



MINNESOTA HISTORICAL SOCIETY

THE CONSERVATION OF TWO CAST IRON BELLS AT THE LAC QUI PARLE MISSION HISTORIC SITE

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Introduction

In September 2005, a request was made by the Historic Properties Office (HPO) of the Minnesota Historical Society for a condition assessment of the two cast iron bells currently at the Lac Qui Parle Mission Historic Site, Montevideo, MN. A mission and fur post overlooked the Minnesota River 150 years ago, and today the mission still stands after being reconstructed in 1940 (Figure 1). In 1826 Joseph Renville, an explorer and fur trader whose mother was Dakota Indian and father was French, established a fur post on the Chippewa River at a wide portion called Lac qui Parle. He invited missionaries to the area, and undertook the development of the Dakota alphabet and the translation of the Bible into the Dakota language. After Renville's death in 1846, Dakota opposition to the mission forced the missionaries out. This Minnesota Historical Society site is currently managed by the Chippewa County Historical Society under a contract agreement.



Figure 1: Front view of bell tower on Lac Qui Parle reconstructed mission building.

Object Condition

Both bells are accessioned objects in the Society's collections. It is likely, however, that neither is original to the site. There is no background information on the objects in the catalog records, or dates of manufacture.

Overall, the condition of both bells was good to fair. The exterior bell (LQ 07) was weathered and has overall corrosion, oxidation, and accretions including bird droppings and vegetative growth (moss) (Figures 2-5). The support and pivot mechanism were stable, with the exception of a narrow crack in the PR support casting that does not go completely through the metal. The bolts were slightly loose and need to be tightened. The surfaces were pitted, and there was active rust overall. The bell tower platform was stable but will require repair in the near future. The practice of allowing visitors to ring the bell during the open season was leading to wear on the clapper and interior of the bell, as well as producing stress to the platform. For this reason, ringing the bell was curtailed as part of the preventative conservation program for these objects.



Figure 2: Front view of exterior bell before treatment.



Figure 3: Detail of exterior bell rope pulley before treatment.



Figure 4: Detail of exterior bell surface before treatment showing corrosion, weather metal, and organic deposits.



Figure 5: Detail of exterior bell clapper prior to treatment showing the wear surfaces from ringing by visitors.

The interior bell (LQ 06) was stable, but had surface corrosion and accretions, including dust and paint splatter. It required cleaning and surface stabilization to properly visually interpret the surface (Figures 10-12).



Figure 10: Interior bell showing before treatment condition paint drips on yoke, corrosion, and green paint transfer on lower bell margin. The bell was dusty overall.



Figure 11: Detail of the yoke of the interior bell before treatment showing paint drips.



Figure 12: Interior bell before treatment showing detail of corrosion on clapper assembly and interior surfaces.

Treatment

Based on the above condition assessment done in 2005, it was decided to treat the bells in 2006. In June, the Society's Senior Objects Conservator and the Collections Assistant traveled to the site to treat the bells *in situ*. It was more efficient to treat them at the site than to bring them to the Society's conservation lab.

Since the bells are composed of cast iron, it was decided that the treatment would consist of mechanical cleaning to remove surface accretions and corrosion, followed by a corrosion stabilization treatment. The stabilizer produces a dark brownish-black to black surface that is consistent with the natural dark oxidation surface that can develop on cast iron (Alten, 1996). It is also similar to an artificial patination process done on architectural cast iron called Bower-Barffing that was developed in 1878 (Goodway, 1993). The original bells at the site would have predated this process, the current bells, however, appear to be from the late 19th century, so this finish is appropriate for that period. The treatment is practical for long-term conservation at a historic site since it requires little maintenance.



Figure 6: Exterior bell after treatment showing stabilized and restored surface.

The details of the treatments were as follows.

- Cleaned the surfaces of the bell and support with a rotary wire brush; removed flaking corrosion, dirt, organic accretions, and paint splatter. Wiped with a cotton cloth to remove powdered rust.
- Treated with tannic-acid based rust converter (Rust-X Rust Converter, Robb Scott Enterprises. NJ); applied two coats by brushing.
- Coated with tinted carnauba wax and buffed with cotton buffing pad on drill and by hand. (Butcher's White Diamond Bowling Alley Wax tinted with powdered lamp black pigment).

The rust converter contains tannic acid and an ethylene vinyl acetate (EVAc) resin emulsion. The tannic acid combines with the rust on the cast iron surfaces and forms ferric tannate (CCI Notes 9/5 (1989) and 9/6 (1995)). The ferric tannate forms a passivation layer on the surface, which slows down galvanic corrosion. The EVAc resin forms over the tannate layer as the water

in the emulsion evaporates. Once the stabilizer has cured overnight, the surfaces are ready for the application of a final wax coating. The wax contains carnauba and bees wax, solvents, and lamp black pigment. The wax coating can be maintained annually or as needed, and makes dusting easier. The tinting allows for a more even color. The exterior bell should be inspected annually and the wax coating reapplied as needed. (Figures 6-9, 13-15)



Figure 7: Exterior bell after treatment showing rear surfaces.



Figure 8: Exterior bell after treatment detail of clapper and interior surfaces.



Figure 9: Exterior bell after treatment detail of rope pulley.



Figure 13: Interior bell during treatment showing application of tannic acid/resin stabilizing solution. The bluish white color is the resin emulsion during drying.



Figure 14: Interior bell after treatment with final coating of tinted carnauba wax.



Figure 15: After treatment view of interior bell.

The treatment of the two bells took approximately two working days to complete. The result is a clean, evenly colored surface consistent with historic cast iron bells. Treating the bells on-site made the most efficient use of time and resources, and eliminated risks to the objects and structure that might have been incurred by moving them.

References

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Goodway, M. (1993). "The patination of iron by Bower-Barffing", in Metal Plating and Patination: Cultural, technical and historical developments, ed. La Niece, S. and Craddock, P., Butterworth-Heinemann, Oxford.

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