# DC metro interaction control of atmospherically exposed reinforced concrete abutments using embedded galvanic anodes

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A galvanic anode system trial which consisted of embedded hydroxide activated zinc anodes was installed into the bridge abutments of a reinforced concrete bridge as part of a rehabilitation and life extension program.
The design of the system was undertaken to enable assessment against the BS EN ISO 12696 'Cathodic Protection of Steel in Concrete' standard by ensuring full anode to cathode zone isolation, embedded monitoring reference electrodes to enable potential assessment and anode to cathode wiring to enable measurement of anode to cathode voltage and current.
During commissioning it was identified that the permanent embedded reference electrodes were fluctuating prior to anode connection and following anode disconnection, these potential fluctuation signatures were similar to that observed for buried metallic structures and following site investigation the potential fluctuations were attributed to DC interaction originating from the Newcastle DC Metro system.
The interaction risk represented a much greater structural corrosion risk than the residual incipient anode risk associated with patch repair of chloride contaminated concrete, which was identified at the design.
The commissioning results identified that the designed and embedded galvanic anode system did not meet the performance requirements listed within BS EN ISO 12696, but it was effective at mitigating and controlling the interaction risk when assessed against the criteria listed within NACE International Publication 01110 Stray-Current-Induced Corrosion in Reinforced and Pre-stressed Concrete Structures.
The findings present information which may support the development of alternative concrete based coating or concrete containment systems for buried metallic structures which are susceptible to DC interaction risk.