



**City of White Bear Lake
Community Development Department
4701 Highway 61 N.
White Bear Lake, Minnesota 55110
651-429-8561 | www.whitebearlake.org**

STORMWATER INFILTRATION PRACTICE SUBMITTAL REQUIREMENTS

Purpose. Numerous studies have shown that the percent coverage of a watershed by impermeable surfaces such as rooftops, roads and driveways is a good indicator of a lake's health and water quality. Generally, when more than 25 percent of a lake's watershed is covered by impervious surfaces, it risks severe and permanent degradation. That is why the City of White Bear Lake requires land owners in the shoreland district to limit impervious cover to 30% or less of their lot size, or requires homeowners to mitigate for impervious surfaces over 30% through infiltration. This can be accomplished by installing rain gardens, infiltration trenches, permeable pavement, or other infiltration practices.

Required Exhibits. Please submit the following items along with the Building/Zoning permit application.

- Raingarden, infiltration trench, or permeable pavement calculation worksheet. If an alternative infiltration practice is proposed, provide design calculations.
- Plan view drawing showing:
 - Existing and proposed contours, if available
 - On-site and off-site existing and proposed buildings
 - Arrows showing the direction of overland flow on the entire property. Identify the specific locations where water flows onto the site and off the site.
 - Location of all proposed infiltration practices⁽¹⁾
 - Type and location of conveyance used for routing runoff from impervious surfaces to the stormwater infiltration practice⁽²⁾
 - An erosion and sediment control plan, if applicable⁽⁴⁾
- Sketch showing the area of impervious surfaces flowing to the infiltration practice(s) and method of conveyance. See example sketch below titled 'Example Impervious Area Mitigation Routing to Raingarden'.
- Soils information at the location of the proposed infiltration practice(s)

For lakefront property only

- show the location of the ordinary high water level (OHW) and shore impact zone

Note: Any work proposed within the ordinary high water level will require a public waters permit from the Minnesota Department of Natural Resources

For permeable pavement only

- Permeable pavement specifications (type, manufacturer, etc.)
- Slope and direction of permeable driveway surface and subgrade⁽⁹⁾
- Location and slope of underdrain, if applicable
- Cross section showing:
 - Permeable pavement material
 - Bedding course material and thickness
 - Base course/subbase course materials and thicknesses⁽¹⁰⁾
 - Underdrain diameter and depth, if applicable

For raingardens only

- Type, location, and elevation of overflow (outlet) including permanent erosion control
- Length and width dimensions
- Cross section of raingarden showing:
 - Type and depth mulch and amended soils⁽¹²⁾⁽¹³⁾
 - Depth of storage volume, measured below the overflow elevation
 - Side slopes of 3:1 (horizontal to vertical) or flatter and/or retaining walls
 - Overflow (outlet), with permanent erosion control⁽⁷⁾
- Piped inlet with rip rap, if applicable
- Planting plan showing the number, type, and size of plants ⁽¹⁴⁾

Design Considerations

- (1) To avoid seepage and frost heave concerns, stormwater infiltration practices should not be constructed adjacent to foundations, footings, or pavement. As a general rule of thumb, stormwater infiltration practices should be located at least 10 feet away from basement walls.
- (2) All runoff from impervious surfaces that is required to be infiltrated shall be routed to the proposed stormwater infiltration practice. Permeable pavement shall not be used for mitigating runoff from additional impervious areas.
- (3) When utilized, excavation equipment shall work from outside the footprint of the stormwater infiltration practice to avoid soil compaction.
- (4) An erosion and sediment control plan is required if the project excavates or fills in excess of 100 cubic yards of material or disturbs a total land surface area of 6,000 square feet or more. Erosion and sediment control is required to be installed before construction begins.
- (5) Infiltration testing is strongly encouraged to determine the infiltration rates of the on-site soils below the proposed stormwater infiltration practice. In the absence of an on-site test, the saturated infiltration rates listed in Appendix A on the calculation worksheets shall be used.
- (6) Stormwater infiltration practices need to be designed with a minimum vertical distance of 3 feet between the bottom of the practice and the seasonally high water table or bedrock layer. In White Bear Lake, bedrock is generally not found near the surface and groundwater elevations vary from location to location. If you find groundwater when digging, a rain garden would not be appropriate in that location.
- (7) Stormwater infiltration practices shall discharge the treatment volume through the existing onsite soil. Additional flows that cannot be infiltrated should be routed to bypass the practice through a stabilized outlet. The overflow shall be constructed in such a way to maintain the existing overland flow path across the property. Historic flow paths will need to be maintained so that proposed grading does not route additional water onto adjacent properties.
- (8) The impervious area construction should be completed and pervious drainage areas established with vegetation prior to introduction of stormwater into the stormwater infiltration practice.

Permeable Pavements

(9) Surface slopes for all permeable pavement types should be at least 1 percent to provide an alternate means for drainage should the surface become completely clogged over time.

The slope of the soil subgrade should be as flat as possible (i.e., less than 1 percent longitudinal slope) to enable even distribution and infiltration of stormwater.

(10) The reservoir below the permeable pavement shall be composed of clean, washed crushed stone aggregate and thickness sized for both the storm event to be stored and the structural requirements of the expected traffic loading. For designs with an optional underdrain, the reservoir thickness is measured below the invert of the underdrain.

(11) Subgrade soil compaction should be avoided wherever possible to maximize infiltration. In some situations, compaction may be needed for supporting vehicular loads. In such cases, compaction density and subsequent soil infiltration should be assessed by an infiltration test on site to determine an acceptable soil density and its contribution to soil strength and infiltration. The measured infiltration rate for use in hydrologic calculations may be reduced to compensate for long-term sedimentation on the subgrade soil.

Raingardens

(12) To improve infiltration on sites with heavy clay soils, over-excavation of the rain garden to remove the clay is recommended. Replace with a 12 to 24 inch depth of amended soil. Amended soil must be suitable for supporting the growth of plants and contain less than 5% clay content.

Recommended amended soil mixture: 70% construction sand
30% leaf compost

(13) Mulch should be used to protect bare soil from erosion and to suppress weeds. Shredded hardwood mulch is preferred over wood chips or bark as it tends to interlock together and does not float out of the rain garden as easily as other types of mulch.

(14) Plants are required in the rain garden and should be selected based on their water tolerance. Plugs, bare root plants, or potted plants are recommended over seed. For native plant suggestions, see the City's preferred list of rain garden plants (forthcoming).

(15) When determining an overflow location for the rain garden, be cognizant of where excess water from a larger storm event will flow out of the rain garden. Try to maintain the existing flow path of the property and avoid directing flow into a neighbor's yard and towards building foundations.

Inspection Process

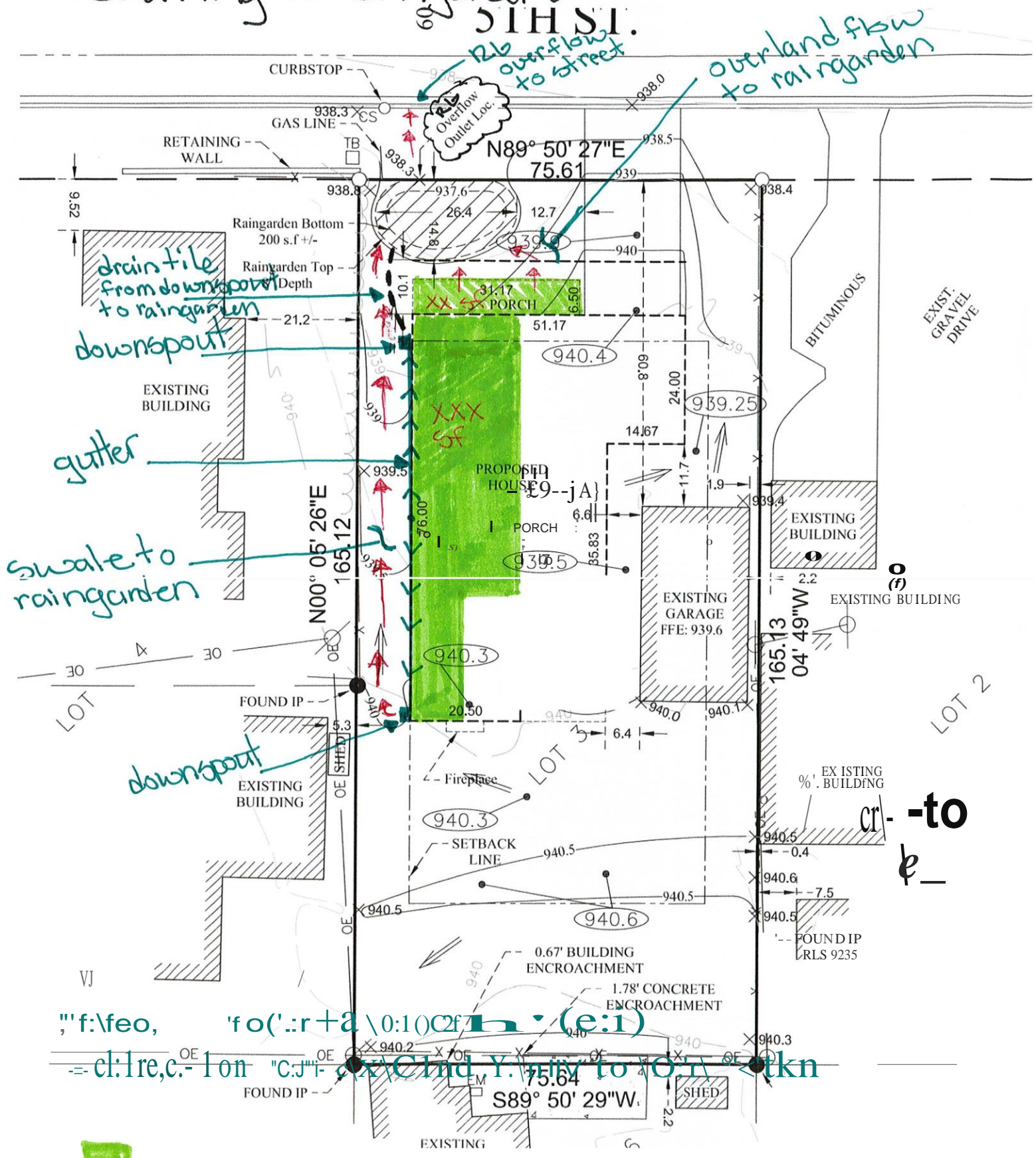
City inspections are required during construction of the stormwater infiltration practices to ensure that the design requirements are being met.

Call for an inspection at the following phases of construction:

Inspection #1. After excavating the rain garden or pervious pavement. Soil type and level of compaction of the native soils will be inspected.

Inspection #2. For rain gardens: after mulch is placed and before planting For permeable pavement, after final construction

Example Impervious Area Mitigation Routing to Raingarden



Handwritten notes and symbols at the bottom of the plan, including "f: feo", "fo (:r + 2 \ 0 : 1) C f h (e : 1)", and "cl: re, c- lon".