



BUILDINGS BULLETIN 2016-016

Technical

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Purpose: This document shall clarify the code and zoning requirements for calculating an increase in impervious surface area of a site when using permeable paving systems or materials.

Related Code/Zoning Section(s):

BC	107.11.2	ZR	25-65
PC	106.6.2	ZR	36-55
		ZR	44-44

Subject(s): Stormwater runoff, impervious surface; Stormwater runoff, permeable paving; Zoning Resolution, open parking area, permeable paving materials; Permeable paving, equation; Department of Environmental Protection, stormwater disposal

Background

The 2014 Construction Codes require applications for construction document approval to include submittal documents relating to the discharge and/or management of stormwater runoff where new or increases in impervious surfaces on a tax lot are proposed. Applications with new or increases in impervious surfaces include, but are not limited to, the following: horizontal building enlargements, additional or larger parking pads, driveways, walkways, patios, and other paved areas. Also, the Zoning Resolution (ZR) outlines acceptable surfacing materials in open parking areas and states that permeable paving materials are allowed, provided such materials are acceptable to the Commissioner of Buildings.

The effectiveness of permeable paving materials varies depending on the selected material, system type and manufacturer. Acceptable permeable paving systems promote on-site stormwater infiltration and may contribute to a reduction in the total area of impervious surfaces. The equation presented in this bulletin shall be used to measure the effectiveness of various permeable paving materials/systems and the resulting reduction in total amount of impervious surface area.

Specifics

Construction Codes

BC Section 107.11.2 of the 2014 Building Code (BC) and Section PC 106.6.2 of the 2014 Plumbing Code (PC) require applications to include submittal documents from the New York City Department of Environmental Protection (DEP) describing the method of stormwater disposal. However, the Code provides the following conditional exceptions:

- For the alteration of an existing one- or two-family building, the combined area of any proposed horizontal enlargements and increases in impervious surfaces not exceeding 200 square feet shall not be required to submit any such submittal documents.

- For the alteration of an existing building that includes a code compliant on-site stormwater disposal system, the combined area of any proposed horizontal enlargements and increases in impervious surface not exceeding 1,000 square feet shall not be required to submit any such submittal documents.

Zoning Resolution

ZR Sections 25-65, ZR 36-55 and ZR 44-44 require all open off-street parking spaces in residential zoning districts and any area intended to be permanently used as an open accessory group parking facility in commercial and manufacturing zoning districts to be surfaced with asphaltic or Portland cement concrete or another similar hard-surface dustless material, and further states that permeable paving materials may be used where determined appropriate by the Commissioner of Buildings.

Common types of permeable paving systems include permeable pavers, porous concrete and porous asphalt. Permeable pavers consist of interlocking modules that are designed to maintain open joints filled with grass or aggregate (no small particles) while porous concrete/asphalt omit fine aggregates in their mix; both create interconnected open voids to allow stormwater to permeate. Soil conditions and the depth to the water table must also be considered when determining if a particular type of permeable paving surface is appropriate for a site. As a result of all of these variables, the permeability of such paving systems varies widely.

Conclusion

Alterations that propose permeable paving systems must provide a calculation for the increase in impervious surface area that accounts for the difference between the permeability of the existing and proposed surfaces. Based on the developed flow equation from DEP’s July 2012 “Guidelines for the Design and Construction of Stormwater Management Systems Manual,” the following equation shall be acceptable:

$$\sum A_{\text{impervious}} = A_{\text{surface}} * (C_p - C_e)$$

Where:

A_{impervious} = total area counted towards the increase in impervious surfaces

A_{surface} = surface area where permeable paving is to be used

C_p = stormwater runoff coefficient of the proposed permeable paving system

C_e = stormwater runoff coefficient of the existing surface

NOTE: Where multiple types of permeable paving are proposed, each area shall be calculated with the corresponding coefficient and then added to determine the total area.

Section 2.1 of DEP’s guidelines lists the stormwater runoff coefficients (**C**) for various surfacing conditions, including permeable paving materials, see Table 1. Therefore, unless alternate equations and/or alternate stormwater runoff coefficients are provided by a manufacturer or by a Code recognized reference standard/listing, applicants shall use the above equation assuming a default runoff coefficient of 0.70 (**C_p**) for any proposed porous asphalt, porous concrete or permeable paver system, and a default runoff coefficient of 0.30 (**C_e**) for the existing surface provided such existing surface is equivalent to an undeveloped natural area. Each area surfaced with permeable paving systems shall use this equation with the applicable coefficients to determine the area that shall be counted toward the total increase in impervious surfaces. Areas that do not use a permeable paving system shall be added completely to the increase in impervious surfaces and this equation shall not apply.

The proposed permeable paving system shall include the surface material, any bedding or base courses, filter layer and drainage. Where soil conditions are known to be impermeable, such as clay, an underdrain or subsurface drain tile may be required as part of the system. The subsurface conditions shall not prohibit on-site infiltration where the permeable paving is proposed.

Stormwater Runoff Coefficients (C)	Surface Coverage Type
0.95	Roof
0.85	Pavement
0.70	Porous asphalt/concrete and permeable pavers
0.70	Green roof with four or more inches of growing media
0.70	Synthetic turf athletic fields with subsurface gravel bed and underdrain system
0.65	Gravel parking lot
0.30	Undeveloped areas
0.20	Grassed and landscaped areas (including rain gardens and vegetated swales)

Table 1: Stormwater Runoff Coefficients from DEP’s “Guidelines for the Design and Construction of Stormwater Management Systems Manual,” July 2012

Example: An applicant is proposing a horizontal enlargement of 160 SF and a new parking pad of 150 SF in the existing side yard to an existing one-family building. The existing yard is composed mostly of loose soil and weeds with no structured landscaping and can be assigned a default coefficient of 0.30 from the above table. The new parking pad will be paved with a permeable paver system using the default runoff coefficient of 0.70 from above. The increase in impervious area of the parking pad is as follows:

$$A_{\text{impervious}} = 150 \text{ SF} * (0.70 - 0.30) = 60 \text{ SF}$$

Since the combined horizontal building enlargement and increase in impervious surfaces is 220 SF (160 SF + 60 SF), submittal documents are required for the method stormwater disposal per BC 107.11.2.

However, if the applicant in this example proposed a permeable paving system with a runoff coefficient of 0.30, as documented in the system manufacturer’s literature or specifications and submitted with the application for review, the increase in impervious area would be as follows:

$$A_{\text{impervious}} = 150 \text{ SF} * (0.30 - 0.30) = 0 \text{ SF}$$

In this case, the combined horizontal enlargement and increase in impervious surfaces would be 160 SF, and the applicant would not be required to submit documentation on stormwater disposal as permitted by Exception 1 of BC 107.11.2.