

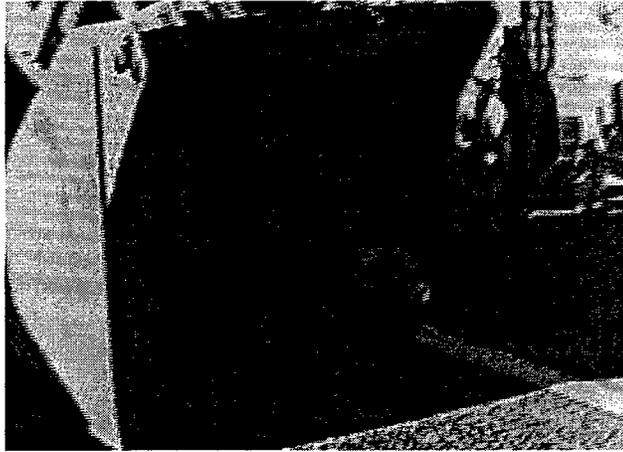


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# Delamination Surveys and Removal Procedures for Rubberized Asphalt Chip Seal (RACS) Bridge Deck Overlays

Study SD96-19  
Executive Summary

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16. Abstract  <b>Rubberized Asphalt Chip Seal (RACS) has been used for several decades to protect the bridges in South Dakota. RACS, among other things, prevents South Dakota Department of Transportation (SDDOT) from evaluating the integrity of the bridge decks in an efficient and accurate manner. This study investigated methods to remove the RACS layer from the bridges in South Dakota.</b>			
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## EXECUTIVE SUMMARY

The South Dakota Department of Transportation has over 470 bridge decks with Rubberized Asphalt Chip Seal (RACS) overlays. A “chain drag” test is often used to determine the condition of the bridge deck and the degree of delamination damage present. The condition of the bridge constitutes a large part of the rating system used to characterize the condition of the decks. This bridge rating system partially determines the amount of bridge replacement funding each state will receive.

A RACS overlay prevents accurate measurements of the condition of the bridge from being obtained. When the results of the chain drag test were compared to those obtained from actual core samples, the results of the two test methods were found to vary significantly.

When bridge repairs or concrete overlays have to be performed, the RACS layer must be removed. This presents a major problem since the current RACS removal attempts have been slow and costly, and may harm the concrete deck surface. Since the RACS prevents accurate delamination survey from being performed, corrective deck treatments may not have been necessary absent RACS removal damage.

Therefore, it is crucial that a feasible technology or procedure for removing the RACS without damaging the underlying decks be developed. A number of other considerations are associated with RACS removal process, such as overall cost, removal rate, and environmental factors. These issues were investigated and are discussed in more detail in the following report.

The procedure followed during the investigation was to first examine numerous options available for RACS removal. These were organized into a “decision matrix” and a formal procedure was followed to extract the most likely candidate methods for further investigation, namely, scraping, high pressure washing, and melting.

These three candidate methods were then examined more closely in the laboratory in an effort to single out one prototype method for full-scale field testing. Lab tests were conducted on RACS-covered bridge deck samples supplied by SDDOT. After considering a number of factors, scraping with heating was deemed to be the method with most potential for success upon scale-up.

A full-scale field test was conducted on an I-90 bridge deck. A propane heater towed by a truck was used to heat the RACS. Both a front-end loader and a grader were used to scrape the bridge deck. The trial successfully met the project specifications, and the report concludes with a recommended implementation procedure, which is reproduced here for convenience:

- Arrange the removal equipment such that the heater is leading the scraper and/or bucket loader.
- Start by checking the temperature of the deck using an infrared pyrometer or other method.
- If the RACS is below a temperature between 52 – 63 degrees C (125 – 140 degrees F), activate the heater (e.g., light all propane burners).
- Allow the heater to heat the RACS and start pulling the heater over the surface very slowly.
- Using an infrared pyrometer or other method, check that the RACS is at a temperature between 52 – 63 degrees C (125 – 140 degrees F). If it is not at the proper temperature, slow the truck and continue checking the temperature until the RACS is ready to be removed.
- When the RACS reaches becomes hot, it becomes very sticky and will bond to the scraping bit. It is therefore necessary to lubricate the blade to prevent the RACS from sticking. Liquid Wrench™ or another non-flammable lubricant should work. The blade may have to be lubricated several times per bridge deck.
- Using the proper scraping angle (nominally 60° – 70°), down pressure (as much as possible without damaging the bridge deck), and speed (as required to keep the RACS at the desired temperature), scrape off the RACS. (To scrape the RACS at the proper temperature, it may be necessary to keep the front-end loader close behind the heater.)
- Once the loader has completed its pass over the deck, the removed RACS may be placed in a dump truck for disposal.