

Design Memorandum

TO: All Design Section Staff
FROM: Bijan Khaleghi
DATE: July 7, 2009
SUBJECT: Interface Shear Transfer - Shear Friction Design

The purpose of this Design Memorandum is to provide guidance for Interface Shear Transfer - Shear Friction Design. In addition, this Design Memorandum presents an acceptable alternative detail for roughening existing concrete surfaces, against which new concrete will be placed.

Interface Shear Transfer - Shear Friction Design is to be performed in accordance with AASHTO LRFD Bridge Design Specification Section 5.8.4. The concrete and the interface shear reinforcement are both effective as described in AASHTO.

When designing for shear transfer between new and existing concrete, the Designer shall consider the high construction cost associated with roughening existing concrete surfaces. Whenever practical, the design for placing new concrete against existing concrete shall be completed such that roughening of the existing concrete surfaces is not required (i.e. use cohesion and friction factors for a surface that is not intentionally roughened).

When the additional capacity provided by a roughened surface is required, the surface roughening shall meet the requirements specified in Section 5.8.4.3 of the AASHTO LRFD Bridge Design Specification (i.e. uniform 1/4-inch minimum amplitude). WSDOT Standard Specification Section 6-02.3(12), and applicable WSDOT special provisions for concrete removal, will be updated effective August 3, 2009 to require a uniform 1/4-inch amplitude roughening wherever an existing concrete surface is specified to be roughened on the plans. The Amendment to WSDOT Standard Specification Section 6-02.3(12) is attached for reference.

Construction of a uniform 1/4-inch amplitude roughened surface is difficult and expensive to construct on existing concrete surfaces. Furthermore, consistently measuring and enforcing the uniform 1/4-inch roughening has been problematic in the past. As part of recent WSDOT construction projects, an alternative existing concrete surface roughening has been accepted by WSDOT. This alternative Spall Pattern Roughening is shown in the photo and details below. There are several advantages to using the Spall Pattern Roughening, which include: 1) the Spall Pattern is quicker and easier to construct, 2) the Spall Pattern is less expensive to construct, 3) the Spall Pattern is easy to quantify/measure and enforce. The Spall Pattern Roughening may be included on projects as an alternative to the default uniform 1/4-inch amplitude roughening. The details shown below must then be included on the Plans.

Background

In recent years, there has been inconsistency between Design Code roughening requirements and the WSDOT construction requirements for roughening existing concrete surfaces, as set forth in the WSDOT Standard Specifications and Special Provisions. In addition, constructing, measuring, and enforcing roughening requirements for existing concrete surfaces has been problematic.

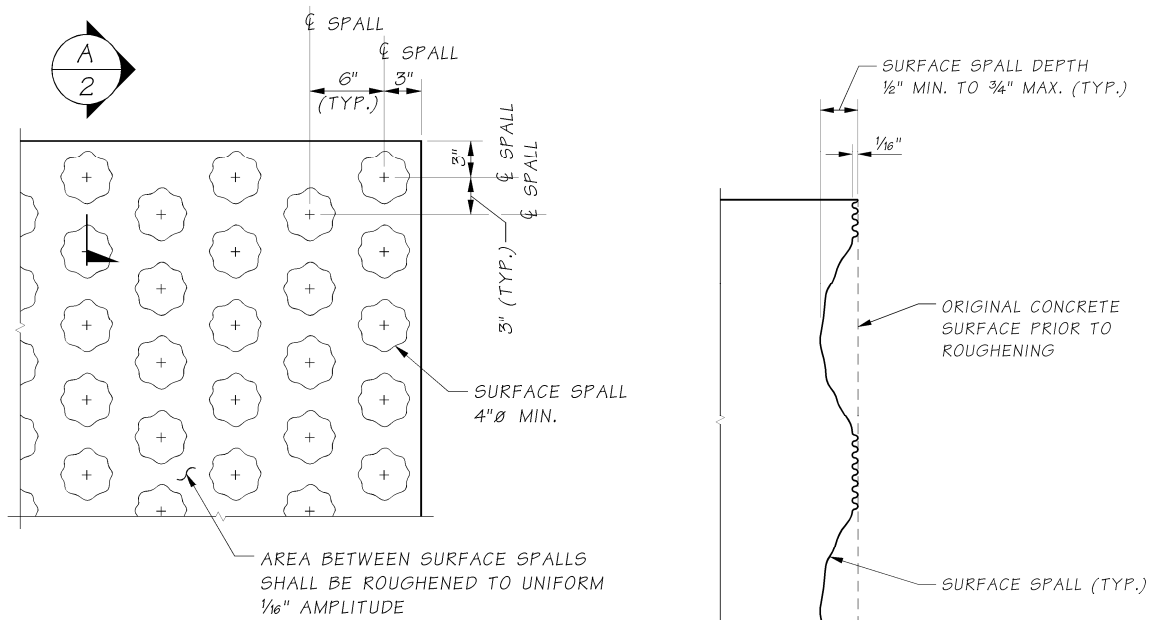
In some instances, such as sections 5.2.4.D and 5.5.4.A.5, the BDM directs designers to consider only one of either the concrete surface or the reinforcement as effective for interface shear transfer. The BDM will be revised so that it is clear both should be considered concurrently.

If you have any questions regarding these issues, please contact Craig Boone at 705-7172 or Bijan Khaleghi at 705-7181.

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Alternative Spall Pattern Roughening Photo



ELEVATION
SPALL PATTERN
ROUGHENED SURFACE

SECTION A
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Alternative Spall Pattern Roughening Details