



# **RESEARCH NOTES** HIGHWAY DIVISION RESEARCH SECTION

1174 CHEMEKETA STREET NE. SALEM, OREGON 97310 503-378-2318

RSN 85-4

## **THE YAQUINA BAY BRIDGE CATHODIC PROTECTION PROJECT IS "ON" AND RUNNING**

When steel corrodes, the end result is a product known as rust. Because rust occupies several times the original volume of the steel that was consumed, steel corrosion in reinforced concrete will cause the concrete to crack and spall. If left unchecked, this can result in ultimate failure of the structure. Cathodic protection is a means of applying an external electric "charge" to the steel. This charge inhibits the chemical reactions that change steel to rust, and the corrosion rate is brought under control.

Cathodic protection has been in use for many years to control steel corrosion in sea water, soils and in tanks. Its use on reinforced concrete structures has only been attempted within the last 10 years. The apparent success of cathodic protection in this application has resulted in the Federal Highway Administration encouraging State Highway agencies to become more familiar with cathodic protection technology through the construction of demonstration projects such as the Yaquina Bay Bridge project in Newport, Oregon.

The Yaquina Bay project consisted of coating the underside of two spans of the bridge with a special conductive paint. One pole of a direct current power source was connected to the painted surface while the other pole was connected to the rebar in the concrete. The installation was then checked for shorts (places where the paint contacted exposed reinforcing bar) and the ability to supply the necessary charge. The system was found to be ready, was activated and is now under evaluation.

The project evaluation includes an assessment of construction problems, e.g. could a general contractor take on such a project and complete it successfully, and the ability of the cathodic protection system to protect the structure. It appears that the project has been a success on both counts. The contractor execution went smoothly, with little or no problem, demonstrating that installation of cathodic protection by a general contractor is practical. A test of the cathodic protection system after six weeks of operation indicated that the system could be operated with 30 percent less power than initially indicated, and that the reinforcing steel in the top deck was also receiving some protection. It also appears that the overall cost of the system can be reduced significantly, down to a range of \$3.50 - 4.00 per square foot compared to the \$11.00 per-square-foot cost for this project.

All-in-all, it appears that cathodic protection is a promising method of controlling corrosion in reinforced concrete structures. If you would like more information on cathodic protection, or would like to receive evaluations of the Yaquina Bay Bridge project as it progresses, write or call the Research Section.

**SUMMARIES AND ABSTRACTS OF CURRENT HIGHWAY RESEARCH**