Protocol 1   Infiltration BMP Setbacks from Structures

A.   Purpose of this Protocol

This protocol (Protocol 1) provides the designer with guidance regarding BMP setback distances from structures, including buildings, pavements, utilities, and other existing or proposed structures.

B.   Infiltration and Setback Considerations

Infiltration systems infiltrate both laterally (through the bed sides) and vertically (through the bed bottoms). When designing infiltration systems, it is important to maintain an adequate horizontal setback distance from structures to avoid potential damage to those structures from water migration.

As a general guideline, BMPs should be set back at least 5 feet horizontally from a structure to allow for protection of the BMP and structure during construction. However, this may not always be feasible or desirable. Infiltration BMPs may be located immediately adjacent to a structure if the design addresses details such as waterproofing of the structure, protection of pavement subbase, etc. The proximity of adjacent structures, the nature and condition of specific site conditions, and the soil conditions should be considered when determining the appropriate setback.

The following additional factors should be considered when locating infiltration BMPs near structures:

- The age and type of structure. If a building has a foundation or slab underdrain system and this system intercepts the infiltrated water, the intercepted flow will quickly discharge to the sewer system and reduce the effectiveness of the BMP.
- Older buildings with stone foundations or poor foundations are more likely to be adversely impacted by altered conditions.
- Utilities that are in poor condition may be damaged by infiltrated runoff.

Unless a structure has appropriate waterproofing, infiltration BMPs should be located such that the infiltrated water moves below the subgrade of the structure, or below the invert of a utility and bedding material.

C.   Estimating Required Horizontal Setback Distance

Appropriate horizontal setbacks from structures that are both upgrade and downgrade from the infiltration BMP can be estimated by the following approach. The top water surface elevation of the BMP is compared to the elevation of interest at the structure, which is assumed to be 2 feet below the basement or lowest slab elevation of a building, or 1 foot below the invert of a utility. This approach assumes that

water moves laterally out of the infiltration bed at an angle of 45 degrees and that there are no site-specific conditions that would direct the flow of water laterally toward the structure. Such site-specific conditions include, but are not limited to:

- Pipes or laterals that could unintentionally direct water flow toward the structure
- Confined layers in the soil (such as clay horizons, historic buried impervious areas, etc.) that could intercept the vertical flow of water and direct water toward the structure

The difference between the water surface elevation of the top of storage and the elevation of the bottom of the structure along with a safety factor to determine setback is shown on Figure A-1.
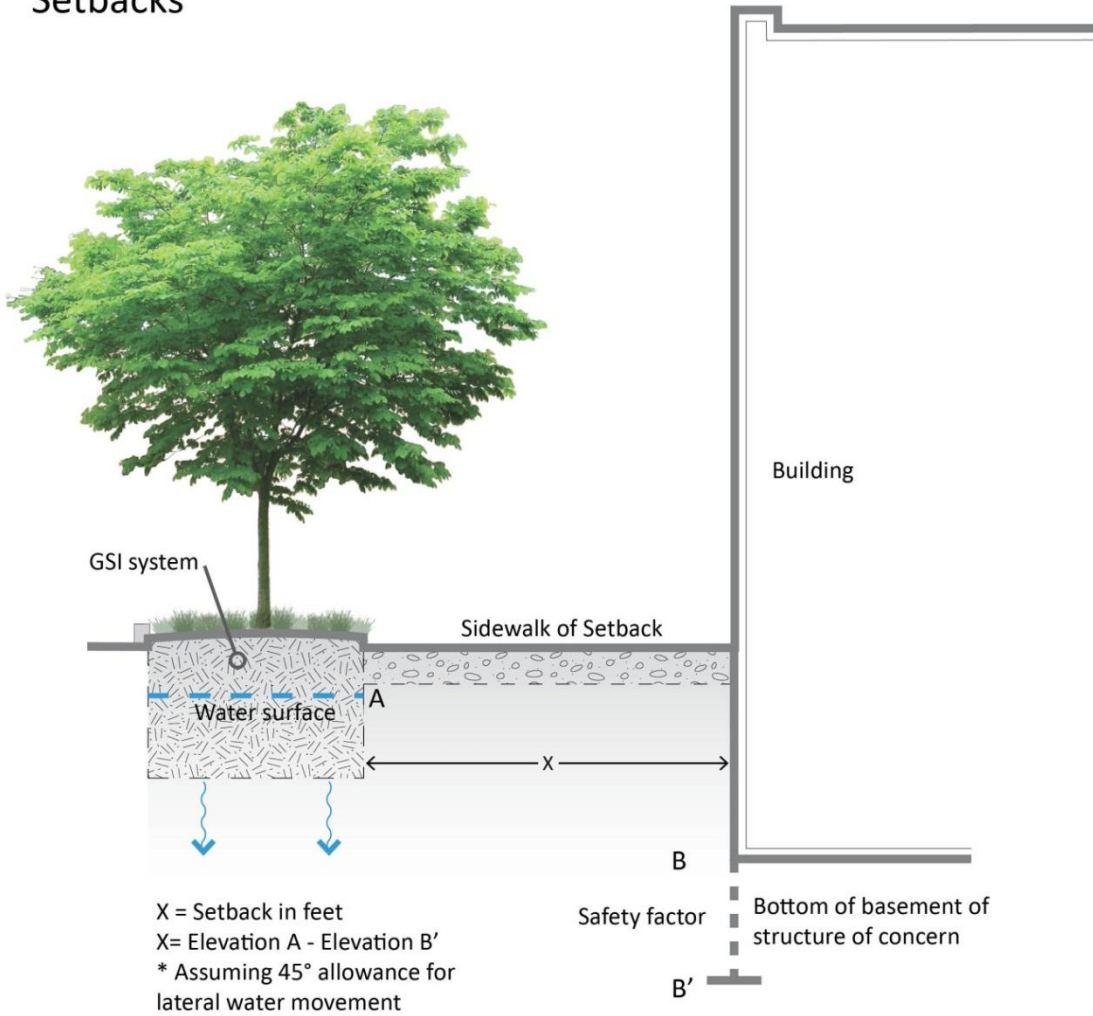
If an infiltration bed is closer than the calculated setback, an impermeable geo-membrane liner should be used along the vertical side of the storage bed and along the bottom of the storage bed to a distance that is at least the calculated setback distance from the building. Using a geo-membrane liner in this way may reduce the infiltration footprint of the system and increase the loading ratio, which must be factored into the design.

The designer should always consider potential impacts when locating infiltration BMPs and may adjust the location and size of the BMP accordingly. For example, a BMP may be set back from a downhill structure a sufficient distance to avoid water movement toward the structure. However, other factors such as existing soil conditions, amount of infiltrated water, etc. should be considered by the designer.

Setbacks

GSI system

Sidewalk of Setback

Building

A

Water surface

X

B

Safety factor

Bottom of basement of structure of concern

B'

X = Setback in feet
X= Elevation A - Elevation B'
* Assuming 45° allowance for lateral water movement

Example:

Top water Surface Elevation   = A = 750' elev
Basement slab elevation   = B = 740' elev
2' "safety factor"   B' = 738' elev
X = A - B' = 750' - 738' = 12' Setback

Figure A-1