RESEARCH REPORT DOCUMENTATION PAGE

1. Report No.	2. Report Date	3. Contract No.	4. Project No.
MR 96-02	December 2001	N/A	NH-6-005(013)312

5. Title and Subtitle	6. Report Type	7. Project No.
Evaluation Of Polysulfide Rubber Joint Sealant In Concrete Joints	Work Plan ☐ Construction ☐ Evaluation ☐ **Final** ☒	SS-6-018(033)224 8. Project No. 9. Project No. 10. Project No.

11. Author(s)/Principle Investigator(s)
Mike J. Marquart

12. Performing Organization Name and Address		13. Sponsoring Agency Name and Address
NDDOT M+R ☒ NDDOT OTHER* ☐ NDSU ☐ UND ☐ UGPTI ☐ OTHER* ☐ *see supplementary notes	North Dakota DOT Materials and Research Division 300 Airport Road Bismarck ND 58504-6005	North Dakota DOT Materials and Research Division 300 Airport Road Bismarck ND 58504-6005

14. Supplementary Notes

15. Abstract

Purpose and Need

Preformed neoprene compression joint sealers have been widely used in North Dakota for many years. The first compression seals were used on I-94 near Sweet Briar Dam in 1964. There has been an increase in the usage of silicone sealants in concrete joints in the past few years. Preformed neoprene compression joint sealers have been effective at keeping out incompressible but tend to leak water. Preformed neoprene also are known to take a compression set, which is when the neoprene no longer presses tightly against the joint wall. Preformed sealers can often pop out of the joints at many locations causing an open joint and are unsightly. Silicone sealants seem to be performing satisfactorily. Research is needed to identify products that will provide long-term performance.

Objective

The objective of this study is to evaluate a polysulfide rubber joint sealant to determine if it provides effective long-term performance, hopefully ten years or more.

Location

The project is located in the city of Cavalier, North Dakota. The test section is partly in project NH-6-005(013)312 and project SS-6-018(033)224.

Scope

The contractor was using silicone to seal the joints on these projects and agreed to substitute the polysulfide sealant in the test section at no added cost. The installation procedure should be the same.

Summary

Both silicone and polysulfide joints had many leaks when tested with the I-Vac system. Thiokol 1P polysulfide sealants have been used in the private sector but never in a government project. The Cavalier project is one of the first to use this product.

No leaks were found in any of the sections right after construction in 1996. Approximately 155 lineal feet of joints were tested of each sealant. The polysulfide sealant performed better than silicone sealant for the first 2 to 3 years, then rapidly deteriorated to a point where it is equal to silicone after 5 years of performance. In 1997 there were 45% more leaks in the polysulfide than in the silicone section. In 1998 there was a 46% increase in leaks in the silicone section compared to the polysulfide section. It should be mentioned that many of the leaks counted in the polysulfide section were concentrated in a few joints. These joints with the most leaks are located near a stop bar or at turning points.

The largest or longest spalls were found in the polysulfide joints. The polysulfide sealant is stiffer than the silicone and could increase spalling.

As of the August 2000 evaluation, both the silicone and polysulfide sealants have a 45% failure rating. It is questionable that the polysulfide sealant will meet our objective of providing long-term performance.

The cost of polysulfide at the time of construction was $32.00/gal. Compared to $26.00/ gal. For silicone. However, the contractor agreed to install polysulfide at the silicone bid price.

Recommendation

Based on physical properties and the results of the study, the polysulfide sealant did not perform any better than the silicone; The use of polysulfide rubber joint sealants is not recommended.

Present research has revealed that the PolySpec Corporation had acquired Morton's line of formulated polysulfide products in 1998. According to a PolySpec representative they have stopped production of two unprofitable products in 1999, which are the 1P and 2P sealant types. Thus, the Thiokol 1P polysulfide product used on this project is no longer available.

16. Key Words	17. Distribution Statement	18. No. of Pages	19. File type/Size
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