

PAVER SURFACE INFILTRATION LABORATORY TESTING REPORT

Terracon

Report Number: 82191489.0002
Service Date: 12/06/19
Report Date: 12/09/19

700 NE 55th Ave
Portland, OR 97213-3150
503-659-3281

Client

Western Interlock Inc
Attn: Landon Pegg
10095 Rickrealle Rd
Rickreall, OR 97371

Project

Western Interlock Paver Infiltration Testing
700 Ne 55th Ave
Portland, OR 97213

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Summary: Terracon representative performed ASTM C1781 – modified to simulate field installation in a laboratory environment – on pavers and aggregates provided by Western Interlock. One paver installation pattern was tested for water infiltration utilizing the Holland Permeare paver mix. One size of Holland Permeare was used to create this pattern; nominal 4” x 8” pavers. The values of inches per hour of water infiltration substantially exceeded any level of record historic precipitation in the Pacific Northwest. Therefore, it may be stated that, assuming the pavers are installed in accordance with Western Interlock instructions, the pavers and aggregates will not be the limiting factor for drainage rate of a paver surface.

Modifications to ASTM C1781: ASTM C1781-18, the Standard Test for Surface Infiltration Rate of Permeable Unit Pavement Systems, is intended to be performed as a field test on previously installed, in-situ permeable unit pavement surfaces. As no previously installed surfaces composed of Western Interlock’s Holland Permeare pavers were available for testing in strict accordance with C1781, a simulated installation was created in the Terracon laboratory (see Test Apparatus and Preparation). A further modification is that C1781 requires a minimum of three separate sub-tests per surface; rather than create three separate surfaces for each installation pattern, three separate tests were performed on the same surface, with at least one hour passing in between tests, to allow the pavers and aggregate to drain.

Limitations: As this testing was not performed on materials installed on subgrade, the influence of individual site conditions on the infiltration rate as determined by testing the laboratory-constructed system cannot be directly inferred; however, to expand on the final sentence in the Summary, the limiting factor for drainage of a Holland Permeare surface properly installed in accordance with Western Interlock’s instructions will be the subgrade, and not the paver / aggregate system. We recommend that if drainage of a site’s subgrade – whether native or installed – are of concern, field infiltration testing be performed to determine a realistic inches per hour infiltration rate for installation of Western Interlock pavers on that site. The effects of sedimentation over time on the infiltration rate is outside of the scope of this testing.

Test Apparatus and Preparation: The tests were performed on a paver surface installed within a wood frame. The frame’s interior dimensions were a length of 22½”, a width of 22½”, and a height of 14¾”. A grid of woven steel mesh with openings approximately 4.75 mm square was securely attached to the base of the frame, allowing material to be retained inside the frame while allowing water to pass out. On top of the steel mesh, a 6” layer of open-graded 2” – 1” ballast rock from Knife River, Coffin Butte was placed; the layer was assembled by hand to ensure that the rocks were locked against each other; this was tested by applying a 20,000 lb force to the full surface of the layer utilizing a compression machine, with no visible deflection. The next layer was a 4” depth of open-graded ¾” - ½” drain rock from Reed. It was similarly hand-installed and checked against deflection. Atop this, a 1½” layer of ¼” - #10 levelling material from Reed was placed and smoothed to a level surface without compaction. Finally, the selected pattern was put in place, with pavers sawcut as necessary to ensure a

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close fit with the frame's edges (less than 1/4"). Levelling course material was then swept into the gaps between the pavers and between the pavers and the frame, and consolidated with a slender rod until the material was firm and unyielding, with the level falling slightly beneath the surface of the pavers. Finally, a piece of timber was carefully struck against the surface of the pavers to ensure the surface was flat.

Test Process: As per ASTM C1781, an impermeable ring was sealed to the paver surface with plumber's putty. The interior diameter of the ring was 11.58", and it was composed of rigid plastic. The surface was then pre-wetted with 8.0 lbs of municipal tap water, with the infiltration time noted to determine the mass of water to be used in the actual testing. In all cases, the infiltration time of the pre-wetting mass of water was less than 30 seconds, and so 40.0 lbs of tap water was utilized for the three infiltration sub-tests performed on each installation pattern. At least one hour was allowed to pass in between tests, to allow the pavers and aggregate to drain.

Test Results: The Herringbone installation pattern was pre-wetted, then tested three times for infiltration. The time elapsed and infiltration rate (in inches per hour) for each sub-test are shown, as well as the average values for the installation pattern. Inside ring diameter and water masses are noted in Test Process.

Western Interlock; Holland Permeare, 4" x 8"; Herringbone Installation Pattern

Pre-Wetting Elapsed Time: 11 Seconds

	<u>Elapsed Time</u>	<u>Infiltration Rate</u>
Subtest 1:	35.2 seconds	1,075 inches per hour
Subtest 2:	35.3 seconds	1,072 inches per hour
Subtest 3:	34.8 seconds	1,087 inches per hour
Average:	35.1 seconds	1,078 inches per hour

Services: Perform modified ASTM C1781 on material delivered to laboratory by paver manufacturer to determine infiltration rate of paver / aggregate system in a simulated field installation.

Terracon Rep.: Charles Schneider

Reported To:

Contractor:

Report Distribution:

(1) Western Interlock Inc, Landon Pegg

Reviewed By:

Charles Schneider
Laboratory Manager

The tests were performed in general accordance with applicable ASTM, AASHTO, or DOT test methods. This report is exclusively for the use of the client indicated above and shall not be reproduced except in full without the written consent of our company. Test results transmitted herein are only applicable to the actual samples tested at the location(s) referenced and are not necessarily indicative of the properties of other apparently similar or identical materials.

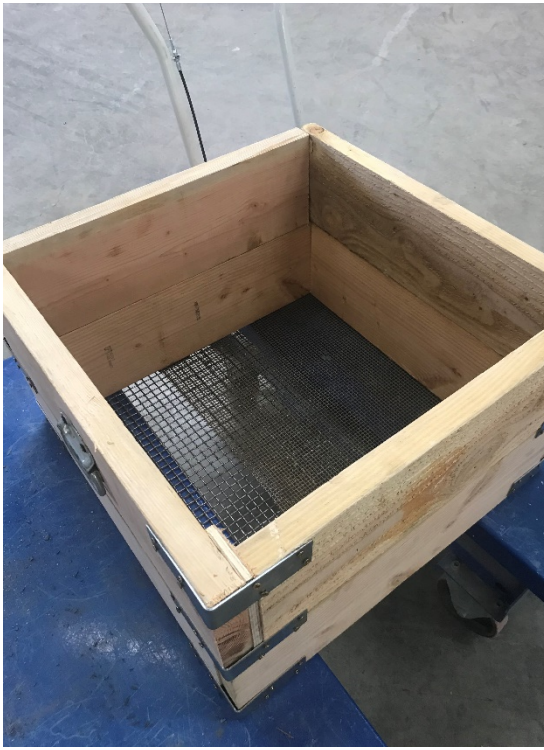


Photo #1 Empty Frame



Photo #2 Frame with Ballast Layer



Photo #3 With Levelling Course



Western Interlock Paver Infiltration Testing	Site Plan: Frame Setup	
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Photo #4 Herringbone as Installed



Photo #5 Herringbone as Prepped (Pre-Test)

Western Interlock Paver Infiltration Testing	Site Plan: Holland Permeare, Herringbone	
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