

ENABLED IMPACT PROJECT UPDATE

PROJECT: CINCINNATI STATE CAMPUS

PROJECT PARTNER: CINCINNATI STATE TECHNICAL AND COMMUNITY COLLEGE



Design Plan showing 6 Rain Gardens, StormTech® Sub-surface Infiltration Chamber, Living Wall, Level Spreader and Permeable Pavers

Living Wall

Permeable Pavers

Permeable Pavers

Level Spreader

Rain Gardens

Infiltration Trench

Rain Gardens

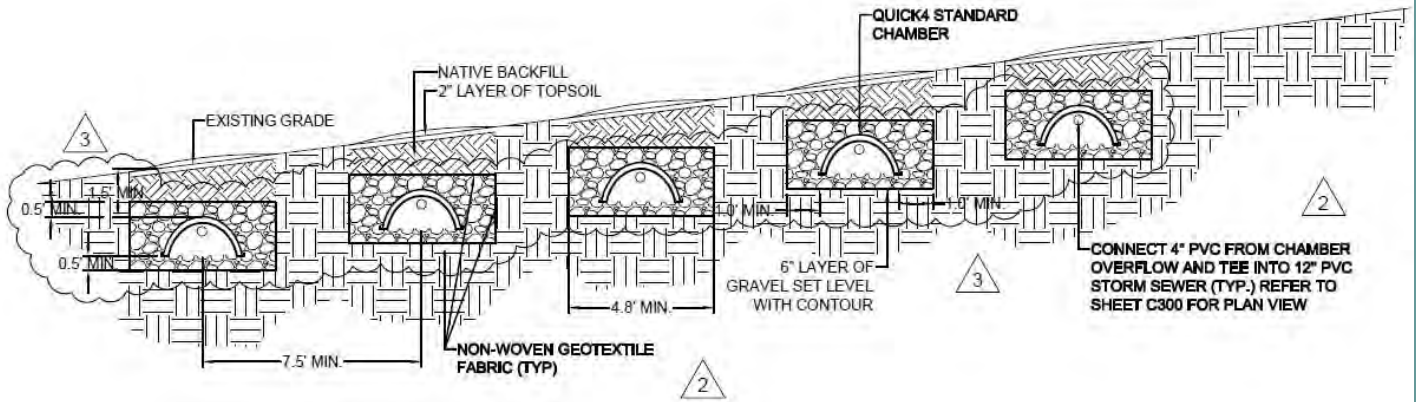
ENABLED IMPACT PROJECT UPDATE

PROJECT: CINCINNATI STATE CAMPUS

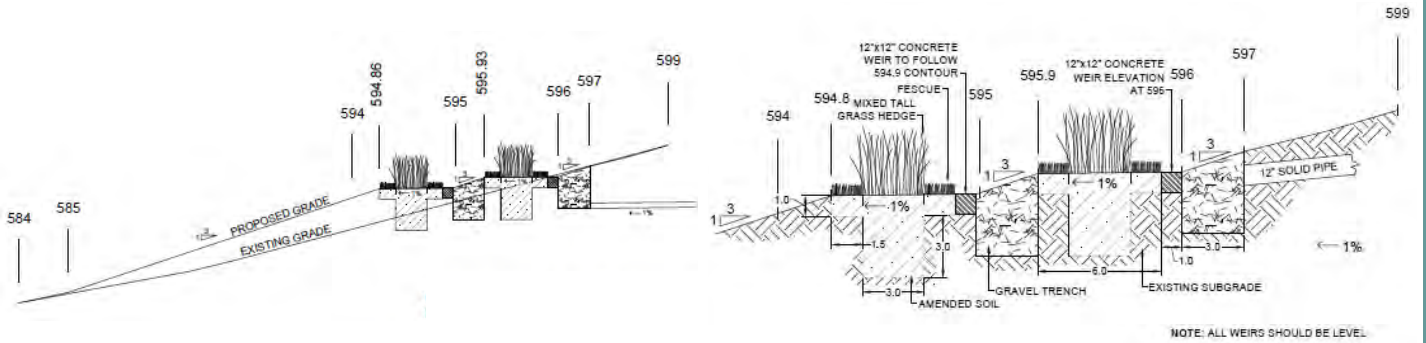
PROJECT PARTNER: CINCINNATI STATE TECHNICAL AND COMMUNITY COLLEGE



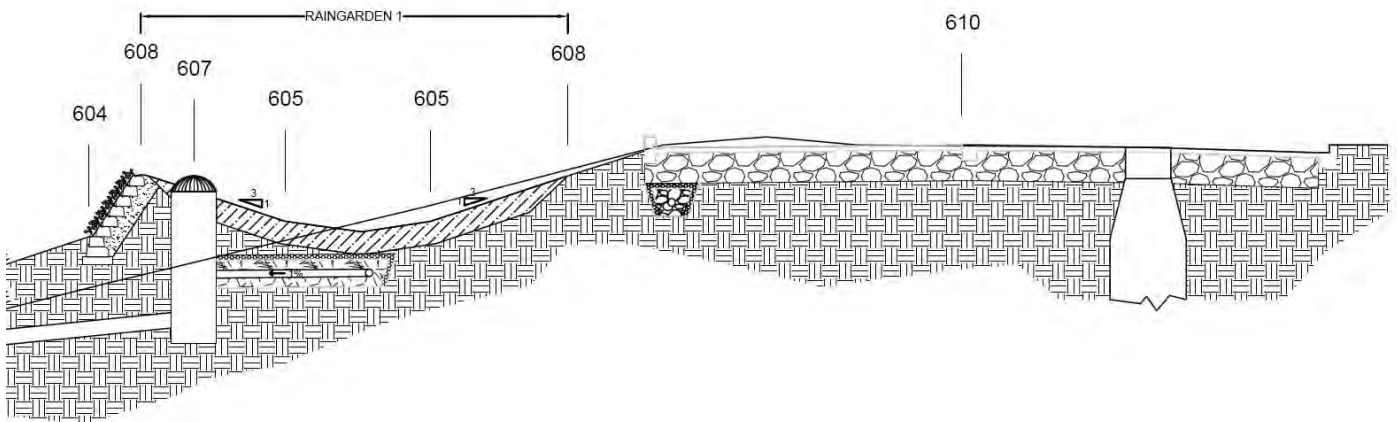
Infiltration Trench Detail



Level Spreader Details



Rain Garden and Permeable Pavement Detail



For more information about Project Groundwork, the Enabled Impact Program, or this project please email MaryLynn Lodor, Environmental Programs Manager at: MaryLynn.Lodor@cincinnati-oh.gov.

ENABLED IMPACT PROJECT UPDATE

PROJECT: CINCINNATI STATE CAMPUS

PROJECT PARTNER: CINCINNATI STATE TECHNICAL AND COMMUNITY COLLEGE



Lesson Learned: Forebay designs should allow for proper drainage to prevent stagnation and mosquito breeding conditions.

The inlets into the bioinfiltration basins were designed with low entry elevations and a clay berm surrounding the inlet to the basin to create a sediment forebay. This design did not allow stormwater to drain out of the forebay section, and the ponding has caused stagnation and mosquito breeding in this area. Bioinfiltration basins, including forebay features, should be designed to fully drain within 48 hours of the rain event.



Water ponded in this forebay caused stagnation and conditions amenable for mosquito breeding.

Lesson Learned: Measures should be taken to prevent excess sediment from clogging the green features during construction.

Raw materials were stored adjacent to the proposed porous pavement areas, which allowed unnecessary, excess sediment to build up in the gravel sub base and pavement voids. Additionally, dirty construction equipment was parked on the newly installed porous pavements and excavated material was placed on the newly installed porous pavements. Future projects should not allow raw materials to be stockpiled near any green stormwater management features and should require extra precautions to prevent excess sediment from clogging the green stormwater management features.



Stock piled raw materials adjacent to the porous pavement areas under construction, vehicles parked on features.



Excess silt and sediment on the porous pavement surface can prematurely clog the system.

Lesson: Outlet control structures should be placed so topsoil cannot easily wash into the outlet control structure.

The location and elevation of an outlet control structure should minimize the likelihood of the topsoil and amended soil washing out of the basin and into the sewer system.



Topsoil can easily wash into this outlet control structure.

For more information about Project Groundwork, the Enabled Impact Program, or this project please email MaryLynn Lodor, Environmental Programs Manager at: MaryLynn.Lodor@cincinnati-oh.gov .

ENABLED IMPACT PROJECT UPDATE

PROJECT: CINCINNATI STATE CAMPUS

PROJECT PARTNER: CINCINNATI STATE TECHNICAL AND COMMUNITY COLLEGE



Lesson Learned: The installation of porous pavers is more efficient with a mechanical paver installation machine.

Many people associate pavers with extensive labor and hand work, but large areas can be paved very quickly and efficiently with a mechanical paver installation machine.



Mechanical paver installation machine provides quick installations of large porous paver systems.

Lesson learned: Pea gravel between pavers will settle over time resulting in the need for placing pea gravel.

Since the pea gravel fill placed between porous pavers will settle over time, the contractor may need to return after settling to place additional gravel in the paver voids.



The pea gravel in this system has settled.

Lesson Learned: Porous pavement is not ideal for heavy traffic areas.

Porous paving located in heavy traffic areas is susceptible to rutting. Some porous pavers have been damaged by heavy trucks. Analysis of the traffic patterns and use of an area should be completed before porous pavement is installed on site. Additionally, paver manufacturers should be consulted about compaction specifications.



Rutted porous pavers from heavy traffic.

Lesson Learned: A silt fence should be installed around the green feature as material is placed.

If a rain event occurs while the amended soil or gravel is being placed in a green feature and a silt fence has not been installed around the green feature, native and exposed materials on the construction site will wash into the open green feature clogging the amended soil or gravel with silt and sediment. Installing and maintaining a silt fence around the green feature before material is placed is recommended. This is critical to the performance of the green feature. Ultimately, the top eight to ten inches of accumulated sediment was removed prior to completing the installation.



After a rain event, stormwater ponded and sediment built up on top of the bioinfiltration basin's amended soil.

Lesson Learned: Heavy equipment should not be driven on the green feature during installation to prevent compaction of the material and reduced infiltration rates.

Maximizing infiltration rates of the native soil is crucial to the success of installed green features. When heavy equipment is driven over the surface, the underlying soil is compacted and infiltration capabilities can be significantly reduced. Soil here was scarified prior to installation of the remaining components of the green feature.



Heavy construction equipment compacts the native soil

For more information about Project Groundwork, the Enabled Impact Program, or this project please email MaryLynn Lodor, Environmental Programs Manager at: MaryLynn.Lodor@cincinnati-oh.gov .

ENABLED IMPACT PROJECT UPDATE

PROJECT: CINCINNATI STATE CAMPUS

PROJECT PARTNER: CINCINNATI STATE TECHNICAL AND COMMUNITY COLLEGE



Lesson Learned: Maintenance of erosion protection and sediment control measures is critical to the success of the green feature installation.

Exposed soil is more susceptible to erosion; and therefore, when vegetation is removed during construction, proper measures for erosion protection and sediment control should be taken. This is particularly important during construction of green features which can be easily clogged if silt and sediment wash into the proposed system.



Broken silt fence promotes erosion and sediment build up in the proposed green feature.

Lesson Learned: To avoid foreign material from entering the green feature, understand the upstream storm network and drainage area.

When retrofitting an existing detention basin feature, it is important to understand what drains to existing pipes and the condition of these pipes. In some cases, unknown pipes can bring foreign material into the green feature causing challenges during construction and additional maintenance needs. Here the pipe was jetted before project completion.



Debris and foreign material from an existing pipe draining into a retrofitted detention basin.

Lesson Learned: Porous asphalt functions best once the pavement surface is wetted.

At Cincinnati State, a test was performed by pouring water directly onto dry, porous asphalt pavement and some of the water appeared to runoff across the surface. Porous asphalt must be wetted before water will readily infiltrate into the pavement because the surface tension of dry, porous asphalt does not allow the water to infiltrate until it has been fully wetted.



Water does not infiltrate as readily on dry, porous asphalt.

Lesson Learned: Underdrains should be designed to minimize the probability of clogging.

Studies have shown that even a small amount of silt can cause filter fabric around an underdrain to clog. Underdrains should be designed to minimize the probability of clogging. The contractor must take extra precautions to prevent clogging prior to and during installation.



Filter fabric and an underdrain being installed.

For more information about Project Groundwork, the Enabled Impact Program, or this project please email MaryLynn Lodor, Environmental Programs Manager at: MaryLynn.Lodor@cincinnati-oh.gov .