

**2018 Research  
Symposium****Development of Pay Factors for QA/QC Concrete  
Compressive Strength****& STIC Annual  
Meeting****RESEARCH PROJECT  
TITLE**

Development of Pay Factors for  
QA/QC Concrete Compressive  
Strength

**STUDY TIMELINE**

May 2016 – December 2017

**INVESTIGATORS**

Jim Sullivan, UVM TRC, PI

**VTRANS CONTACTS**

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Manager  
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This fact sheet was prepared for the  
2018 VTrans Research and  
Innovation Symposium & STIC  
Annual Meeting held at the State  
House in Montpelier, VT, on  
**September 12, 2018** from  
**8:00 am– 1:00 pm.**

Fact sheets can be found for  
additional projects featured at the  
2018 Symposium at

<http://vtrans.vermont.gov/planning/research/2018symposium>

Additional information about the  
**VTrans Research Program** can be  
found at

<http://vtrans.vermont.gov/planning/research>

Additional information about the  
**VTrans STIC Program** can be found  
at <http://vtrans.vermont.gov/boards-councils/stic>

**Problem Statement**

The objective of this project was to develop new pay factors for use by VTrans in paying its contractors for in-place concrete based on the 28-day compressive strength. The Agency's intent is to use these pay factors to create incentives for its concrete contractors to yield compressive strengths that are within a specified strength range, as opposed to a simple minimum.

**Methodology**

A series of pay factors were developed to penalize the payment for in-place material that is between a rejection limit and a reward boundary and to reward in-place material that is between the reward boundary and the target design mean. The final preferred structure of the pay-factor schedule was determined after discussion with VTrans. This preferred structure was then presented to the industry representatives and further adjustments were made to respond to industry concerns

**Conclusions and Next Steps**

The method used to develop the initial set of pay factors is required by a lack of historical cost data that is specific to the Vermont region. The Agency's interest in establishing a new upper bound for 28-day strength was motivated by concerns that industry (producers and contractors) are simply trying to minimize their risk and producing a product that exceeds the design strength threshold by a large margin. Excessively strong concrete may move the centroid of the composite section into the concrete deck and exacerbate cracking. The new pay factors will shift the average strength toward the ideal design mean that results in a net over-payment of 3% when compared to payments made without pay factors for an assumed new lot distribution, while balancing risk between the Agency and the industry. Future research should involve revisiting the payment incentive / disincentive structure and the pay factor schedule once several years of projects have been completed under the new PRS. At that time, the exact form of the new lot CCS distributions should be checked, as the recommended pay factor schedule is based on assumptions regarding the underlying distribution.

**Potential Impacts and VTrans Benefits**

This project provided VTrans with the framework for a new specification for in-place 28-day concrete compressive strength. The Agency intends to put this new specification in practice as soon as possible, possibly in 2019.