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| 14. Supplementary Notes  |   |  |   |
| 15. Abstract<br><br><b>Purpose and Need</b><br>To produce an aesthetically pleasing surface finish on visible concrete, such as jersey barriers and bridge fascias, the NDDOT specifies Surface Finish "D" (specification 602.03 I.5). Before Surface Finish "D" may be applied the concrete must complete the curing period of seven days. NDDOT Specification 602.03 F does not allow the use of liquid forming curing compounds on concrete surfaces that will receive Surface Finish "D". Concrete that will receive Surface Finish "D" must either have forms kept in place or be wet cured until the completion of the curing period. The surface finish material consists of an application, or applications, of a cement-based, commercially-packaged masonry coating material.<br>An alternative to a cement-based coating is Texcote XL-70C Bridge Cote. XL-70C is a polymer based organic resin system that contains a curing compound. Because it contains a curing compound, the manufacturer maintains that the product may be applied during the curing period. It does not require sandblasting of the concrete surface prior to application and requires only one coat. The manufacturer reports that another major benefit of this product is that it produces a uniform color coating that is less "splotchy" than is often seen with cement-based coatings.<br><b>Objective</b><br>The objective of this project is to determine if Texcote XL-70C Bridge Cote will produce an aesthetically pleasing and durable surface finish for concrete and the results of this evaluation may be used to determine if a change in the current specification for Surface Finish "D" should be considered.<br><b>Summary</b><br>There was some difficulty applying the XL-70C until the equipment was set-up correctly. When observed approximately 5 weeks after application, the color appeared uneven. The uneven color was probably a result of the spray pattern used by the applicators. The control section with the cement-based material also appeared uneven and blotchy. The material was tested for its ability to act as a curing compound and did not meet requirements of AASHTO T-155 when tested by NDDOT. After approximately four years, the XL-70C is showing signs of distress, particularly in the bottom 3 to 6 inches, most likely because of salt/snow plow damage. The uneven color on the Jersey barriers is still evident in both the test section and the control section. Because the XL-70C did not meet the requirements of AASHTO T-155 it is not recommended that this product be used as a curing compound. As a surface finish, the XL-70C did not perform as well as the control section. However, the control section was located along a ramp while the test section was located along mainline interstate. As a result, there were differences in traffic loading and the amount of salt and snow plow activity. Also, a segment of the control section was protected by a guardrail. These issues may have improved the life of the control section. Therefore, while XL-70C is not recommended as a curing compound, further research would be beneficial to determine if XL-70C performs as well as Surface Finish "D" under identical conditions. |   |  |   |
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**NORTH DAKOTA  
DEPARTMENT OF TRANSPORTATION**

**MATERIALS AND RESEARCH  
DIVISION**

Experimental Study MR 2004-02

**Use of Texcote XL-70C Bridge Cote as  
a Concrete Surface Finish and Curing Compound**

**Final Report**

IM-8-029(052)065

April 2009

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# **Use of Texcote XL-70C Bridge Cote as a Concrete Surface Finish and Curing Compound**

## **MR 2004-02**

### **Purpose and Need**

To produce an aesthetically pleasing surface finish on visible concrete, such as Jersey barriers and bridge fascias, the NDDOT specifies Surface Finish “D” (specification 602.03 I.5). Before Surface Finish “D” may be applied, the concrete must cure for a period of ten days. NDDOT Specification 602.03 F does not allow the use of liquid membrane curing compounds on concrete surfaces that will receive Surface Finish “D”. Therefore, during the curing period, concrete that will receive Surface Finish “D” must either have forms kept in place or use the wet curing process as specified by NDDOT Specification 602.03 F 2.c.

Surface Finish “D” requires that after the completion of the curing period, the surface of the concrete is to be sandblasted, to roughen the surface, and then a surface finish material is applied. The surface finish material consists of an application, or applications, of a cement-based, commercially-packaged masonry coating material. Maintenance personnel report that they have performed well and generally do not receive any maintenance.

Texcote XL-70C Bridge Cote (XL-70C) is an alternative to the cement-based coatings. XL-70C is a polymer based organic resin system that contains a curing compound. Because it contains a curing compound, the Texcote manufacturer maintains that the product may be applied during the curing period. It does not require sandblasting of the concrete surface prior to application and requires only one coat. The manufacturer reports that another major benefit of this product is that it produces a uniform color coating that is less “splotchy” than is often seen with cement-based coatings.

In 2003, a similar compound, Texcote XL-70 was applied on the jersey barriers on the US 52 Bypass at Jamestown as part of project HPP-2-052(018)915. Texcote XL-70 is the same as XL-70C except that it lacks a curing compound. Texcote XL-70 was applied to structures numbered 052-915.484 and 052-915.716. Surface Finish “D” was applied to the structure numbered 052-917.499. The appearance of the Jersey

barrier finished with Texcote XL-70 was more uniform than those treated with the standard cement-based surface finish as designated by Surface finish “D”.

## **Objective**

The objective of this project is to determine if Texcote XL-70C Bridge Cote will produce an aesthetically pleasing and durable surface finish for concrete. The results of this evaluation may be used to determine if a change in the current specification for Surface Finish “D” should be considered.

## **Location**

NDDOT project number IM-8-029(052)065 was selected to incorporate this product. The project is located on Interstate 29 at RP 65.258 in Fargo, ND. The product was applied to Jersey barriers along Interstate 29 at the US 10 (Main Avenue) interchange. The location is shown in Figure 1.

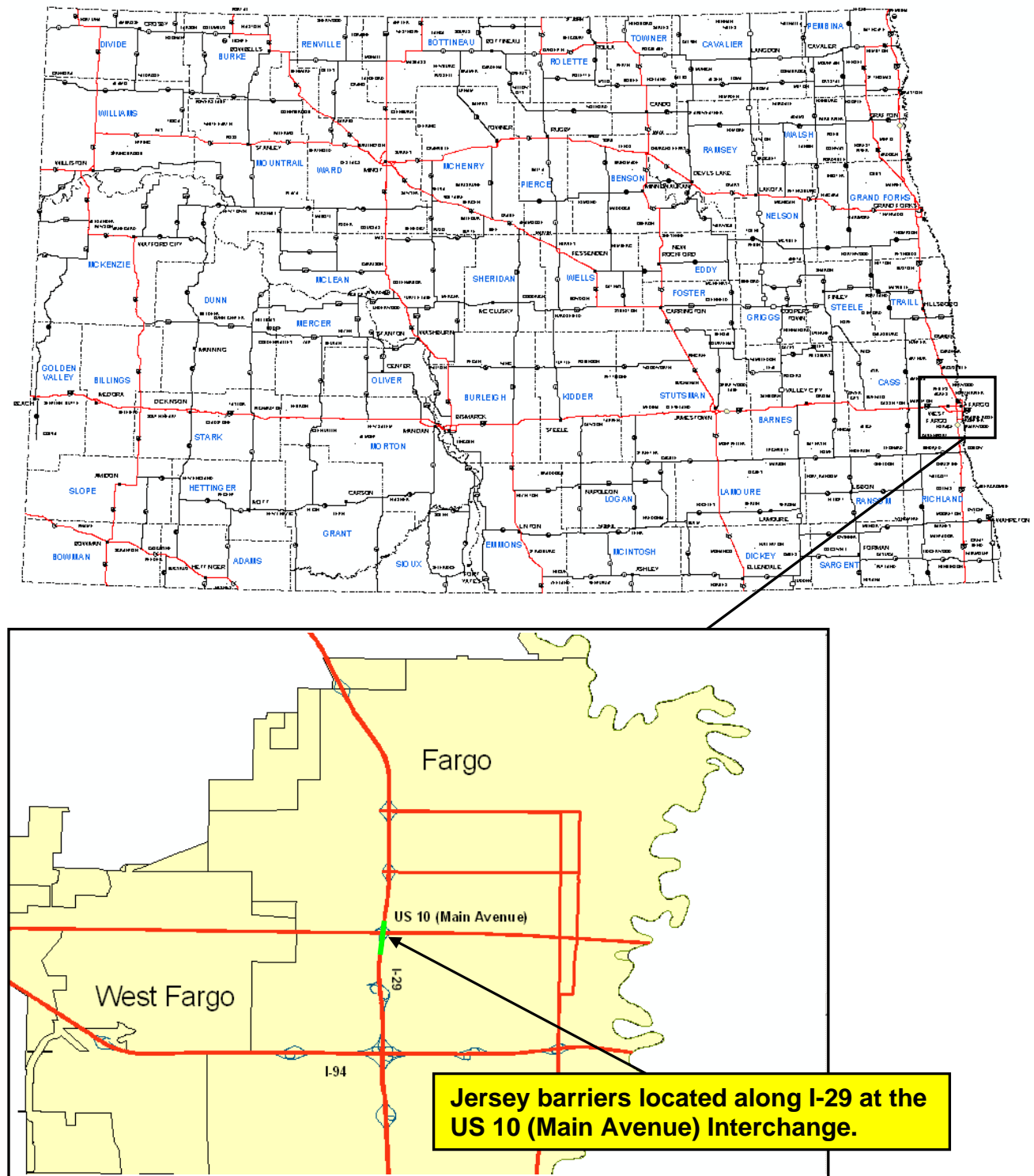


Figure 1 - Project Location.

## **Design**

Texcote XL-70C Bridge Cote was applied to Jersey barriers along Interstate 29 at the US 10 (Main Avenue) interchange. These Jersey barriers are located in the Interstate 29 median and around the bridge piers between northbound and southbound lanes of Interstate 29. Approximately 4,000 linear feet of Jersey barriers have had this product applied.

These Jersey barriers were slip-formed. XL-70C was applied and acted as both a curing compound and a surface finish.

## **Construction**

The Jersey barriers were slip-formed on October 13, 2004. The XL-70C Bridge Cote was applied with a sprayer. A representative from Texcote was present to demonstrate the application of the material.

The Texcote representative initially had problems achieving an even coat because the material clogged the paint sprayer. After changing to a new nozzle, the XL-70C was applied more evenly. Personnel from Prairie Supply, the contractor awarded the project, continued to apply the product to the remainder of the barriers. Photo 1 shows the Texcote representative applying the product and Photo 2 shows the contractor applying the product.



**Photo 1 - Texcote Representative demonstrating the application of XL-70C material.**



**Photo 2 – Contractor’s personnel applying the product.**

Three Samples of XL-70C were obtained at the site and tested by the NDDOT for its ability to meet NDDOT specifications for use as a liquid curing compound. NDDOT specifications require that liquid curing compounds meet AASHTO M-148, which contains a requirement for performance according to AASHTO T-155. AASHTO T-155 is a laboratory test to determine the ability of a curing compound to retain water during the curing period. AASHTO M-148 requires that the material, when tested in accordance with T-155, restricts the water loss in a sample of concrete to less than  $0.55 \text{ kg/m}^2$  in 72 hours. When tested by the NDDOT, the samples of XL-70C did not meet AASHTO specifications, having an average water loss of  $1.23 \text{ kg/m}^2$  in 72 hours.

### **First Evaluation**

The fully cured material and the control section were observed on November 23, 2004. The color of the XL-70C appeared uneven and it appeared that the applicator’s up and down spray pattern could be seen. An improved spray pattern, or a second application, could provide a more even appearance. Photo 3 shows the cured XL-70C on a Jersey barrier in the test section.

The color of the cement-based material in the control section also appeared uneven and blotchy. Photo 4 shows a Jersey barrier in the control section.



**Photo 3 – Cured XL-70C on Jersey barrier.**



**Photo 4 – Cement-based material on Jersey barrier in the control section.**

## **Final Evaluation**

Materials and Research personnel conducted a final evaluation of the product on November 4, 2008. The Texcote XL-70C was showing signs of adhesion problems. The coating was either flaking off or missing at the bottom of the jersey barriers. There was also evidence of the coating eroding from surface voids. Both distresses are shown in Photo 5. Possible explanations for the accelerated deterioration at the bottom of the barriers are from de-icing salts and snow plow damage. The coating surface appeared blotchy in one location approximately 100' long. See Photo 6.



**Photo 5 – Texcote severe distress at bottom of Jersey barrier and eroding from surface voids.**



**Photo 6 – Texcote appears blotchy.**

The control section was performing much better. However, the control section is protected from nearby traffic by a guardrail. The presence of the guardrail reduces the amount of salt contact, and eliminates snow plow damage. As the guardrail tapers closer to the Jersey barrier and eventually ends, the severity of the distress increases. See photos 7 and 8. The control section also experiences less traffic because it follows an on-ramp, while the test section follows mainline traffic.



**Photo 7 – Control section performing well behind guardrail.**



**Photo 8 – Control section, without guardrail, exhibiting similar distress as XL-70C**

## **Summary**

There was some difficulty applying the XL-70C until the equipment was set-up correctly. When observed approximately 5 weeks after application, the color appeared uneven. The uneven color was probably a result of the spray pattern used by the applicators. The control section with the cement-based material also appeared uneven and blotchy. The material was tested for its ability to act as a curing compound and did not meet requirements of AASHTO T-155 when tested by NDDOT. AASHTO T-155 is a laboratory test to determine the ability of a curing compound to retain water during the curing period. After approximately four years, the XL-70C is showing signs of distress,

particularly in the bottom 3 to 6 inches, most likely because of salt/snow plow damage. The uneven color on the Jersey barriers is still evident in both the test section and the control section. Because the XL-70C did not meet the requirements of AASHTO T-155 it is not recommended that this product be used as a curing compound. As a surface finish, the XL-70C did not perform as well as the control section. However, the control section was located along a ramp while the test section was located along mainline interstate. As a result, there were differences in traffic loading and the amount of salt and snow plow activity. Also, a segment of the control section was protected by a guardrail. These issues may have improved the life of the control section. Therefore, while XL-70C is not recommended as a curing compound, further research would be beneficial to determine if XL-70C performs as well as Surface Finish "D" under identical conditions.