Center of Excellence for Preservation and Service Life Extension

Gardiner Expressway Case Study

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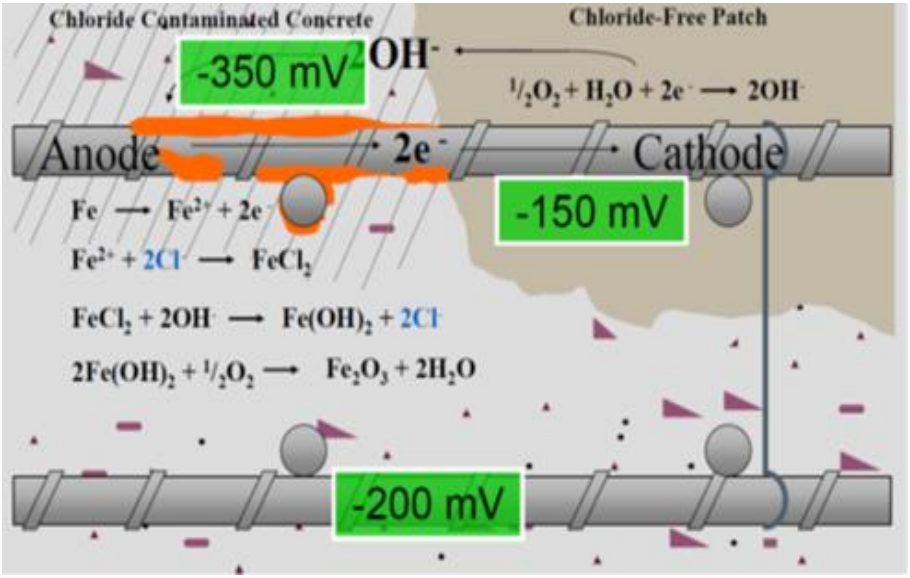
BBC

Gardiner Expressway- Background

- 4 mile long (6+ km long), 6 lane elevated Expressway.
- Constructed in the late 1950s
- De-icing salt caused corrosion of the reinforcing steel and concrete spalling
- Remedial work started in the 1990s at a cost of **$8 million per year.**

Non-Durable Repairs



Conventional repairs do not stop corrosion in the surrounding / adjacent concrete if chloride-contaminated concrete remains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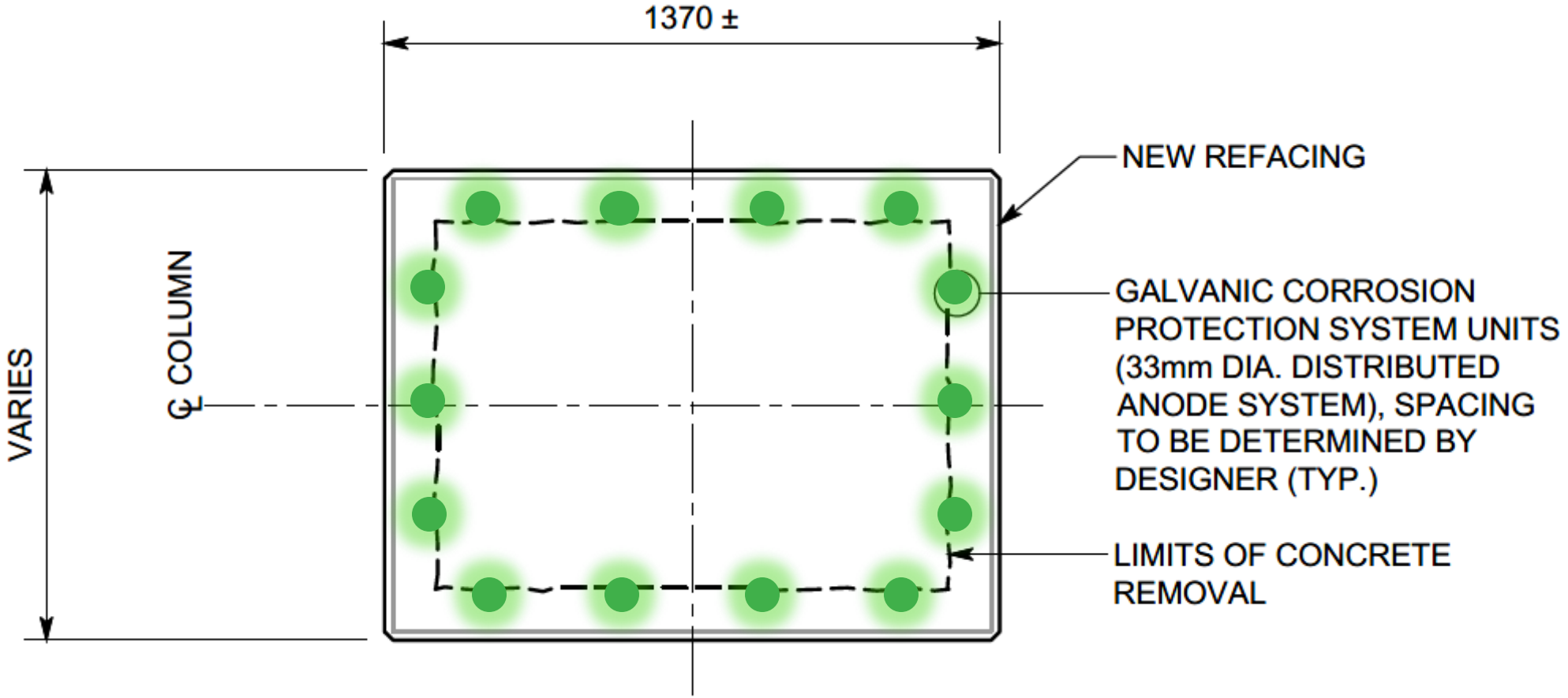
Gardiner Expressway-
Distributed Anode Installation



Repairs in Progress

Gardiner Expressway-
After Rehabilitation

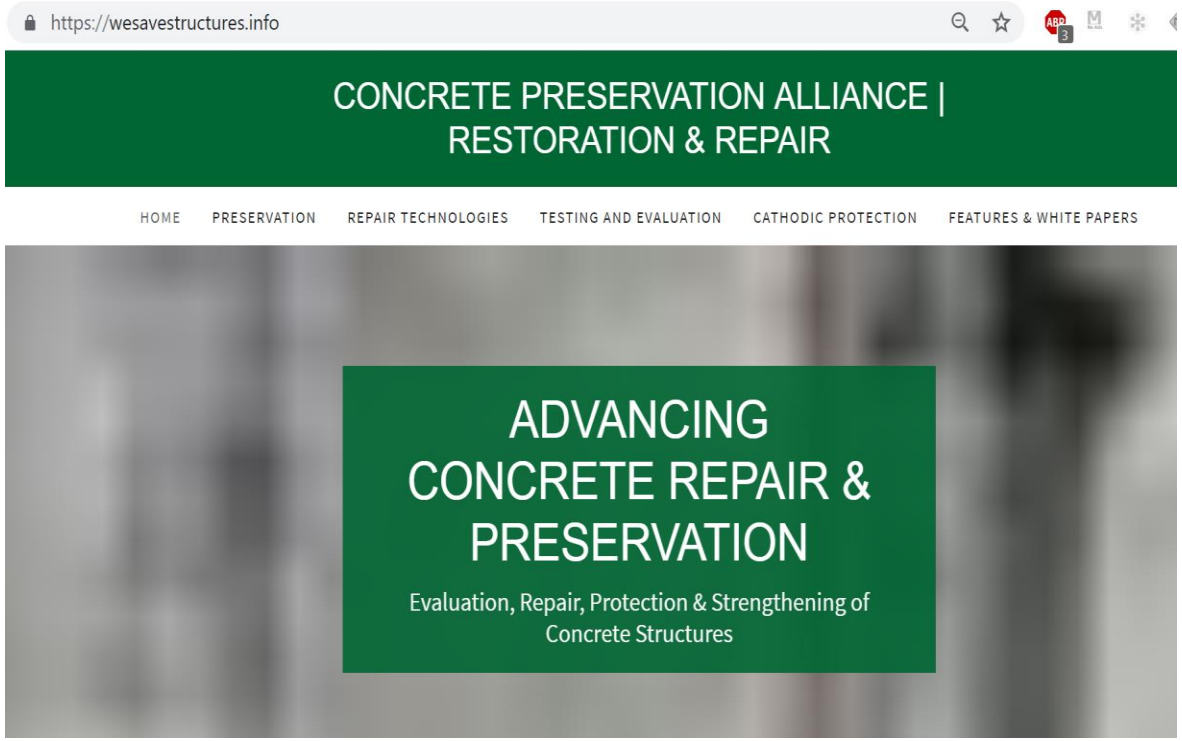
Concrete

- Concrete is **the most widely used man-made product** in the world
- **33 Billion tons produced per year** (~14 Billion m^3)
- Huge **consumer of raw materials and energy**
  - Cement
  - Aggregate
  - Concrete production and transport
  - Steel production is also energy intensive

Gardiner Expressway

- **25+ year service life extension**.
- **70,450 yd^3 (53,865 m^3)** of concrete was maintained in service.
- **140,940 tons** of concrete rubble was not produced.
- Enough potable water for the daily needs of **14,000 people** was conserved.
- Reduced CO_2 emissions by **35,225 tons**.
- Equivalent to annual emissions of **7,045 people**.

WeSaveStructures.info



WeSaveStructures.Info is an educational website that promotes the benefits of preservation technologies which can extend the useful service life of concrete structures. To illustrate the benefits of concrete preservation, this website has useful Environmental Impact Calculator.

Inputs

Volume of concrete to be preserved	8700	yd3	6651	m3
	Calculate		Calculate	

Print PDF

Outputs

Emissions

Concrete CO2	2290	US tons CO2	2075	metric tons CO2
Steel CO2	2466	US tons CO2	2235	metric tons CO2
Carbon Dioxide	4756	US tons CO2	4310	metric tons CO2
Equivalent to annual CO2 emission of:	1081	people	1078	people
NOx (as NO2)	8480	lbs	3782	kg
SO2	2368	lbs	1056	kg
Total Pollutants	9524298	lbs	4314929	kg

Waste Generation

Solid Waste (Rubble)	17618	US tons	15962	metric tons
Energy (heat generation from cement production, cement hydration, and steel production)	20746	GJ	19691	GJ
Equivalent energy to boiling	26	Olympic Pools	24	Olympic Pools

Natural Resources Required

Fine aggregate	4581	US Tons	4150	metric tons
Coarse aggregate	7223	US Tons	6545	metric tons
Cement	3915	US Tons	3492	metric tons
Steel	1409	US Tons	1277	metric tons
Total tons	17128	US Tons	15464	metric tons
Potable Water	220120	gal	814748	liters
Equivalent to daily water usage for:	2201	people	2037	people

Questions?