slag Successes
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Lightweight slag – the product of choice for Highway 17 in Renfrew, Ontario

A build-up made possible with lightweight expanded slag keeps differential settlement to a minimum and eliminates subgrade displacement at bridge abutments

Bridge abutment layers of regular granular fill, Styrofoam® and lighweight expanded slag on top.

Northwest of Ottawa, as a new stretch of Highway 17 was being constructed in 2002, a challenge emerged in the construction of bridge abutments at every overpass.

The indigenous area sub-soil is leda clay. The clay has high plasticity when its moisture content is above optimum, causing instability in the sub-grade. There is also the problem of high settlements due to compression of the clay. The end result, potentially, could be failure of the sub-grade, causing uncontrolled differential settlement between the approach and the bridge structure itself. Using normal weight aggregates (19-22 kN/m3-125-135 lbs/ft3 compacted) on the soft sub-grade would cause long-term settlements resulting in frequent repairs and, possibly, damage to the bridge structure.

To meet the challenge, the Ministry of Transportation (MTO) specified lightweight expanded slag from Lafarge NA, Hamilton, Ontario. Due to its engineering properties, its lightweight compacted density, and high angle of internal friction, slag

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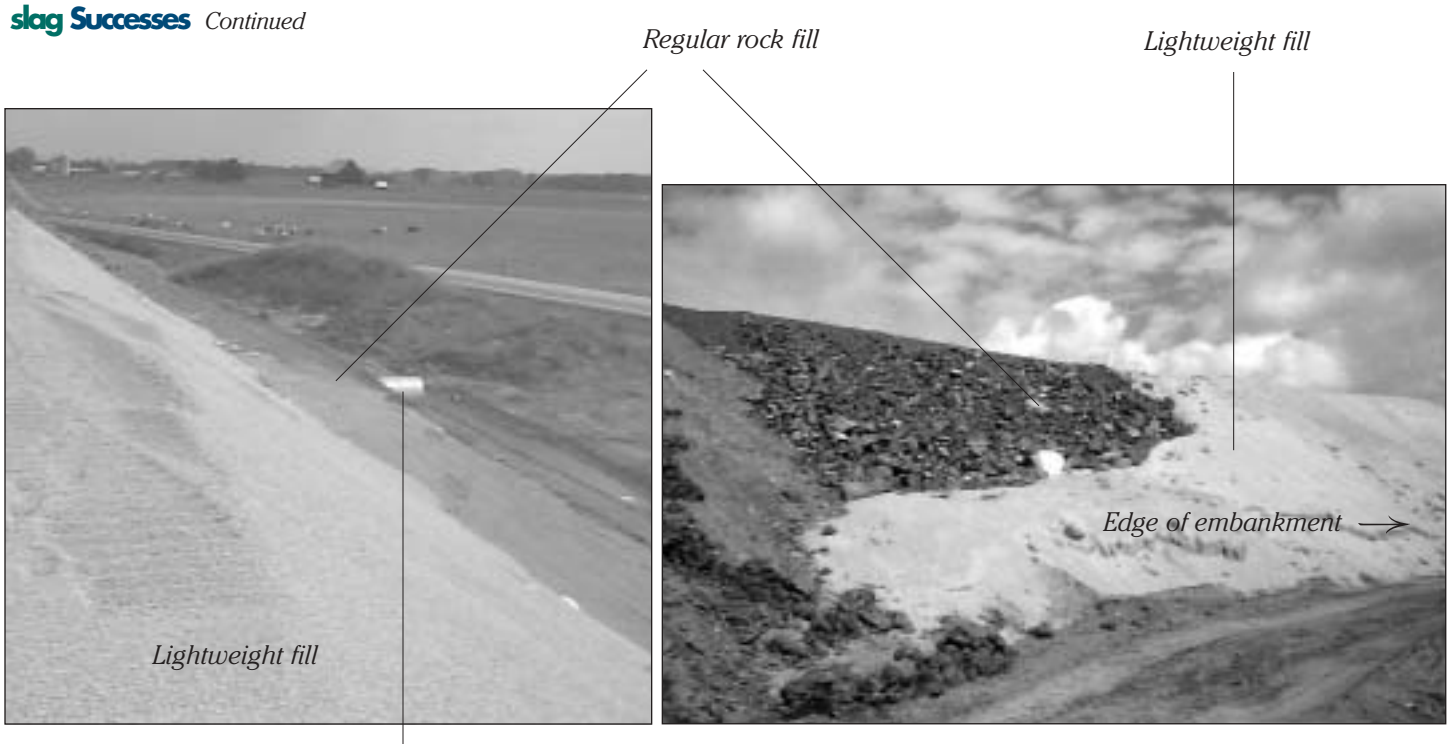

Drain pipe from wick drain allows for drainage of displaced moisture during settling.

offered the best and most economical engineering solution. The MTO had previous success with the expanded slag, having used it on an earlier project. Lafarge provided the engineering and test data making it an easy selection process for the MTO. The contractor on the project, R.W. Tomlinson, worked with Lafarge to ensure proper installation techniques were used.

"Without a doubt, the best solution was lightweight expanded slag, which we tested to ensure conformance with the maximum 11.5 kN/m3 (73 lbs/ft3) specification," says Tom Carrozza of Lafarge Slag, Hamilton, Ontario. The information and reports generated by Lafarge greatly aided the MTO in decisions on final construction. Only then could the road and bridge be completed.

"By testing for in-site density we were able to prevent breakdown of the material through over-compaction. Testing saved money for the customer, as well as minimizing his compaction efforts," Carrozza added.

Prior to backfilling operations, wick drains were installed below the roadway to bleed off any excess moisture from the clay. The slag, in combination with the wick drains, accelerated settling. When gauges installed in the roadway indicated the settling had ceased (approximately one year), final road and bridge construction were completed without concern for future sub-grade failure. Normal weight aggregates would have made the task impossible.

In looking back, suppliers and customers alike see the tremendous value in two important aspects of this project: (1) a proactive approach in testing *before* building and, (2) using lightweight expanded slag as part of the mix in creating heavy-duty support for bridge abutments on porous soil.

In one way or another, slag is the material you can always build upon.

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