An Introduction to Cathodic Protection

enterprise mouchel

VECTOR CORROSION TECHNOLOGIES
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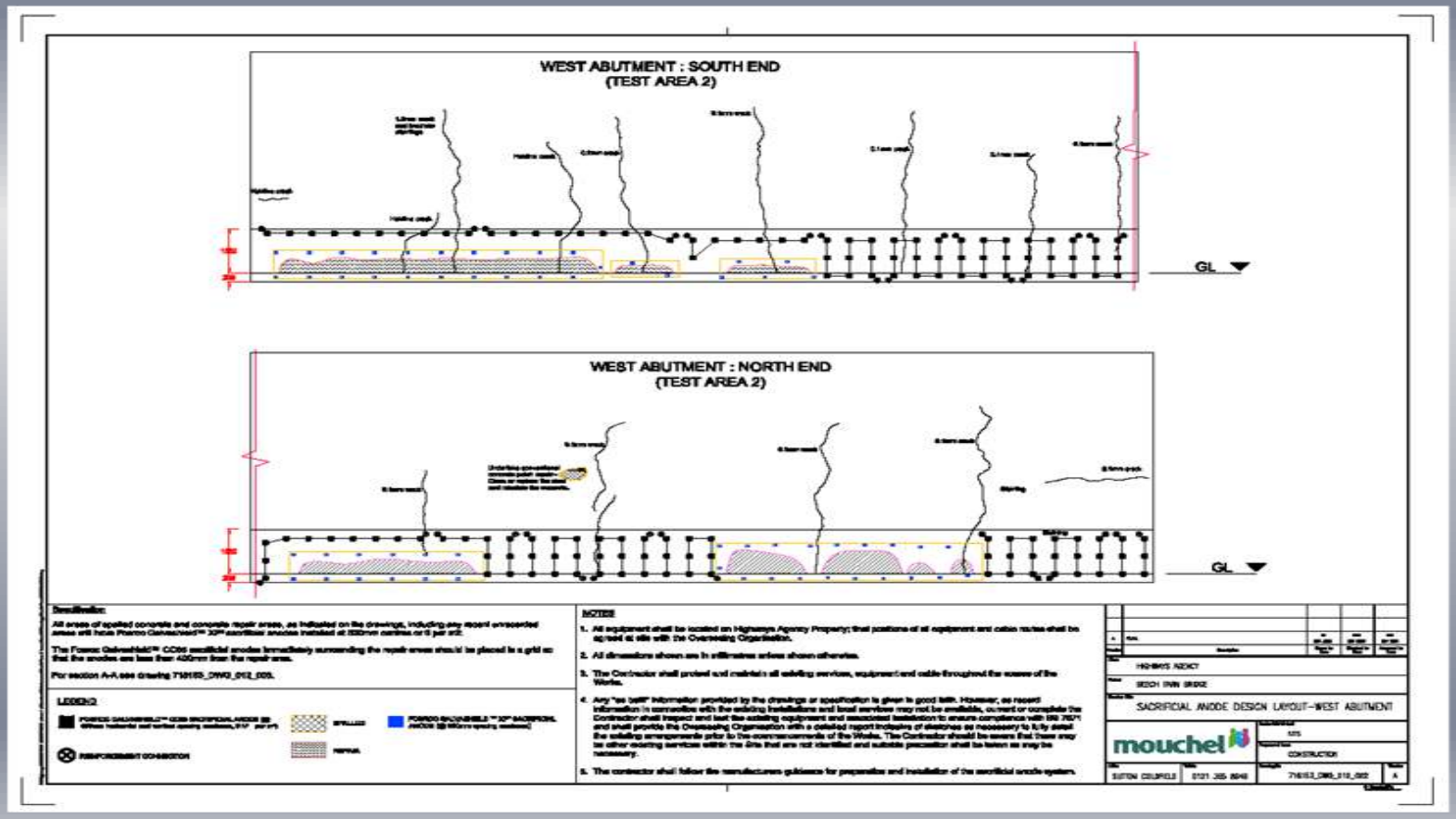
CORROSION PREVENTION LIMITED

The Problem

Water and de-icing salts along the splash zone of the abutment walls to this roadbridge have caused the reinforcement within the concrete to corrode. This expanding rust has caused the surface to spall and crack leaving the reinforcement exposed to further attack.

The Solution

The Corrosion Engineer has designed a corrosion control system using Galvashield XP zinc anodes to provide localized protection to the perimeter of the patch repairs, and Galvashield CC anodes drilled and fitted to provide targeted corrosion control to the surrounding sound concrete.

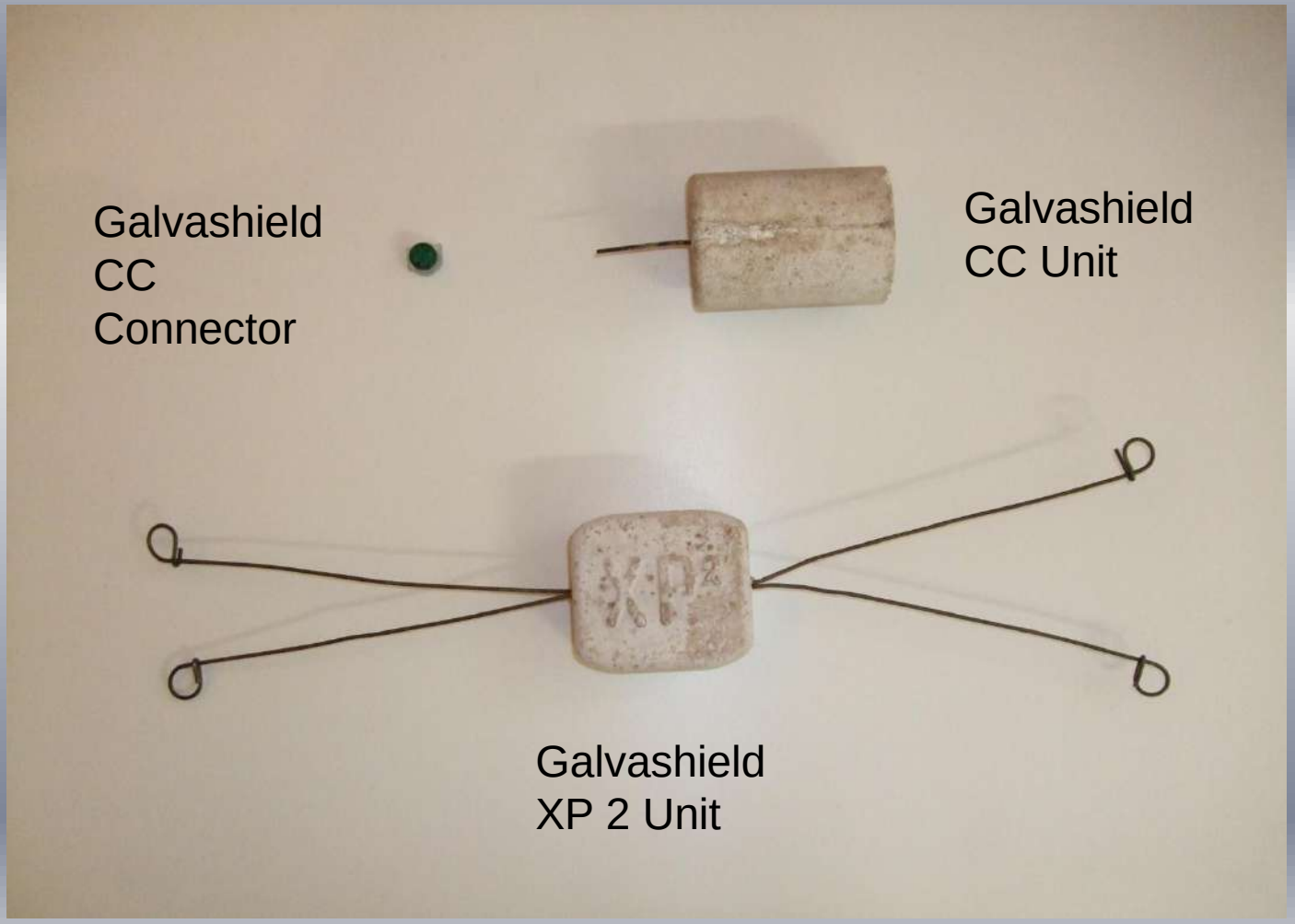


The defective areas are identified by an acoustic hammer test survey and marked out. The defective concrete is then broken out using electrical breakers and the edges cut using diamond blade angle grinders.

The concrete has to be broken out and the reinforcement chased back until clean steel is reached. Breaking out behind the steel reinforcement bars must also be carried out to allow the complete removal of rust (even behind the bars).

The steel is cleaned to remove all rust using either a gritbalasting technique or mechanical wire brushes and emery cloth. This ensure complete removal of all corrosion and gives a good connection for the galvanic XP anodes.

The anodes selected for this project were the Galvashield XP 2 for the patch repairs and Galvashield CC for the sound but contaminated concrete.



The Galvanic XP 2 anodes are wire tied to the reinforcement. The wires not just holding the anode in place but also forming the electrical connection.

The steel reinforcement is then painted with a zinc rich primer to protect the steel

The concrete is marked out to the Corrosion Engineers drawings and then Cover meter surveyed to ensure that core holes do not cut through the existing reinforcement. Positions adjusted and the holes cored. A slot between the core holes is made using an angle grinder.

The core holes are flushed out to clean them and then pre-soaked to ensure that the specialist gouting mortar for the Galvashield CC units doesn't dry to quickly.

The CC units are also pre-soaked prior to installation

The specialist grout is mixed and pushed into the core hole. The Galvashield CC unit is then pressed firmly into the hole.

The excess grout is wiped away and the connection wire cleaned of any grout residue.

The connecting wire is then passed between each anode and connected using the special crimp on connection unit

An area alongside the run of anodes is opened up to expose a section of reinforcement. The ends of each run of anodes (normally between 6-10) are connected to directly to this reinforcement bar using a rivet through a pre-drilled hole.

All connections are tested for continuity by the installers and then double checked by the corrosion Engineer.

South West Concrete Repairs Ltd / Corrosion Prevention	Beech Farm Bridge INSPECTION & TEST PLAN (ITP) GALVANIC CATHODIC PROTECTION						Project : 91 Doc ID : ITP-001 Revision : 0 Pages : 2 Date : 26/01/11	
		Verification						
	Description	Responsible Person	Frequency	Reference Documents	Acceptance criteria	Registration doc	South West Concrete Repairs	Corrosion Prevention	Mouchel
1	Material inspection & inspection of QA documentation	SW Concrete Repairs Engineer	Each Delivery	Galvanic CP Spec clauses 7-13	Manufacturers / suppliers certificate of conformity	AP/01	I	W	O
2	Continuity of reinforcement	SW Concrete Repairs Engineer	All exposed reinforcement	Galvanic CP Spec clauses 24-28	< 1 ohm	AP/02	I	W	W
3	Set-out and install XP anodes	SW Concrete Repairs Engineer	Every anode	Galvanic CP Spec clauses 16 and drawings 718153_DWG_012_ 001-003	Max 500mm c/c at repair perimeter	AP/03	I	W	H
4	Check XP anodes electrical continuity, cover to anode and installation	SW Concrete Repairs Engineer	Every anode	Galvanic CP Spec clauses 18 & 21	< 1 ohm >25mm cover	AP/03	I	W	W
5	Confirm as-built record XP anodes and connections	SW Concrete Repairs Engineer	Every anode	Documentation Spec clause 3	As-built record	As-built drawing	I	W	O
6	Set out CC anodes	SW Concrete Repairs Engineer	Every anode	Galvanic CP Spec clause 16 and drawings 718153_DWG_012_ 001-003	Max 400mm c/c and holes avoiding reinforcement	AP/04	I	W	H
7	Set out reinforcement connections	SW Concrete Repairs Engineer	Every connection	Galvanic CP Spec clause 19 and drawings 718153_DWG_012_ 001-003	Max 10 anodes between connections	AP/04	I	W	H
8	Check installation of CC anodes	CP Engineer	Every anode	Galvanic CP Spec clause 19 and drawings 718153_DWG_012_ 001-003	< 1 ohm between connections	AP/04	I	W	W
9	Confirm electrical continuity of completed installation	CP Engineer	Every string of anodes	Galvanic CP Spec clause 19	< 1 ohm	AP/04	I	W	W
10	Confirm as-built record CC anodes and connections	SW Concrete Repairs Engineer	Every anode and connection	Documentation Spec clause 3	As-built record	As-built drawing	I	W	O
11	As-built drawings	SW Concrete Repairs Engineer	Each drawing	Documentation Spec clauses 3-11	Approval by Mouchel	As-built drawing	I	W	H

NOTE: CHECK THAT THE LATEST ISSUE OF EACH DOCUMENT IS IN USE

Traditional concrete repairs are then carried out to the broken out patch repairs, core holes, chases for wire connections and any other defects such as cracks identified during the works.

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The splash zone areas are then high power pressure washed to remove any dirt, algae , grease or other contaminants. The areas are then primed and given two coats of an Anti-Carbonation coating.