



NORTON CORROSION LIMITED

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December 12, 2003

CITY & BOROUGH OF JUNEAU

Attention: Mr. Joab Cochrane
409 D Street
Douglas, AK 99824

Subject: **OPERATIONAL INSPECTION
CATHODIC PROTECTION SYSTEM
JUNEAU PARKING FACILITY
STEEL SUPPORT PILES**

Dear Mr. Cochrane:

Norton Corrosion Limited (NCL) personnel completed the operational inspection for the Parking Facility's galvanic cathodic protection (CP) system in August 2003. The CP system is designed to prevent external corrosion on the submerged surfaces of the parking facility's steel support piles. Authorization to perform this work was issued per Purchase Order No. SH03123.

TESTING AND CRITERIA

Structure-to-water potentials were measured on the piles with a portable silver-silver chloride (AgAgCl) reference half-cell to determine the level of protection being obtained. The attached data sheet details the results of the testing. NCL evaluated the data per the following NACE International (National Association of Corrosion Engineers) criteria, where adequate CP is indicated on a structure by obtaining:

- A polarized potential of -0.733 volts or more negative in reference to a AgAgCl reference half-cell (-0.850 volts in reference to a copper-copper sulfate (CSE) reference half-cell),
- Or,
- 100 millivolts of polarization as seen by the difference between the native and polarized potentials.

RESULTS

The potential measurements indicate that partial protection is being achieved. Additional anodes are required to obtain full protection on the steel piles. NCL recommends upgrading this galvanic anode system to increase the level of protection being seen. Several options are available for installing the anodes. One option is to weld anodes to the piles from a boat. This avoids the cost of a diver, but more anodes are needed for good distribution and occasionally during low tides, the anodes would be out of the water. Plus access to some of the piles by a boat is limited. A second option is to install anode sleds. This allows larger anodes to be installed for a longer life, better current distribution and the anodes remain submerged, but the cost of a diver to route the wiring is needed along with the cost of a boat that has the capacity to handle the anode sleds.

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NCL would be pleased to provide you with materials and or engineering to upgrade this CP system. The following are estimated prices:

Engineering: \$2,400

- ⇒ Provide cost estimates and support to determine best method of installation per the City of Juneau's constraints
- ⇒ Installation drawings
- ⇒ Materials list

Materials:

10 year life \$9,000-\$12,000

20 year life \$18,000-\$24,000

These estimates do not include freight charges and are based on a 75% coating efficiency.

Note: The CP only protects the submerged surfaces of the steel piles. The splash zone and above requires a high-build coating system to supply additional protection when those portions of the piles are not submerged. The piles have an existing coating, however, this coating will require periodic maintenance to prevent corrosion damage.

NCL appreciates this opportunity to be of service to the City and Borough of Juneau. If you have any questions or require additional information, please do not hesitate to contact our office.

Sincerely,



Eric Shadle, P.E.
Corrosion Engineer

CITY BOROUGH OF JUNEAU
 GALVANIC CATHODIC PROTECTION
 STEEL SUPORT PILES
PARKING FACILITY

DATA SHEET: 1 OF 1
 NCL JOB#: O-17246-M
 DATE: AUG. 2003
 BY: E. SHADLE

POTENTIAL MEASUREMENTS:

Row	Bent	July 24, 2001 CSE Ref High Tide	July 11, 2002 AgAgCl Ref Low Tide	Aug. 2003 AgAgCl Ref High Tide	Anode output (amps)
A	9	-0.564	-0.601	-0.622	
A	8	-0.555	-0.587	-0.597	
A	7	-0.544	-0.583	-0.597	
A	6	Not Submerged (N/S)	N/S	-0.597	
B	9.7	-0.591	N/A	-0.623	
B	9	No Access (N/A)	N/A	-0.615	
B	8	-0.591	-0.602	-0.610	
B	7		N/A	-0.606	
B	6	N/S	N/S	-0.596	
B.7	9.7	-0.591	-0.637	-0.632	
B.7	9	-0.591	-0.631	-0.629	A = 0.0
C	10	-0.600	-0.649	-0.630	
C	9.7	-0.611	-0.643	-0.629	
C	9	-0.587	-0.650	-0.634	A = 1.34
C	8	-0.565	-0.617	-0.621	
C	7		N/S		
C.5	11	-0.606	-0.686	-0.631	
C.5	10	-0.606	-0.685	-0.631	A = 1.20
C.5	9.7		-0.680	-0.637	
C.5	9		-0.671	-0.634	
C.5	8.5		-0.664	-0.627	
C.5	8	-0.584	-0.656	-0.631	
C.5	7.5		-0.631	-0.631	
C.5	7		N/S	-0.621	
C.5	6.5		N/S	-0.617	
C.5	6.3		N/S	N/S	
C.5	6	-0.567	N/S	N/S	
D	11	-0.601	N/A	-0.635	
D	10		-0.674	-0.637	
D	9.7		-0.682	-0.638	A = 0.99
D	9		-0.655	-0.633	
D	8.5		-0.636	-0.631	
D	8	-0.600	N/S	-0.617	
D	7.5		N/S	-0.620	
D	7		N/S	N/S	
D	6.5		N/S	N/S	
D	6.3		N/S	N/S	
D	6	-0.601	N/S	N/S	