

Lake Wise Info Sheet



Shoreland Best Management Practices for Lake-friendly Living.

Benefits

- Water Quality
- Prevents Erosion
- Slow, Spread, Sink Stormwater
- Low Cost
- Low Maintenance
- Small spaces
- Visual Appeal
- Protection & Resiliency

Acceptable BMP under the Vermont Shoreland Protection Act

Related Info Sheets:

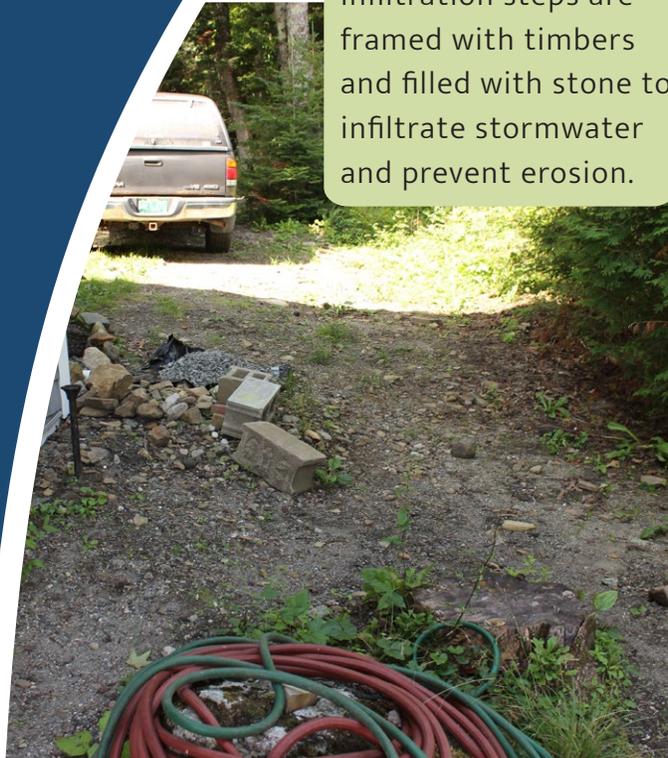
- Planning Pathways
- Water Bars & Open-top Culverts
- Lakeshore Buffers

INFILTRATION STEPS

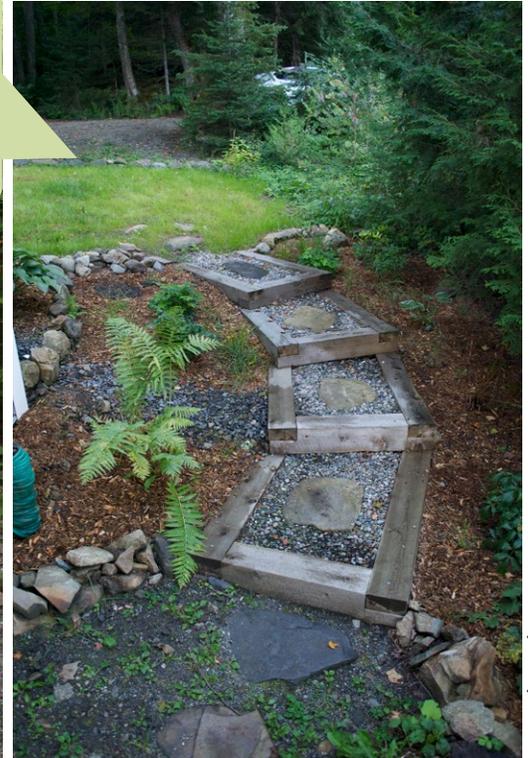
Low impact lake access

Description.

Infiltration steps are framed with timbers and filled with stone to infiltrate stormwater and prevent erosion.



Before: Driveway runoff and erosion.



After: Infiltration steps and plantings; a water bar above diverts runoff.

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Applicability.

Infiltration steps can be built in place of a path or traditional steps to stabilize areas with significant foot traffic. They can be installed on moderate slopes, especially where foot traffic is causing erosion. Not appropriate for 45-degree slopes or steeper.

How to.

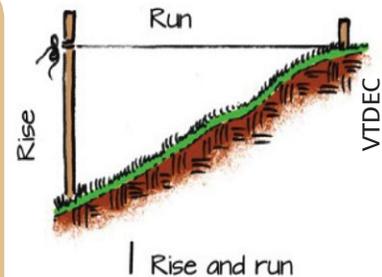
1. Measure the rise and run of the area where stairs will be installed. Select rot-resistant cedar or pressure-treated timber at least 6 to 8 inches in diameter. This information will be used to calculate the number of steps:

$$\text{Number of steps} = \text{Rise (ft)} / \text{Timber width (ft)}$$

$$\text{Step tread depth (ft)} = \text{Run (ft)} / \text{Number of steps}$$

Note that a comfortable tread depth will be at least 15 inches. A comfortable step width will be about 4 feet for a single person, but can be made wider or more narrow depending on site conditions.

Determine the materials needed, including length of timber, amount of steel rebar, and stone.



Measuring slope with string line level.

VERMONT

DEPARTMENT OF ENVIRONMENTAL CONSERVATION
WATERSHED MANAGEMENT DIVISION



Graphics by Greenleaf Design, LLC

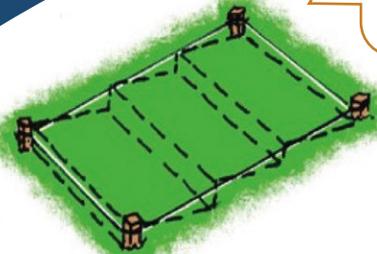


Make sure to dispose of excavated soil in a place where it will not wash into lakes or streams.

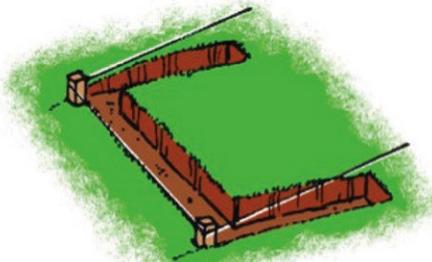


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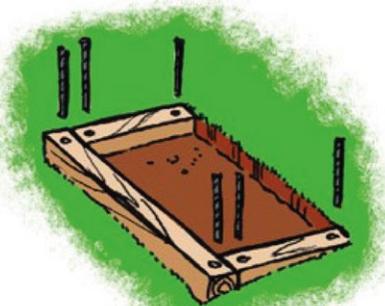
Constructing timber frame.



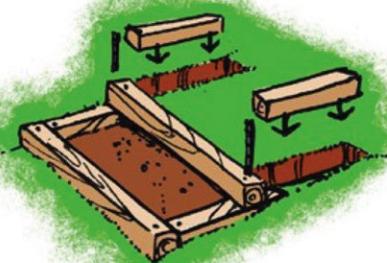
2 Marking steps



3 First stair



4 Installing timbers



5 Next stair

How to.

2. Mark the area for the steps. Begin by using stakes to mark the outer corners. Tie a string around stakes to mark the outer boundaries of the stairs. Use spray paint to mark the steps.

3. Beginning at the bottom of the stairs, dig a trench for the riser timber and the side timbers. Side timbers must extend 6 inches beyond the next step's riser so that the next step will overlap the lower step. Ensure trenches are level.

Note that side timbers may not be necessary in areas where the surrounding area is higher than the pathway (e.g., severely eroded pathway). Extend the riser timber into the adjacent banks if side timbers are not used.

Measure and cut the riser timber and two side timbers to length. Drill $\frac{1}{2}$ inch diameter holes 6-inches from the ends of each timber.

4a. Position the timbers, ensuring that they are level. Anchor the riser timber by driving two 18-inch pieces of $\frac{1}{2}$ -inch diameter steel rebar through the holes and into the ground. Make sure the rebar is flush or slightly recessed since the edges may be sharp.

4b. Level and anchor the side timbers with two more pieces of rebar each. Excavate soil from inside the step, creating a surface level with the timber bottom.

5. Measure back from the first riser and mark the calculated tread depth. Dig trenches for the side timbers. Place the riser on the ends of the first step's side timbers. Drill pilot holes about 5 inches in from both ends of the riser – in line with the side timbers below. Anchor by spiking riser into the side timbers of first step with 12-inch galvanized spikes.

Set the side timbers. Repeat steps 4b and 5 for the remaining steps.





Materials.

- Measuring tape
- Stakes, string, level to measure slope
- Wood stakes, string, spray paint for marking
- Shovel
- Drill
- Metal Saw (for sizing rebar)
- Sledgehammer
- Steel rebar (1/2" by 18")
- Galvanized spikes (12")
- Rot resistant timbers
- Clean 3/4 inch crushed stone or pea stone

How to.

9. When installing the top step, cut the side timbers 6 inches shorter than the other side timbers. These timbers do not need the extra length since no stairs will rest on them.

10. Fill each step with 3/4 inch crushed stone or pea stone until it is about 1 inch below the top of the timber. This lip will break up water flow and encourage infiltration. Paving stones can also be set into crushed stone to provide a smooth surface for walking provided ample crushed stone is exposed to allow infiltration.

11. Seed and/or mulch bare soil adjacent to the steps. Planting areas adjacent to the steps with native plants such as shrubs and groundcovers softens the edges, helps prevent erosion adjacent to the steps, and increases stormwater infiltration capacity of the area.

Maintenance.

Inspect the steps after large rain events and in the spring. If any damage occurs, repair as soon as possible. Replace rotten timbers. Refill stone where it has settled.

If the stone becomes filled up with sediment over time, remove, clean out sediment, and replace with clean stone.



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Lakeside infiltration steps filled with pea stone.



6 Filling stairs

For more information...

- The Vermont Guide to Stormwater Management for Homeowners and Small Businesses (2018)
- New Hampshire Homeowner's Guide to Stormwater Management (2019)

