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Technical Memorandum

Subject: Differential Settlement

Technical Information:

Retaining walls installed in a fill section will undergo some amount of settlement under the weight of the new embankment. The amount of settlement is dependent on the amount of new fill and on the characteristics and load history of the underlying strata. The settlement at the face of the retaining wall will generally be about half of the settlement that would be expected for a semi-infinite fill of the same thickness.

It is difficult to state the tolerable amount of total settlement for a Stone Strong retaining wall, as it is highly dependent of the specifics of the project. Total settlement in the range of 3 to 6 inches would be tolerable for most retaining walls as long as the differential settlement is not excessive. In some cases, the tolerable total settlement may be less, and there may be some circumstances where larger total settlement may be tolerable.

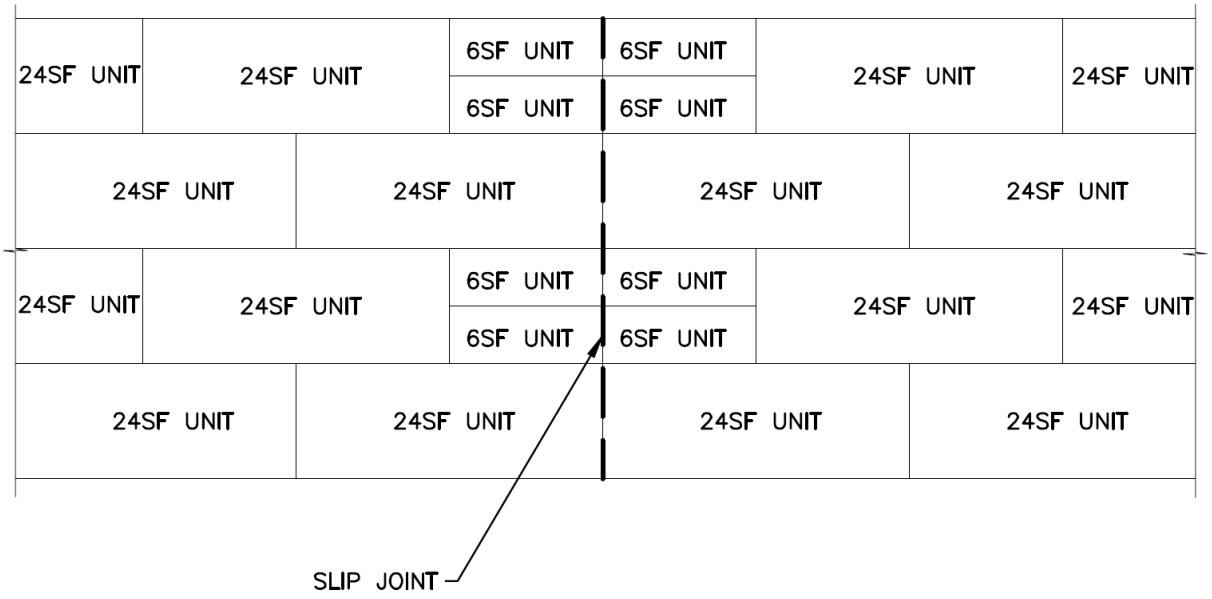
Differential settlement will generally have greater influence on the retaining wall. Section 11.10.4.1 of the AASHTO Bridge Design Specification (Eight Edition, 2017) provides the following table for limiting differential settlement within the commentary:

Joint Width (in.)	Limiting Differential Settlement	
	Area $\leq$ 30 ft^2	30 ft^2 $\leq$ Area $\leq$ 75 ft^2
0.75	1/100	1/200
0.50	1/200	1/300
0.25	1/300	1/600

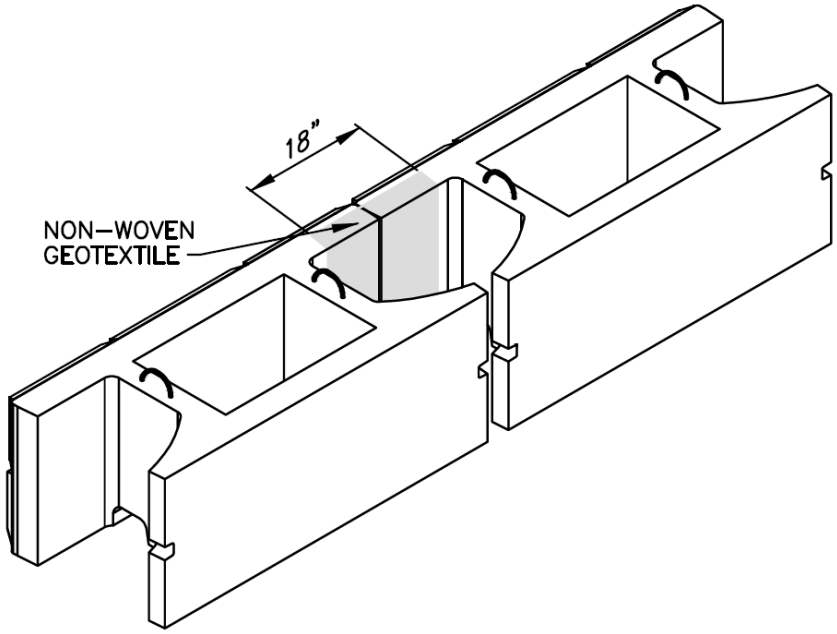
Based on a joint tolerance of ¼ inch (6mm), Stone Strong recommends a limiting differential settlement of 1:300, or 1 inch over 25 feet (25 mm over 7.5 m).

Walls that have experienced settlement within this limit have generally performed well. We have limited observations of walls that have exceeded this tolerance, and although some cracks occurred in the units, the walls have still performed well over time.

Where differential settlements are expected to approach or slightly exceed the recommended limit, control joints (slip joints) should be incorporated into the wall as shown in the following partial elevation. Note that where a CIP tail extension is used, the control joint should be extended continuous through the tail extension.



Since gaps greater than ¼ inch (6 mm) may develop due to differential movement across the slip joint, a non-woven geotextile should be provided behind this joint to ensure that the infill is retained, as shown below:



Another option is to install the Stone Strong units in a stack bond configuration. This essentially creates closely spaced control joints that will allow for more flexibility and greater vertical movement. When a stack-bond configuration is used to address differential settlement concerns, a non-woven geotextile is recommended behind the vertical face joints to minimize infill loss in the event that any joints open greater than ¼ inch (6 mm).