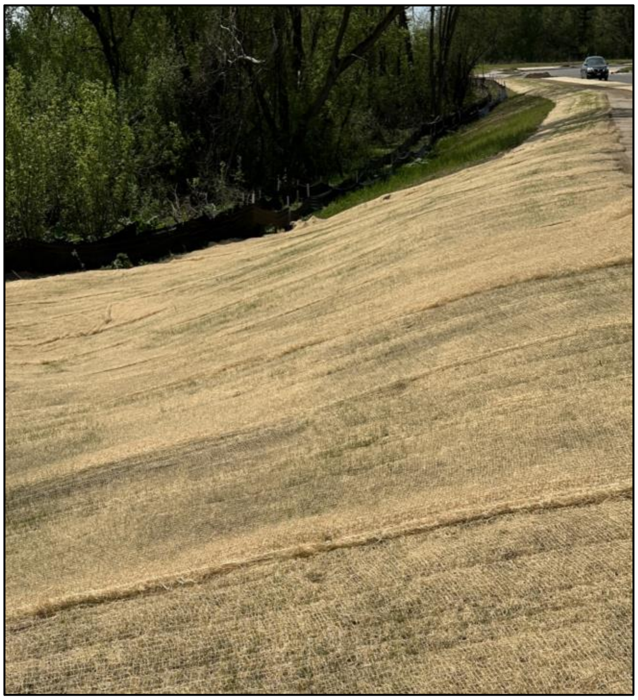

Figure 8. Curlex® II FibreNet™ installed across the length of a roadside slope.

Next Steps

Because of the proximity to two busy streets and the presence of several local businesses, accessible areas of the site will be regularly mowed and maintained. A "final results" update to this case study will be provided in the future.