A Structural History of the Casemated Redoubt
Fort Henry
Kingston, Ontario
1832-1957

(Revised)

by
David McConnell
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prepared for
Dennis Carter-Edwards
Ontario Service Centre
Parks Canada
Cornwall, Ontario

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to present you
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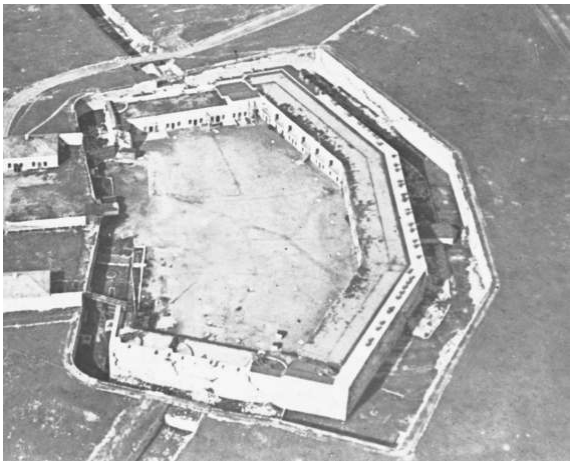

Fort Henry 1919
Detail from Bishop Barker Co., National Archives of Canada, PA-030467

Chapter 1

The Rise of Fort Henry 1832 – 1870

Building the Casemated Redoubt

In London, in October 1829, a committee of four officers of the Royal Engineers, of which Sir Alexander Bryce was president, sat down to consider the proposed defences of Kingston, Upper Canada. Already in 1825, a commission headed by Sir James Carmichael Smyth, had investigated the problem and proposed that the fortifications on the heights of Point Henry to the east of the town be strengthened. Two years later, Lieutenant-Colonels Fanshawe and Lewis, members of a committee sent to Upper Canada to study the Rideau Canal, visited Kingston and decided that Smyth's scheme would not adequately protect the naval dockyard or other stores depots nearby. They then ordered a survey to be made of the area to illustrate the local circumstances. In 1829, on orders of the Master General of the Ordnance and instructions of the Inspector General of Fortifications, the Bryce Committee examined the various documents relating to the proposed defence of Kingston and on 24 October submitted its report "...on the nature and extent of the Works, which, in their opinion, should be erected for the defence of this post, without materially exceeding the rough Estimate of £220,000..."[1]

The Committee proposed an extensive series of redoubts, towers, and batteries surrounding Kingston to protect the town from attack by land or water. Of these, the largest would be a casemated redoubt to replace the works that had been thrown up on the heights of Point Henry during the War of 1812.

> On carefully considering the position of the Fort on Point Henry together with the plans and Estimates very ably prepared by Lt Col: Wright for its improvement we are of opinion that owing to the confined nature of the ground (which will not admit of a Front of more than 84 Toises) and other unfavorable circumstances the chief of which is the great expense of excavating the Ditches and defilading the Work in solid Rock, from an amphitheatre of higher ground in front, a very objectionable Work would be obtained at a very great comparative expense. We have therefore been induced to propose altering the nature of this Work, from a bastioned Fort to a large Casemated Redoubt, defended by reverse Fire, which at little more than one third of the expense would we think [illegible, make?] this situation equally efficient, whilst the saving effected by this construction, with a moderate addition, would afford the means of executing several advanced works both on the Point Henry and Kingston sides, which we respectfully submit are essentially necessary for the security of the Dock yard and the Ord^{ce} and Commissariat stores on Point Henry.[2]

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1 National Archives [henceforth NA], MG13, WO55/1886, Bryce to Mann, 24 Oct. 1829.

2 Ibid.

The report then went on to outline very briefly the nature of the works that it thought would be adequate to fortify Point Henry.

> Point Henry. The Work we propose for this Point has been traced to command the Ridge in front, and that with a small Garrison, the ground on which the Depots of Ordnance and Commissariat Stores will be concentrated may be secured from a Coup de Main on the Land side.
>
> A Sea Battery on the rear will be necessary and may be constructed under protection of the Redoubt on such level as may be found on the spot most desirable for the object in view. Within the Redoubt will be casemated cover for 300 Men with their Officers and Stores of all kinds for its defence.
>
> Casemated Store rooms may be constructed in the rear for the intended Commissariat Depot, which will cover the communication with the Sea Battery.
>
> Flank Ditches being extended from the Ditch of the Redoubt to the Water on each side will enclose a great part of the existing Ordnance Stores and afford a safe position for such others as it may be found necessary to erect.[3]

It was to be over two years later, however, before a decision was finally made to build the Casemated Redoubt on Point Henry. Toward the end of January 1832, the Master General of the Ordnance met with Lord Goderich, the Secretary of State for the Colonies, and Lord Althorpe, the Chancellor of the Exchequer, to present the Bryce Committee's plan for the defence of Kingston. The Master General put forward two arguments in favour of the Bryce Committee's plan, one military and the other financial. First, he claimed that Bryce's plan would provide greater security to the town and harbour. Secondly, he pointed out that the building of the largest redoubt, the one on Point Henry, would cost some £100,000 less than the reconstruction of the old fort on Point Henry as proposed by the Smyth Commission of 1825. Bryce's scheme contained the added advantage of allowing for the piecemeal building of the defensive system of Kingston as Parliament voted the necessary funds from year to year rather than its having to vote for a large work which might remain unfinished for lack of funds. Goderich and Althorpe were convinced by the Master General's presentation and agreed that the necessary orders should immediately be given to begin building the Casemated Redoubt on Point Henry. On 2 February, the instructions of Sir Alexander Bryce, now Inspector General of Fortifications, were duly sent to the Commanding Royal Engineer in Canada, Gustavus Nicolls, to begin building the Casemated Redoubt on Point Henry.[4]

While the decision to build the Casemated Redoubt on Point Henry was taken in England, the plans for Fort Henry, as the new work came to be called, were drawn up in Upper Canada. Indeed, in 1826, in anticipation of some works being built at Kingston, the Board of Ordnance had authorized an officer "...to quarry Stone and make all other preliminary preparations short of

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[3] Ibid.

[4] NA, MG13, WO55/869, pp.16-18, Minute, 30 Jan. 1832; Byham to Bryce, 2 Feb. 1832.

breaking ground for the foundation of the works..."[5] Thus by 1832, a large stockpile of building material had been assembled. Plans and sections of the proposed fortification and estimates of amounts and costs of materials were prepared under the supervision of Lieutenant-Colonel J. R. Wright, Commanding Royal Engineer in Upper Canada, stationed at Kingston. In mid-July 1832, he sent them to Lieutenant-Colonel Gustavus Nicolls, Commanding Royal Engineer in Canada, at Quebec, for approval and transmission to England.

The plans and estimates called for a six-sided casemated redoubt surrounded by a dry ditch. (The original plans drawn up by the Bryce Committee in 1829 called for a five sided redoubt; Nicolls changed these, see below.[6]) Two smaller ditches were to extend from the main east and west ditches to the water's edge, thus cutting off the southern portion of Point Henry where a sea battery and commissariat storehouses were to be erected. The north front of the redoubt was to be made up of three faces, two stories high while the east, west, and south faces were one story in height. The foundations, walls, ramparts, scarp, and counterscarp were to be made of rubble masonry and lined with ashlar limestone. The piers of the casemates were to be constructed of rubble masonry and the arches of brick. Over the arches dry rubble was packed down up to the level of the terreplein which was made up of a mixture of rubble and gravel. The ditch on the north, east, and west sides was to be defended by casemated reverse fire chambers built into the northeast and northwest corners of the counterscarp; a casemated caponier extending across the mid-point of the north ditch was to provide additional defence. The south ditch was to be defended by demi-bastions at the junction of the south face with the east and west faces of the redoubt.[7] (See Appendix 1 for estimates and Plans 1, 2, and 3 for plans and sections.)

Once the decision to build was taken, no time was lost in beginning work on Fort Henry. Even before the plans and estimates were completed "...the excavation of the Rock for the Ditch, Escarp Wall, & Casemates of the Land Front was commenced on 18 June and I [Nicolls] think the masonry of this Front ought to begin during this month [July]." Nicolls reported that, on his own initiative, he had made an alteration in the design of the redoubt. Originally, the north front was to be composed of two faces; Nicolls redesigned it with three faces. He explained:

> I have made an alteration in the Land Front, in making it of three faces instead of two, in consequence of the Redoubt N^{o} 1. having been struck out of the

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5 NA, MG13, WO55/1886, unpaginated, Extract from Minute dated 10th March 1826.

6 NA, National Map Collection, NMC 20781, "Plans and Sections of Casemated Redoubt, proposed by the Committee for Point Henry, Kingston, Upper Canada," to accompany the committee's report dated 24 Oct. 1829.

7 NA, MG13, WO44/32, pp. 23-26a, "Estimate of the Expence of Erecting a Casemated Redoubt on the site of the present old Work on Point Henry, Kingston...," signed, J. R. Wright, 13 July 1832, G. Nicolls, 23 July 1832; National Map Collection, NMC 22963, 22964, and 20788.

> Committee's Project for the defence of the Dock Yard (according to your Mem: 29th Jany 1832) whereby the high ground only 670 yds distant, on which it was to have stood was left opposite the salient angle, but which has now been brought under a direct fire. The combined fire has thus been improved, and this face being flanked by a Caponiere, will in conjunction with the Casemate of Reverse fire, throw considerably more fire over the Ditches & Counterscarp of the three faces as shewn in the Plan No 1.[8]

In his instructions, Bryce had directed that the limestone being quarried for Fort Henry not be chisel dressed in order to save money. Nicolls reported that the instructions came too late:

> The greater part of the stone quarried in preparation in consequence of the Grants[?] & Orders already given, having been chisel dressed, it is now too late to adopt this piece of economy – however no further chisel dressed work will be adopted in the Redoubt, except for Quoins, Door & Window Sills, & Lintels, (jambs may principally be got out of the stone already dressed) and other parts of that nature.[9]

Throughout the summer and fall of 1832, work went ahead on Fort Henry, and in early November, Wright reported to Nicolls that:

> About 15,000 yards of Rock & rubbish excavated and removed in sinking for the Ditch & Casemates &ca on the North Front & 150 Toises of Masonry Built in the Escarpe, Piers & Front Walls of the Casemates in the Centre Face.

At the same time, the workers pulled down and destroyed "rotten debris" on site, presumably decaying structures from the War of 1812.[10]

While the work was progressing the authorities in England were considering Nicolls' changes to the design of the northern casemates from two to three faces. There was a certain amount of a feeling of bureaucratic affront at his acting unilaterally. One official minuted:

> I fully concur in the principal laid down in the Boards Minute viz: that when the Plan of a work has been approved of by the M Genl & Board & ordered to be executed conformable thereto that no Officer of Engineers who may be charged

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8 NA, MG13, WO44/32, p. 23, 29, Nicolls to Bryce, 23 July 1832.

9 Ibid., p. 29.

10 NA, MG13, WO55/869, p. 308, Wright to Nicolls, 6 Nov. 1832; pp. 304-5, Nicolls to Inspector General of Fortifications, 17 Dec. 1832.

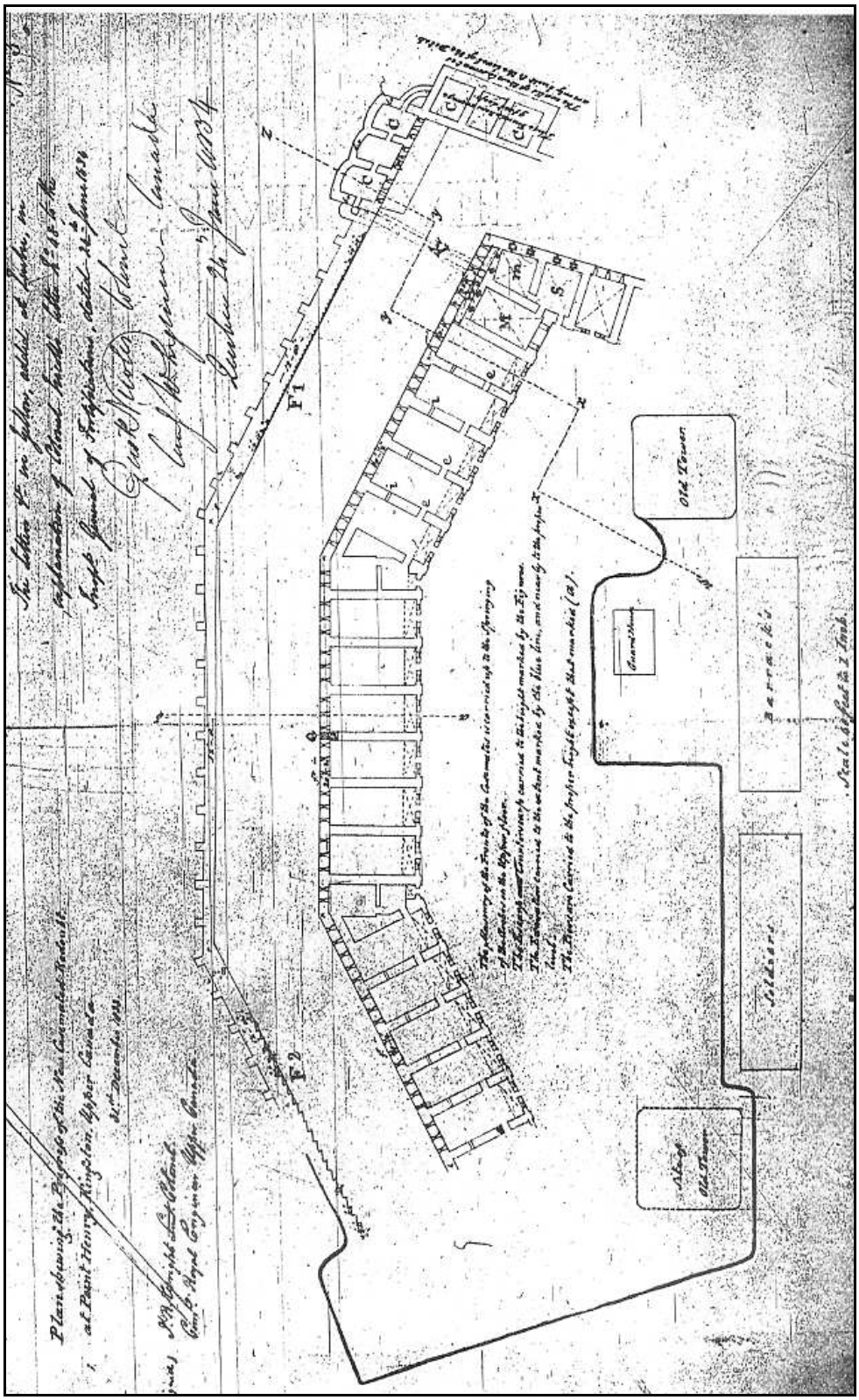

Figure 1 Plan shewing the progress of the New Casemated Redoubt at Point Henry, 31 Dec. 1833. NA, MG13, WO55/872, p. 188.

> with the execution of the work shall be permitted to deviate materially from the Approved Plan without the previous Consent of the M Gen^{l} & Board.[11]

It was subsequently decided that Nicolls was justified in making the design changes but that he should have obtained permission beforehand.[12] Almost a year after Nicolls had written his report explaining his decision, the Secretary of the Board of Ordnance informed the Inspector General of Fortifications that Nicolls' plan was approved while at the same time reprimanding him for acting without receiving the proper authority.[13]

By 31 December 1833, Lieutenant-Colonel Wright reported that the northern front of casemates, as well as scarp, counterscarp, and the reverse fire chambers in the northeast corner of the ditch were largely completed (see Figure 1).[14] While the building of the fort was moving ahead satisfactorily, Nicolls had made a number of other changes to the original plans that the ever watchful eyes of the authorities in England noted with some disfavour. The most significant alteration was the manner in which the walls and arches were built, or rather, connected. "The committee [of 1829] intended the walls and arches to be carried through, and the outer and inner walls to be filled in; but, by the plan, the Engineer appears to have built up the outer wall against the end of the casemates."[15]

Nicolls replied to the criticism by pleading that he had not fully understood the Committee's scheme and then, in a second report, that his method of construction would be stronger in the face of attack.

> By the Sections in Plan N^{o} 3 that accompanied the Committee's report dated 24 October 1829, it is shewn that the piers and arches were intended to be carried through the Escarp and Front wall of the casemates – but no elevation of either having been drawn, it was not understood that they were to be built first, and then the wall filled in , and therefore the walls were all bonded together as shewn in the Revised Plan, which I hope you will consider sufficiently strong to answer all purposes required. The arch, you will see by the Section S, is carried

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11 NA, MG13, WO44/32, p. 29a, note dated 27 Sept. 1832.

12 Ibid., pp. 30-30a, note dated, 5 Oct. 1832.

13 NA, MG13, WO55/870, Butler to IGF, 15 July 1833.

14 NA, MG13, WO55/872, pp. 186-8, "Plan shewing the Progress of the New Casemated Redoubt at Point Henry, Kingston, Upper Canada, 31st December 1833".

15 Ibid., p. 191, memo, signed S. B. H., 3 April 1834.

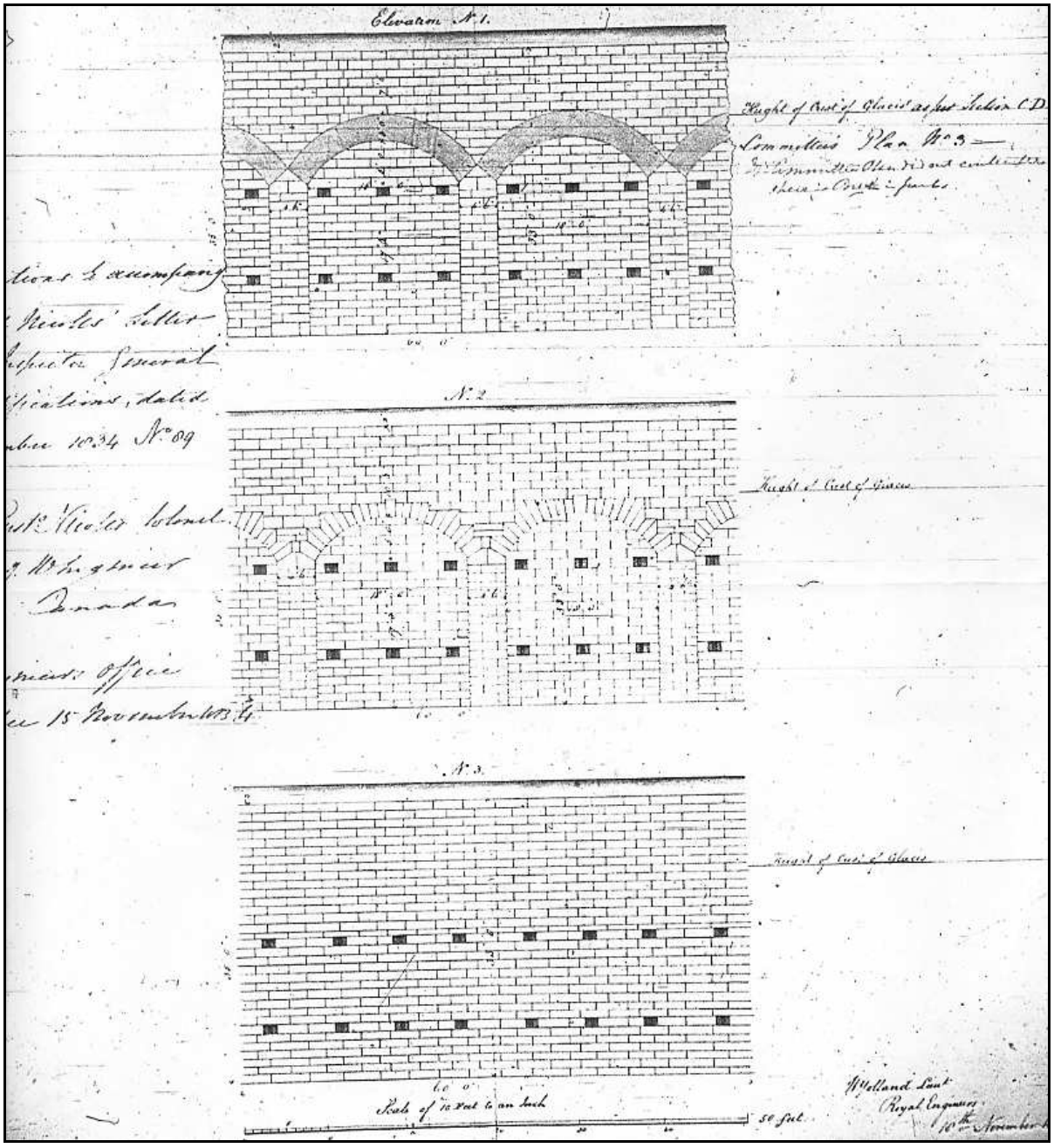

Figure 2 Elevation to accompany Colonel Nicoll's Letter to the Inspector General of Fortifications, dated 15 November 1834. MG13, WO55/872, p. 185. No. 1 and No. 2 were as the scarp should have looked; No. 3 is how it looked.

through the Front Wall of the Casemates but only to that of the Escarp.[16]

In his second report, Nicolls pointed out that if he had built the arch through the scarp wall:

> ...it seems to me that such an Elevation would have a strange appearance, and that the want of bond with the cut stone above and below the Arch, as well as at the upper part of the Piers, in a part exposed to the effects of an attack from an Amphitheatre of higher ground in front...would greatly facilitate the destruction of the same...: that the bricks in front would not stand the Climate, and the expence of turning the Arch through the Wall would much exceed that of building the Wall solid, especially as the Ashlar had been previously cut.

Even if the face of the brick arch were covered with cut stone, he saw no advantage except in appearance.[17] To illustrate his argument, Nicolls enclosed three elevations of the scarp wall, two showing the arch built through, and the third showing the manner in which the scarp wall had actually been built (see Figure 2).[18]

The authorities in London noted other deviations from the plans of 1829 that were less controversial. Nicolls had connected the rooms on each floor in each wing of the north front with doorways, except for the lower floor of the central wing. He explained that these provided better air circulation as well as providing a means for an officer to move from room to room without having to leave through an outer door thereby exposing the troops each time to a cold blast in winter. He also pointed out that connected rooms allowed for defensive support if enemy soldiers got into the fort. Along with the doors, he drove smaller passages through the walls for air circulation. The exterior wall of each room was pierced with three loopholes, again to improve air movement, but more importantly to allow musketry fire into the ditch.

Nicolls provided for two stairways from the second level for the soldiers to make their way onto the ramparts from their living quarters. He suggested that it would be extremely awkward for the men to descend from their quarters, cross the parade, ascend the stairs to the south wall, and then proceed along the east and west ramparts to climb onto the north ramparts; better to go directly up. (Apparently stairways were provided for in the original planning; either Nicolls did not understand or the plan was inadequately explained.)

Nicolls chose to turn the rooms at the northeast corner where the north front meets the east front into two powder magazines and a shifting room. He explained that, while it was clear from the

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[16] Ibid., pp. 179-179a, Nicolls to Pilkington, IGF, 24 June 1834.

[17] Ibid., p. 176a-7, Nicolls to Mulcaster, IGF, 15 Nov. 1834.

[18] Ibid., p. 185, "Elevations to accompany Colonel Nicolls' letter to the Inspector General of Fortifications, dated 15 November 1834, N^{o} 89."

estimates that two powder magazine were to be built in the fort, their location or construction was not designated on the plans. Consequently, he had chosen a location he considered most suitable. Behind one of the powder magazines he provided a passage which led to the passageway under the ditch giving access to the reverse fire chambers. He explained as well that the caponier was not yet built because the workmen found that the entrance to it provided a convenient way for them to get into the ditch to continue their work there; consequently Nicolls had ordered that the entrance not be closed off by building the caponier while the entrance way remained useful.

Nicolls' work on the counterscarp was also criticized: "The counterscarp at FF [i.e., the northeast and northwest faces] is carried up to the height of 12^{ft} 8^{in} without being notched out, which was ordered to be done."[19] Nicolls responded:

> The counterscarp at FF was built previous to the receipt of N^{o} 860, to suit the object pointed out in your minute of 8th July transmitted therewith. It is proposed to indent the Ashlar at F1 as shown in yellow on the Revised Plan for the length given on the Fly and at F2 to take down the part already built, and build it and the remainder of that length [illegible] as in this Plan, which will approximate the [illegible] shown on the Fly, and will be more economical and in a wall of 8^{ft} thick will not weaken it to signify [sic, too significantly?]; the joint also will be better protected from the weather and I hope this will meet your approbation.[20]

The drawing (see Figure 1) shows a jagged edged profile of the counterscarp at the points F1 and F2 as if the ashlar stones were inserted into the wall at an angle. There is also a plan of the casemates and counterscarp signed with the date 31 July 1833, which shows in greater detail this jagged edged profile (see Plan 4). On the plan Edward Fanshawe has noted "Fly leaf referred to in the Inspector General's Minute dated 8th July 1833 on Circular Letter of 18th Decbr 1832. For Col Nicols' guidance by order of M Genl Pilkington."[21] The purposes of this jagged edge or notching was to prevent musket balls being deflected along the ditch; it was not constructed to the top of the counterscarp but only part way up.

In June 1835, Nicolls visited Kingston and directed that plans and sections be made of Fort Henry and, on 18 August, sent these to England with an explanatory letter to Major General F. W. Mulcaster, Inspector General of Fortifications. Nicolls seems to be concerned with justifying the heights of the parapets and explaining how the interior of the fort is covered from attack. The plan of Fort Henry shows the heights of the parapets, ditches, and glacis down to the water level.

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19 Ibid., p. 191a, memo, signed S. B. H., 3 April 1834.

20 Ibid., p. 180a, Nicolls to Pilkington, IGF, 24 Jan. 1834.

21 NA, National Map Collection, NMC 4532.

(See Plan 5; Plan 6 shows sections of the glacis extending from the ditch)[22]. The parapet of the north front is calculated to be 121 feet 1 inch above the level of the lake. The parapets of the east and west fronts drop down in two steps of 3 feet 6 inches to be 7 feet lower. The parapet of the south curtain wall is another 2 feet lower, that is 9 feet lower than the parapet of the north front. These drops in height seem to be designed to mask the terreplein of the east, west, and south fronts from a land attack from the north, but apparently it had been pointed out (and would be again) that the interior of the fort could be seen from the water. Nicolls argued that since the cross trees of a frigate were higher than 121 feet, even if the south front was built to the same height as the north, the interior of the fort could still be seen from the water.[23]

It is not clear from Nicolls' letter or from the plans how much of the fort has been built by August 1835 and how much was still proposed. As well as the overall plan of the fort he sent a plan and section of the east front which is clearly a proposal (see Plan 7).[24] What is interesting about this drawing is that it shows how the armament was intended to be mounted on the flanks. Six guns were shown on iron garrison carriages resting on common iron traversing platforms. The two platforms at the angles rotate on centre pivots while the other four use front pivots. The parapet is not pierced for an embrasure to command the ditch. Later plans show a different gun configuration and iron carriages and platforms were not used (see below). Even in mid-1835, Fort Henry was still a "work in progress".

We know that the caponier was not built in 1833. It may have been built in 1834 or as late as 1835. There is a detailed plan and section of it dated 23 January 1835; this could be the working plan, in which case the caponier was put up in the spring or summer of 1835. The drawings show a casemated one story structure which does not quite extend across the north ditch; there is a space of 9 ½ feet between it and the counterscarp. It is sunk three feet below the level of the ditch and pierced with eight loopholes for muskets on each side. Its walls are 4 ½ feet thick and its interior is 12 feet wide (see Plan 8).[25]

When was the casemated redoubt at Fort Henry completed? In April 1837, the Commanding Royal Engineer, Upper Canada, Lieutenant-Colonel Wright was reporting that he had

> every reason to hope that the unexpended balance upon the Amount already authorized with the balance upon the Estimate for the works applied for in the General Estimates for the year 1837, will, when authorized be sufficient to complete the Casemated Redoubt, and outworks at Point Henry agreeable to the

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22 Ibid., NMC 22966, NMC 4535.

23 NA, MG13, WO55/872, pp. 173-175a, Nicolls to Mulcaster, 18 August 1835.

24 NA, National Map Collection, NMC 4534.

25 Ibid., NMC 4536.

original Estimate.

In November, he noted that the casemated redoubt was nearing completion.[26] It seems likely then that the Casemated Redoubt was finished in 1837, although it may have been substantially complete in 1836.

What did the completed Casemated Redoubt look like? A set of plans, elevations, and sections prepared in November 1839 are probably the nearest we are going to come to finding "as built" drawings of the Redoubt. They were prepared by the Clerk of Works at Kingston and signed by Captain Benjamin Stehelin, RE, on 3 December 1839. Two sheets show the plans of the ground and upper floors of the Redoubt, identifying the purpose of each room and the use it was actually being put to in November 1839. Another sheet provides elevations of the south front, northeast face, and officers' quarters along with sections through the north front and ditch, officers' quarters and ditch, and south front and ditch. The fourth sheet shows the plan of the platforms on the terreplein, that is, the location of the curbs and pintles of the 27 traversing platforms proposed for the Redoubt. It also shows embrasures overlooking the east and west ditches (see Plans 9, 10, 11, and 12).[27]

Of particular note was the outline of the two drainage systems of the Redoubt. One of these collected rain water from the ramparts into underground drinking water tanks. A stone gutter ran along the inner edge of the ramparts which collected rain water as it ran off the terreplein. At periodic intervals the gutter opened onto vertical drain pipes leading down to scuppers which were in turn joined together by a horizontal pipe. We also know from later documents (see stanching the casemates, below) that a drain in each of the valleys between the arches of the casemates also fed into the horizontal drain pipe. At seven points along the horizontal pipe, vertical pipes led down to a series of underground drains which carried the water to five interconnected water tanks under the eastern end of the parade. There the water was filtered as it passed from one tank to another.

The second system collected rain water from the parade and ran it through the privies out into the river below. Around the edge of the parade a series of surface drains led to six receptacles emptying into underground drains. These carried rain water to the men's and officers' privies, the water flushing them out before it entered two major drains leading to Navy Bay and Hamilton Cove (later Deadman's Bay) (see Plans 9 and 11).

Stanching the Leaks

Within a year or so of the completion of the Casemated Redoubt construction problems were

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[26] NA, MG13, WO55/873, pp. 264-5, Nicolls to Mulcaster, 10 April 1837, quoting Wright; pp. 422-3, Wright to Mulcaster, 18 Nov. 1837.

[27] NA, National Map Collection, NMC 20785, 20786, 20784, and 20787.

being encountered. In July 1839, the Commanding Royal Engineer in Canada called for a report on Fort Henry concentrating on the quality of the cement used in its construction and the state of the casemates. The pointing of the ashlar facing was failing and the casemates were reported to be damp. In December 1839, the Royal Engineer in Kingston, Captain Benjamin Stehelin, made his report.

The cement, he claimed, had only failed in the pointing, refusing to adhere to the ashlar limestone. Although this cement, which was made on the spot from limestone taken from the excavation of the ditch and burnt in a common lime kiln, was inferior to Harwich cement from England, he attributed its failure to a number of causes. He thought that the sand in the mixture had not been properly washed. The proportion of one part sand to two parts cement was improper. The joints of the masonry had not been raked to a proper depth before the pointing was done. Finally the pointing was carried out at an "improper" season of the year. Stehelin's solution was to use a pointing compound that he said was used in Kingston buildings: one part brick dust, two parts sand, and one part slaked lime to which was added half that quantity of unslaked lime immediately before use.

Generally, Stehelin felt that the casemates were in a good condition: "The Casemates at Fort Henry are not more damp than Barracks of that description usually are, particularly after recent completion, and when the masonry is of lime stone." He suggested that the two storey north range made comfortable barracks for the men and that the store rooms on the first floor were quite dry. Any dampness in the barracks appeared only in the autumn and disappeared when the stoves were lit. He did note that the arches of the gallery, that is the passage way on the second floor, was receiving much injury from water making its way through. The problem (and this would be noted again over the years) was that the arches abutted the walls and did not pass through them and that water was passing down between the walls and the arches.

The officers' casemates, on the other hand were much damper. This he attributed to the faulty construction of the chimney flues:

> which are carried vertically through the piers and Springing of the arches into the valley, and nearly horizontal to within a few feet of the interior face of the scarpe wall, and gradually rising are brought out perpendicularly through the middle of the parapet, and as the gutter [in the valley of the arches] runs over the flues, with a large mass of limestone masonry, a constant drip must ensue, until the walls are perfectly dry, and the fireplaces smoke so much from this construction as to be perfectly useless.

The magazines and shifting room in the northeast corner, contiguous to the officers' quarters in the east range, were also found to be quite damp, one of which he said would have to be abandoned. He remarked that four years ago the earth over one magazine and the shifting room was removed "and the two courses of tiles (which were manufactured here) that covered the Dos d'ane were found perfectly soft, and I fear while they continue so it will be difficult to render the

arch completely dry." The main reason for the dampness, he felt, was the lack of ventilation. Ventilators had been built into the front wall but not into the opposite wall and the floor was not ventilated. (This condition, he noted, was true of all the floors in the fort which would result in the decay to the joists and floors.) Moreover, the magazines were not lined with bricks, as was usual, to prevent moisture getting in.

Stehelin made another comment which gives us some insight in the manner in which the drainage over the dos d'anes was originally constructed:

> I have further to observe that the arches of the whole of the Casemates are covered with two courses of the bricks manufactured by the Department laid dry over the stone flagging of the Dos d'ane with interstices and I am apprehensive that if they should become in similar state as the tiles, that hereafter the water courses will become clogged and cause a dampness throughout the Mens Barracks.

Does this mean that there was a layer of flag stone on the dos d'anes, surmounted by rows of bricks with water channels in between, covered with tiles, which were becoming soft and might transmit this to the bricks so that they collapsed and clogged up the channels?[28] (For the complete text of Stehelin's report see Appendix 2.)

Stehelin had identified the two greatest problems at Fort Henry; the yearly need to point the stonework and the leaking of water from the terreplein into the casemates. He seems to have understated this problem to some degree, but the authorities in London decided it needed to be addressed. About 1840, the Royal Engineers were beginning to experiment with asphalt as a means of waterproofing flat surfaces such as terrepleins over casemates. In 1837, a Mr. Claridge had obtained a British patent on asphalt made from the bituminous rock found near Seyssel in the Jura Mountains in France. "Claridge's Patent Seyssel Asphalte" was the best known of the asphalts used in England, but for unknown reasons the Royal Engineers decided to experiment with "Bastenne" asphalt in Canada. It is not known if there were significant differences between the two products.[29]

In March 1841, the Commanding Royal Engineer in Canada proposed:

> that the Casemated redoubt at Fort Henry, Kingston, should be covered with

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[28] NA, MG13, WO55/875, pp. 231-239a, Oldfield to IGF, 28 Jan. 1840; Stehelin to Oldfield, 3 Dec. 1839; "Report on the Casemates at Fort Henry called for by the Commanding Royal Engineer's Orders of 23rd July 1839," signed, Stehelin, 3 Dec. 1839.

[29] Elizabeth Vincent, *Substance and Practice: Building Technology and the Royal Engineers in Canada*, Studies in Archaeology, Architecture and History (Ottawa: Environment Canada, Parks Service, 1993), pp. 117-18.

> asphalt...and... that a supply of 35 Tons of that material with a proper Grate and Implements, should be sent to Canada for the experiment.

The Board of Ordnance approved the Commanding Royal Engineer's suggestion and ordered that the asphalt be sent out to Canada.[30] Sometime in 1841 or possibly 1842, the terreplein at Fort Henry was covered with Bastenne asphalt, probably in the manner described by Major L. A. Hall, Commanding Royal Engineer, London District, who for some reason was familiar with the process.[31]

By May of 1843, it was clear that the experiment with asphalt at Fort Henry had failed. The Commanding Royal Engineer in Canada attributed the failure of the asphalt covering to the extreme alterations of heat and cold from summer to winter. He went on to describe the problem in detail:

> For the shrinking and disruption in the Asphalte caused by the frost of Winter rend that cement [sic] in all directions; and form cracks and fissures in it, through which afterwards the melted Snow and rain penetrate into the body of the Work beneath. – This would in ordinary cases pass down to the Gutters of the dos d'anes, and thence into the vertical pipes fixed to the exterior facing of the casemates, and so run from the Building. – But in consequence of the ensuing frosts causing all water in the gutters and drains over the Arches to be frozen at their points of exit and the future drainage to be blocked up for the Season; the moisture above the dos d'anes being unable to escape, and being pent within the mass of the work sinks by degrees through the Arches, and occasions the Casemates beneath to become damp and unhealthy.[32]

Colonel Holloway, the Commanding Royal Engineer in Canada, has left a vivid description of the state of the casemates at Fort Henry in the summer of 1844:

> Upon a personal inspection of the casemates of Fort Henry in the course of last summer [1844], I found them to be uninhabitable from damp, and the Magazines to be totally unfit for the storage of gunpowder – Over the barrels and over almost all parts of the interior of these magazines there was grown tough and spongy fungus and dry rot to the thickness of more than half an Inch, – and from this cause I never witnessed magazines in a worse condition.
>
> In like manner the Guard House, Mess Room and many other portions of

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30 NA, MG13, WO55/876, pp. 154-5, Byham to IGF, 7 May 1841.

31 Ibid., pp. 156-8, L. A. Hall, "Memorandum on the mode of applying the Bastenne Bitumen," 28 April 1841, reproduced in Vincent, op. cit., Appendix 3, pp. 241-2.

32 NA, MG13, WO44/44, pp. 88a-89, Holloway to IGF, 27 May 1844.

the Casemates were streaming with water – [33]

Having previously successfully experimented with a new method of waterproofing the casemates at Quebec City in 1844, Holloway lost no time in applying this "approved" method to a part of the casemates at Fort Henry. It seems likely that the initial experiment at the fort was conducted in the northeast corner over the powder magazines and shifting room. Holloway had found these in poor condition and had moved the powder out. There are also extant two plans:

1) Plan and Sections of the North and East Face of Fort Henry, shewing the mode in which the work was originally built, dated 14 September 1844;
2) Plan and Sections of the 2 Powder Magazines and Shifting in Fort Henry, dated 21 October 1844 (see Plans 13 and 14).[34]

It is not clear why these plans were drawn, but they do show changes to the dos d'anes and to the drainage system from the terreplein. The result of the experiment on part of the terreplein at Fort Henry was successful and Holloway, arguing that the matter was urgent, instructed Sir Richard Bonnycastle, the Commanding Royal Engineer at Kingston, to complete the work of waterproofing the remaining casemates by the improved method.[35] His orders were subsequently approved by the Master General and Board of Ordnance.[36]

In 1848, on the request of an officer of Royal Engineers in Halifax, Holloway described in some detail the manner of the renovations at Fort Henry:

> ...I [Holloway] caused the Covering of Earth over the Arches to be removed & then directed a Coating of Asphalte ½ inch thick to be laid upon the whole Surface of the Dos d'anes having first caused the portions of both scarp and retaining Stone Revetment rising above the Level of the Dos d'anes gutters to be hipped in the same way as denoted in the Drawing which you have been good enough to send me with oversailing Courses of flags 3" thick laid weathering and breaking joints [?] with each other, in Water Lime Cement – On the top of the Asphalte, & to prevent the Composition from being cracked or broken by Stones cast upon it, as well as to preserve clear Channels for the Water, small ribs of dry Brickwork, two courses in height laid flat, at half brick intervals, nearly perpendicular to the ridge of the Dos d'anes, and in Mortar, on the sides thereof; – and across them were laid longitudinal courses of Brick work thereby leaving so

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33 Ibid., pp. 84a-85, Holloway to IGF, 23 June 1845.

34 NA, NMC, 22967; NMC 4541.

35 NA, MG13, WO44/44, p. 86, Holloway to IGF, 23 June 1845

36 NA, MG13, WO55/879, pp. 169-70, Byham to IGF, 30 July 1845.

> many small covered Drains whereby every particle of water was run off to the Valleys of the Dos d'anes.
>
> Again, to prevent the Congelation of the Water in the Valleys and Communication to be maintained between the moisture in the Dos d'anes Valleys and external Atmospheric Cold Air, perpendicular holes four inches in diameter were drilled and jumped [?] from the lowest points in the Valleys (Gutter Stones with hopper heads being therein inserted and the latter having a fall of 1 ½ inches in every 10 feet of length from the Scarp,) thro' the Masonry of the Arches, and chaced [sic] down to about 1 ½ ft below the Level of the floors, to receive Cast Iron pipes 5/16" thick with Slip joints, whence Communication being made with the general underground Drainage of the Fort, the Water was all carried off. – The heads of the pipes from the Gutter Stones are let into the bottom of the Bassins or Hoppers and bedded in white Lead – the hopper heads of the Pipes, from the perforated Sink Stones on the Terrepleine are let into the underside thereof and likewise bedded in white lead.[37] (See Figures 3, 4, and 5)

Holloway's explanation is not always clear and it may be helpful to attempt to paraphrase it and reduce it to distinct stages:

1. He removed the covering of the terreplein down to the dos d'anes;
2. He hipped the dos d'anes, that is, he built a brick sloping structure from the scarp and the revetment wall down into the valley of the dos d'anes;
3. He covered the slopes of the hips and dos d'anes with asphalt;
4. He laid ridges of bricks to form channels running down the slopes of the dos d'anes;
5. He laid a layer of bricks longitudinally across these channels to keep them clear;
6. He laid gutter stones in the valleys of the dos d'anes;
7. He drilled holes down through the piers into which were inserted cast iron pipes leading to the underground drainage system; the down pipes and the gutters were joined by what he called hoppers;
8. The ramparts above the dos d'anes were filled in with rubble and the terreplein was levelled with rubble and gravel.

A drawing indicates that there was pipes leading from the gutter along the edge of the terreplein to the drains in the valleys of the dos d'anes. Another drawing suggests that there was a layer of bricks laid directly on the masonry of the dos d'anes "flushed" with asphalt, before the miniature drains were laid (see Figures 3, 4, and 5). The purpose was to direct water down into the internal drainage system where it was well away from the cold air of winter and would not freeze. (This description needs to be tested by archaeology.)

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[37] NA, MG13, WO55/882, pp. 516-20, Holloway to Calder, 19 July 1848.

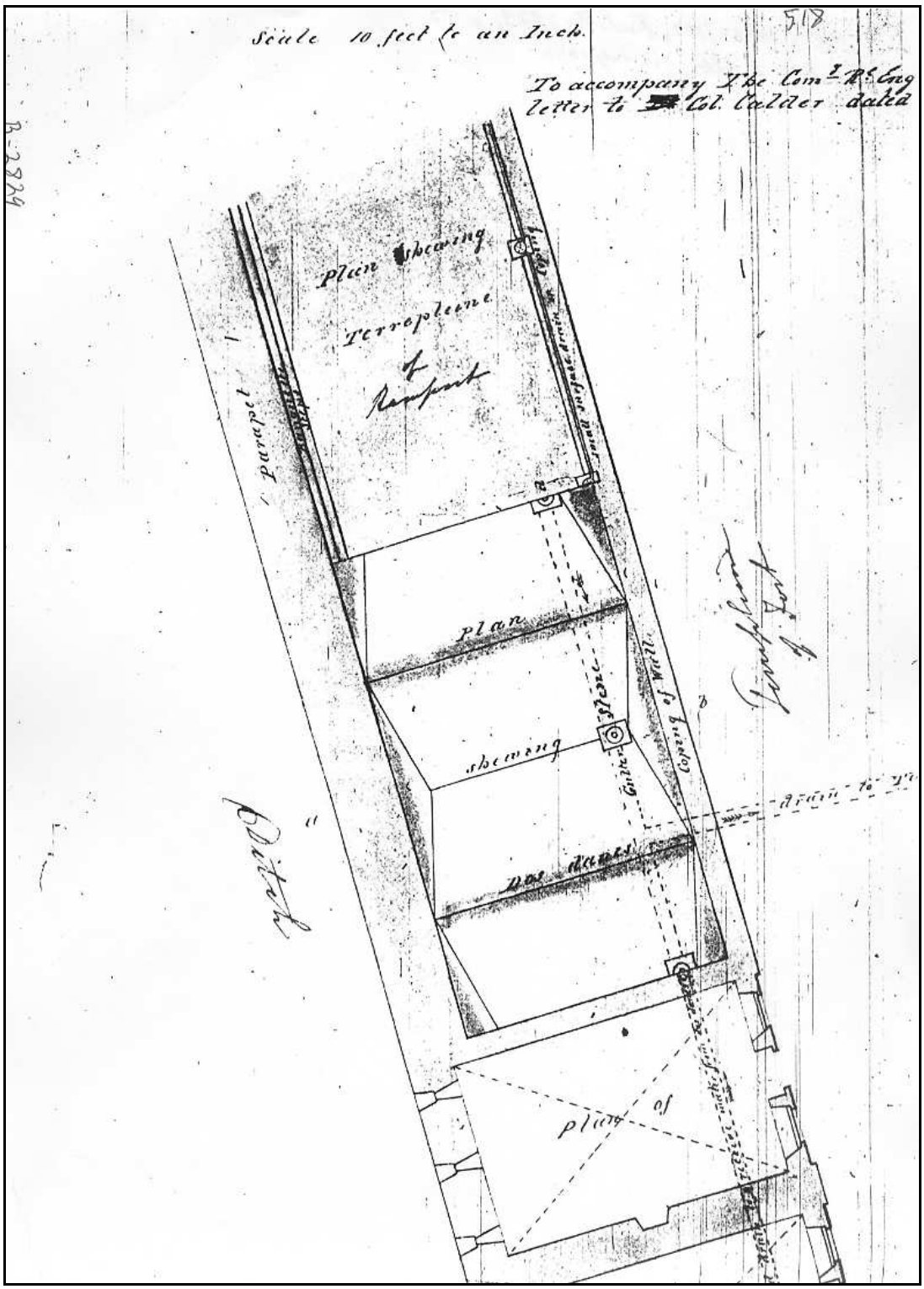

Figure 3 Plan of terreplein of west wall of Fort Henry showing the dos d'anes. NA, MG13, WO55/882, p.518, accompanying Holloway to Calder, 19 July 1848. Note the hipped dos d'anes ; the small surface drain in the coping; underground drains.

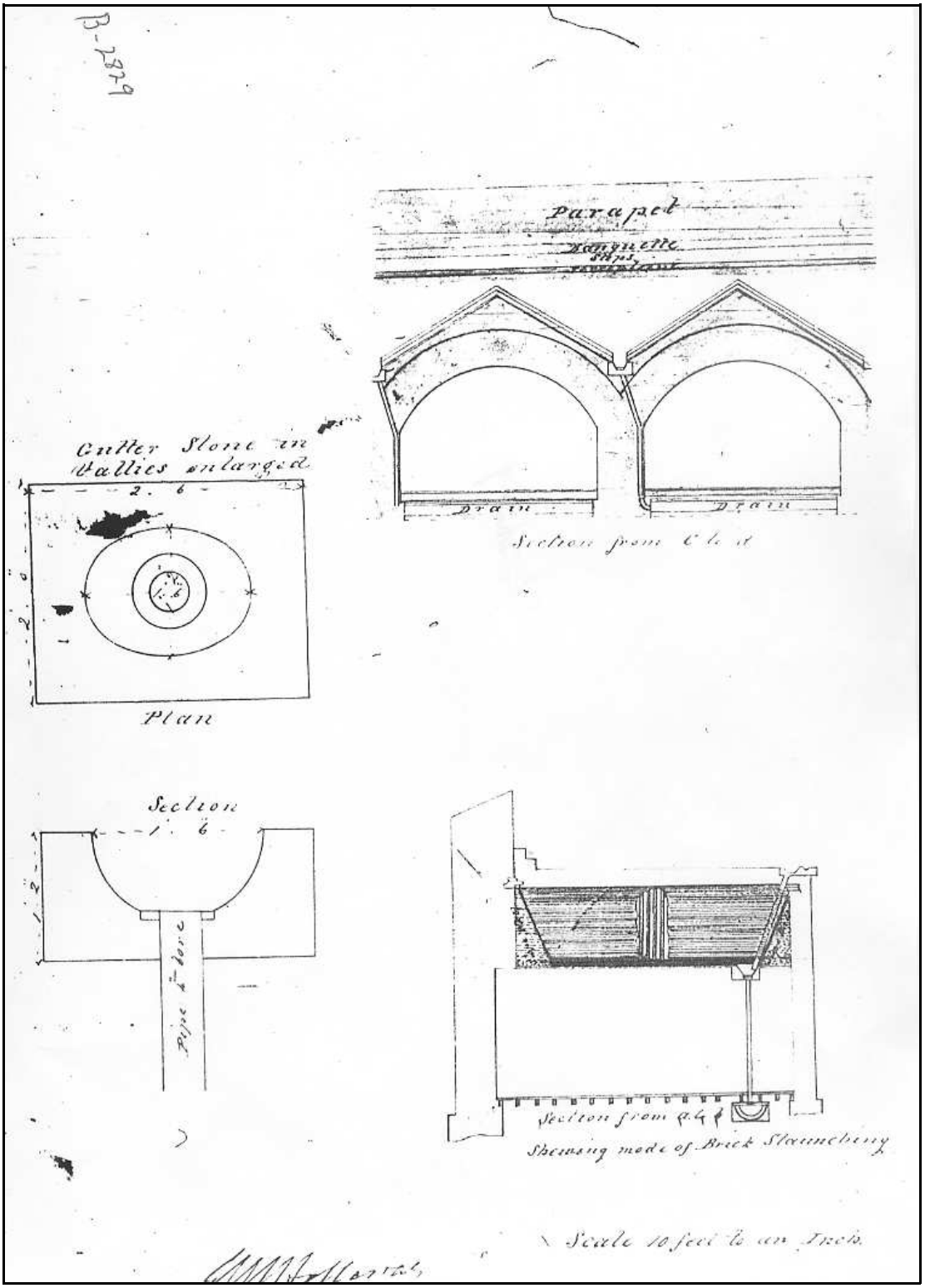

Figure 4 Details of stanching the leaks in the casemates. NA, MG13, WO55/882, p. 516, Holloway to Calder, 19 July 1848. Note the small drains down the side of the dos d'ane.

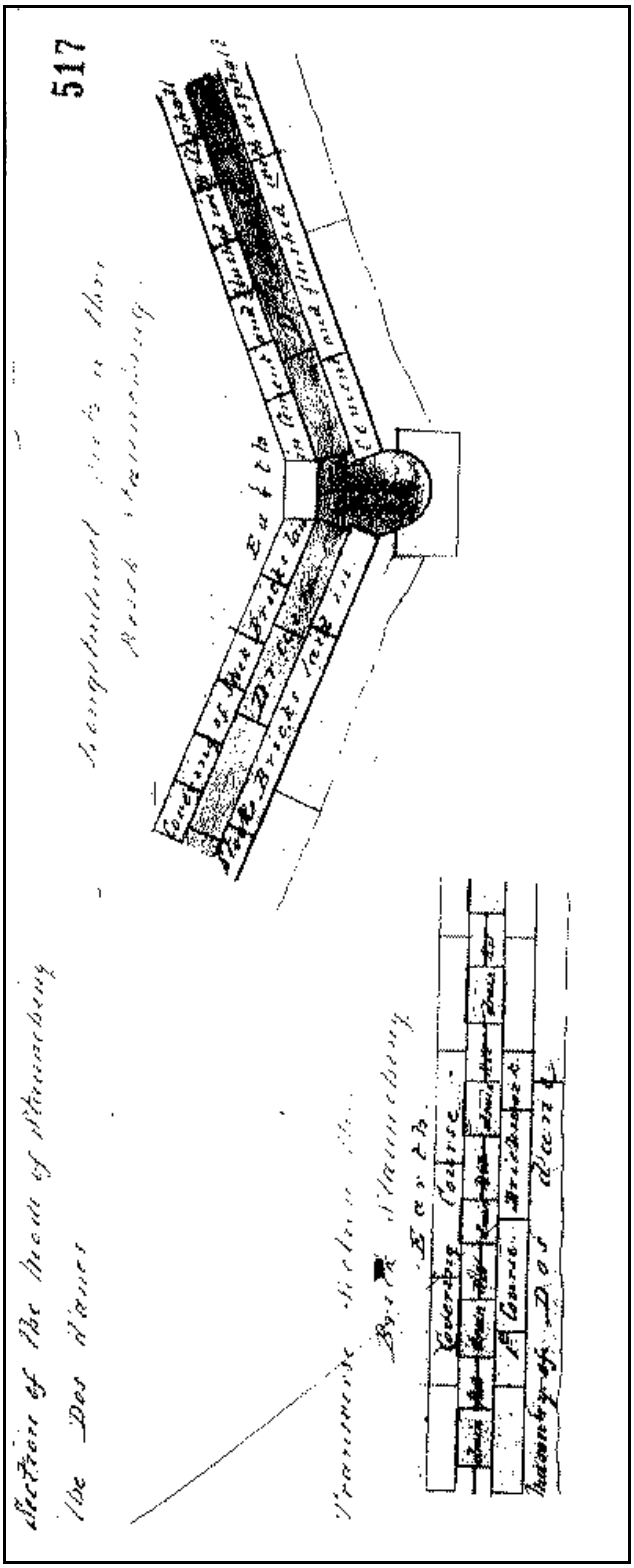

Figure 5 Brickwork on the dos d'anes. NA, MG13, WO55/882, p. 517, Holloway to Calder, 19 July 1848

Despite this work the reputation of the casemates in the redoubt was difficult to escape. In December 1845, the Deputy Commissary General at Kingston refused to accept casemates assigned to the Commissariat Department in Fort Henry. He remarked that a few years ago he had stored some flour "...in the inner fort...in similar Stores, and in the same range with those offered to me – the consequence was, that the flour became damaged and was condemned as unfit for issue to the troops." Holloway, the Commanding Royal Engineer in Canada countered by observing:

> The walls of Fort Henry are now quite dry, and the Casemates in the Fort have been recently improved, and made impervious to damp by coatings of asphalt over the Dos d'anes and below the surface of the ground, and the drains from them altered and improved...in fact...the Casemates are perfectly dry.

Nevertheless, Deputy Commissary General Laidley felt that three loop holes through the scarp wall onto the ditch would not provide adequate ventilation. Holloway suggested that the barrels of provisions be piled on skids, thus providing air circulation beneath them. He also suggested that the windows be fitted with iron bars so that the sashes and shutters could be opened at any time of the day or night. He also noted that Major General Sir R. Armstrong, commanding the district, had indicated that the store rooms should be contiguous and that interior openings could be made between them for ventilation if it were thought necessary. This implies that the store rooms in question were in the first floor of the centre section of the north casemates since, according to the 1839 plan, these were the only casemates without connecting doors or air passages. Major General Armstrong noted that the Commanding Royal Engineer, Canada West, had already begun to improve the ventilation in the casemates. Since the documentation is incomplete, what this means is obscure, but perhaps iron bars were being added to the windows.[38]

Holloway's solution of hipping the dos d'anes and covering them with asphalt seems to have prevented leakage through the arches of the casemates. By 1853, however, another problem had come to the fore. The problem was stated succinctly by Colonel Dixon, Commanding Royal Engineer in Canada:

> ...a careful inspection having been made of the Casemates at Fort Henry, Kingston, in which Arms are deposited, it does not appear that there is anything to complain of, at this time, for, although the end walls shew symptoms of damp, the casemates are now dry. The water appears to have found its way down the flue, and the Banquette above having settled towards the Parapet, and the joint being very open, all the water falling on the tread of the banquette, and against the interior slope of the Parapet, has no other means of Escape than by soaking

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[38] NA, RG8, Vol. 455, pp. 268-9, Holloway to Military Secretary, 29 Nov. 1845; pp. 282-5, Holloway to Military Secretary, 18 Dec. 1845; p. 301, Armstrong to Military Secretary, 23 Dec. 1845

through the work, and thereby rendering at times, several of the Officers' Rooms below exceedingly wet.

This defect might, in a great measure be remedied, by re-gravelling the Terrepleine, and giving it more slope, relaying the whole of the Banquette, altering and raising the Chimney tops, to prevent the water running into the flues; and taking up and relaying the Gutters in the rear part of the Terrepleine, they being in a very bad condition also, owing to settlement....[39]

For once the Board of Ordnance responded quickly and gave the necessary authorization on 19 August 1853. Unfortunately, the engineers were not able to do the work in time and a supplementary estimate had to be prepared for 1854-5.[40]

In June 1854, tenders were called for the repairs to certain portions of the masonry of the parapet at Fort Henry and a contractor named Hope was awarded the job. Although most of the leakage had been reported in the officers' quarters, the estimate called for taking up the whole of the banquette and digging up the adjacent terrepleine down to the level of the top of the dos d'ane. The face of the foundation of the banquette was to be raked out and pointed with American cement. The foundation was to be repaired where necessary, grouted with roche lime and sharp sand, and the banquette was to be relaid with American cement. The drawings show that the terrepleine was also to be opened next to the wall on the parade, but only of the officers' quarters; presumably the wall was to be pointed there. The superior slope of the parapet was to be pointed and the flue stones removed and discarded. Sixty-four new ashlar stones were to be brought from Wolfe Island to replace them. They were to be drilled to receive the flue pipe and a channel was cut around the hole to direct water away from the flue(see Appendix 3 and Plans 15, 16, 17,18).[41] The contract was dated 28 July and the work was undertaken shortly thereafter. A report dated 13 January 1855 refers to "...the extensive work just completed, at an outlay of about £400. to the Banquette &c...."[42]

Seven years later the officers' quarters were reported to be leaking again. In the autumn of 1861,

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39 NA, RG8, Vol. 1407, pp. 138-9, Dixon to IGF, 11 June 1853.

40 Ibid., pp. 189, Dixon to IGF, 6 Oct. 1853; pp. 211-12, Dixon to IGF, 12 Nov. 1853.

41 NA, MG13, WO55/886, pp. 746-7, "Report and Estimate of Works and Repairs proposed to be carried on in the Royal Engineer Department in the Kingston Division C. W. In the year 1854-5", 6 Oct. 1853; NMC 4779 and 4780; on these plans is written "Plans relating to my Contract dated 28 July 1854, [illegible] Hope".

42 NA, MG13, WO55/887, p. 278a, "Joint Report of the District Commanding Officers of Royal Artillery and Royal Engineers...", 13 Jan. 1855.

the front walls of the officers quarters of both the east and west ranges were showing signs of becoming detached from the arches and were out of perpendicular. Consequently water was getting into the casemates and the medical officers were urging that they be repaired to safeguard the health of the occupants. A report and estimate were prepared for the repair work to be done in 1862. The report called for digging up the terrepleine 10 feet back from the wall and "for taking down the Coping, Channel Course, and front walls, and rebuilding the same." The amount of work and material shown in the estimates, however, is not sufficient to allow for the taking down of the entire walls. It seems more likely that only the top courses were removed and then relaid in cement and asphalt to prevent rain seeping into the rooms below (see Appendix 4).[43]

Another expedient to prevent water leaking into the casemates was to cover the superior slope of the parapet with boards. This was first done in 1858. In the summer or early autumn of 1856, the Lieutenant General Commanding the Forces had complained of dampness in the casemates at Fort Henry and, in consequence, estimates were prepared for covering the parapets with boards. The work was completed by mid-October 1858.[44] This method of preventing leaks seems to have been controversial for it was noted the next year that "The C.R.E. does not approve of a boarded cover for the superior slope...."[45] The local engineer thought it had some value for in August 1859 he wrote: "The wooden sheeting over the parapet of the men's casemates may have contributed towards the prevention of damp but I think the latter is more to be attributed to the careful pointing of the masonry last year."[46] (See Figure 6 for a view of the construction of the parapet.) It seems likely that it was the superior slope of the parapet only of the north range of casemates that was covered in 1858 for in the estimates for 1862-3, there was provision only for "Painting the wood covering of the superior slopes of the Parapet North Faces" with two coats of oil, common colour. It was noted that the wood covering was last painted in 1858, that is, when the covering was first put on.[47]

Whatever the Commanding Royal Engineer may have thought in 1859, by the summer of 1862 it was believed that covering the parapet with wood had proven effective and provision was made

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[43] NA, RG8, Vol. 1421, pp. 2, 42, 44, "Fortifications. Report and Estimate Of Works & Repairs proposed to be carried on in the Royal Engineer Department in Canada in the Year 1862.63".

[44] NA, RG8, Vol. 1610, p. 18, Skyring to CRE, Canada, 6 Nov. 1858.

[45] Ibid., p. 1166, memo, Menzies, 19 Aug. 1859.

[46] NA, RG8, Vol. 1610, p. 117, Fanshawe to Servante, 31 August 1859.

[47] NA, RG8, Vol. 1421, pp. 2, 45, 48, "Fortifications. Report and Estimate Of Works & Repairs proposed to be carried on in the Royal Engineer Department in Canada in the Year 1862.63".

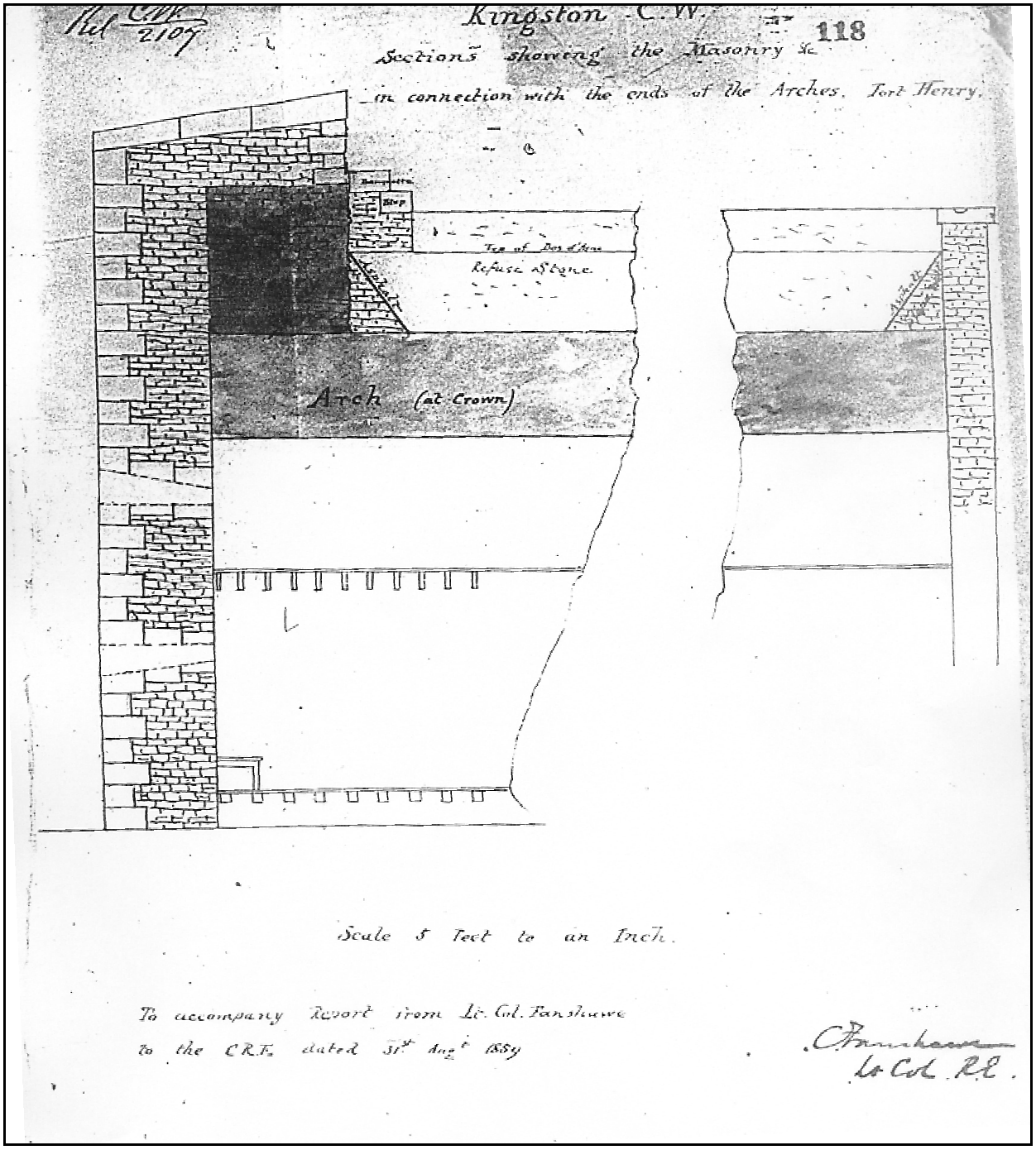

Figure 6 Sections showing the construction of the north casemates. NA, RG8, Vol. 1610, p. 118, Fanshawe to Servante, 31 August 1859. The words "Dry Masonry" are printed in the dark area immediately under the parapet.

in the estimates for 1863-4 for extending the method to the slopes of the east and west parapets. The work was to be done "...in the same manner as now on the north face of the parapet...."[48] Before the boards were laid the cast iron chimney pots were removed and put in store. Brick chimneys were built of "Toronto yellow bricks" to encase the flues. Then the boarding was laid. Rough pine battens, 1 ½ inch x 2 inch, were attached with oak plugs to the parapets, about 2 feet apart centre to centre, presumably running parallel to the edge. Then the pine boards, 1 inch x 7 inch, were attached to the battens. The boards were finished ("wrot") on one side, the edges accurately planed ("shot"), and they were joined with white lead. The report says that there was to be "a Circular groove at each Side of the joint". It is not clear what this means. It also appears that there was a facer board attached with oak plugs to the top of the interior face of the parapet. The wood work was to be painted with three coats of oil paint (see Appendix 5).[49]

Magazines

A powder magazine had been constructed in the northeast corner of the redoubt to hold the gun powder for the artillery of the garrison. It consisted of a large two story high room, a smaller room immediately in the corner, and, next to the officers' quarters, a shifting room. During the British period these magazines were never entirely satisfactory, and for considerable periods much of the powder was stored in the commissariat stores in the Advanced Battery because the magazines in the redoubt were damp. As was noted above, in 1839, Captain Stehelin had commented on the cause of the dampness:

> I consider however that imperfect ventilation has contributed as much as any other cause to the continued dampness of this magazine, as also the circumstances of the absence of the usual brick lining so essential to prevent moisture; ventilators are in the front wall but no openings are on the opposite side to introduce a current of air. The floor is likewise without ventilation, which indeed is the case in the whole fort, and will eventually cause decay in the joists and floor.[50]

The plan of Fort Henry drawn in November 1839, however, shows two windows at the front and three ventilators at the rear of the large magazine room. The small magazine and the shifting

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48 NA, RG8, Vol. 1612, p. 120, Noble to CRE, Canada, 22 July 1862; Vol. 1422, pp. 2, 29-30, "Fortifications. Report and Estimate Of Works & Repairs proposed to be carried on in the Royal Engineer Department in Canada in the year 1863.64".

49 NA, RG8, Vol. 1422, pp. 2, 29-30, "Fortifications. Report and Estimate Of Works & Repairs proposed to be carried on in the Royal Engineer Department in Canada in the year 1863.64".

50 NA, MG13, WO55/875, p. 237, "Report on the Casemates at Fort Henry called for by the Commanding Royal Engineer's order of 23rd July 1839," Benjamin Stehelin, 3 Dec. 1839.

room were also provided with ventilators.[51] (See Plan 9) Later plans show the windows and ventilators.[52]

Whatever the explanation of the apparent discrepancy between Stehelin's description and the 1839 plan, there is little doubt the magazines were damp. Colonel Holloway's remarks have already been quoted in which he reported that the magazines were coated with fungus and dry rot and that he had never witnessed magazines in a worse condition.[53] He had dug up the terrepleine, hipped the dos d"ane, and coated the hip and the dos d'ane with asphalt to address the problem. These repairs seemed to work, initially at least, although in the summer of 1846 there was a proposal to make "...some further additions and alterations to render the Magazine in Fort Henry more perfect and secure and to provide for the better protection of the Ordnance Stores....[54] These modifications may have been what Lieutenant-Colonel Dixon, Commanding Royal Engineer in Canada, described in 1853 when he reported on the alleged dampness at Fort Henry:

> ...in consequence of the reports on this subject [dampness] some years since, considerable expense was incurred in constructing a Gallery adjoining the Magazines, and opening Ventilators therein; – Also, in building in front an enclosure Wall, to enable the doors and windows to be left open for ventilation, with safety from accident by fire...

He went on to report that since then no defects of any consequence had been found in the magazines and the powder, last tested in 1845/6, was still found to be good.[55] The changes he described can be seen in plans of 1860. A wall has been built in the adjacent storeroom to create a passage way and ventilators have been built into the side wall of the large magazine. A curved enclosure, or blast, wall is evident at the front (see Plan 36).[56]

Nevertheless the magazines remained problematic. In October 1858, an artillery officer reported that "The regular magazine in Fort Henry has been for a considerable time in a state of repair being from obscure cause unfitted by dampness (with the exception of a small portion) for the

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51 NA, NMC 20785, "Ground Plan of Fort Henry," drawn 14 Nov. 1839.

52 For example, NA, NMC 4541, "Plan and Section of 2 Powder Magazines and Shifting Room in Fort Henry," 18 Oct. 1844, see Plan 14.

53 NA, MG13, WO44/44, pp. 84a-85, Holloway to IGF, 23 June 1845.

54 NA, RG8, Vol. 456, pp. 285-6, Respective Officers, Montreal, to Military Secretary, 5 June 1846.

55 NA, RG8, Vol. 1407, p. 104, Dixon to Burgoyne, 18 March 1853.

56 NA, NMC, Fort Henry, "Ground Plan," 3 May 1860.

reception of powder." In November the engineer officer in Kingston reported that the "Flooring and sheeting of one compartment and the Shifting Room were renewed", but he doubted if these rooms would ever be thoroughly dry from lack of ventilation and the porous nature of the limestone. The large room he thought was sufficiently dry to take powder.[57] In 1860, a proposal was put forward to expand the magazine. The shifting room had at some earlier date been converted into a magazine. To remedy this loss, Lieutenant-Colonel Fanshawe proposed turning the adjacent officers quarters partly into a shifting room and partly into a magazine. He also contemplated modifying two of the storerooms on the other side into magazines. This proposal was probably part of a controversy about where to create a depot magazine in Kingston, not just for Fort Henry but for the whole garrison. There is no evidence that any of these modifications was ever carried out.[58]

Drains and Sanitation

The development of the drainage system to remove water from the ramparts has already been described. It fed into a system of drains beneath the parade which was designed to take the rainwater into five tanks or reservoirs to be filtered and stored for drinking purposes. The outline of the original system is shown quite clearly on a plan of the fort in 1839 (see Plan 9).[59] There were seven down pipes on the faces of the casemates leading into underground drains – one on each of the faces of the north range, one on the east range, one on the west range, and two on the south curtain wall. Each then drained into a central drain running the length of the parade which emptied into the five tanks built under the eastern end of the parade. The drain down the east range was an exception; because of its proximity to the tanks it fed directly into them.

There was a second drainage system designed to remove the surface water from the parade and flush the privies into Navy Bay or Hamilton Cove (Deadman's Bay). Catchment basins had been constructed at six corners of the parade (four opposite the north face and one each in the southeast and southwest corners). Surface drains around the perimeter of the parade directed the rain water into them. From there underground drains took the water through the privies and then into drains leading to the lake. The officers privies on the east and west sides were flushed by their nearby drains. The water from the two central catchment basins on the north combined underneath the middle of the parade before running through the men's privies in the south curtain wall. The run off from the men's privies and the west officers' privy combined in a drain beneath the ditch and than ran underground along the ditch and underneath the counterscarp wall to drain into Navy Bay. On the other side, a drain for the small ditch underneath the drawbridge

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57 NA, RG8, Vo. 472, pp. 65-7, Taylor to Assistant Adjutant General, 20 Oct. 1858; Vol. 1610, pp. 18-19, Skyring to Commanding Royal Engineer, 6 Nov. 1858.

58 NA, RG8, Vol. 1610, pp. 235-43, Fanshawe to IGF [?], 16 March 1860; NMC 22995, "Sketch showing the Magazines...," 16 March 1860.

59 NA, NMC 20785, Ground Plan of Fort Henry, 3 Dec. 1839.

joined the drain emerging from the east officers' privy to follow a similar course to empty into Hamilton's Cove (Deadman's Bay) (see Plan 9).

When the work was done to stanch the leaks to the casemates and the gutters in the valleys of the arches were connected by pipes through the piers to the underground drains to the tanks, the exterior drain pipes were removed and all drainage from the ramparts was through percolation down to the asphalted dos d'anes. One drawing suggests, however, that there were interior drain pipes from the gutter at the edge of the terreplein to the gutters of the dos d'ane (see Figure 5). The plans also indicate that there was only one point of exit from the drain under each of the north, west, and east ranges. The drains from the north and west casemates met under the parade before feeding into the water tanks; the east drain led directly to the tanks (see Plans 15,16, and 19).[60]

The 1839 plan indicated to some degree the interior structure of the privies. The officers privies each had three stalls. The mens privies were much simpler; there is merely a line drawn across the space to indicate some sort of rest (see Plan 9). In 1858 the men's privies were reconstructed and the flushing system overhauled to some extent. It seems that the General Commanding the Forces was offended by the stench as he entered the redoubt and ordered that the evil be remedied. By November 1858, the Clerk of the Works could report;

> Since the reconstruction of the Soil-pit at Fort Henry and of the Reservoir for flushing the same, I beg leave to state that I consider a great improvement has been accomplished.
>
> There is now no more unpleasant smell from the Soil-pit than is usual with all Privies. When the wind is in the S.W. the air ascends the Drain from the Lake and causes the effluvia from the soil to be perceived in the Fort.
>
> This has now been remedied by covering the Drain which was partially open near the outlet, and which, most probably, was the cause of the effluvia when his Excellency the Gen[l]. Commanding the Forces made his inspection.
>
> The Reservoir referred to, so far answers every expectation, but it is dependant on the fall of rain for a supply of water.[61]

The plan and sections for the repairs shows the three privies with a screen in front. One of the privies is for women and shows four holes; the two for men show six square frames.

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60 NA, NMC 22982, "Fort Henry Ground Plan", 3 May 1860; NMC 7172, "Kingston Plan of Fort Henry shewing in yellow the positions of the Privies and the Sewers leading in and from the Soil Pits", 13 Sept. 1866; NMC 195573, [Ground Plan Fort Henry, nd, circa 1870]; NMC 4667, "Fort Henry Shewing the Drains under the ground floors and the Vertical Pipes to convey the water from the Dos D'Anes into the Tank", nd.

61 NA, RG8, Vol. 1610, p. 16-17, Wheeler to Skyring, 11 Nov. 1858.

Immediately in front of the privies where the drain enters there is a square shown; this must represent the reservoir that was used for flushing the privies. How this was done was not explained; perhaps water was trapped here and then periodically released to rush through the privies and carry the refuse out into Navy Bay. It should be noted that the nearby officers' privy has a screened urinal at its entrance (see Plans 20 and 21).[62]

The problem with the privies was not solved. In the summer of 1862, their state was again brought to the attention of the District Commanding Royal Engineer at Kingston: "New Privies to be cleaned out and flushed...These Privies are at present in a most objectionable condition." The engineer proposed to insert a gate (he called it a "trap door") in the drain that comes from the privies by digging down to the drain in the ditch. When it was closed the cess pit would be filled with three feet of water, and each morning the water would be released draining off the refuse of the last twenty four hours.[63] It is not known if this scheme was carried out. In 1865, problems were still being reported: "From the absence of a good water supply for flushing, the drainage is defective, causing offensive effluvia from the sewer gratings, especially those near Officers quarters No 1 and 2."[64] These quarters were in the west casemates.

Water Tanks

A large water tank, or rather a series of five interconnected water tanks, was constructed under the eastern section of the parade to store the garrison's water supply. Originally it appears that six chambers were to be built, but an area of granite proved too difficult to excavate. Like the rest of the fort these tanks were bomb-proof casemates. According to the 1832 estimates the walls were constructed of rubble masonry, the arches were made of brick, and protected by dos d'anes lined with flagging. Provision was made for "Plaistering in Cement to side Walls and bottom of Tank" (see Appendix 1).

The 1839 plan of the redoubt indicated a filter tank but it does not indicate how it would function; interestingly, the large scale plan of the tank did not show a filter, but one was surely necessary (see Plan 22). In 1838, Lieutenant-Colonel Bonnycastle, Commanding Royal Engineer

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62 NA, NMC 4784, "Kingston, C.W. Fort Henry, Plans and Sections of the Officers and Soldiers Privies, shewing the position of Sewers; also the proposed alterations in yellow", 3 Oct. 1856. The date seems to be 1856, but there is a notation "To accomp^{y} Item B.A.E. [Barrack Annual Estimate] 1857.58" and another notation Ex^{d} I.C./F.W./13/5/58.

63 NA, RG8, Vol. 1612, p. 97, "Extract from Sanitary Inspection Report of Barracks and Hospitals; pp. 99-101, Noble to CRE, Canada, 22 July 1862.

64 NA, RG8, Vol. 1613, p. 91, "Report of the Proceedings of the Sanitary Committee which assembled at Kingston, CW, Nov^{r} 29 – 1865, agreeable to Garrison Orders."

at Kingston, in response to complaints about the water, had the tanks cleaned out and the two filter tanks (the southern ones) repaired and two feet of gravel and charcoal added.[65] In the Ordnance Annual Estimates for 1848-9, plans were put forward to install a filter, no doubt to replace the filter that Bonnycastle had repaired.. This involved building two partial walls in the intake chamber, of the height of the spring of the arches. One of the walls had a series of passages cut through it at the floor level; the other was solid. Rainwater came into the first chamber through two pipes and passed through a layer first of sand and then of charcoal before passing through the passages at the foot of the wall into the second chamber, there passing through another layer of sand (or charcoal?). The water had to rise over the second wall and then pass through the passages under the pier supporting the arch to get into the second and succeeding chambers (see Plan 23).

A manhole in the top of each chamber allowed access. There was a pump over the northeast chamber. Both the manholes and the pump are shown on the 1839 plan (see Plan 9). An overflow drain from the filter chamber took any excess water out through the officers privy. Around 1854, a new overflow drain was installed which emptied out through the kitchen and met the main sewer to empty into Hamilton Cove. Plans later than 1847 indicate that the filter chamber was about half the size as that proposed in 1847, but the method of filtration remained the same (see Plans 24, 25, 26, and 27 to follow development of tanks). In 1866, a proposal was put into the Barrack Annual Estimates to drill a well just to the west of the tank as a means apparently of keeping the tanks full in dry weather, but this well seems not to have been built (see Plan 27).[66]

Arming the Casemated Redoubt

When the Casemated Redoubt was built pintles and stone curbs were installed for 27 common traversing platforms rotating on a front pintle (see Plan 12).[67] Initially the Commanding Officer of the Royal Artillery in Canada had requested iron carriages and iron traversing platforms, but the home authorities thought otherwise:

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65 NA, RG8, Vol. 449, pp. 148-9, Bonnycastle to Oldfield, 19 Aug. 1839.

66 NA, NMC 4539, "Plan and Section of Tank," 17 May 1839; NMC 4549, "Plan and Section of Rain water Tank shewing the proposed Filterer to accompany O.A.E. 1848-9", 20 July 1847; NMC 4689, "Plan and section of the Tank in Fort Henry shewing the supply and waste pipes," nd; NMC 4770, Plan and Section of the Tank &c shewing the proposed Overflow Drain into the East Branch Ditch," 16 July 1851; NMC 4782, "Plan and Section of the Tank shewing the old and new overflow drains," 18 April 1854; NMC 5011, "Sketch shewing the overflow drain from the Tank in Fort Henry," 27 Jan. 1866.

67 NA, NMC 20787, "Plan of Platforms", 30 Nov. 1839.

> "...as there is a doubt as to the policy of using Iron Gun Carriages and Iron Traversing platforms in so severe a Climate as that of Canada, [the Master General and Board] have decided that the whole of the Armament of Fort Henry shall be with Wooden Carriages and Wooden Traversing platforms..."[68]

In August 1839, estimates were prepared of the expense of removing 29 [sic] traversing platforms from the Ordnance Wharf and placing them on the ramparts of the Casemated Redoubt. Amazingly these estimates were not approved until June 1841 when the cost was to be provided for in the estimates of 1842-3.[69] It seems inconceivable that the platforms would have remained on the wharf since 1839. Since undoubtedly the platforms would be moved by the Royal Artillery, perhaps this was merely a bookkeeping exercise and the platforms were moved up to the redoubt in 1839. In April 1840, it was reported that Fort Henry was armed with twenty-seven 24-pr. guns, eight carronades, and four 10-inch mortars.[70]

This account is at variance with officers writing in 1855. According to them, in 1839, only seventeen 24-pr. guns were mounted in Fort Henry on traversing platforms made under the Master General and Board's order of 23 May 1838.[71] Whatever was the case in 1839, in 1849 it was reported that seventeen 24-pr. guns were mounted in the redoubt along with nine 32-prs. in the Advanced Battery, also on traversing platforms. Only four of these had iron racers. (It was not stated which of the four, if any, was in the redoubt.) It was found that the frost tended to move the ends of sections of the stone curbs so that the sections were often at different levels. This situation made traversing the guns more difficult. Consequently in 1849 and 1850 iron racers were installed for these platforms.[72] The racers were described and the means of installing them in the Report and Estimates for 1849-50. They were wrought iron, 2 inches by ¾ inch, averaging 45 feet long, wrought to the proper curve. They were punched about every three feet to take wrought iron rivets which were leaded into mortises cut in the stone curbs to attach

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68 NA, MG13, WO55/873, p. 264, Butler to Inspector General of Fortifications, 13 July 1838.

69 NA, MG13, WO55/876, pp.194-5, "Estimate of the expense that will be required to remove 29 Traversing Platforms from the Ordnance Wharf and placing the same on the Ramparts of the Casemated Redoubt...", 16 Aug. 1839; pp. 193-4, Byham to Mulcaster, 23 June 1841.

70 NA, MG13, WO55/875, p. 83, "Table shewing the Garrison, Armament, Object and Expenses of the several posts proposed to be established in the defence of Kingston," 18 April 1840.

71 NA, MG13, WO55/887, p. 278, "Joint Report of the District Commanding Royal Engineers...", 13 Jan. 1855.

72 Ibid., p. 278.

them. Twenty-two racers were provided for 1849, but it was not specified how many went into Fort Henry as opposed to the Advanced Battery.[73] (See Appendix 6 for a complete description.)

The decision to add an 8-inch shell gun to the armament of Fort Henry necessitated structural changes in the northeast angle of the Casemated Redoubt in 1851. In response to the Oregon Crisis with the United States in the mid-1840s, the British authorities decided to build four martello towers and the market battery to defend Kingston from possible attack from Lake Ontario. At the same time certain heavier guns were proposed for the existing works, including an 8-inch shell gun to be mounted in the northeast angle of the Casemated Redoubt. In October the Master General and Board of Ordnance ordered the 8-inch gun sent to Kingston.[74]

Since the 8-inch gun was replacing a 24-pounder, it was necessary to make modifications to the parapet and banquette at the northeast angle. Although the gun had been ordered in 1846 and probably delivered in 1847, there appears to have been some confusion and lack of cooperation between the artillery and engineer officers in Canada in drawing up plans for the modification of the northeast angle.[75] In September 1849, Henry Vavasour, the Commanding Royal Engineer in Canada, wrote:

> I beg to observe that, no Plan of the position to be occupied by the 8 inch Gun at the Eastern Angle of Fort Henry accompanies these documents [plans of works at Kingston], as it is necessary that the parapet should previously undergo certain alterations, to enable an increased extent of range to be obtained, after which a Plan of the locality will be transmitted.[76]

It was not until 24 January 1851 that Vavasour sent the required plan[77]: "Plan and Section of the proposed Alteration in the Eastern Angle of Fort Henry, provided in the Ordnance Estimate for

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73 NA, RG8, Vol. 1418, pp. 7, 133-4, "Ordnance. Report and Estimate of Works proposed to be carried out in the R^{l} Eng^{r} Department in Canada in the Year 1849.50." Authorized 17 April 1849.

74 NA, MG13, WO55/880, pp. 229-30, Butler to Burgoyne, 2 Oct. 1845; pp. 286-9, Smith to Campbell, 31 Nov. 1845; Holloway to Campbell, 17 Jan. 1846; Smith to IGF, 16 Sept. 1846.

75 NA, MG13, WO55/884, pp. 303-4, Director General of Artillery to IGF, 27 March 1850; pp. 94-5, Butler to IGF, 17 March 1851.

76 NA, MG13, WO44/49, pp. 85-6, Vavasour to IGF, 17 Sept. 1849.

77 Ibid., pp. 106-7, Vavasour to IGF, 24 Jan 1851.

1851.2, to receive the 8 inch gun"(see Plan 28)[78]. The northeast angle was modified in 1851 at a cost of £80.19.7.[79]

The 8-inch gun, of 9 feet and 65 cwt, was to be mounted on a traversing platform rotating on a centre pintle. Being mounted on a centre pintle gave the gun a wider angle of fire than if it were mounted on a front pivot as were all the 24-prs. This necessitated the removal of the front pintle for the 24-pr., the rebuilding of the banquette and firing step so that they flowed in a continuous curve around the angle, and the rebuilding of the parapet in the angle. From the plans it also appears that the terreplein was dug down to the dos d'ane to construct a foundation for the curb for the rear section of the racer to rest upon. The front section of the racer rested on the reconstructed firing step (see Plans 29, 30, and 31).[80]

It was also necessary to modify the common traversing platform. Because the front racers were mounted on the firing step of the banquette, thus raising them above the level of the rear racers on the terrepleine, the front legs of the platform were shortened by 10 inches. The radius of the racers was 5 feet 1 ½ inches. The carriage appeared to be a garrison carriage with the rear trucks replaced by a wooden chock (see Plan 31).[81] It would be many years, however, before the gun was mounted (see below).

In August 1854, Lieutenant-Colonel Savage, Commanding Royal Artillery, Canada West, reported "...that the Traversing Platforms at Fort Henry were for the most part unserviceable." Since the storekeeper at Quebec had none of the same pattern in store, Colonel Bell, Commanding Royal Artillery in Canada, put in a requisition for new platforms in his annual demand of stores. Instead of demanding the common platform, the pattern that had been installed at Fort Henry in 1839, he asked for the dwarf platform in accordance with the confidential circular on coast defences of 28 January 1853 that directed that common traversing platforms were not to be issued in the future. The installation of dwarf platforms would necessitate modifications to the ramparts and, in consequence, Savage, along with the Commanding Royal Engineer, Canada West, Lieutenant-Colonel Gordon, was directed to visit Fort Henry and report on the changes necessary. Much to Bell's surprise and chagrin the two officers agreed in reporting against installing dwarfs and in favour of retaining common traversing platforms.

They made three arguments against installing dwarfs at Fort Henry. First, it would be very

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78 NA, NMC 4769, 3 Sept. 1850.

79 NA, MG13, WO/887, p. 278, "Joint Report...", 18 Jan. 1855.

80 NMC 4776, 2 Sept. 1851; NMC 4771, 2 Sept. 1851; NMC 4774, 23 Dec. 1851.

81 NA, NMC 4774, 23 Dec. 1851 for a drawing of the gun, carriage, and platform and some details.

expensive to build new raised beds for the racers of the platforms as well as to supply new pattern pintles. Secondly, in order to install the beds it would be necessary to undo all the work that had just been completed on the banquettes, at a cost of £400, and probably do some damage to the casemates below. Thirdly, since the guns were intended to scour the glacis at Fort Henry, raising the dwarf platforms to a sufficient height to fire over the parapet and command the glacis would not provide the gunners with any more protection than they would enjoy when working the guns on a common platform. (Dwarf platforms were designed to fire through embrasures, thereby providing protection to the gunners behind the parapets. Piercing the parapets for embrasures at Fort Henry would be pointless since the superior slope of the parapet is almost in a continuous line with the slope of the glacis.)

Bell was not impressed with these arguments and insisted on requiring dwarf traversing platforms. Colonel Orde, Commanding Royal Engineer in Canada, argued instead for the common platforms. The issue was left for the home authorities to settle. While commending Bell for his desire to introduce dwarfs to Fort Henry, the Director General of Artillery "on the score of expense and other considerations...it will be necessary to replace the unserviceable Platforms at Fort Henry with Platforms suited to the existing parapets &c." The Inspector General of Fortifications agreed with the decision of the Director General of Artillery and informed Colonel Orde in Canada in a note dated 23 June 1855.[82]

The platforms may not have been replaced until late in 1859. On 12 October that year a Board of Officers "...having carefully examined all the platforms & carriages of the Guns which are about to be replaced at Fort Henry [emphasis added] are of the opinion that the whole of the above Platforms & Carriages are unserviceable & perfectly useless and do therefore condemn them."[83] On 15 December, two months later, a return of armaments in Fort Henry described the artillery there, but made no mention that the platforms and carriages were unserviceable. It seems highly unlikely that "perfectly useless" platforms and carriages would not be noted. The inference is that the unserviceable ones have been replaced.

This account gave a good snapshot of the state of the armament of Fort Henry on 15 December 1859:

> There are places on the Terrepleine for 29 guns, 2 of which have embrazures and

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[82] NA, MG13, WO55/887, pp. 273-9, 297, Orde to Burgoyne, 26 May 1855; Cator to Bell, 19 June 1855; "Report of the Commanding Royal Engineer in Canada..., 26 May 1855; "Report of the Commanding Officer Royal Artillery in Canada..., 17 May 1855; "Joint Report of the District Commanding Officers of Royal Artillery and Royal Engineers on the proposed changes in the description of Traversing Platforms at Fort Henry. Kingston", 13 Jan. 1855.

[83] NA, RG8, Vol. 754, pp. 144-5, "Proceedings of a Board of Officers assembled at Fort Henry Kingston Canada West on the 12 of October 1859."

> ground platforms. The remaining 27 are intended for traversing Platforms, the guns firing over the parapet. The 2 24 pr. carronades in the Return are mounted on the ground Platforms at the embrazures above mentioned. One of the 27 places has been altered for an 8 inch gun , and is quite ready for its reception, the gun, traversing platform & carriage being in store in the Dock Yard. The remaining 26 places are all provided with pivots as well as curbs, but 17 only are furnished with iron racers. These 17 have guns mounted.
>
> In the Ditch there are reverse fires, in which are places for 6 guns – 4 only are furnished with guns, (the 4 18 pr. carronades mentioned in the Return) –
>
> There are in store guns (24 prs.) sufficient for the completion of the armament of the Terrepleine i.e. in number 9, but there are only 7 carriages, and no traversing Platforms. The reverse fires are deficient of 2 carronades. There is one only in Store, but no carriages.[84]

The accompanying return also indicates that there were two 10 inch mortars in the redoubt.

The modification of the northeast angle of Fort Henry had been carried out in 1851, as recounted above, but the 8-inch gun had still not been mounted in November 1861. In exasperation, in September 1861, Lieutenant-Colonel Whittingham, the District Commanding Royal Engineer, at Kingston, protested to his superior in Montreal:

> It would perhaps be advisable to recall to the recollection of the officer Commanding the Royal Artillery that the Common Traversing platform for an 8 inch gun, which arrived last summer for the Eastern Angle of Fort Henry, is still lying on the ground – the pivot and racers have been ready ten years, and I understand that the gun and carriage are in the Storekeeper's charge.[85]

Indeed at one point it was suggested that a 68 pr. be substituted for it. In exasperation, Whittingham pointed out that it was too late in the season to reconstruct the curbs even if the proper racers had been sent with the 68 pr. The Commanding Royal Engineer in Montreal agreed and the necessary orders were issued in late November 1861 to mount the 8-inch gun in Fort

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[84] NA, RG8, Vol. 1610, Reel C-3831, p. 179, "Additional Remarks to Accompany Return of Armament"; p. 180, "Return of the Armament of the several Works of Defence at Kingston CW", 15 Dec. 1859.

[85] NA, RG8, Vol. 1611, Reel C-3831, p. 211, Whittingham to Servante, 5 Sept. 1861.

Henry.[86] Provision was made in the estimates for 1862-3, for taking up the wrought iron racers that were laid down in 1851 and "have never been made use of." They were to be replaced with cast iron raised racers. The report and estimate made no mention of any modification to the banquette or curb; presumably it was a straight job of replacement.[87] The 8-inch gun appeared, mounted, in the Inspection Report of November 1862.[88]

Even with the mounting of the 8-inch gun, the armament of Fort Henry was obsolete. In September 1861, before he had succeeded in having the shell gun put in place, Whittingham had voiced his displeasure with the state of affairs at Fort Henry:

> I have the honor to suggest that the attention of the Lt General Commanding be drawn to the very inefficient Armament of Fort Henry at this station.
>
> This Fort appears either to have been forgotten during the general revision of the Home & Colonial Fort Armaments from 1850 to 1855, or the recommended alterations have been indefinitely postponed.
>
> It is at present armed as it was immediately after its erection, nearly 30 years ago, whilst great improvements have been made in Artillery.[89]

(Interestingly, it is an engineer officer not an artillery officer who is complaining.)

In 1863, a Lieutenant Storer stationed at Kingston inspected the 24-pr. traversing platforms at Fort Henry. He wrote that they were the old pattern although they had been sent out as recently as 1858. He described the construction of their cheeks: "the body of the cheek being formed of pine and the top of two separate strips of teak, on one of which the iron slide is fixed." He goes on to explain that the original carriage mounted on the platforms had four trucks but that a rear chock had been substituted for the rear trucks. Since the slope of the platform had not been diminished, when a gun was fired the effect of the recoil on the platform and pintle was much greater and resulted in breaking the pintle after one or two shots. While the platforms showed no sign of decay, they were unserviceable because of the damaged pintles. He noted that the platform of the 8-inch gun had been equipped with raised racers "last summer", i.e., 1862, and

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[86] NA, RG8, Vol. 1611, pp. 336-7, Whittingham to Servante, 23 Nov. 1861; note on letter, 27 Nov. 1861.

[87] NA, RG8, Vol. 1421, pp. 2, 45, 46, 48, "Report & Estimate of works & Repairs proposed to be carried on in the Royal Engineer Department in Canada in the Year 1862.3."

[88] NA, RG8, Vol. 1635, p. 263, "Inspectional Report Kingston C.W., 7 November 1862."

[89] NA, RG8, Vol. 1611, p. 210, Whittingham to Servante, 5 Sept. 1861.

wondered if the common traversing platforms for the 24-prs.could be equipped similarly with raised racers. He then had second thoughts: "The Extensive alteration being thus necessary in order to make the guns of the fort serviceable, might it not be better to introduce dwarf traversing platforms instead of adapting the whole terreplein to a description of platform now almost obsolete."[90]

The authorities in Montreal accepted his advice and during April Storer drew up plans, report and estimate for installing dwarf traversing platforms on the east ramparts of Fort Henry. The report and estimate have not been found but the plan is entitled "Plan and Section of the S.E. Face of Fort Henry, shewing proposed method of adapting the Terreplein for the reception of Ribbed Racers and Dwarf Traversing Platforms." Storer dated it 29 April 1863 (see Figures 7 and 8). The plan showed that the banquette was to be removed and a rubble platform built to raise the gun on the dwarf platform above the parapet. The raised racers would be fixed to ashlar stone curbs. When the District Commanding Engineer in Montreal, Captain Noble, forwarded Storer's plans to the Commanding Engineer in Canada, he added: "With your permission I should like to experiment on one gun by substituting a timber curb for a stone one – I think it would stand the frost much better & would be cheaper." When he sent the plans to England for approval, Colonel Servante, the Commanding Royal Engineer in Canada, included this suggestion.

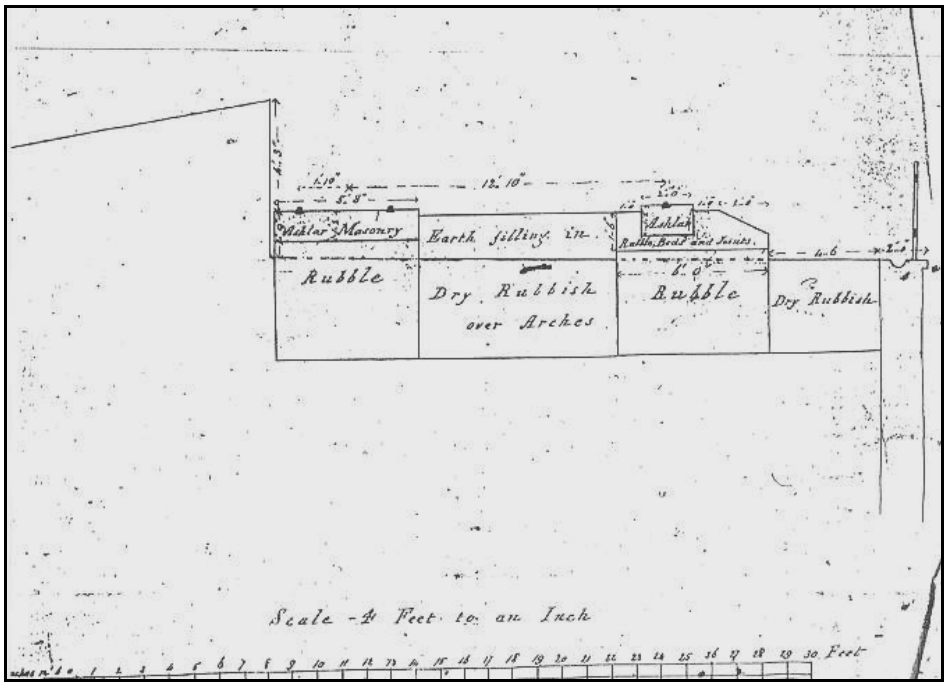

Figure 7 Section of the east face of Fort Henry, showing method of adapting terreplein for ribbed racers. NA, RG8, Vol. 1612, p. 279, 29 April 1863.

[90] NA, RG8, Vol. 1612, pp. 224-8, Storer to Noble, 11 March 1863.

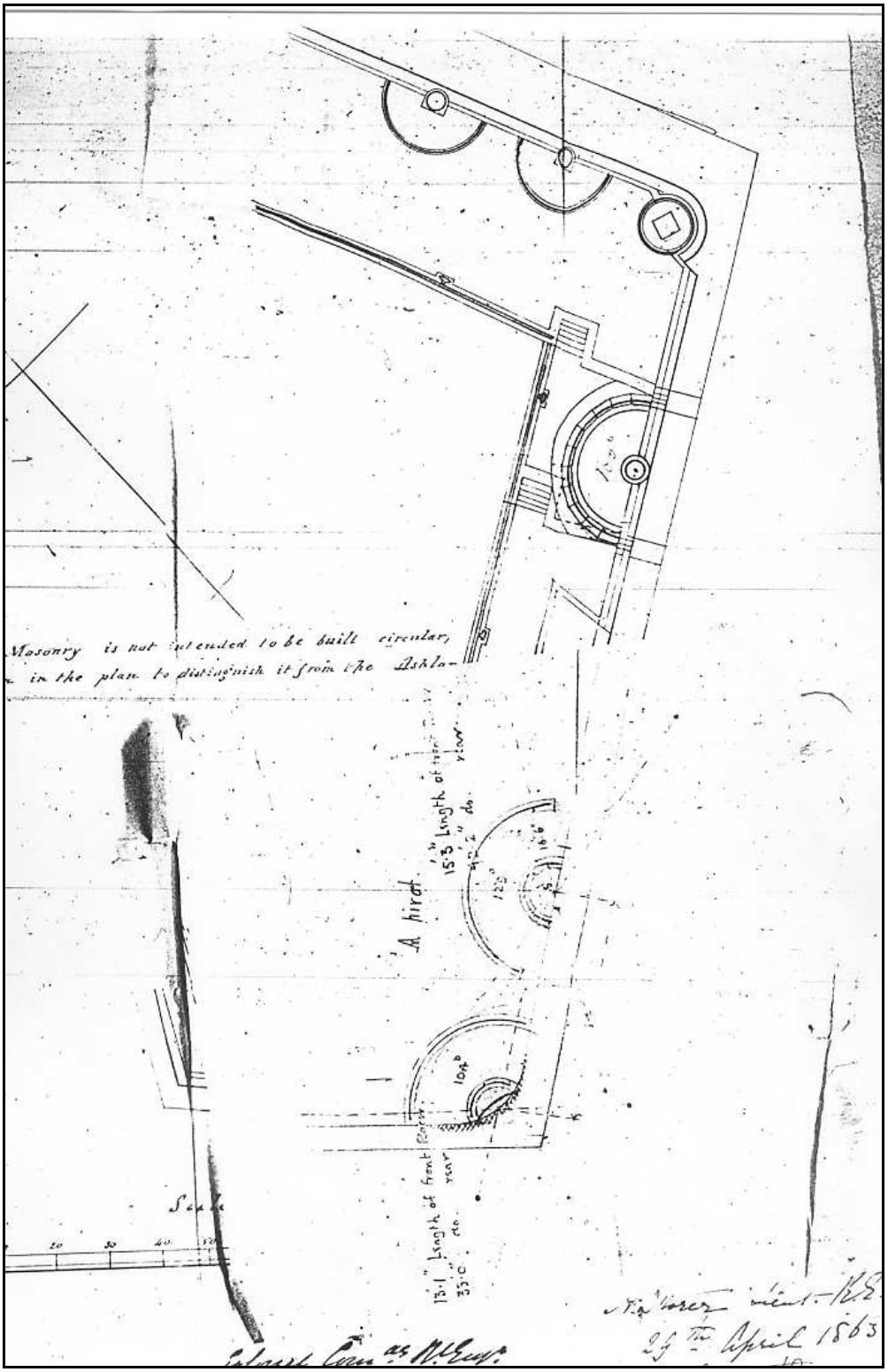

Figure 8 Plan of the east ramparts of Fort Henry showing the proposed modifications to the curbs and racers. NA, RG8, Vol. 1612, p. 279a, 29 April 1863.

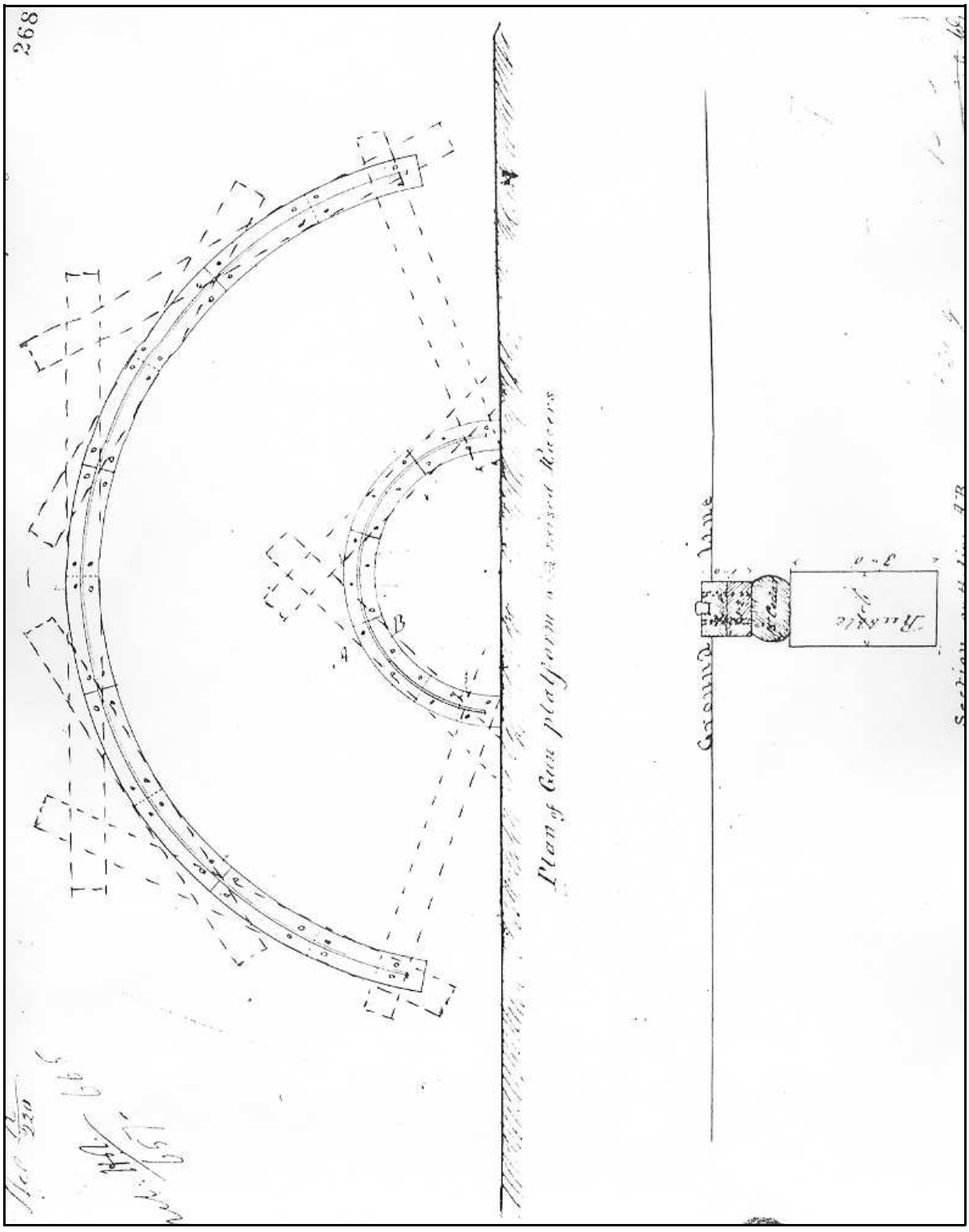

Figure 9 1st Project. Plan of an experimental gun platform with raised raisers. NA, RG8, Vol. 1612, p. 268, Storer to Noble, 3 Aug. 1863..

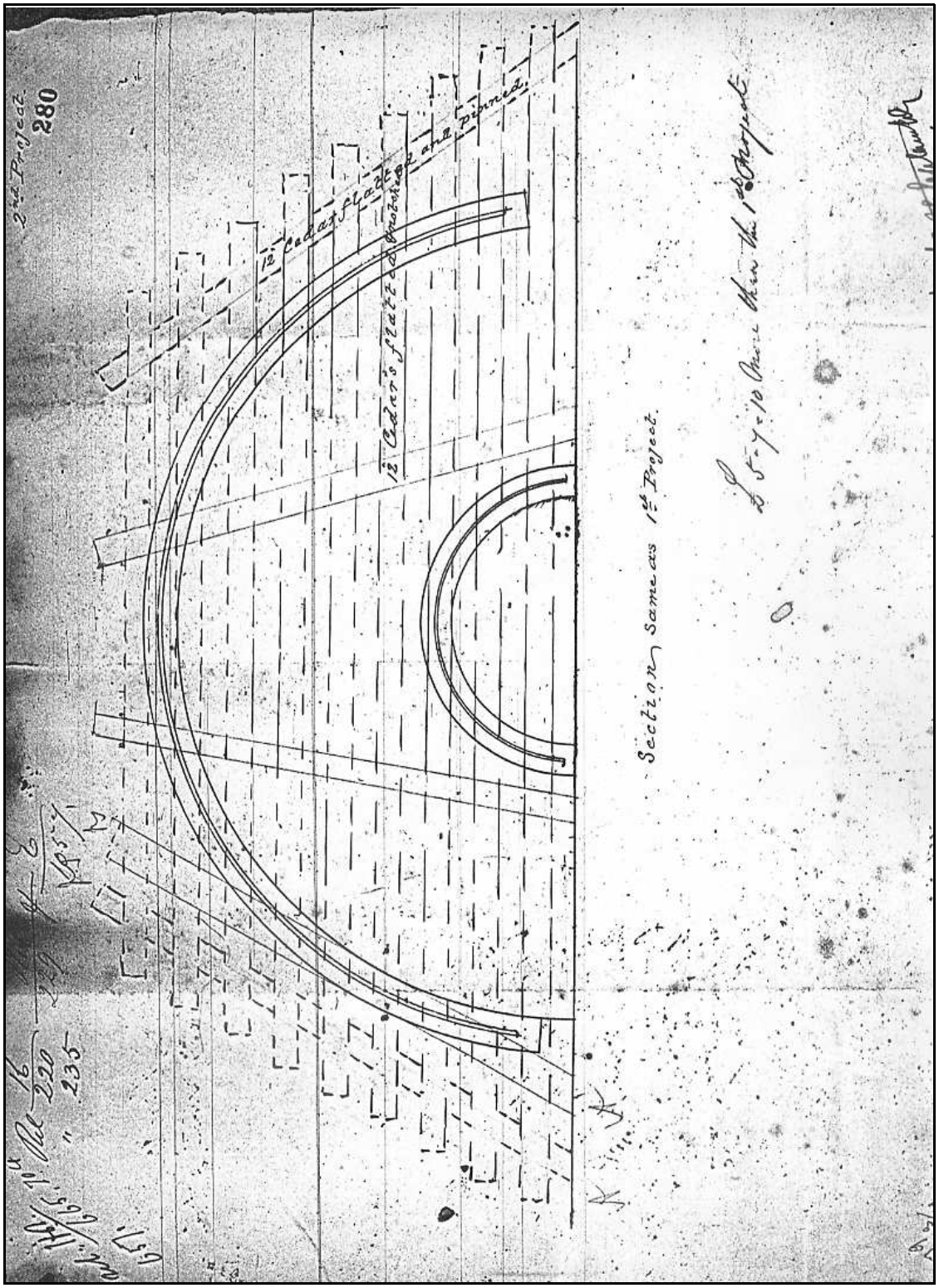

Figure 10 2nd Project. Plan of an experimental gun platform with raised racers. NA, RG8, Vol. 280, Storer to Noble, 3 Aug. 1863.

The instructions from England have not been found, but the authorities there seem not only to have endorsed the idea of the experiment but to have given permission to go further. By the end of June 1863, Captain Noble was preparing different plans for modifying the terreplein and raising the dwarf traversing platforms to enable the guns to fire over the parapet: "In returning the War Office letter of 4 June...I have the honor to forward for your approval the plan of the woodwork proposed to be adopted for laying the ribbed racers on wooden platforms at Fort Henry Kingston." There followed a series of letters between Montreal and Kingston outlining the development of plans to remodel the terreplein of the east wall and install dwarf traversing platforms. The plans that Storer at Kingston was instructed to develop called for the excavation of the terreplein deep enough to build a solid foundation for a superstructure of 10 inch cedar logs, flatted and notched to take succeeding layers. Oak curbs cut to the proper curve would then be fixed to the cedar superstructure and ribbed racers fitted to the curbs with "wrot iron jagged bolts." It seems as if there was to be space between the timbers which was to be "filled in with earth and small stones well rammed to a level of 3" below the top of the curbs." The banquette along the part of the parapet occupied by the platforms was to be removed and the parapet in the southeast angle was to be modified (see Figures 9 and 10).[91] These specifications should be studied carefully to determine precisely what was intended (see Appendix 7). There is not any report indicating the work had been carried out and none of the British inspection reports in the 1860s indicate anything other than common traversing platforms for the 24-prs. in Fort Henry. Only in November 1872, after the Imperial authorities have transferred Fort Henry to the Canadian government are three dwarf traversing platforms for 24-prs. recorded at Fort Henry.[92] It is difficult to believe that the Canadian government, since August 1870 when they took over Fort Henry, had gone to the expense to reform the east ramparts of the redoubt. It seems more likely that the British had mounted the dwarf platforms, whether on experimental or conventional masonry platforms is impossible to say, and that the inspectional reports are wrong.

Storer had suggested initially adapting the common traversing platforms to take ribbed racers. At this time a Memorandum had come from the War Office, which applied to Fort Henry, as well as to Fort Frederick and the Market Battery, at Kingston, relating to mounting guns on ribbed racers. On inquiry from the Royal Engineers the Officer Commanding Royal Artillery in Canada replied that he wished all the platforms fitted with raised racers, "if it can be done."[93] Installing raised racers in the terreplein implies the fixing of hollow soled trucks to the platforms to fit onto the raised racers. In the fortifications estimates for 1864-5, provision was made to install ribbed

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91 NA, RG8, Vol. 1612, pp. 266-80, especially pp. 276-8, "Specifications".

92 NA, NMC 195572, "Kingston Fort Henry", Nov. 1872, a list of armament at Fort Henry.

93 NA, RG8, Vol. 1612, pp. 24-5, Noble to CRA, Canada, 13 March 1862.

racers for 12 guns at Fort Henry.[94] There is no direct evidence but this work may have been carried out in 1864.

The early armament of the redoubt has been described above – originally pintles and stone curbs were laid on the terreplein for 27 guns. Perhaps 27 guns were initially mounted but by 1849 only seventeen 24 pr. guns were mounted on traversing platforms. In 1851 the northeast angle was altered for an 8-inch shell gun, which was not mounted until 1862. Eight carronades and four 10-inch mortars were mentioned in 1840. The first complete inventory after 1840 available occurred in an Inspectional Report of 1855 which records:

17	24-pr. guns
2	24-pr. carronades
4	18-pr. carronades
2	10-inch mortars

The two 24-pr. carronades undoubtedly defended the east and west ditches and the 18-pr. carronades were mounted in the reverse fire chambers. Perhaps the mortars were mounted on the empty spaces on the east and west walls. The Inspectional Reports until 1869 were generally consistent. There were usually seventeen 24-prs recorded, although in 1861 there were said to be 19 and in 1862 only 16. Whether guns were being moved around or there has been an error in counting or copying is impossible to say. In 1862, the 8-inch gun has been mounted and two 8-inch mortars appeared for the first time. In 1866, an additional 18-pr. carronade was counted. When the Canadian government took over in August 1870, the official inventory read:

1	8-inch gun
17	24-pr. guns
2	24-pr. carronades
5	18-pr. carronades
2	10-inch mortars
2	8-inch mortars

The 24-pr. carronades were mounted on stone platforms and the mortars on wood.[95] A plan dated 30 December 1868 perhaps gives the best summary of the positions of all the weapons at the end of the British period. The plan did not identify the artillery pieces but it provided for the 8-inch gun in the northeast angle, the seventeen 24-prs.on the terreplein, the 24-pr.carronades covering the branch ditches, the 18-pr.corronades in the reverse fire chambers (three in the east,

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94 NA, RG8, Vol. 1423, pp. 2, 23a, 23b, Report & Estimate Of Works and Repairs to be carried out in the Royal Engineer Department in Canada in the Year 1864.65.

95 NA, RG8, Vol 1635, Inspectional Reports 1855-69, passim.

two in the west), and the four mortars on the parade (see Plan 32).[96]

Attached to the correspondence from Lieutenant Storer when he was considering the question of replacing the old pattern traversing platforms at Fort Henry was a short report, "Details of Platforms at Kingston C.W. examined by Regimental Board, 5 March 1863."[97] Included is information on four 24-pr. and three 32-pr. traversing platforms all dated 1858 and all with damaged pintles. It does not indicate that they were at Fort Henry, only at Kingston, but they may well have been in the Casemated Redoubt and Advanced Battery. What is interesting is that the guns are identified by maker (Carron and Walker) and by serial number. The serial number on the Carron guns is unique; to identify positively the Walker guns we would need the date of manufacture as well.

No. Of Gun	Maker and Date	Calibre
75533	Carron 1809	24-pr.
70059	Carron 1806	24-pr.
143	Walker	24-pr.
104	Walker	24-pr.
66789	Carron 1803	32-pr.
70445	Carron 1806	32-pr.
252	Walker	32-pr.

Other Items

Swing Bridge

In February 1841, the Commanding Royal Engineer in Canada proposed to the Inspector General of Fortifications that a swing bridge rather than a rolling bridge be constructed across the west branch ditch at Fort Henry. The Inspector General recommended such a measure to the Board of Ordnance and the Board approved the recommendation.[98] Although the report and estimates have not been found, there is an undated plan and section with the hand written notation, "Plan & Section of Bridge proposed for the West Branch Ditch, Fort Henry", which may be of the 1841

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96 NA, NMC 5014, Kingston Canada Fort Henry, 30 December 1868.

97 NA, RG8, Vol. 1612, p. 229, with Storer to District Commanding Royal Engineer, 11 March 1863.

98 NA, MG13, WO55/876, pp.116-17, Byham to IGF, 31 March 1841.

bridge (see Plan 33).[99] Presumably the Royal Engineers at Kingston erected the swing bridge during the building season of 1841, perhaps in the summer.

Drawbridge

The other bridge was the drawbridge that controlled entrance directly through the south wall into the fort. There is a plan of the bridge, dated 10 April 1867, that was proposed to replace the worn out bridge in 1867. It was endorsed "Designed and drawn by G. Graham Lt. Colonel, D.C.R.E. [District Commanding Royal Engineer] Montreal 10th April 1867" (see Plan 34)

Porches

In the autumn of 1844, the officers of the 82nd Regiment stationed at Fort Henry found that their individual quarters were uncomfortable as the doors opened directly from the parade into their rooms. Consequently, Major Slater, commanding the detachment, asked that porches be put up for the officers' comfort during the winter. Estimates were prepared and in January 1845 the Board of Ordnance approved the request to erect internal porches to each of the 11 officers quarters and the mess room. These porches were to be secured to the door architrave with hooks and straps[?] so that they could be removed in the summer if necessary. The door way, which opened to one side, was closed by a folding door (see Appendix 8).[100] The porches were probably put in during the spring of 1845. Their outline can be seen in the 1860 plan of Fort Henry (see Plan 36). It should also be noted that external porches are also shown on the officers' quarters on this plan.[101] The internal porches are missing from a plan dated 25 September 1869 (see Plan 41).[102]

Signal Lamps

In July 1846, the Master General and Board of Ordnance decided to put in the estimates for 1846-7 provision for establishing signals at Fort Henry and the Royal Artillery Park in Kingston as a method to prevent desertion. These signals were oil lamps attached to the flag staffs at the two locations. In December 1847, Sir Benjamin D'Urban, Commander of the Forces gave authority "for the issue of Oil and wick for the Signal Lamps on the Flag Staffs at the artillery Barracks at Kingston and Fort Henry...." Presumably when a soldier was missed the lamps

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99 NA, NMC 4675, undated, "Plan & Section of Bridge proposed for the West Branch Ditch, Fort Henry."

100 NA, MG13, WO55/879, pp. 2-4a, Slater to Fraser, 25 Oct. 1844; Fraser to Bonnycastle, 26 Oct. 1844; "Report and Estimate of the Probable Expence of Providing internal Porches to the Officers Casemates Fort Henry Kingston", 30 Oct. And 4 Nov. 1844; Byham to IGF, 8 Jan. 1845.

101 NA, NMC 22982, Fort Henry Ground Plan, 3 May 1860.

102 NA, NMC 35526, Outline Plan of Fort Henry, 25 Sept. 1869; see also, NMC 195573-1.

would be lit to alert the authorities on each side of the Cataraqui River.[103]

Ablution Room

In 1861, the facilities in the ablution room were ordered to be improved and the work was completed by early November: "The wooden floor to be taken up and a brick one substituted, additional benches to be supplied &c."[104] In the summer of 1865, further improvements were proposed to the room – to add a bath and a boiler and to modify the drains. A plan and section of the ablution room showing the proposed changes is extant but it is not known if the proposal was actually carried out. The Ablution Room was located on the ground floor of the east wing of the north casemates (see Plan 35).

The Completed Fort

During the 1860s, the Casemated Redoubt reached the apex of its development. (The only major development thereafter would be the addition of the 7-inch RBL (Armstrong gun) in the mid-1870s.) Ironically, as it reached maturity, the introduction of rifled artillery in the 1860s rendered fortifications like Fort Henry obsolete. At the same time British imperial policy was about to undergo a change. The Trent Affair during the American Civil War and a general anxiety about American intentions once the war was over prompted the Imperial authorities to review the practicalities of defending the Canadian colonies against American attack.

A commission sent out in 1862 produced a grandiose and expensive scheme involving the building of defensive works from Quebec to Sarnia. Undoubtedly shocked by the cost, the British government then sent out Lieutenant-Colonel W.F.D. Jervois to reconsider the problem. Jervois produced two reports. The first, in 1864, recognized the importance of Kingston as a naval base but made the development of interdependent works in addition to Fort Henry contingent on the enlargement of the Ottawa and Rideau canals. The second report made similar recommendations but removed the condition of canal improvement.

Despite the more modest proposals put forward by Jervois, the Imperial government would not spend vast sums on inland defences. While acknowledging its ultimate responsibility to defend the Canadian colonies, it was prepared only to improve the defences of Quebec City. At the same time it supported the Canadian proposal of Confederation as a means of transferring local defensive responsibility to the new Canadian government and allowing it to bring the "Legions" home.[105]

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[103] NA, MG13, WO55/880, p.186, Byham to IGF, 27b July 1846; RG8, Vol. 751, Reel C-3248, Treasury to D'Urban, 9 Feb. 1848.

[104] NA, RG8, Vol. 1611, pp. 321-2, series of notes re: cost of "Fitting up an Ablution Room in Fort Henry", 14 Sept. – 11 Nov. 1861; Vol. 1408, p. 444, Servante to IGF, 20 Nov. 1861.

[105] Richard A. Preston, *Canada and "Imperial Defense"* (Durham, N.C.: Duke University Press, 1967), pp. 41-46.

A picture of the Casemated Redoubt in the 1860s is provided by a series of plans dated from 1860 to 1870. The 1860 plans of the ground floor and upper floor shows the layout of the Redoubt and the functions of the casemates. The ground floor plan shows as well the drainage system and the plan of the water tanks. A third plan is of the terreplein, showing the gun positions, curbs, and racers (see Plans 36-39). Subsequent plans of the ground and upper floors dated in 1869 and 1870 confirm the 1860 plans (see Plans 41-45). Finally, a sheet of sections and elevations dated in 1861 gives us a partial visual impression of the appearance of the Redoubt in the 1860s. These include sections of the caponier and soldiers' casemates, the magazine and officers' quarters, the gateway, the eastern reverse fires, and the small casemates (that is, the south curtain wall). The elevation of the curtain wall shows its parapet with a series of loopholes. There is also an elevation showing the interior face of the gateway, guardroom, and cells (see Plan 40).

Chapter 2

The Decline of Fort Henry 1870 – 1914

On 15 August 1870, Lieutenant-Colonel Thomas Wily reported to the Minister of Militia and Defence that on 8, 9, and 10 August he had taken over from the Imperial authorities various forts, towers, and buildings, including Fort Henry with the advanced battery and two branch towers.[1] While he recorded the armament he had received, he made no mention of the condition of the fort which he had accepted on behalf of the Dominion government.

Very little has been found in the records about Fort Henry in the early 1870s. There is one curious note, however, in November 1870. The caretaker discovered a large piece of lead in the ditch:

> I have to report for your information that a large piece of lead which served as coping for roof of covered way that guards the north angle of the ditch at Fort Henry has been blown of[f], or fell from the roof and now lies in the ditch. It weighs between 3 & 4 cwt.

Presumably, by "covered way" the caretaker meant the caponier, but what does he mean by coping? The report was not deemed sufficiently important to necessitate repairs. In December, Lieutenant-Colonel Wily noted:

> Nothing is at present required to be done in this matter. I have the lead which I found lying in the ditch of Fort Henry placed in the store for safe keeping.[2]

Armament

When Lieutenant-Colonel Wily accepted the transfer of Fort Henry from the Imperial government, he recorded the artillery pieces. In the redoubt, he listed:

1	8-inch gun
17	24-pr. guns
2	24-pr. carronades
5	18-pr. carronades
2	10-inch mortars
2	8-inch mortars[3]

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1 NA, RG9, II, A1, Vol.21, File 3403, Wily to Minister of Militia and Defence, 15 Aug. 1870.

2 Ibid., Vol. 26, File 4104, Caretaker to Officer Commanding Depot Battalion, 14 Nov. 1870; memo, Thomas Wily, 12 Dec. 1870.

3 Ibid., File 3403, Wily to Minister of Militia and Defence, 15 Aug. 1870.

Two years later, another inventory printed with a plan of Fort Henry, provided additional information. It indicated that seven of the 24-pr. guns were mounted on iron carriages on wooden common traversing platforms. While another seven 24-pr. guns were on wooden carriages on wooden common traversing platforms, the remaining three 24-pr. guns were mounted on wooden dwarf traversing platforms. The platform of the 8-inch gun moved on raised racers. The two 24-pr. carronades, which commanded the branch ditches, rested on stone platforms, the five 18-pr. carronades in the reverse fire chambers on wooden floors, and the four mortars on wooden platforms.[4]

The artillery pieces, with one exception, were serviceable although their carriages and platforms were not. One 24 pr. gun was said to be unserviceable although no reason was given[5]. The seven carronades were declared obsolete, but even so they would still function perfectly well. Of more significance was the condition of the carriages and platforms. The judgement was harsh: "The twenty-four common traversing platforms at Fort Henry, shown as unserviceable, are of an obsolete pattern, and would not, in their present condition, stand more than a few rounds fired from the guns mounted upon them." This tally included the nine platforms in the Advanced Battery, thus leaving one platform for the 8-inch gun and 14 platforms for the 24-pr. guns in Fort Henry as unserviceable. By inference, since they were not mentioned, the three dwarf traversing platforms for the 24-pr. guns were serviceable. The mortar platforms were rotten. There was no mention of the carronade carriages.[6]

A major change to the armament of the redoubt in the 1870s was the substitution of a 7-inch rifled breech loading (Armstrong) gun for the 8-inch shell gun. In May 1874, Major D. I. Irwin, the Commandant of the School of Gunnery at Kingston, requisitioned two of these weapons from Quebec City, one to be mounted in Fort Henry, the other in Murney Tower. He argued that "they would have a wide range in defence of the town and harbour and would be very efficient in resisting an attack from the lake or the fire of gunboats." The request was sanctioned and the guns, with their stores, were in Kingston by 25 September 1874.[7] One of the guns was mounted at Fort Frederick (not Murney Tower) by January 1875 and the other may have been mounted in the northeast angle of the redoubt the following summer. It was reported in position in March

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4 NA, MNC 195572, "Kingston Fort Henry", Nov. 1872.

5 This a 50 cwt gun, which means it was 9 ½ feet in length.

6 *Report of the State of the Militia of the Dominion of Canada for the year 1874*, Sessional Papers (No. 6) (Ottawa, 1875), p. 225. The survey was dated 15 Jan. 1875. It indicated that the carriage for the 8-inch gun was "sliding dwarf", which is at odds with the evidence from the 1860s.

7 NA, RG9, II, J 1, Vol. 13, Irwin to Adjutant General, 12 May 1874; note in margin, "Sanctioned & Guns Stores &c received – 25th September 1874."

1877 and recorded in the departmental *Annual Report* for 1878.[8]

In 1875, the Department of Militia and Defence wanted to replace the unserviceable common traversing platforms. There was even some thought given to installing some Palliser converted 64/32 pr. rifled guns.[9] It is not clear from the records, however, precisely what the military authorities had in mind. In June, Irwin, the Commandant of the School of Gunnery at Kingston, wrote to Ottawa:

> I have the honour to forward herewith drawings as required shewing the necessary arrangements to be made for the alteration of the present traversing platforms mounted on the works at Fort Henry – I have also the honour to point out that the raised racers suitable for the New Pattern Traversing Platforms will not suit the present Platforms and that consequently until new Platforms are provided the guns (with four exceptions) cannot be remounted on the Fort.[10]

The reference to altering the present traversing platforms is strange if they were unserviceable. The remainder of Irwin's letter seems to indicate that the military authorities intended to lay down raised racers for hollow soled trucks in anticipation of "New Pattern Traversing Platforms"; that the guns had been dismounted; and that only four (perhaps the 8-inch, or the Armstrong gun, and the tree 24-pr. guns on the east ramparts) could be remounted. In July estimates were prepared for laying 26 gun foundations in the redoubt:

Excavation Rubble Masonry and Cut Stone	$ 184.00
Wrought iron racers	50.00
	$ 234.00
Number of foundations	26
	$6084.00[11]

If one does not count the gun position in the northeast angle, 26 foundations would account for the number of gun positions that were originally laid down when the redoubt was built. Whatever was intended in 1875, nothing appears to have been done that year.

In mid-July 1876, in order to facilitate the laying of wood block pavement on the terreplein (see below) the guns were removed from the ramparts: "The work of moving guns and platforms will

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8 NA, RG11, Vol. 542, p. 983, Irwin to Adjutant General, 19 March 1877; *Report of the State of the Militia of the Dominion of Canada for the year 1878,* Sessional Papers (No. 5) (Ottawa, 1879), pp. 276-7.

9 NA, RG9, II, A 1, Vol. 74, File 01673, note by Selby Smyth, 12 June 1875.

10 Ibid., File 01673, Irwin to Adjutant General, 17 June 1875.

11 NA, RG11, Vol. 540, p. 244, Gage to Scott, 24 July 1875.

be proceeded with at once in order to enable the Department of public works to lay the new block pavement in Fort Henry."[12] The stone curbs and racers were not laid until mid-September or later. Drawings were prepared at that time of iron raised racers for Fort Henry (see Figure 1).

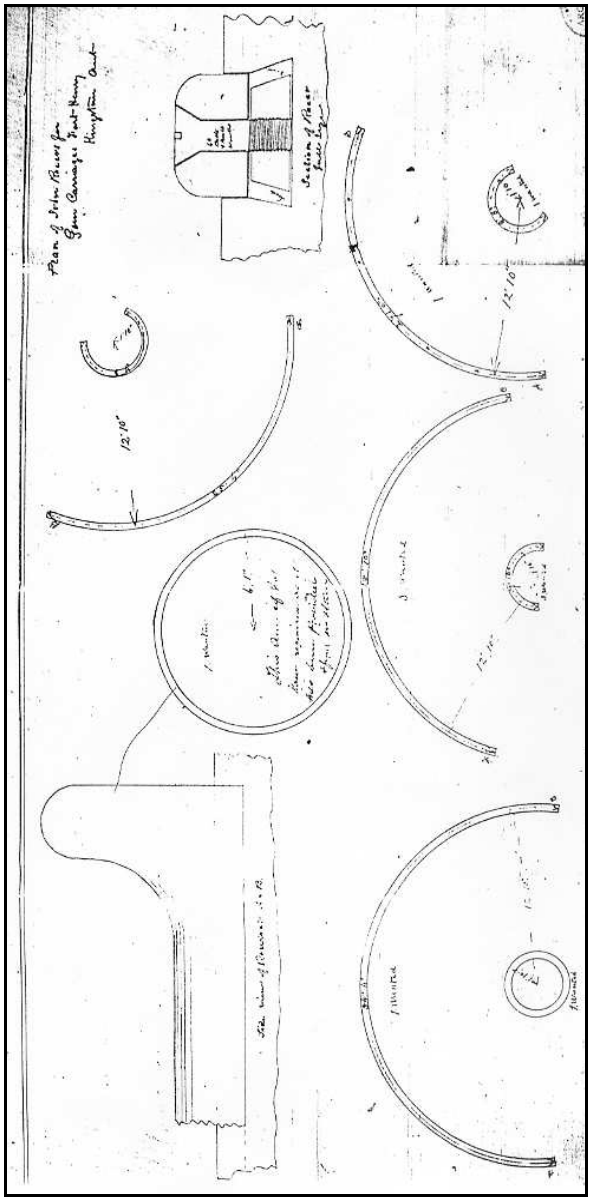

Figure 1 Plan of Iron Gun Racers, NA, RG11, Vol. 541, p.686, with Gage to Scott, 15 Sept.1876

12 NA, RG9, II, J 1, Vol. 13, order by Cotton, 20 July 1876, on Memo, Powell to Cotton, 17 July 1876.

The preparatory work was to be done at the penitentiary:

> You will please inform me when the order is sent to the Penitentiary and I will give them the position of the holes in racer that the nuts may be set in the stone away from the joints.
>
> I understand the Order for Cut stone has not been sent to the Penitentiary yet. You will be pleased to arrange that the Order be sent at Once and that the Warden receive such instructions that the stone may be cut with all possible haste as the Contractor will require them soon.[13]

That this work was done is implied in a letter in March 1877 when the Commandant at Fort Henry requested "that five new stone beds, *similar in pattern to those already erected* [emphasis added], be placed in position before the new pavement [is laid]." He went on:

> This can be done now at less expense than subsequently and although there are no new pattern platforms or carriages at present available yet I presume these will be supplied eventually as the present old platforms are rotten & quite unserviceable.

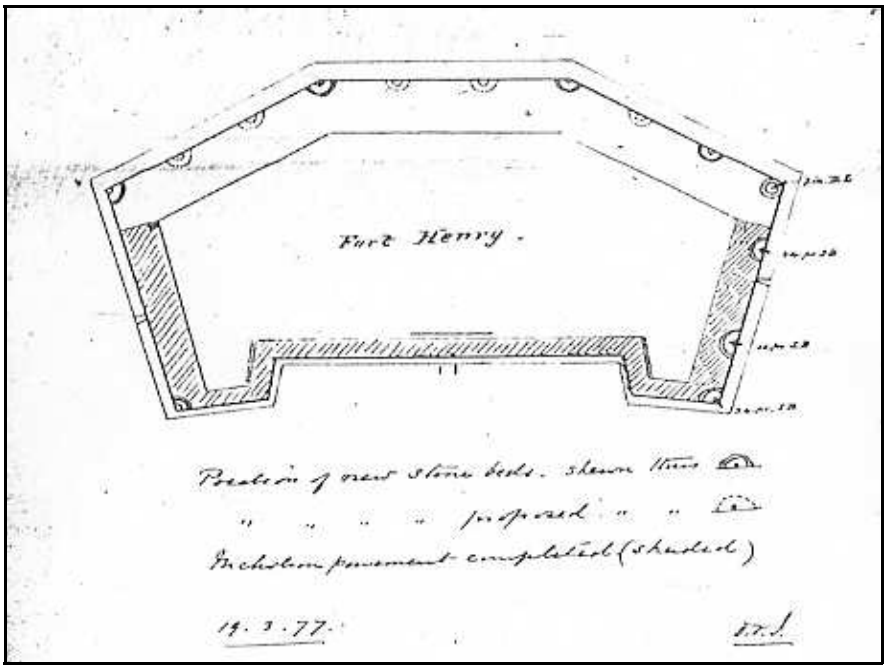

Figure 2 Positions of new and proposed stone beds and Nicholson Pavement, shaded, 19 March 1877. NA, RG11, Vol. 542, p. 963.

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[13] NA, RG11, Vol. 541, p.687, Gage [local architect] to Scott [Chief Architect, DPW], 15 Sept. 1877.

Irwin enclosed a sketch showing the guns that were already mounted, the position of the beds already created, and the positions of those suggested (see Figure 2). The sketch indicated that the 7-inch RBL was mounted in the northeast angle and three 24-pr. guns on the east ramparts. There was one stone bed in the southwest corner and four on the north ramparts. Five more were proposed to fill in the gaps on the north ramparts.[14] In June, the Minister of Public Works, Alexander Mackenzie, visited Kingston and authorized, among other items, "Stonework for bedding guns" and "racers (to be obtained at Penitentiary)."[15] Presumably the work was done.

In May 1879, a Board of Officers reported on the state of the ordnance at Fort Henry:

> Mounted Ordnance Three 24 pr: S.B. Guns on traversing platforms (and one 7 in BL Gun) are the only guns in the fort available for service – Five Guns could be mounted on the traversing platforms already in charge of the Commandant S of G [School of Gunnery] if racers were laid down – and the stone beds are all ready for the racers – (note in margin: "The racers should be laid down if possible. WP [Walker Powell] AG [Adjutant General]")
>
> Dismounted Ordnance Fifteen old pattern and unserviceable traversing platforms are at present in the Fort together with the 24 Pr SB Guns for them – It is recommended that these platforms be broken up by the Artillery and the iron fittings &c sold or returned to store, as some of them maybe of use in the manufacture of New Platforms. (in margin: Recommended WP/AG)[16]

In January 1880, in response to the report of the previous May, an estimate for fixing five new iron racers was put forward. It was also noted that the old platforms had been broke up.[17] In 1884, there was another estimate for iron racers and for platforms for two guns which fired directly into the branch ditches.[18] No details were given and it is not known if the work was carried out. In November 1889, a Board of Officers reported that "The gun carriages & platforms entirely decayed & useless." It was noted, however, that the carriage of the 7-inch RBL had been painted in 1888 while the rest were not worth painting. It at least was serviceable.[19]

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14 NA, RG11, Vol. 542, pp. 962-3, Irwin to Adjutant General, 19 March 1877.

15 NA, RG11, Vol. 542, p. 1037, ? to Secretary, Department of Public Works, 4 June 1877.

16 NA, RG11, Vol. 543, Reel T-1110, p. 1593, "Proceedings of a Board of Officers assembled at Kingston on 5th to 9th May 1879."

17 NA, RG11, Vol. 543, p. 1585, Estimates, 23 Jan. 1880.

18 NA, RG9, II, E 1, Vol. 2, File A97, James to Caron, 23 July 1884.

19 NA, RG9, II, A 1, Vol. 232, File A9631, Asst. Inspector's of Artillery report..., 1889.

Figure 3 Interior of Fort Henry showing the terreplein of the north casemates. Only mortars are evident on the ramparts. From Powell Scrapbook, Vol. II, p.11, National Archives of Canada, C-014225.

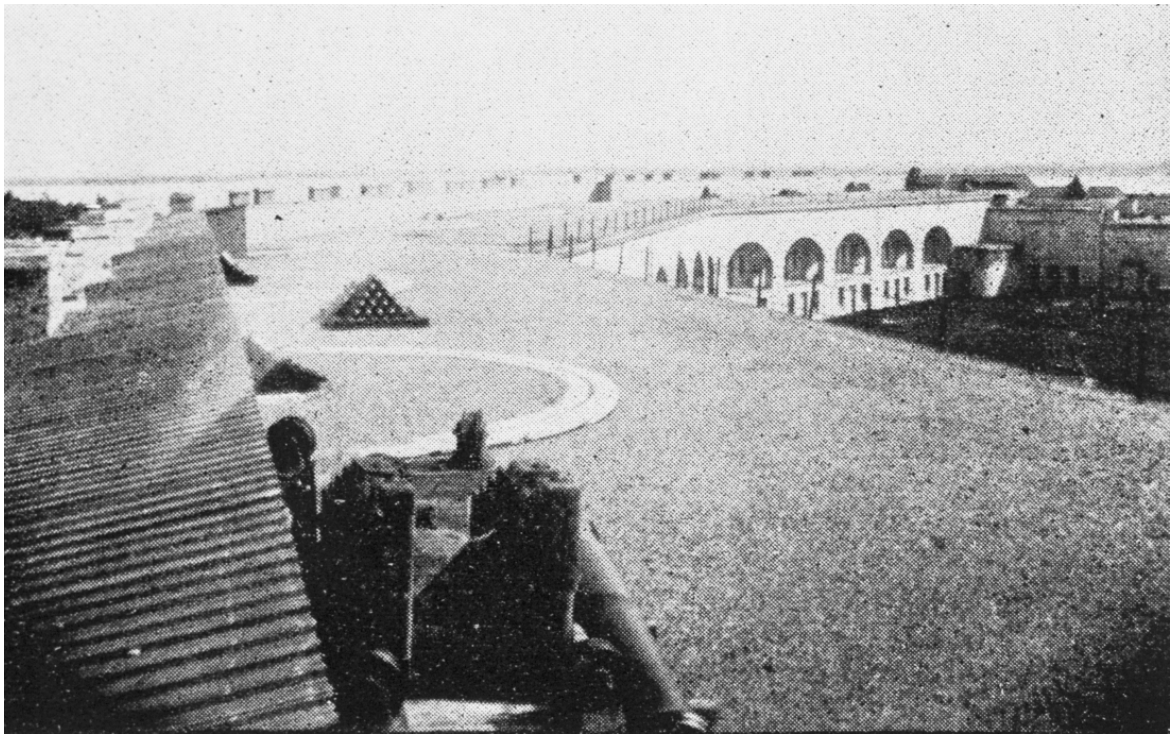

Figure 4 Ramparts of the north casemates, from "City of Kingston Illustrated", circa 1912, p. 25, photo dates circa 1885. Note stone curb; curb may only have groove for racer. National Archives of Canada, C-028228.

It appears, then, that during the 1870s, probably in the summer of 1876, the guns were removed from the ramparts of Fort Henry while the wooden block pavement was being laid down. The 7-inch RBL and the three 24-pr. guns were returned to the east ramparts (perhaps they were never removed). Nine stone beds – that is, stone curbs for racers – were laid along the north parapet and one bed in the southwest corner of the redoubt. It is not clear when the racers were attached to the curbs. It is questionable if the guns were remounted. Photographs clearly show the north ramparts empty, except for mortars, although the remains of a carriage and platform along with a gun are visible in one of the photographs (see Figures 3 and 4).[20] It is evident from these photographs that while stone curbs and racers were laid for the guns, raised masonry beds were not constructed on the north ramparts as had been done on the east wall.

(Note: If one interprets "stone beds" as meaning raised beds similar to what were constructed on the east wall, then one has to suppose that the Canadian government constructed them in the 1870s and then for some unknown reason took them done. There is absolutely no evidence of such demolition. It is more reasonable to interpret "stone beds" as meaning the stone foundations and curbs set into the level terreplein as shown in the photo.)

Paving the Ramparts

Until 1875, the Canadian authorities seem to have made few if any repairs to Fort Henry. The annual report of the Department of Militia and Defence for 1872 noted:

> At Kingston the fortifications being mainly of stone, a large amount of pointing, &c., is annually required; but nothing has been done since the summer of 1870, and probably not for some time previous thereto.[21]

The coming to power of the Liberals in 1873, with Alexander Mackenzie as his own Minister of Public Works, signalled a change in the fortunes of Fort Henry. The Liberals seemed to have taken the Canadian military more seriously than the Conservatives; it was the Mackenzie government which established the Royal Military College in 1874. This interest may explain the work done at Fort Henry over the next few years. In the autumn of 1874, the authorities decided that the ramparts of Fort Henry needed extensive repairs:

> The walls and casemates of Fort Henry having been damaged by water and frost, it was decided to lay over them a wooden block pavement, but, as winter was close at hand, the boarding only of it was finished.
>
> It has been decided to lay block pavement as a permanent covering and the work is now progressing rapidly. When traverses for the new guns are fixed in position, block pavement will be laid around them.
>
> The coping of the external walls, having been affected by the frost, they

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[20] NA, National Photograph Collection, C-014225 and C-028228.

[21] *Report of the State of the Militia of the Dominion of Canada for the Year 1872* (Ottawa, 1873), p. xvii.

> are in course of being covered with boards with fillets over joints. The woodwork to be painted. The walls are also being pointed.[22]

Because it was a simpler process and likely cheaper than the block paving, the covering of the slope of the parapet was completed first and the chimneys which protruded through the parapet covered with galvanized iron. A progress report dated 1 March 1875 noted:

> The parapet walls have been covered with inch dressed lumber and joints battened [,] the tops of the chimneys covered with Galvanized iron.[23]

The annual report, cited above, dated at the end of June, suggests that the work was still going on. Whatever the case, the covering of the parapets with board and batten was undoubtedly complete by the end of summer of 1875 (note the board and batten covering in Figure 4). Three years later, in late October or early November, a severe storm tore off a portion of the covering of the parapet. The wood was recovered by the Commandant of A Battery and in January 1879, the Chief Architect, DPW, inspected the damage and, because of the danger of further injury, ordered that the covering be repaired immediately, at a cost of $245.00.[24]

The laying of the wooden block pavement on the terrepleine of the ramparts took much longer. This covering was a patented product known as Nicholson pavement. Work began in the early spring of 1875. The local architect in charge reported on 1 March that "a portion of the terrepleine has been covered with inch match[?] stuff laid on battens bedded in sand." A report in mid-April indicated that a portion of the terrepleine had been covered with tongue and groove inch boards which had "...in a great measure prevented water from penetrating the arches." The Chief Architect's remarks in July provided a little more detail on the process of laying Nicholson pavement:

> Grooved and tongued boarding has been placed over the whole of the casemates, and apparently with a satisfactory result. One portion has been laid with blocks for wooden pavement. The pitch &c for this is now on ground and work will be prosecuted in the course of a few days, when the necessary gravel has been

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22 *General Report of the Minister of Public Works, for the Fiscal Year Ending 30th June, 1875*, Sessional Papers (No. 6) (Ottawa, 1876), Appendix No. 17, p. 89.

23 NA, RG11, Vol. 540, p. 76, "Report of Progress in Government Works at Kingston", 1 March 1875, R. Gage, Architect.

24 Ibid., Vol. 543, pp. 1447-8, Irwin to Adjutant General, 11 Nov. 1878; pp. 1476-7, Scott to Braun, 9 Jan. 1879.

procured.[25]

One of the reasons for the delay in laying Nicholson pavement was the need to remove the platforms, carriages, and guns from the ramparts and then to lay new stone curbs and iron racers. On 5 July 1875, the Chief Architect of DPW, Thomas Scott, reported that:

> No work has been prepared for the traversers of guns since my return, however, a drawing has been furnished, which as soon as authorized to carry out will be traced and forwarded to the Architect in charge for execution.[26]

On 24 July, the local architect in Kingston submitted an estimate for building 26 gun foundations and laying the same number of wrought iron racers at $1404.00 each, for a total of $6084.00.[27] The cost seems much too high for merely laying the curbs and racers, but if the intention was to build raised masonry platforms for new dwarf traversing platforms, it was not done; the cost would in all likelihood discourage the Minister approving the estimates. Subsequent references to reinstalling the guns seem to refer only to curbs and racers (See below for a further discussion of armament).

For whatever reason, the laying of more block paving was deferred until 1876.[28] On 17 July of that year, the Adjutant General notified the Commandant of the Royal School of Gunnery at Kingston that DPW was ready to lay the block pavement at Fort Henry and directed that the guns be removed.[29] Before this, however, Major Cotton, the Commandant, had reported that the drawbridge at Fort Henry was in a dangerous state and needed a new railing and flooring and began the process of having it repaired by DPW.[30] This process dragged on over the summer and into the autumn when, early in November, it was reported that the repairs to the drawbridge "...not being so urgent as some other work have been left to this time undone[;] they are however

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25 Ibid., Vol. 540, p. 76, "Report of Progress in Government Works at Kingston", 1 March 1875, R. Gage, Architect; Vol. 540, p. 138, Ewart to Scott, 17 April 1875; pp. 208-9, Scott to Braun, 5 July 1875, Reel T-1110.

26 Ibid., pp. 208-9, Scott to Braun, 5 July 1875.

27 Ibid., p.244, Gage to Scott, 24 July 1875.

28 Ibid., Vol. 541, p. 372, 14 Dec. 1875, "Works authorized but not executed deferred until next year", includes "Block pavement".

29 NA, RG9, II, J 1, Vol. 13, p. 373, memo, Powell to Cotton, 17 July 1876.

30 NA, RG11, Vol. 541, p. 575, Cotton to Adjutant General, 8 July 1876

being done."[31] Some repairs to the drawbridge must have been undertaken by local workers in July, however, for, on 20 July, Cotton directed that "the work of moving guns and platforms will be proceeded with at once in order to Enable the Department of Public Works to lay the new block pavement in Fort Henry." There is a note in the margin of a letter from Cotton to Powell on 20 July "Bridge being repaired" and a record of an unpaid bill for $79.50, dated 20 July 1876, for "new draw Bridge Fort Henry."[32] Sometime after 20 July 1876, then, the draw bridge was repaired, the guns and platforms removed, and DPW began to lay more of the block pavement on the terrepleine.

According to a rough plan prepared by Lieutenant-Colonel Irwin in March 1877, the Nicholson pavement had already been laid over the terrepleine on the east, west, and south ramparts (see Figure 2). He anticipated that the pavement would be laid over the north terrepleine during the coming summer and suggested that stone beds for five more traversing platforms be placed in position beforehand.[33] In June, the Minister of Public Works visited Kingston and, among other items, approved the completion of the laying of Nicholson pavement at Fort Henry. He also approved the "Stonework for bedding guns" and "Racers".[34] In all likelihood, five more sets of curbs and racers were put in place in the summer of 1877 and the laying of the Nicholson pavement was completed at the same time. It is possible, however, that the pavement was not completed until 1878. There is a report of 5-9 May 1879, which states that at Fort Henry: "Considerable repairs have been carried on during the past year [i.e. 1878] – principally in the completion of the Nicholson pavement on the ramparts...."[35]

A report written in January 1880 indicated that the Nicholson pavement, while working well generally, needed some refinement:

> The Nicholson pavement on the ramparts appears to answer a good purpose in the body [underlining in original], but the eaves are very defective, the cement has ran off, the wood is bare, and the water passes between the blocking and fascia planks, into the walls, destroying the pointing and masonry – to remedy the evil we would advise the fascia be taken off and refixed lower, having a strip

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31 Ibid., p. 576, DM, Dept. of Militia and Defence, to DPW, 11 July 1876; pp. 754-6, Gage to Scott, 2 Nov. 1876

32 NA, RG9, II, J 1, Vol. 13, p. 373, [order], Cotton, 20 July 1876; p. 374, note in margin, Cotton to Powell, 20 July 1876; RG11, Vol. 542, p. 1029, "Statement of Work done on Past Years authority Yet to be Paid for," Reel T-1110.

33 NA, RG11, Vol. 542, pp. 962-3, Irwin to Adjutant General, 19 March 1877.

34 Ibid., pp. 1036-7, Scott to Braun, 4 June 1877.

35 Ibid., Vol. 543, pp. 1593-4, "Proceedings of a Board of Officers at Kingston on the 5th to 9th May 1879...".

> of galvanized iron set into the face of the blocking and passing out over the gutter – also fix a thin fillet of wood on top of the blocking, to prevent the cement running off.[36]

Presumably the writer is using the term cement in a generic sense, meaning an adhesive, and in this case undoubtably meaning the tar used to hold the gravel on top of the block paving. It is not known if these modifications were made.

Sanitation

A continuing problem was the condition of the latrines and drains or sewers in Fort Henry. In the summer of 1878, workmen for the Department of Public Works, who were opening the drains, presumably to clean them, were forced to stop their work because of the state of the latrines. Since Public Works had made no provision for an appropriation to clean the latrines, which the Commandant of the Royal School of Gunnery said was absolutely necessary, a call was put out for tenders to determine the lowest cost for the work. Tenders were submitted in September but apparently no work was done.[37] In March 1879, it was pointed out:

> The Latrines at Fort Henry have not been emptied since 1870 and, on sanitary considerations alone, the work is most urgently required – and can best be done at this season of the year –[38]

Early in May a review board at Kingston echoed this appeal:

> The present state of the Latrines calls for immediate action – they require to be thoroughly cleaned out, and the traps and floodgates repaired.
> The drains appear to be in good order.[39]

Even with this endorsement, it was not until 23 January 1880 that an estimate was submitted, "Cleaning latrines and repairing flood gates" at a cost of $110.00. Presumably the necessary work was now done.[40]

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36 Ibid., pp. 1584-5, Estimate, 23rd Jan. 1880.

37 NA, RG9, II, A 1, Vol. 92, File 04849, Cotton to Adjutant General, 27 Aug. 1878.

38 Ibid., Irwin to Adjutant General, 12 March 1879.

39 NA, RG 11, Vol. 543, p. 1594, "Proceedings of a Board of Officers at Kingston on the 5th to 9th May 1879...".

40 Ibid., p. 1585, Estimate, 23 Jan. 1880. There is a penciled note, undated, on Irwin's letter, 12 March 1879, see fn 39, that "The Department of Public Works have taken action.".

The problem reoccurred in late 1886:

> I [Cotton] have the honour to strongly recommend that during the present cold season, and as soon as possible, the Latrines at Fort Henry be thoroughly emptied and cleaned out, and all the flushing apparatus placed in good order.[41]

Cotton repeated his appeal in April 1887, but in June, although he noted that the work had been authorized, he found that nothing had yet been done to clean the latrines.[42] His recommendation was echoed by Surgeon Major Wilson:

> I have the honour to repeat that the Latrines in Fort Henry are in a very bad condition owing it is stated to some obstructions in the drains. The stench therefrom is very offensive and may be the cause of disease at this season.[43]

In August, Wilson went on at some length about the problem:

> I regret to have again to bring to your notice the very unsatisfactory condition of the SE Latrine and of the drains generally in Fort Henry. The NE Latrine was emptied in June last and appears to be in good order now.
>
> The smell issuing from the drains from the Latrines in the SE angle and also from the Officers Latrine in the NE angle is not only most offensive but a constant threat to the health of those inhabiting the fort particularly during this exceptionally hot season.[44]

This description is puzzling because none of the plans of Fort Henry shows a latrine in the NE angle; the latrines were all in the south wall or in the adjacent demi-bastions (see Plan 43, for example).

What is clear was that the latrines were in poor condition. In April 1888, Cotton asked that the sewers from the east flank latrine and drains be opened and cleaned. He also called for an examination of the water tanks: "It is suspected that owing to the choked drain in East Flank there is an overflow into the Water Tank." Ottawa responded by noting that since these repairs were not requested in the returns for 1888-89, they would have to be postponed since no money

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41 NA, RG9, II, J 1, Vol. 17, p. 198, Cotton to Officer Commanding the Regiment of Canadian Artillery, 2 Dec. 1886.

42 Ibid., p. 312, same to same, 26 April 1887.

43 Ibid., p. 340, Wilson to Cotton, 8 June 1887.

44 Ibid., Vol. 18, p. 15, Wilson to Cotton, 6 Aug. 1887.

was available.[45] The records are silent as to when the latrines were cleaned.

As Barracks and Stores Depot

From about 1890 to the First World War the question of what to do with a fort that was slowly disintegrating but was of little defensive value was periodically brought forward. In November 1889, W. H. Cotton, Commandant of the Royal school of Artillery at Fort Henry, put forward one suggestion.

> I have the honour to recommend that nine casemates in Fort Henry may be occupied by married N.C. Officers & men of the Battery stationed here and that rations of wood be drawn for them...
>
> I make this recommendation on the grounds of economy & protection to the Fort; – economical because the occupation would preserve the works, and the cost of fuel wood would not amount to the constant damage by frost and moisture.
>
> And secondly as these men would provide a stronger guard and protection to the Magazines and Armament.

Cotton's proposal was endorsed by both D. I. Irwin, Commanding the Regiment of Canadian Artillery and by Major General Sir Frederick Middleton, the General Officer Commanding the Canadian Militia.[46] It seems likely that the proposal was implemented, although precisely when is unknown, because when the curtain wall was demolished in 1897 (see below), the contractor was instructed to replace the latrines for the N.C.O.s and their families with dry earth closets.

Later that same month in 1889, a Board of Officers assembled at Kingston to review the state of the fortifications there. Fort Henry they found in a deplorable state:

> The Board find this Fort in a ruinous condition. The Gorge wall falling down. The gun carriages and platforms entirely decayed and useless – The escarp walls moving out of place from rain & frost & want of proper care & pointing.

Of the gun carriages it was noted: "The 7" RBL gun carriages [one was at Fort Henry] were painted last year and the rest are not worth painting." The powder magazines were said to be damp, although no details were given. The General Officer Commanding sent the report on to the authorities in the Department of Militia and Defence with the rather pathetic note: "I would beg to draw attention to the report on Fort Henry. It appears a pity to let this work go to pieces,

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45 Ibid., p. 166, Cotton to Officer Commanding The Regiment of Canadian Artillery, 9 April 1888: notes on letter, 26 and 27 April 1888.

46 NA, RG9, II, A 1, Vol. 232, File A9585, Cotton to Irwin, 16 Nov. 1889; note by Irwin, 19 Nov. 1889; note by Middleton, 19 Nov. 1889.

as it might be required some day."[47]

The arrival of a new General Officer Commanding, Major General Ivor Herbert, in 1890, may have injected new life into the debate over national defence and the provision of defensive works. In his annual report for 1891, Herbert wrote:

> Numerous defensive works were handed over by the Imperial Government 22 years ago. In many cases they have fallen into a very dilapidated condition. The question as to how far they should be adapted to modern requirements, supplemented by new works, or to what extent they have ceased to be of value for national defence, appears to me to form part of the problem to which I have alluded under the head of "Defence."[48]

While Herbert raised the general problem of fortifications, the Inspector of Artillery raised the specific issue of Fort Henry:

> Fort henry and Advanced Battery in bad order: no repairs for some years. Question of repairs requires careful and extended consideration.
> East and West Branch towers both in bad order, including the ditches.
> The guns, carriages and platforms under cover in various towers are all serviceable and in good order: the guns elsewhere are all dismounted, the carriages and platforms being quite unserviceable from decay.[49]

If the Fort was no longer adequate for defensive purposes, then perhaps it could be used for storage of military supplies. In 1892 or early in 1893, the decision was taken to convert the fort into a store depot.

> At Kingston, the casemates at Fort Henry have been put into thorough repair, provided with heating apparatus, and made available for use by the store branch, being thus saved from gradual destruction.

This may have been an overstatement because almost immediately "The work of converting Fort

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47 Ibid., File A9631, "Report of Board of Officers assembled at Kingston on the 29th day of Nov 1889 and following days..."; note by Middleton, 5 Dec. 1889.

48 Department of Militia and Defence of the Dominion of Canada. *Annual Report 31st December 1891*. Sessional Papers (No. 19) (Ottawa, 1892), Appendix No. 1, Report of the General officer Commanding the Militia, p. 8.

49 Ibid., Appendix K, p. 93.

Henry into a store depot had to be discontinued owing to lack of funds."[50] Then, probably in September 1893, the work was resumed on fitting up the casemates and in November it was noted that one-half the buildings were ready for occupation. By April 1894, the work was resumed on the remaining casemates.[51]

In April, the local architectural firm reported that it "will not be able to take up the matter of the roof until the dry season sets in", but it was not until mid-September that it was receiving tenders for the Fort Henry roof.[52] This may refer to an asphalt covering of the casemates. In March 1897, Lieutenant-Colonel Cotton reported that "a portion of the new asphalt covering of the casemates, Fort Henry, has been blown off. Also as the Contractors have guaranteed for 8 years, the damage will be repaired without cost to the public."[53] It may have referred, however, to the wooden roof over the east ramparts in which a fire was reported in September 1897.[54]

Aside from asphalting the roof, what else was involved in fitting up the casemates for stores? In 1893, it was said that the casemates were "provided with heating apparatus", and subsequently there are a number of references to "furnaces" being repaired.[55] In 1898, it was reported that there were six furnaces. It is not clear precisely what is meant by "furnaces", but presumably they are large stoves to heat the casemates by means of pipes. One requisition referred to "pipes & smoke connections."[56] That there were six furnaces suggests, perhaps, that there was one furnace in each of the ranges of rooms in the three sections, top and bottom, of the northern casemates.

The Collapse of the South Curtain Wall

It is of course ironic that while the military authorities were casting about for a use for the fort

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50 Department of Militia and Defence of the Dominion of Canada. *Report for the Year ended 30th June, 1893.* (Ottawa, 1894), Part 2, p. 42; Part 1, p26; NA, RG9, II, E 1, Vol. 7, File A383, Power & Son's Report for 1893.

51 NA, RG9, II, E 1, Vol. 7, File A383, Power and Son's Report for 1893; Vol.9, File A474, Report for Feb. and March 1894, dated 3 April 1894.

52 Ibid., Vol. 94, Register, 1182, n.d., filed 17 Sept. 1894.

53 Ibid., Vol. 95, Register, 1624, 25 March 1897.

54 Ibid., 1736, 8 Sept. 1897.

55 Department of Militia and Defence of the Dominion of Canada, *Report for the Year ended 30th June, 1893* (Ottawa, 1894), Part 2, p. 42.

56 NA, RG9, II, E 1, Vol. 96, Register, 2117, 2 Nov. 1898, "Repairs to pipes & smoke connections of six furnaces at Fort Henry."

that they allowed the south curtain wall to deteriorate to such an extent that they had it torn down. A problem was first noted in July 1884 when the newly appointed Architect of the Department of Militia and Defence included $50.00 in the estimates to repair and point the arch over the entrance gateway to Fort Henry.[57] There is no record that this expense was approved or the repairs carried out. Four years later, the effect, perhaps, of ignoring the problem became manifest when Lieutenant-Colonel W. H. Cotton, the Commandant of the Royal School of Artillery, reported:

> I have the honor to report that a portion of the masonry composing the arch of Gateway to Fort Henry became detached & fell during the night of 31st August [1888]. The remainder of archway is now almost sure to follow and is, of course, more or less dangerous.
>
> The Frosts of the coming autumn & Winter will certainly demolish a large portion of the Gorge wall of Fort Henry.[58]

It is difficult to imagine that some action was not taken at least to shore up the arch, but the records are silent until August of 1889. Once again Cotton raised the alarm:

> I have the honour to direct attention to the ruinous condition of Fort Henry, Kingston.
>
> Portions of the Gorge Wall are momentarily in danger of falling, at more or less risk to those passing in and out and living in the Fort.
>
> Owing to the State of this Fort I have closed it to visitors.

This time the General Officer Commanding, Frederick Middleton, recommended that "authority be granted for the necessary repair."[59] Cotton's report was confirmed by a Board of Officers which reviewed the state of the fortifications in Kingston and found, in part, that Fort Henry was "in a ruinous condition. The Gorge wall falling down." Middleton endorsed the findings of the Board and appealed for repairs: "It appears a pity to let this work go to pieces, as it might be required some day."[60]

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[57] Ibid., Vol. 2, File A97, James to Caron, 23 July 1884.

[58] Ibid., J 1, Vol. 18, p. 255, Cotton to Adjutant General, 1 Sept. 1888.

[59] Ibid., A 1, vol. 229, File A9276, Cotton to Officer Commanding the Regt of Can. Artillery, 29 August 1889; note, Fred Middleton, 30 Aug. 1889.

[60] Ibid., Vol. 232, File A9631, "Report of Board of Officers...29th day of Nov 1889"; note: Fred Middleton, 5 Dec. 1889.

Figure 5 South curtain wall, 22 April 1897, just before it was pulled down. Note collapsed section and props holding up gateway. Ontario Archives, S974.

Whether Middleton's appeal had any effect is unknown for the records are again silent until the early spring of 1897. In March it was reported "that the archway at the approach to the inner enclosure at Fort henry is in a very unsafe condition, and temporary repairs are recommended." This amounted to propping up the arch while negotiations were carried on with a W. Newlands of Kingston as to whether to rebuild the arch and the gorge wall or to demolish it (see Figure 5). Initially, the Department of Militia and Defence authorized Newlands to take down the dangerous portions of the wall in early June and then on 10 July, the Minister approved the demolition of the whole wall. Throughout the summer and autumn of 1897, Newlands' workmen took down the wall and piled the debris in a line parallel to the demolished wall in the middle of the parade. Most of the work was completed by 9 November when the remainder was ordered to be left over to the spring. Since the wall contained latrines for the NCOs and their families living in the fort, Newlands was instructed to build dry earth closets to replace them.[61]

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[61] Ibid., E 1, Vol. 94, Register, 1621, record of correspondence.

In 1898, it was reported that "The roof at east and west ends of gorge well [sic] was repaired, and the ends of walls covered."[62]

The last note on the curtain wall occurred in 1903. In June, a C. M. Chisholm wrote to William Harty, MP for Kingston, asking that he be allowed to purchase the debris remaining in the middle of the parade for $500.00 to be used for building railway culverts. Harty pressed Chisholm's proposal with the Deputy Minister of Militia and Defence, Colonel Pinault, but the latter declined to accept the offer, claiming that the department intended to crush much of the stone for concrete work. The ashlar it could also use. Presumably over the next decade the debris was slowly removed by the department as it needed stone.[63]

The Final Decline

When the decision was taken to turn Fort Henry into a stores depot, it was clear that the fort had little value as a defensive work for the city and harbour of Kingston. As the nineteenth century drew to a close, the Canadian government established the Canadian Defence Committee in 1898 to consider a scheme of defence for the Dominion. The possibility of war between Great Britain and the United States over the Venezuela boundary in 1895 and more recently the danger of American encroachment in the Yukon brought Canadian defence policy to the attention of the Canadian government. In considering Fort Henry's role in the defence of Kingston, the Committee recognized that the 7-inch RBL Armstrong gun in Fort Henry had some value on the land front and suggested that two 64 pr RMLs be mounted on the lake front, presumably in the Advanced Battery. Local defence got lost in the enthusiasm of the South African War and nothing was done.[64] In 1902 and 1903 subsequent investigations by Canadian and Imperial officers found that Fort Henry had practically no value in the defence of Kingston.[65]

In May 1903, Lieutenant-Colonel R. W. Rutherford summarized the reasons for preferring Cedar Island over Fort Henry for the positioning of guns to defend the eastern river approaches to Kingston:

> The selection of Cedar Island in preference to Fort Henry is due to the

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62 Department of Militia and Defence of the Dominion of Canada, *Report for the Year ended 31 Dec. 1898,* Sessional Papers (No. 19) (Ottawa, 1899), Appendix No. 2, p. 8.

63 NA, RG24, Vol. 5894, File 40-2-1, Vol. 1, Chisholm to Harty, 29 June 1903; Harty to Pinault, 30 June 1903; Pinault to Harty, 2 July 1903.

64 Preston, op. cit., pp. 233-4, 244-9.

65 NA, RG24, Vol. 2268, File HQS-10, Vol. 1, "Defence of Kingston Ont", T. E. Naish, 17 Dec. 1904.

> much more advanced position it occupies and to the more extended water area it commands, though Fort Henry is higher, is too much enclosed for an extended command, Cedar Island masks its fire over a large area of dead water and would enable boats to creep up to within close range before coming under fire. On the other hand, Cedar Island has a sufficiently high command to give full effect to the use of automatic sights and is therefore much preferred in every way.[66]

Even in terms of land defence, Fort Henry had only a good view up to the road past Barriefield. Beyond that there was good cover for artillery to bombard Kingston unseen from the fort.[67] In the opinion of Captain T. E. Naish, an imperial officer, Royal Engineers, Fort Henry had only a modest royal to play: "Fort Henry will form a good barrack for the off-duty Artillery reliefs of this [Cedar Island] battery, as well as for the reserve of the land defences on this side."[68]

It is against this background that the Canadian authorities had to consider the monetary demands to maintain Fort Henry. It is not surprising then that, while the local officers were concerned about the state of the fort, the politicians and senior bureaucrats in Ottawa were unsympathetic. In May 1903, the litany about the failure of the walls began: "May 22nd Memo from the G.O.C. stating that owing to frost and weather the walls have fallen down in several places in large quantities."[69] There is no record of what, if any, action was taken to repair the destruction.

Almost two years later the Fortress Commander, Kingston, reported that the walls had fallen or were about to fall down:

> I have the honour to report that owing to the effect of frost the exterior facing and other walls at Fort Henry have fallen down in several places, and in large quantities.
>
> In one place at outer side of ditch it has fallen in such a manner that steps are formed by which means anyone can enter the Fort without going through the main gateway, and the District Gunner in charge would have no knowledge of the same, although he is held responsible for the safety of the arms etc, which are stored there.
>
> In several other places the walls are bulging out to such an extent that they are liable to fall down at any moment and I fear that unless something is done at

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66 Ibid., Rutherford to General Officer Commanding, 16 May 1903.

67 Ibid., Vol. 2268, File HQS-10, Vol. 1, "Defence of Kingston Ont", T. E. Naish, 17 Dec. 1904.

68 Ibid., "Kingston Harbour", T. E. Naish, 15 May 1903.

69 RG9, II, E 1, Vol. 102, Register, 4196, 26 May 1903, "Repairs to face walls at Fort Henry."

once, the Fort will soon become a total wreck.[70]

In response to this plea, Lieutenant-Colonel Weatherby of the Royal Canadian Engineers minuted to the master General of the Ordnance: "What is the policy with reference to the repairs to this fort. It is practically useless as a defence work."[71]

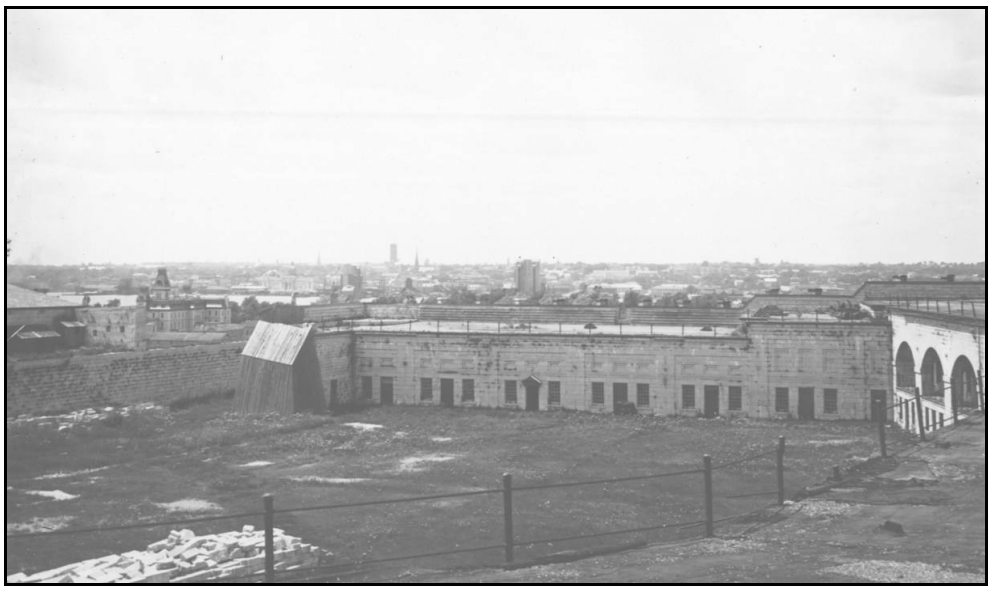

Figure 6 West officers' quarters, Fort Henry, circa 1910. Note remains of south curtain wall and rubble in parade. Marsden Kemp, Ontario Archives, 10003972.

In December 1905, Lieutenant-Colonel Willoughby Gwatkin, Director of operations to the Chief of the General staff, visited Fort Henry. His report echoed that of the Fortress Commander:

> As regards trace and site, the work is faulty in the extreme. It has been neglected, and, though solidly built, it is in a bad state of repair. The expense of restoration would be great, and could not be justified.

Aware that the proposal to mount modern guns on Cedar Island had not been implemented, he suggested that in the meantime Fort Henry be turned into a smaller work armed with modern weapons. "Meanwhile," he wrote, "a small sum could be provided in the Estimates to stay the further progress of decay." He then went on to describe the present use of Fort Henry:

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70 RG24, Vol. 5894, File 40-2-1, Vol. 1, The Fortress Commander, Kingston, to the Secretary, Militia Council, Ottawa, 25 April 1905.

71 Handwritten note on Ibid, 27 April 1905.

> Following the not uncommon fate of permanent fortifications, the work is used to some extent as a warehouse for ordnance stores. This may be convenient as a peace arrangement; but it would be highly objectionable to collect[,]in a situation so exposed to attack, equipment which would be required on mobilization.[72]

The future of Fort Henry remained unresolved until January 1907 when the Secretary to the Militia Council reminded the Chief of the General Staff, Sir Percy Lake, that a decision on modifying the existing fort had been outstanding since July 1905. Lake temporized and recommended "that for the present our attention be confined to taking steps to prevent further decay in the walls and buildings." The bureaucratic wheels ground slowly, and in October the Master General of the Ordnance suggested that $25,000.00 be placed in the estimates to repair the walls at Fort Henry. Not surprisingly, this sum was reduced to $12,500.00 and then eliminated altogether.[73]

Figure 7 Northeast corner of the Redoubt, circa 1910. Note the powder magazine blast wall, with collapsed roof, and the pump into the water tanks. Marsden Kemp, Ontario Archives, 10003975.

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72 Ibid., Gwatkin to CGS, 5 Dec. 1905.

73 Ibid., Jarvis to Lake, 26 Jan. 1907; Lake to Jarvis, 28 Jan.. 1907; MGO to DES, 7 Oct. 1907; note, 25 Oct. 1907; Maunsell to MGO, 9 June 1908.

The state of the fort was also beginning to be noted, and deplored, beyond military circles. In May 1908, Clarance Warner, President of the Lennox and Addington Historical Society, wrote to the Minister of the Interior, Frank Oliver, regretting that European and American visitors to Kingston must see such a "wreck." Oliver passed Warner's letter on to Sir Frederick Borden, the Minister of Militia and Defence, who, while pointing out that the fort had no military value, promised to lay the question of its future before the Militia Council.[74] But nothing was to be done. The Director of Engineer Services, Major Maunsell, held out a slight hope:

> To renovate Fort Henry works, completely, would take a very large appropriation, but there are parts of the old fortification which could be restored by early action, though as already reported of no use as a fortress.[75]

Figure 8 East ramparts of Fort Henry with 24-pr. gun on dwarf traversing platform in foreground, Armstrong gun to the rear, circa 1910. Note the board and batten covering of the parapet. Marsden Kemp, Ontario Archives, 10003974.

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74 Ibid., Warner to Oliver, 19 May 1908; Oliver to Borden, 22 May 1908; Borden to Oliver, 26 May 1908.

75 Ibid., Maunsell to MGO, 9 June 1908.

Lieutenant-Colonel Gwatkin, in evaluating the military value of Fort Henry once again, reaffirmed his previous opinion that new works were necessary. Then he added:

> Meanwhile, though faulty both in trace and site, Fort Henry is better than nothing at all; it contains barrack and storage accommodation; and, at any rate until guns have been mounted on Cedar Island, I do not think it should be entirely abandoned.[76]

And so it went, the old fort slowly disintegrating. In April 1910, the District Engineer wrote:

> I have the honour to repeat that a large portion of the main masonry wall on the North side of Fort Henry has collapsed thus leaving the interior exposed.
>
> I also notice that a considerable portion of the masonry of the passageway down to the Martello Tower has also fallen in.

He then asked that he be allowed to remove some of the stone to be used for the alteration and repairs to barracks or at the Royal Military College, which request was approved by the Militia Council.[77]

The collapse continued. In December 1912 the local commanding officer informed his superiors:

> I have the honour to state, for the information of the Minister in Militia Council, that the C.R.C.E. [Commanding Royal Canadian Engineer] 3rd Division, reports that about fifty feet of the outer stone wall at Fort Henry, has fallen into the ditch.
>
> This is that portion of wall in rear of that part of Fort Henry formerly occupied as Officers' quarters, and facing the "drawbridge" over the West ditch.
>
> This portion of wall that has now collapsed is a continuation of a part that fell at some previous period, and the walls cannot be rectified unless there is a special grant for re-building and shoring up of same.[78]

And so it would have continued but for the First World War.

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[76] Ibid., Gwatkin to Secretary [of Militia Council?], 16 June 1908.

[77] Ibid., Hughes to DOC, MD3, 18 April 1910; MGO to DOC, MD3, 17 May 1910.

[78] Ibid., Officer Commanding 3rd Division to Secretary of Militia council, 10 Dec. 1912.

Chapter 3

From Prisoner of War Camp to Historic Site 1914 – 1957

The First World War

With the coming of war in Europe in August 1914, the military authorities found a new use for Fort Henry – as an internment camp, first for "enemy aliens", and then for German prisoners of war. When the British Empire – and therefore Canada – declared war on Germany and Austria-Hungary, Anglo-Canadians became suspicious of their fellow countrymen of German or Austrian descent who, even if naturalized or Canadian born, were seen as "enemy aliens". On 28 October 1914, the Canadian government, responding to increasing public pressure, passed an Order-in-Council under the War Measures Act requiring the registrations of enemy aliens, i.e., those residents of Canada who were not Canadian citizens. Some 85,000 turned up to register and over 80,000 were duly registered and sent home. The remainder were arrested and sent to internment camps, one of which was Fort Henry.[1]

It is not clear how Fort Henry was prepared for its new occupants. Presumably certain security measures were taken, such as putting up barbed wire barriers, building sentry posts, closing possible escape routes, and furnishing the casemates for occupation by the internees. In November, Major General Sir William Otter, the officer commanding internment operations, visited Kingston where Fort Henry was being readied to receive some 400 internees. Perhaps Otter was appalled by what he saw because Fort Henry's first stint as an internment camp was short lived, for by December, Otter was transferring detainees to a new camp at Petawawa.[2]

Fort Henry's second stint as an internment camp began in July 1915. This time it was German prisoners-of-war, both officers and men, who were housed in the casemates. They were to remain there until April 1917.[3] Whatever repairs were made to the fort in 1914-1915, however, could not remove the effect of years of neglect. Almost immediately the alarm was sounded that there appeared to be some danger of the facing stones falling from the walls. The Acting Commanding Royal Canadian Engineer reported:

> ...on the night of the 25th inst. [July] a movement took place in a portion of the structure, particularly on the East side of the compound where the German officers have their quarters. This movement has caused several new fractures in the face stones and lintels over openings, also some alarm amongst the prisoners.

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1 John Herd Thompson, *Ethnic Minorities During Two World Wars*, Canada's Ethnic Groups, Booklet No. 19 (Ottawa: Canadian Historical Association, 1991), pp. 4-7.

2 Desmond Morton, *The Canadian General: Sir William Otter* (Toronto: Hakkert,1974), p 330.

3 NA, RG9, II, F 9, File MD3, Internment Station Fort Henry July 1915-May 1917, Pay lists of Active Militia.

The trouble seems to be confined to the stone walls only and particularly the facing, the vault arches (brick) are intact, but there are cracks between arches (vaults) and walls at ends of same, showing that the walls are moving.

The cause of the trouble is briefly the same which has caused so much of the facing of the walls throughout the Fort to fall away i.e. the entrance and subsequent freezing of water in the wall, the fault being in some cases want of pointing, and in the case in hand the defective roof covering this portion of the structure.

This roof...is in an almost hopeless state of repair, without going to considerable expense. It was thought that the trouble might be tidied over, but the recent occurrence shows the condition to be more grave than appears on the surface, and that something must be done to help the water out.

We are now shoring up the wall were the movement took place and will strip a portion of the roof above to ascertain what will be necessary to make the roof tight.[4]

British and Canadian officers from the previous century, had they been there, would have experienced a sense of *déjà-vu*.

Figure 1 East wall of Redoubt, May 1917: note the props holding the wall up. Detail from G. E. Marrison, National Archives of Canada, C-043233

[4] NA, RG24, Vol. 5894, File 40-2-1, Part 1, Officer Commanding 3rd Division to Otter, 30 July 1915.

Figure 2 West wall of Fort Henry, circa 1917: note the props holding up the walls. National Archives of Canada, PA-046186.

In September, the Officer Commanding the 3rd Division reported on the work in progress in the fort. The stone walls had been shored up by a civilian carpenter. "The prisoners were not employed on this work as it required skill and speed in the carrying out and neither are conspicuous with the prisoners." Photographs of the interior of Fort Henry taken during this period show the shoring up of the interior walls of both the east and west casemates (see Figures 1 and 2). The roof over the officers' quarters in the east casemate was investigated:

> A portion of the roof over the defective wall has been treated as follows: the old block roof removed and the area covered with boarding and ready roofing and a narrow board walk laid over the roofing for the passage of the sentries. This area is the section near the flag pole and over the prisoner officers' kitchen.
>
> A considerable area of the roof over the prisoners quarters requires attention. This is block (pavement) with the blocks badly rotted, and I consider that a treatment of tar concrete will be best for this as a temporary expedient and to avoid unreasonable expense.

According to Ronald Way, who would become Director of Old Fort Henry, "To make the casemates passably habitable for prisoners, a wooden roof, overlaid with asphalt roll roofing, was constructed to cover both the terreplein of the rampart and the parapet."[5]

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[5] Ronald L. Way, "Report of the Structural Condition of Fort Henry, August, 1965", unpublished report prepared for the Department of Tourism and Information, p.10.

Th commanding Officer also reported that the entrances to the passages leading to the reverse fire chambers were being built up, that is, closed. There must also have been some problems with the retaining walls of the entrance way to the fort through the ditch wall: "Work is still in progress on retaining walls to driveway to lower court. The labour on this is by prisoners except one foreman."[6]

The record is incomplete but it is clear that various repairs were carried out through the remainder of 1915 and in 1916. A Kingston newspaper in July 1916 reported that:

> A number of improvements are being made to the Fort. Cement floors are being laid in the corridors, and new flooring in the rooms, and the drainage is being improved. Progress is being made with the new roof.[7]

A squabble between the Department of National Defence and the Director of Internment

Figure 3 West and north casemates of Fort Henry, 1917. Note roof on north casemates. G.E. Marrison, National Archives of Canada, C-023474.

Operations over who would pay for repairs to the fort reveals that there was a long series of what appear to be minor maintenance problems. Accounts were rendered for carpentry, plumbing, masonry, painting, and electrical work. Such items as fences, gates, sentry boxes, and window frames were repaired or replaced. There were a number of accounts for roof repairs, an account for closing in staircase to postern [?], others for closing drains to prevent escapes, and for shoring up buildings in the lower fort. None of these seem to be major items but, except for the shoring up, repairs of normal wear and tear to keep the redoubt more or less habitable until the war was

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6 NA, RG24, Vol. 5894, File 40-2-1, Part 1, Officer Commanding 3rd Division to the Secretary Militia Council, 4 sept. 1915.

7 Fort Henry Archives, Peach Scrapbook, [Kingston Standard, July 1916 ?].

over.[8] As it turned out, for Fort Henry, the war was over in April 1917 when the prisoners left; in May Quarter Master Sergeant Anderson tidied up and turned the fort over to a caretaker.[9]

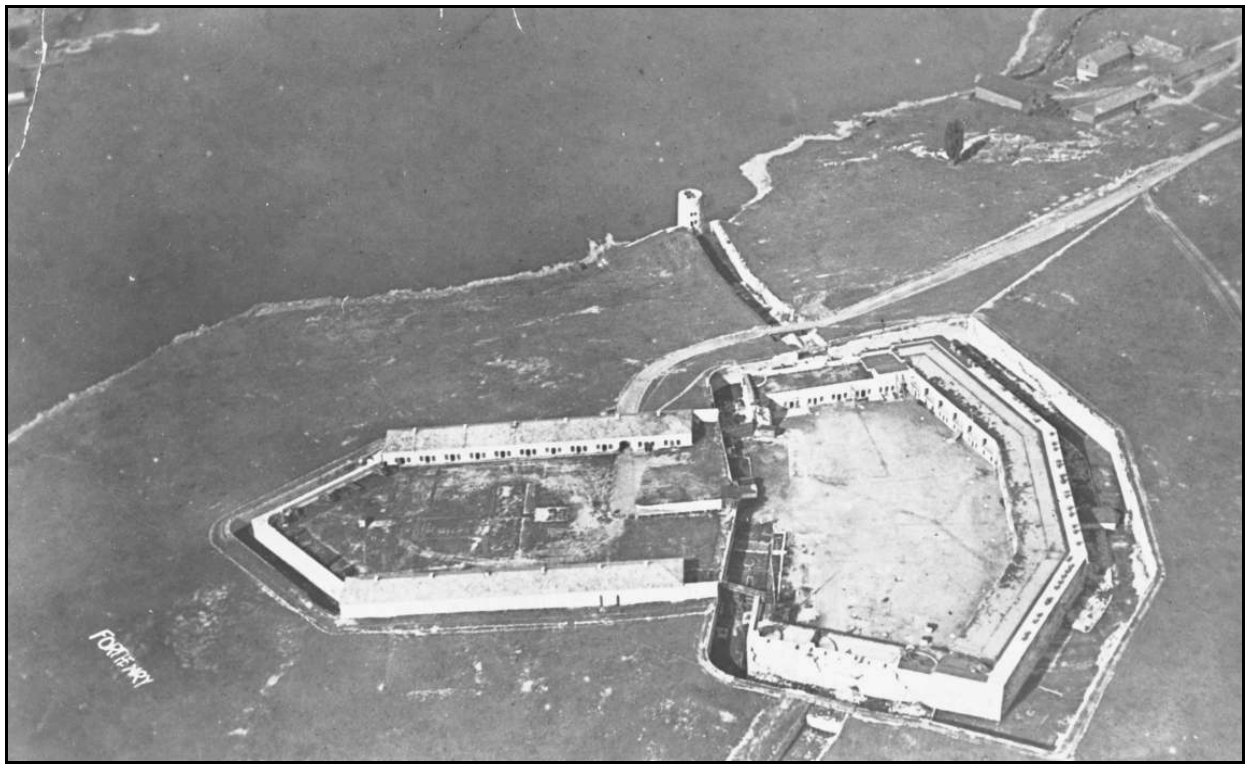

Figure 4 Aerial view of Fort Henry, 1919. Bishop Barker Co., National Archives of Canada, PA-30467.

Between the Wars

The First World War had provided a brief respite in the disintegration of Fort Henry, but with the removal of the prisoners-of-war the Canadian government still faced the problem of what to do with a militarily obsolete fort. In the next two decades, the Canadian military authorities cast about for a solution as they realized that as its military value slipped into the background its historical value came to the fore. The problem was that the military had no mandate to preserve historic monuments, especially as the price tag in the case of Fort Henry would be substantial. In

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8 NA, RG24, Vol. 5894, File 40-2-1, Part 1, Otter to DM, Dept. M&D, 11 Jan. 1917; Statement of Accounts attached to Deroche to Master General of the Ordnance, 6 March, 1917: GOC, MD3, to Secretary, Militia Council, 20 March 1917; GOC, MD3, to Secretary, Militia Council, 17 April 1917.

9 NA, RG9, II, F 9, File MD3, Internment Station Fort Henry July 1915-May 1917, Pay list of Active Militia, May 1917.

1920, the officer commanding Military District No. 3, Brigadier General W. B. King, described the situation well:

> While I realize that this Fort is of no Military value, it has a very great historical interest, and is of the utmost use to us for storage of stores that are surplus to what we can house in our Ordnance. Further all the ammunition of this District is stored in this old building. The walls around the Moat are gradually falling down, the wall on one side of the moat forming the outer wall of the Fort itself. It is considered that if this Fort is not to be allowed to crumble away finally, something should now be done. I, therefore enclose an estimate of the cost, and a further estimate of the cost of making it fit for habitation.[10]

King prepared an estimate for $211,000.00. The Minister's immediate reaction has not been recorded, only his Deputy's understated note: "Minister says that no such expenditure can be incurred this year."[11]

It will be recalled that the historical importance of Fort Henry had been brought to the government's attention before the First World War by Clarance Warner of the Lennox and Addington Historical Society. In 1922, the Historic Sites and Monuments Board expressed some interest in the fort, indicating that the Board considered it of national importance and that it should be preserved and restored. The Deputy Minister of the Department of the Interior (to whom the Board reported) enquired if the Department of Militia and Defence might consider transferring it to Interior while reserving whatever storage space was necessary. Sir Eugene Fiset, Deputy Minister of Militia and Defence, replied that there was no other storage facility for ammunition and explosive stores in Ontario and, therefore, Fort Henry could not be transferred. He then went on to make the remarkable offer that he would have no objection to Interior doing the work of preservation and restoration. Because of the presence of explosives, however, the fort could not be opened to the public. In May 1923, the Board handed the ball back to the newly named Department of National Defence, passing a resolution urging "the expediency of the speedy execution of needful repairs to arrest dilapidation and prevent further decay."[12]

The Department delayed and in the winter of 1925 a large portion of the walls of the Redoubt collapsed exposing some of the ammunition. The DOC was instructed to remove the endangered supplies and report on the situation.[13] The report of the District Engineer gives us a snapshot of the state of the Casemated Redoubt in the summer of 1925.

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[10] NA, RG24, Vol. 5894, File 40-2-1, Part 1, King to Secretary, Militia Council, 23 Dec. 1920.

[11] Ibid., handwritten note on Morrison to Fiset, 5 Jan. 1921.

[12] Ibid., Cory to Fiset, 4 Feb. 1922; Fiset to Cory, 14 March 1922; Extract from Minutes of Historic Sites and Monuments Board Meeting, 29 May 1923.

[13] Ibid., memo from Quartermaster General, 12 March 1925.

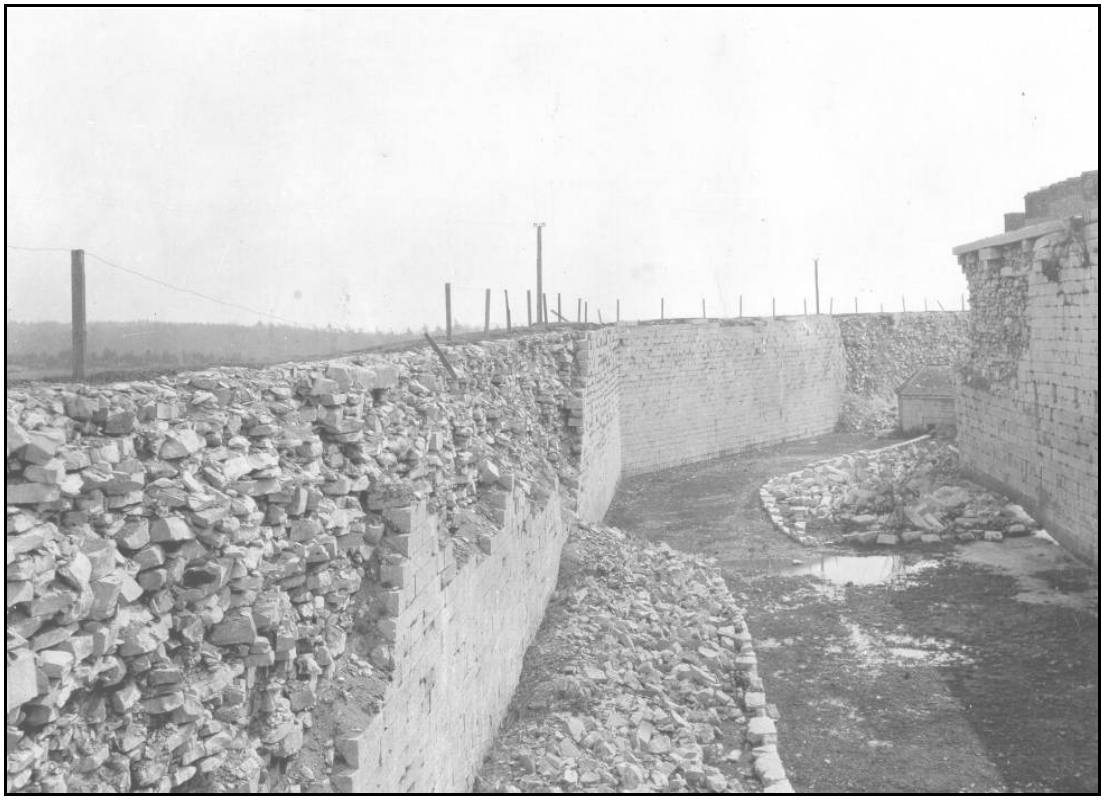

Figure 5 North ditch looking northeast, 1922. Parks Canada, 1205.

Figure 6 West and north casemates, 1922. Cf Figure 8. Parks Canada, 1206.

> Considerably more than half of the facing stone on the outside wall of the lower battery [Casemated Redoubt] has fallen into the moat, and the balance is very loose and liable to fall at any time. The rubble masonry back of the facing is in good condition; but, as the joints between the roofing stones [i.e., the stones of the slope of the rampart] are opening up, the rubble will deteriorate rapidly. Owing to the falling of the face, the roofing stones have tilted in many places, and pointing would not give any good results.
>
> On the inside of the lower battery, many of the main columns separating the arches are very badly cracked, and, I consider, that the portion of the gallery near these pillars is in a very dangerous condition. The parts of the facing that were shored up a few years ago, have opened up during last winter, and unless a considerable amount of work is done, the stones will probably start falling into the court yard after another season.
>
> A part of the casemates on the lower battery are being flooded, owing to the condition of the walls; and, I know of no way to prevent this other than by carrying out extensive repairs, and it would be extremely difficult to give even an approximate estimate of the cost. I understand that a few years ago a rough estimate of $70,000.00 was given. At the present time, the cost of restoring would be three or four times that amount. It might, however, be possible to face the outside walls with concrete, and repair the arches by pointing, for a smaller amount. If this is done, the rock for the concrete could be supplied on the work by using a rock crusher in the moat and crushing up the old stone facing. For work of this description, it would be very difficult to let any contract, and it would probably have to be carried out on either a "cost plus" basis, or by day labour.[14]

To summarize: much of the scarp wall has fallen or was about to fall and because of this the stones of the slope of the parapet were separating and moving out of position. In the interior, some of the piers to the arches were cracked and the facing that was shored up during the First World War was separating and in danger of falling. Some of the casemates were flooded. Altogether a most disturbing report (see Figures 5 and 6)!

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[14] NA, RG24, Vol. 5894, File 40-2-1, Part 1, Hill to Secretary, DND, 27 July 1925.

Figure 7 Collapsed section of east wall, officer's quarters. Note arches and dos d'anes, July 1931. Eric Arthur, Ontario Archives, 10002554.

Figure 8 West wall; note supports, July 1931. Cf Figure 6. Eric Arthur, Ontario Archives, 10002550.

Figure 9 North ditch, looking northwest, caponier in centre, circa 1928. Note corral for stone underneath wall. M.O. Hammond, Ontario Archives, 10001705.

By 1925, DND was constructing new magazines at Petawawa and could move some of the endangered ammunition to that base; the rest could go into the Advanced Battery. The Deputy Minister, G. J. Desbarats, having initially rejected its suit, then turned to the Department of the Interior again, enquiring if it were still interested in the transfer of the fort. As a sweetener, he indicated that eventually all ammunition would be removed, even from the Advanced Battery. W. W. Cory, the Deputy Minister of the Interior replied that the offer would be considered by the Historic Sites and Monuments Board; in March 1926 it was still considering.[15] The Department of the Interior was not about to accept responsibility for this decayed fortification. Even if the Advanced Battery was in good condition, in 1930, the Commanding Officer MD No. 3 reported that the Redoubt "is beyond repair, without the expenditure of many thousands of dollars, as a historic site."[16] Repairs were made to the Advanced Battery in 1928 and 1929, but no records have been found of any work being done to the redoubt. (The records way be incomplete, but it is clear that DND would not countenance any major outlay.)

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[15] Ibid., Desbarats to Cory, 18 Aug. 1925; Cory to Desbarats, 28 Aug. 1925; Cory to Desbarats, 11 March 1925.

[16] Ibid., Anderson to Quartermaster General, 9 June 1930.

In the early 1920s pressure had come from the Department of the Interior and the Historic Sites and Monuments Board to repair the fort; in the 1930s it came from The Architectural Conservancy of Ontario. Incorporated in 1933, this charitable society was founded by Professor Eric Arthur and other concerned individuals "...to conserve for the people of Ontario the architectural and historic buildings of the Province as well as land of particular beauty, historic interest or great public amenity." The Conservancy believed that there was no finer example of a military fort in North America than Fort Henry, but it deplored its condition as one of the foremost examples of historic buildings in disrepair. In support of its hope that Fort Henry could be made safe for the public to enter and enjoy, in October 1933, Anthony Adamson , the Honorary Secretary of the Conservancy, sent to Major General A. G. L. McNaughton, the Chief of the General Staff, a report on the condition of Fort Henry, together with recommendations for repairs to make the fort safe for visitors (see Appendix 9).[17]

The report of the Conservancy echoed in many ways the description of 1925 in relation to the ditch walls and the facing of the parade walls of the casemates, but, surprisingly, it found little evidence of water leakage problems in the interiors of the casemates. About one-half of the facing stone of the scarp and counterscarp had fallen into the ditch and the remainder was in imminent danger of coming down as well. The rubble masonry walls underneath were sound and in no immediate danger of collapse (see Figure 9). The "enfilading gallery in the moat" (presumably the caponier was meant) was in good condition, except for a foot or more of water. The arches and piers supporting the ramparts were said to be sound and, except in a couple of instances in the centre range of the north casemates, there were no signs of rain penetration.

The north casemates was generally in good condition, both inside and out. Except for about 50 square feet around three windows in the upper floor, the stone facing was sound. One pier in the gallery on the upper floor had two chipped and displaced stones but it was not dangerous. The wooden roof was tarred and gravelled, but it was not water tight and some of its joists were rotten. The parapet was cracked in several places. Finally, two of the brick chimneys were unsound (see Figure 10).

While their interiors were said to be in good condition, the exteriors of the west and east ranges of casemates were in danger of total collapse. The facing of the west range was bulging in two places and three shores were in place to prevent its collapse (see Figure 8). The platform above was sodded[18] and the parapet, which had lost its wooden covering, was cracked. There were no guns on the ramparts. The east range of casemates was in far the worst shape. Parts of the face had already fallen, blocking two doorways, and the remainder would fall if the shoring were removed (see Figure 7). "The platform...was at some time covered with a stepped sloping concrete floor which is no longer watertight at the step and at the outside edge." (Was this

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17 Ibid., Adamson to McNaughton, 13 Oct. 1933.

18 It is not clear what Adamson meant by sodded; an actual earth covering or does it merely indicate grass and plants growing thickly in the gravel covering?

repairs from the First World War?) The parapet has lost its wood covering and was badly cracked. There were three smooth bore muzzle loaders (Carron 1806) and the Armstrong 7-inch RBL on the ramparts; one of the smooth bores was dismounted as its carriage had collapsed. Finally, the two staircases to the reverse fire galleries were still closed off at the bottom.[19]

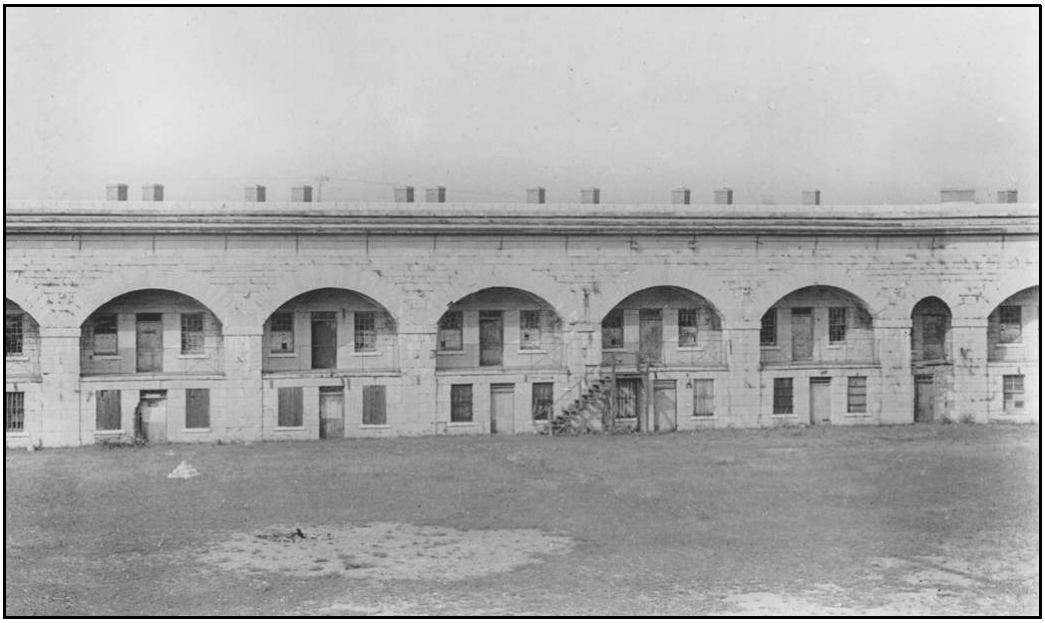

Figure 10 Part of north casemates; note roof. Stairway possibly left over from POW camp. Eric Arthur, Ontario Archives, C57-2-56_1.

In Ottawa, Adamson met with a Major Turner on 17 October 1933 to outline his proposals to renovate Fort Henry. According to Turner's memorandum to McNaughton, Adamson did not propose extensive repairs, merely sufficient to make the fort safe for visitors and to prevent further deterioration. He also suggested that if DND removed its explosive stores from the Advanced Battery, perhaps the fort could be turned over to Parks Branch of the Department of the Interior if that department were willing to assume responsibility for the maintenance of the structure. McNaughton was not much impressed by Adamson's proposal, minuting to the Quartermaster General: "I do not think that these proposals add anything to our knowledge of the situation. I do not believe the Parks Branch would take the fort over even if we could give it up which we cannot."[20]

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19 Ibid., "A Report of The Architectural Conservancy of Ontario[,] Fort Henry, Kingston" accompanying Adamson to McNaughton, 13 Oct. 1933.

20 Ibid., Memo, Turner to McNaughton, 18 Oct. 1933.

Salvation came from an unexpected source. In September 1935, R. M. Smith, Deputy Minister of Highways of Ontario, approached the Chief of the General staff with a proposal. Smith revealed that his department was interested in preserving and restoring historic sites in Ontario, such as Fort Henry, as tourist attractions. He wanted to know if the Department of National Defence would consider repairing Fort Henry so that it could be opened to tourists. If a long term program of repairs could be worked out, Smith thought that the province would consider collaborating with the federal government.[21]

The Department of National Defence was sympathetic to this idea, but once again attempted to turn Fort Henry over to the Department of the Interior, the department responsible for the federal historic sites program. Once again Interior decline to act.[22] While National Defence dithered, the Ontario Department of Highways made a proposal to Norman McLeod Rogers, the Minister of Labour and Member of Parliament for Kingston. Rogers put the offer before Ian Mackenzie, the Minister of National Defence:

> The Government of the Province of Ontario has offered through its Department of Highways to do certain work in connection with the restoration of Fort Henry at Kingston and the Dominion Government proposes to assist in this work as an Unemployment Relief project.
>
> It is proposed to engage an architect who has had experience in work of this sort and his plans for the reconstruction will be submitted to you for your approval if you are prepared to grant the necessary permission for this work to be undertaken.[23]

The Department of National Defence was quite happy to agree to this proposal and over the next two years negotiated an agreement to turn over Fort Henry and adjoining land to the care of the Ontario Department of Highways. The agreement provided that the commissariat storehouses could be used by National Defence until alternative storage space could be found.[24] The agreement was to come into effect on 1 September 1938, to be renewed yearly.

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21 Ibid., Memo, "Notes of a Meeting in the office of the C.G.S. at 10:45 on Tuesday, September 10th [1935]."

22 Ibid., LaFleche to Wardle, 21 Oct. 1935; Wardle to LaFleche, 15 Nov. 1935.

23 Ibid., Rogers to Mackenzie, 29 May 1936.

24 The negotiations can be followed in OA, RG14-153-1 [1937], File 472.6, Reel MS 3908 and [1938], File Misc 38, Reel MS 3916, passim. For a more detailed discussion of the negotiations see, Fort Henry Archives, Stephen D. Mecredy, "From a Pile of Stone to Living History Museum, the Fort that Nobody Wanted: The Restoration of Fort Henry Fifty Years Ago – 1936 to 1938", unpublished paper, Sept. 1988

Restoration

Even before Fort Henry was turned over to the Ontario Department of Highways, an architect and engineers were planning its restoration. The Deputy Minister of Highways, R. M. Smith, was very much involved with the project and he was aware that it was quite different from building a highway. He explained his thinking:

> In the development and renewal of the Fort at Kingston so much of the old structure had been destroyed it was necessary to have an architect prepare plans in addition to supervising the actual work. This project is a little different from highway work which would, of course, be supervised and handled by our own engineering staff.[25]

To prepare the plans and supervise the restoration, Smith hired the Toronto architect William Lyon Somerville.

It was a major project and yet there was little time for planning in June of 1936.

> Our thought [wrote Smith], providing permission is given as to allow us to go ahead with the work, is that the outside wall of the main building would be considered first. Architects and contractors have made an inspection and we hope in the very near future to have a tentative arrangement with contractors allowing us to proceed.[26]

Indeed, a high powered delegation had visited Fort Henry on 9 June to begin the process. On that Tuesday, Somerville, accompanied by the Minister of Highways, T. B. McQuesten, his deputy minister, R. M. Smith, and Herb Frid, a Hamilton contractor, met Lorne McDonald, the representative of the Minister of Labour, Norman McLeod Rogers, at Kingston to look over Fort Henry.[27] Their impressions of the fort have not been recorded, but according to Ronald Way "...the structure had deteriorated almost past the point of no return. Leakage of the casemates was so severe that water streamed down all the interior walls which were, in many places, covered with a thick, green fungus."[28] Over the next few weeks, Somerville, in consultation with Smith and Frid, worked out the initial plans for the restoration of Fort Henry. On 19 June, he sent preliminary specifications (dated 16 June) for the work on the outer walls to Deputy

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[25] OA, RG14-153-1, File 472.6, MS 3889, [Smith] to Hereford, 29 July 1936.

[26] Ibid., Smith to Noonan, 15 June 1936.

[27] Queen's University Archives, Somerville Diaries 1932-1936, Tues. 9 June 1936.

[28] Way, op. cit., p.10.

Minister Smith (see Appendix 10).[29] Somerville visited Fort Henry from time to time in June and July as he developed the restoration plans in his Toronto office.[30] By 21 July plans and specifications for the first stage of the restoration had been submitted to, and approved by, the Department of National Defence.[31] On 30 July, the Department of Highways awarded the first contract for the restoration of Fort Henry to the Frid Construction Company Ltd of Hamilton, Ontario, for $72,288.50.[32]

The preliminary specifications that Somerville prepared were for work on walls "A", "B", and "C", that is the south wall of the west demi-bastion, the west scarp wall, and the northwest scarp wall.[33] The ditch was to be grubbed down to the "natural level", the facing stones were to be removed carefully from the walls, the rubble masonry walls were to be stabilized, repaired, and the facing stones and coping were to be replaced as they were originally. Since the facing stones were to be reused, they were to be taken down carefully and if damaged to be squared and edged. Similarly, care was to be taken in dealing with the rubble masonry walls to prevent their collapsing. Where necessary they were to be shored up to prevent injury to the workmen and loose masonry was to be replaced or built up before the facing stones were replaced. The stones were to jointed with cement mortar and pointed to a depth of ½ inch with the same material (one part cement to one and one-half parts sand). The top of the masonry wall was to be covered with a coating of cement mortar, "floated finish", and then with a heavy coating of membrane waterproofing. The coping stones were to be laid at the same angle as the originals and they were to be anchored together and jointed with "waterproofing compound".[34]

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29 OA, RG14-153-1, File 432.36-87, MS 3889, Somerville to Smith, 19 June 1936.

30 Queen's University Archives, Somerville Diaries 1932-1936, June-July 1936, passim.

31 OA, RG14-153-1, File 472.6, MS 3889, Dickson to Smith, 21 July 1936.

32 OA, RG14-153-1, File 432.36-87, MS 3889, letter of notification, 30 July 1936.

33 OA, Somerville Drawings, Drawing No. 305; copy available at PWGSC in Gatineau.

34 OA, , RG14-153-1, File 432.36-87, MS 3889, "Specifications", 16 June 1936.

Figure 11 East ditch, looking north, reconstruction of counterscarp. Note railway to move material; facing moved forward slightly from original position. Fort Henry Archives.

Presumably the preliminary specifications, modified and expanded to some degree no doubt, governed this first contract awarded to Frid Construction at the end of July. Although there was much less detail in the contract, it was similar to the preliminary specifications. It called for grubbing and earth excavations, removing existing stone and erection of stone facing and coping to the ditch walls, anchoring the rubble walls, cutting loopholes, waterproofing, and rebuilding the chimneys (See Appendix 11).[35] Frid Construction moved ahead with the work quickly and by about 21 August the company submitted its "first progress estimate" for the work done for $15,121.50.[36] No other invoices have been found for 1936, but presumably the work continued on schedule. In September, there were negotiations with the federal government, which was paying part of the cost, to continue the work, "such as pouring concrete and shaping up some of the stone work", into the winter.[37] On 12 December, Frid Construction was notified that the contract was extended to cover additional work:

> Removing existing facing stone and erecting of stone facings to existing walls, 27,000 cubic feet
> Coping Stone, 5,000 cubic feet

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35 Ibid., letter of notification, 30 July 1936.

36 Ibid., Provincial Auditor to Smith, 21 Aug. 1936.

37 OA, RG14-153-1, File 472.6, MS 3889, Chief Engineer to Smith, 10 Sept. 1936.

The cost of the additional contract was between $45,000 and $46,000.[38] Perhaps this extended the contract to the restoration of the north and northeast faces of the counterscarp.

Figure 12 Officers' Quarters, east casemates. Facing entirely removed. Fort Henry Archives

With the extension of the contract in December, work, weather permitting, probably went on during the succeeding winter months. Then early in February, Frid Construction submitted a proposal to the Department of Highways to supply 15,000 cubic feet of stone facing for Fort Henry, an amount which would keep the workmen going well into March (the end of March being the end of the fiscal year):

> Stone for the outside facings to be supplied in lengths from two feet to five feet, and beds from eight inches to seventeen inches. Inside facings in smaller sizes as required.

The Deputy Minister recommended that Frid's tender of 15,000 cubic feet for $10,500 be accepted, and on 10 February Frid Construction was notified that this addition had been made to its contract.[39]

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38 OA, RG14-153-1, File 432.36-87, MS 3889, Chief Engineer to The Frid Construction Co., 22 Dec. 1936. The cost is smudged in the document.

39 Ibid., Frid Construction to Smith, 2 letters, 3 Feb. 1937; Assistant Engineer to Frid Construction, 10 Feb. 1937; File 472.6, MS 3908, Smith to McQuesten, 6 Feb. 1937.

Figure 13 Officers' Quarters, west casemates, facing entirely removed. Fort Henry Archives.

Figure 14 Beginning to build the south curtain wall. Facing on west casemates completely rebuilt. Some work being done on north casemates. Fort Henry Archives.

For the next fiscal year, the restoration of Fort Henry was divided into two contracts, one for road work, which need not concern us, and the other for the fort restoration.[40] The latter contract was awarded to Frid Construction for $305,448.50 (see Appendix 12).[41] The contract called for the grubbing of the east ditch and the restoration of the east scarp and parapet, as well as the complete counterscarp of the fort. In essence, the restoration of the scarp, counterscarp, and the parapets was to be completed. Moreover, the firing steps and the terreplein were also to be relaid. The terreplein was described as "Concrete roof slab reinforced over fill throughout...23,000 sq. ft.". According to Ronald Way, "...a six-inch reinforced concrete slab, with mastic expansion joints at appropriate intervals was laid over the entire terreplein of the ramparts."[42]

At the time of the restoration, A. F. Gill of the National Research Council, accompanied by Dr. R. E. Stradling of the Building Research Station in England, were shown over the fort by Way (see Appendix 13). As well as deploring the use of Portland cement, Gill remarked on the treatment of the terreplein:

> On top of the ramparts concrete slab decks are being used without any membrane water-proofing, a surface treatment of a penetration oil being applied. We were informed that this treatment was guaranteed indefinitely but it appears obvious that these decks will crack under temperature stresses.[43]

It was also at this time that the south curtain or gorge wall, designated as the Guard's Quarters, was designed and built. It will be recalled that this portion of the redoubt was demolished in 1897. Somerville's plan (No. 312) followed the historical plans in design and exterior appearance. He did not attempt to build a casemated structure, however, but used modern methods to give the historical appearance (note, however, the lack of loopholes in the parapet).

While the exterior of the redoubt was being rebuilt , a contract was being negotiated to finish the ceilings and walls of the officers' quarters and the ceilings of the mens' quarters with a compound called "Gunite." Gunite was described by the Gunite and Waterproofing Limited of Toronto:

> Gunite pre-mixed in the proportion of one part of Portland cement to three

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[40] OA, RG14-153-1, File 432.37-21, MS 3906, Assistant Engineer to Smith, 26 Feb. 1937.

[41] OA, RG14-153-1, File 472.6, MS 3908, Notification of contract award, 11 May 1937.

[42] Way, op. cit., p. 10.

[43] NA, RG24, Vol. 5824, File 40-2-1, Part 3, Report by A. F. Gill, "Visit to the Restoration Work in Progress at Fort henry, Kingston, on 23 June, 1938, accompanying Dr. R. E. Stradling."

> parts of sand, shall be applied in two or more coats at an average thickness of one and one-half inches throughout. The final coat shall contain an admixture of ten per cent (10%), by weight, of hydrated lime.

The Gunite mixture was sprayed onto expanded metal reinforcing fabric attached to the areas to be sprayed by means of Gunite hooks (see Appendix 14).[44] The coating of the walls and ceilings was not included in the initial contract with Frid Construction. Gunite and Waterproofing Limited had made a proposal to Frid Construction in December 1936, but it was not until July or August 1937 that a second proposal was accepted. In October, Guniting the walls and ceilings was added to the original contract – 40,000 sq. ft. for $10,400.00.[45]

Figure 15 Reconstruction of south counterscarp wall; south curtain wall has been completed. Fort Henry Archives.

At the same time, other items were added to the contract:

> Supplying new doors and frames and transoms and installing in mens' [sic] quarters 36 units @ $25.75.....$927.00
> New window frames, sash and trim and installing same in mens' [sic] quarters and Guards' Quarters 97 units @ $25.75.....$2,497.75

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[44] OA, RG14-153-1, File 432.37-21, MS 3906, "Specifications for Application of Gunite to Ceiling and Walls at Fort henry...", 23 July 1937.

[45] The proposal was made on 23 July 1937, good for 30 days; I assume it was accepted and carried out before it was formally added to the contract. If not, it was then done sometime after 5 Oct. when it was added to the contract.

The counterscarp wall in front of the newly constructed south curtain wall was taken down and rebuilt. Finally, an addition was made to the contract allowing for:

> Taking down stone front, supplying new stone and re-building stone piers, arches and wall above arches on Court side of mens' [sic] quarters Main Fort Building.[46]

This description seems to be of part of the northern casemates, but it is not clear what is meant by "Court side of mens' [sic] quarters." It does seem to be a major restructuring, however, involving the piers and arches of the north casemates as well as the facing stones.

As 1937 ended, there still remained considerable work to be done under the May contract and, in the year to come, there would be further additions to the contract. In December, Ronald Way, who was curator of Fort Henry and a major player in its restoration planning, put together for architect Somerville what he called a "list of extras for Fort Henry".[47] Some of these were major items. He called for the repair of the stone work in the east and west branch ditches and the repair of the ditch towers. The drawbridge to the fort and a bridge over the east branch ditch were required and the east entrance to the Advanced Battery needed to be opened. The water supply had to be secured and toilet fixtures put in. Way called for the water tanks (he called them cisterns) and the filter system to be renovated and an "old pump" installed over one of the tanks. The electrical system needed some work. He asked that the powder magazine be properly restored and that the interiors of at least three barrack rooms, at least one kitchen, guard room, cells, officers' quarters, etc. be fitted up.

His request for ordnance is of particular interest. He asked that13 gun carriages and 14 traversing platforms for 32-pr. guns be built, including trucks for the platforms and racers for the gun curbs. He required the "Repair [of] carriages of the 4 field guns donated by the City of Kingston last summer" and the "transport of five guns from City Parks to Fort Henry and construct carriages for same." Further, he asked that complete sets of operating equipment be made for at least two guns (see Appendix 15). There is evidence that much, perhaps all, of these extras were supplied during 1938 (see below).

In 1938, work on the restoration of Fort Henry continued apace. Early in January, payments were authorized to additions made to contract 37-21. These included excavation for concrete footings under the "outer moat" (ie, counterscarp) wall and excavation in the east and west branch ditches, excavation under the drawbridge, and the building of the drawbridge and the east branch ditch bridge. The stone work was completed in the scarp wall of the north casemates. The stone drains were taken up, cleaned, and relaid and trenches were dug for Bell Telephone and electrical

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[46] OA, RG14-153-1, File 432.37-21, MS 3906, Contract Engineer to Frid Construction, 5 Oct. 1937.

[47] Ibid., Way to Somerville, 19 Dec. 1937.

cable (see Appendix 16).[48]

At the same time that these payments were authorized, further additions were made to the contract: to supply and cut the stone for the outside moat wall, coping, and towers; to supply stone for the ditch walls; to supply and erect iron railings; and to build 17 gun carriages and platforms. Much as Way had requested, carpentry work to the powder magazine and officers' quarters was approved (see Appendix 17).[49] Then in March, more additions were made. These included supplying and installing down pipes and copper scuppers to the drainage system and copper covered doors and windows to the powder magazine (see Appendix 18). Of especial interest are two items:

> Raising guns and other material from Navy Bay
> Lowering and transporting guns from Cedar Island over ice to Fort Henry.[50]

Figure 16 Rebuilding the wall west officers' casemates. Fort Henry Archives.

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48 OA, RG14-153-1, File 37-21, MS 3919, Order Form, Contract Engineer to Frid Construction, 10 Jan. 1938.

49 Ibid.

50 Ibid., Order Form, Contract Engineer to Frid Construction 23 March 1938.

Figure 17 Interior showing north casemates, probably winter 1938. Note sheers and gun carriages. Alexandra Studio, National Archives of Canada, RD-000937.

Late in March 1938, Frid Construction announced that its workmen were starting to erect stone and pour concrete. This work seems to have been mainly in the ditch walls of the Redoubt and the branch ditches (see Appendix 19). For the work that was to go ahead, the company estimated that it would need 30 to 35 railway cars of Portland cement; in the previous year it had used about 34 car loads.[51] Of particular interest was a decision made in May: "Swing bridge to be obtained from Rideau Canal and altered to suit. To be installed complete with mechanism and necessary alterations to operating chamber."[52] In late April, after long negotiations with the military authorities, the eastern gateway to the Advanced Battery was opened as an exit which would prevent congestion at the western entrance. Over the spring and summer Frid Construction continued laying stone and completing work on the interior of the casemates and on 9 August Deputy Minister Smith reported to the Department of National Defence that the work on Fort Henry would be completed in about two weeks.[53] The formal transfer of the fort from the federal government to the province of Ontario was by license of occupation, intended to be

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51 Ibid., Frid Construction to Smith, 23 March 1938; Somerville to Welby, 26 March 1938.

52 Ibid., Somerville to Frid Construction, 16 May 1938.

53 Ibid., telegram, Smith to LaFleche, 9 Aug. 1938.

renewed yearly, dated 1 September 1938.[54]

As the historical restoration of the fort went forward, it became necessary to add certain modern facilities. In early November 1937, a local electrical contractor, James Harris, was hired to install the electrical system in Fort Henry. Initially he was instructed to lay cables and install lightning arresters and 2300 volt cutouts, as well as setting up two 15 K.V.A. 2200/110 x 220 volt transformers.[55] Harris continued the electrical work on the fort throughout 1938, although the records do not indicate precisely what he was doing.[56] Harris was also contracted to erect lightning rods on the ditch towers, but he got into a dispute with the Department of Highways administration. His contract was cancelled and a new contract was awarded to The B. Phillips Co. Ltd of Toronto who presumably put up the lightning rods.[57]

In October 1938, Somerville recommended that parts of Fort Henry, especially the museum rooms, be heated and tenders were called for from Kingston contractors. The contract was awarded to the lowest bidder, Joseph Barrett, to install a heating system for almost $2,600.00. It is not clear from the records what precisely he was to put in, probably a hot water system; the records mention a special electric belt driven pump with a 50 gallon tank with a capacity of 200 gallons an hour. He was also to run pipe to the boiler room.[58]

What is especially puzzling about the records of the Department of Highways dealing with the restoration of Fort Henry from 1936 to 1938 inclusive (aside from the general paucity of evidence) is the almost total lack of reference to the taking down and rebuilding of the interior facings of the casemates. (The only reference found was to work on the "Court side of the men's quarters"; see above). Yet we know from pictorial evidence that such work was undertaken. Indeed it is clear that the facings of both the east and west casemates were taken down (parts of the east face had already fallen) and were rebuilt stone by stone (see Figures 12, 13, and 16).[59] The only evidence of work on the north portion is one photo which seems to show work being

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54 OA, RG14-153-1, File Misc 38, MS 3916, Smith to LaFleche, 20 April 1938; LaFleche to Smith, 22 April 1938.

55 OA, RG14-153-1, File 472.6, MS 3908, Contract Engineer to Harris, 10 Nov. 1937.

56 OA, RG14-153-1, File 37-21, MS 3919, Contract Engineer to Harris, 27 March 1938; File Misc 38, MS 3916, Contract Engineer to Harris, 17 Oct. 1938.

57 Ibid., Somerville to Harris, 27 Nov. 1938; File Misc 38, MS 3916, Contract Engineer to The B. Phillips Co. Ltd, 6 Dec. 1938.

58 OA, RG14-153-1, File Misc 38, MS 3916, Smith to McQuesten, 3 Oct. 1938; Contract Engineer to Joseph Barrett, 8 Nov. 1938; Assistant to DM to Walters, 9 Nov. 1938.

59 Way, op. cit., p. 11.

done on the north casemates (see Figure 14).

The Second World War

When Canada declared war on Germany in September 1939, the Department of National Defence invoked its right to repossess Fort Henry. Initially in 1939 it was used to intern civilians detained under the Defence of Canada regulations, but their time in the fort was short lived. The first group of internees arrived on 7 September and toward the end of the year they were removed to a camp at Petawawa.[60] It seemed for a moment as if the old fort would revert to its role as a historic tourist attraction. Circumstances dictated otherwise. In late June 1940, more civilian internees and enemy merchant seamen (EMS) from the United Kingdom arrived at Fort Henry. The internees were removed in October and German officers and other ranks arrived in November to replace them. The German combatants were removed in November 1941and replaced by more enemy merchant seamen and internees from the United Kingdom. They remained in the fort until 16 November 1943, shortly after which the camp was closed "...as a matter of economy in accordance with the policy of concentrating internees and prisoners of war in larger camps."[61]

The fort that the Department of National Defence reclaimed in September 1939 was hardly the ruin they had so happily turned over to the Ontario Department of Highways. It was necessary, of course, to take certain steps to make it habitable and to prevent the internees or prisoners from escaping. Records have not been found of renovations in 1939, but when it was decided to bring in enemy merchant seamen , the Department of National Defence hired civilian workmen to make the necessary alterations. Late in June, even as the Germans were about to arrive there was still a great deal to do. There is no complete record of what was to be done, but four tasks were to be undertaken immediately:

1. Boarding in the two stairways leading to the Ramparts.
2. Removing the copper drain pipes, and Flag Pole within the Compound..
3. Bricking in stairways and firing ports leading from casemates.
4. Iron bars on all windows. Heavy doors in entrance to compound.[62]

While such measures were necessary to secure the fort, at the same time it was necessary to prepare the casemates to receive the prisoners. The casemates had to be readied for sleeping accommodation. A standard kitchen building, an ablution hut, and two bucket latrines were put up on the parade. Initially mess marquee tents were used as dining halls, but shortly two wings

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60 Fort Henry Archives, Scrapbook No. 1, clipping, Kingston *Whig Standard*, 7 Sept. 1939; 5 feb. 1940.

61 NA, RG24, File 7236-5, Reel C-5376, Memo, Colonel H. N. Streight, 16 May 1945.

62 NA, RG24, Vol. 15394, Serial 2279, Folder No. 1, Internment Camp No. 31, War Diary, 28-30 June 1940.

were added to the kitchen to create a standard "H" hut. The ablution hut was immediately in front of the centre section of the north casemates and the "H" hut occupied most of the eastern portion of the parade. By early in July, the kitchen, ablution hut, and latrines were ready, flooring had been put in the casemates, and the lighting and alarm systems were finished. An underground drainage system carried waste outside the walls into an open ditch which emptied into Lake Ontario. This was judged to be sufficient for kitchen waste and ablutions but not for toilets. Consequently bucket latrines were put into service. The electricity for lighting was provided by running a 1000 foot 500volt transmission line from the Marine Department Radio Station to the fort. Since the well in the ditch was inadequate to supply sufficient water, an electric pump with chlorinator was installed to bring water from Lake Ontario.[63]

When Fort Henry was inspected in November 1940 certain problems were identified. The latrines were very crude and too near the kitchen and dining halls. The kitchen floor was dirty and the dining rooms and ablution room had no ceilings. When it rained, the water poured off the ramparts flooding the parade because the drain pipes had been removed. The description of the casemates was reminiscent of the past:

> Some are quite damp caused by rain water seeping through the ramparts. This is objectionable and should be repaired forthwith. Casemates were tidy and clean. A number of casemates require new floors. At present dirt drops on beds in lower casemates.[64]

Chemical toilets were brought in to replace the bucket latrines, the kitchen floor was repaired, and the drain pipes were replaced.[65] It is doubtful if the dampness in the casemates was relieved. In February 1943, casemates 19 and 20 were leaking and in June, casemates 12 and 21 were very damp.[66]

In May 1941, the existing security system was improved. Three guard houses, or towers, 4 foot by 6 foot, "V" front, glass all round were counterbalanced over the edge of the outer wall of the ditch. One was at the southwest corner, one at the southeast corner, and the third at the centre of the north wall. In addition, two stationary lights were put up at each of the guard houses to illuminate the ditch.[67]

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63 NA, RG24, File 7236-5, Reel C-5376, Boak to Secretary, DND, 13 June 1940; telegram, Rooney to Director of Engineering Services, 3 July 1940.

64 Ibid., illegible to Officer administering Canadian Provost Corps, 18 Nov. 1940.

65 Ibid., Armstrong to Secretary, DND, 23 Dec. 1940.

66 NA, RG24, Vol. 15394, Serial 2279, Folder No. 2, War Diary Feb. 1943; File 7236-95-1-31, Reel C-5420, Inspection Report, June 1943, p. 2.

67 NA, RG24, File 7236-5, Reel C-5376, Armstrong to Secretary, DND, 22 April 1941; Stethem to Director of Engineering Services, 1 May 1941.

The military were somewhat slow in blocking off possible escape routes. In July 1941, the War Diary noted that "engineer workmen completed the blocking of Old privies with bars and cement."[68] This more than a year after the first prisoners had arrived. Ironically, when prisoners staged a mass escape on the night of 26 August 1943 through the sewer from the officers' privy in the west side, they were able to cut these bars across the sewer entrance. Nineteen prisoners slipped into the sewer and crawled until they were beyond the road way, then tunnelled upward to escape. (All were captured.) After the escape, prisoner labour cleaned out the sewer where the escape was made out of the sewer as the engineers prepared to fill the hole in. There was also a breather, or manhole, in the ditch, 10 ½ feet deep, leading to the sewer. The engineers laid two 8 inch iron pipes side by side and cemented them into the drain downhill from the breather. Presumably this prevented anyone crawling through the drain without impairing its draining capacity.[69] Aside from this mass escape (there were others involving two or three prisoners), the prisoners were continually attempting to tunnel out. The casemates were regularly inspected and there were numerous reports of damage to the walls or floors which then had to be repaired, at the prisoners' expense.[70]

Such repair problems were minor. What may have been more serious was recorded just before the camp was closed. On 7 November 1943:

> Commandant, Adjutant and Quartermaster entered ramparts and looked over break in Casemate from spiral staircase leading to ramparts.

The report does not indicate which of the two spiral staircases in the north casemates was meant. The next day the "break in the Casemate wall" was photographed before it was repaired.[71]

The history of Fort Henry during the prisoner-of-war period is incomplete. Perhaps the best thumbnail sketch of its use by the prisoners was contained in an Inspection Report in June 1943, six months before the last of the prisoners were moved out on 16 November. Casemates 2-17 (upper level) and 19-29 (lower level) housed 240 and 146 POWs respectively. Casemates 12 and 21 were very damp. Heating was by individual stoves, fuelled by coal. The three most southerly casemates on the west side contained the hospital, one casemate for medical inspection and the dental clinic and the other two for the hospital proper. Casemate 18 contained the POW and internee stores. Four casemates on the east side were used as a library, band room, and sports storage room. Three casemates on the north side served as study rooms. Casemate 39 was the dry canteen. As previously noted chemical toilets had replaced the bucket latrines and water was

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68 NA, RG24, File 15394, Serial 2279, Folder No. 1, War Diary, 9 July 1941.

69 Ibid., Folder No. 2, War Diary, 2 Sept.1943; File 7236-95-1-31, Reel C-5420, Report by H. L. Macpherson, 30 Aug. 1943..

70 Ibid., File 15394, Serial 2279, Folders No. 1 and 2, War Diary, passim.

71 Ibid., Folder No. 2, War Diary, 7 and 8 Nov. 1943.

supplied by an electric pump and chlorinator.[72]

When Fort Henry was closed as a Prisoner of War Camp, it was used for the storage of Ordnance equipment and vehicles. Then, on 29 March 1945, it was inspected to assess its suitability as a Military Detention Barracks for Soldiers Under Sentence (SUS) returning from overseas:

> Fort Henry is comprised of inner and outer bastions [sic] with casemates and several wooden huts. The condition of casemates is not presently suitable for occupation, and practically all plumbing and heating equipment has been removed from the kitchens and ablution rooms. Casemates previously used by P/W are quite damp, require renovating, repairs and drying out.
>
> These casemates are dark and necessitate artificial lighting almost continuously. Owing to the difficulty of ventilation same are inferior to the rooms provided in a standard MDB.

Despite this lacklustre appreciation, after discussions with the District officers, "it was considered under existing circumstances that Fort Henry would be suitable for use as an MDB." If NDHQ agreed immediately, work parties could be assembled and working by 2 April and the fort could be ready for occupation in approximately 21 days.[73]

There are no details as to precisely what was done but an inspection report of 19 June suggests that the redoubt was reasonably comfortable:

> S.U.S. – Casemates lower court-yard Fort Henry. These are dry, can be heated and are suitable for the purpose. 16 men are lodged in each casemate. Bucket latrines for all lavatories. Service is satisfactory.[74]

Over the summer there was some concern about the "cement work over the casemates", and in August some work – how much is not clear – on resurfacing the ramparts was going on.[75] Another problem was the drain at the rear of the kitchen. If the army was using the old drain this may refer to one of the two drains in the east end of the parade.[76] Other than these brief entries

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72 NA, RG24, File 7236-95-1-31, Reel 5420, Inspection Report, 21 June 1943 (Inspection on 1-2 June).

73 NA, RG24, File 8328-1396, Reel C-4995, Inspection Reports – No. 89 Military Detention Barracks, Fort Henry, Memo, G. T. Coad, 31 March 1945.

74 Ibid., Inspection Report, 19 June 1945.

75 NA, RG24, Vol. 16,542, Serial No. 2089, Folder No 1, War Diary of No. 89 Military Detention Barracks, Fort Henry, Barriefield, Ontario, 1 June, 8 Aug., 13 Aug.

76 Ibid., 20 July, 1 Aug.

the records of No. 89 Military Detention Barracks provide very little information on the physical condition of the fort. Fort Henry's role as a military detention barracks lasted a year until the end of May 1946 or shortly thereafter.[77]

After the War

Even before the end of the Second World War, the Ontario Department of Highways was asking that the Department of National Defence return Fort Henry to its care. When Fort Henry had become an internment and prisoner of war camp, the Fort Henry administration had removed its museum articles and other material to a warehouse in Kingston. By early 1945 that warehouse had been sold and the new owner was asking that the Department of Highways remove the historical artifacts.[78] The Department of National Defence, as recounted above, replied that the fort was to be used as a detention barracks for Soldiers Under Sentence. Early in 1946, the Deputy Minister of Highways, having learned that there was available space in the commissariat casemates at Fort Henry, again raised the problem of the storage of Fort Henry's historical artifacts. The Department of National Defence agreed to turn over two casemates for the storage of the goods and in February the material was moved from "Mr. Dalton's warehouse."[79]

When the Military Detention Barracks at Fort henry was closed in June 1946, the district command at Kingston decided that the fort was surplus to its needs and suggested that it could be turned over once again to the Ontario Department of Highways. Within the fort were seven temporary hutments (five within the Advanced Battery and two within the redoubt). These would have to be removed. As well, the Commandant of MD No. 3 noted that "Beneath the Fort there is a network of underground passages which have been thoroughly blocked to prevent the escape of prisoners." These would have to be opened, the barbed wire removed from the walls, the 6000 gallon water tank removed from the east ramparts, and the pumping equipment in the west ditch tower taken out.[80]

By December of 1946, negotiations were under way between the Department of National Defence and the Ontario Department of Highways to return the fort to provincial jurisdiction. The Department of National Defence put forward an agreement essentially the same as the one signed in 1938. The Department of Highways balked at a clause which stated that the province was to "assume all cost and responsibility of and for the restoration, repair and maintenance of the said Fort Henry." The Department of Highways argued that the fort was in perfect condition when it was turned over to the military authorities and that "the Fort should be restored to its

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77 The War Diary covers the period 1 May 1945 to 31 May 1946, but the record may be incomplete.

78 NA, RG24, Vol. 5894, File 40-2-1, Part 3, Millar to Ross, 28 Feb. 1945.

79 Ibid., Millar to Campbell, 12 Jan. 1946; Campbell to Millar, 29 Jan. 1946; Millar to Campbell, 4 Feb. 1946.

80 Ibid., Bogert to Secretary, DND, 30 Aug. 1946 and 11 Oct. 1946.

condition before it was taken over by the Department of National Defence at the outbreak of the war." It suggested that the cost of repairs was at least $20,000.00.[81]

After an inspection, even National Defence officials were prepared to admit that this estimate, if perhaps somewhat high, was reasonable.

> Although my inspection was necessarily somewhat cursory, I noted that considerable damage seems to have been done to the Fort during the time it was occupied by the Department. The furnace and heating system has been neglected and is in bad condition; some hundreds of windows are broken, floors are heaved up and seriously damaged through doors being left open; doors have been kicked in and broken, passages have been blocked up, copper drain pipes have been removed, the well polluted, the drainage and sewage system damaged generally and various structures such as water tanks, barbed wire fences, etc., have been erected and will have to be removed. The grounds are overgrown with weeds and littered with rubbish.[82]

After discussions with J. D. Millar, Deputy Minister of the Department of Highways, the Department of National Defence agreed to pay $15,000.00 to the government of Ontario and transfer Fort Henry to its jurisdiction as a historic site.[83] As noted above, the agreement was very similar to the one that was signed in 1938. It was renewable yearly, subject to the return of Fort Henry to the Department of National Defence in case of an emergency.[84]

Once Fort Henry had been returned to the Ontario government in 1947, the Department of Highways began to plan the necessary repairs to have the fort ready for the 1948 tourist season. The Divisional Engineer, W. A. Clarke, consulted Ronald Way, the fort curator, who reported that the required work could be done that winter.[85] A local contractor, Charles A. Smith, of T. L. Smith & Sons, accompanied by Way, inspected the fort in December 1947:

> In company with Mr. Way, we inspected many of the rooms, balconies, and stone work requiring repairs. Some of the rooms require a good deal of repair work and some only a small amount. The amount of work to be done in each

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81 Ibid., Millar to Mills, 26 June 1947.

82 Ibid., Orde to DM of DND, 6 Aug. 1947.

83 OA, RG14-153-1 [1947], File Misc 38, Reel MS 4053, Mills to Millar, 6 Aug. 1947; NA, RG24, Vol. 5894, File 40-2-1, Part 3, Millar to Mills, 10 Sept. 1947.

84 Ibid., "Memorandum of Agreement..." The signed agreement is dated 1 June 1947 but it must have been signed at a later date by J. D. Millar, Deputy Minister of Highways.

85 Ibid., Millar to A. A. Smith, 26 Nov. 1947; Clarke to Millar, 11 Dec. 1947.

> room varies greatly, and it would take weeks to go over the whole establishment and make even an approximate estimate of the amount of work to be done.[86]

Because, in Smith's opinion, it was impossible to make an estimate of repairs beforehand, he proposed that the work be undertaken on a cost plus basis – net cost of labour and material plus 8% fee and overhead cost of 10% of all labour, materials, and sub-contracts. Smith's proposal was accepted and work began probably early in January 1948.[87]

The records of the Department of Highways do not describe precisely what repairs were made to Fort Henry in 1948. One letter in March mentions an old and recurring problem:

> There is a very bad condition existing on top of the ramp [sic terreplein ?] at Fort Henry and which is allowing considerable water to pour down into the show rooms.[88]

According to Ronald Way, "...the concrete slab of the ramparts was subjected to a surface treatment. This consisted of two applications of colas[?], the first being covered with fine stone chips, the second with stone dust." This treatment was ineffective.[89]

By mid-May, as the tourist season neared, the Deputy Minister of Highways indicated to Way that only essential work was to be undertaken, to be finished by the end of May, to ready the fort for opening in early June.[90] The cost of whatever work was done far exceeded the $15,000.00 given to the Department of Highways by the Department of National Defence. In addition to the federal money, the Department of Highways had spent by the end of May 1948 slightly more than $52,800.00 and the Department estimated that another $35,000.00 would be required to complete the work.[91]

Although the Department of Highways records are not very informative, there is an account of the ongoing work from the Kingston *Whig Standard* in mid-April 1948. The repairs had been going on since early January.

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86 Ibid., C. A. Smith to Dept. of Highways c/o Ronald Way, 16 Dec. 1947.

87 Ibid., Clarke to MacLachlan, 20 Dec. 1947.

88 OA, RG14-153-1 [1948], File Misc 38, MS 4073, Clarke to Robbins, 31 March 1948.

89 Way, op. cit., p. 11; according to the Kingston *Whig Standard*, the Fort reopened on Friday 25 June 1948.

90 Ibid., Millar to Way, 19 May 1948.

91 Ibid., Accounts, May 1948.

> One of the main jobs now under way is the waterproofing of the ramparts. Weakened cement surface had allowed water to get into the stonework of the fort causing dripping ceilings and frost damage. This danger is being eliminated by chipping the cement and then laying down alternate layers of a tar product and sand. Result will be a surface both waterproof and smooth.
>
> Another big job at the moment is laying down a new drainage system. This is work that hadn't been anticipated but inspection showed that the tile drain installed previously had deteriorated because of frost and was broken up.
>
> The fort has two drainage systems. One system drains the parade square, or main courtyard in the fort. Rain falling on the square flows down these drains, made of stone, to the former privies. Here it could periodically be released by a sluice gate and allowed to flow down a huge stone drain to the St. Lawrence River. It was down one of these drains, almost three feet in diameter, that some Nazi prisoners escaped during the war.
>
> This system is intact.
>
> It is the second system, designed to provide water supplies for the garrison, that is being repaired. Rain falling on the roof goes via drains into a series of underground filter cisterns at the east end of the courtyard. Using carbon filters the water passes from tank to tank until it is considered fit for drinking. In the renovated fort this water is used for heating and other purposes.
>
> Composition pipe, of which the main component is tar, is being laid for this system.
>
> With this work in progress the parade square is in somewhat of a shambles at the moment. But it is not nearly as bad as a couple of months ago when the yard was littered with debris from the temporary army buildings that had been torn down.[92]

The records of the Department of Highways do not indicate how, or even if, the estimated $35,000.00 was spent during the remainder of 1948 and in 1949. It was not until the autumn of 1949 that records of repairs show up in the files. Ronald Way went to Toronto to raise several concerns with the Deputy Minister:

> Mr. Way mentioned several matters which he feels will require attention during the off season. The most pressing is the old difficulty of leakage on the roofs and ramparts. Would it be possible to fill cracks that have developed with the rubberized material which is now being used for crack filling in concrete pavements? Failing this, could another light application of surface treatment be given to at least carry the roofs through the winter months.

What was this surface treatment ? Presumably what had already been tried. Way also mentioned the other traditional bugbear – the entire building required pointing. This was rather unusual work for the Department of Highways, the Deputy Minister commented to one of his officials,

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[92] Fort Henry Archives, Scrapbook, clipping, Kingston *Whig Standard*, 17 April 1948.

but as Fort Henry "...is rapidly becoming one of the greatest drawing-cards in Ontario from a tourist standpoint, we are very anxious to keep it going."[93]

What was immediately done to stop the leaking is not known, but the Department of Highways turned to the contractor, T. L. Smith Construction Co. Limited, which had previously worked on Fort Henry, to find a long term solution to the problem. T. H. Smith described the circumstances in April 1950:

> In their present state, both decks and parapet walls are open to the weather at the major construction joints, open in the majority of stone masonry joints and in the case of both surfaces considered [ramparts and parapets], both are very porous and non-waterproof.
>
> The direct result of this condition during the rain and frost is a rapidly deteriorating structure. Many serious structural cracks have developed and a damp, unhealthy condition prevails.

In attempting to find a solution, the Smith Company consulted other firms in the industry. Smith proposed two solutions:

> The deck slab recommendations...propose to clean the existing area, prime the surface with a waterproof compound, and into this is embedded a membrane and repeat the priming operation. Over this a ½" thick mastic deck is applied. This treatment gives a waterproof, durable traffic surface.[94]

In a report prepared in 1965, Ronald Way describes this procedure:

> After installing copper flashing at the juncture of the banquette and the interior slope of the parapet and removing all loose material from the terreplein of the rampart, a waterproofing compound called "Glassfab"was applied over the entire terreplein. While the latter material was the waterproofing unit, it was necessary for it to be overlaid with a bituminous concrete, both for its own protection and to provide a walking surface. The final application consisted of a bituminal material covered with Silica to act as an abrasive.[95]

For the parapets, he suggested:

> The recommendation here is to apply a coating of grey mastic, under pressure, to

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[93] OA, RG14-153-1 [1949], File Misc 38, Reel MS 4094, Memo, Millar to Fraser, 14 Oct. 1949.

[94] OA, RG14-153-1 [1950], File Misc 38, MS 4117, T. H. Smith to Way, 25 April 1950; telegram, Millar to Way, 4 May 1950.

[95] Way, op. cit., pp. 11-12.

> the entire area, from the finishing point of the deck coating, up and over the parapet wall. This application is a tried and recommended practice for jobs of this sort.

He thought that these procedures be tried on a sample section, such as part of the south curtain wall, to be completed before the fort's opening on 24 May and the remainder to be done after closing in the autumn. J. D. Millar, the Deputy Minister of Highways, approved the trial waterproofing on 4 May.[96]

Smith applied the surface treatment to what he called "the promenade deck" of the south curtain wall and the grey mastic coating to a small section of the parapet. In his opinion, by September, "Both materials proved their effective values." He suggested one modification:

> Our recent discussions [with Way] have proved it would be wiser and in better interest to the Historical atmosphere of Fort Henry to restrict the use of the grey mastic coatings to the actual top surfaces of the parapet walls and effect a true masonry operation to all vertical surfaces since they are always in immediate view.

He then put forward his proposal:

1) to coat all deck slabs (i.e. the terreplein) and firing steps in the manner of the sample on the south curtain wall;
2) to coat the top of the parapets with mastic:
3) to point the interior vertical wall of the parapets;
4) to point the exterior vertical wall of centre section of the south curtain wall.

If his instructions are understood correctly, he was concerned with pointing only the section of the exterior wall which was obvious to those tourists coming into the fort. The Department of Highways agreed to Smith's proposal to waterproof the fort on a cost plus basis, but set aside only $10,000.00, about one-third of the total cost of Smith's estimate.[97]

Smith went to work on the project in the autumn and in April an estimate was brought forward "For completion of waterproofing" (some $13,700.00) as well as $4,000.00 for additional masonry pointing. "The pointing of the main walls has been neglected since 1938, and serious deterioration has developed." This money was approved and the work went ahead.[98]

The material that was put on the parapet by Gunite and Waterproofing Limited was called "Dum

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[96] OA, RG14-153-1 [1950], File Misc 38, MS 4117, T. H. Smith to Way, 25 April 1950; telegram, Millar to Way, 4 May 1950.

[97] Ibid., Smith to Way, 7 Sept. 1950; Order Form, 15 [?] Sept. 1950.

[98] OA, RG14-153-1 [1951], File Misc 38, MS 4144, Way to Zoller, 14 April 1951.

Dum". Over the summer of 1951, the tourists had damaged some portions, necessitating repairs. The Gunite company provided a brief description:

> As you [Way] know, the very nature of Dum Dum allows it to remain soft and pliable on a surface, thus providing a perfect membrane to withstand any weathering. We feel sure that the passage of another winter would allow the Dum Dum surface to become harder so that any future repairs will be confined to very small areas.

These repairs were approved by the department and presumably carried out in the autumn.[99]

This appears to have been the completion of the major renovations after the Department of Highways resumed responsibility for Fort Henry in 1947. The problem of water damage to the stonework was continuing, however. In December 1952, an official of the department discussed the "question of waterproofing the outer coping of the fort wall" with the "emulsion people, in Toronto." It was agreed that using "rubberized crack filler would be the best method" of remedying the problem. If the crack were very wide, oakum could be inserted to hold the filler in place until it hardened. There is no record in the 1953 Fort Henry file that such work was ever carried out.[100] In 1959 and 1960 the "Dum Dum" was removed from the slope of the parapet and two coats of a vinyl spray was applied, the second coat being coloured to match the limestone.[101]

In the Winter of 1954, Way tried an innovative method of pointing the interior walls of the redoubt. It had proved impossible to do the work during the summer because the fort was open to the public. Way was becoming alarmed at the accelerating damage to the stone work and suggested that the repairs be undertaken during the winter with the men working in enclosed scaffolds heated by stoves. The results were extremely satisfactory but expensive because he had to retain five men over the winter who would have been laid off at the first freeze-up.[102]

In February 1957, an engineer made an inspection of the three bridges at Fort Henry. The swing bridge over the west ditch, which he noted had been reconstructed in 1936, was stationary and no longer rotated. He found that the deck and substructure were no longer sound and should be rebuilt. The foundation of cut stone masonry was in good condition. The stationary section of the drawbridge into the redoubt had recently been rebuilt. The northerly, vertical lift section, however, required rebuilding. The bridge over the east ditch was in good condition although the

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99 Ibid., Eakins to Way, 13 Sept. 1951; Eakins to Way, 9 Oct. 1951; see also, Way, op. cit., p.12.

100 OA, RG14-153-1 [1952], Misc 38, MS 4172, Hutcheson to Robb, 9 Dec. 1952.

101 Way, op. cit., pp. 12-13.

102 OA, RG14-153-1 [1954], File Misc 38, MS 4232, Way to Zoller, 22 Feb. 1954.

engineer felt that the concealed ends of the timber beams should be investigated to ensure that they were sound.[103]

At the end of March 1957, the materials to repair the swing bridge and the drawbridge were ordered. It is possible that the swing bridge was repaired before the fort opened for the season. In September, a list of "essential work to be done at Fort Henry during the 1957-58 winter" included rebuilding the drawbridge to the redoubt with materials on hand, but made no mention of the swing bridge. Presumably it had already been repaired.[104] Since all the items on the list were approved, the drawbridge was probably repaired during the autumn when outdoor work was still feasible.

Finally it should be noted that some work on the armament of the fort was undertaken in the 1950s. In 1951, $1,500.00 was spent on "Heavy oak platform and carriage" for the Armstrong gun, which suggests that the traversing platform and carriage for the 7-inch RBL in the northeast angle were replaced. In 1957, Way received permission for "Rebuilding of Fort Henry gun carriages for which material has been in stock since 1956." The work was to be done in the fort workshop during the off-season.[105]

The Department of Highways had always been aware that running and maintaining a historic site was quite a different operation than building highways. During the 1950s the incongruity of the Department being responsible for Fort Henry seemed to become more apparent. Consequently, in 1957 the Ontario government decided to transfer responsibility for Fort Henry to another agency and on 1 April 1958, the fort was officially turned over to the Ontario-St. Lawrence Development Commission.

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[103] OA, RG14-153-1 [1957], Misc 38, Reel MS 4377, Walker to Gibson, 21 Feb. 1957.

[104] Ibid., Cavell to Welby, 27 March 1957; Superintendent of Office Services to Way, 20 Sept. 1957.

[105] OA, RG14-153-1 [1951], Misc 38, Reel 4144, Way to Zoller, 14 April 1951; [1957], Reel MS 4377, Way to Flagg, 10 Sept. 1957; Superintendent of Office Services to Way, 20 Sept. 1957.

Chapter 4

Summary

As the British military authorities considered the defence of Kingston following the War of 1812, they put forward an elaborate scheme of redoubts, towers, and batteries to protect the city. The only elements of these proposed works actually built were the casemated redoubt, advanced battery, and commissariat storehouses on the heights of Point Henry to the east of the city. Styled Fort Henry, the Casemated Redoubt was designed to resist a land attack.[1] It was a six sided structure of rubble masonry casemates lined with ashlar limestone. Its north front, the strongest, was composed of three faces to resist a land attack. The east and west fronts, which were slightly weaker, were stepped down to two demi-bastions that defended the south gorge or curtain wall that completed the enclosure. The casemates of the north front were two storeys in height while the remainder were only one storey. The redoubt was surrounded by a dry ditch, the scarp and counterscarp of which were lined with ashlar limestone. Flanking ditches stretched down to the water from the east and west walls to prevent the fort being encircled by an attacking force. Although stockpiling of building stone had begun as early as 1826, construction of the Redoubt began only in 1832 and was completed in 1837.

Almost immediately upon completion and throughout the British period – indeed throughout its long history – Fort Henry suffered water leakage from the terreplein into the casemates. Its story over the next 170 years might be said to be the search for a solution to this problem. In the early 1840s, the military covered the terreplein with a coating of an experimental substance – asphalt. When the asphalt failed on the surface under severe Canadian weather conditions, the Royal Engineers then opened up the terreplein down to the dos d'anes over the arches of the casemates, coated the dos d'anes with asphalt, and created minor brick drains along the surface of the dos d'anes to take the rain water down to a gutter in the valley between the arches. From there the water was carried through down pipes driven through the piers supporting the arches into underground drains leading to a series of water tanks under the parade. This technique seemed to work until the banquettes began to settle allowing water to leak between them and the inner wall of the parapet. Again, parts of the terreplein were opened and the banquettes rebuilt. Finally, to prevent water seeping through the superior slope of the parapets, in the late 1850s and early 1860s, they were covered with inch boards joined with white lead. Despite these efforts, the problem of damp casemates was never completely solved.

To provide for its defence the Casemated Redoubt was to be armed with 27 24-pr. guns mounted on common traversing platforms, although it seems likely that only 17 were actually mounted. Two carronades, firing through embrasures, covered the branch ditches and three carronades in each of the reverse fire chambers controlled the main ditch. Supplementing these weapons were four mortars. In 1851, the northeast angle of the Redoubt was modified to take an 8-inch shell

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[1] Today the whole complex is called Fort Henry, but, in the British period at least, that term seemed to apply to the redoubt, distinguishing it from the commissariat storehouses and the advanced battery.

gun mounted on a modified common traversing platform, although the gun itself was not mounted until 1862. The other major modification to the armament was the provision of three dwarf traversing platforms for the 24-pr. guns on the east ramparts around 1864 or later. By the time that the British turned over Fort Henry to the Canadian government in August 1870, the armament was:

1	8-inch shell gun
17	24-pr. guns
2	24-pr. carronades
5	18-pr. carronades
2	10-inch mortars
2	8-inch mortars

The Canadian government under the Liberal administration of Alexander Mackenzie seem to have intended to modernize the armament of the Redoubt. Plans were afoot to put in new curbs and raised racers for new pattern traversing platforms with hollow soled trucks. The curbs and racers were laid down but the new platforms were not added. In fact, the armament was removed from the walls to facilitate the repairs to the terreplein in the mid-1870s and, except for the guns on the east wall, seem not to have been put back. Along with the three 24-prs. on dwarf traversing platforms on the east wall, the Canadian military authorities mounted a 7-inch RBL (Armstrong) gun in place of the 8-inch shell gun in the northeast angle. It was ordered in 1874 and probably mounted the next year.

The Canadian authorities faced the same problem of damp casemates as had the British. They attempted to solve the problem by laying down wood block pavement, known as Nicholson pavement, on the terreplein in the mid-1870s. They dealt with leakage through the parapet in the same way as the British by covering the superior slope with boards, but joined by battens rather than by white lead. The Nicholson pavement seems to have worked reasonably well although there were still reports of dampness, especially in the powder magazines.

By the 1880s, the Canadian government was loath to spend money on an obsolete fort. The artillery men of the Royal School of Gunnery (later Artillery) seem to have occupied the Redoubt only intermittently, although by the 1890s some NCOs and their wives were living in the casemates. At the same time, the military was thinking of turning the Redoubt into a stores depot. While the authorities dithered the Redoubt continued to deteriorate, and in 1897 the south curtain wall, which had been in disrepair for a number of years, became so dangerous that it was torn down. As new plans for the defence of Kingston were mooted in the late 1890s it was clear that Fort Henry had little role to play and, consequently, Ottawa was not prepared to spend much money on its upkeep. In particular, the stone work of the ditch continued to fall away.

The coming of the First World War allowed Fort Henry to play a new role – as an internment and prisoner-of-war camp. Although certain work had to be done to provide security and to make the casemates habitable for large numbers of inmates, ironically the Redoubt continued to

collapse. The facing of both the east and west casemates threatened to fall during the war and had to be shored up with wooden braces. There are, as well, records of other minor repairs during the war period. By April 1917, the prisoners had been moved out and the camp was closed down.

During the 1920s, the Department of National Defence searched for a way to dispose of Fort Henry. The officers of the Department were aware of the historical importance of the fort but they had no mandate to spend large sums on a militarily useless fortification. Attempts to transfer Fort Henry to the Department of the Interior, which was responsible for the federal historic sites program through the Historic Sites and Monuments Board of Canada, were unsuccessful. Then in 1935, the Department of Highways of the Ontario government expressed an interest in developing the fort as a tourist attraction. An arrangement was worked out with the federal Department of Labour to restore the Redoubt (but not the Commissariat Stores or Advanced Battery) as an Unemployment Relief Project. The Department of National Defence was more than happy to work out an arrangement to transfer control to the Ontario Department of Highways. A Toronto architect, W. L. Somerville was hired to supervise the project, Frid Construction of Hamilton was responsible for the reconstruction work, and a young man, Ronald Way, who would continue to play a major role in the evolution of Fort Henry as a historic site, undertook the historical research.

From 1936 to 1938 the Redoubt was rebuilt. As much as possible of the original limestone was reused, although some new stone had to be brought in from local quarries. At many locations the stonework had to be taken down before the walls could be rebuilt. In some places new concrete foundations were put in to support the walls. In the interior, photographs show that the walls of the east and west casemates, which had been propped up since the First World War, were completely taken down and then rebuilt. It is not clear precisely how much rebuilding was done to the north casemates. The south curtain wall, which had been removed in 1897, was rebuilt as historically accurate as possible, in exterior appearance if not in structure. Opened in the summer of 1938 with Prime Minister Mackenzie King in attendance, Fort Henry was off to a good beginning as a historic site under the auspices of the Ontario Department of Highways.

Once again war intervened. When Canada entered the Second World War, the Department of National Defence exercised its right to resume control of Fort Henry and once again the fort became an internment and prisoner-of-war camp. Unlike 1914, however, it was in excellent condition, although certain changes had to be made for security reasons and to make the casemates ready for inmates. In November 1943, the fort was shut down as a prisoner-of-war camp and then was used as a storage depot. As the war was drawing to a close, in May 1945, Fort Henry was turned into a Military Detention Barracks for Soldiers under Sentence returning from Europe. It continued in this role until May or June of the following year.

When the Military Detention Barracks was closed, the Department of National Defence and the Ontario Department of Highways once again entered into negotiations to transfer Fort Henry to the Ontario government as a historic site. An arrangement was worked out to compensate the

Department of Highways for the considerable damage done to the Redoubt by the military during the war and in 1947 an agreement very similar to the pre-war agreement was signed by the two departments. In the winter of 1948, sufficient repairs were made to allow the fort to open for tourists in June. Further work was carried out in 1949. Once again water leaking into the casemates became a problem and the Department of Highways appealed to a local contractor, T. L. Smith Construction Co., to find a long term solution. After consulting other firms in the industry, Smith proposed covering the terreplein with a waterproofing compound and spraying the parapet with a different waterproof substance known as "Dum Dum". While Smith's efforts probably reflect the best advice of the time, his solutions were less than successful and in 1959 and 1960 it became necessary to remove the "Dum Dum" from the parapets.

Toward the end of the 1950s, the Ontario Department of Highways decided that its role as a tourist agency did not fit well with its prime mandate to build and maintain the provinces highways. Consequently, on 1 April 1958, the responsibility for the operation of Fort Henry was turned over to the Ontario-St. Lawrence Development Commission.

Appendices

Appendix 1

Estimate of the Expence of Erecting a Casemated Redoubt on the site of the present old Work on Point Henry, Kingston U.C. to accommodate 300 men and officers with the Stores necessary for it's Defence; formed on the principles pointed out in Sir A. Bryces Instructions dated 31st Jany 1832 framed conformably to the Master General's Minute of the 30th of that Month

			£	S	d
41,090	Yards of Excavation in rock on forming the Ditch and for the Escarpe, Counterscarpe & Casemates	4/4 per Yard	8,902	16	8
?0889 ½	Yards of Excavation in Rock in forming the Interior of the Work	.. ..	4,526	1	2
2932	Yards of Stone Rubbish dº dº	2/6 p yard	369	–	–
105 ½	Toises of Masonry in Foundation of Escarpe Wall in the North, West and East fronts	30/– per Toise	158	5	–
38	Toises of Dº in foundation of South Front	30/– ..	57	–	–
1559 ⅔	Toises of Dº in Escarpe above foundation in North, West and East front	30/– ..	2,339	10	–
24066	Feet, Superfl, of ashlar, cut in dº	130/– p 100 feet	1,564	5	9 ½
876	Toises of Masonry in Escarpe above foundation in South front	30/– p toise	1314	–	–
11128	Feet, Superfl of ashlar cut in dº	130/– p 100 feet	723	6	4 ¾
692 ⅔	Toises of Masonry in Parapet of North, West and East fronts above D'os D'ane	30/– p toise	1039	–	–
4470	Feet, Superfl, of ashlar, cut, in dº	130/– p 100 feet	290	11	–
180	Toises of Masonry in Retaining Wall of Rampart, South front	30/– p toise	162	–	–
	carrd forward	£	21,445	16	0 ¼

	Bro^{t} forward	£	21,445	16	0 ¼
2648	Feet, Superf^{l}, of ashlar, cut in Retaining Wall of Rampart South Front	130/ p 100 feet	172	2	4
19	Toises of Masonry in Stone Banquette	30/ p toise	28	10	–
2980	Feet of Flagging in forming d^{o}	1/3 p foot Sup^{l}	186	5	–
213	Toises of Masonry in foundation of Counterscarp	30/ p toise	319	10	–
1838 ¼	Toises of Masonry in the Counterscarpe, deducting front Wall of Casemates in d^{o} to the height of D'os D'ane and area of open Casemates to flank the Branches	30/ p .. [toise]	2757	7	6
34456	Feet, Superf^{l}, of ashlar, cut in d^{o} above Foundation	130/ p 100 feet	2239	12	9
1659	Toises of Masonry in Walls and over arches of Casemates for Men & Stores	30/ p toise	2488	10	–
692 ¼	Toises of Masonry in Casemates for officers	.. ..	1038	7	6
17171	Feet, Superf^{l}, of ashlar, cut in front ??? d^{o}	130/ p 100 feet	1116	2	3
80 ⅓	Toises of Masonry in Walls and over Arches of Caponier	30/ p toise	120	10	–
1900	Feet, Superf^{l}, of ashlar, cut in side Walls and roof of D^{o}	130/ p 100 feet	123	10	–
232 ¼	Toises of Masonry in foundations of Walls of Casemates in Counterscarpe	30/ p toise	348	7	6
257 ¾	Toises of D^{o} in Pier, Side and End Walls of Casemates in Counterscarpe	.. ..	386	12	6
126 ½	Toises of Masonry in front Walls of D^{o} to the height of the D'os D'ane	.. ..	189	15	–
55 ½	Toises of masonry in Walls of Galleries leading to Casemates in Counterscarpe	30/ p toise	83	5	–
	carr^{d} forward	£	33044	3	6

	Bro^{t} forward	£	33,044	3	6
75 ⅓	Toises of Masonry in loop holed Wall and Piers of open Casemates, flanking Branches	30/ p toise	113	–	–
20 ¼	Toises of D^{o} in arches of two open Casemates flanking Branches	45/ ..	45	11	3
1,191,076	Bricks laid in arches of Casemates for Men & Stores	75/ p th [1000]	4,466	10	8 ¼
592,843	Bricks laid in arches of officers Casemates and arch way of entrance	.. ..	2,223	3	2 ½
38748	Bricks laid in arch of Caponier	.. ..	145	6	1
174,552	Bricks laid in arches of Casemates of reserve fire in Counterscarpe	.. ..	654	11	4 ¾
28000	Bricks laid in arches of Galleries leading to casemates of Reserve fire	.. ..	105	–	–
20700	Superficial feet of Tiling laid in Cement over arches of Casemates for Men and Stores	9 d [pence] p foot	776	5	–
12000	Superficial feet of Tiling laid in Cement over arches of Casemates for officers	9 d ..	450	–	–
3347	yards of Filling in with Stone and Shingle over arches of Casemates & on Rampart of South Front	3/6 p yard	585	14	6
13850	Yards, Superf^{l} forming & levelling Glacis	6 d ..	346	5	–
2565	Feet d^{o} of Flagging in passage in front of Mens Casemates	2/ p foot	256	10	–
700	Yards d^{o} of Paving in front of officers Casemates and Main Building	2/6 p yard	87	10	–
690	Feet run^{g} of Channel, Stone, round officers Casemates and Main Building	1/6 p foot	57	15	–
1100	Feet run^{g} of Circular Stone Curbs for Traversing Platforms	5/6 ..	302	10	–
	carr^{d} forward	£	43653	15	7 ½

	Bro^{t} forward	£	43,653	15	7 ½
26	Pintles, oak, for Traversing Platforms & setting	80/ ea	104	–	–
1300	Yards, Cubic, of Excavation in Rock in forming Tank	4/4 p y^{d}	281	13	4
102	Toises of Maisonry in Walls of Tank	35/ p toise	178	10	–
101500	Bricks laid in arches of Tank	75/ p th	380	12	6
166	Yards of Flagging to d^{o}	9/ p yard	74	14	–
338	Yards of Plaistering in Cement to side Walls and bottom of Tank	2/6 ..	44	15	–
900	Feet running of Drains underground	7/6 p foot	337	10	–
720	.. d^{o} of Common Sewer	17/ ..	612	–	–
800	.. of Flues to Chimnies	1/ ..	40	–	–
534	.. of Conductors for Rain water from Platform	1/ ..	26	14	–
1200	.. of Drains from Ditto to Tank and Excavation	7/6 ..	450	–	–
1000	.. of Underground Drains and Sewers	17/ ..	850	–	–
	? 46 Iron Chimney Bars	15/ ea	34	10	–
2448	Feet of lead Guttering between arches of Casemates	4/8 p foot	571	4	–
1500	Yards of Lime Whiting to Walls of lower floor	1 ½ d p y^{d}	9	7	6
1260	Yards of lath & plaistering to ceilings to d^{o}	2/ ..	126	–	–
3163	Yards of Wall Plaistering to arches and Walls of Soldiers Casemates	1/4 ..	210	17	4
1573	d^{o} of d^{o} d^{o} to arches & walls of officers Casemates	1/6 ..	113	9	6
720	Yards of lath & plaistering to Partitions	1/1 ..	39	–	–
	carr^{d} forw^{d}	£	48,138	12	9 ½

	Brot forward	£	48,138	12	9 ½
280	Squares of Centering [?] to arches of officers & Soldiers Casemates, Magazines, Galleries &c	40/ p square	560		
760	Feet of Oak Lintels to Doors & Windows	2/ p foot	76		
268	loop hole Stoppers and Shutters	5/ ea	67		
78	Squares of oak floor & Joists to Artillery, Commissariat & Barrack Stores	100/ p square	390		
14	Squares of do do to Magazine	100/ ..	70		
24	do of Boarding and lining to do	50/ ..	60		
2	External Doors covered with Copper, Copper Locks, Hinges &c	£ 26 ea	52		
4	Pair of Sashes and frames hung with Copper Hinges	60/ p pair	12		
4	Pair of Shutters covered with Copper, Copper Bolts, &c	120/ p pair	24		
	Fitting 2 Magazines with Bays	£ 20 each	40		
38	External Doors, oak frames, with	60/ ea	114		
	Fitting up officers Mess Kitchen with ? Holes,, oven &c		40		
	Fitting up two Casemates for Mens Cooking Kitchens with Boilers, Furnaces &c		183	17	2
12	External Doors, Oak frames in officers Casemates	60/ ea	36		
12	Interior do in ditto	60/ ea	36		
6	do do to other openings	60/ ea	18		
6	do do to Staff Sergeants	60/ ea	18		
36	Pair of Sashes frames, including Glass Mens Casemates	50/ p pair	90		
	carrd forwd	£	50,025	9	11½

	Brot forward	£	50,025	9	11½
24	Pair of Sashes & frames including Glass officers Casemates	50/ p pair	60		
32	.. of dº dº dº dº in Stores lower floor	50/ ..	80		
	Fittings for Artillery & Barracks Stores and 9 Rooms	£ 20 each	180		
145	Squares of oak Floor and Joists in Soldiers Casemates & Casemates in Angles	100/ p square	725		
3888	Feet of Skirting in Mens Casemates	4 d p foot	64	16	
2112	dº of base ???? in officers dº	6 d ..	52	16	
650	dº of Hanging Shelves	1/ ..	32	10	
700	dº Rack Pins ?	9 d ..	26	5	
6	Small closets for Staff sergeants	40/ ea	12		
	Arm Bands for 300 Men	1/3 ea	18	15	
57	Squares of Floor & Joists, Pine [?], to officers Casemates	45/ p square	128	5	
32	dº of Partitions in ditto	24/ ..	38	8	
50	feet of Rail & Pin in Mess Room	1/ p foot	2	10	
24	Setts of Window Architraves	8/ p sett	9	12	
24	Pairs Shutters Soffits backs & Elbows	45/ p pair	54		
12	Closets with Shelves & Locks to Doors	60/ ea	36		
1152	Window Rebates	3/ ea	172	16	
936	Door dº	3/ ea	140	8	
148	Door & window Sills	10/ ea	74		
148	dº dº Lintels	10/ ea	74		
268	Loop holes, forming	20/ ea	268		
108	Stone Steps to Galleries &c	30/ ea	162		
90	dº dº to Platforms over Casemates	30/ ea	135		
	carrd forwd	£	52,572	10	11½

	Bro^{t} forward	£	52,572	10	11½
2	Stair Cases of oak to Mens Casemates	£ 17 each	34		
5	Toises of Masonry in Foundation of Casemates under the Ramparts of the South Front	30/ p toise	7	10	
134	Toises of masonry in Pier and front Walls of Ditto	30/ – –	201		
1692	Feet Superf^{l} of ashlar in front walls of D^{o}	130/ p 100 feet	109	19	7
140650	Bricks laid in arches of Casemates	75/ p th	527	8	9
3400	feet of Tiles laid in Cement in covering arches of Ditto	9d p foot	127	10	
16	Loop holes forming	15/ ea	12		
16	Stoppers Shutters for loop holes	5/ ea	4		
300	Feet Superf^{l} of Lead in Gutters between Casemates	4/ p foot	72		
336	Door and Window Rebates	3/ ea	50	8	
30	Door and Window Lintels	10/ ea	15		
30	Door and Window Sills	10/ ea	15		
120	Feet running of oak Lintels	2/ p foot	12		
14	Doors with Lock & hinges complete	50/ ea	35		
16	Pair of Sashes & frames including Glass	45/ [ea]	36		
4 ½	Squares of oak Floor & Joists in Guard Rooms	100/ p square	22	10	
	Fitting up Guard Bed		6	10	
6 ½	Squares of Pine floor and Joists in Cells and Privies	45/ p square	14	12	6
20	feet of hanging shelves	1/ p foot	1		
18	Arm Bands	1/3 ea	1	2	6
	Fitting up officers Privies		4	10	
	d^{o} d^{o} Privies for Men		4	10	
	carr^{d} forw^{d}	£	53,886	2	3 ½

	Bro^{t} forward	£	53,886	2	3 ½
	Painting External & Internal Wood Work 3 times in oil		100		
	Forming Entrance with a Bridge across Ditch, 50 feet, with part to Draw		300		
			54,286	2	3 ½
	add 1/10th for contingencies		5,428	12	2 ½
		£	59,714	14	6

National Archives of Canada [NA], MG13 WO44, Vol. 32, pp. 23-26a.

Appendix 2

Report on the Casemates at Fort Henry called for by the Commanding Royal Engineer's orders of 23rd July 1839

1 The Cement employed at Fort Henry was manufactured on the Spot from Stone found in excavating the Ditch of that works. It was burnt in a common lime kiln and when used mixed with sand taken from the Margin of the Lake, in proportion of 2 parts of cement to 1 of sand.
[In margin] How pulverized.

2 The Cement has only proved defective in the pointing of the masonry, and not adhering to the lime stone, of which the walls are built, has, from sudden contraction left large cracks on each side of the Vertical pointing and on the Upper side of the horizontal into which the water has insinuated itself and the frost detached the Cement from the joints.
[In margin] Cement seldom adheres to limestone of this ???? which is very close & impervious

3 The same result has taken place where the Harwich Cement has been employed; consequently, although that manufactured in this Country is very inferior in quality, yet to this cause alone cannot be ascribed the failure in the pointing. I am led to attribute it to several causes.
1st The sand was not free from loam, not having been washed previously to use.
[In margin] This may be remedied in future.
2ndly The proportions of one part of sand to two of Cement is not applicable to this climate, for as the contractibility of the composition is solely in the Cement a greater proportion of sand appears to have been necessary, and the Cement is strong enough to have borne a much greater quantity. The detached pieces of the composition are tolerably hard, & a piece which has been under water for three years is equally so.
[In margin] A trial may be made with different proportions
3rdly The chief part of the masonry is Ashlar, with chiselled margin, and the joints have not been raked to a sufficient depth to hold the pointing. If cement were originally intended to have been employed for this purpose, the exterior face should have been set with this material.
[In margin at beginning] Try pointing on a small scale with oil putty
[In margin at end] Yes ???
4thly The Cement in many places is put on in such quantity, that its own weight has a tendency to detach it from the joints.
[In margin] Requires Explanation
5thly I understand the work was performed at an improper season of the year, the month of October, when the nights being usually frosty might have caused too sudden a contraction of the Cement.

4 The Public and private buildings in the town of Kingston are all pointed with common mortar, to which in some cases, ashes are added to harden the composition, and the material used sparingly, appears to stand for several years. I should therefore recommend that, instead of employing cement for pointing, a composition be substituted, consisting

of 1 part brick dust, 2 parts of sand and one of slacked [sic] lime, to which half that quantity of unslacked [sic] lime, finely powdered, is to be added immediately before use, and, if these materials be of good quality, I do not apprehend the same failure from contraction which has taken place in employing cement.
[In margin] This should be tried when pointing is required at Fort Henry, and the effect reported upon

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7 The Casemates at Fort Henry are not more damp than Barracks of that description usually are, particularly after recent completion, and when the masonry is of lime stone.

The dampness appears only in the front walls, and arises I am led to believe from the mass of lime stone immediately over that part, and from the arch terminating at the interior face of the wall instead of passing over a portion of it, so that the sweating of the lime stone makes it[s] way through the junction-
[In margin] The IGF [illegible]

8 This dampness is only visible at the fall of the year, and disappears as soon as stones are used consequently, I make no doubt, will cause no inconvenience when the masonry is completely dry. They are occupied, and make comfortable Barracks.

9 The Stores on the lower floor are quite free from dampness, and in like manner are well suited for their appropriation. But the brick arch of the gallery in this range of building is receiving in some places, much injury from the wet making its way through, owing to the same cause as the dampness in the casemate wall, viz: the arch abutting against the Screen wall <u>instead of passing over it.</u>
[In margin] What remedy can Capt^{n} Stehelin suggest for this evil

10 The officers casemates, which have only one story, are much more damp; and one of the magazines must shortly be abandoned until some remedy can be discovered.

11 The former I attribute to the construction of the chimney flues, which are carried vertically through the piers and Springing of the arches into the valley, and nearly horizontal to within a few feet of the interior face of the scarpe wall, and gradually rising are brought out perpendicularly through the middle of the parapet, and as the gutter runs over the flues, with a large mass of limestone masonry, a constant drip must ensue, until the walls are dry, and the fire places smoke so much from this construction as to be perfectly useless.
[In margin] Can this construction be ameliorated

12 The rooms are warmed by stoves the pipes of which carried into the flues in the escarpe wall similar to those in the Mens Casemates.

13 The earth over the Magazine above referred to Marked A on the plan and contiguous shifting room was removed about 4 years since, and the two courses of tiles (which were manufactured here) that covered the D'os d'ane were found perfectly soft, and I fear while they continue so it will be difficult to render the arch completely dry.

[In margin] Why not use slates in place of Tiles. could they not be imported for this purpose They would be more liable to crack & occasion leakage

14 I consider however that imperfect ventilation has contributed as much as any other cause to the continued dampness of this magazine, as also the circumstance of the absence of the usual brick lining so essential to prevent moisture; ventilators are in the front wall but no openings are on the opposite side to introduce a current of air. The floor is likewise without ventilation, which indeed is the case in the whole fort, and will eventually cause decay in the joists and floor.

15 An opinion prevails here that a circulation of air under the floor will cause the rooms to be cold, which opinion I consider, as the floors are tongued and grooved, fallacious for it must be admitted that a much more disagreeable and unhealthy sensation is produced by constant moisture than by the introduction of fresh air.
[In margin] Concur

16 I would recommend the Magazine to be lined with ½ [?] brick work leaving a vacant space of 2 ½ inches between the lining and the masonry and the arch to be covered inside with cement, carried over the junction of the lining with the arch. That ventilators be constructed over the door ways being the only available place and ventilation introduced under the floor the latter to be plain jointed to admit a free circulation of air.
[In margin] Concur & provide accordingly in An^{l} Est^{e} 1840-41

I have further to observe that the arches of the whole of the Casemates are covered with two courses of the bricks manufactured by the Department laid dry over the stone flagging of the D'os d'ane with interstices and I am apprehensive that if they should become in a similar state as the tiles, that hereafter the water courses will become clogged and cause a dampness throughout the Mens Barracks.

17 As the ammunition lodged in the Shifting room is reported to have suffered injury from damp, it would be advisable to find a temporary expense Magazine for the Artillery, and I have the concurrence of Lieut: Colonel Ward in suggesting the adjacent officers room, which is without a fire place for the purpose to which it can be made applicable by removing the tables and filling in the windows with brick having an additional thickness of 6 inches to enable air flues to be constructed and by having a double door and securing the loopholes in the escarpe wall.
[In margin] Concur, and the suggestion to be acted upon
by order
[signed] Benj^{m} I.. Stehelin
Captain R Eng^{r}
3^{d} Dec^{r} 1839

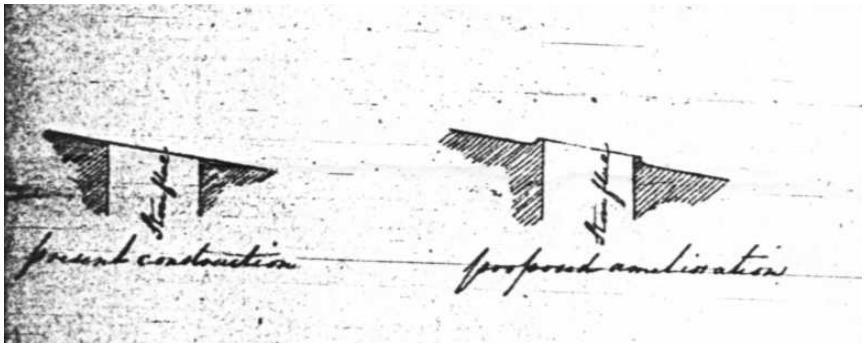
In addition to my report of the 3rd ultimo, & agreeably to your orders on paragraph 9 – I beg to suggest, as the only remedy, except that of rebuilding the arches of the gallery in stone; that the soffit of the arches should be covered with a coating of Harwich cement & the exterior be opened as far as necessary to secure the junction of the arch with the [?] wall from leakage which might

probably be effected by brick cut edge wise bedded in cement.

2. With reference to paragraph 11. I am fearful the construction cannot be ameliorated, but the dampness may be reduced when the masonry is perfectly dry, any alteration should therefore be postponed for two or three years.

3. An estimate for fitting up a magazine for the Artillery amounting to £35..7..7 ½ and deducting stores that can be furnished requiring an outlay of £19..2..6 ¼ is herewith forwarded.

4. Since writing the report the snow has fallen. I find that the water makes its way down the stone flues, the opening on the top being level with the superior slope of the parapet, & the channel which is cut round not carrying off the water this can be remedied by substituting the subjoined construction which will not interfere with the firing of the Guns.



present construction proposed amelioration

[signed] Benj^{m} I.. Stehelin
Captain R Eng^{r}
21st Jan^{y} 1840

NA, MG13 WO55, Vol. 875, pp. 234-9.

Appendix 3

Report and Estimate of Works and Repairs proposed to be carried on in the Royal Engineer Department in the Kingston Division C. W. In the year 1854.5

Report

This service is brought forward with reference to the memorandum 4863 of the 8th April 1853 from the Inspector General of Fortifications, and is necessary in consequence of leakage in the casemate owing to settlement having taken place in the tread of the Banquette toward the parapet, the water finding its way in consequence through the masonry, and also done the flues, which being of defective construction, and damaged, require renewal. – It is therefore proposed to take up the whole of the Banquette and open the Terrepleine to the depth and width shewn in the accompanying drawings, and [illegible] sketch, rake out the joint of masonry in the face of the foundation of Banquette and rear walls, and point them with American cement above the portion coated with asphalte, to repair the foundation of Banquette where necessary and grout them with roche lime and sharp sand, to relay the banquette in approved American cement, and to rake out the joint of rubble masonry in face of the parapet where required and point the same with cement. – also to take out the old flue stones and remove them off the premises, supply new Ashlar stone in blocks forming flue stones 23 – 6.3x2.4x1.4 average and 41 – 3.8x3.6x1.4 average wrought and sunk with channel course round flues –

These stones it will be necessary to procure from a distance at Wolfe Island.

By special contract.

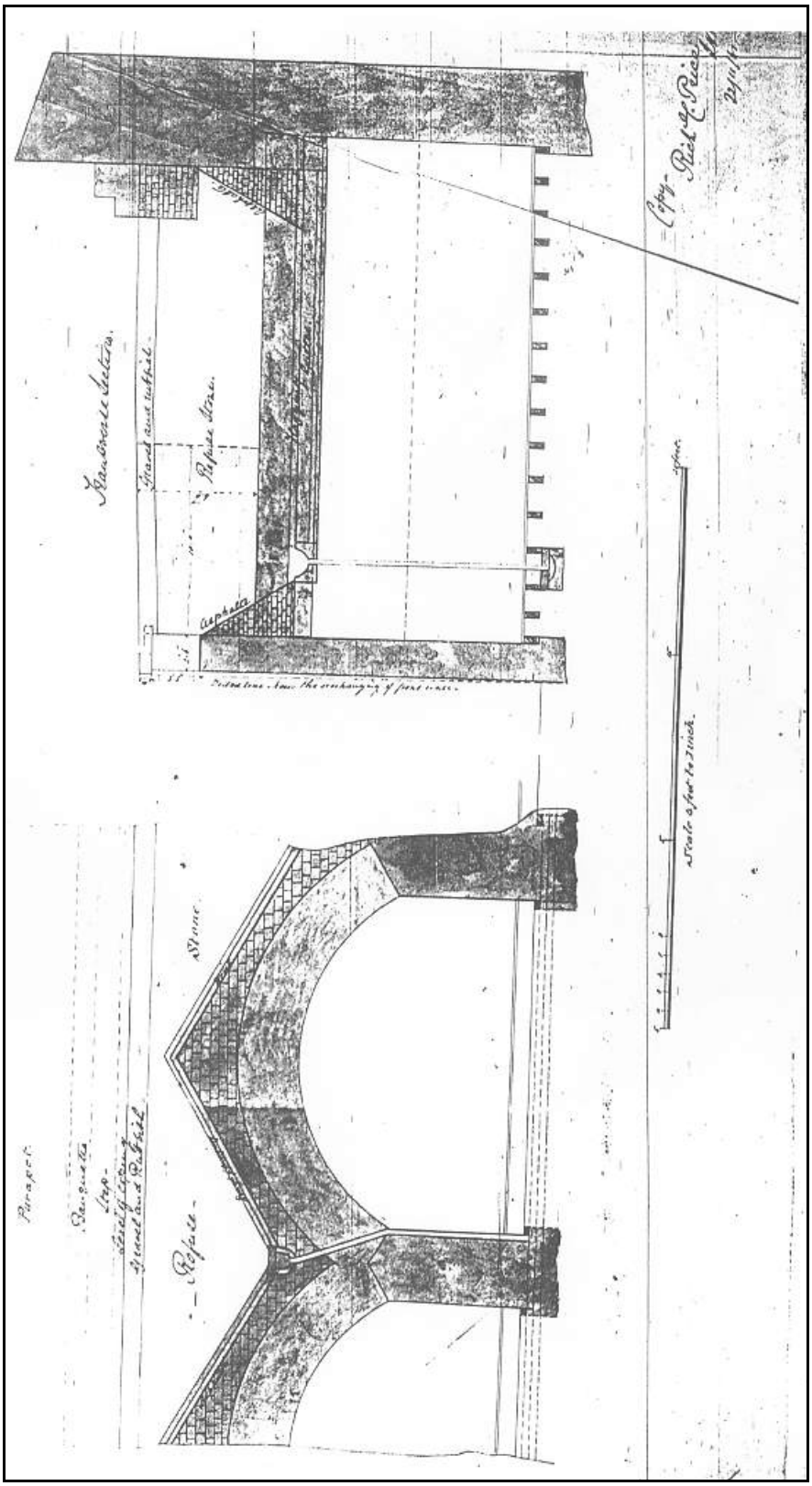
Estimate

Kingston
Stanching the Casemates by
relaying Banquette &c & Supplying
new flue Stones
Fort Henry

171 ½ yds cube Digging and throwing out earth including filling in and ramming
3804 Ft cube Taking down & rebuilding ashlar masonry set in American cement
3681 Ft supl Raking out joints of rubble masonry & pointing with American cement
306 Ft linl Cutting channel courses 3 inches wide properly [illegible]
269 ½ yds cube Excavating in loose refuse stone including throwing out and carefully replacing them over the dos d'anes
909 Ft linl Grouting with roche lime and clean sharp sand in foundations of rubble masonry 2 ft 9" wide including repairing foundations where necessary
1 Raking out joint of rubble masonry and pointing with cement in patches
1149 Ft cube Ashlar building stone not wrot including cement mortar & settings the stones to be brought from Wolfe Island quarry
861 ½ Ft supl Rough boucharding on face & sunk [?] work
68 Cutting holes 8 in to 14 in diameter thro' stones 16 inches deep and fixing cast iron cowls

1149 Ft cube Breaking out old flue stones and removing same 300 yds spreading & levelling including preparing wall to receive the new
1 Raking joint of coping & pointing with American cement in patches

Alex^{dr} Gordon Lt Colonel
Royal Engineers
6 October 1853



NA, MG13, WO55/886, pp. 746-7.

Appendix 4

Fortifications. Report 7 Estimate Of Works & Repairs proposed to be carried on in the Royal Engineer Department in Canada in the Year 1862.63

Abstract Kingston Fort Henry

[Item] 29 Staunching leaks over the Officers Casemates on the East and West Sides

[Report]

This service is brought forward in consequence of the front retaining wall of the Officers Casemates having shewn indications of detachment from the Arches, and being out of the perpendicular: owing to which causes the Officers rooms are not water tight, and the Medical Officers have strongly urged that, for the health of the occupants the dampness of these Casemates should be remedied.

Provision is therefore made in this Item for excavating the terrepleine of the ramparts to the depth shewn on the accompanying section, for taking down the Coping, channel course, and front walls, and rebuilding the same in ashlar and rubble masonry; the Coping, and the Ashlar, 4 inches from the face, to be set in Portland Cement, – The defective masonry and channel course to be made good, the first course of masonry to be bedded in Asphalte ½ inch thick.

By Measurement.

[Estimate]

Kingston
Fort Henry
Stanching Leaks over the Officers Casemates

525	Feet cube taking down & resetting rubble masonry in mortar
30	Feet – " – in rough boucharded ashlar work as Item 26 of Schedule
350	Feet – " – taking down & resetting ashlar masonry in mortar
5	Letting in and leading newals
303¼	Feet supl taking up, squaring & relaying paving
$93^{3/9}$	Yards -"- gravelling 2" thick and spreading
7	Bushels Portland Cement
140	Feet linl taking down and refixing iron railings and newals
30	Feet -"- sunk [?] & boucharded coping channelled to match old
$46^{6/9}$	Yards supl coating with seyssel Asphalte ½" thick including 1 ½ Cwt of sand to 2 ½ Cwt of Asphalte, and all fuel, Tar and implements to complete
1	Making good junction of old Asphalte fuel and Labour
$155^{15/27}$	Yards cube excavating through stiff rubble and filling in

For the East Side
For the West Side

[note: the above amounts are for one side]

NA, RG8, Vol. 1421, Reel C-3722, pp. 2, 42, 44.

Appendix 5

Fortifications. Report and Estimate Of Works and Repairs proposed to be carried on in the Royal Engineer Department in Canada in the year 1863.64

Abstract. Kingston Fort Henry

[Item] 21 Covering the superior slope of the Parapet on the East and West Faces

[Report]

[Item] 21

This Item is brought forward in consequence of the letter from the Commanding Officer Complaining of dampness in the Officers Quarters. –

The Item provides for covering the superior slope of the parapet in the same manner as now on the north face of the parapet with boards to prevent the wet from getting into the wall as it now does through the joints of masonry. –

The cast Iron Chimney pots to be taken off and removed to store and to raise the flues in brick work with Toronto yellow bricks, laid in ½ American Cement and ½ Sand, sinking holes in lime stone 4 ½" deep and 1" in diameter for oak plugs to receive the battons of rough pine 2" x 1 ½" placed about 2 feet apart from centre. – The covering boards to be of 1" Pine 7" wide, wrot one Side edges shot and put together with white lead, with a Circular groove at each Side of the joints, the boards to be of 1" Pine wrot 1 side edges shot and plugged to walls. – The superficies of the wood work to be painted 3 coats in oil. –

Dimensions 2/ 180'.0" x 6'.6"
By Measurement

[Estimate]

Covering the Superior Slope of the Parapet on the East and West Faces.

2340 Feet Supl 1" Pine wrot one side edges shot and put together with white lead
360 Feet Supl ----- Do. ----- and plugged to Walls
8021 " linial groving [sic] to order per 10 feet
300 ⅔ Yards Supl Painting 3 coats in oil
23 Taking off cast Iron Chimney Pots & removing to Store
340 Feet cube brick work with Toronto yellow bricks laid ½ American Cement and ½ Sand
430 Sinking holes in limestone 4 ½ " deep & 1" diameter
1440 Feet linial rough pine filled [?] & fixing including oak Plugs

NA, RG8, Vol. 1422, pp. 2, 29-30.

Appendix 6

Providing wrot Iron Racers to the Curbs of the Traversing Gun Platforms mounted in Fort Henry & the Advanced Battery

Report

There are seventeen 24 Pounder Guns within the Fort and nine 32 prs. in the Advanced battery mounted on Traversing Platforms, only 4 of which have Iron Racers, and great inconvenience is experienced in consequence of the frost raising the ends of the Stone Curbs, thereby causing one Stone to stand above the Surface of the other at the Joints, which very much retards the movement of the Platforms, whereas those which have racers maintain their proper situation, the Irons having a tendency to keep the Curb Stones on the same Level.

Provision is therefore made in this Item for 22 Racers of wrought Iron 2" x ¾" averaging 45 feet long, wrought to the proper Curve, punched at about every 3 feet, to receive the Studs, and the top countersunk, the Studs to be of wrot Iron, 1" x1" 3 inches long, having a rivet formed with square Shoulders, and rivetted to the Racers, the heads to be filed flush with the top of the Racers, in Mortices to be cut in the Stone Curbs to receive the Studs 2 inches deep, and run with lead.

By measurement.

Estimate

308 letting Studs into Stone 2 inches deep including [illegible] Lead 1 [illegible]
5207 lbs wrot Iron Racers & Studs the former wrought to the Curve of the latter rivetted to the Racers

NA, RG8, Vol. 1418, pp. 133-4, 17 April 1849.

Appendix 7

Specification

Foundation

The terrepleine to be excavated for the foundation walls down to the dos d'anes of the arches, or as far as may be necessary to secure a solid foundation.

The foundation walls to be of rubble masonry laid in mortar of approved quality, to be 2 ft thick and to be laid of a polygonal plan following the line of the oak curbs. The walls where practicable, to be carried up to the under side of the oak curbs, spaces being left for the lower layer of timbers.

Banquette to be removed

The Banquette along the part occupied by the platform to be removed.

Lower Layer of 10" Cedars

The lower layers of timbers to consist of ten inch cedars flatted on top, notched to receive the next layer and laid in the direction shewn in the plan with a solid foundation throughout of dry stones and earth. The ends of the cedars to run not less than two feet into the parapet wall, into which they are to be firmly built and further secured by clamps of wrot iron 1 ½ in. by ½ inch; each cedar to have two clamps each 3 feet long.

Upper layer of 10" Cedars

The next layer to be also of 10 inch cedars placed 2 ft between centres, flatted both sides and notched on the upper side to receive the oak curbs. – The cedars to have solid foundations throughout – the same as the first layer.

In the second and third guns the first cedar to be placed parallel to and touching the parapet, to which it is to be secured by clamps as before not less than four feet apart. – In the gun at the anglethe upper layer of cedars to be let into the wall in the same manner as the lower layer. The end timber in all the platforms to be of pine 10" x 20" well seasoned.

Oak Curbs

The curbs to be of well seasoned oak 10" x 14" rough and fixed, and cut circular, the pieces halved together, or of oak 10" x 20" not cut circular, fixed as before, and laid so that the centre of the racer shall at no place be less than seven inches from either edge of the curb. The whole of the timbers to be fixed together with 1 ⅝" oak treenails [?] knocked through auger holes 1 ½" diameter. A groove ¾" deep and exactly fitted to the size and curve of the racer to be formed in the centre of the curb. The curb is to rest solidly throughout on the timbers or on the foundation walls.

Racers

The racers to be fixed to the curb with wrot iron jagged bolts 7" long, and, wherever there is more than 3 ft between any two of the bolt holes, an additional hole to be drilled on the spot. A piece of 2" pine 6"wide and scribed to the curb to be fixed round the back of the curbs.

Filling in

The whole space between the timbers to be filled in with earth and small stones well rammed to

at least 3" below the top of the curbs.

Ramp
A ramp with a slope of 1 in 2 and a tread at the top 1 ft wide to be formed round thje back of the outer curb as shewn in the section.

NA, RG8, Vol. 1612, pp. 276-8, to accompany Storer to Noble, 3 August 1863.

Appendix 8

Report and Estimate of the Probable Expence of Providing internal Porches to Officers Casemates Fort Henry Kingston

[Report]

This estimate is brought forward agreeably to the order of the Major General Commanding Canada West(copy herewith dated 26 October 1844) and provides for internal wooden porches to officers Quarters in Fort Henry which Service is essential for the comfort of the occupants as the entrance doors open immediately into the rooms, thereby rendering them very uncomfortable during the winter from the admission of cold air.

This Item therefore provides for an internal wooden porch to each of the 11 officers Casemates and the Mess room as shewn on the accompanying drawing to be secured to the door architraves with hooks and straps[?] to admit of being removed if required in the Summer Season.

The sides back and top to be 1 ½ inch pine framed square and flat with doors 6'9" x 3'9" hung folding with 4 inch cast butt hinges to have two 10 inch barrel bolts and a Spring latch to each< the sides to be rebated to receive the back, the under side of the top to be grooved to receive the sides and back, and the bottom to be secured to a wrought & chamfered fillet fixed on the floor – The sides and top to be connected with 3 inch Screws to admit of being taken apart – the whole of the wood work to be painted 3 coats in oil.

By Measurement

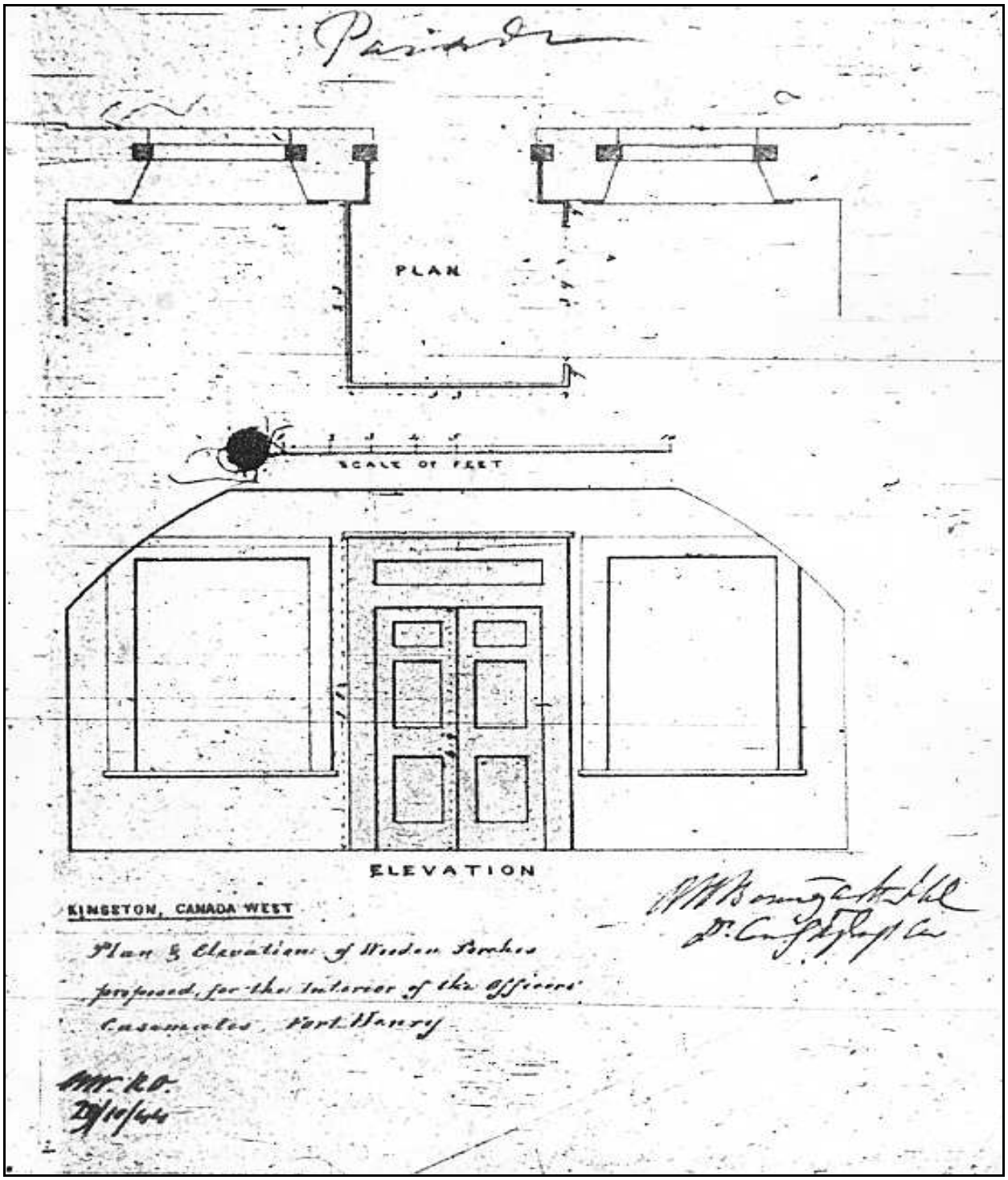
Estimate Kingston Fort Henry

<u>Providing Eleven Internal Porches to officers Casemates</u>

1960 feet sup: 1 ½ inch pine framed square, not molded	[prices
189 feet lineal grooving	
144 feet lineal pine wrought & chamfered fillet	have
207 feet lineal rebating	
8 doz: 3 inch Screws fixed	been
24 pairs 4 inch cast iron butt hinges with screws	
24 10 inch barrel bolts with screws and fixing	left out]
12 Spring latches with brass Knob handles fixed complete	
48 wrought iron hooks with straps 6[?] inches long including fixing with screws	
439 yards sup: painting 3 coats white	

Approved

13 November 1844



NA, MG13, WO55/879, pp. 3-4.

Appendix 9

A Report of the Architectural Conservancy of Ontario

Fort Henry, Kingston

Part One. A survey of Delapidations [sic]

1. The approach to the Fort is over a road whose surface is gone but the foundation is mostly good and the road is passable in winter.

2. The Stockade has approximately 250 feet of stockading down or gone. The buildings inside it are in good repair.

3. The New Fort (1840). The buildings are in excellent condition. Eight cannon (Carron 1806), four in position on original mountings and four fallen, through the rotting of the timber carriages, are still on the South Battery. Approximately 60 feet of the cut stone veneer of the outside wall of the South Battery has fallen into the moat but the wall itself is still sound.

4. Old Fort.

   A. The South wall between the Old and New Forts and the connecting Ramp are in excellent condition.

   B. The buildings on the North side consist of 24 bays two storeys high with brick vaulted rooms and gallery and have cut stone veneered rubble walls facing the moat, and a wooden roof tarred and gravelled. The condition of the lower range of rooms is good, the floors are safe, the brick vaults are sound, the window sash is in position with approximately 20% of the panes broken, 4 of the 24 doors are gone. The condition of the upper range of rooms opening onto the gallery is very fair, the floors are safe, two or three of the brick vaults show signs of rain penetration but all are sound, 20% of the panes are broken, all the doors are in position. The condition of the gallery and facade of the buildings is good, approximately 50 sq feet of thin stone veneer surrounding three windows has fallen, the gallery vaults and groins are sound, one pier has two chipped and displaced stones but is not dangerous. The railing is in position except in one bay. Only one of the four wooden outside stairs to the gallery is safe. Most of the stone veneer on the outside has fallen into the moat but the outside wall is still self-supporting. The roof of this building is not watertight, some of the joists appear to be rotten and the roofing is pervious. Two of the brick chimneys are unsound. The parapet to the moat is cracked in several places.

   C. The building on the East side consists of a single row of vaulted chambers, formerly officers' quarters, above which is rubble filling forming the platform for the east Battery. This building has a cut stone facade on the inside ornamented with rectangular sinkings, the outside walls facing the moat are rubble walls

veneered with cut stone. The condition of this building is dangerous. Part of the facade has already collapsed, blocking the entrances of two rooms and the rest would fall if the existing shoring were removed. As the facade is not a bearing wall its collapse has not endangered the battery platform above, which is supported on the brick vaults. The plaster ceilings in the accessible rooms show no sign of damp so that it is to be presumed that no rain reaches the vaults from the battery platform, and as all the vaults are uncracked they can be considered sound. Most of the stone veneer on the outside has fallen into the moat but the wall is still self-supporting. The platform of the East Battery was at some time covered with a stepped sloping concrete floor which is no longer watertight at the step and at the outside edge. The parapet has lost its wooden covering and is now badly cracked. Three Cannon (Carron 1806), and one breech loading gun (Armstrong-Whitworth) are still in position, one dismounted owing to collapse of the carriage.

D. The building on the West side is similar in plan and construction to that on the East. The facade bulges in two places and three shores are in place to prevent its collapse, the floors or [sic of] the rooms are safe, the vaults are sound, the platform of the West Battery above is sodded, the parapet has lost its wooden covering and is cracked, most of the stone veneer of the outside wall has fallen into the moat, no cannon is in position on the West Battery above but one is below in the square of the Old Fort and three lie in the Stockade, their carriages have gone. The condition of the West Side as it stands now with shores is safe for any entering the range of rooms below and standing on the West Battery.

E. The enfilading gallery in the moat is in excellent condition except for the presence of a foot or more of water.

F. The two staircases to the moat have been walled up at the bottom.

G. The condition of the moat is dangerous to the public, over half the cut stone veneer on both the escarp and counterscarp walls has fallen into the moat, the remainder is in gradual danger of following. The cells in the moat are therefore dangerous of access. The actual collapse of the retaining counterscarp wall is not imminent nor is that of the main escarp wall of the Fort.

H. The temporary structures erected during the war are all safe except for the boarding on the wooden bridge between the East Battery and the New Fort Square.

5. The East and West waterside towers are in very fair condition structurally, but the floors inside are either gone or dangerous and approximately 10 feet of the coping on the West tower has fallen. A cannon is still mounted on the top of each tower, and the East tower has a wooden roof.

6. The East and West flanking moats from the Old Fort to the waterside towers are partially ruined and dangerous in a storm or thaw.

7. One of the two wells in the Fort is known to be pure and in good condition.

Part Two. Recommendations. [not copied]

Part Three. Plan and Photographs. [lost]

NA, RG24, Vol. 5894, File 40-2-1, Part 1, enclosed in Adamson to McNaughton, 13 Oct. 1933

Appendix 10

W. L. Somerville to R. M. Smith, Deputy Minister of Highways, 19 June, 1936.

Enclosed find preliminary draft of specification for work on outer walls.

These are not complete by any means but cover points discussed at the site.

Will you please send me a copy of what it is necessary to put in the General Conditions to comply with the Department's usual practice. Also how many copies of specifications will be required.

June 16th, 1936

Specifications

General Conditions

That the Department supplies?

Scope of work

Re-building stone facing of walls "A" - "B" - "C" as shown on plans, on South and West of Fort.

Masonry Specifications

Excavation

Remove all earth and debris accumulated on floor of moat, dowh to the natural level, and dispose of to site as directed by Architect.

Trees and Vegetation

Cut down all trees and shrubs or any other vegetation or debris and dispose of same to site as directed by Architect.

Existing Stone Work

Remove existing face stone work, down to the level of moat floor very carefully, as this stone has to be used again. Any spalled edges or damaged stone must be cut off, squared and edged.

Protection of existing Walls

Existing Rubble walls which form the back of the stone facing that requires to be cut for headers or facing stone must be cut very carefully to avoid collapse of walls.

Shoring to be used wherever necessary to eliminate accident and injury to workmen.

The Contractor to replace or build up any loose masonry that he may encounter before building up face stonework.

Face Stonework

The face stone of these walls to be built only with the material on the property. No other stone will be placed on the site by the Department.

This work to be squared coursed ashlar, to match existing work. To have level courses throughout. Height of coursing to be the same as original walls.

Walls to be plumb, in the same line as the base of wall. Stone to be fully bedded and jointed with cement mortar. All spalls and back up to be flushed full at each course.

Headers to have a minimum area of 144 sq. inches cut into present walls to a depth sufficient to attain adequate anchorage. This to be determined by the Architect. The header stone to be wedged, anchored and grouted in place, and fill all voids. These headers to be staggered with a maximum spacing of one header to every 30 [50?] sq. ft. of wall.

Pointing and Cleaning

Rake all joints to a depth of ½" [inch] and point with cement mortar. One part cement; one and one-half parts sand. Clean stone face when work is completed, leaving a finished workmanlike job.

Anchors

Anchors for masonry to be 1" [inch] diam iron rods, to a required length, buried down at one end into stone with nut and plate washer on the inside of wall. Spaced one anchor to every 30 sq. ft. of wall, or where advised by Architect. [Sections difficult to read.]

Stone Coping

To be placed to the same slope as original coping, fitted and jointed using old coping stone. Fully bedded and jointed with waterproofing compound. All coping stones to be anchored together to prevent sliding or displacement.

Waterproofing Treatment

When masonry walls are built to required height cover the entire surface with a good covering of cement mortar, floated finish. Then apply a heavy layer of membrane waterproofing.

Shoring and Bracing

The Contractor must during the operations protect the adjoining walls of the premises by shoring and bracing for the safety of the workmen and preservation of property. The Contractor will be held responsible for damage occurring during the fulfillment of his contract, and will have to replace same at his own expense.

Recesses for Gun Sights

Cut recesses for gun sights wherever they are in the existing walls.

[hand written list:
"Notes
Mortar Mix
Speed & Time Limit
Equipment
Inspector
Labour

Connection of Coping & Adjoining Arches Walls
Roof Intersection to Wall & Flashing
Removal of Chimneys & Rebuilding

Ontario Archives [OA], RG14-153-1, File 432.36-87, MS 3889.

Appendix 11

Contract with Frid Construction Company Ltd, 30 July 1936, Contract 36-87

Clearing and grubbing as ordered	
Earth excavation	1,570 cu. yds.
Removing existing facing stone and erection of stone facings to exterior wall	40,000 cu. ft.
Coping stone	7,000 cu. ft.
Anchors 12'-0"-1" diameter	33
Anchors 6'-0"-1" diameter	17
Anchors 5'-0"-1" diameter	134
Anchors 4'-0"-1" [diameter]	23
Gun sights	90
Waterproofing	6,000 sq. ft.
Rebuilding chimneys	30

OA, RG14-153-1, File 472.6, MS 3889, Dickson to Smith, 21 July 1936.

Appendix 12

Contract No. 37-21 awarded to Frid Construction Company
Specifications 11 May 1937

1.	Earth excavation per cu. yd.	4,000 cu.yds.	@	.40 ¢	$1,600.00
2.	Remove existing facing stone supply & erect old and new stone facings to exterior walls of moat and east elevation of east wing as specified,-				
	(a) Remove cut and set old stone on site per cu. ft.	6,000 cu..ft.	@	1.30	$7,800.00
	(b) Set new stone on site per cu. ft.	15,000 cu. ft.			
	(c) Allowance for new stone on site	15,000 cu. ft.		etc.	
	(d) Supply, cut and set new stone per cu. ft.	23,500 cu. ft.		etc.	
3.	Coping stone as specified & parapet & firing steps:				
	(a) Remove, cut and set old stone on site per cu. ft.	5,000 cu. ft.			
	(b) Supply, cut and set new stone per cu. ft.	7,000 cu. ft.			
4.	Guards' Quarters:				
	(a) Removing foundations & excavation per cu. yd.	250 cu. yds.			
	(b) Supply, cut & set cut stone facing per cu. ft.	31,000 cu. ft.			
	(c) Supply, cut & set stone back-up & interior face walls per cu. ft.	36,000 cu. ft.			
	(d) Supply, set & cut, coping stone, steps per cu. ft.	5,000 cu. ft.			
	(e) Door, frames & transom sash complete installed	18 units			
5.	Outside face retaining wall of moat per cu. ft.	60,000 cu. ft.			
6.	Swing bridge to roadway over ditch	1 unit			
7.	Anchors 6' 0"-1" diam. Each Unit Price per foot	1,320 ft.			
8.	Gun sights	123 sights			
9.	Waterproofing	6,000 sq. ft.			
10.	Rebuilding chimneys	62 chimneys			
11.	Concrete floor on ground reinforced with steel mesh unit price per sq. ft.	20,000 sq. ft.			
12.	Concrete roof slab reinforced over fill throughout unit price per sq. ft.	23,000 sq. ft.			
13.	"A" Reinforced concrete, per cu. yds.	150 cu. yds			
14.	"B" Concrete foundations, per cu. yds.	600 cu. yds.			

OA, RG14-153-1, File 472.6, MS 3908.

Appendix 13

A. F. Gill to A. G. L. McNaughton, President, National Research Council, 19 July 1938

The President:

Re: Visit to the Restoration Work in Progress at Fort Henry, Kingston, on 23 June, 1938, accompanying Dr. R. E. Stradling

We were conducted over this work in detail by Mr. Way who has been in charge of the historical research incidental to the undertaking. Construction operations, it is understood, are in the hands of a contractor.

1 The only comments offered on the actual work of restoration are as follows:–
The new masonry work is evidently being laid with portland cement mortar. In the opinion expressed by Dr. Stradling, this is very undesirable for the reasons given in the paper which he presented to the Annual Meeting of the Society of Chemical Industry, i.e., moisture percolation through the masonry, instead of being taken up by the mortar, will tend to be through the surface of the stone with the result that frost action or expansion effects of mineral salts will manifest themselves in spalling of the stone. Dr. Stradling was of the opinion that if a more porous mortar were used evaporation would take place at the face of the mortar rather than at the face of the stone and spalling would be eliminated. Dr. Stradling mentioned that the use of cement mortar in the restoration of monuments in England had resulted in the ruin of the masonry in many instances, sometimes in a very short time.

2 On top of the ramparts concrete slab decks are being used without any membrane water-proofing, a surface treatment of a penetration oil being applied. We were informed that this treatment was guaranteed indefinitely but it appears obvious that these decks will crack under temperature stresses.

From the information given to us it appears that the difficulty of water-proofing these decks was an indirect cause of the deterioration of the building in previous years. We were informed that when the fortifications were first erected asphalt decks were used to provide a water-proof surface. This material checked and cracked badly under winter temperature conditions and, as a consequence, at one stage in the life of the structure, the fill was removed for a depth of several feet below the deck and water-proofing was applied immediately above the ceilings of the quarters below. Moisture was thus allowed to permeate through all the masonry above the water-proofing and its freezing and thawing undoubtedly contributed to the disruption of the masonry facing.

The examination of the original masonry in these fortifications was of outstanding interest to both Dr. Stradling and myself. The outside walls of the structure were made of cut Kingston limestone with exterior galleries roofed with the same material. Interior galleries, gun replacement [sic], store rooms and living quarters were roofed in some cases with the same limestone and others with brick. This brick, we were informed as [sic] was of British manufacture and had been brought over as ballast. Presumably throughout the whole original structure lime mortar had been used.

Either since the abandonment of the fortifications or, possibly, since the time when water-proofing of the upper deck was abandoned, there has been apparently steady percolation of water downward through the interior walls and arches. This water has carried in solution alkaline earth bicarbonates from the masonry above and through surface evaporation has probably brought into play all the factors which attend the transfer of soluble salt from one part of a structure to another.

On arched ceilings where there was a tendency to drip, stalactites were to be seen in all stages of development, from a single hollow drop of solution with surrounding shell of carbonate to substantial ones of seven pounds in weight. Where the solutions were free to move down the arches onto the walls hard-topped shells of re-crystallized carbonate have been formed over large areas of the masonry giving it a completely monolithic surface. Again, where conditions were such that the solutions could drip clear of the masonry the effect has been in some cases, to remove the lime from the mortar and leave a sandy inter-layer. The other instance where the surface was such that dripping did not take place, and evaporation occurred, there has been disruption and spalling of the bricks and, sometimes, the forcing out of substantial portions of the mortar. The relative magnitude of these two effects would presumably depend upon the relative permeabilities of the two materials.

In some places there has been spalling of the bricks at the bottom of arches apparently through mechanical stresses resulting from the superimposed load. In others, particularly the tops of arches, where the stresses would naturally be smaller, there is evidence of spalling of brick work as a result of frost action while in a wet condition. In some of the galleries the bricks are covered with monolithic layers of precipitated carbonate without any visible evidence of deterioration. In others spalling has been so severe that the floor is covered with an inch or more of fine brick dust.

The paper presented by Dr. Stradling at the Society of Chemical Industry emphasized in no uncertain way the importance of careful interpretation of weathering effects in terms of physico-chemical principles. The masonry in Fort Henry appears to supply a most fruitful field for studies of this kind both as a means of augmenting our general knowledge of weathering processes and of evaluating the behaviour of different materials, under the conditions obtaining in this structure. Dr. Stradling himself was most enthusiastic about possibilities of having a study of about a month made of this matter and subsequently in conversation Mr. G. McL Pitts of the Architects' Association of the Province of Quebec stated that his organization would be most interested if we could give them an address on this subject. Any information that could be obtained would also be of direct bearing to the work of the masonry section of the National Building Code project.

It seems unlikely that a full month would be required for the work but it is recommended that provision be made, if at all possible, for about two weeks to be spend in Kingston for a thorough study of any material that could be brought to light. Mr. Way has undertaken to give his complete co-operation if it were decided to proceed.

If a study of this work were undertaken, it would also be of fundamental interest to study the weathering characteristics of the Kingston limestone itself. During the examination

of the structure Dr. Stradling drew attention to several places where disruption of the stone was evidently occurring even in places where no water percolation was in evidence. This he ascribed to the oxidation of bituminous material in a manner similar to the disruption of the "black" limestone in Quebec. This is a matter that could be investigated with very little difficulty.

Of secondary interest in the structure is the state of preservation of wood plank floors and racks in powder magazines, some of which are over l00 years old and are still in excellent condition. Copper and iron hardware and fittings are installed in close proximity to each other under varying conditions of exposure. They, too, would undoubtedly be worthy of some study.

(Sgd) A F Gill

NA, RG24, Vol.5894, File 40-2-1, Part 1

Appendix 14

Specification for Application of Gunite to Ceilings and Walls at Fort Henry Kingston, Ontario submitted by Gunite and Waterproofing Limited

Scope of Work

The work included under this specification consists of the application of a gunite lining to:

(a) The ceilings and walls of the officers' quarters. The gunite shall be carried down to the floor level.
(b) The brick ceilings of the men's quarters, carrying the gunite down to the base of the ceiling arch.
(c) The brick ceilings of the passage-ways to the ramparts, carrying the gunite down to the base of the ceiling arch.

Preparatory Work

The ceilings and walls outlined in "Scope of Work" of this application shall be cleaned of white-wash, paint and loose particles by means of sand and water blast, priop to the application of gunite.

Reinforcing

Expanded metal reinforcing fabric, size 3:14:06, shall be attached to the areas to be gunited by means of gunite hooks. The fabric shall be lapped at least four inches at the end of each sheet, it shall be securely tied with No. 16 gauge wire and shall be spaced approximately in the centre of the gunite lining.

Gunite

Gunite pre-mixed in the proportion of one part of Portland cement to three parts of sand, shall be applied in two or more coats to an average thickness of one and one-half inches throughout. The first coat shall contain an admixture of ten percent (10%), by weight, of hydrated lime.

The gunite shall be so designed that the following physical characteristics shall be obtained:

(a) A compressive strength of not less than 5500 lbs. Per square inch at 28 days.
(b) A water-cement ratio of between 1.8 to 2.2 gallons of water per bag of cement.
(c) A density at 28 days sufficient to completely resist the passage of water through a test specimen one-half inch thick, exposed to a static water pressure of 60 lbs. Per square inch for a period of 72 hours.

Finish

All gunite work shall be carefully finished with a wood float.

Cement

All cement used shall be Portland and shall conform with the specifications of the Canadian Engineering Standards Association.

Sand

Clean sharp concrete sand, free from impurities, shall be used in the gunite work.

Superintendence

The work of preparing surfaces and placing the gunite shall be done under the supervision of a competent superintendent who has had at least five years' experience in connection with all phases and details of this class of construction.

Operators

The gun operators and nozzlemen used for guniting shall be thoroughly experienced and qualified, and shall be able to show a record of at least three years' experience in this class of work.

July 23rd, 1937
Toronto, Ontario

OA, RG14-153-1, File 432.37-21, MS 3906, attached to Wilson to Frid Construction, 23 July 1937.

Appendix 15

Ronald Way to W. L. Somerville, 19 December 1937

Dear Mr. Somerville:

Please find enclosed the required list of extras for Fort Henry. Items underlined are those not included in the list we made in Toronto. Will forward the statement of locks and latches for Mr. Frid to-morrow.

Yours very sincerely,
[signed] Ronald

Extras for Fort Henry

I. General Construction:

1. Revetting ditches.
2. Repairing two martello towers.
3. The drawbridge.
4. Highway bridge over East Ditch.
5. Open East entrance of Advanced Battery and make gates.

II. Water Supply System:

1. Gasoline water pump to supply water for toilets and system for sprinkling grass in quadrangle – pipe connection for same.
2. Toilet fixtures.
3. Electric suction pump for pumping water from caponier and tunnels.
4. Cistern tanks to be renovated and filter system renewed – old pump to be installed above one of the tanks.

III. Electric Light System:

1. Lighting fixtures.
2. Chimney in counterscarp to make possible wiring for caretaker's quarters.
3. Electric motor for workshop.

IV. The Quadrangle:

1. Make and install iron grill at entrance gate.
2. Installation of iron railings about ramparts and stairs.
3. Iron steps moved at West end and installed at East end.
4. Two brass plaques at entrance.
5. Sentry box for rampart above the gateway.
6. Flagpole.

7. Cap covers for chimneys.
8. Copper down pipes for gutters.
9. Driveway and flaggstone [sic] paths for quadrangle.
10. Flaggstone [sic] road across the Advanced Battery and down ramp to drawbridge.
11. Clean well – place coping about top and install windlass for same.

V. Ordnance:

1. Build 13 thirty-two pdr. Gun carriages and 14 traversing platforms – trucks required for said platforms and racers for the gun curbs – large quantity of heavy bolts, etc.
2. Repair carriages of the 4 field guns donated by the City of Kingston last summer.
3. Transport five guns from City Parks to Fort Henry and construct carriages for same.
4. Manufacture a number of ramrods – sponges – swabs – etc. to provide complete operating equipment for at least two cannon.

VI. Interior Work

1. Restore powder magazine (including magazine doors with copper sheeting, wood floors, racks for powder barrels, copper hardware.)
2. Hardware for barrack rooms and officers' quarters – also for towers – inside doors between barrack rooms, north front.
3. Restoration of at least 1 kitchen with brick ovens, etc.
4. New floor in room 127.
5. Allowance for barrack rooms, shelves, gunracks, pegs, etc. (at least 3 rooms.)
6. Guard bench, windlass and arms' rack for guardroom.
7. Iron gates for prison cells and bars for cell windows.
8. Partitions in rooms of officers' quarters west front.
9. Aprons for window sills in soldiers' barrack rooms.
10. Fix wall at entrance to North East tunnel and install door.

VII. Museum Appropriation:

1. Showcases.
2. Lathe for workshop.
3. Funds for [purchase of workshop material until fort commence operation – payment of museum staff until fort opening.
4. Desk for fort office.
5. Uniforms for guides.
6. Funds for collecting additional museum articles.

VII. Miscellaneous.

1. Diving operations in the bay.
2. Danger signs for edge of main ditch – also tourist signs on Highway.

OA, RG14-153-1, File 432.37-21, MS 3906, Way to Somerville, 19 Dec. 1937.

Appendix 16

Order Form. Contract Engineer to Frid Comstruction Co., 10 Jan. 1938
[Approval for following additional items on Contract 37-21]

1.	Excavation			
	Outer moat footings	500 cu. yds		
	Excavation under draw Bridge	1,520 ..		
	Excavation East Ditch	3,890 ..		
	Excavation West Ditch	3,250 ..	@ .40	$3,664.00
2.	Additional stone cut and set on			
	Wall of Main Fort Building in Moat			
	No. Of cu. ft. built in wall	28,500 cu. ft		
	No. Of cu. ft. in estimate	23,500 ..	@ 1.80	9,000.00
3.	Concrete footings under outside			
	Moat wall and in East Ditch			
		350 cu. yds.	@ 4.00	1,400.00
4.	Erection of Timber Bridge over			
	East Ditch and Lift Bridge			950.00
5.	Drains			
	Stone drains taken up, cleaned and relaid			
		987 lin ft.	@ .90	888.30
6.	Digging trenches and back filling			
	For Bell Telephone and Electric Cable			
		970 ft.	@ .50	485.00
	Cutting brick work, stone walls for			
	electric conduit			550.00
7.	Electric wiring to December 4th, 1937			1,560.00
8.	Hardware supplied			3,600.00
				21,897.30

OA, RG14-153-1, File 37-21, MS 3919.

Appendix 17

Order Form. Contract Engineer to Frid Construction Co., 10 Jan. 38
[Approves an extension on Contract 37-21 as follows]

Stone to supply & cut for outside moat wall, coping & towers	26,000 cu. ft.	@ 1.80	46,000.00
Stone supply for ditch walls	40,000	@ .60	24,000.00
Railings iron supply & erect	1,800 ft	@ 3.50	6,300.00
Gun carriages & platforms, supply and erect	17 units	300.00	5,100.00

Carpenter Work

Powder Magazine floor 1 ½ " plank sleepers & fill [?]	1260 s.f.
Loop hole frame and doors at each gun sight	161
Wood floors Officers' Quarters' 1" x 6" under floors 2 layers 13/16" oak flooring finish	3,000 s.f.
Trim Officers' Quarters Oak Doors	
Casings panelled	12 units
Window Casings panelled	24 ..
Base 1" x 7"	1200'0"
Dado	1200'0"
Picture Mould	1200'0"
Partitions Q. Oak	1000[?]
Mantels old repaired	3
Mantels new	9

$86,373.00

[Note: carbon copy, difficult to read cost figures]

OA, RG14-153-1, File 37-21, MS 3919

Appendix 18

Order Form. Contract Engineer to Frid Construction Co., 23 March 1938
[Approval of additional work on Contract 37-21]

Supplying and installing down pipes	$	721.00
Supplying and installing copper scuppers		595.04
Supplying and installing of 12 candle lanterns and 21 copper lamps		485.56
Raising guns and other material from Navy Bay		1,425.00
Lowering and transporting guns from Cedar Island over ice to Fort Henry		750.00
Supplying 6 copper covered doors and 2[?] copper covered windows		350.00
Supplying ornamental grill in entrance arch		290.00
Painting and staining as per attached list, lump sum		3,420.00
		8,056.60

OA, RG14-153-1, File 37-21, MS 3919

Appendix 19

Order Form. Contract Engineer to Frid Construction Co., nd [March 1938?]
[Approval of addition to Contract 37-21]

1.	Setting of stone in walls of moat 26,000 cu. ft. @ .30	7,800.00
2.	Setting in stone in walls of ditches 40,000 cu. ft.	12,000.00
3.	Completing outside face retaining wall of moat. 65,000 cu. ft. @ .90	58,500.00
		$78,300.00

OA, RG14-153-1, File 37-21,MS 3919

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- National Photographic Collection

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- RG14-153-1, Records of the Department of Highways, Central Registry
- Photo Collection
  - Marsden Kemp
  - Eric Arthur
  - M.O. Hammond
  - John Boyd
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- Photo Collection

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