Right-of-way Green Infrastructure Protections During Construction

Updated January 2020
Agenda

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BIOSW1

Protection and Restoration of NYC DEP Green Infrastructure: The Permittee shall take extreme care to prevent any and all damage to right-of-way green infrastructure assets. The Permittee shall install NYC DEP-approved protection measures for all green infrastructure practices in which the following conditions apply: 1) asset is within three hundred (300) feet of the construction work zone, 2) asset is along the construction access route, and 3) asset is located downstream of the work zone. The Permittee must contact NYC DEP at GIutility@dep.nyc.gov at least 2 business days prior to commencing work to confirm the proper green infrastructure protection measures. Protection Requirements available at https://www1.nyc.gov/site/dep/water/green-infrastructure.page. The Permittee shall be responsible for restoring any damage to green infrastructure assets which is caused directly or indirectly by construction activities, as directed by DEP.

PERMPAVE1

Protection and Restoration of Permeable Pavement: The Permittee is required to contact NYC DEP at Glutility@dep.nyc.gov at least 20 business days prior to commencing work within three hundred (300) feet and downstream of any permeable pavement surfaces including, but not limited to, Right-of-way Precast Porous Concrete Panels, Right-of-way Porous Asphalt, and Right-of-way Permeable Pavers. The Permittee shall install NYC DEP-approved measures to protect the permeable pavement from clogging and/or damage due to the work. Protection requirements available at https://www1.nyc.gov/site/dep/water/green-infrastructure.page. The Permittee shall be responsible for restoring and replacing any and all permeable pavement material impacted by the work, as directed by NYC DEP.
As part of efforts to improve water quality in New York City, the New York City Department of Environmental Protection (DEP) is implementing a Green Infrastructure (GI) Program.

The program includes the construction of GI in the Right-of-Way (ROW) throughout the combined sewer areas of the City.

The goal of the ROW GI practices is to collect stormwater runoff from the ROW and infiltrate it into existing subsoils.
Green Infrastructure Program Snapshot

- Installed over 4,500 Assets
- Over 7,000 GI assets going into construction 2019-2021

Source: DEP Green Infrastructure Program Map (publicly accessible)
ROW GI Construction Map

As of November 2019

Additional planned area for GI implementation
ROW Green Infrastructure Design

Typical ROW Green Infrastructure Terms

- Rain garden
- Right-of-way Bioswale (ROWB)
- Right-of-way Greenstrip (ROWGS)
- Right-of-way Stormwater Greenstreet (ROWSGS or SGS)
- Right-of-way Infiltration Basin (ROWIB)
- Right-of-way Precast Porous Concrete Pavement
- Permeable Pavers
- Porous Asphalt

Example rain garden schematic

Example ROWIB photo and cross section design

www.nyc.gov/dep/greeninfrastructure
Purpose of Proper GI Protections

- Protect hardscape, vegetation, and soil from being damaged, directly or indirectly, by construction debris or physical impacts
- Prevent construction debris from entering practice by blocking all openings and setting up fence
- Set up physical barriers to discourage people, equipment, materials, etc. from entering practice

Left: Materials from DPR tree protection causing damage to other vegetation in rain garden
Middle: Broken tree guard impacted by heavy machinery during construction
Right: Concrete runoff entering rain garden due to upstream construction activities and lack of any protections
Types of Green Infrastructure in the ROW

- Rain gardens
  - Bioswales and Greenstrips with vegetation
  - Bioswales and Greenstrips that are not yet planted
  - Bioswales with stormwater inlet (Type B and Type D Rain Gardens)
  - Stormwater Greenstreets

- ROW Infiltration Basins
  - Grass Top
  - Concrete Top
  - Combination Grass and Concrete Top

- Porous pavement (typically in the parking lane/gutter, entire roadway width in some locations)
  - Precast concrete panels
  - Permeable pavers
  - Porous asphalt
How to Identify ROW Green Infrastructure

Which of these pictures shows ROW Green Infrastructure?
How to Identify ROW Green Infrastructure

On the surface, ROW Green Infrastructure look similar to typical streets and sidewalks.
Locating ROW Green Infrastructure

• Check address/location information on permit
• Confirm exact location on DEP online GI map
• Look for signs of stormwater conveyance
  o Tapered curbs
  o Cuts in the curb
  o Stormwater grates (catch basins)
• Other identifying features
  o Signs with DEP logo
  o RAIN GARDEN decals
  o Pucks on sidewalk
Overview: GI Protection Requirements

- All GI practices **must be protected** if construction is being performed within 300ft or upstream to a practice, in order for the GI practices to maintain their function. Install protection measures at **all nearby and downstream GI practices**.

- **Do not stockpile materials** within or on top of any GI practice.

- **Control construction runoff and debris at the source** to the extent possible.
  - Install control measures around work producing dust, concrete slurries, or other construction debris. The Contractor must also control dust following DEP, OSHA and any applicable Federal and State regulations.
  - Cover and install erosion control measures for stockpiled materials to prevent particulates from migrating.

- The Contractor must ensure that protection measures are **properly installed, adequately maintained, and are kept in place** throughout all construction activity.

- The Contractor **must keep protective measures in place** until completion of construction activity or DOT Street Opening Permit is no longer required, and **properly remove all protective measures** at the conclusion of construction.

- **The Contractor shall be liable** for damage to ROW GI practices if proper controls are not installed and maintained throughout the construction period.

- The Contractor must **allow DEP personnel to have access** and to perform inspection of the ROW GI practice and GI protections as necessary.
All Planned or Emergency Work

• Follow all GI Protection requirements as listed in previous slide
• Updated GI Protections Document on DEP webpage
• Notify DEP at GIutility@dep.nyc.gov at least 2 business days prior to commencing work. Provide the following information:
  o Date and time of planned work
  o Extent of work
  o Type of work
• Take photos of nearby and downstream GI assets before and after work
• Install all applicable protection measures and keep in place throughout work

Given enough lead time, DEP staff will be available to provide on-site guidance for proper installation of GI protection measures

• Contractor shall be liable for any damage to GI assets due to construction activities
**Protection Measures for Sidewalk Rain Gardens**

PROTECTION COMPONENTS

- **Wooden protection** around entire rain garden. Wooden structure must be 6’ high and installed outside of the rain garden steel tree guard.
- **Landscape fabric** or geotextile, 3’-4’ high, installed flush to ground and attached to wooden members using zip ties on sidewalk side (may be attached with staples on street side)
- **Sandbags** at all curb openings
- **Silt sock** (minimum 6” diameter) on sidewalk, zip-tied to horizontal member around three sides of rain garden
GI PROTECTION TIP

- Do not step inside rain garden when installing protection measures
- No protection components should be placed in or on top of soil bed – wooden members must rest on sidewalk or top of curb
- Fence can be stabilized by tying to tree guard if necessary
- Ensure sandbags are placed so that they completely block out all runoff from entering rain garden. Use sufficient number of sandbags and place firmly to close the open channel(s).
- Routinely check landscape fabric and sandbags to ensure that they are intact
Protection Measures for Unplanted Rain Gardens

**PROTECTION COMPONENTS**

- Use same protections as rain gardens with vegetation where feasible. If not, at a minimum:
  - Place **sand bags** at curb cuts
  - Lay **temporary covering** (landscape fabric or plastic) over the bare soil area and gently secure
  - Install **landscape fabric** 2’-3’ high around entire rain garden, supported by wooden stakes

**GI PROTECTION TIP**

- Avoid stepping onto the soil when placing temporary covering
- Do not stockpile materials inside of rain garden, regardless of whether there is vegetation or not
Protection Measures for Rain Gardens with Stormwater Inlet

**GI PROTECTION TIP**

- Check protection measures regularly to ensure that the ROW GI is properly protected
- Check and remove sediment from the inlet filter bag when it becomes full
- Remove all protection measures after construction activities have ceased

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**PROTECTION COMPONENTS**

- Install all applicable protection measures for typical rain gardens including, but not limited to sand bags and temporary fencing
- Install temporary **inlet filter bags** for stormwater conveyance inlets, following methods used to protect Standard DEP Catch Basins.
- Refer to NYC DOT’s *Standard Highway Specification Volume II, Appendix F* for material and installation specifications for inlet protection.
Protection Measures for Stormwater Greenstreets

PROTECTION COMPONENTS

- Install site protection fence using 6’ **steel or wood posts** and **landscape fabric** around entire perimeter of planted area
- Close off all curb openings with **sandbags**
- Trees within Stormwater Greenstreets will require DPR standard protection for street trees

GI PROTECTION TIP

- Avoid impacting existing vegetation when installing fence and/or placing DPR tree protection
- Do not step inside or place materials within Stormwater Greenstreet
- Confirm protections are intact throughout construction activities
Temporary Covering for Existing Vegetation

- **Additional protection requirement** for the following types of work being conducted near or above existing vegetation in rain gardens:
  - Concrete work including, but not limited to:
    - concrete pouring
    - sawcutting
    - concrete demolition
  - Any other dust-producing work
  - Any other spatter-producing work

- Vegetation within rain garden must be protected with a temporary cover material that is designed to filter out fine particles and is resistant to moisture and biological degradation
  - Typical acceptable material include woven geotextiles with Water Flow Rates (per ASTM D4491) of less than 100 gpm/ft²
  - Cover material shall be *gently* placed over all vegetation at the start of the work day prior to the construction activities, then promptly removed at the end of the work day
  - Cover material shall not be kept over vegetation for more than 12 continuous hours
Right-of-way Infiltration Basins

Key features: clean-out covers, concrete headers, NYC DEP logo on grates (at some locations), openings in the curb, concrete apron in roadway gutter

Left: Infiltration Basin with Concrete Top
Right: Infiltration Basin with Grass Top (curb cuts and grates are closed)
Protection Measures for ROW Infiltration Basins

PROTECTION COMPONENTS

- Install **sand bags** at curb cuts along the gutter line
- Cover or **close grate openings** (e.g. plywood, rigid plastic board, proprietary filtering system). Secure material as appropriate.

GI PROTECTION TIP

- Place safety cones wherever there may be a tripping hazard on the sidewalk
- Do not stockpile materials on top of GI practice
- Check protection measures regularly to ensure that the ROW GI is properly protected. Repair or replace GI protection as needed
Right-of-way Permeable Infrastructure

Porous Concrete Panels and Permeable Pavers along the parking lane

Locations: Wakefield (Bronx), Rego Park (Queens), *in construction*: Ozone Park (Queens)
Right-of-way Porous Asphalt

Porous Asphalt along parking lanes only & full roadway width

Location: 4 street segments in Maspeth (Queens)

Anticipated construction Spring 2020
• Permit stipulation: Contractor must contact DEP prior to any work

• Construction runoff will clog the surface and may irreparably damage the porous material

• Install sediment and erosion control:
  o Where possible, implement sediment control at the source
  o Place silt socks or other methods around the permeable pavement to divert sediment away
  o Use temporary cover over entire permeable surface

• Restore porous surface at the conclusion of construction activities with appropriate equipment.
  o Standard mechanical sweepers not permitted
  o Equipment selected must have demonstrated performance for restoring clogged porous surfaces
  o Multiple passes may be required (minimum 2 passes at the proper speed)

• No heavy machinery over permeable material
Protection Measures for Permeable Pavement

**PROTECTION COMPONENTS**

- Utilize **silt sock** around segments of permeable pavement that are nearby and/or downstream
- Install **temporary covering** over entire permeable surface and secure in place.
- No heavy machinery. If unavoidable, use **steel plates**.

**GI PROTECTION TIP**

- Check to make sure protection measures remain in place and are functioning as intended.
- Assess vehicular access considerations for permeable pavement in front of driveways
- Place steel plates gently and do not drag across pavement surface
Contractor must restore permeable surface material AND underlying layers (open graded stone and choker course or geotextile) at the end of construction.

Removing *precast porous concrete slabs*:

- In general, if slabs are removed correctly, they can be reused and reinstalled after completion of work.
- Most slabs have cast-in ½” lifting inserts (typically four locations for 5’ x 4’ slabs and two locations for smaller slabs). Use equipment that can lift the slab vertically and not on an angle.
- Only where necessary, slabs should be cut at joints.
- In no case shall partially supported slabs remain in place during duration of the work.

Removing *permeable pavers*: can also be reused if removed and handled carefully (e.g. by hand).
• Installing protection measures is easier than repairing damage. In many cases, damage cannot be “undone” and requires completely rebuilding the asset.

• Improper protections can cause as much damage as no protection.

• Consider what plants need to survive – sunlight, clean water, stable soil, etc.
Each photo shows a situation where there is potential or actual damage to GI due to improper protections.
List of Materials for GI Protections

- Site protection fence materials for rain gardens (bioswales, stormwater greenstreets, etc.)
  - Wooden 2x4 members for vertical, horizontal, and cross beams (For stormwater greenstreets: use wood or steel stakes instead)
  - Landscape fabric (filters debris but allows air, typically non-woven)
  - Zip ties to attach landscape fabric to wood
- Temporary cover material to protect vegetation during concrete work (less permeable than landscape fabric for rain garden protection fence, e.g. woven geotextile)
- Sand bags to block all curb cuts and grated inlets
- Silt sock for perimeter of rain gardens and/or permeable pavement
- Standard erosion control for catch basins (e.g. inlet filters)
- Safety cones
- Impermeable liner to cover grated openings on ROW Infiltration Basins
- Steep plate for permeable pavement, if using heavy machinery
• All green infrastructure must be protected regardless of where it is located in relation to the construction activity. Even if the rain garden is at a higher elevation than where the construction is planned, all rain gardens listed in permit and/or near the construction zone or construction access route must be protected.

• Contractors must exercise extreme caution when performing sawcutting, excavation, jackhammering, or any other concrete work within 10 feet of green infrastructure practices. Additional close-up photos of rain garden (e.g. header, tree guard, inlet/outlet, apron, etc) before starting work is highly recommended.
nyc.gov/dep/greeninfrastructure

Utility Coordination: GIutility@dep.nyc.gov

General GI Inquiries: RainGardens@dep.nyc.gov or 718-595-7599