

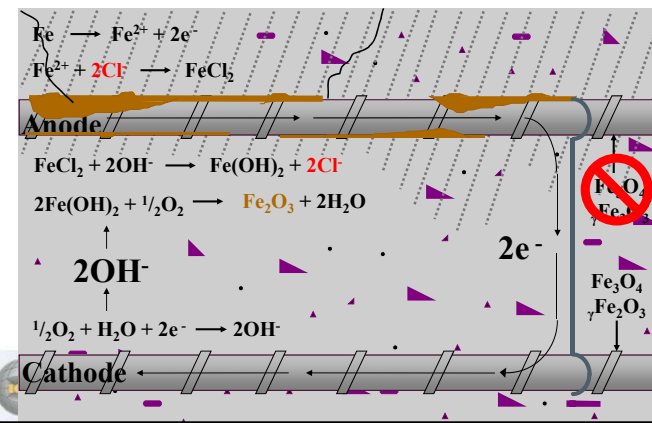
Rapid Bridge Replacement projects in Ottawa

- 2007 highway 417 Island Park Drive Overpass
- 2008 Highway 417 Clyde Ave Overpass
- 2012 Highway 417 Kirkwood Overpass
- 2013 Highway 417 Carling Ave Westbound overpass
- 2014 highway 417 Riverside Drive Underpass
- 2015 Highway 417 Kent St Overpass
- 5 more bridges to come.....



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Corrosion Cell in Concrete



How Anode Works

Partial Galvanic Series	
Metal	Voltage
Zinc	-1100 mV
Steel in concrete	-200 mV to -500 mV

*Typical potentials measured with respect to copper-copper sulfate electrode

electronic

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- Galvanic Strip Deck Protection
- Ontario Ministry of Transportation

MTO Galvanic Bridge Deck Overlay

Time (days)	Temp (°C)	Current Density (mA/m2)	Depolarization (mV)
13	7	6.5	273
222	20	3.8	271
258	23	2.6	220
267	21	2.5	260
336	23	1.7	211
426	8	1.4	230
486	-20	0.55	142
571	3	1.4	293
655	20	1.7	350
676	20	1.8	313
766	8	1.3	284
789	0	1.1	276
859	-7	0.8	167
942	10	1.4	330
1040	25	1.6	353
1165	7	1.24	281
1299	-3	1	201
1433	22	1.5	501
1573	0	7.6	322
1649	3	1.1	314
1755	20	1.6	421
2000	-5	0.65	273
3174	22	1.8	278
3646	23	1.13	388
4285	25	1.08	403

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Island Park Bridge (417) with DAS anodes, Ottawa, Canada

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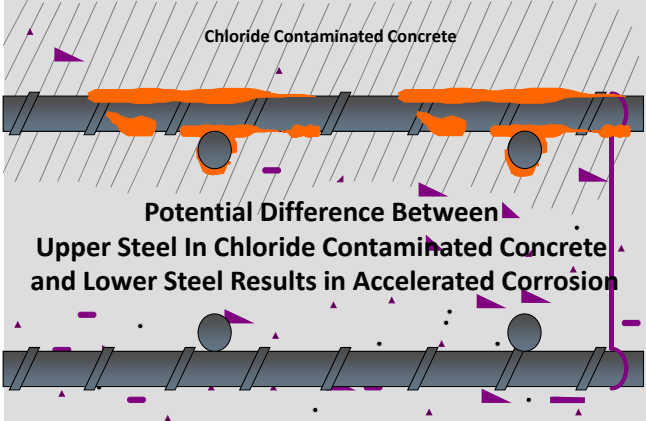
Case Study Island Park Drive Overpass, Ottawa

- Stem walls
 - Spalls and delaminations covers approximately 14.5% (36.5m²) and 10.5% (28m²) of the exposed faces of the east and west abutments respectively
 - Chloride contents at the steel level of west and east abutments are 0.111% and 0.297% respectively, which are well above the threshold of 0.025% by mass of concrete inducing corrosion
 - Over 95% (238.5m²) and 74.5% (204m²) of the east and west abutments respectively exhibit corrosion potentials more negative than the threshold value of -0.35V required to induce corrosion in the reinforcing steel.
- Wing walls
 - North wing walls are in good condition, however 100% (36.1m²) and 97% (63.6m²) of the northeast and northwest wing walls respectively, exhibit corrosion potentials more negative than the threshold value of -0.35V required to induce corrosion in the reinforcing steel.
 - South wing walls exhibit severe delamination with 55% and 20% concrete delamination and spalling for southeast and southwest wing walls respectively.




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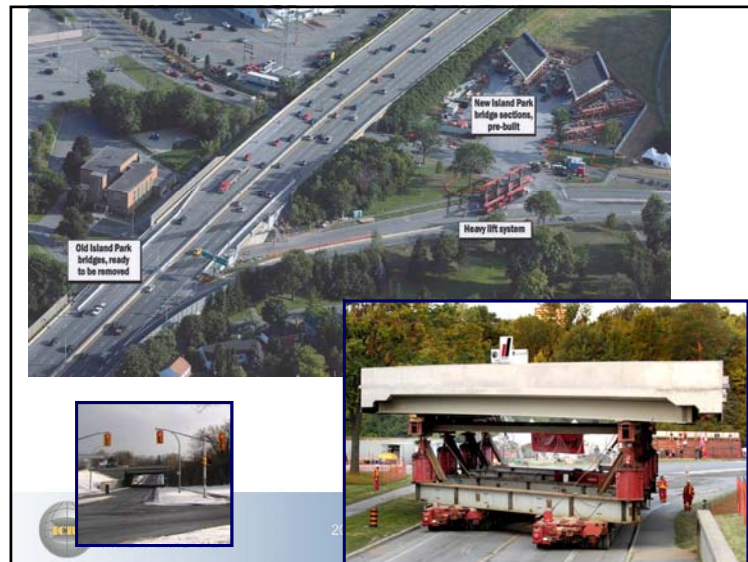


**Potential Difference Between
Upper Steel In Chloride Contaminated Concrete
and Lower Steel Results in Accelerated Corrosion**



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Highway 417 Island Park Overpass, Ottawa, Canada

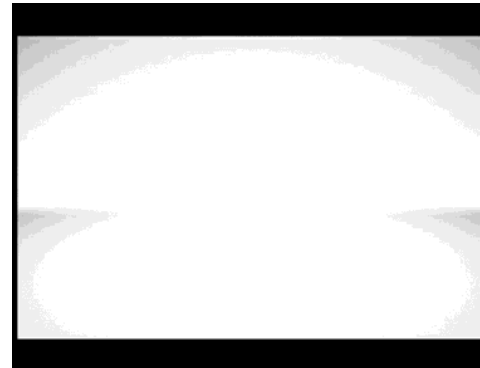
- Rapid Deck Structure replacement overnight
- Substructure rehabilitation with Galvanic anodes, designed to last as long as the new deck.



2017

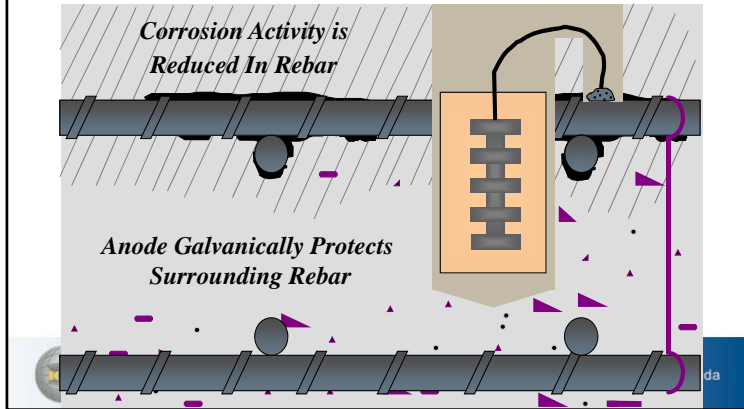


- Rapid Bridge Replacement Video
Island Park Drive, Ottawa, Canada



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Galvanic Anode Installation





Extending service life of concrete structures



*We do nothing, anodes work hard everyday
extending service life*

Making Structures Happy Again



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