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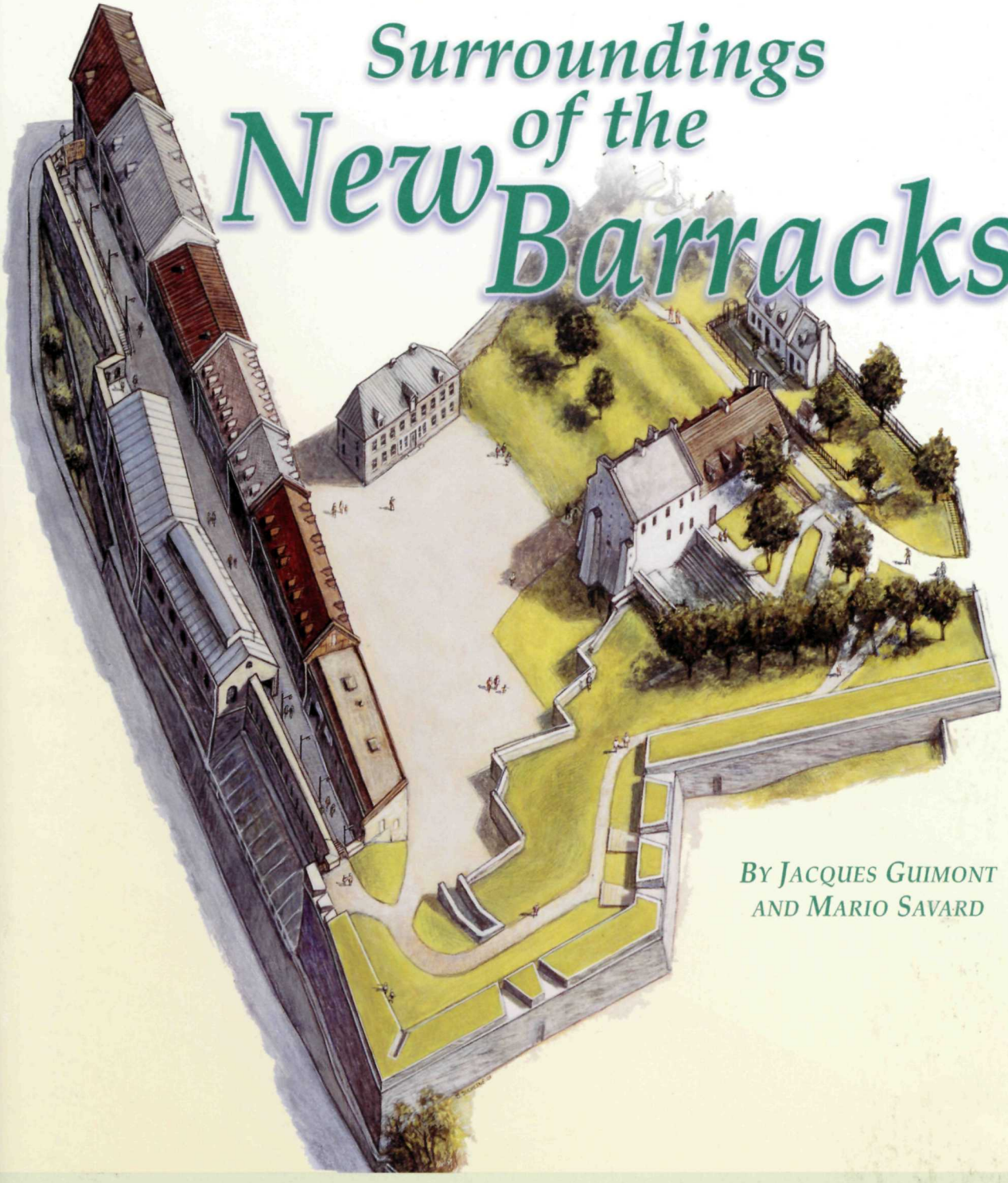
Surroundings of the New Barracks



By Jacques Guimont
and Mario Savard

Parks Canada Parcs Canada

Canada

Surroundings of the New Barracks

By Jacques Guimont and Mario Savard

With research assistance and contributions from Michel Brassard, Geneviève Duguay and Paul-Gaston L'Anglais

ÉDITIONS
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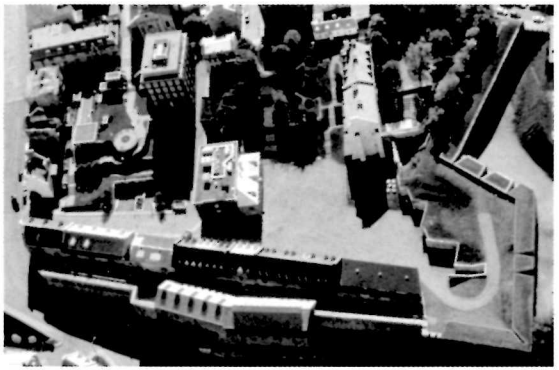
Discoveries at Artillery Park

Between 1995 and 2000, Parks Canada restored a large section of the fortification walls of Artillery Park's New Barracks sector in Quebec City. Archaeologists ran a number of significant digs, resulting in major discoveries and a better understanding of the site's history. This restoration will ensure the structure's long-term conservation, and give the public access to the complete ramparts of the fortifications.

For 250 years, from the end of the 17th century to the middle of the 20th, the site now known as Artillery Park evolved in line with its military significance. The imposing ramparts that we see today were built between 1740 and 1750 by famed French engineer Gaspard-Joseph Chaussegros de Léry, following a number of initiatives to adequately fortify the colony of Quebec after the first wall was erected in 1690. In 1749, to meet the need to lodge French troops, Chaussegros de Léry also built new barracks within Artillery Park itself. At the end of French rule, this massive 160-metre building – the largest ever built by the New France colonial administration – served to lodge troops helping to garrison this settlement against the British. Under British rule, the New Barracks became the principal residence of the Royal Artillery regiment, the source of the Park's name. After the British troops left Quebec in 1871, the New Barracks and some of the buildings from its interior court were integrated into an industrial complex built to manufacture munitions: the Federal Cartridge Factory, better known as the Quebec Arsenal. This new step in the history of the site was marked with significant changes to the way the space was used and the installation of heavy equipment – leaving marks that are still visible today.



New Barracks sector, Artillery Park.
PHOTO: PARKS CANADA / P. LAHOUD.

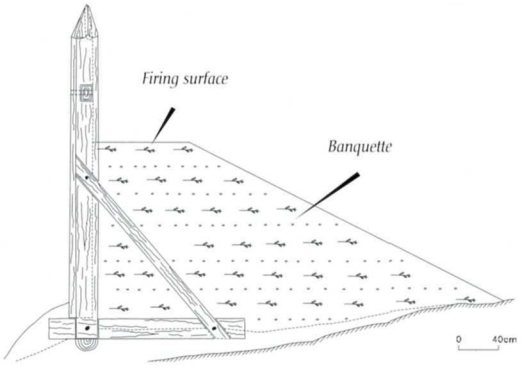
Archaeological work has contributed not only to a better understanding of the highly complex fortifications, but also to an understanding of the changes in barrack conditions for the French and British troops in Quebec City after the construction of the New Barracks; an evolving way of life that affected everything from hygiene to family life for the soldiers. The presence of women and children in the rooms of the New Barracks has been confirmed through the recovery of objects found in some of the latrine pits of the interior court. The archaeological dig has also provided detailed documentation of the technology used to manufacture munitions, and a better understanding of changes that took place, including the evolution of buildings as they were adapted to meet current needs. Tens of thousands of rejects from the munitions manufacturing process were found and have become incomparable assets to the understanding and study of these various projectiles, manufactured for over 80 years.

Five years of intensive research unveiled a number of secrets buried around the New Barracks. The most revealing of these will be shared here, so that you too can experience their story...

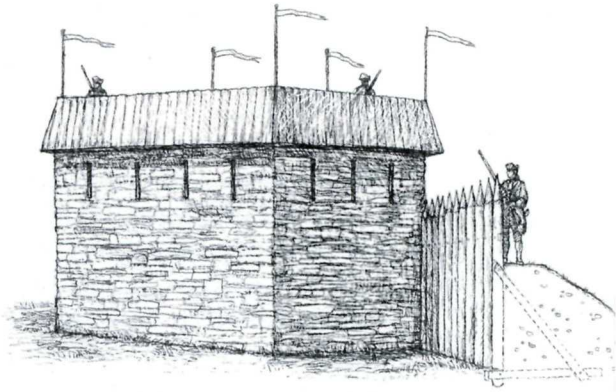
Enemy at the gates...

From 1690 to 1760, active wars waged by European powers – England, France, Germany, Holland and Spain – had direct consequences on the North American colonies. Here, there was no concern about the succession of the Crown – rather colonial wealth was what spurred on the acting powers.

Throughout this troubled period, Quebec had to seal itself inside defensive walls capable of withstanding a focused attack first from their neighbours to the south and their Amerindian allies, and then from British troops themselves. Through the years, these defences were bolstered with several temporary works intended to improve their effectiveness, and finally replaced altogether by an impressive stone fortification designed to withstand long sieges while awaiting reinforcements. The future Artillery Park, thanks to its strategic location, saw its surroundings constantly modified by this progressive military construction.

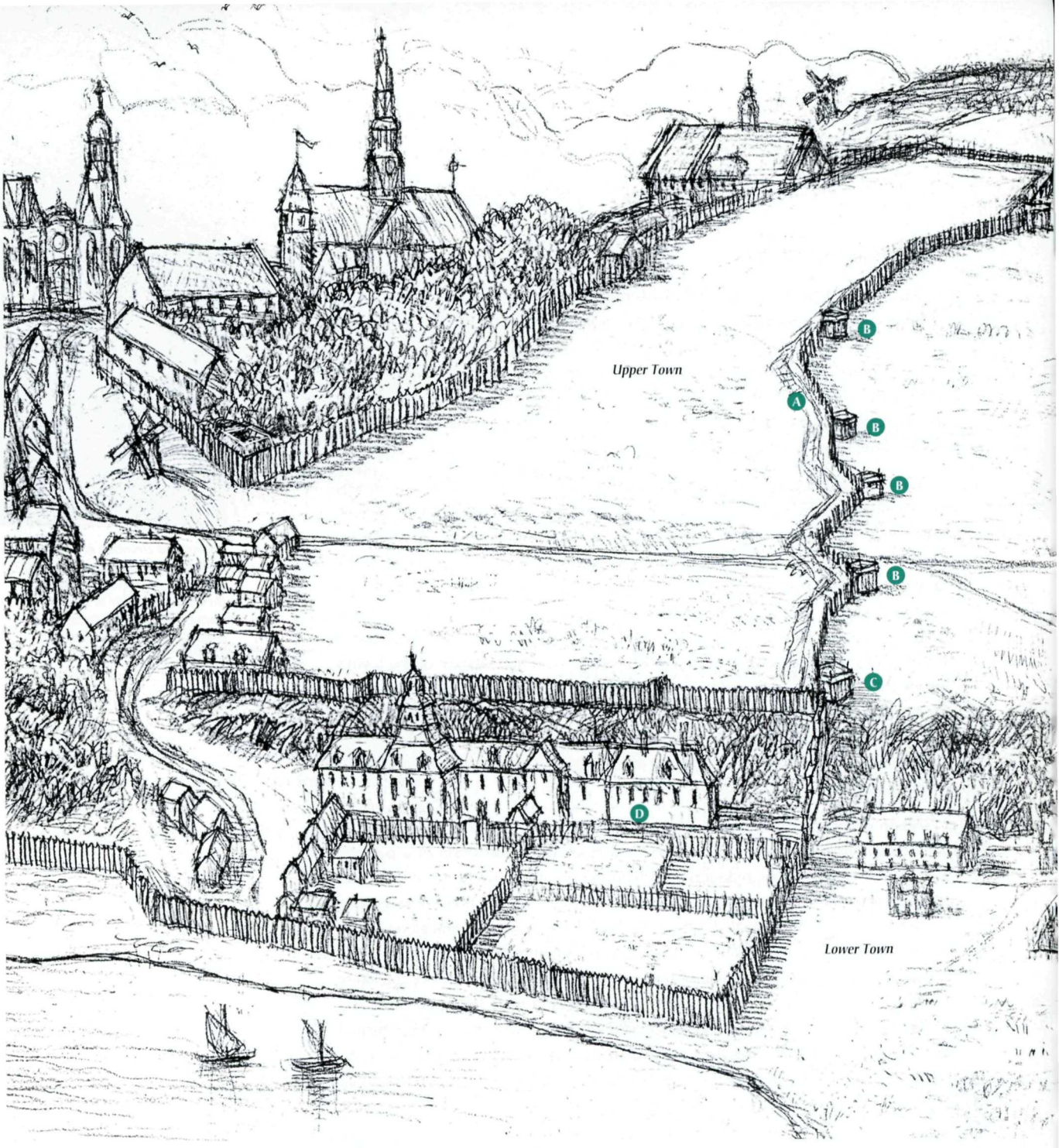


Profile of the 1690 palisade and its earth banquette, which included layers of branches to stabilize the soil.
ILL.: PARKS CANADA/J. GUIMONT AND L. GRENIER.



The Du Palais Redoubt in 1690. Unlike the upper storey, the ground floor did not have loopholes.
ILL.: PARKS CANADA/B. DUCHESNE.

It was the Count of Frontenac, governor of New France, who constructed the first fortifications for the settlement with Major François Provost. This first effort was a palisade of cedar, 3.25 metres high, staggered with 11 stone redoubts – 10 in the upper town. The palisade, backed by an earth banquette, circled almost the entire town with the exception of a crest that was home to Fort Saint-Louis, where the Dufferin Terrace is found today. The Du Palais Redoubt, whose remains have been uncovered in the New Barracks sector, was a strategically located with a vantage point over the Heights or Plains of Abraham, the Intendant's residence, the banks of the Saint-Charles River and the Beauport shoreline. The small stone redoubt had a windowless ground floor for storing munitions and powder in case of conflict, leading to an upper floor with several loopholes, and a final storey made of wood, projecting outwards and called the *'étage à mâchicoulis'* (machicolation floor). This floor had openings cut in the floors along the walls, allowing soldiers to shoot vertically or throw various things down on assailants, like in Middle Age forts.



The layout of the 1690 palisade (A), its small stone redoubts (B), and the Du Palais Redoubt (C) on the city's west side, facing the countryside and the Heights of Abraham. Below, the Intendant's residence (D).
ILL.: PARKS CANADA/B. DUCHESNE, ACCORDING TO A FONVILLE ENGRAVING DATED 1699.

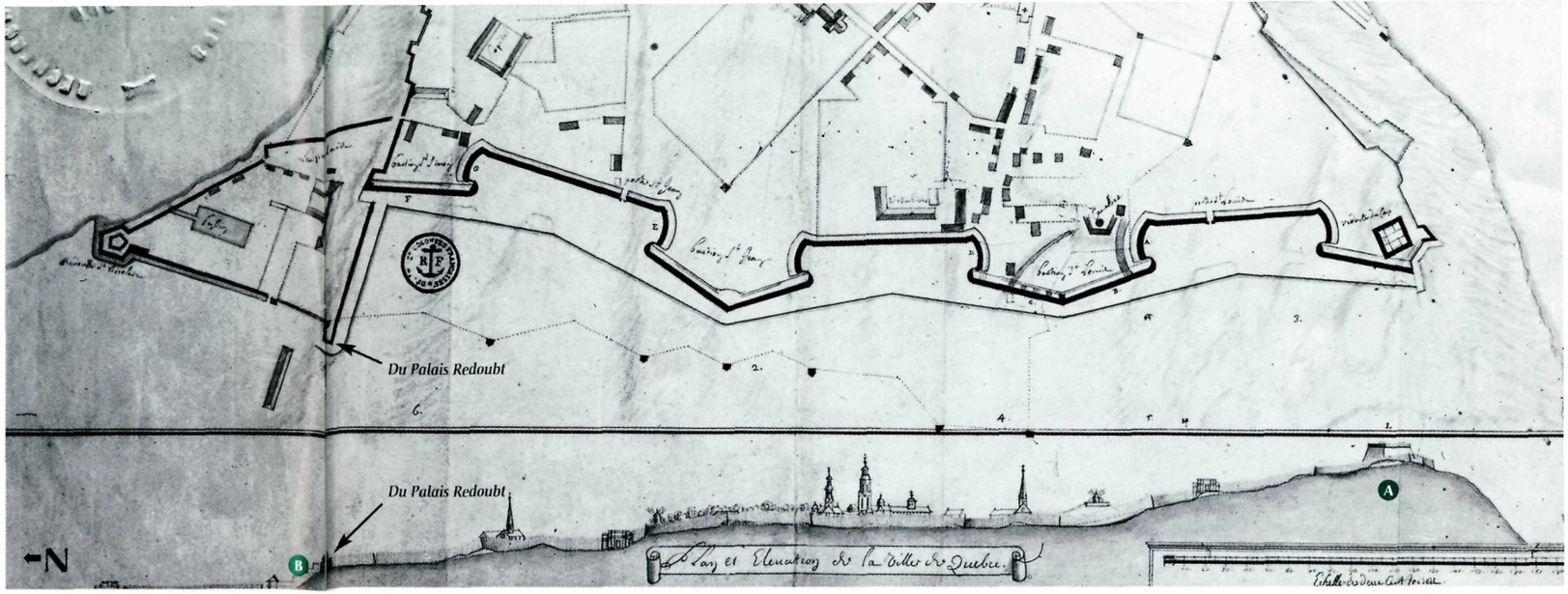
Panic in Quebec!

On August 4, 1689, 1,500 Iroquois warriors infiltrated the Lachine settlement and massacred the civilian population – men, women and children. News of the terrible massacre spread like wildfire throughout the colony. The chaos of cries, curses and sobs grew, and followed the river to instil despair across Montréal, Trois-Rivières and Quebec City, which at that point were not fortified. Emotions were heightened by the proximity of the "accursed" English in Massachusetts, whom the French thought might invade to take control of the fur trade.

One man went against the grain of panic. Only recently returned to the colonies, the Count of Frontenac, a bold administrator and intractable military man, had the necessary cedars cut to create a palisade the following winter. Thousands of cedar posts were piled on the outskirts of town, waiting for the governor's orders to be raised into a solid palisade. The wait was long – worry was etched on every face in Quebec. And then, the inevitable happened: the fleet of General Phips took Port-Royal without a shot being fired! Worry became panic. Short nights of sleep were punctuated with horrible nightmares, where one could hear the cries and despair of the town's inhabitants, the curses of the soldiers and militia members falling to the tomahawks of the Iroquois, the plaintive wails of dying men on the field of battle, their broken bones and hot blood littering the new homeland. All these horrifying sounds could not cover the prayers of the nurses – and the noise of the sheets that they tore to be ready for dressing wounds.

Action was needed, and quickly. Major François Provost, helped by Paul-Denys de Saint-Simon, marshal of the constabulary, undertook the construction of a palisade interspersed with 11 stone redoubts to defend the city from invaders. For six weeks, day and night, the inhabitants of Quebec heard only the incessant noise of saws, axes and adzes cutting wood, mingled with the tools of the stonemasons and stonecutters, the cries of the drivers mandated to transport construction materials, the noises of the beasts of burden and the neighing of horses – penetrating every corner of the entire town. The work was far from in vain: the palisade was in place before the arrival of Phips' fleet. With the work complete, all the local citizenry sheltered themselves behind the first fortified wall around the city of Quebec. Phips and his men could come. Soldiers, militia and *habitants*, women and men, lower and upper class, all were under Frontenac's orders and confidently awaited the English soldiers!

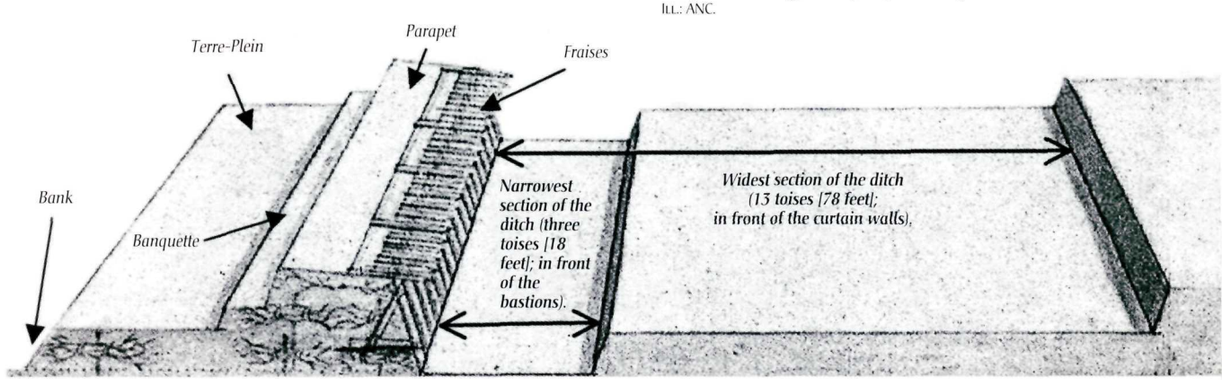
J.G.



Layout and elevation of Boisberthelot de Beaucours' rampart in 1693. The rampart extended along the entire west side of the city, from the top of Cap Diamant (A) to the Coteau de la Potasse (B).
ILL.: ANC.

Since the 1690 palisade was not built to last, a decision was made to construct a permanent rampart to protect the city. This was done in 1693 under the direction of engineer Josué Boisberthelot de Beaucours. The rampart was made of an imposing mass of earth covered with wood, between nine and 10 French feet (about three metres) in height. It could resist cannon blasts, and included – like all fortifications of its kind – bastions separated by curtain walls. Covering the entire west front of the town, the sole front lacking any natural defence, this rampart faced an expanse of countryside where an enemy army could maneuver and place cannons at its leisure. The fortification lines were constructed from the heights of Cap Diamant to Coteau de la Potasse, about a kilometre in length. At the extreme northern end of the rampart, Boisberthelot de Beaucours erected another palisade – a single row – that connected to the Du Palais Redoubt for better defence against invaders from the west.

One of Boisberthelot de Beaucours' 1693 rampart bastions. Supported by posts leaning against the soil, the rampart consisted of a banquette for firing, a terreplein, and a slope.
ILL.: ANC.

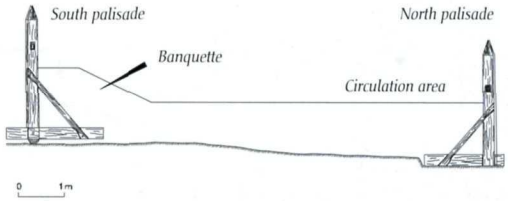


Ingenuity

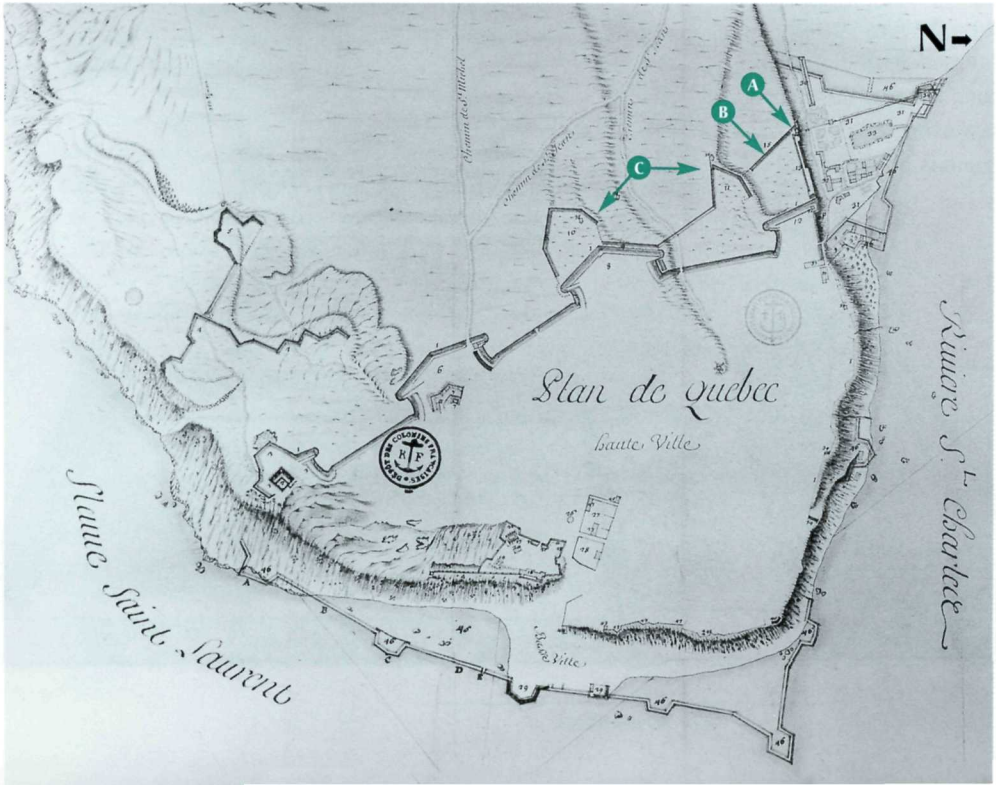
From a military perspective, this first rampart had several weaknesses due its failure to recognize certain topographic features. Several of its sections were visible from the Plains of Abraham, and the enemy could easily breach the rampart with their cannons.

Boisberthelot de Beaucours' mistakes, particularly in the Artillery Park area, obliged his successor – the new engineer Jacques Levasseur de Neré – to construct several temporary works in 1697 in front of the main wall, such as a covered way and an *avant-face*.

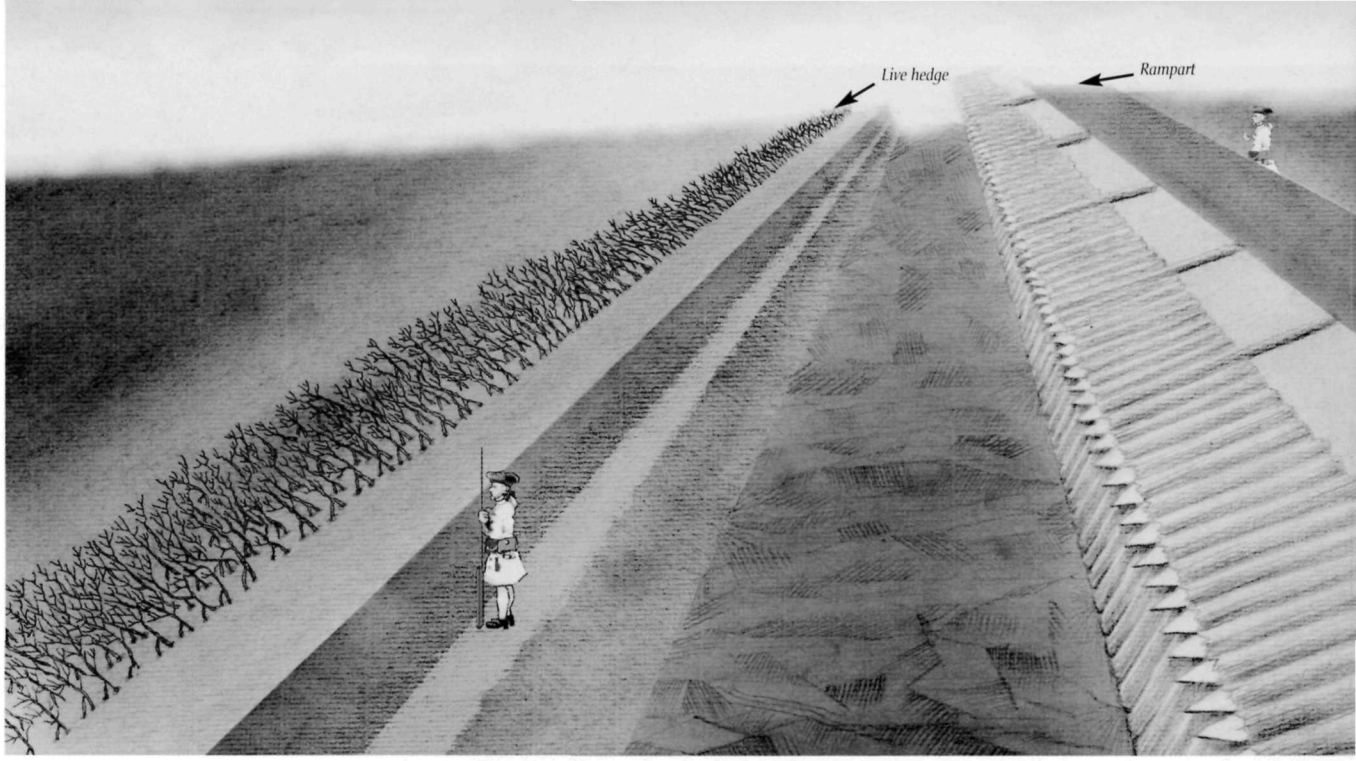
One of the most significant weaknesses in the Boisberthelot de Beaucours fortifications sprang from the isolation of the Du Palais Redoubt and the palisade linking it to the body of the place – neither were really connected to the rampart. The soldiers also had their backs to the Intendant's residence in the Lower Town, and couldn't adequately defend it. Levasseur de Neré fixed this major defect by constructing a covered way between the redoubt and the rampart. Two palisades were placed parallel to each other, forming a corridor where soldiers could fire both towards the Intendant's residence and the higher reaches of the west side. This protected space also served as an opening for soldiers to retreat through while being sheltered from enemy fire, as implied by the name *covered way*.



Profile of Levasseur de Neré's covered way in 1697. The construction included two palisades and a covered way that could serve as an area for retreating soldiers, if necessary.
ILL.: PARKS CANADA / J. GUIMONT AND L. GRENIER.

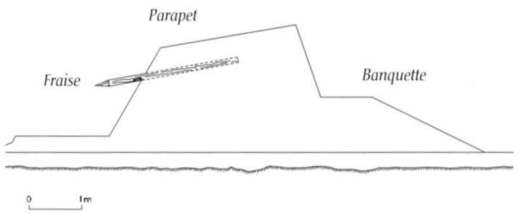


The advanced works built by Levasseur de Neré in 1697 in the current Artillery Park sector included a covered way (A), an avant-face (B), and two demi-lunes (C).
ILL.: ANC, NATIONAL COLLECTION OF MAPS AND PLANS.



"Live hedge" entrenchment in front of one of Boisberthelot de Beaucours' main wall bastions in 1709.
ILL.: PARKS CANADA/ J.-F. COUTURE.

To fix another major deficiency in the main wall in the Coteau de la Potasse sector, Levasseur de Neré built an *avant-face* 7.5 French feet (2.5 metres) in height, which served both to hide the rampart from enemy eyes and prevent its destruction by cannon. Made of earth, the *avant-face* combined a broad parapet that could resist cannon fire and a banquette that allowed soldiers to shoot assailants on sight.



Profile of Levasseur de Neré's avant-face in 1697. The structure's outside wall included a fraise to prevent the enemy from climbing the bastion.
ILL.: PARKS CANADA/ J. GUIMONT, L. GRENIER AND F. PELLERIN.

As these works were hastened by the perception of an imminent threat, they were fragile – and acutely sensitive to Quebec's harsh weather, which included freezing temperatures, thaws, melting snow and rain. They had to be rebuilt periodically, which was the case in the spring of 1709 when a new fleet from Boston threatened New France's capital. Levasseur de Neré built a number of "live hedge" entrenchments to prevent the eventual march of the enemy on the town. These entrenchments, built from raised earth, were about 50 French feet (16.24 metres) wide and 7.5 French feet (2.5 metres) high including a banquette, and also served to hide the rampart. The sloping front part was festooned with young trees planted on an angle in the ground with stripped branches pointing towards the open field, creating a significant obstacle to any advances by assailants. These "live hedges" foreshadowed the barbed wire to be used in two world wars.

Remains of the stone wall built by Boisberthelot de Beaucours at Coteau de la Potasse in 1712. The upper part of the wall was destroyed in 1745.
PHOTO: PARKS CANADA/A. NAULT.

The Du Palais Redoubt becomes the Hangman's Redoubt

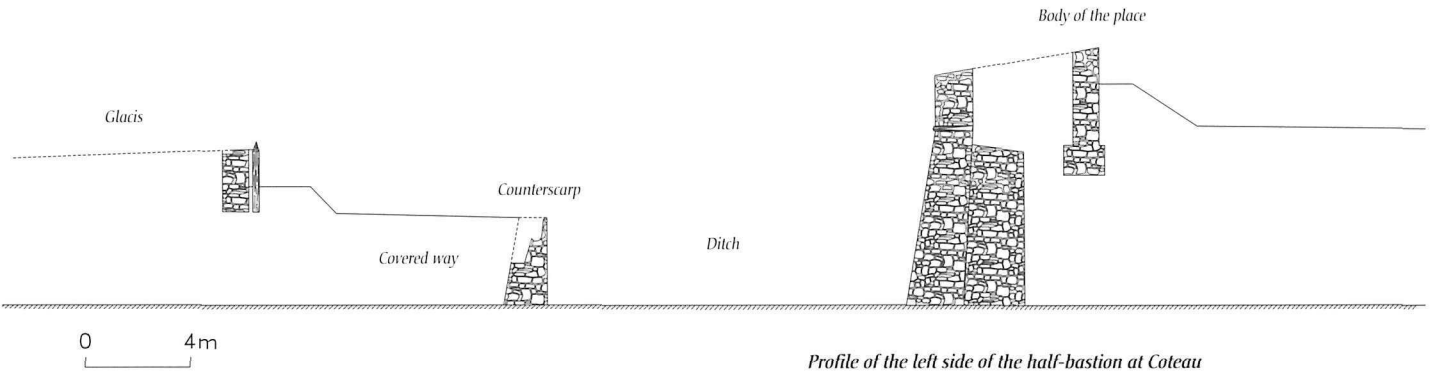
The Du Palais Redoubt was re-christened as the Hangman's Redoubt around 1700, as it became the official residence of the hangman. Since the hangman position was traditionally filled by a criminal who wanted to reduce his sentence by filling the office, the population of the capital wanted to live as far away as possible from the residence. New France had only one hangman for the entire territory – and he lived in Quebec City.

Levasseur de Neré was the first engineer to really grasp the particular challenges posed by Quebec's irregular topography. First and foremost a practical man, he considerably reduced the main wall's weaknesses through original, if unorthodox, solutions.

As the 1693 fortifications of Boisberthelot de Beaucours deteriorated quickly, 1710 saw the first construction of a new line of defence, including a new rampart – this time made with a wall of masonry, much more solid and durable than a palisade. In 1712, two new structures began to appear in the Artillery Park sector: the Dauphine Redoubt and a stone wall that ran along the escarpment between the Du Palais Redoubt, now named the Hangman's Redoubt, and the Côte du Palais. This wall, between six and 10 French feet (two to three metres) high, was intended to prevent climbing and invasion of the city from the Saint-Charles River.

The half-bastion (A), the curtain wall (B) and the fausse-bray (C) built by Chaussegros de Léry at Coteau de la Potasse.
ILL.: LIBRARY OF CONGRESS.

After a peaceful period that saw little interest in fortifications for the town, the Austrian War of Succession caused repercussions in the colony in 1745. The fall of Louisbourg that year alarmed the colonists and ignited panic. Merchants, traders, citizens and *habitants* of Quebec City urged the governor to build new defenses, as the old ones had deteriorated. In response to the desperate situation, chief engineer Gaspard-Joseph Chaussegros de Léry – who had held the position since 1716 – began the construction of a new rampart in August 1745. At the current Artillery Park site, in the northwestern corner of the walls, the engineer constructed the "Coteau de la Potasse" half-bastion. To complete the defense of the entire sector, the engineer included a number of sophisticated structures: a ditch, counterscarp, covered way, and glacis.



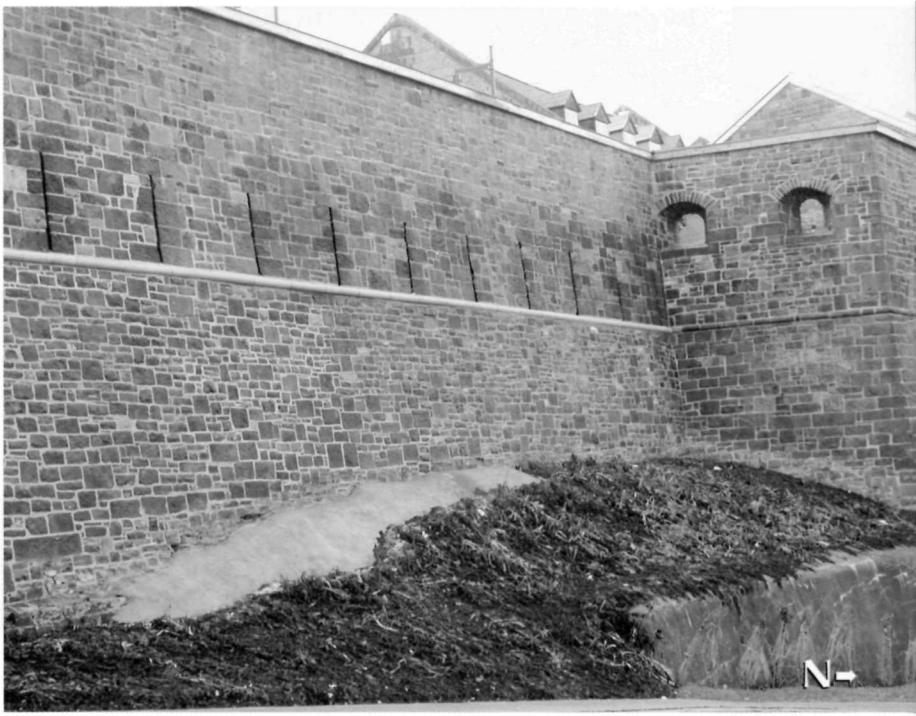
Profile of the left side of the half-bastion at Coteau de la Potasse and Chaussegros de Léry's advanced works erected in 1745.
ILL.: PARKS CANADA/J. GUIMONT AND L. GRENIER.

On the escarpment dominating the Lower Town, Chaussegros de Léry built two large structures to complete the defense of the sector: a curtain wall, whose embrasures allowed cannons to be fired towards the Saint-Charles River and which served as the northern wall of the New Barracks, and a crenelated fausse-bray, lower, raised directly in front of the curtain wall and allowing guns to be fired. These two structures joined at the Du Palais hill, where the engineer built the gate of the same name. To complete the updates, Chaussegros de Léry built the New Barracks, an immense building meant to lodge reinforcement troops.

Despite their best efforts, New France fell to the British in 1759. Quebec City was surrendered after the battle of the Plains of Abraham, and the British military took over the town. From their arrival – and well before the signing of the Treaty of Paris in 1763 – the British colonial authorities were concerned with the state of the fortifications. They did not improve them, however, until the turn of the century, raising Chaussegros de Léry's fausse-bray by approximately 15 British feet (4.6 metres). This new fortification, with its many loopholes, reached the dimensions we know today, and retained its principal purpose of foiling climbers. The old curtain wall built by Chaussegros de Léry – now the northern wall of the New Barracks – became completely useless as a fortification, with the cannon embrasures on the higher part of the wall having become unusable.

The east end of Chaussegros de Léry's curtain wall – the New Barracks' current north wall – where five of the original 17 cannon embrasures can still be seen.
PHOTO: PARKS CANADA/R. GAUVIN.

The space located between the raised fausse-bray and the northern wall of the New Barracks thus lost its defensive function to become the court of the New Barracks, where several buildings were soon constructed for military purposes.



The fortification wall raised by British soldiers at the turn of the 19th century, with its loopholes (left) and cannon embrasures on the bastion's right flank.
PHOTO: PARKS CANADA/R. GAUVIN.

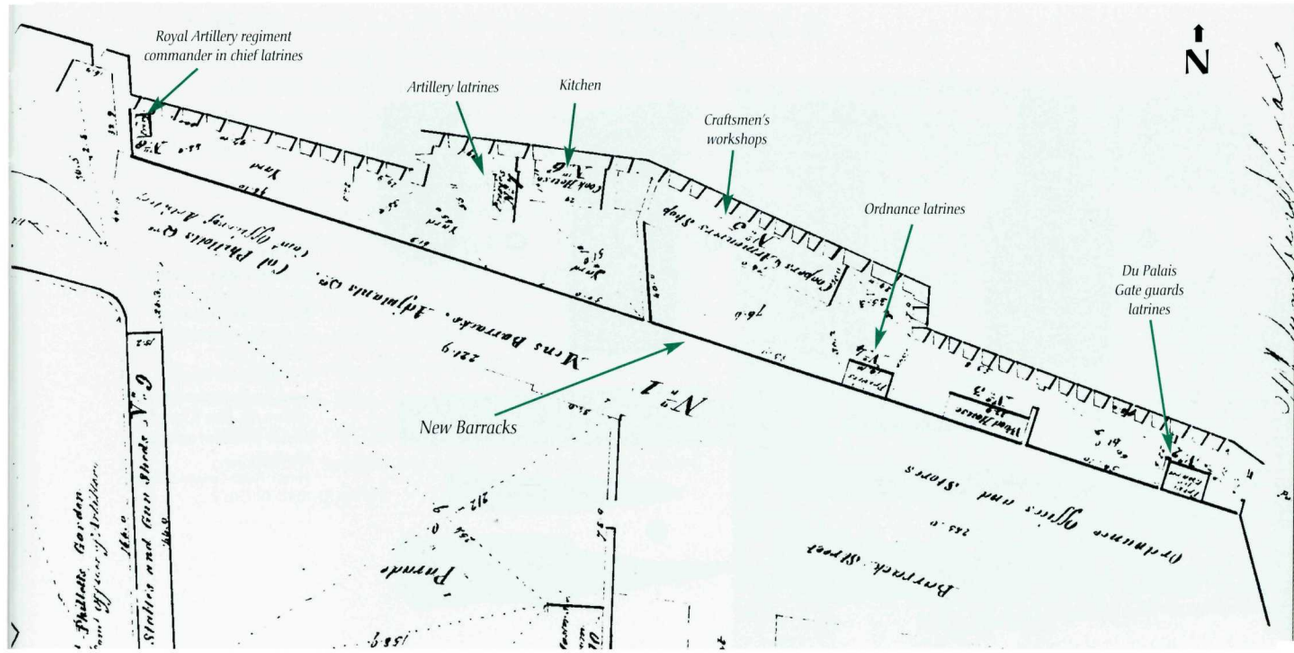
The barracks period

The northwestern sector of the fortifications, the future Artillery Park, had been viewed by the French colonial military authorities since the early 17th century as an ideal zone for quartering troops. Its position, close to the lines of defense and relatively far from the population, was ideal. Moreover, military leaders could establish a protected perimeter, making it possible to better control the comings and goings of soldier, making discipline easier.

During the French regime, however, colonial troops had to lodge with citizens according to the metropolitan system called "billeting." This situation changed radically starting in 1745, when British troops threatened to overrun the country after the fall of Louisbourg. The presence of a large number of soldiers in the capital made the colonial authorities seriously reconsider the need for barracking. For that reason, in 1748 and 1749, they renovated the Royale and Dauphine Redoubts for lodging purposes. Since these buildings could house no more than 200 people at a time, Chaussegros de Léry undertook the construction of a massive building intended to house 400 soldiers: the New Barracks.

This new building had four stories, including cellars and vaults, and was 490 French feet (160 metres) long. Its construction took four years of work, from 1749 to 1752, but the military only took possession of the site two years after that. At that point, only the building's western end was used for lodging, the east end containing arms storage, magazines, prisons, and the guard corps for the recently built Du Palais Gate.

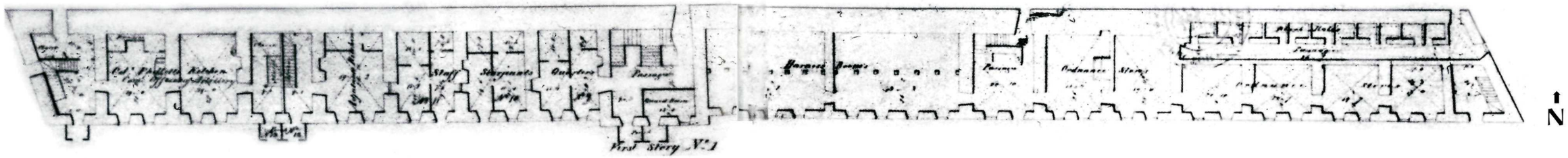
After the Conquest, the British took over the New Barracks. Although barracking was not a common practice in Great Britain at the time, they nonetheless used the building to lodge part of their troops. In the latter half of the 18th century, several regiments stayed in the barracks before it became the exclusive lodgings of the Royal Artillery regiment in the following century. Like their predecessors, the British used the east end of the building for other purposes. In the 19th century, for example, the Ordnance offices were located there – the British Army's Intendant's department, also known as the Artillery and Engineering Department. Its members were responsible for administering assets, providing most of the army's supplies, and managing all military buildings.



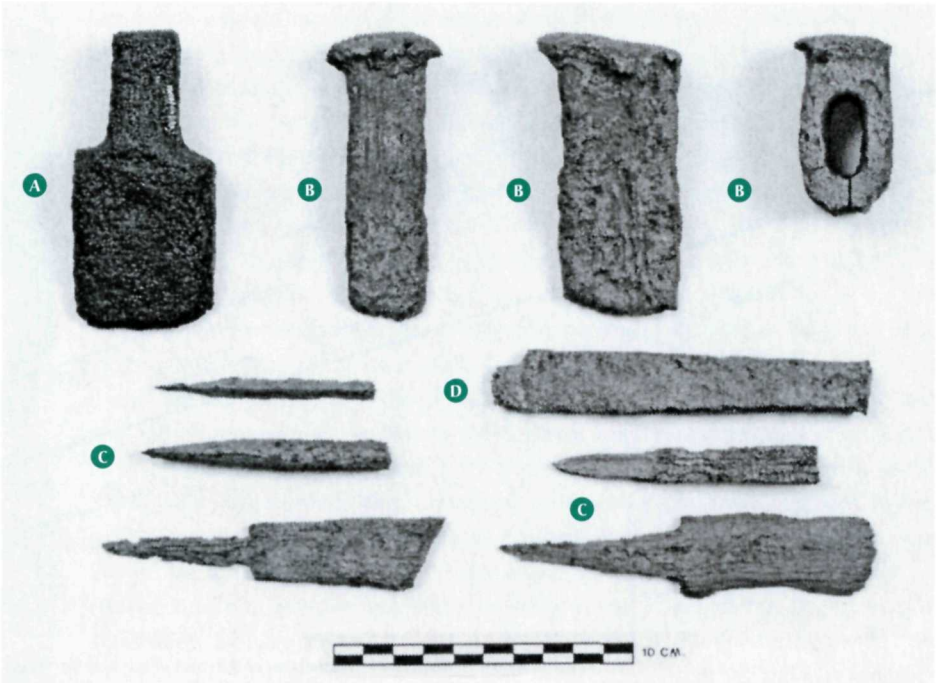
Floor plan of the court of the New Barracks in 1823, showing the service buildings constructed in the early 1820s.
ILL.: NAC.

Since the space between the New Barracks' north wall and the old fausse-bray was no longer useful for defence purposes, the "court" could be used for service buildings required by the Ordnance, such as craftsmen's workshops, hangars, warehouses, latrines, and for the barracked soldiers a kitchen, latrines and an ablution room.

The floor plan of the New Barracks' ground floor in 1823. At the west end were the lodgings of colonel Phillott, commander in chief of the Royal Artillery regiment. To the side were the warrant officer's quarters, and those of the soldiers. In the centre and to the east was housed the Ordnance.
ILL.: ANC.



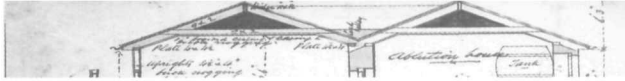
The interior court of the New Barracks: a workspace



During their digs, archaeologists uncovered parts of metal tools used by craftsmen working in the New Barracks' interior court. A forged-iron hardy used for heat trimming (A), cutters (B), files (C) and a scissor (D) were among the finds.
PHOTO: PARKS CANADA/J. JOLIN.

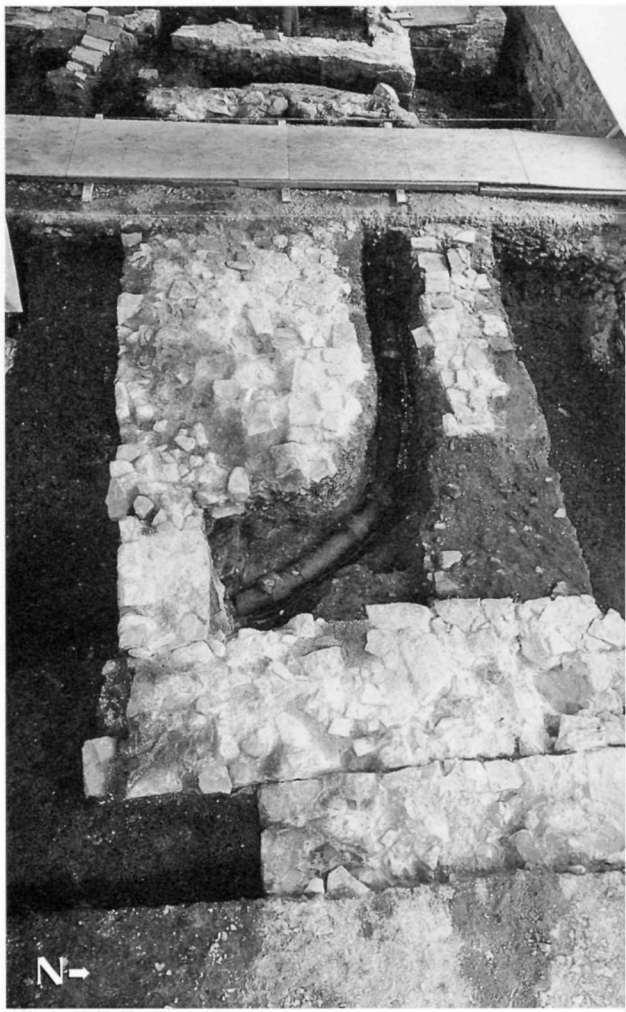
Ordnance needed many craftsmen to maintain the equipment required to keep the army functioning smoothly: blacksmiths, gunsmiths, coopers, cartwrights, joiners and carpenters were generally chosen from among the soldier-craftsmen in the barracked regiments. Their workshops were originally located in the eastern section of the New Barracks. Having a forge inside the building caused serious concerns about fire, however – fears which were justified in 1816. That fire caused authorities to build a dedicated structure for Ordnance craftsmen in the New Barracks' court in 1822. It initially contained only two rooms: one for the blacksmiths and gunsmiths at the western end, and another for carpenters and coopers. Raised by one storey and then rebuilt in 1858, the workshop was used by craftsmen until the departure of the troops in 1871.

Several artifacts recovered during the archaeological digs are proof of the Ordnance craftsmen's work, including metal and woodworking tools. Several objects made by the craftsmen were also found, as well as production scraps and imported objects being repaired, such as firearms parts – rare evidence of the work of army gunsmiths.

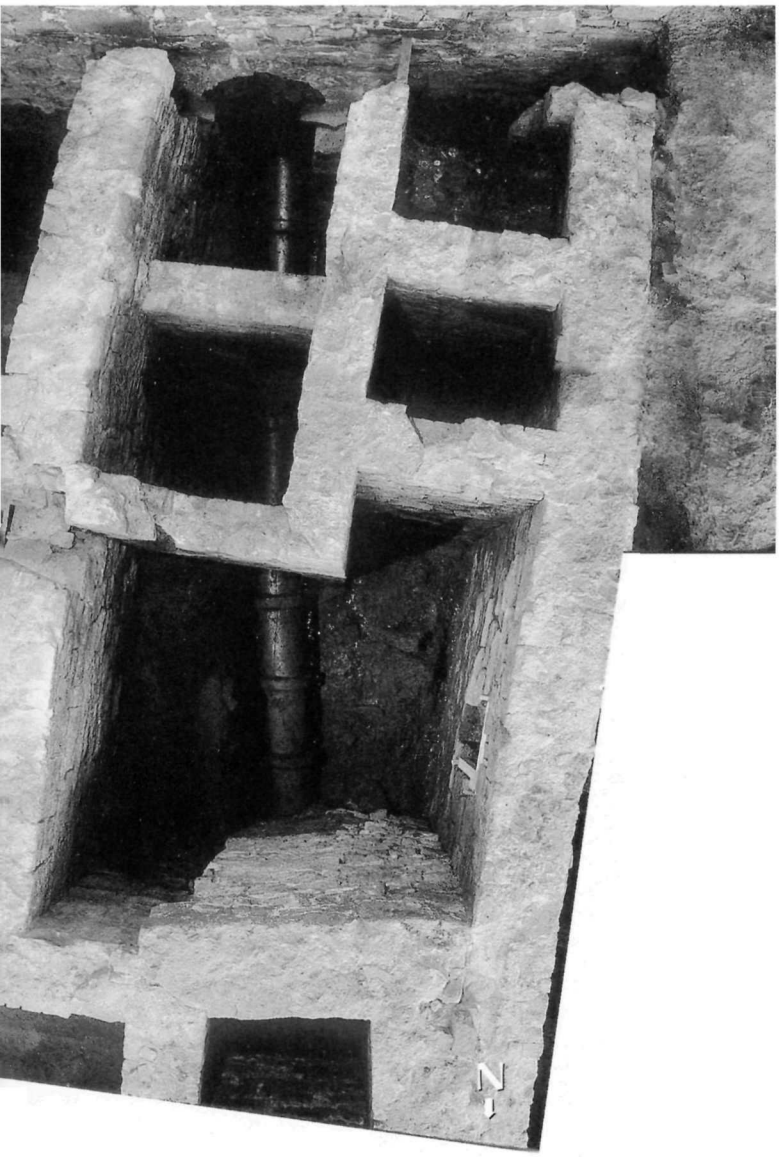


Improvements to comfort

British military authorities also changed the court to improve the quality of life in the New Barracks, providing them with facilities that left numerous archaeological traces. A large kitchen was built in the centre of the court in 1819, eliminating the inherent problems of cooking food inside soldiers' rooms and officers' quarters – a risk of fire and the presence of smoke and nauseating smells, particularly in the winter. The stone building was covered with a sloping roof; food was cooked on a *potager* generally in large copper pots. The *potager* was made of stone, with several food warmers for the small-flame cooking of soups and stews. Boiling was one of the only cooking methods these soldiers knew. In 1859, a masonry bread oven was added to the east end of the building. Despite the kitchen's construction, soldiers and officers still occasionally cooked food in their quarters.



Remains of the Artillery kitchen built in the court in 1819.
PHOTO: PARKS CANADA/J. BEARDSELL.

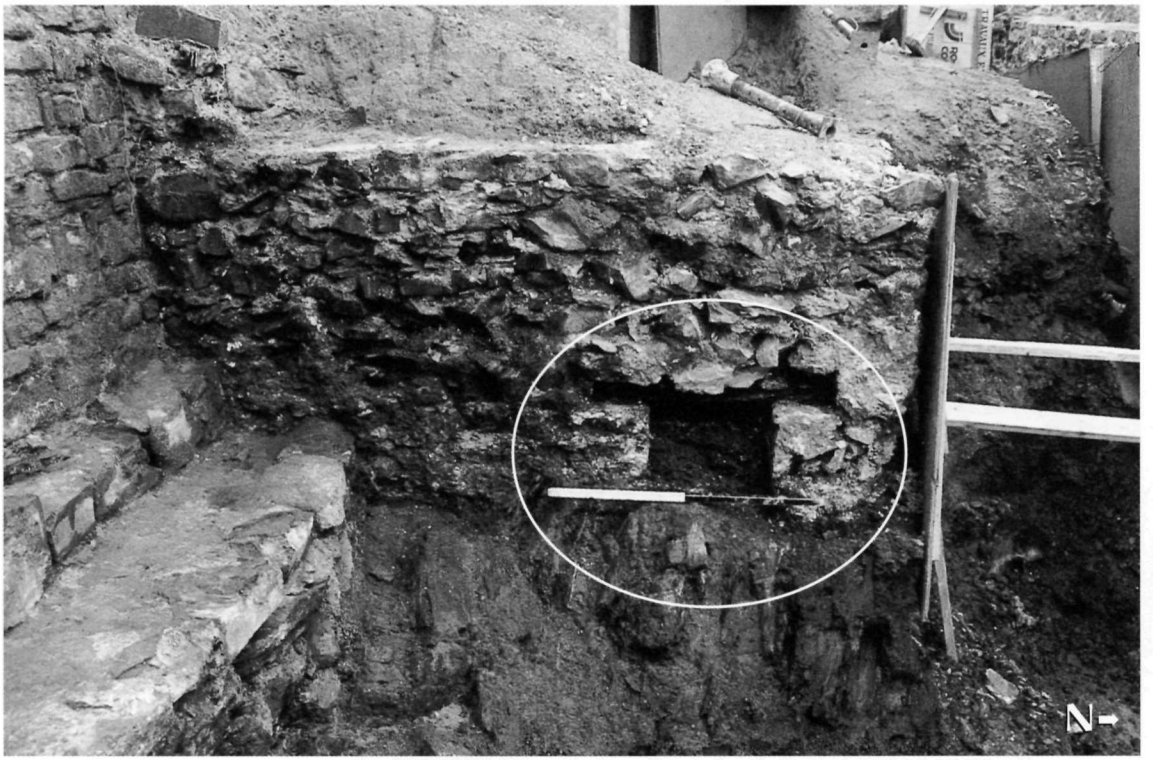


Remains of the Artillery latrine pits from 1820, the largest latrines built in the court.
PHOTO: PARKS CANADA / J. BEARDSELL.

In the early 1820s, several latrines were built in the New Barracks' court: a set for the Du Palais Gate guards and for Ordnance personnel at the east end of the court, an imposing structure for the Artillery regiment in the centre, and another for the Royal Artillery regiment commander in chief in the western end. The latrine pits were made of masonry and the buildings sheltering the latrines were made of wood with shingled roofs in a lean-to style. Until 1864, the latrine pits had openings out of which liquids could disperse, and were emptied manually. It seems that between 1750 and 1820 no such latrine construction existed in the New Barracks or the court. The assumption therefore is that soldiers would relieve themselves wherever they chose during the day and in chamber pots at night, which were then emptied onto the street or in the court – the habit of "everything onto the street" being socially entrenched for ages. The appearance of the latrines in the New Barracks' interior court was parallel to the construction of the first water-closets in Great Britain.

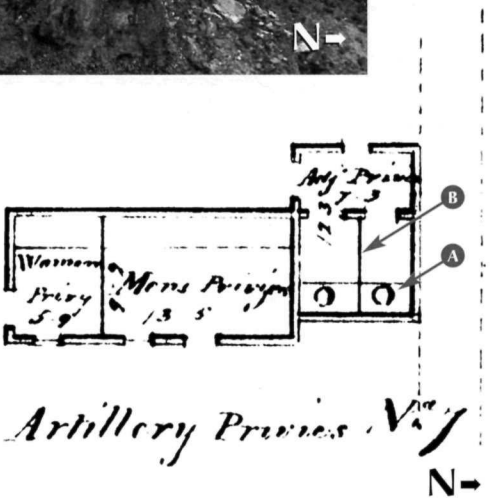
Comfort was apparently dependent on one's place in the military hierarchy, however. Only the officers' and non-commissioned officers' latrines were divided into stalls. The floor plan of the Artillery latrines shows that warrant officers' privies featured a seat and backrest while soldiers and their wives had no such luxury. They squatted over the drain, probably keeping their balance by holding onto bars – like people once did in what were called *"bécosses à barreaux."* We don't know when this situation changed, but it is possible the practice was abolished in the early 1850s since the latrine floor plans of that time no longer show seats, presumably because facilities had been standardized without regard to military rank. It was also at

Eastern wall of the pit, from the first latrines built for Du Palais gate guards. Note the opening, which served as a drain for liquids.
PHOTO: PARKS CANADA/A. QUESNEL.



this time that military authorities in the mother country took notice of the unhygienic conditions in soldiers' latrines. They remedied the situation, which had a strong positive influence on the colony.

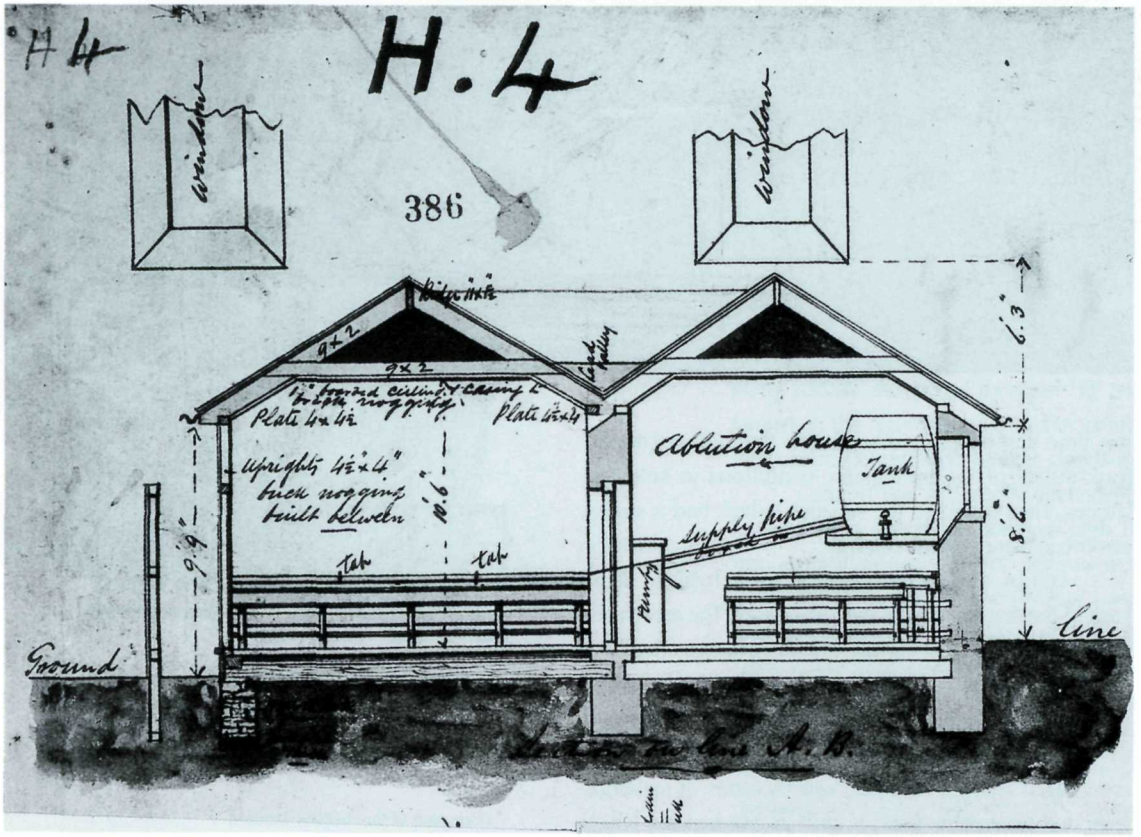
Led by doctors, concern for social hygiene dates back to the first decades of the 19th century. The movement took place throughout Europe, but England was a leader – its health commissions prioritized individual health, especially in cities. There, larger populations, promiscuity and the absence of adequate water and sewage systems encouraged cholera, smallpox, various forms of malicious fever and respiratory illnesses such as tuberculosis, which ravaged the public all too frequently. Not without reason, the army was far from escaping this wave of propriety and



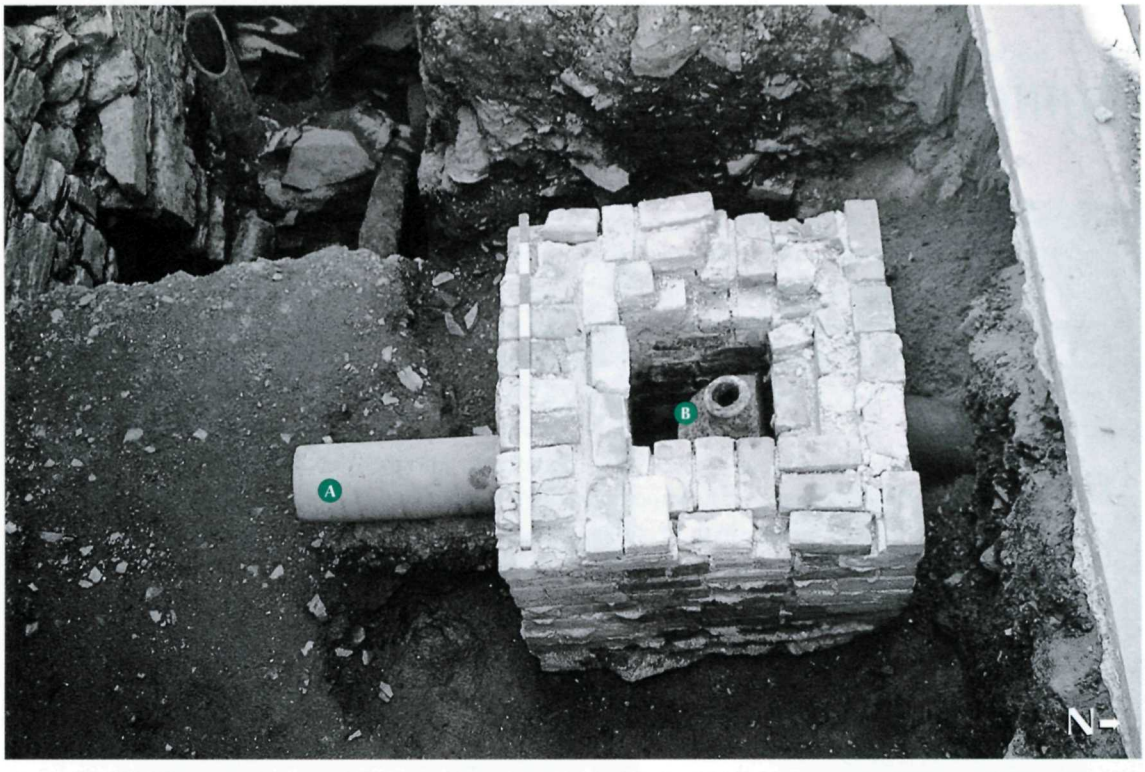
Floor plan of the Artillery latrines. Note the seats (A) and stalls (B) offering privacy in the warrant officers' privies.
ILL.: ANC.

hygiene. Soldiers' lack of hygiene was almost legendary in the 18th century; each received only two pounds of soap and two combs per year, for example. Studies also show that poor hygienic and health conditions in the barracks were the cause of high disease and mortality rates.

This would have been reason for construction of an ablution house in the New Barracks court in 1847, near the Artillery latrines. The military washroom was undoubtedly one of the first in the British Empire because such sanitary installations were not introduced in metropolitan barracks until 10 years later, meaning that the colony probably served as a testing ground.



Section of the first ablution room (right) and its expansion (left) in 1861. Note the sinks and water reservoir.
ILL.: ANC.



The ablution room's floor drain with its waste water pipe (A). The charcoal deodorizer was found inside (B).
PHOTO: PARKS CANADA / J. CROTEAU.

The ablution room was a building made of sandstone and contained a water pump, sinks, and at least one bathtub, which is surprising given the context of the era: immersing the body was a new practice previously reserved for a medicinal purposes. The small size of the building allowed for only a few sinks fitted with faucets, meaning that all soldiers could not use them daily. In the early 1860s regimental assets were at their peak and military authorities decided to expand the building. The ablution room was fitted with a stove to keep the building warm in winter and undoubtedly to heat bath water. A charcoal deodorizer was installed inside the floor drain to improve the ablution room atmosphere and eliminate nauseating smells coming from neighbouring latrine pit connected by ceramic pipe. It appears the deodorizer was one of the first such devices installed in the country and possibly the entire Empire.

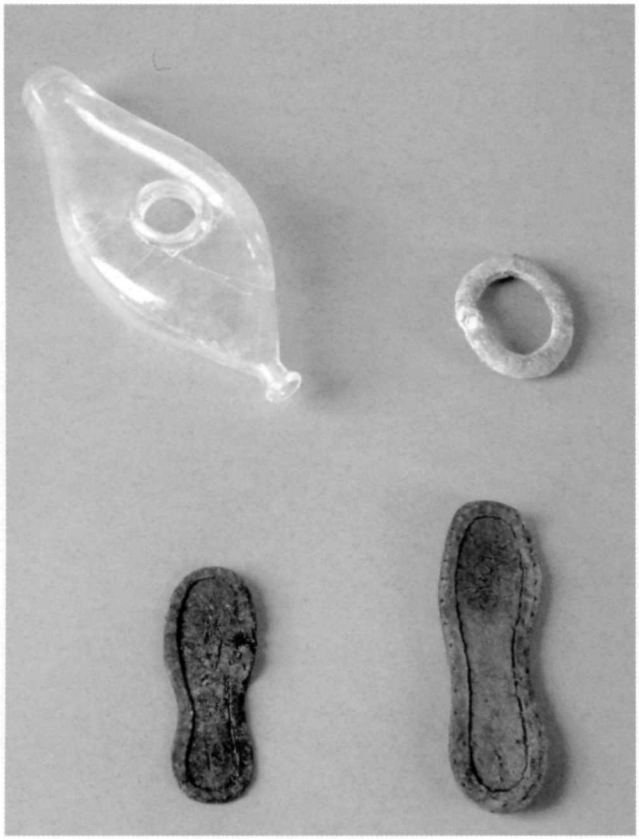
Fragments of family life

The New Barracks lodged officers, non-commissioned officers (NCOs) and soldiers, as well as women and children since not all military men were single. Latrine pits are often treasure troves for archaeological research. Two pits in the court, filled with debris at the end of the 1860s, reveal barracks life was not quite as dull as the documents would have us believe.

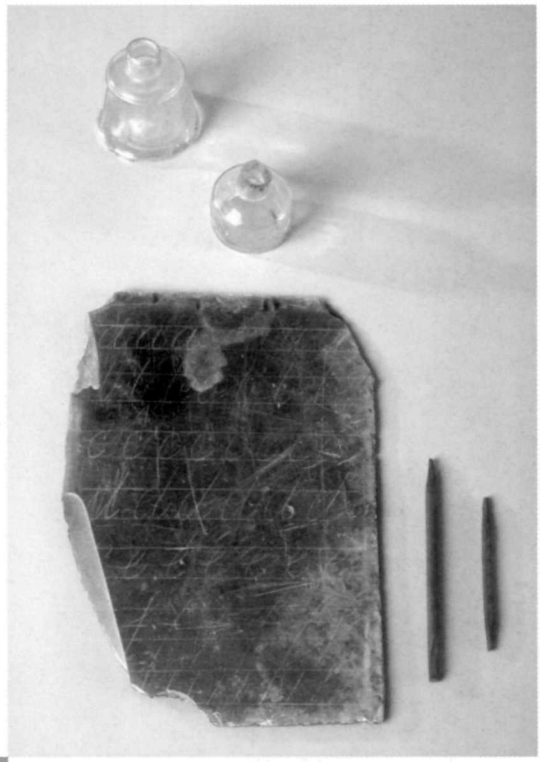
Military authorities didn't like having soldiers marry and start families, but they finally accepted it to encourage recruitment and avoid desertion. Families, usually of one or two children, were therefore tolerated in the New Barracks as long as they helped the regiment. However, only six women were admitted per company of 100 men. Since barracks space was allotted according to position within the military hierarchy, soldiers lived in common rooms, unlike officers and NCOs. Families were sometimes gathered in the same room; at other times they were given a corner in the common room where they were divided from single soldiers by a curtain. Children who grew up in these conditions were said to have been "raised behind the curtain."

Artifacts discovered by archaeologists show that the soldiers and their families had a large quantity of personal effects meant to enhance their environment: fashionable dishes, knick-knacks, potted plants, figurines, decorative vases, trendy lamps, and lace. Spouses and young girls apparently followed fashion trends, tried to improve their hair growth with miracle powders, cared for their skin with ointments, and perfumed themselves. Children's dinnerware was occasionally decorated with aphorisms, pastoral scenes and even their first names: Ann, Alice, Thomas... They had games and toys such as porcelain marbles, small vehicles and dolls. Some of the babies even drank their milk from glass bottles with rubber nipples, new at the time. Such expenses were undoubtedly the result of earnings outside the regimental walls by mother or father, since the army did nothing to help families.

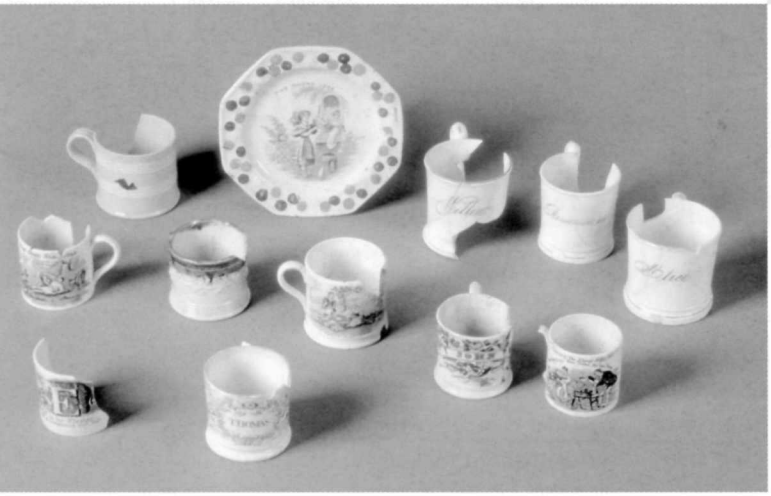
Education also had its place in the barracks, as confirmed by a slate found covered in alphabet and number exercises. Beginning in 1820, children of the Quebec garrison had access to a regimental school. Lessons included writing, reading, and arithmetic. Boys and girls completed their education with lessons on the domestic tasks involved in daily life. While girls washed the linen and clothing, boys hung them to dry on the clothesline, polished the silverware and waxed the leather.



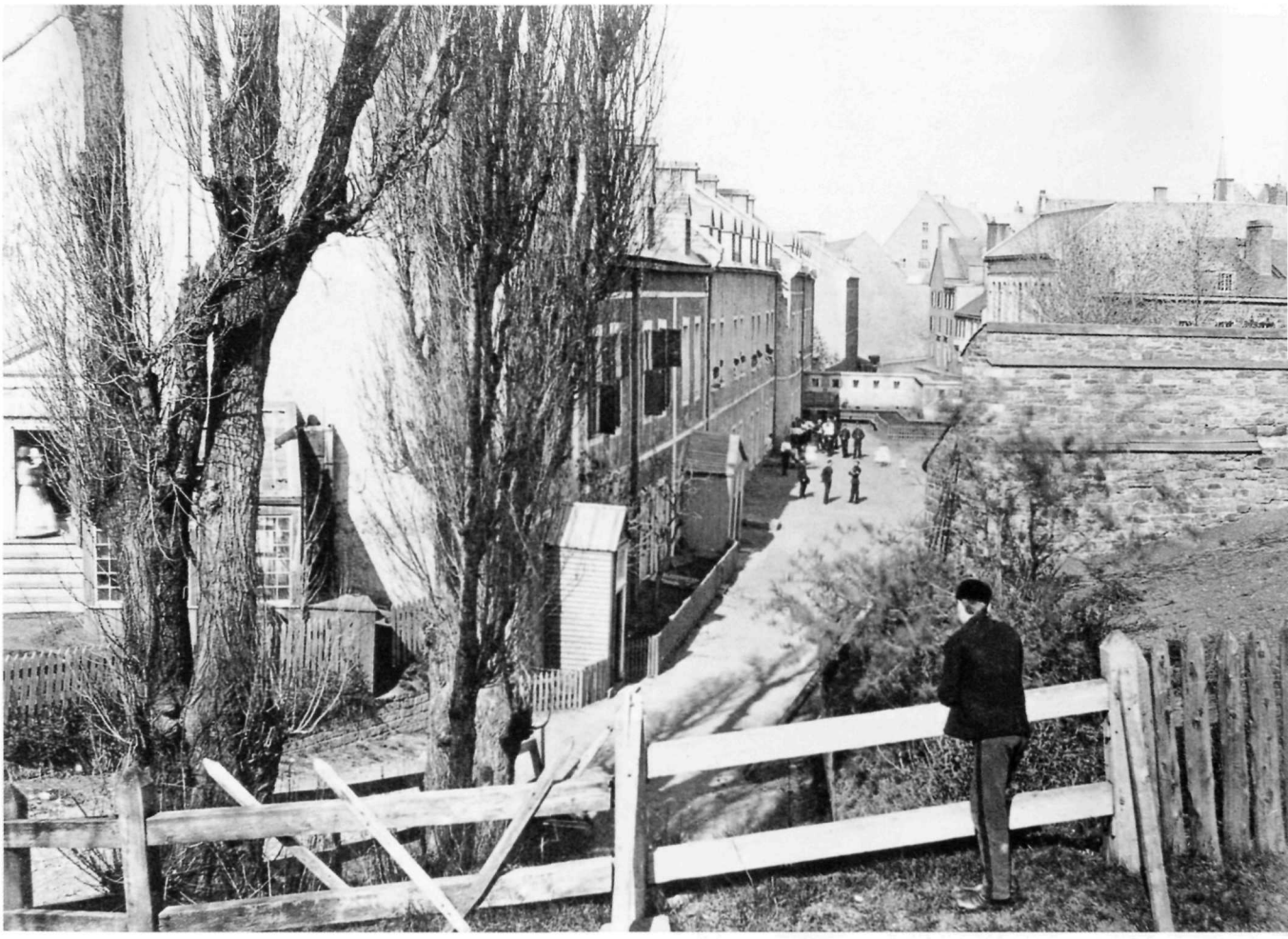
Rubber teething ring, glass bottle, and good quality babies' and young children's shoes – all found during the digs. These articles of daily life were uncommon in civilian households.
PHOTO: PARKS CANADA/ J. BEARDSELL.



Military children were well equipped for their formal education. Archaeologists found inkwells, slate chalks, and slates with writing exercises on one side and numbers on the other.
PHOTO: PARKS CANADA/ J. BEARDSELL.



Children's dishes, adorned with aphorisms and educational scenes, carried their names: Alice, Ann, Thomas, John and William.
PHOTO: PARKS CANADA/ J. BEARDSELL.

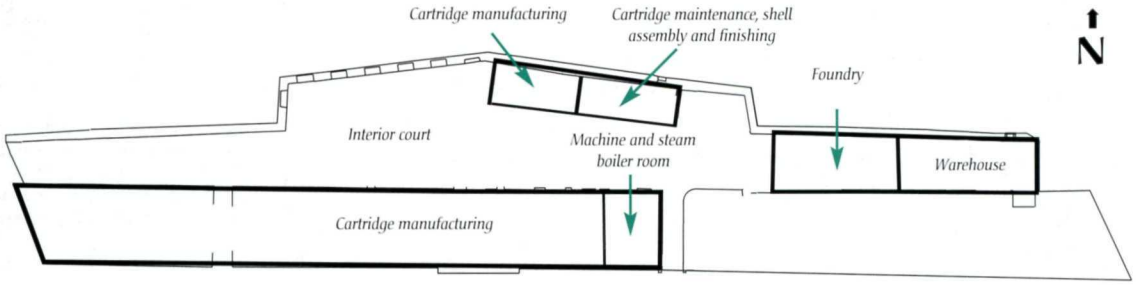


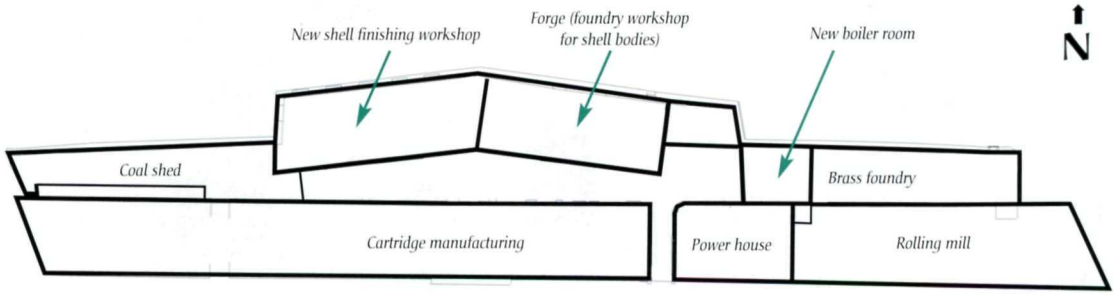
Small wooden vestibules offered protection against bad weather in the western section of the New Barracks, where officers lived.
PHOTO: LIVERNOIS AND BIENVENU, CIRCA 1870, ANQQ.

Military life was governed by decree from Great Britain and applied across the army. It appears, however, that in Quebec soldiers and their families enjoyed a degree of latitude that allowed them to improve their financial condition and augment their quality of life. This was one of the conclusions of the archaeological digs – and fascinating discoveries were not limited to the barracks, since in the latter decades of the 19th century the New Barracks sector changed radically to become the first Canadian munitions factory.

From cartridge factory to arsenal

Just three years after Canadian Confederation, the Treaty of Washington ended, in principle, the threat of invasion from the United States. The Treaty was also an expression of England's desire to free up defence expenses in some of its colonies, notably Canada; in 1871, British troops left the country. Until then, the mother country had supplied its colony with arms. The Canadian militia continued to tap that source for another dozen years, but eventually the notion that the new country should supply its own munitions won the day, and on December 22, 1879 the Privy Council in London approved the decision to create an arsenal. Quebec City was chosen over Halifax, Kingston, Ottawa, Montreal and Toronto because of its fortifications and protection against an American attack, which remained a concern despite the 1870 Treaty. Captain Oscar Prévost, who held office in Quebec City, was sent to the Woolwich Arsenal in England to study the operation of a modern munitions factory before establishing one in Quebec.



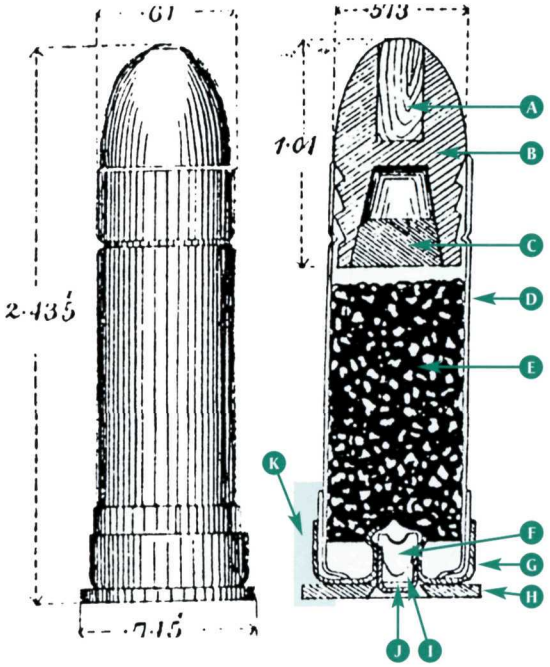


Cartridge Factory facilities in the New Barracks sector between 1882 and 1894 (above) and in 1903 (below).
ILL.: PARKS CANADA / M. SAVARD.

Cartridges – and shells

The Federal Cartridge Factory's original mandate was to serve the Canadian militia's needs for small-calibre munitions. In 1881, construction of a plant began in the Artillery Park buildings, which had been transferred to the Canadian militia and been left more-or-less abandoned following the departure of the British troops. It took the western part of the New Barracks and the old Ordnance craftsmen's workshops still standing in the interior court. Very few architectural elements remain from these first installations of the Cartridge Factory. However, numerous production rejects found in archaeological digs have allowed us to document production and techniques.

Between 1882 and 1892, small-calibre munitions manufacture was geared mostly towards the Snider-Enfield gun, the first metal-cartridge and breech-loading rifle, which had been adopted by the British army in 1866. Production reached 1,900,000 bullet rounds and 226,000 blanks in 1887. The average annual rate of production for this cartridge reached a million and a half until 1894, when they stopped being manufactured in Quebec City. From 1892 to 1895, the Cartridge Factory also manufactured cartridges for the Martini-Henry gun, another one-shot rifle, introduced in 1871. Annual production reached a million and a half in 1894. Martini-Henry munitions were merely an evolved version of the Snider-Enfield cartridges.



The Snider-Enfield cartridge is composed of the following parts: the opening (A), lead bullet (B), clay plug (C), brass case (D), powder charge (E), anvil (F), brass cup (G), iron base disk (H), percussion chamber (I), percussion cap (j) and the base (K).
ILL.: EXCERPT FROM THE WORK OF C. PURDON, 1990.

During their digs, archaeologists uncovered rejected Snider-Enfield cases and bullets.
PHOTO: PARKS CANADA / J. BEARDSELL.

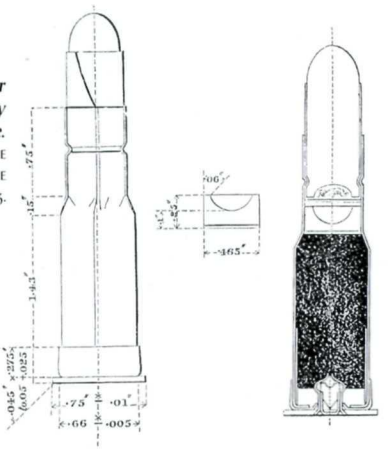
The Snider-Enfield cartridge

Assembly of this cartridge required many separately manufactured components. The cartridge was made of a cylindrical case of rolled brass sheets with the base reinforced by two cups, also made of brass, one inside and the other out. An iron base disk was then attached to the outer cup, completing and strengthening the cartridge base. The base components, disk and cups, were perforated with a percussion chamber penetrating to the inside of the case and enclosing a pointed anvil. The chamber included a tiny perforation at its peak and was kept in place within the case by a spiral of compressed paper. Finally, the base disk had a small percussion cap filled with fulminate, which ignited when the firing pin struck the anvil inside the chamber. This ignition passed through the opening at the top of the chamber, igniting the powder charge in the case, which in turn propelled the bullet out of the gun barrel. The pointed lead bullet included a clay plug at its base and an opening in its point. It was attached to the shell at the very end of the manufacturing process, after the powder was loaded. During the ejection of the bullet, the clay plug compressed the lead, which was softened by the heat of the enflamed gas, into the grooves of the gun bore – the projectile and the bore meshing perfectly so that the bullet followed the rotation of the spiral grooves.

The Martini-Henry cartridge

The Martini-Henry cartridge was simply an evolution of the Snider-Enfield, from which it borrowed most of its components: a rolled brass case, two cups, an iron base disk, a percussion or priming chamber, an anvil, and a percussion cap. The Martini-Henry bullet was designed differently, and did not include the clay plug. Its smaller diameter required that the case collar be narrower, giving the shell its distinctive bottle shape.

In 1887, production needed to expand to manufacture shells for the Canadian militia's artillery. A foundry was required in the Ordnance's old warehouse for casting shells and various copper and bronze parts. Expansion included a shell finishing and assembly workshop in the Ordnance's old workshops, and the building was entirely rebuilt at twice its original size in 1895. From 1887 onward, Quebec-manufactured shells were mainly destined for the nine-pound field gun, although a smaller quantity was produced for medium artillery cannons using 64-pound projectiles. The front-end loading shells were of two types: explosive and shrapnel.



The short-chamber .45 Martini-Henry cartridge.
ILL.: EXCERPT FROM THE WORK OF V.D. MAJENDIE AND C.O. BROWNE, 1973.

Martini-Henry cartridge cases and bullets. The case on the left is made with a rolled sheet of brass, the one on the right of drawn brass.
PHOTO: PARKS CANADA/J. BEARDSELL.

Cast iron shells

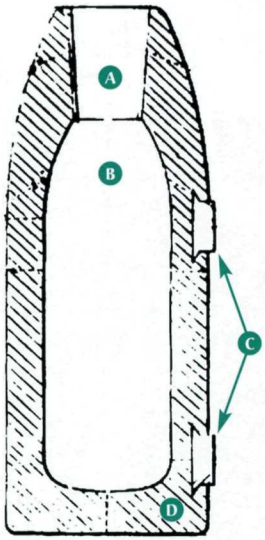
Explosive shells are as old as artillery, and were ultimately a way of destroying buildings and fortifications. They included a hollow cast structure, with a thick, pointed wall filled with explosive powder. Two other parts were attached to this structure: rifling studs and the fuse case, made respectively of copper and bronze. The rifling studs – a kind of nipple on the outside of the structure – fit into the gun bore grooves, giving the shell a gyrating movement to increase velocity and accuracy. The fuse case was the threaded part that fit into the head opening, to screw in the detonating fuse before inserting the shell into the gun barrel.

The shrapnel shell, whose main characteristics source back to the early 19th century, contains not only a charge of explosive powder but also lots of spherical shot – a devastating anti-personnel weapon when detonated at the right moment. Like the explosive shell, shrapnel shells have a cylindrical-shaped cast iron body, but their walls are thinner to compensate for the additional weight of the shot, the goal being to fire a projectile of similar weight and ballistics to the explosive shell. The shrapnel shell also has external rifling studs. Inside the shell, in addition to lead and antimony shot, a complex firing system runs from one end of the shell to the other. The system was made up of a small tin-plated iron cup placed at the base containing black powder – the powder cup – topped with a thick iron disk perforated in the centre – the diaphragm – which protected the cup from pressure generated by the heavy weight of shot placed on top. Completing the system, a small bronze tube filled with fuse powder – the powder tube – carried the shot charge from the powder to the detonating fuse inserted in the fuse case, itself connected to the shell head. The head, made of thin steel covering a wooden cone, was welded to the shell body.

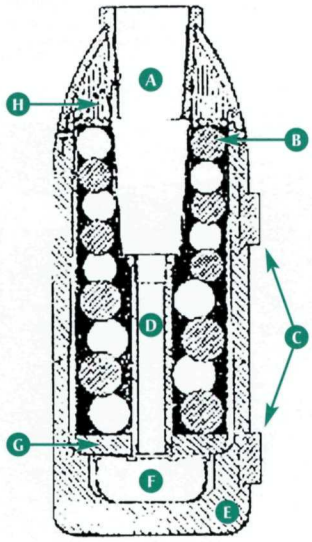
The physics of shells

After calculating the trajectory, an artilleryman would adjust the detonating fuse according to estimated flight time and insert the shell in the cannon. The force of the launch, caused by the ignition of propulsive powder, would activate the fuse mechanism. The weak charge in the fuse case would ignite the powder within the explosive shell after a certain period of time, shattering its casing. The principle behind the shrapnel shell was generally the same up to the point of igniting the fuse, which would also immediately ignite the powder in the vertical tube. Fire would then be forced down the tube until it reached the charge in the base, causing an explosion, shattering the shell head and releasing lead shot.

Different parts of the 9-lb. shell found during archaeological work. From top to bottom: the shell body, a shell head in which the fuse case was inserted, and a shrapnel shell fuse case and its plug.
PHOTO: PARKS CANADA/J. BEARDSELL



The fuse case (A), internal cavity (B), rifling studs (C) and body (D) are components of the 9-lb. cast iron explosive shell.
ILL.: EXCERPT FROM THE WORK OF J. D. CHOWN, 1967.



The 9-lb. cast iron shrapnel shell was made of the fuse case (A), lead and antimony shot (B), rifling studs (C), powder tube (D), the body (E), the black-powder cup (F), the diaphragm (G) and the head (H).

Remains of the foundry's crucible furnaces

The remains of two small crucible furnaces were found in the foundry. Used for recasting copper and copper alloys, the equipment resembled natural-draft pit furnaces, and were made of a central brick block in which two small cylindrical cavities, the fireboxes, had been left for the crucibles. On either side of the block were two large rectangular openings covered by a grill for allowing air in and for removing ashes that accumulated at the bottom of the fireboxes. The chimney was located at the back of the fireboxes.

Remains of a crucible found in the shell foundry.
PHOTO: PARKS CANADA / J. JOLIN.

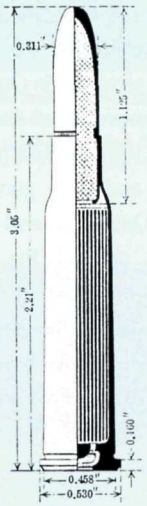
A new century, new munitions, new facilities

At the turn of the 20th century, the Quebec munitions factory had systematically changed production and expanded to the point that its name changed to the Federal Arsenal in 1901. It began manufacturing modern cartridges and steel-jacketed shells, respectively represented by the .303 cartridge and the 18-lb. shrapnel shell, whose production rejects have been found in the thousands.

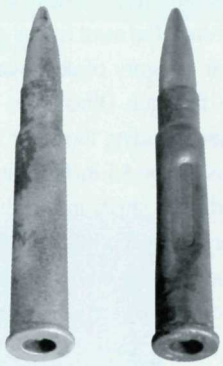
The .303 cartridge was used mainly in the then-new Lee-Enfield gun. Production began in 1896 and reached several million units annually, except during the Great War when it increased to over 100 million or 300,000 shells a day. The .303 cartridge remained the Quebec factory's main small arms product until the 1940s.

The .303 cartridge

The .303 cartridge was innovative in several ways, the most significant being its solid drawn brass, single-piece case. Its manufacture required no more than 25 procedures, compared to 80 for the rolled brass case of earlier cartridges. Its bullet was made of a mixture of lead and antimony, providing greater durability, and covered in a thin layer of cupronickel, giving it the strength required to withstand torsion caused by rotation as it followed gun barrel striations. Finally, black gunpowder was replaced by cordite powder, which provided more power and eliminated smoke. The new cartridge was thinner and longer than previous ones, providing greater velocity and accuracy.



A cross-section of the .303 Mark VI cartridge.
ILL.: EXCERPT FROM THE WORK OF D.T. HAMILTON, 1916.



.303 Mark VII cartridges found during excavation work.
PHOTO: PARKS CANADA/ J. BEARDSELL.

Artifacts showing the different manufacturing stages of a .303 cartridge case (bottom) and bullet (top).
PHOTO: PARKS CANADA/ J. BEARDSELL.

At the beginning of the 20th century, the Quebec Arsenal stopped producing cast-iron shells in favour of steel shells, which were better adapted to new rapid-fire artillery. This new artillery style featured breech loading and an anti-recoil system, and used fixed shells and new explosives. The most typical projectile produced in Quebec in that category of shell was the shrapnel shell for the 18-lb. field gun. Other types of shells were manufactured, though, including those for 12-, 13- and 15-lb. guns, as well as for the 4.5-inch howitzer. The Quebec Arsenal produced such shells in the thousands, and was the only factory in the country producing all artillery munitions components based on the British model. For that reason, it also served as an advisory office, sharing its expertise with private firms wanting to fill British orders during World War I.

This radical change in the production of shells and cartridges at the turn of the 20th century brought significant modifications to the factory's installations and spatial organization. Numerous remains of new equipment found during archaeological work provide a relatively accurate picture of the technology that had been adopted.

The steel shrapnel shell

The general design of this new shell wasn't much different from the old cast iron shrapnel shells of the 19th century; its components were the only things that were really modified. The structure was now of steel and shaped in the form of a warhead. The internal parts, whose shapes were changed significantly, were now made of brass. On the outside structure of the shell, the rifling stud was replaced by the sabot, a copper ring that ensured rotation of the projectile by compressing it down the striations of the barrel upon firing. Bullets retained their previous composition, still being made from lead and antimony.

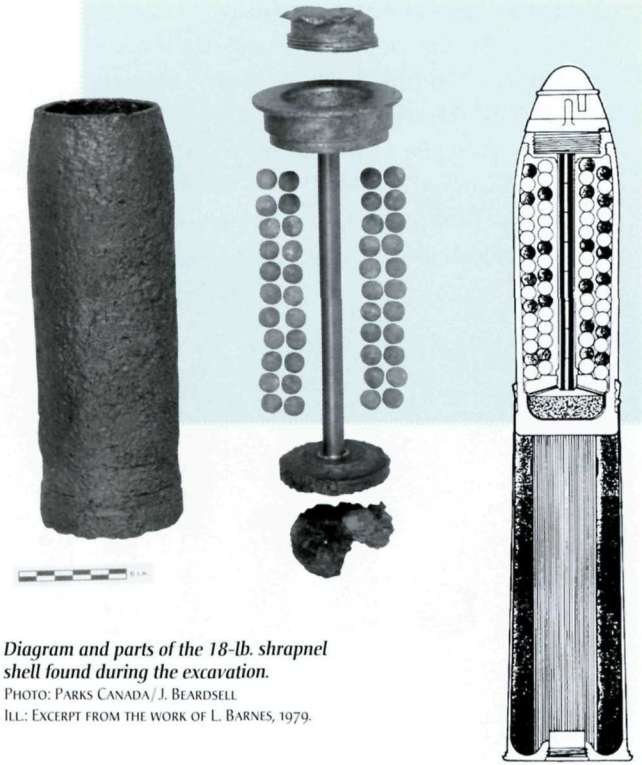
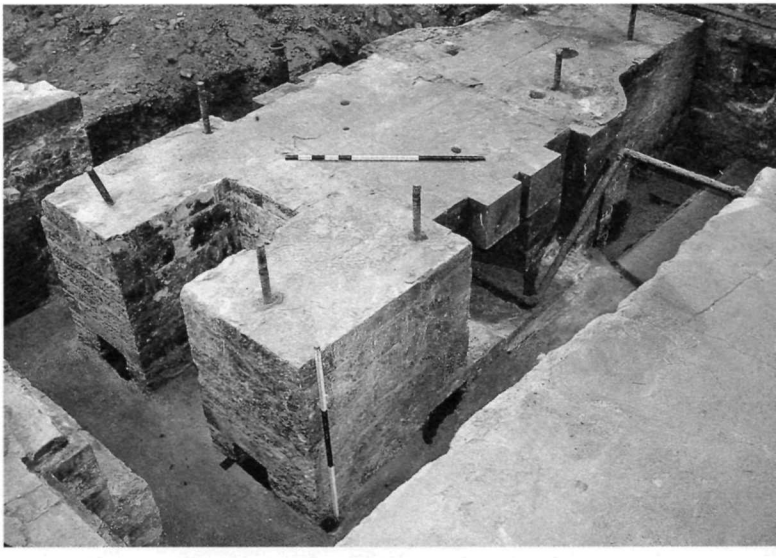


Diagram and parts of the 18-lb. shrapnel shell found during the excavation.
PHOTO: PARKS CANADA/J. BEARDSELL
ILL.: EXCERPT FROM THE WORK OF L. BARNES, 1979.

The new shells were no longer moulded as they had been, but rather forged with hydraulic presses, explaining the construction of a smithy in the old finishing and assembly workshop. Two presses and all other necessary equipment, including a hydraulic accumulator and pump, were installed. A furnace was also built to heat steel during the shell forging process. Remains of this and other such equipment were found during archaeological digs. Finally, a new shell finishing and assembly workshop was built, using the existing fortifications as its north and west walls.



The foundation of the hydraulic pump, whose remains were found in the foundry workshop for shell bodies.
PHOTO: PARKS CANADA/J. BEARDSELL.

Foundation of a hydraulic press.
PHOTO: PARKS CANADA/J. BEARDSELL.

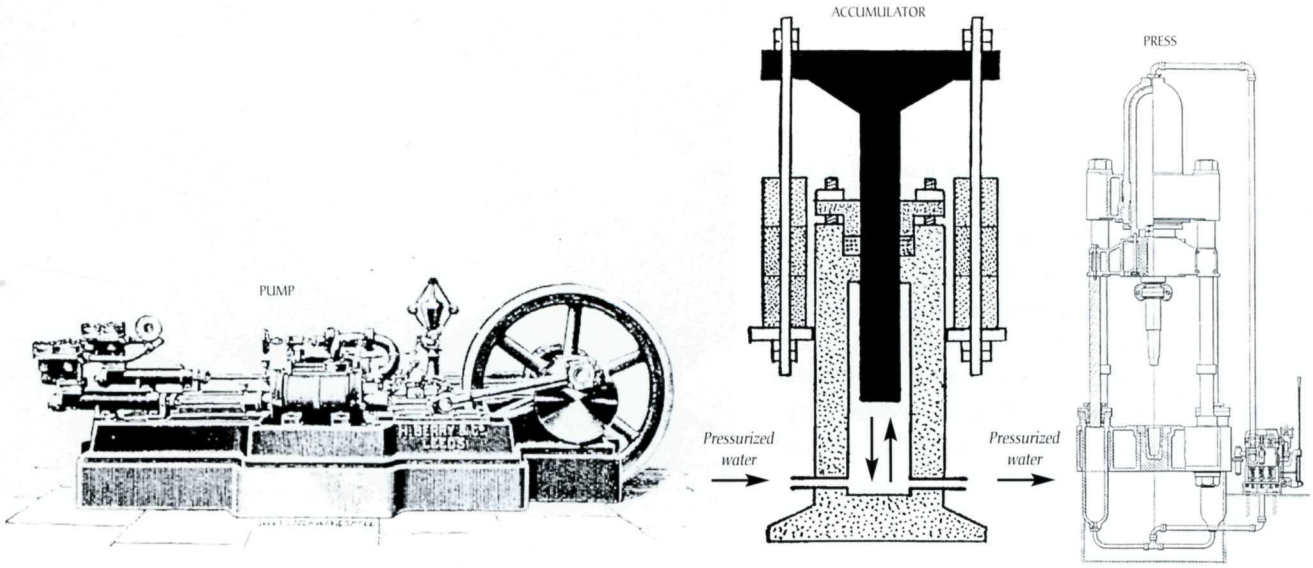


Diagram of the general operation of the hydraulic system installed in 1902-03 in the foundry workshop for steel shell bodies.
ILL.: BASED ON EXCERPTS FROM THE WORKS OF G. CROYDON MARKS, 1903, I.P. CHURCH, 1905, AND D.T. HAMILTON, 1915.

Hydraulic equipment and the smithy

The hydraulic pump was driven by an integrated steam-powered machine, and supplied pressurized water to the accumulator through a pipe. The accumulator stored a reserve of hydraulic energy, which could be supplied to the presses on demand while maintaining stable pressure. It consisted of a system of valves and a heavy piston moving vertically in a cylinder. The effect of the water made the piston rise in the cylinder. When the presses were working, the pipes' valves linking the accumulator and the pump would close, while the pipes linking the accumulator to the presses would open. The weight of the piston applied pressure on the water accumulated beneath it, increasing pressure in the pipes leading to the presses and therefore providing the required hydraulic power needed to operate the presses. A steel billet was placed in a die designed to receive it on the press's lower plate. When the press's upper plate lowered under the hydraulic pressure, the billet was pierced and partially drawn by the attached punch. The punch and die design therefore gave the billet the shape of the shell body.

In 1902, part of the old cast iron foundry was enlarged and transformed into a steam boiler room. The installation of new hydraulic equipment required considerably greater power, leading to the addition of two steam boilers to the existing facilities. Archaeological digs uncovered remains of almost all the equipment in the new boiler room.

Beginning in 1896 when .303 cartridge production began, the raw materials required, brass and cupronickel, came in long straight bars from which blanks were cut and drawn in several stages throughout the manufacturing process. At the turn of the century, authorities decided to install the equipment they needed to make the bars at the site, eliminating the need to have the bars brought from elsewhere. A new brass foundry was constructed, as well as a rolling mill. The foundry occupied the old cast iron foundry's space, and the rolling mill was located in a new building to the immediate south of the foundry. Systematic archaeological inquiries focused only on the foundry, where remains of virtually all former equipment were found, as well as thousands of cartridge remains awaiting recasting, ingot and bar fragments, ingot moulds, and crucible parts.

Workers at the brass foundry's crucible furnace in 1909. They used long-handled lifting tongs, and a two-men shank, a tool with which the crucible was carried to fill the moulds.
PHOTO: PARKS CANADA COLLECTION.

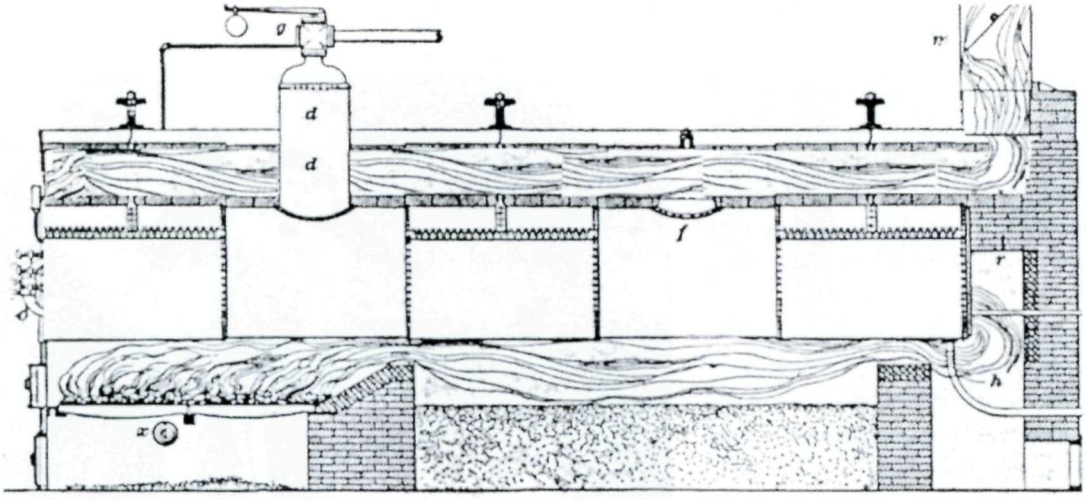
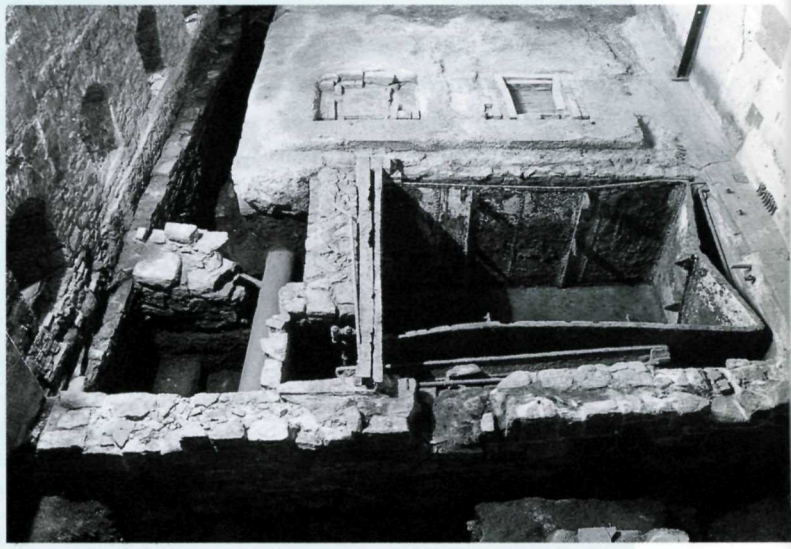


Diagram of the type of boilers installed in the new boiler room in 1902.
ILL: INTERNATIONAL LIBRARY OF TECHNOLOGY (ED.), (1907).

Steam boilers

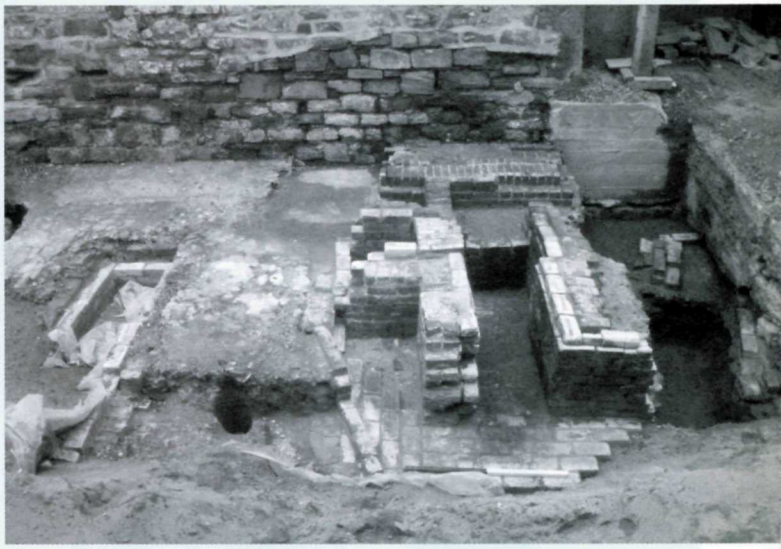
The boilers came in the shape of cylindrical reservoirs made of riveted steel sheets 16 feet (4.88 metres) long and six feet (1.83 metres) in diameter. They supplied 120 metric horsepower each. The boilers were aligned horizontally inside a brick structure. A coal-fired furnace was located at the front of each boiler. The front part of the structure was made of steel and cast iron, and featured six doors accessing the boilers, furnaces and ashes.



During their digs, archaeologists found the reservoir which contained water for the boilers. Note the access pit on the left.
PHOTO: PARKS CANADA/ J. JOLIN.

The brass foundry's crucible furnace

The perimeter of the brass foundry's crucible furnace was made of four small walls in the shape of a rectangle. Six small holes were arranged longitudinally on top of the furnace, which was at about the same level as the foundry floor. The holes opened onto the furnace's fire-boxes, small chambers made of firebrick whose bottom consisted of a simple grill, and were designed for holding the crucibles for melting the brass. The fireboxes were located inside the furnace and were built on two small steel beams. Also at the top of the furnace, opposite to and slightly lower than the top of the fireboxes, was a metal grill to allow in the air required for combustion and to remove ashes. The draft was provided by a small conduit linked to each firebox and connected to another conduit which ran the length of the fireboxes and through to the chimney. Air drawn in by the draft of the chimney entered through the metal grill, went into the fireboxes from the back, activated combustion, then travelled through the conduits to be expelled through the chimney.



Western section of the reheating furnace constructed in 1902-1903.
PHOTO: PARKS CANADA/A. NAULT.

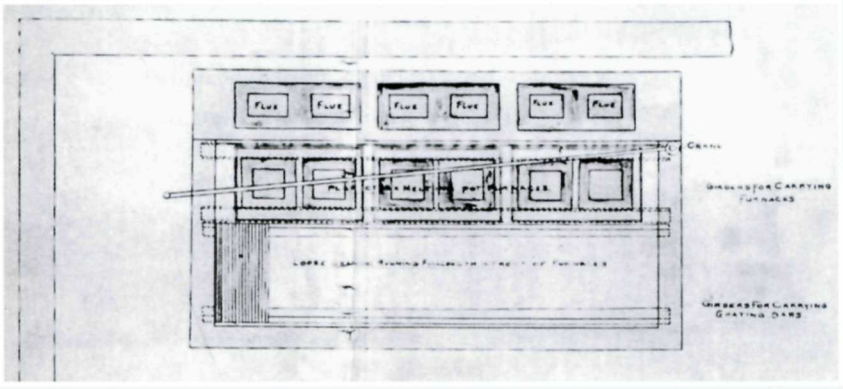


Diagram and cross-section of the crucible furnace installed in the brass foundry in 1902.
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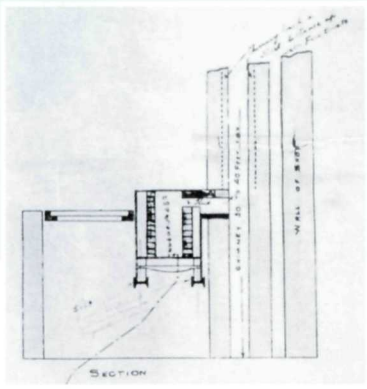
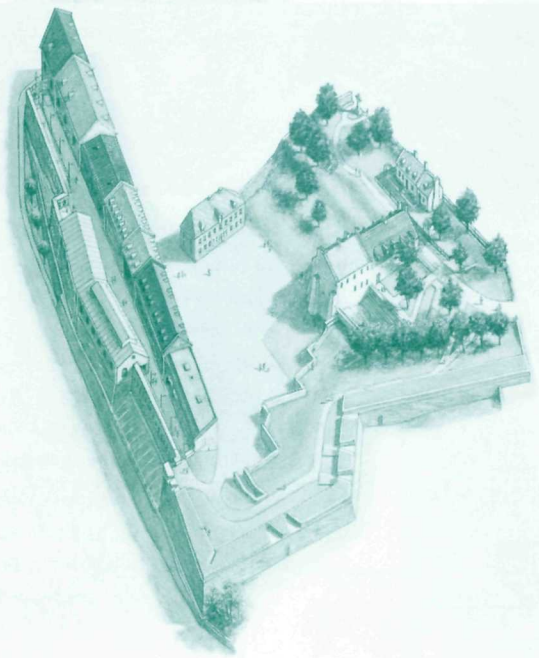


Military, archaeological and educational vocations

As nerve centre for the fortifications, the ideal location for barracks, and the site of the first munitions factory in Canada, Artillery Park is a site whose evolution is of great interest to archaeologists, historians and history buffs.



Five years of archaeological research by Parks Canada in the New Barracks sector has provided a better understanding of the challenges of defending the city and colony and of Quebec barracks life, thanks to the discovery and analysis of many artifacts. The research has provided new information on defence strategies, spatial organization, and facilities and buildings, as well as on previously unknown aspects of barracks life, especially with regard to the comfort and family life of their residents. Archaeological work in the New Barracks interior court allowed detailed documentation of the Arsenal's products, manufacturing processes and equipment. Uncovering this sector of the fortifications has revealed numerous archaeological remains, concrete information, and important artifacts that will alter our perception of the past long into the future.

LEXICON

Bore: Interior of a gun or rifle barrel.

Banquette: A slight elevation in the landscape, usually of earth but sometimes of wood, behind a parapet, on which soldiers climb to fire at the approaching enemy.

Bastion: The key element in a fortification, in the shape of a pentagon and covered in wood or masonry. A bastion includes two fronts, two flanks, and a gorge.

***Bécosse à barreaux*:** Seatless latrines, fitted with one support bar for the buttocks and another for the feet, to help with balance.

Counterscarp: The exterior wall of a ditch.

Body of the place: The main rampart surrounding a fortress.

Curtain wall: A defensive wall linking a fortification's bastions.

Fausse-bray: A forward and isolated parapet, located in front of the main rampart. Together, they define a free space used as a "covered way."

Detonating fuse: A small fuse attached to the head of a shell, designed to expel the projectile.

Glacis: A gentle bank sloping from the covered way's parapet to the field, so that attackers are exposed to the grazing fire of defenders.

Machicolation: Projection at the peak of a high building or tower, protected by a parapet of stone or wood and equipped with a series of holes that allow defenders to drop firebombs and other projectiles onto attackers.

Parapet: A mound of earth that may or may not be covered, which ends the upper part of a rampart. The parapet protects artillerymen and soldiers from enemy batteries.

Redoubt: An earth or masonry construction outside the rampart for the additional use of guns and cannons.

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