

Keeping a Low Profile: An Archaeological Perspective on the Building of Fort Henry

Joseph H. Last

After five seasons of excavation at Fort Henry, we are beginning to understand the complexities of the 1832 construction and marvel at the scope of its undertaking. Foreshadowing later nineteenth century military thinking, the fortification design was both innovative and unique. As a hybrid between the earlier Italian/French “bastioned trace” and the Prussian “polygonal system”, it is an uncommon 1830s military “work”. The stealth-like nature of its profile also links Fort Henry to later fortification development. This paper discusses the nature of the fort construction, examines the magnitude of the enterprise, and suggests reasons for its advanced design.

Introduction

From an Ontario perspective, Fort Henry is a rare beast indeed. Unlike other fortifications constructed in Upper Canada, few *Vauban*-inspired elements are evident in its design (Vauban 1968). Lacking are the forward-thrusting bastions and *advanced works*, which provided the requisite interlocking fire and protection for more traditional military installations (Duffy 1975; Hogg 1977:37-70). In addition to its distinctive trace (Figure 1), the method of construction was also unique. Not just sunk into overburden soils, the Royal Engineers proposed the mining of Fort Henry deep into the bedrock of Point Henry. When completed, it was but a whisper on the landscape. Rather than standing

proud as a visual deterrent, Fort Henry ushered in the principles of stealth and invisibility. But why was it so conceived? After five seasons of investigations, we are just beginning to understand the magnitude of the work involved and the reasons for its configuration. We are also beginning to appreciate the singular nature of its design and the challenges that it presents.

The Magnitude of the Endeavour

Although several previous archaeological investigations have occurred within and about Fort Henry, most of them involved work beyond the *enceinte* of the *redoubt* and the advanced *battery* (see also *advanced works*) (Bazely 1994, 1995, 1996a, 1996b, 2004; Daechsel 1995). Consequently, we were uncertain of what to expect when Parks Canada and the Province of Ontario initiated a programme of structural stabilization in 2001. The primary task was to assess the impact of engineering proposals on the fort and its resources. Our first investigations focused on the 1832 entranceway. Providing the only access to the redoubt, its suspected structural failure required immediate examination and repair.

Before our investigations began, we knew little about the history of the entranceway, its retaining walls, or for that matter, the remainder of the extant fort. How much of the present work was original? What were the impacts resulting from the 1936-1938 reconstruction (Mecredy 2000:50-55)?



Figure 1. Aerial view of Fort Henry seen from the west. The enclosed redoubt is to the north (left) and the advanced battery to the south (right). Photo by B. Morin. Parks Canada, Ontario Service Centre [OSC], Cornwall. Photo no. 131H-457E.

Considering the immensity of the depression-period repairs (Figure 2a-b), how much of the second 1832 Fort Henry occupation and associated landscape remained intact? Even more intriguing, would any evidence of the earlier 1812 fort be found?

While vestiges of the early Commissariat and Engineers' complexes exist along Navy Bay, none of the 1812 defensive work is readily apparent. However, we optimistically assumed that Lieutenant-Colonel J. Ross Wright, the superintending Royal Engineer overseeing the 1832 construction, had incorporated much of the first fort into the construction of the second. The investigations of the redoubt entranceway provided an opportunity to evaluate the relationship of the two major building phases and to determine the impact of the second Fort Henry on the original defensive work.

The results of our first investigation were illuminating (Cary and Last 2002; Cary et al. 2003). From a practical view, we discerned multiple, undocumented building and repair phases that established the construction sequence of the entranceway (Figure 3). However, our most astonishing find transcended the immediate requirements of the project and surprisingly came from the most basic source: the bedrock.

Work behind the entranceway walls revealed the elevation of bedrock to be substantially higher than that within the interior of the present redoubt. Our findings indicate that Lieutenant-Colonel Wright had more than 1.8 m of the limestone strata removed to accommodate the

building of the second Fort Henry. Considering that this included the *ditch*, the fort *parade*, and *reverse fire chambers*, workers quarried an enormous amount of limestone from the site. In fact, approximately 34,400 cubic metres of material was mined in preparation for the fort's construction.

Lowering the fort into the bedrock effectively masked the work from enemy fire. While this is certainly a primary goal for every defensive installation, it brought about numerous engineering challenges, the most significant of which was drainage. Quarrying bedrock to the required depth invited pooling of both rain and ground water. In effect, Lieutenant-Colonel Wright oversaw the construction of a very large, and very expensive, swimming pool.

To rectify the problem, he installed an elaborate system of drains (Figure 4); some to divert and store potable rainwater; and others to carry surface and grey water away from the site (Garcia 2004). Two large sewers, servicing the latrines, also acted as storm drains. One sewer, located by the southwest *demi-bastion*, channelled water down to Navy Bay. The other, adjacent to the southeast *demi-bastion*, drew water away towards the east (Figure 4). Installing them meant more expense for they had to be carved an additional metre into bedrock. As well, Wright had the elevation of the freshly cut ditch raised with the addition of quarried rubble. By so doing, he created an enormous French drain about the work that guaranteed good drainage (Cary 2005:45).

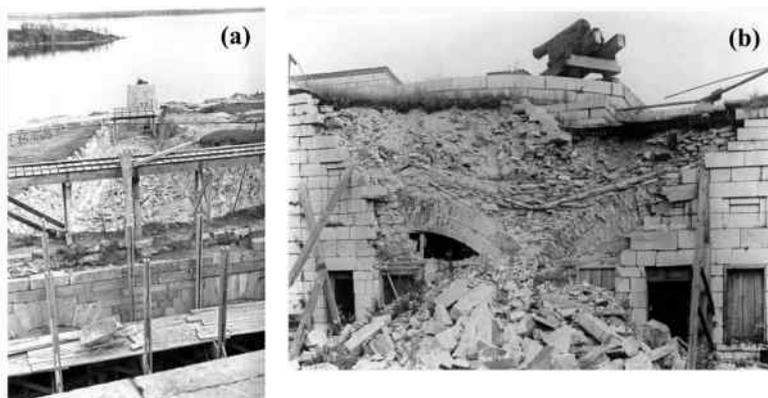


Figure 2. Views of the 1936-1938 restoration. Image (a): extent of the repairs within the east branch ditch. Fort Henry Archives; Image (b): northeast corner of the redoubt, Archive of Ontario, Photo no. 10002554.

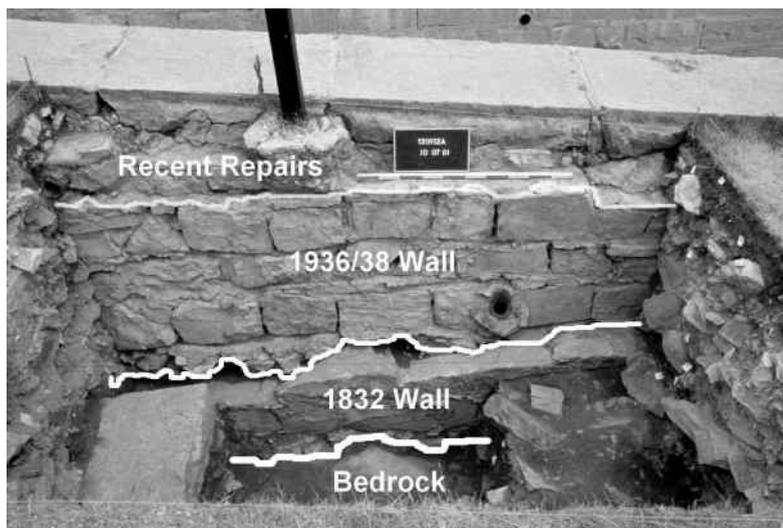


Figure 3. Portion of west retaining wall of the redoubt entranceway revealed in excavation unit 131H12A showing sequence of building phases. Photo by J. Last. Parks Canada, OSC, Cornwall. Photo no. 131H-108T.

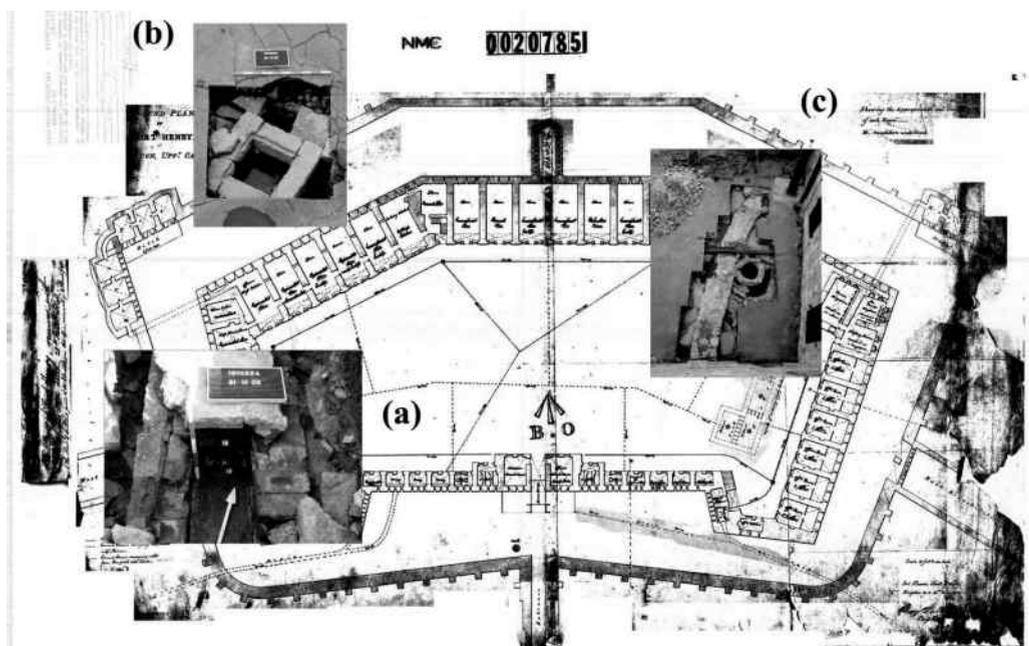


Figure 4. Fort Henry drainage. Background image: LAC, National Map Collection [NMC] 00207851. Ground plan of Fort Henry, Kingston, Upp. Canada. Dated 14th Nov. 1839. Image (a): parade drain. Photo by R. Brooks. Parks Canada, OSC, Cornwall. Photo no. 131H-264E. Image (b): parade catch basin. Photo by J. Last. Parks Canada, OSC, Cornwall. Photo no. 131H-256E. Image (c): blast wall and sink. Photo by J. Last. Parks Canada, OSC, Cornwall. Photo no. 131H-630E.

The Anomalies

While quarrying of ditches into bedrock is a relatively common procedure, the act of mining the entire enceinte is another matter. Fort Mississauga is the only other nineteenth century site in Ontario

where investigations have revealed a similar construction activity—albeit for an entirely different reason. In this instance, Lieutenant George Pillpotts, Royal Engineer in charge at Niagara, had the interior elevations of the 1814 fort lowered by at least 50 cm (19.69 in) (Last 2004:119). His

rationale for lowering the parade did not stem from a desire to create a flattened profile. Rather, it was the only way that he could economically acquire the soil necessary to fashion the fort's protective *rampart*, given that the fort lacked a defensive ditch.

Similarly, in Halifax, the summit of Citadel Hill was graded in 1795 to make way for Fort George, the predecessor of the Halifax Citadel. Here, Captain James Straton supervised the removal of 4.26 m (13.98 ft) of till in order to accommodate the enceinte of the newly proposed Vauban-style work (Cuthbertson 2001:54-57). While it could be argued that preparation activities at Halifax and Kingston are comparable, their rationales were not. Straton lowered the elevations of the Citadel Hill to increase the footprint of the summit and thus addressed the limitations imposed by a constrictive landscape. On the other hand, at Fort Henry, Wright proposed the use of an advanced water battery to sweep the steep slopes of the fort's south and west *glacis*. The decision to sink the parade deep into the bedrock of Point Henry played no role in neutralizing the physical constraints of the peninsula.

The novelty of the proposal was not overly debated in the correspondence with the Commanding Royal Engineer. This is surprising since the concept of "digging in" was nearly four decades ahead of its time. It was not until the late 1860s, after the advent of rifled guns (see *rifling*) and lessons learned from the Crimean and American Civil Wars, that advocacy for low-lying, and occasionally camouflaged, works took hold (Gould et al. 1991:34-37; Hogg 1974:57-61; Triggs 1989:132). In his 1890 controversial treatise on fortification, G.S. Clarke clearly indicated the merits of what he termed "invisibility."

In the permanent Fortification of the future ... (t)he ground must be thoroughly studied from the point of view of the attack as well as of defence. Self-advertising works will then cease to be created, and linear methods being discarded, the main object will be to blend the works into the landscape. With care this object can always be attained; but far more thought and study are required than were

involved in plotting on a drawing-board the elaborate traces of the so-called "modern French" or "German" systems [Clarke 1989:154].

Not only was the new work at Fort Henry revolutionary but it also broke norms by not incorporating previous 1812 era defences into its design. Given the amount of preparation required to ready the site, there would have been advantages in utilizing as much of the existing fort as possible. Certainly, this was the case for other fortifications in Ontario, where Royal Engineers commonly modified extant works to rectify defensive failings. At Fort George, Niagara-on-the-Lake, first the Americans and then the British, severely altered the fort by severing it in half. Although the *trace* of Fort George changed drastically, the remodelling incorporated many of the *bastions* and ditches of the original fort (Last 1998:91-95; Sattelberger 2001; Wilson and Southwood 1976:15-21, 76-81). Similarly, alterations to Fort Malden in Amherstburg recycled elements of the previous work maintaining elements of the west and south *curtain walls* as well as the entire southwest bastion and ditch (Last 2000:93-97, 2004:106-116) (Figure 5a-b).

Unlike the revisions made to Fort Henry, many of these modifications occurred under extreme stress during the War of 1812. As one would expect, expediency, cost and speed all had a part to play in realizing modifications in the most economical and timely manner possible. Even later peacetime alterations continued on a similar trend. While commanding Royal Engineers submitted over-designed proposals for the defence of Upper Canada, sober scrutiny prevailed. As Lieutenant-General Jackson noted:

I wish to observe, with regard to the works proposed by the Commission of 1825, that I ventured in my former memorandum to attribute their non-execution to their magnitude and cost, and to recommend the adoption, if possible, of a scale more in accordance with the means that would probably be placed at the disposal of the Engineer department [Library and Archives of Canada [(LAC) 1840:135].

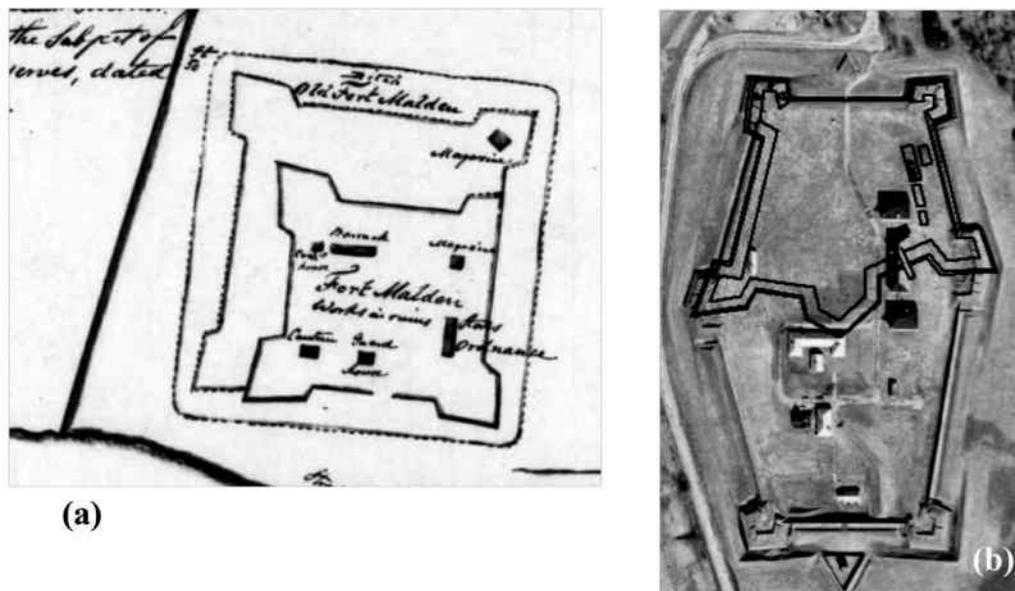


Figure 5. Typical incorporation of earlier works into later defensive modifications. Image (a): Plan of the fort at Amherstburg. Note silhouette of the earlier and larger work. LAC, NMC, H4/440—Amherstburg—1836. Image (b): overlay of the 1796 and 1814-1815 Fort George. Aerial photo National Air Photo Library no. A30426-7, overlay by H. Cary. Parks Canada, OSC, Cornwall. Photo no. RDO382E.

Jackson's views echo later opinions that questioned the need and rationale for large-enclosed defensible works. Praising the utility of smaller interlocking redoubts, Clarke states:

[Carnot] shows a clear grasp of the principle far more important than the trivialities of trace and detail which have sometimes been mistaken for progress. [Furthermore] The so-called German system was superior to that of Vauban's later designs, by being simpler, admitting fewer caprices of the compass and ruler, and costing less [Clarke 1989:22, 23].

In the end, defensive enhancements were minimal and employed as much of the existing fortification elements as possible. At Fort Mississauga and Fort Wellington, for example, most of the earlier traces were incorporated into the revised designs (Flemming 1982:10-19; Last et al. 1985). The same applies to the 1839-1842 rehabilitation of Fort Malden (Carter-Edwards 1980:177-214). In fact, post-Rebellion period alterations appear to have honoured more of the inherited earlier trace than modifications undertaken during earlier times of duress.

Surprisingly, at Fort Henry this was not the case. The construction of the 1832 redoubt completely eradicated the northern half of the War of 1812 fortification. Unfortunately, this included the spectacular northern towers that dominated the parade. Similarly, once the redoubt was completed, work on the advanced battery incorporated none of the early structures. However, since the advanced battery saw limited quarrying, vestiges of the 1812 fort remain. Over the past several years, we have been able to locate and identify two pre-1832 structures: the 1820 officers' barracks and the 1816 powder magazine (Cary 2005:4-27). Although the areas investigated are teasingly small, they have allowed us to establish a clear relationship between the first and present forts. Based on our current knowledge, we now presume that other 1812 structures, including privies, and the half-moon battery, lie intact under the protective asphalt topping of the advanced battery parade (Figure 6).

The Rationale

Considering the difficulties and effort involved in preparing the site for the 1832 construction,

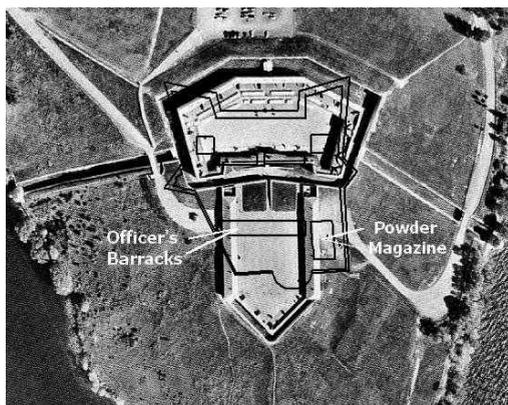


Figure 6. Overlay of the present (1832) work with that of the 1829 Fort Henry based on recovered remains of the officer's barracks and powder magazine. Aerial photo National Air Photo Library no. A28143-46, overlay by H. Cary, Parks Canada, OSC, Cornwall. Photo no. RDO383E.

why did Wright not employ a more conventional design? Factors influencing the construction of any fort are complex and varied: its strategic positioning, the lay of the land, its geological make-up, contemporary military principles, the size of the work, existing defences, the presence of other supporting defences, access to materials and labour, the cost, and of course, politics. All of these influenced the building of the 1832 Fort Henry.

To understand how Fort Henry became a low-profiled redoubt requires a brief review of contemporary military design and principles. For several centuries before the building of Fort Henry, major defensive installations were commonly configured as multiple-bastioned works (Herman 1992:7-78; Hughes 1991:91-139). Originally an Italian concept, the development of the bastioned trace and the subsequent preoccupation with flanking fire (see *enfilade fire*) is attributed to Sébastien le Prestre de Vauban (1633-1707), Engineer-in-Ordinary to the King. Inherent in his systems were two overriding principles: defence in depth and self-supporting enfilade bastion fire (Vauban 1968). Under Vauban's regime, fortifications became increasingly complex. Geometry ruled the day and prescribed methods of laying the trace involved strict use of mathematical formulae (Hogg 1977:53-63). Eventually, Vauban's principles

gave way to elaborate drawing board dreams that crippled his system by extravagance (Clarke 1989:23).

Marc René, Marquis de Montalembert (1714-1800), a successor to Vauban, believed that artillery would always carry the day. Taking a more aggressive posture, he sacrificed close-range flanking fire for direct fire to the field. This he called "perpendicular fortification." In an attempt to emulate the broadsides of a man-of-war, he advocated multi-tiered *casemates*, rather than bastions, to keep the enemy at bay (Hughes 1991:130-131; Saunders 1989:134-135). His provocative concepts were ill-received in France. However, other countries in Europe wholeheartedly embraced his polygonal-shaped trace, formulating the basis for the redoubts of the Prussian or German System (Crick 1996:39; Herman 1992:73-74; Hughes 1987:87).

Interest in the design eventually crossed the Atlantic to North America and the Caribbean. In the United States, two coastal fortifications, Fort Sumter and Fort Pulaski are early examples of brick constructed, polygonal-shaped works. Collaboratively designed by General Simon Bernard and Colonel Joseph Totten, they share similar characteristics. Both employ a truncated hexagon as their trace with landward-facing *gorge* curtain walls. True to Montalembert's principles, Fort Sumter and Fort Pulaski were initially planned as multi-tiered, casemated works capable of mounting 135 and 146 guns of 32-pound calibre, respectively (unstable soil conditions eventually limited Fort Pulaski to only one tier) (Lattimore 1954:1-10; National Park Service 1984:7-13). Although Fort Pulaski was not completed until 1847 and Sumter until 1860, the design for both began in 1828-1829, making them definitive prototypes of the American "Third System" of permanent fortifications (Herman 1992:156-162; Lewis 1979:37-66). Building upon this concept, American coastal fortifications grew in fire-power, eventually culminating in the massive 450-gun deployment of Fort Jefferson (Lewis 1979:62).

Wed to no particular school, British engineers employed the polygonal trace throughout the Empire. Brimstone, on St. Kitts, is perhaps the

earliest example. Although its exact date of construction is unknown, it was designed no later than 1788 and is thought to have been completed by 1793 (Smith 1992). Other early examples are Fort Vido in Corfu (1824) and Fort Cunningham in Bermuda (1815-1823) (Gould et al. 1991; Smith 1992:69; Harris 1987:38-40). The resemblance between the Bermudian work and Fort Henry should not be surprising (Figure 7) since Lieutenant-Colonel Fanshawe was intimately familiar with Fort Cunningham and, as part of the Bryce Commission, very influential in the final defensive plan on Point Henry (Harris 2001:157; [LAC] 1829).

As prescribed by the principles of Montelambert, and later Lazare Carnot (1753-1823), polygonal redoubts separated the firepower required for long and short-range defence. Traditionally, bastions, in concert with outworks, provided close-range protection. With the advent of the bastionless-trace, reverse fire chambers and *caponnières* suppressed the threat of a *coup de main* (Kent 1986:41). At Fort Henry, the reverse fire chambers, carved into the limestone bedrock, provided adequate protection against enemy intrusion. The inclusion of indents, along the *counterscarp* wall, controlled friendly fire towards the chambers while directing *ricochet fire* back towards the ditch (Figure 8a-b).

Since Fort Henry's reverse fire chambers and the *caponnière* provided sufficient short-range protection, why was the traditional bastion design abandoned for the simpler redoubt?

Generally, redoubts had several advantages. Not constricted by the geometry of the drafting board, engineers could easily adjust them to suit the terrain on which they fell. Fanshawe and Lewis alluded to this, as did the Bryce Commission Report ([LAC] 1828; [LAC] 1829). In addition, lacking bastions, redoubts could harness more long-range firepower towards the enemy. Their more confined trace also allowed them to be defended by a smaller garrison. The overall result was a less expensive installation, which, in rough terrain, could be a more effective and powerful work (Crick 1996:52).

At Fort Henry, terrain was a major factor. Lieutenant-Colonel J. Ross Wright, whose task it was to implement the recommendations outlined in the Carmichael Smyth Commission Report of 1825, developed several proposals. From the outset, he acknowledged the severe lay of the land, especially towards the west, the constrictive nature of the peninsula, and the commanding ground to the north ([LAC] 1827:216-217). Appearing to ignore a northern attack, he chose a traditional Vauban design anchored by a strong water battery, casemated as per Major-General Sir James Carmichael Smyth's request ([LAC] 1826).

To effect greater flanking fire along the west and east ditches, he also substituted the existing *redans* with well-developed bastions. Perhaps influenced by Fanshawe and his experience in Bermuda, Wright also incorporated the use of reverse fire chambers and a *caponnière* to provide fire along



Figure 7. Fort Cunningham.
Photo by E.C. Harris (Harris 2001:337 Plate 56).

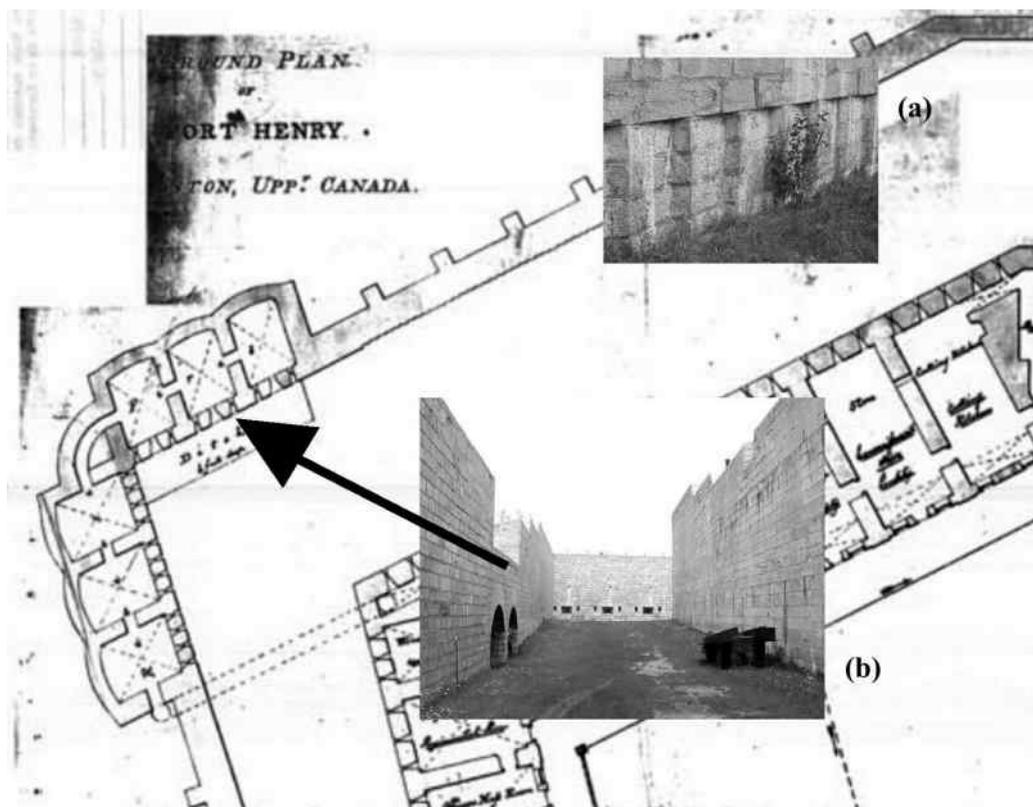


Figure 8. Reverse fire chambers. Detail of LAC, [NMC]0020785. Ground plan of Fort Henry, Kingston, Upp. Canada. Dated 14th Nov. 1839. Image (a): detail of counterscarp indents to direct ricochet fire. Photo by J. Last . Parks Canada, OSC, Cornwall. Photo no. 131H-696E. Image (b): view of reverse fire chamber loopholes. Photo by J. Last . Parks Canada, OSC, Cornwall. Photo no. 131H-701E.

the entire length of the newly revamped water battery ditch. Discussions with Fanshawe and Colonel Durnford, then the senior Royal Engineer in Canada, eventually led to two additional plans. They too relied on a Vauban-shaped trace, but abandoned the notion of retaining any of the 1820 structures that stood in the southern portion of the fort (Figure 9).

After reviewing the final proposal, Lieutenant-Colonel Fanshawe and Major-General Bryce, Inspector General of Fortifications, recommended that:

On carefully considering the position of the Post on Point Henry with the plans and Estimate 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 unfavourable circumstances ...the nature of the work [be altered] from a bastioned Fort to a large Casemated Redout [sic], defended by reverse Fire which at little more than one third the expense would ...be equally efficient, whilst the saving effected ...with a moderate addition, would afford a means of executing several advanced Works both on the Point Henry and Kingston sides[(LAC) 1829:3rd page of an unpaginated report].

Although cost was a significant factor in the decision, other forces were at play. The abandonment of Wright's casemated water battery is telling, albeit speculative. For whatever reason, Fanshawe and Bryce rethought the deployment of firepower, opting to focus upon a northern, rather than a southern threat. With it came new and exciting

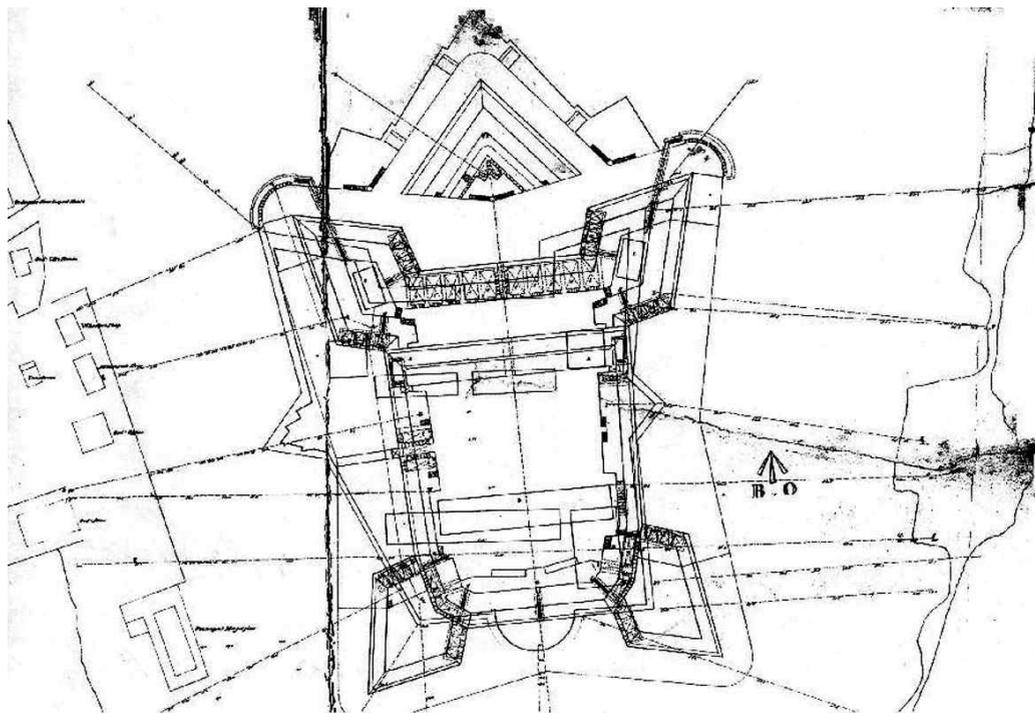


Figure 9. Second proposal by Lieutenant-Colonel J. Ross Wright, entitled *Plan showing the Outline of the Present Work at Point Henry with a revised Project for rebuilding constructed as far as the Nature of the Ground would admit comfortably with General Mann's instructions to Col' Durnford dated 6th August 1828.* LAC, NMC 11453.

possibilities. Long enveloping ditches and their requisite bastions were no longer essential defensive elements. Their departure provided the opportunity to explore simpler solutions. Point Henry, with its constricted space, undisciplined terrain, and subordination to higher ground, was fertile for experimentation. Probably Fanshawe, with his previous Bermudian experience, sowed the seed.

In 1826, Edward Fanshawe, under the instruction of the Duke of Wellington, Master General of Ordnance, travelled to Bermuda in order to inspect and make recommendations on the defences of that island. While there, he undoubtedly visited Fort Cunningham, which had only been completed three years previous. In many ways, the work foreshadowed the final design of Fort Henry. In particular, its overall trace, the relationship between the elevation of the parade and that of the ditch, and its use of reverse-fire chambers are hauntingly similar. As described by Captain Thomas Cunningham, R.E., who oversaw Fort Cunningham's construction:

The defence of the ditch [would be] by Casemates in the angles of the counterscarp, which can be executed without any difficulty, and little expense, as the rock, though much more calculated for the purpose is nearly as easily cut as chalk, and does not require casing. The ditch will also be cut out of rock, and consequently save the expense of rivetting [sic] [Cunningham cited in Harris 2001:179-180].

Equally telling is the peculiar arched design of the *scarp* face of the ditch used at Fort Cunningham and later proposed for Fort Henry (Gould et al. 1991:71; Harris 1987:38-40). Gracing the inner wall of the *moat*, for most of its length, is a series of in-filled masonry arches. Speculatively, they served as sacrificial "blow-out" walls in case of a magazine explosion but their purpose remains unknown (John R. Triggs, personal communication 2006). Regardless, they are not evident on any other Bermudian defensive work. Similar arches were initially proposed for

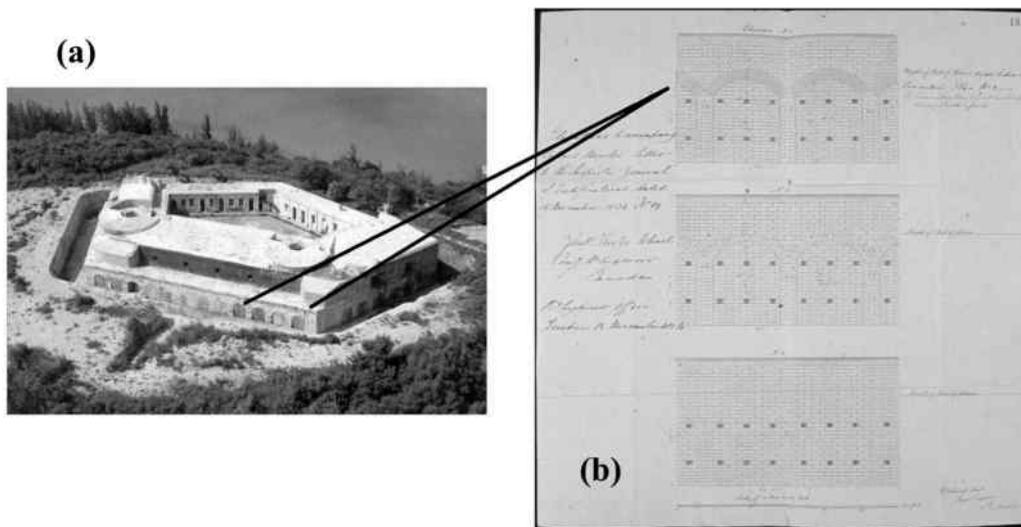


Figure 10. Image (a); view of Fort Cunningham showing arched scarp face. Photo by E.C. Harris (Harris 2001:337 Plate 56). Image (b): detail of proposed design of scarp face for the Fort Henry Redoubt, note similarity. LAC WO 55/872.

Fort Henry (Figure 10a-b). However, in this instance, the arches appear to span greater widths and are integral to the casemates, being a continuation of their construction. Only a last minute alteration had them superseded by a more weather-resistant veneer of uniform ashlar coursing.

Only one other change was made to the plan. Sceptical that the proposed supporting northern advanced works would ever be built, Lieutenant-Colonel Nicholls, then Commanding Royal Engineer in Canada, converted the fort into a six-sided work adding a central northern face to its landward front. This enhanced direct firepower to the country and ensured that the troublesome commanding ground to the north received adequate coverage. Save for the construction of the Commissariat Stores along the Advance Battery, the planning of Fort Henry was all but complete.

Conclusion

As the last major fortification constructed in Upper Canada, where does Fort Henry's value lie? To say that the fort is unique is an understatement. Certainly, in scope, design, and the magnitude of the undertaking, Fort Henry has no equal among the fortified places in Upper Canada. One could reasonably argue that it was

decades ahead of its time. Not until the 1870s were the advantages of the "modern system" appreciated and incorporated around the globe as the standard means of defence. Although the tradition of the bastion-less redoubt can be traced to the works of Montelambert, the developments at Fort Henry remain innovative.

While atypical for the time, nothing in the correspondence among the participating engineers suggests the final design was out of the ordinary or even special. Neither does the documentation give credit to any one engineer. However, without the presence of Lieutenant-Colonel Fanshawe, the final polygonal shape of Fort Henry may not have been adopted. It is a common fact that fortifications are named after the political proponents or monarchs that supported their construction. Rarely do they bare the name of the Engineer that influenced their design. If that were the case, assigning lineage to Fort Henry's design would be an easy matter. Regardless of the source of inspiration, the work on Point Henry remains an early example of changing defensive strategy, one that was as much revolutionary as it was evolutionary.

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Après cinq saisons de fouilles à Fort Henry, nous commençons à comprendre la complexité de la construction de 1812 et nous nous émerveillons devant l'ampleur de cette entreprise. Se démarquant par rapport à la pensée militaire de la fin du dix-neuvième siècle, la conception des fortifications a été à la fois innovatrice et unique. Faisant figure d'hybride entre les anciens bastions italiens, français et le système polygonal prussien, cette construction militaire revêt un caractère peu commun pour les années 1830. La nature presque furtive de son profil relie aussi Fort Henry au développement plus récent des fortifications. Cet article passe en revue la nature de la construction du fort, examine la magnitude de l'entreprise et propose quelques raisons susceptibles d'expliquer sa conception avancée.

Joseph H. Last
Ontario Service Centre
Parks Canada
111 Water Street East
Cornwall, Ontario, Canada K6H 6N7
joseph.last@pc.gc.ca