



SCALING OF LATE SEASON CONCRETE PLACEMENTS

Mid-Winter Update – February 12, 2015

The study consists of a 2³ factorial statistical design laboratory phase and a 15 yd³ field placement phase. This approach allows the performance of the concrete through both the laboratory and field phases. Aggregate Industries is also doing a popout study adjacent to our MCC research slab. The concrete mix is different, but the curing, sealer application, and deicer exposure is the same.

Field Phase

The 10 x 100 foot slab-on-grade was placed on October 31, 2014 during subfreezing weather. The 3 x 70 foot walkway was placed on November 1, 2014 (see Photo 1). As of February 11, 2015, no scaling has occurred on the main slab. The walkway, which has a mix that has a high potential for resulting in popouts, is just starting to show popouts (the first popout was observed on January 3, 2015) (see Photo 2).

Laboratory Phase

Independent Variables

Three independent variables were considered at two levels see Table 1 below.

1. Curing time
2. Type of sealer
3. Deicer exposure

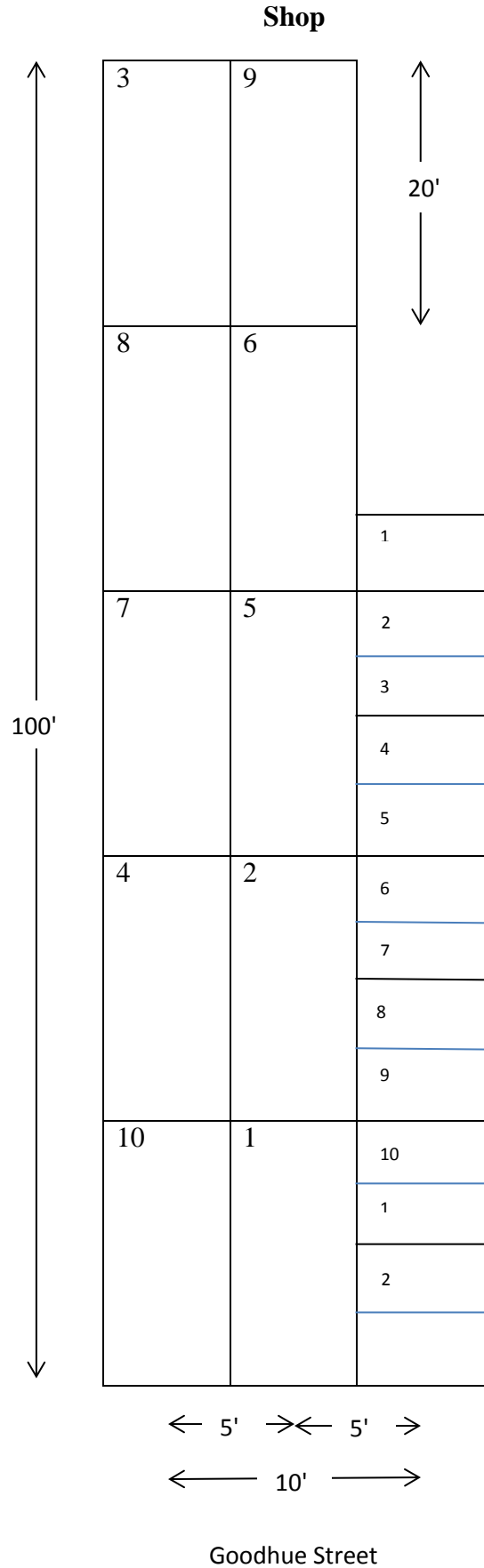
Dependent Variables (See Photos 3 and 4)

The two dependent variables (responses) are scaling, which is being determined by ASTM C672, "Standard Test Method for Scaling Resistance of Concrete Surfaces Exposed to Deicing Chemicals," and chloride ion ingress, which will be determined by performing ASTM C1218, "Standard Test Method for Water-soluble Chloride in Mortar and Concrete."

Table 1

Independent variables studied in the laboratory phase			
Factorial Points	Curing	Sealer	Deicer Exposure
1	4 weeks	8% siloxane	CaCl ₂
2	4 weeks	40% silane	CaCl ₂
3	4 weeks	None	None
4	4 weeks	None	CaCl ₂
5	2 weeks	8% siloxane	CaCl ₂
6	2 weeks	40% silane	CaCl ₂
7	2 weeks	None	CaCl ₂
8	2 weeks	None	None
9	3 weeks	8% siloxane	CaCl ₂
10	3 weeks	40% silane	CaCl ₂

The laboratory phase has been extended to beyond the specified 50 cycles and will be completed in mid-March. The duration of the field study has yet to be determined.



PHOTOGRAPHS
Scaling of Late Season Concrete Placements



Photo 1: Overall view of research slabs.

Photo 2: Showing initial popouts in slab #7 of the popout study.



PHOTOGRAPHS
Scaling of Late Season Concrete Placements



Photo 3: Showing scaling of ASTM C672 panel #7 after 50 cycles.

Photo 4: Showing scaling of ASTM C672 panel #4 after 50 cycles.

