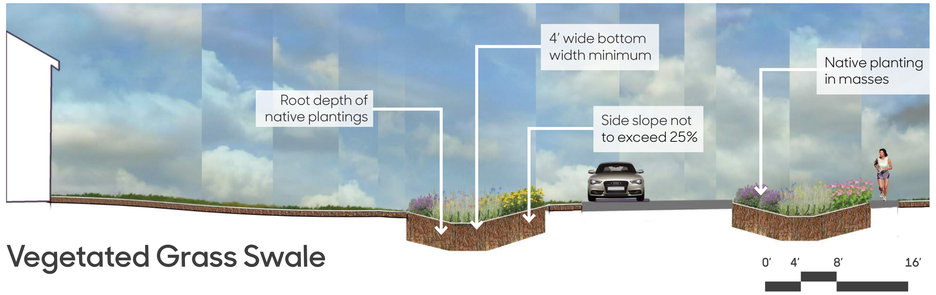
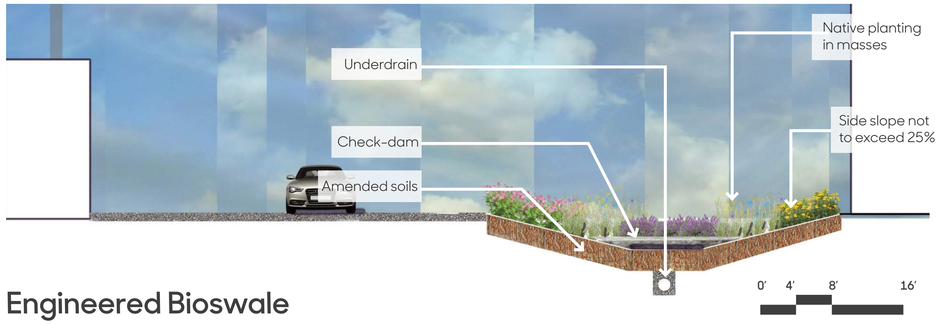
Stormwater Improvement Plan

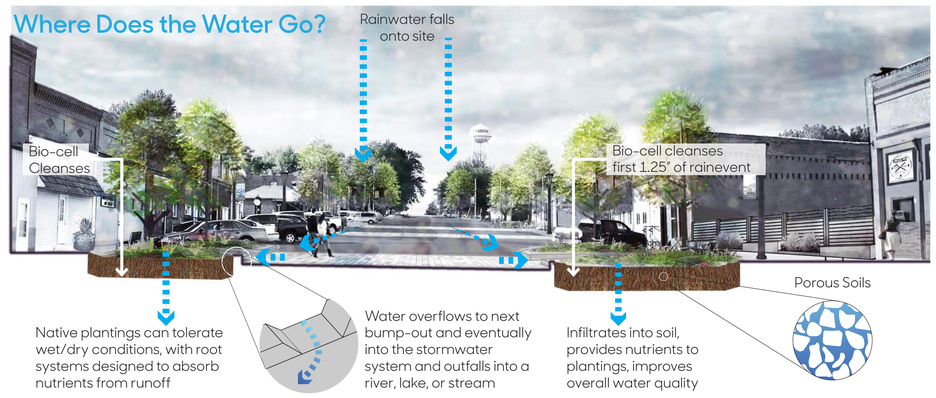
Large elevation change in Massena presents challenges and unique opportunities for stormwater management. Current drainage patterns divert most of the stormwater over land, rather than into a traditional stormwater system. The top of the watersheds in Massena begin near Highway 92 and direct most of the runoff down Pine, Cedar, Spruce, and Main Streets. The high problem areas occur on Main Street with minimal storm inlets, and Spruce Street which maintains a highly eroded grass swales on both sides of the street.



Vegetated Grass Swale



Engineered Bioswale

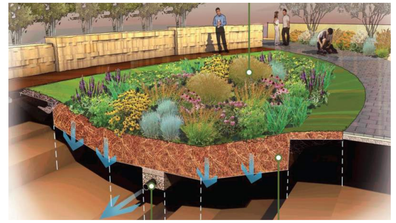


Streetscape Water Management

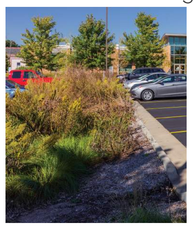
Slowing down the water and implementing vegetated grass swales, bioswales, and check dams in key locations will help improve the extensive erosion occurring in Massena. Basic stormwater modeling and watersheds have been identified to determine that this strategy would be sufficient to handle typical stormwater events. The creation of a larger chain of bioswales in City Park to collect and infiltrate much of the initial flow and deter washout is needed to provide significant impact downstream.

A bioswale conveys flow from small storms at slow speeds (< 1 fps) so that pollutants are filtered and runoff has time to infiltrate into the soil media. The underdrain reduces the potential for standing water. The total watershed area to this practice would be just under 50 acres, so a bioswale of this size and length is certainly possible. For pretreatment, we might need to configure the outlet pipe from the swale upstream (where runoff from Main and Clarke empties) with a staged outlet so that some of the heavier sediments will drop out prior to being routed into the bioswale.

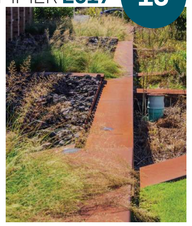
Typical Bioswale & Precedent Examples



Diagrammatic section-perspective of a bioswale



Black River Falls, Wisconsin



Black River Falls, Wisconsin

Planting Palette

Blue Grama Ht: 2'
Bouteloua gracilis

Blue Fescue Ht: 1'
Festuca glauca

Butterfly Weed Ht: 2.5'
Asclepias tuberosa

Lanceleaf Coreopsis Ht: 2'
Coreopsis lanceolata

Heath Aster Ht: 3'
Symphyotrichum ericoides

Blanket Flower Ht: 3'
Gaillardia x grandiflora

Purple Coneflower Ht: 5'
Echinacea purpurea

Blazingstar Ht: 4'
Liatris spicata

Improving the existing condition of the vegetated grass swales is needed along Spruce Street. A typical section of the swale is provided. Key components to the success of this system:

1. The creation of long linear grass swales with a minimum of 4' wide base with a 4:1 side slope. The wider base allows the water to spread out and slow down as it moves through the swale.

2. Topsoil for plants to develop an established root system or adding amended soils to the swale will improve the vegetation quality.

3. Short grass prairie mix that can tolerate both wet and dry conditions. The height of this prairie mix is typically around 3'. Providing additional length to the vegetated grass swales will slow the water flow and increase infiltration rates, reducing erosion.

Near the recreational complex the recommendation is to expand the existing ditch into a bioswale. The ditch would need to be expanded with the slope relatively flat. We would need to install check dams at 200' intervals (approximate). This type of bioswale will need engineered soil media, an underdrain, and an overall depth of 3-4 feet.

Massena

Stormwater Management

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Iowa's Living Roadways community visioning