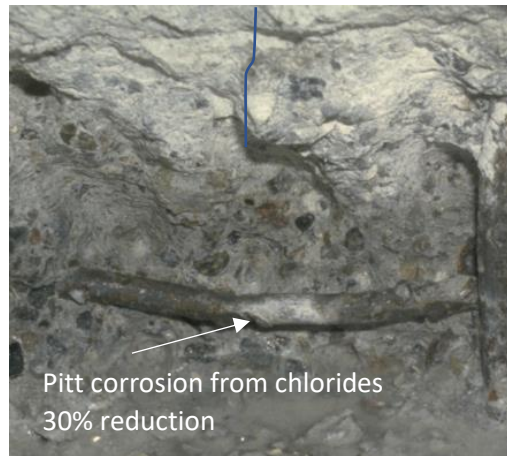


Case 2.1 Electrical resistance and potentials for corrosion evaluation with the Mini Great Dane



Opening



Electrical Resistance (kOhm)						level
25	21	20	14	18	26	75 cm
20	26	20	8	10	19	60 cm
18	19	15	6	10	20	45 cm
10	8	6	4	7	10	40 cm
2	0	5	2	2	1	25 cm
0	0	0	1	0	0	10 cm

crack

Potentials, Ag/AgC, (mV)					
-10	-8	7	-90	-9	-11
-40	-32	-34	-110	-21	-24
-100	-89	-110	-288	-288	-80
-150	-143	-180	-400	-190	-200
-250	-192	-195	-450	-210	-220
-300	-390	-490	-600	-500	-340

crack

A 5-year old highway bridge column, close to the traffic lane, exhibited a crack (width 0.2 mm) vertically in the column. Suspecting corrosion of the rebars from splash water with chlorides, the following investigation was made.

Reinforcement was located near the ground, and electrical connection made at one location, using sloping edge Allan bolts, twisted and cutting into the reinforcement for perfect electrical connection.

Testing was made, after water spraying the column in the selected test points, with the **Mini Great Dane** for electrical resistance of the cover layer and half-cell potentials of the reinforcement, circumferentially, starting from the ground and moving upwards in steps of 15 cm.

First, the electrical resistance in kOhm is measured, and if reasonably low, the half-cell potential is registered, in mV.

The electrode used is a self-contained Ag/AgCl electrode. Compared to the ASTM C 876 cell, the Cu/CuSO₄ cell, the potential measured is 110 mV higher, so if a -190 mV value

is measured with the Ag/AgCl cell, the corresponding value on the Cu/CuSO₄ cell would be -300 mV.

The ASTM C 876 states there is a 90% risk of corrosion if the potentials are lower than -300 mV on the Cu/CuSO₄, equivalent to -190 mV on the **Mini Great Dane**. However, the standard is not mentioning any requirement for moistening, as with the case of the Mini Great Dane, where the moist and the presence of chlorides is measured, reflected in the electrical resistivity.

Evaluation:

From 40 cm height and downwards the electrical resistance of the cover layer is low, indicating presence of moist and chlorides.

The potentials are low in the same region with the lowest potentials at the footing, close to the crack -600 mV.

Chlorides were measured at the footing with **RCT**, showing 0.95% Cl-/mass and further up, at level 60 cm, 0.04 % Cl-/mass.

The cover was opened at the location at the lowest potential, -600 mV. The reinforcement was corroded in pits, as illustrated above.