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## A Mill At Sainte Marie

### ABSTRACT

The aqueducts, trenches and basins between the north and south compounds at Sainte Marie I are reconsidered and the alternative explanation of an undershot waterwheel driving a gristmill is offered. The explanation of a canal and lock system for canoes is further discussed and reasons for its abandonment stated.

### DISCUSSION

The trenches or ditches which are incorporated into a unified system within the various compounds at the site of the Jesuit missionary residence of Sainte Marie (1639-49) near Midland, Ontario, manifest certain peculiar features. These have resulted in an interpretation which makes Sainte Marie in a special way unique in North America, and perhaps the Western hemisphere. That is, the 17th century occupants designed and built a fully operating canal, complete with hydraulic lift locks (Jury and Jury, 1954: 60-75).

There is little doubt that the French of the period had sufficient technological knowledge to accomplish such an undertaking, but in view of the missionary function of Sainte Marie and of some of the subordinate, utilitarian activities connected with this function, there arises the question of purpose: was a canal needed? Further, a reading of the excavation reports reveals a sufficient variation of evidence to throw some doubt on the coherence of the canal interpretation: was it really a canal? A review of the findings will point out the problem and present factors suggesting an alternate proposal which may prove more tenable.

The main trenches crossing the site have been visible from the earliest times as the various maps show, but were considered as moats or at least some part of the defensive system of the residence. Only by extensive archaeological investigation did it become clear that almost all these ditches lay *within* the palisades and among the buildings and features of the different areas, thus ruling out any protective function. As excavation proceeded, particularly in the western or river end of the east-west trench that separates the north compound from the south compound (Fig. 1), the relative intricacy of the water-preserved pilings, planks and hand-hewn timber troughs found there served only to pose a further problem. Such elaborate engineering was evidently executed for something more than mere drainage . . . the very width and depth of the trench itself indicated this . . . but in what did this "more" consist ?

Jury and Jury (1954, p. 62) reveal that a practical explanation for the trenches was provided by the discovery of the aqueduct (A). What-ever water the trenches might have contained had always been con-

sidered in former years to have been controlled by the level of the Wye River. But what had never been taken into consideration is that, had the Wye at any time been high enough to fill these trenches it would also have placed Sainte Marie on a spit of land either almost entirely inundated or dangerously close to such a condition. Moreover, for defensive ditch works, contemporary military theory preferred dry moats (de Rochmonteix, 1899: IV, 370-371).

At any rate, with the uncovering of the aqueduct, a comprehensive and coherent picture unfolded for the archaeologists. Water flowed from the aqueduct (A) into the north-south water channel (D). Then,

"After the abrupt turn west to the river, further control was regulated by three locks [G, J, L], the second of which opened into a spillway, while the first lock was in reality a 10-foot square water chamber. The function of the three locks was to raise the water to the level of the upper reaches of the canal.

"In the upper section of the east-west channel, above the second lock [J], lay timber troughs [H], 12 inches deep and apparently 9 feet long. Below the second lock and spillway piling 4 feet apart lined the sides of the channel. Between the first lock, or water-gate [L], and the river were the two well-preserved 9-foot troughs [M], whose discovery led us to the course of the water channel.

"When the water gates at Sainte Marie were open, the flow from the springs would be directed by this series of timber troughs, thus preventing erosion of the clay walls of the canal. Each lock would be controlled by a heavy timber gate operated as a lift-gate, as proved by the upright timbers, sawn to a uniform height, found crossing the first and second locks. The gate would come to rest on these timbers.

"The total length of the canal, including the aqueduct, was 460 feet. The gradient of the canal was 1.8+ percent." (Jury and Jury, 1954: p. 72)

This reconstruction attempt, as with some other interpretations given of Sainte Marie and its features, provokes a few questions.

If the two troughs (M) at the mouth of the east-west trench were to carry off the water once the gates were opened, why were they set underwater? Jury and Jury (1954, p. 56) expressly state that they were one foot below the surface of the water, and this at a time when the river level was at its lowest ebb in several years. In fact the water level at least prior to 1911 had been dropping perceptibly for a considerable length of time. In 1911 it was approximately the same height as at the time when the troughs were discovered, but around 1820 had been about four and a half feet higher (Hunter, 1911: p. 9). If this is so, can a steady drop be postulated from 1649 onwards? To do so would mean that the French had sunk all the pilings and constructed the intricate network while working underwater, or at least behind some kind of cofferdam. But had this been the situation there was no need for a canal at all since the banks would have been very close to the river-surface.

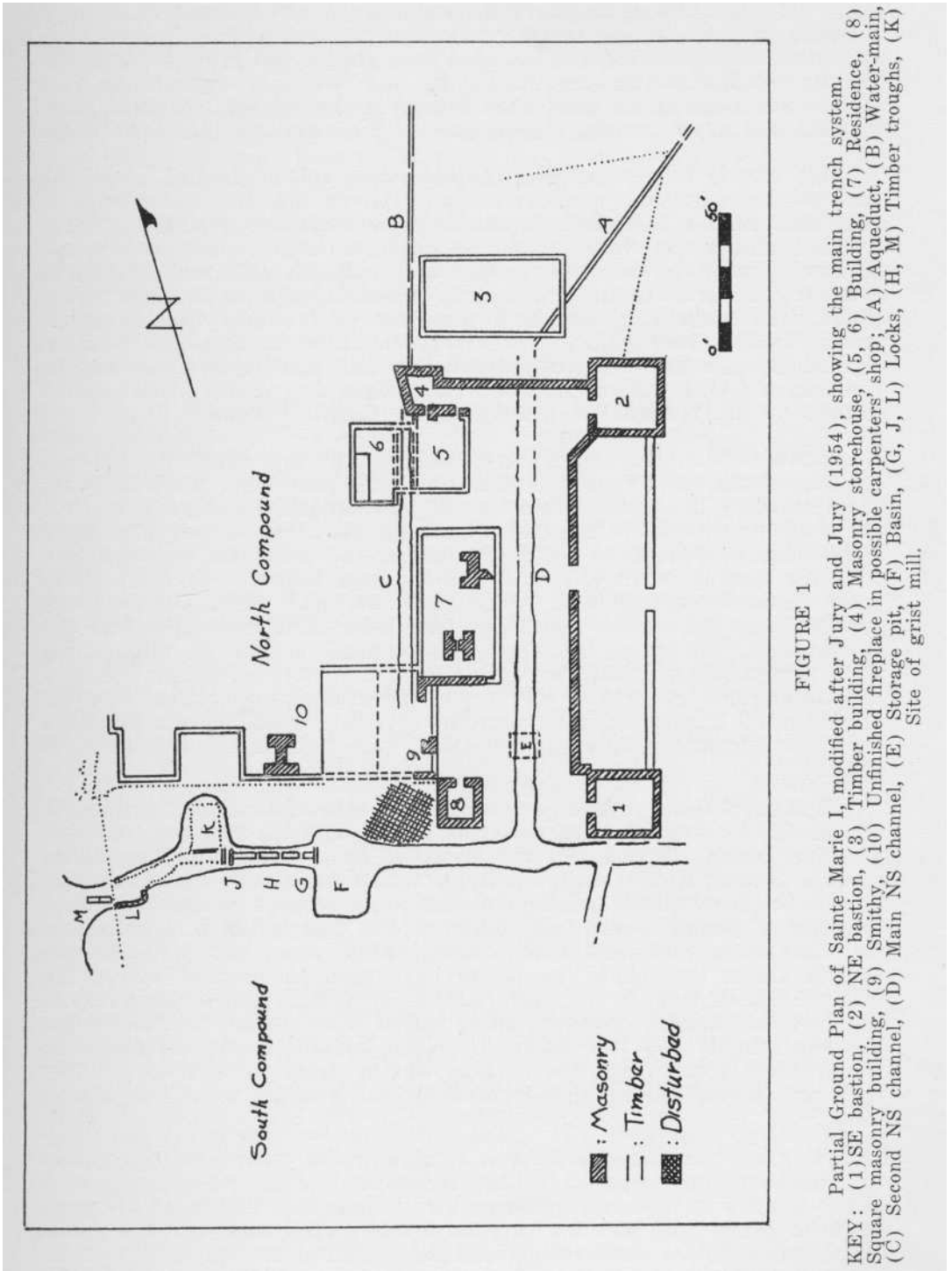


FIGURE 1

Partial Ground Plan of Sainte Marie I, modified after Jury and Jury (1954), showing the main trench system.  
 KEY: (1) SE bastion, (2) NE bastion, (3) Timber building, (4) Masonry storehouse, (5, 6) Building, (7) Residence, (8) Square masonry building, (9) Smithy, (10) Unfinished fireplace in possible carpenters' shop; (A) Aqueduct, (B) Water-main, (C) Second NS channel, (D) Main NS channel, (E) Storage pit, (F) Basin, (G, J, L) Locks, (H, M) Timber troughs, (K) Site of grist mill.

On the other hand, the pilings leading into the first lock (L) are burnt off but a foot or so above the water level, which seems to indicate a relatively low surface to the water during Sainte Marie's existence. In other words the 1649 water level was almost the same as in 1963. This seems incontrovertible, but if so, how does one explain the fact that in many instances, what were islands in the neighbourhood in 1820, by 1911 had at all seasons become part of the mainland (Hunter, 1911).

This merely serves to bring the discussion full circle and leaves the observer in as great a quandry as ever. Given that the water level in 1649 was similar to today's, a canal whose locks are so closely placed together and whose water supply to fill those locks is carried through narrow, gravity-fed conduits, needs every inch of clearance possible to give sufficient draft to any vessel being raised through it. It seems highly impractical in such an instance to place foot high timber troughs in the trench at the very points where this clearance is most in demand. Again, there were two troughs set but one foot underwater at the junction of trench with river, where one judges they would prove a direct hazard to the bottoms of heavily laden, fragile canoes.

But this is not the end of the difficulties. Jury and Jury's written description of the other timber troughs and their placement, the inadequate supplementary illustrations and lack of more specific photographs, leave the student with little idea of where precisely the second and third locks begin or end. It is not clear whether the third lock was identical with the landing basin (F) or lay in the area below it. If below, then where does the second lock really begin or end? From the text one gathers that the section floored by the upper timber troughs was the second lock, but if so, this leaves an unusual stretch of piling-sided waterway between it and the square first lock (L), an unusual characteristic because the greater the length, the greater the volume of water needed to fill it, and the small aqueduct certainly would place a premium on water economy if speed and dispatch were to have any consideration at all.

The canal interpretation runs into further trouble in the north-south trench (D) as well. It is here, almost in line with the south-east bastion (1) that the fourth lock (E) was supposed to be (Jury and Jury, 1954 : p. 64). But as Kidd (1949: 61-64), who had previously excavated this area in the early 1940's pointed out, this was a storage pit and revealed a quantity of pumpkin seeds and other objects that lay in a mass indicating they were stored rather than tossed in as mere refuse. Aside from considerations that show the pit to have been constructed within the original trench, there is the matter of size, something which also concerns the first lock and the channel leading inland from the latter. The storage pit was roughly 51/2 feet square by inside measurement; the first lock was 10 feet square; and the channel leading from the first lock 4 feet wide and *curved*. If all this formed part of a canal, what was floated in it ?

The sole conveyance that comes to mind is the canoe, the only means of transportation available to both Indian and white man in this part of the country in the seventeenth century. Champlain had noted (Biggar, 1922-36, IV, p. 39) that the canoes of this period were "8 or 9 yards long", while Father Bressani claimed they held "at most 8 or 10 persons but commonly not more than 3 or 4" (Thwaites, 1896-1901, XXXVIII,

p. 247). Father Charles Lalemant's evidence is rather a compromise and he stated that "the smallest of them can hold 4 or 5 persons and leave room for their little baggage" (Ibid, IV, p. 205). Assuming the size varied, even the smallest canoes of bark and large enough to transport safely three or four men, would be more than ten feet long, and certainly the canoes that came to Sainte Marie were even larger since they had also to carry supplies meagre though they often were. Put plainly, a canal then exists which has nothing to convey, since the only available boats of the time would not fit its locks.

Furthermore, during the time it would take for sufficient water to accumulate in the locks in order to give even a shallowdraft vessel enough water to float, the cargoes could easily have been manhandled up the river bank — no great task for men who had already made more than thirty-five portages between Quebec and Sainte Marie (Ibid, VIII, p. 27). Hence it is difficult to reconcile the narrow, restricted, even curved water passage and its time-consuming operation with practicality.

Yet, if practicality be the issue, what purpose did this obviously engineered construction fulfill. There is another operation which re-quires a controlled water supply, namely, a mill. The number of Frenchmen at Sainte Marie, the altar-breads for the Masses of the Jesuits and the increasing number of communicants, to say nothing of the free meals given to visiting Hurons and Algonquins whose staple was sagamite (or crushed corn), required that a considerable amount of grain be transformed into flour and meal. To do this by hand would be a monumental task involving the full time of more than one man whose hands could be used at other tasks. Certainly a mill was a necessity.

The increase in Sainte Marie's productivity shows particularly after the year 1647. In August, 1649, the Jesuit diarist at Quebec noted the departure of "domestics for the Hurons, Tourmente, roger (sic), Raison and Oliveau; the latter a miller, or sent as such" (Thwaites, 1896-1901, XXXIV, p. 59). This group did not get through to Huronia but met on the way up the surviving missionaries and Hurons abandoning Christian Island after the horrors of the winter of 1649-50. But if Oliveau was sent from France specifically as a miller it indicates the strong possibility that a call had been sent out at least a year previously, since a double trans-Atlantic crossing was involved. Thus it appears that with the increasing food demands at the Residence some milling operation was called for and initiated ; and while it was temporarily conducted by the local staff, a request had been sent overseas.

For milling purposes the troughs or sluice boxes and the spillway situated immediately to the east of the loading basin (F) could easily channel water with the minimum force necessary to turn an undershot wheel. The first "lock" (L) then, would act as a dispersal area for the tailrace, the submarine troughs (M) preventing, as Jury and Jury suggest, the resulting eddies from undermining the river banks, but now for a different reason. The basin (F) may have been dug to provide a headwater, whose volume and consequent head might ensure enough pressure. This pressure would be increased by funnelling the water through the flume or sluice boxes. No trace of wheel or mill-stone was found at Sainte Marie but they may be lying in or near the unexcavated area of Sainte Marie II on Christian Island since Sainte Marie I was thoroughly dismantled before being deliberately razed.

All this makes another coherent picture, except for the same objection that stood in the way of the canal: the storage pit. If a mill was so necessary, an obstruction placed across the trench in the autumn of 1648 at the latest makes the channel inoperative as a watercourse at a time when its desirability was at a maximum.

Fortunately there is an answer for this. There are *two* north-south trenches at Sainte Marie. The second (C) runs parallel to that containing the storage pit and immediately west of the buildings numbered 5 and 7 in the accompanying diagram. Jury and Jury give this channel but passing mention although they describe another wooden underground water main (B) with an outside measurement of 8 by 9 inches, laid on stones to give the whole a rise of 1½ inches every ten feet. It ran north from the second trench (C) under the stonework of the masonry store-house (4) for 85 feet before passing under the roadbed of the Canadian National Railways (Jury and Jury, 1954: 60-61). The fact that it passes under a stone building should not cause the same apprehension as with the aqueduct (A) under the corner of the timber building (3). Stone does not succumb to rot as wood does, a fact proved by the evidence of the passage of the trench (D) under the wall connecting the north-east bastion (2) with the masonry storehouse (4). After 300 years this wall has sagged because of the deterioration of the wooden frame beneath it, but water could still flow through the original course today.

Now, the second trench was open in 1649 since burned boards and charcoal lay at the bottom of it, and was investigated by Kidd (1949, p. 86) during the first excavations. He shows it quite plainly originating at the storehouse (4) and running south until it turns west and disappears in a disturbed area where a later road crossed the property (Kidd, 1949; Map 8). It makes sense to presume it turned south again and emptied into the wide basin which lies almost at this point. The kink or bend in the trench was necessary to avoid the smithy (9), where undoubtedly the water would be handy for the cooling and tempering tub; and whose end wall abutted on the small square structure (8).

These details are mentioned because Jury and Jury seem to have lost sight of them and made the buildings (5) and (6) into a single structure when in reality there must have been two. For the same reasons there must have been an opening between the smithy and the building with the unfinished fireplace (10) and which may have been the carpenter-shop. Of course, the ditch at this point could have been filled in and subsequently built over, but surely at least one part of the trench system was in operation for the last year or two of Sainte Marie's existence, and the storage pit (E) precludes the other (D).

One must keep in mind that as far as the evidence in the earth goes, there is no more final proof at present for a mill than for a canal. Yet of textual references, there is one which brings a miller to the scene. For a canal or anything like it, there is only silence.

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