NORTON CORROSION LIMITED

8820 222nd Street SE, Woodinville, WA 98077
Phone (425) 483-1616 • Fax (425) 485-1754
E-mail: sales@nortoncorrosion.com

August 19, 2004

Mr. Joab Cochrane
City and Borough of Juneau
409 D Street
Douglas, AK 99824

Subject: **2004 OPERATIONAL INSPECTION**
CATHODIC PROTECTION SYSTEM
JUNEAU PARKING FACILITY
STEEL SUPPORT PILES

Dear Mr. Cochrane:

On August 3, 2004, Norton Corrosion Limited (NCL) personnel completed the operational inspection for the Parking Facility's galvanic cathodic protection (CP) system. 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 verbally issued on August 1, 2004.

TESTING AND CRITERIA

Structure-to-water potentials were measured on the piles with a portable copper-copper sulfate (CSE) 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 -0.850 volts or more negative in reference to a CSE reference half-cell (-0.733 volts in reference to a silver-silver chloride (Ag/AgCl) 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. The anode located at "B.7" has suffered a broken cable connection and is in need of repair. This is a simple repair and could be made by City Personnel. Another option would be for NCL personnel to bring the necessary materials and make the repairs during next years inspection.

Ultimately, additional anodes are required to obtain full protection on the steel piles.

As a follow-up to last year's report, 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.

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

Engineering: $2,500

⇒ 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	$9,500-$12,500
20 year life	$19,000-$25,000

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,

Jason D. Schumacher

Jason D. Schumacher
Corrosion Engineer

Eng\17765ol_CBJ_Parking Garage.doc
Cc: J. Weiser, NCL

NORTON CORROSION LIMITED

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

DATA SHEET: 1 OF 1
NCL JOB#: O-17765-M
DATE: AUG 3, 2004
BY: J. SCHUMACHER

POTENTIAL MEASUREMENTS:

Row	Bent	July 24, 2001 **CSE Ref** High Tide	July 11, 2002 **AgAgCl Ref** Low Tide	Aug. 2003 **AgAgCl Ref** High Tide	Aug. 2004 **CSE Ref** High Tide	Anode output (amps)
A	9	-0.564	-0.601	-0.622	-0.696	
A	8	-0.555	-0.587	-0.597	-0.696	
A	7	-0.544	-0.583	-0.597	-0.681	
A	6	Not Submerged (N/S)	N/S	-0.597	-0.681	
B	9.7	-0.591	N/A	-0.623	N/A	
B	9	No Access (N/A)	N/A	-0.615	N/A	
B	8	-0.591	-0.602	-0.610	N/A	
B	7		N/A	-0.606	N/A	A=N/A
B	6	N/S	N/S	-0.596	N/A	
B.7	9.7	-0.591	-0.637	-0.632	-0.695	
B.7	9	-0.591	-0.631	-0.629	-0.695	A = 0.0
C	10	-0.600	-0.649	-0.630	-0.689	
C	9.7	-0.611	-0.643	-0.629	-0.689	
C	9	-0.587	-0.650	-0.634	-0.689	A = 0.59
C	8	-0.565	-0.617	-0.621	-0.689	
C	7		N/S			
C.5	11	-0.606	-0.686	-0.631	-0.693	
C.5	10	-0.606	-0.685	-0.631	-0.693	A = 0.55
C.5	9.7		-0.680	-0.637	-0.693	
C.5	9		-0.671	-0.634	-0.693	
C.5	8.5		-0.664	-0.627	-0.693	
C.5	8	-0.584	-0.656	-0.631	-0.689	
C.5	7.5		-0.631	-0.631	-0.689	
C.5	7		N/S	-0.621	-0.689	
C.5	6.5		N/S	-0.617	-0.689	
C.5	6.3		N/S	N/S	N/S	
C.5	6	-0.567	N/S	N/S	N/S	
D	11	-0.601	N/A	-0.635	-0.695	
D	10		-0.674	-0.637	-0.695	
D	9.7		-0.682	-0.638	-0.695	A = 0.66
D	9		-0.655	-0.633	-0.659	
D	8.5		-0.636	-0.631	-0.659	
D	8	-0.600	N/S	-0.617	-0.659	
D	7.5		N/S	-0.620	-0.658	
D	7		N/S	N/S	-0.658	
D	6.5		N/S	N/S	-0.658	
D	6.3		N/S	N/S	N/S	
D	6	-0.601	N/S	N/S	N/S	