Bolton & Menk specializes in providing public infrastructure solutions for clients and has more than 450 employees in 17 offices, including a professional staff of more than 150 engineers, planners, landscape architects and surveyors.

SERVICES PROVIDED:

- Civil/Municipal Engineering & Planning
- Water & Wastewater Engineering
- Transportation Planning & Engineering
- Structural Engineering
- Aviation Services
- Water Resources Engineering
- Planning & Urban Design
- Land Surveying
- Geographic Information Systems
- Project Funding & Financing
Beyond the Blueprint | Overview

### Bioretention Basins
- Bolton & Menk Ames Office | 2018
- Ames City Hall Parking Lot | 2017
- Storm Lake North Central Stormwater | 2017
- Blue Earth, MN Ag Center Parking Lot | 2017
- Storm Lake Erie Street Reconstruction | 2016
- Perry Soccer Complex | 2016
- Waconia, MN Fountain Park Pond Impr. | 2016
- Ames 24th Street Reconstruction | 2016
- Perry McCreary Center Parking Lot | 2013
- Storm Lake East Central Stormwater | 2013

### Bioretention Swales
- Storm Lake East Central Stormwater | 2013
- Perry McCreary Center Parking Lot | 2013

### Rain Gardens
- Waconia, MN Cedar Point Park Shoreline | 2017
- Mound, MN Carlson Park Stormwater Impr. | 2017

### Native Vegetation
- Bolton & Menk Ames Office | 2018
- Ames City Hall Parking Lot | 2017
- Storm Lake North Central Stormwater | 2017
- Waconia, MN Cedar Point Park Shoreline | 2017
- Mound, MN Carlson Park Stormwater Impr. | 2017
- Blue Earth, MN Ag Center Parking Lot | 2017
- Storm Lake Erie Street Reconstruction | 2016
- Waconia, MN Fountain Park Pond Impr. | 2016
- Ames 24th Street Reconstruction | 2016
- Perry Soccer Complex | 2016
- Perry McCreary Center Parking Lot | 2013
- Storm Lake East Central Stormwater | 2013

### Low Maintenance Lawn
- Bolton & Menk Ames Office | 2018
- Ames City Hall Parking Lot | 2017
Beyond the Blueprint | Overview

**Permeable Pavers**
- Hopkins ARTery Streetscape Recon. | 2018
- Algona Dodge Street Recon. | 2018
- Ames City Hall Parking Lot | 2017
- Storm Lake Erie Street Reconstruction | 2016
- Waconia, MN Fountain Park Pond Impr.| 2016

**Soil Quality Restoration**
- Ames City Hall Parking Lot | 2017

**Infiltration Trenches**
- Bolton & Menk Ames Office | 2018
Beyond the Blueprint | No “One Size Fits All” Solution

HOW WE ARE RETHINKING THE PROBLEM

RE-ENVISIONING AND RE-DESIGNING CITIES TO CAPTURE STORMWATER AND PROTECT OUR WATERSHEDS

These systems allow nature to play a role by slowing down water, removing pollutants, and providing habitat.

1. PERMEABLE PAVERS
   Pavers designed with extra wide joints so rainwater can flow back into the earth below, instead of running off the surface into the storm sewer.

2. CURB CUT
   A gap in the curb allowing rain water to flow into the rain garden before it reaches the storm sewer.

3. BIORETENTION CELL
   Landscaped depression, with native plants, that captures runoff from impervious surfaces, designed to filter pollutants out of stormwater runoff.

4. SANDY SOIL MIX
   Specially designed soil mix that is made up of sand, leaf compost, and soil. Plant material and the soil work together as a filter to clean the stormwater.

5. WATER STORAGE ROCK
   Rock that is about three inches in size is installed in the bottom of the bioretention cell and under the permeable pavers. The rock has the ability to hold the stormwater, allowing it to slowly flow back into the earth below.

6. NATIVE PLANTS
   Plant types that grew in the area before buildings and roads were built. These plants help absorb more rainfall and reduce the amount of stormwater entering the sewer in urban spaces.

BRING IT HOME
- Consider using permeable pavers for driveways.
- Identify low points in your yard that could be converted into rain gardens.
- Consider using rain barrels to capture rain water.

THANK YOU TO OUR SPONSORS:

[Logos of sponsors]

FOR MORE INFORMATION:
[Hyperlink to more information on stormwater management]
OWNER / CLIENT: Seeks a solution
DESIGNER: Has a solution, wants it to be attractive / innovative
PUBLIC: Sees a “patch of weeds”, “waste of money”, wonders “why are we trying something different.”
Beyond the Blueprint | Promoting a Positive Outcome

What’s the Strategy?
What’s Acceptable?
Beyond the Blueprint | Promoting a Positive Outcome

**Education / Public Outreach**
- Education + Communication are crucial in promoting green infrastructure and community buy-in
- Engage the community in the process

**Understand The Process / Manage Expectation**
- Understand the construction sequence, consider schedule impacts (seeding dates)
- Make sure the Owner knows what to expect when it’s finished
What’s the Best Soil Mix For the Practice?

Isn’t all mulch the same?
Beyond the Blueprint | Promoting a Positive Outcome

**Construction Observation**

- Invest time in the implementation process
- Witness critical steps in the process
- Knowing how to spot potential issues, can prevent failures
Establishment and Warranty

- Follow the specifications
- Clearly communicate the Contractor’s responsibility
- Educate the contractor
- Conduct periodic site visits
- Document the establishment / warranty periods
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Post-Construction Maintenance

• Have a maintenance plan in-place

• Follow the maintenance plan!

• Visit the site regularly, promote the progress, inform the community
Establishment Period and Maintenance Practices for Bioretention Basins

First Year:
During the first year of bioretention establishment native plants will grow slowly above ground as they establish an extensive below ground root system. Annual and biennial weeds will grow much faster if areas are not maintained and properly cared for. The following items are maintenance practices that should be carried out on a weekly basis and after substantial rainfall events. Routinely checking bioretention basins prior to anticipated rainfall events during the first year will ensure that they will function properly and that any erosion prevention measures are in proper order.

- Weeds should be hand pulled when soil is soft for the best chance of removing roots.
- Control weeds by keeping area mulched with hardwood mulch.
- If mulch is shifted during heavy rain events, it may be necessary to pull mulch away from plant bases and crowns to prevent suffocation of young plants.
- Remove sediment from bioretention inflow areas to ensure proper water flow and infiltration.
- During the first year, much of the soil is still exposed and may require attention after every substantial rainfall event (1” or more in 24 hours).
- Periodically remove litter and debris from bioretention systems.

Second Year:
Use a mulching mower to cut back the native plant material in the bioretention area in the spring prior to the emergence of new growth. Using a mulching mower with the blade set to a 6” height will chop winter foliage and retain it as mulch around the base of the plantings. Mowing in the spring promotes growth of native plants and creates a clean canvas for new growth within the basin. During the second year of establishment the following items will need to be managed.

- Plant growth should fill in naturally and suppress most areas of new weed growth. Hand weeding (like year one) may still be necessary in some areas to prevent weed takeover.
- Erosion from spring rains could be an issue if vegetation is not securing the soil. Additional rock checks may need to be installed to slow water flow, or permanent TRM's may have to be installed in eroded channels after grades are fixed if this is an issue.

Third Year:
During the third year the bioretention basin should be fully established and self-functioning. Regular maintenance items will still be needed to ensure continued success within the basin.

- Sediment in bioretention inflow areas will need to be removed to ensure proper water flow and infiltration.
- Periodically check and remove litter and debris from bioretention areas.
- If water ponds and silt stagnant for 24 hours, additional maintenance may be required to the under-drain, and/or engineered soil mix to ensure proper infiltration. This could be caused by excessive sediment or plugged under-drains.

- Annual early spring mowing with mulching blades will promote healthy plant growth and provide organic mulch and food for the growing plants as the mulched material decays.
- Remove litter from the basin on at least a monthly basis (more frequently if needed) to keep debris and litter from hindering infiltration or stormwater flow within the system.
- Replace any dead vegetation in early spring to reduce the need of watering during dry summer months.
- Inspect inflow points for clogging and remove any sediment seasonally or as needed.
- Inspect all channels for erosion or gullying, correct with appropriate soil and erosion control measures of coil logs and mulch blankets seasonally or as needed.
- If water ponds and silt stagnant for 24 hours, additional maintenance may be required to the under-drain, and/or engineered soil mix to ensure proper infiltration. This could be caused by excessive sediment or plugged under-drain. Look for evidence of standing water in the riser pipe as a sign of hydraulic failure.
- Replace / clean rock checks when clogged to ensure proper functionality.
- Additional native grasses and forbs can be added as owner or maintenance staff sees fit on an annual or biennial time frame. New plants can reinvigorate bioretention systems and will help phase out older plants as they begin to fade.
Post Construction Maintenance: Establish a Routine
Beyond the Blueprint | Promoting a Positive Outcome

Post Construction Maintenance: Sediment / Debris Removal
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Post Construction Maintenance: Guides / Tools

Appendix IV: Weed Identification Guide

**FLEABANE** - Erigeron annuus
- **Habitat:** Mesic to wet-mesic
- **Bloom Season:** June to October

**GIANT RAGWIE** - Ambrosia trifida
- **Habitat:** Mesic to wet-mesic
- **Bloom Season:** June to August

**HONEYVINE MILKWEED** - Asclepias curassavica
- **Habitat:** Mesic to dry-mesic
- **Bloom Season:** June to September

**LADYSTHUMB** - Polygonum persicaria
- **Habitat:** Mesic to wet-mesic
- **Bloom Season:** March to May

**SANDBAR WILLOW** - Salix interior
- **Height:** 3' to 20'
- **Bloom Season:** May to June

**MULBERRY TREE** - Morus
- **Height:** 30' to 50'
- **Bloom Season:** June

**COTTONWOOD** - Populus deltoids
- **Height:** 30' to 80'
- **Bloom Season:** May to June

**STEBBANIAN PUMILLA** - Ulmus pumilla
- **Height:** 30' to 60'
- **Bloom Season:** March to May

Common Weeds | Broadleaf Cut Sheets

Common Weeds | Tree Cut Sheets
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**Informational Signage & Education**

- Promote the installation, identify project partners, describe the technical components of the practice

- Help people understand the value in green infrastructure
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Informational Signage & Education

**BIORETENTION BASIN**

This basin is designed to treat storm water from the building, parking lot and site. It has been planted with native vegetation to provide habitat for pollinators.

**PERMEABLE PAVING**

This permeable paving allows stormwater to infiltrate and fill the aggregate subgrade below.
Thank You [contact information]

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