BIORETENTION CELLS

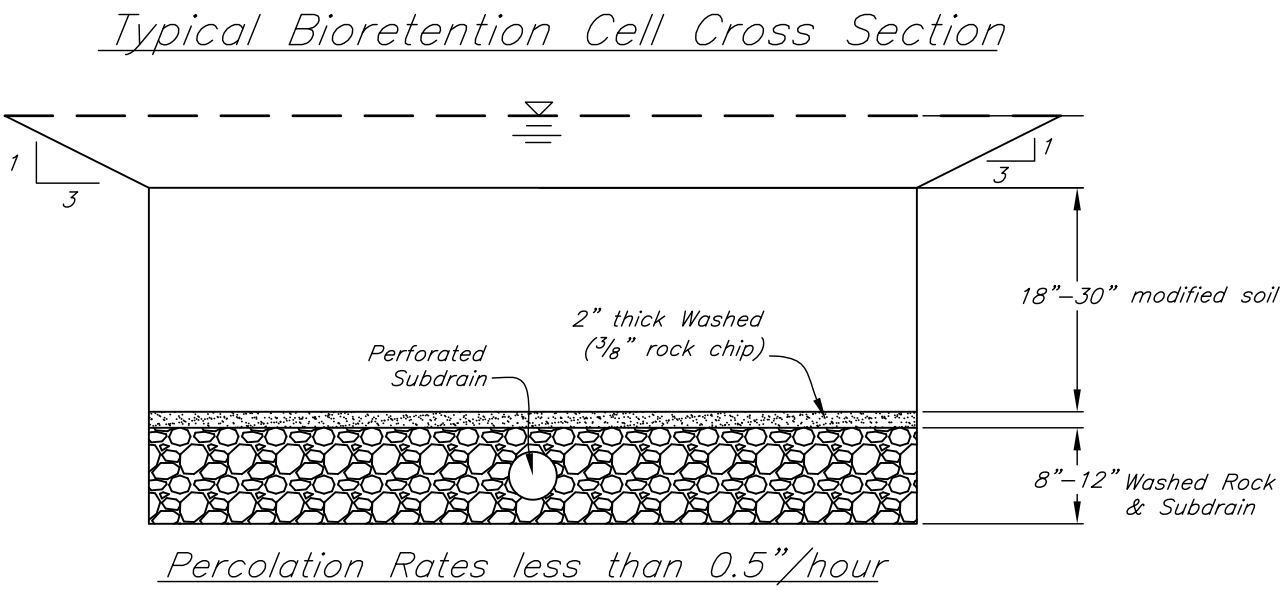
Green Infrastructure For Stormwater Management

WHAT ARE BIORETENTION CELLS?

Bioretention cells treat runoff from impervious surfaces such as streets and parking lots. Bioretention cells (biocells) impound and infiltrate runoff from up to 2 acres of drainage area. The sandy soil media used in a bioretention cell filters the runoff. Pollutants are captured and broken down in the soil media by beneficial microbes. Biocells are used where the existing soils lack an adequate percolation rate. They are designed with a rock chamber at the bottom of the cell that contains a perforated drain tile. If water can't percolate down to recharge groundwater, it will exit the cell via the drain tile. Drain tile flow mimics groundwater flow – it moves slowly, it's clean and cool compared to fast moving, dirty, hot surface runoff.

Bioretention cells often feature native plants that develop deep root systems. The native plants can find water deep in the soil during dry periods. Their deep root systems help build and maintain soil with high organic matter content and high porosity, which helps maintain good percolation of water through the system. A shredded mulch layer is typically installed to help maintain moisture, suppress weeds and aid in pollutant capture.

Bioretention cells and other infiltration-based stormwater management practices are called "post-construction practices". They are typically installed after construction activities are completed as part of final landscaping. If they must be installed during active construction, it is imperative that sediment control measures are employed to keep sediment out of the cells. Excessive sediment will plug a biocell, which prevents infiltration and renders the cell non-functional.



BIORETENTION CELL DESIGN

- As with all infiltration-based stormwater practices, biocells are typically designed to manage the frequent, small rainfall events - up to 1.25 inches of rain. Historically, 90% of rainfall events have been 1.25 inches or less. The runoff for the 1.25 inch rain is called the water quality volume (WQv). Bioretention cells protect water quality and reduce flashy stream flows that cause erosion.
- Designers use a formula to calculate the cubic feet of water that will enter the cell when 1.25 inches of rain occurs. Another formula is used to calculate the required surface area and ponding depth of the biocell. Design guidelines and specifications for bioretention cells are available in the Iowa Stormwater Management Manual.
- Biocells typically pond 6-9 inches of water. Impounded water should drain into the soil media in 9 hours. A stand pipe is usually installed, which is connected to the subdrain tile. Runoff from larger rainfall events overflow into the stand pipe and are conveyed via the subdrain tile.
- Bioretention cells (and other infiltration based practices) must maintain a minimum separation distance of 10 feet from buildings with basements. The bottom of the biocell must be at least 2 feet above normal water table elevations. Infiltration-based practices such as biocells are also not recommended for brownfield sites. A water proof liner can be installed to ensure water moves out of a biocell through the subdrain to overcome limitations due to high water tables or brownfield sites.
- The soil media for biocells is designed to move water readily through the subgrade. Researchers are continually working to determine the best blend for bioretention cell soil media. A blend of following materials is currently specified in the Iowa Stormwater Management Manual :
  - 75% - 90% sand
  - 0 – 25% topsoil
  - 0 – 10% compost

BIORETENTION CELL MAINTENANCE

- The primary maintenance issue is managing vegetation to maintain a pleasing appearance.
- Perform weed control as needed.
- If native vegetation is used, consider burning annually if local code allows.
- Inspect annually for scour erosion at point of entry.
- Inspect annually for sediment accumulation. Bioretention cells trap sediment that will periodically need to be removed.
- Remove accumulated trash and debris.
- Monitor mulch until plants have grown to a height that exceeds ponding depth. Mulch can float and smother small plants or plug outlets. Re-position mulch to maintain a 2" uniform layer. Replace mulch if needed.
- If initial planting has mortality, replace dead plants until the plant community is well established.

BIORETENTION CELL INSTALLATION

STEP 1 Excavation and Installation of the Subdrain

STEP 3 Placing the Soil Media

STEP 2 Installation of Rock Chamber and Overflow Stand Pipe

STEP 4 Planting and Mulching

(Notice how deep water will pond before it overflows into the stand pipe.)

BIORETENTION CELLS OF IOWA

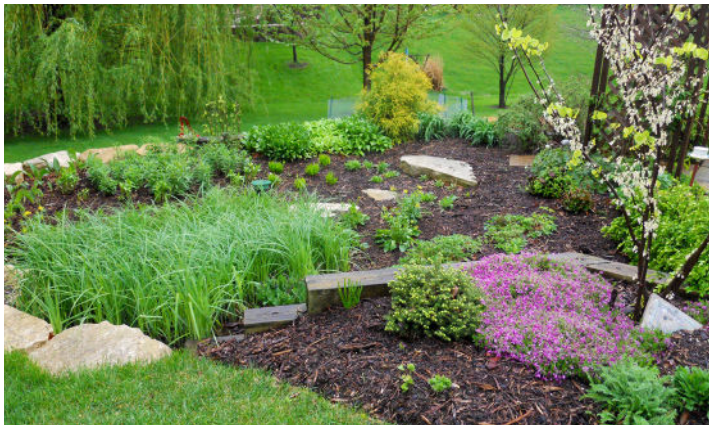
Cedar Falls - University of Northern Iowa Campus

Ames - Public Works

Des Moines - The Cathedral Church of St. Paul

East Lake Okoboji

West Union - Business District



Iowa City

Rainscaping Iowa Landscapes for clean water
rainscapingiowa.org

IOWA STORM WATER ISWEP EDUCATION PROGRAM
iowastormwater.org

USDA United States Department of Agriculture
Natural Resources Conservation Service
ia.nrcs.usda.gov

Polk Soil & Water CONSERVATION DISTRICT
polk-swcd.org

IOWA DEPARTMENT OF AGRICULTURE AND LAND STEWARDSHIP
iowaagriculture.gov

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