

Washing Bridges to Reduce Corrosion

Reinforced concrete bridges on Oregon's coast are exposed to chloride ions from marine salt that penetrate into the concrete and cause the reinforcing steel to corrode. The corrosion causes the concrete to spall from the bridge and also reduces the cross section of the steel bars.

Repairs include removing the damaged concrete and rust, replacing the badly corroded steel, restoring the dimensions of the beam, and applying cathodic protection to stop further corrosion. Repair and mitigation is expensive, but if left unchecked, the structural capacity of the bridge is diminished. In extreme cases, the bridge is replaced.

One option that the Oregon Department of Transportation is investigating is periodic bridge washing. Bridge washing could have two effects: first removing the chloride from the concrete and secondly, stopping further uptake of chloride ions. If shown to be viable, bridge washing could be a less expensive mitigation method in some cases.

Washing trials are being conducted over a 4-year period on concrete blocks to determine whether

chloride ions can be removed from the concrete or at least prevented from entering the concrete. After 2 years, the results are inconclusive for removing chloride. However, frequent washing does appear to reduce the uptake of chloride ions. For the experiments, 11 liters/square meter/day of fresh water reduced the uptake of chloride ions by 89%.



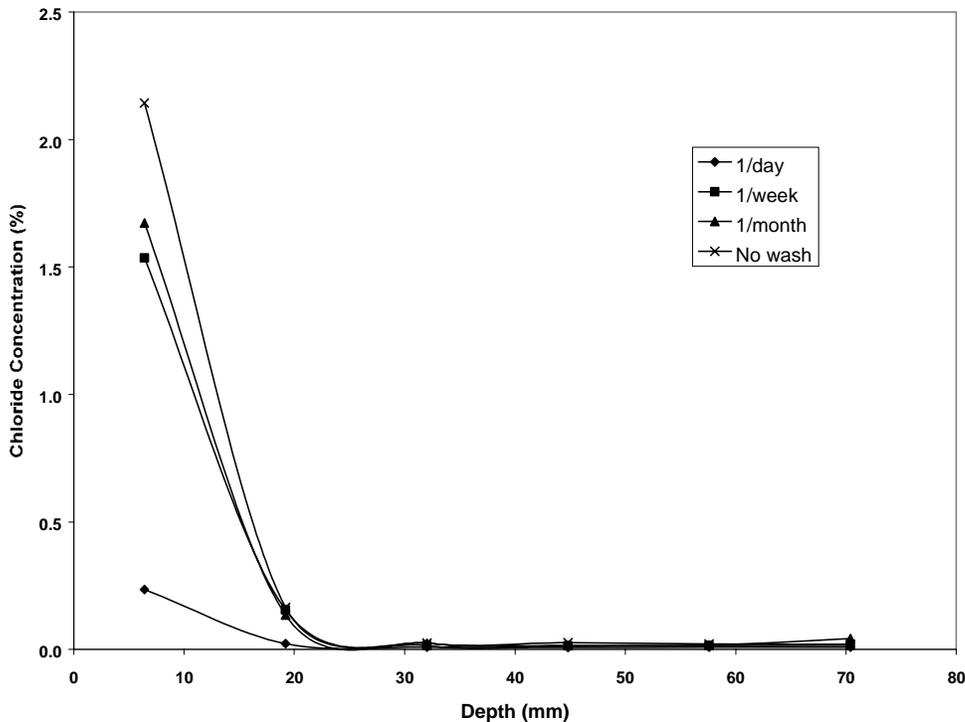
Rack for washing concrete slabs.

The laboratory experiments will be run for another two years to determine the effect of washing on chloride removal and to verify the effect of washing on reduced chloride uptake. The results-to-date indicate that occasional washing will have little effect on chloride ion concentration. Frequent washing may be necessary to

achieve any beneficial effect, which may be

accomplished, in some cases, by using an automated sprinkler system.

The Bridge Washing interim report can be accessed at the ODOT Research website at www.odot.state.or.us/tddresearch



Results showing the effect of washing frequency on the uptake of chloride ion. All conditions were sprayed once per week with salt water as the source of chloride ion.

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**For more information on ODOT's Research Program and Projects,
check the website at**

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