Context:
Gabriola, salt-weathering

Citations:
Doe, Nick, Museum Notes—The Memorial Wall failure, *SHALE* 16, p.48, July 2007.

Errors and omissions:

Other salt-weathering *SHALE* references:

http://www.nickdoe.ca/pdfs/Webp26c.pdf —what makes holes in sandstone
http://www.nickdoe.ca/pdfs/Webp58c.pdf —the geometry of honeycombs (tafoni)
http://www.nickdoe.ca/pdfs/Webp51c.pdf —various "salts" cause honeycombing
http://www.nickdoe.ca/pdfs/Webp239c.pdf —sandstone honeycombing away from the sea
—calcite from weathered anorthite as a "salt"?
http://www.nickdoe.ca/pdfs/Webp217c.pdf —the salt-weathering of concrete posts
http://www.nickdoe.ca/pdfs/Webp512c.pdf —salt-weathering and sandstone galleries
http://www.nickdoe.ca/pdfs/Webp27c.pdf —geology of sandstone gallery

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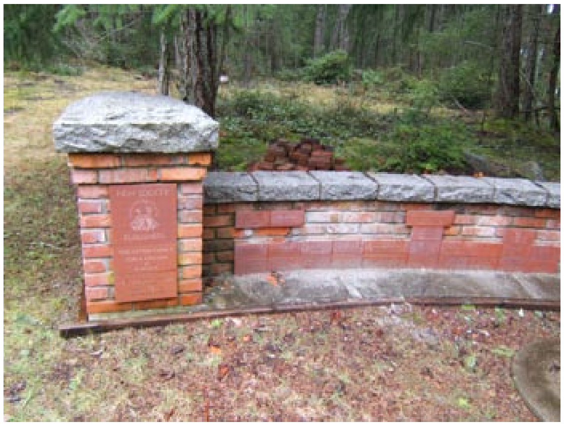
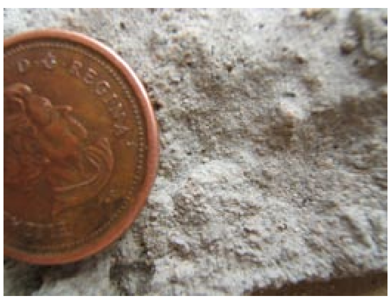
The museum page

The Gabriola Museum is at 505 South Road—about a 15-minute (uphill) walk from the ferry.





According to experts, too much salt in our diets isn't good for us. Turns out it isn't good for the Museum's Memorial Wall either. When tiles engraved with the names of donors started falling off in alarming numbers last year, Jared Hooper, the man who makes the petroglyph replicas, was convinced he'd right royally screwed up in making the special mortar he'd used to fix the tiles to the wall. But he was wrong.

Living on Gabriola as most of us do, we're all familiar with the effect of salt on cement—it's what causes the sandstone on our beaches to be honeycombed. So, when we compared the mortar that was not failing (*above left*) with that that was (*above right*) and saw that the "bad stuff" was riddled with holes, salt became the prime suspect.

Two samples of the mortar were sent off to a geochemical lab for analysis. One sample appeared undamaged, and a second was just a powder. Both were ground up and soaked in water for an hour, and chemical analyses were then made of the water samples to see what was in them. The water soaked in damaged mortar was deficient in aluminium, but more significantly, it contained twice the amount of sodium and potassium as did the water soaked in undamaged mortar. Not conclusive evidence that salt was the culprit perhaps, but taken together with the physical evidence, pretty convincing.

So how did the salt get there?

If you look at the wall, you'll see that the tiled face looks out southeast over the driveway toward the morning sun, while the back of the wall is always in the shadows of the trees. Any moisture in the wall will evaporate from the sunny, ventilated face, and this draws water through the brick from the colder, damper face at the back. As the water diffuses through the wall, it picks up salt from the bricks and deposits it on the front face when it evaporates. And where did the salt in the bricks come from? Guess what? Some of the bricks are discards donated by people who picked them up from—where else but—Brickyard Beach. The salt came from the sea.

Needless to say, the GHMS were dismayed that this had happened. However, the good news is that the tiles have been retrieved and everything is being put right. ◊

EDITOR

Additional information (not in the print edition)

Memorial Wall cement tests

Two samples were taken, both from the front face of the wall. One (intact) was a fragment of mortar still in place on the wall. The other [powder] was a scoop of powder lying at the foot of the wall.

Both were immersed in water at room temperature to obtain saturated solutions of soluble minerals. The solutions were then analysed using standard groundwater testing techniques.

Intact: Sample 29, NORWEST file: 460061-1

Powder: Sample 30, NORWEST file: 460061-2

	intact ppm	powder ppm	intact %ions	powder %ions
Ca^{2+}	416	339	62.4	55.8
Si [in $H_3SiO_4^-$]	102	115	21.9	27.1
Al [in $Al(OH)_3$]	26	6	5.8	1.3
Na^+	19	32	5.0	9.2
K^+	20	30	3.1	5.1
S [as $X^{2+}S$]	8	5	1.5	1.0
Sr^{2+}	2.4	2.2	0.2	0.2
P [in HPO_4^{2-}]	0.7	1.2	0.1	0.3
V [?]	0.2	0.3	0.0	0.0
Ba^{2+}	0.1	0.2	0.0	0.0
Ti [in TiO_2?]	0.1	0.0	0.0	0.0
			100.0	100.0
			intact %anions	powder %anions
HCO_3^-	3000	4000	95.1	96.3
Cl^-	71	71	3.9	2.9
SO_4^{2-}	50	51	1.0	0.8
			100.0	100.0