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YORK FACTORY: A STRUCTURAL HISTORY

by George Ingram

(1979)

PRINCE OF WALES'S FORT: A STRUCTURAL HISTORY

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THE NORTH WEST BASTION BAKEHOUSE, LOWER
FORT GARRY: A STRUCTURAL AND FURNISHING
STUDY

by Gregory Thomas

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Garry: A Structural and Furnishing Study
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(January, 1979)

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York Factory: A Structural History

In September 1714, in accordance with the terms of the Treaty of Utrecht, James Knight, representing the Hudson's Bay Company, arrived at the estuary of the Hayes to officially take over the fort there "if so it may be called" from a wretched group of French traders.¹ York, key to the western heartland with its hinterland rich in furs had been the prize most sought after during the years of French-English rivalry. For 17 years it had rested securely in the hands of the French. Back under the control of the Hudson's Bay Company, York was unrivalled throughout the eighteenth century as the Company's most important post on the Bay. Residence of the senior Company representative it was also the Company's largest wooden bayside fort.

Throughout the eighteenth century York was rebuilt many times. Almost immediately Knight set about replacing the "confused heap of old rotten Houses" he had inherited from the French. Twenty-five years later, in the 1740s, his factory was rebuilt completely, and in the late 1770s and early 1780s the replacement underwent extensive renovations. Following the complete destruction of York in 1782 by le Comte de LaPerouse, a prefabricated house was brought out from England to accommodate the Company's operations. Intended only as a temporary solution, the house was gradually replaced by a permanent factory, built on the site of old York. A terrifying deluge in 1788 forced yet another rebuilding. This time a new site was chosen in a safer location and Joseph Colen's post, finished early in the 1790s, survived into the nineteenth century.

In each building phase the builders were guided by pre-requisites common to all sites on the Bay; the factory reflected the concerns for defence, shelter and trade. But the building was influenced too by the environment: the unfavourable terrain offered by the banks of the Hayes, the river itself, the climate and the limited resources for building.

By the eighteenth century the Hayes had clearly won out in preference to the Nelson as the superior location for a trading post at the estuary of the two rivers. Although the Nelson offered a superior harbour for the annual supply ships from England, had more secure building sites and provided more accessible and better building materials, the Hayes offered one advantage which outweighed all others: the inland Indians chose this route to travel down to the Bay and for a Company seeking to attract the Indians to trade and to offer them the easiest means to do so, the Nelson took a tortuous and difficult route through the barrens was no alternative to the Hayes system which offered passage, albeit difficult, to the interior of the fur bearing country. Only once during the 18th century did the Company establish a post on the Nelson, and Flamborough House, an outpost of York, served only briefly to assert the Company's proprietary rights and to discourage outside trading concerns from establishing on the Nelson.

The difficulties presented by the Hayes were formidable. The building sites which offered access from the sea were low lying, swampy and often subject to inundation with the break-up of the ice in the river and the heavy tides of spring and fall. All of the factories in the 18th century were located on the north bank of the Hayes, on a piece of land often described as Hays's island lying between the Nelson and the Hayes.² Forming a part of the geographical feature, the Hudson Bay low lands, the land, covered in large part by marshes, was "disagreeable, wet and swampy" and was cut by numerous small creeks which swollen with the spring runoff cut deep ravines through the terrain.³ The soil itself was "a light sandy marle" which

observed Joseph Colen, "dissolves away in water like salt."⁴ The river deposited silt, the produce of years of flooding by the Hayes, which offered little in the way of firm footings for building.

The floods in themselves were terrifying and damaging. Twice in the 18th century the Hayes overflowed its banks enough to play havoc with the Company's buildings at York. In the spring following the repossession of the post by the Hudson's Bay Company in 1714, James Knight was forced to flee from his dinner table, 7 May, by a flash flood which drove him and his complement of men to the rooftops to escape. There surrounded by the "dreadful sight" of the ice towering 20 feet higher than his highest building, Knight watched his palisades, and buildings being "tore all to pieces & carry'd away."⁵ His men fled to the woods for safe refuge in the tree tops returning 11 May when the flood waters finally subsided. The destruction was disastrous and confirmed Knight's decision to relocate. Little could be done to prevent a similar occurrence in future, although Knight attempted what he could; he chose a site of relatively higher ground located back from the river and to "raise the ground about the House and to secure it from Ice & deluges" he spread the earth excavated from the moat on his proposed site, thus elevating the level of the ground about five feet.⁶

York was free from massive flooding throughout most of the 18th century more through good fortune than Knight's precautions. Although his site was built upon two times not until 1788 was the post similarly inundated. Ironically it was again 7 May when the ice and water entirely engulfed the site and caused "almost universal destruction."⁷ Demonstrating considerable ingenuity Joseph Colen, then resident at York, embarked in a canoe with two men while the river was still in flood and observing that "water is as true a level as can be found" examined many sections of the river until he located a site "many feet above the surface of the water rose by this deluge" and chose it for the erection of his new factory.

The floods experienced by Colen and Knight, while being totally destructive were infrequent enough to be suffered as an acceptable hazard of locating on one of the Bayside rivers; in fact little could be done to defend against total inundation in exceptional years regardless of building precautions or choice of site. More vexatious and certainly a problem which prompted far greater building activity was the annual damage caused by ice moving out and the high tides of spring and fall. Almost invariably the ice destroyed the "launch" or wharf built in front of the factory to act as a landing place for the lighters unloading the London supply ship. Annually the spring breakup was followed by the inevitable period when the launch was extensively repaired or entirely rebuilt. Or in the fall the men were sent chasing up and down the Hayes for pieces of the wharf broken up by a high sea after shiptime. Finally the carpenters designed a launch which could be dismantled and stowed away safe on shore as soon as the ships set sail for England. More dangerous was the scouring action of ice and water on the "light earth" of the banks in front of the factory. Regularly, sometimes desperately, the daily journal in the spring and fall recorded the loss of several feet of bank.⁸ Knight still living in the old French fort in the fall of 1715 while building its replacement noted the bank was not four feet from the houses and added "it was full time to remove or else we should be tumbled into ye River."⁹ And all through the 1720s a succession of factors watched the bank creep toward Knight's new site.

The danger continued throughout the 18th century, in spite of several solutions attempted to arrest the erosion. These ranged from the simple expedient of stacking brush and stones against the banks, all unsuccessful, to more sophisticated solutions. They proved little more successful. Between 1751 and 1752, for example, James Isham began the ambitious programme of building a stone wall for 400 feet along the river front.¹⁰ When this too failed—it was extensively undermined

by erosion from the rear—Joseph Colen in the 1780s built a pile driving machine and drove piles along the face "fixed with strong land ties & faced with slabs after the mode practised in England on the Banks of the river Thames."¹¹ Its success is not known for the factory was flooded out and moved to a new location before the shore protection was severely tested. The problem however, has persisted to the present day when the 18th century site of York is to a great extent washed into the Hayes.

The vulnerability to erosion of the banks at York was heightened by the presence of permafrost. The Nelson-Hayes estuaries lie near the southern limit of the zone of continuous permafrost.¹² James Knight in 1716 provided almost a classic definition of permafrost when he noted "the summer never thaws above the depth of what the following winter freezes."¹³ Continuously frozen soil is extremely vulnerable to erosion, especially in a situation such as that at York, where the river banks exposed the permafrost to continuous thaw in the spring, and summer months. The thawing action would explain for example, why great chunks were broken off the banks at one time and certainly contributed to the massive extent of erosion at the factory. Turnor noted that the ground at York was "so shaken with frost in winter that when the snow dissolves the land entirely washes away and undermines the banks until the sides fall in several tons in a piece and washes away."¹⁴

The presence of permafrost also posed perplexing problems for the builders at York. Only recently has technology been developed to deal with construction in permafrost zones; simply stated, modern solutions are based upon the principle of not disturbing the permanently frozen soil either by insulating the ground so that it does not thaw when a structure is erected upon it or by raising the structure above the ground on piles so that air circulates freely between the structure and the ground thus ensuring that the permafrost does not thaw. For the 18th century builder, however, these approaches were en-

tirely opposed to his traditional way of going about building: a good substantial house was one with deep foundations; a cellar below ground provided good adequate storage and a moat or ditch was a necessary component of 18th century defences. All exposed the permafrost and all eventually brought grief to the builder in the form of sagging buildings, an eroding site and constantly caving earthen walls.

During the actual building process the permafrost proved to be a constant annoyance. Knight for example surrounded his factory with a moat which utilized in part a creek bed which ran close by the site but for the most part involved tedious time consuming excavation in the permafrost to reach a depth of $8\frac{1}{2}$ feet and width of 24 feet. In the fall of 1715 when excavation began, Knight noted "the rest of the men digging the moat it being froze so at topp & bottom that wee make but poor work of it but the bottom I believe has been froze so ever since the creation of the world."¹⁵ The period of excavation which lasted four years was marked by great difficulty and when completed was almost the undoing of the site. The unstable sides, constantly caving in, posed an ever-present threat to the factory buildings. During construction land ties were installed to retain the slopes and when these failed piles were driven and brush piled against the sides. Finally in the 1740s the trench was filled in when the factory was reconstructed.

The trench or moat by its magnitude exaggerated the problems posed by permafrost. Almost daily however, builders were faced with its influence. Digging a shallow trench to install a palisade line for example became a tedious undertaking as the trench was slowly excavated as the ground was revealed and thawed. To dig cellars which were essential to keep goods from being frozen, was like excavating in concrete and once excavated the sides were unstable, threatening to undermine the building which stood above. Consequently all were lined with a heavy timber crib to keep the walls from caving in. Drains needed to draw water off from the cellars were at first con-

structed, closed over in the traditional manner but they soon froze in winter and became inoperative. Builders landed upon the expedient of leaving them open, lining the sides with posts driven down in a V-shape. Building foundations posed the greatest potential problems. The squared log construction employed throughout most of the 18th century was probably the most compatible 18th century solution to deal with the problems of permafrost. Resting on a ground sill, shimmed to level it, the building involved a minimum of disturbance of the soil beneath. The Committee however, located in remote London, time and time again insisted upon firm foundations for the buildings either in stone or brick. Local officers resisted the pressure throughout most of the century citing local conditions. However, when a stone and brick powder magazine with deep foundations was erected in the central court it caused constant problems; uneven settlement caused by the permafrost warped and twisted the building and caused its frequent collapse.¹⁶

York Factory had very few types of timber available, that used for building being primarily spruce, and it was in short supply.¹⁷ With the demands for building and for firewood the scarce timber supply soon became depleted. As early as 1714 the French told Knight he would have to go upriver 20 miles for his timber and before he had completed his factory he had to look considerably further.¹⁸ Each fall and winter men were sent into the bush to locate suitable trees, cut and square them in the bush, sometimes sawing them into planks and then to haul them to the river bank. Each spring the winter's cut was floated down the river to the factory over the shoals of Hayes river. As the century progressed the problem became more acute, the timber being located further from the factory and also further from the river banks. Each building programme was preceded by a period of gathering timber supplies and often shortages during construction, held up building for considerable periods of time. The Committee alarmed at exhausted

resources urged that only wood essential for building and fuel be collected but the exhaustion continued.

Timber was the most important local resource in short supply. But York lacked many others as well. Although there were round river stones these were not regarded as good for building, certainly not as good as those at Churchill. The limestone, however, was suitable for making lime and a kiln was built in 1718 and throughout the remainder of the century York burned its own lime for building purposes.¹⁹ An attempt to use the local clay for brick making was less successful. In 1742 a cask of clay from York was tested in England and was supposedly found suitable for making bricks. A brick maker, Benjamin Pengriffe, was sent to York. When he arrived there he found the clay "would not do at all" and was rapidly demoted from brick maker to labourer to serve out his contract period.²⁰

The local shortage of building materials meant that exterior sources had to be found. From time to time for example, the Committee attempted to have York supplied from other areas richer in local resources such as Severn or the posts at the bottom of the Bay. But almost every attempt was frustrated either by the failure to link up supply to demand or because other posts, themselves short in resources and undermanned, resented sharing their hard won reserve of building materials with another post.²¹ One unending source of supply was London which throughout the history of the trade supplied building materials to York.²² Lead roofing was perhaps the best example; throughout the century practically all the buildings were covered with heavy sheets of lead sent out from England in preference to shingles or a locally contrived form of roofing material.²³ But in addition, supplies of window glass, nails, building hardware, bricks, paint and even deals were mentioned in the bills of lading of the annual supply ships.

The problems of short supply of building materials and those presented by his factory location faced James Knight as he decided what to do about the ruined factory he repossessed

in 1714.

The buildings taken over by James Knight from the French were in his humble opinion "fitt for nothing."²⁴ By the re-
turning ships he complained to the Committee

.....The Place as wee are come to is nothing but a Confusd. heap of old rotten Houses without form or strength nay not sufficient to Secure Your Goods from the Weather not fitt for Men to live in without being Exposed to the Frigid Winter. My own Place I have to live in this Winter is not half so Good as our Cowhouse was in the Bottom of the Bay & I have never been able to See my hand in it Since I have been here without a Candle it is so black & Dark Cold & Whett with all nothing to make it better but heaping up Eart Abt. it to make it warm....²⁵

Knight immediately set about repairing the dilapidated buildings in which he had to winter but it was evident that he would have to construct a replacement for the worn-out factory.

The existing site was unacceptable "for the banks of the river are washed away to the undermining of the house and flankers sides."²⁶ Early in September Knight had already pitched upon a new location:

about half-a-mile off below this house, a very convenient place for it's upon a growing point where the land comes up gradually from the water-side, rising without a caving bank to wear away, and on a point that commands the river much better than ever this did, and the ships must come very near to it that comes in, neither can [it] be attacked by an enemy but one side and that with great difficulty.²⁷

Actually, whether Knight was unclear in his description or perhaps changed his mind, he eventually built his new factory further up the small creek which had flowed by the previous post. Knight had chosen quite well for his site served as the location of factories at York for the next 70 years. It was situated on a higher point of land bordered on two sides by the Hayes and on the third by "water-hole creek" which served as a source of drinking water and place to freshen salt provisions.

The decision to rebuild and to change sites was made even more imperative the following spring when the fort was inundated by the spring flooding. Knight shored up the buildings which were still standing and replaced the palisades but the poor condition of the buildings and the dampness which persisted months and even years after the flood, were strong incentives to get on with the building.

In planning the factory, Knight, one of the Company's most experienced builders, was apparently given a free hand for there is no indication that a plan was sent out with him or that he was given detailed instructions before he left England. Never a modest man, he later claimed that he had erected "the best and biggest house and flankers that ere was built in the N.W.^t." ²⁸ It consisted of a centrally located square house, enclosed by a palisade which linked four flankers, or bastions. The whole was surrounded by a trench or moat. This arrangement had been developed in the last years of the 18th century at the posts at the bottom of the Bay, and Knight who had played no small role in its development had previously used the plan himself in the construction of posts there.

Actual construction, preceded by the gathering of timber and the clearing of the site, began 14th June 1715 when Knight "measured the Ground & fix'd stakes" for the square house "35 foot & $\frac{1}{2}$ square within side." ²⁹ By mid-August the house had progressed considerably and Knight then "sett of the Ground for the flankers today 27 [August] & staked it out." At the end of the month he laid out the moat. ³⁰ Construction moved ahead steadily. The main priority was the preparation of the square house for the accommodation of the officers and men before the onset of winter. They then languished in the old French houses made even more uncomfortable by the flooding of the year before. Finished to a height of two storeys the house was roofed over and the interior fitted up so that 6 October Knight was able to assign every man his birth in what he des-

cribed as "the best lodging as ever man had in this country."³¹
 And when, three weeks later

wee being pretty well settl'd in our House and
 have gone as farr as wee have timber & boards
 to do wee must stay twill next summer to finish
 so after there had labour & trouble in getting
 the timber & building I though fitt to give the
 men a holyday by makeing a House warming and I
 treated them with every 4 men 2 geese 4 deers
 tongues flower, suit & plumbs cheese, brandy
 wine strong beer & sugar.³²

Over the winter nothing could be done in the way of construction but once again the men were sent into the bush to gather and square timber in anticipation of recommencing construction in the spring. In April work was begun on taking the house up another storey to provide safer warehouse space high above the danger of flooding.³³ Work also continued on the four flankers and by mid-summer when they were finished to a height of one storey and were therefore "high enough to keep anybody out" Knight paused temporarily to set palisades joining flanker to flanker "that we may enclose ourselves."³⁴ The trench was the most laborious and time-consuming undertaking and work on it continued through 1716, into 1717 when Knight left for Churchill and his deputy Henry Kelsey took over supervision of the Factory. Finally in 1718 it was possible to add a second palisade line which ran through the trench. Construction of the factory itself was probably completed in the season 1719 but work continued after this date: various service buildings were added during the next few years, a third palisade line was built in 1723 and all the buildings were lathèd and plastered in the 1720s, the local answer to the committee's desire that the factory be faced with stone to protect it from "fire-arrows."³⁵

When completed, the complex consisted of a main factory area with a cook house outside and the whole enclosed by the outer stockades. The square house in the centre at first housed both men and goods and may even in the early period have been the location of the trading shop. Approximately

36 feet square it stood 24 feet or three storeys high. It was of square log construction with a flat or slightly pitched roof covered with sheet lead. The top storey was used as a warehouse "to put all the dry goods & skins in wch will be out of deluges & lye dry."³⁶ The second storey was very likely Knight's quarters, perhaps shared with the other officers. The men's cabins were located in the ground storey. This was the temporary arrangement during construction; one by one most of the functions were removed to the flankers as they were completed, leaving in the square house only warehouse space and accommodations for the officer in charge of York.

Like the house-warehouse, all four flankers were constructed of squared logs, probably resting on ground sills. With the possible exception of the powder magazine, they stood two storeys or 13 feet 6 inches in height. All had plank roofs possibly flat or slightly pitched covered with sheet lead. At least two also had cellars, lined with wood. Their functions changed slightly with the passage of time. The south west bastion or south bastion served as the trade room. The south east and north east flankers provided living space for the men. The north west flanker served as the powder magazine. Knight took special pains with its construction.

wee build it in the NWt angle of ye NWt flanker & frame it so that their will be 2 floor thickness of earth rain'd in betwex the frame & ye outside of ye flanker wth a double bulk head fill'd up with 2 doors not opposite one against another but to go betwixt ye walls when wee got too put the powder in & I design to cover it wth timber loggs & then lay earth 2 foot thick on ye topp & upon that plank of 3 inches thick well cork'd. It will hold above a 100 barrells of powder & I hope will be very secure from any lightening or fire.³⁷

In spite of all Knight's precautions the powder had to be moved in 1719 to the upper loft of the west bastion when the first magazine proved to be too damp.

The defences of the factory consisted of the flankers, three palisade lines, the moat and various batteries. The first

palisade line (curtain walls) joined flanker to flanker and enclosed the inner area of the factory. Two cannons were mounted in the lower storey of each bastion (one in each flank) to provide flanking fire along the palisade.³⁸ A second palisade line ran through the centre of the trench and a third, which may have replaced the second, was added in 1723 enclosed the park land about the factory.³⁹ The palisades were similar in construction, consisting of a frame of principal posts and sawn rails with posts barked, pointed and in a few cases sawn, apparently nailed to the rails.⁴⁰ From the factory, there was one main gate toward the river.⁴¹

No mention of a gun battery was made until 1727 when carriages were ordered from England and a ground platform erected about a mile below the factory to defend its approaches.⁴² This was a simple half moon with a ground platform constructed of planks laid on sleepers. It mounted six cannon of 2400 pounds weight. However, there were also batteries in advance of the factory, between it and the shore. And it may have been one of these which was given a stone breast work in 1741.⁴³

The moat or trench surrounding the fort (it was actually a dry ditch with a creek running through one portion of it) was intended to strengthen the fort defensively but actually structurally, tended to weaken it considerably. It was at least $8\frac{1}{2}$ feet deep and 24 feet wide.⁴⁴ Water hole creek was invaluable in that it provided a source of water and a place to freshen salt provisions but it also provided a constant menace to the factory in the spring when it was swollen with the runoff. The rest of the trench required constant attention as it was subject to slump. In 1722 a drawbridge which led to the main gate was constructed over the trench to replace the earlier fixed bridge.⁴⁵

A series of cook houses located outside the main factory but within the outer stockades were the only outbuildings associated with Knight's factory. The first erected in the fall of 1715, was apparently constructed of log.⁴⁶ It was pulled

down in April 1716 to provide timber for the construction of the top storey of the house-warehouse.⁴⁷ A combination cook room and smith's shop, apparently a log building resting on a ground sill with a flat roof, decked and covered with earth, was erected in 1717.⁴⁸ The cook room contained the cooking fireplace, copper for brewing and an oven while the smithy, only later separated from the cooking area by a partition, contained the forge.⁴⁹ Although the building was plastered in 1723, by December 1725 it was in such perilous condition that a rebuilding was necessary.⁵⁰ The replacement appears to have been similar in construction to the old. It too was replaced in 1737 when the cook room and smith's shop was pulled down "in order to build it up a new with stones & brick to prevent any damage by fire."⁵¹ Like its predecessors it stood without the works "at the distance of forty foot from the nearest part of the factory" to lessen the danger from fire.⁵²

Not all agreed that Knight had erected "the best and biggest house and flankers" which he had claimed in 1715 upon commencing his building. Thomas McCleish, himself an experienced builder, complained caustically when he arrived to take over the factory in 1723 that "I must confess for good contrivance and workmanship I left a palace to come live in a Scotch or Irish hut in comparison of new Fort Albany, where the worst man has a better lodging than what I live in." (McCleish had of course built Albany).⁵³ He added that he had spent most of the summer "making good several parts of the trench that fell in last fall" and that it had taken "at least 150 tun of gravel to keep us out of bogs worse than the bogs of Allen." It was the trench which was the major undoing of Knight's factory. Because of the unstable nature of the soil its walls were constantly caving. Even during construction land ties were necessary to retain its slopes and in the years that followed brush and piles were tried unsuccessfully to stem the relentless erosion toward the creekside flankers.⁵⁴ Added to this was the inevitable rot which attacked wooden buildings, accelerated

considerably at York by the application of plaster to the exteriors; not applied properly it allowed damp to penetrate and lie against the timber walls where rot worked unnoticed. By 1737-38, "the old factory being almost dropping down" the search had begun again for extensive stands of timber to undertake a rebuilding.⁵⁵ And the need was underlined the following year when in undertaking routine maintenance, the bricklayer plastering the rotten logs discovered he "cou'd shove his troule up to ye handle with his hand."⁵⁶ The factor concluded pessimistically that the factory "decays faster yn we can repair itt notwithstanding [sic] our carpenter being continually employ'd."

In 1740, the Governor and Committee finally took notice of the decaying condition of York. For over a decade the resources of the Company had been concentrated on the construction of Prince of Wales's Fort; now, so the Committee thought, the factory was almost completed, and James Isham at York was informed that the craftsmen employed for so long at Churchill would be free to "put your fort in a much better condition then at present."⁵⁷ The Committee thinking in terms of repair, asked Isham for a plan of York Factory and a detailed outline of its defects; in preparation for undertaking repairs they directed him to commence gathering timber. At shiptime when the Committee's instructions arrived, Isham was too busy to prepare a plan of York or even to write a detailed description of its condition—these he left to William Coats the returning ship captain—but he did argue strongly against repairing the old factory "it next to putting new cloth to old cloth."⁵⁸ Only a complete rebuilding would suffice and that must be undertaken on an entirely new site.

to rebuild it upon the same foundation will never do, the trench being the ruination to the flanker and the foundation. It might be rebuilt upon the same ground providing, the flankers was all down, the trench filled up, and the ground made level and firm, which I presume would be a longer time doing and in a manner as much charge to your honours as to build a factory upon other ground.

Isham had already selected what he believed was a good site for a new factory, which he pointed out to Captain Coats and left to him to describe it to the Committee. To a committee query whether the stone of Churchill would be of use to him Isham replied in the negative. Certainly a stone fort such as Prince of Wales was impossible at York there "being no foundation for such a building." Secure in the idea that his advice regarding relocation would be accepted, Isham commenced collecting timber as the Committee had directed and began to clear ground at Robinsons gully "in case a new factory is to build there."⁵⁹

Thus began the long drawn out negotiations between London and the Bayside post over how to proceed to remedy the sagging York Factory. After receiving the General Letter in the fall and hearing from Captain Coats, the Committee did agree with Isham that the factory would have to be rebuilt but it rejected Isham's suggestion that the factory should be moved and chose instead to rebuild on the existing site. In reaching the decision, the report of Coats must have been instrumental as he was familiar with both the old site and Isham's proposed site. But more important was the advice of Thomas White, then in London who had previously been in charge of York and was to go out in 1741 to take over from Isham. White was called before the Committee and took an active part in discussing the rebuilding.⁶⁰ In the general letter of the spring, detailed instructions were sent out indicating how the rebuilding would proceed.

we do direct that a new fort or factory be built with four bastions on the same ground where the fort now stands to be ninety foot square from out to out with a double row of stockadoes or palisades, at proper distances from the outside of the fort, and that the present moat or trench be filled up as soon as conveniently can be, and that the foundation of the old fort and bastions be left remaining from the surface of the ground and not dug up, and that the centre of the present warehouse and building be the center of the new fort

or factory and we do direct that the middle of one of the bastions be made use of as a store room for the gun powder, to have but one floor which is to be three foot from the surface of the ground to keep it clear from the damp, and that no iron or any other goods whatsoever be put therein and that another bastion be made use of for a warehouse, and the 3rd and 4th bastion to be for lodging for the chief and the rest of the factory and that such shades or store houses as shall be thought necessary be erected in the inside of the curtains and the area to be left entirely open, and after the rebuilding of the factory the smiths shop and cook room is to be built within the palisades where you shall think most convenient.⁶¹

In selecting a plan for the new fort, the committee had chosen the flanker-shed design which had developed in the previous decade at other posts on the bay. In place of the square central house and detached four flankers which had marked Knight's factory and earlier construction at the bottom of the bay, the new design omitted the central house, leaving the court relatively free with all services and accommodations being placed in the four flankers and in the sheds which joined the flankers and served as curtain walls.

By the general letter James Isham was ordered to take charge of Churchill, but the York Council, even with his impending departure, supported his views in considering the Committee's letter. Now under Thomas White, it argued strongly against building upon the existing site: "We find itt will not be proper ye ground there being so very loose occasioned by ye moat & likewise ye filling itt up to long to be undertook."⁶² Instead the council recommended Isham's site "a place we have surveyed about 200 yards lower downe which we find to be in every respect commodious for ye Indians & likewise for ye dispatch of ye ship as ye other was." Perhaps Isham had managed to make his viewpoint prevail before leaving for Churchill. At any rate the council reported that it would continue to clear the land on the site and to collect timber for building. Richard Ford the carpenter (described

with William Grant as "extraordinary good hands" when they were transferred from Churchill) returned by ship for a year in England and would report in detail to the Committee the preparations which had been made.

Ford's arguments and the York Council's strong opting for Isham's new site must have been compelling for the Governor and Committee wrote the following spring endorsing the proposed move. By the time that the ship arrived the following summer (1742) bearing the Committee's approval of the new site the York Council had changed directions once again. With Isham safely away at Churchill, it had returned to the Governor and Committee's original suggestion:

It was our intent to have built ye factory on a new spot which we had clear'd for yt purposes, but we find by nicer inspection into ye matter, yt we can build upon ye old spot as I first proposed & can come in from our old foundation 10 foot, so shall proceed by pulling downe one flanker at a time & building up againe leaving our square house in y middle up, untill all is completed.⁶³

Within days, Richard Ford, who returned on the annual ship from his year in England, made a start on the new factory by pulling down the west flanker.⁶⁴

Once the question of site had been resolved the construction of the new factory progressed quite rapidly. Richard Ford, who was responsible for building, lived up to his reputation as an "extraordinary good hand;" he had several tradesmen at his disposal during the construction and although building timber had to be collected from great distances, enough had been gathered to speed along the work in its initial stages. By the end of the fall the foundations of the north and west bastions had been laid as well as those for the north east, north west and south west sheds (curtains) and during the winter Ford built up the walls. The following summer, he began the south and east bastions and south east shed. In each case Ford was able to lay the foundations of the new buildings by cutting into the walls and lifting the floors of the exis-

ting flankers so that when they were dismantled, he could erect their replacements quickly and could reuse materials saved in the demolition.⁶⁵ By late summer 1744 the buildings were completed and a model of the finished factory was sent home to the committee.⁶⁶ Apart from the addition of service buildings and defences in the form of batteries and stockades and the inevitable round of annual repairs, especially in the late 1760s and 1770s, the factory remained substantially unchanged until the burst of building just before the factory was destroyed by LaPerouse in 1782.

The factory itself, consisted of four flankers linked by sheds, the backs of which served as curtains, enclosing an inner court yard. Apparently when first constructed the eight units stood independent and were entered separately. In 1771 all were linked internally in order that one could move from flanker to curtain to flanker under cover.⁶⁷ The flankers were all two storey, built of squared logs with flat or slightly pitched plank roofs covered with sheet lead. All had a set of exterior stairs leading to landing outside the second storey (where possibly there was an exterior door). From the landing, stairs led to the roofs of the adjacent sheds.⁶⁸ The bastions at first were pointed and left uncovered but in 1748 the exterior were lathed and plastered (rough cast). Some at least were also weather boarded and there are references to whitewashing.⁶⁹ Loopholes for small arms fire were cut in the walls of both the flankers and sheds and covered over with parchment.⁷⁰

The interior finish depended upon the function of the flanker. The south flanker was intended for the Chief and the other officers, both for sleeping quarters and for their mess. There was a common chimney with brick stoves likely on both the first and second floors.⁷¹ The Chief's area, apparently on the second floor, was given a relatively fine finish; there are references for example to plastered ceilings and to wainscoating.⁷² He would have a sleeping room, a parlour where

the fire place was located and perhaps even a separate mess area. On the ground floor there was very likely one large room for the officers' mess where the stove would be situated with sleeping cabins or rooms ranged around the central area. The East bastion was the men's flanker. It like the Chief's flanker had a chimney and brick stove with the mess or guard room and cabins on the ground floor and likely more cabins on the second storey.⁷³ There was apparently an internal set of stairs to the second storey. The sleeping cabins—there were 28 bed places in the flanker—were extremely small areas, in some cases for one man but in most instances for two, lined with boards.⁷⁴ They were intended only for sleeping. The flanker also had a cellar, possibly because it like the Chief's bastion was heated.⁷⁵

The west flanker was originally built as a powder magazine and in form it closely followed the Committee's instructions of 1741. It was the first flanker erected and by May of 1743 the tradesmen were "plaistering & pointing the inside of ye powder room."⁷⁶ Robson described it "as having a wall of the same thickness as the fort-wall (eight to nine inches). its floor is raised two feet and a half or three feet above the level of the fort, and its sides are lined with slit deal plaistering."⁷⁷ In 1751 when a new powder magazine was completed in the central court the west bastion was "converted into a storehouse, laid....flush in two stories entirely for trading goods."⁷⁸ The north bastion was apparently a storehouse from the time of its construction.

Not a great deal is known about the sheds, especially about the interior arrangement. They were apparently constructed of squared logs like the flankers and had shed roofs with a slight slope (four inches) which were planked and leaded.⁷⁹ A low breast work about nine inches high ran along the outside edge of the roofs and there was a railing, probably only on the interior edge, for the safety of the sentries who were posted on the roofs of the sheds.⁸⁰ Watch houses were

located on the roof of each shed midway between the flankers on either side.⁸¹ "Three pateraroes or swivel guns" were mounted on each shed roof designed to fire through embrasures or "ports" in the breastwork.⁸² At least two of the sheds, and probably all of them were divided on the interior into two stories.⁸³ The south east shed was either bisected or pierced by the main gate.⁸⁴ Loopholes were cut in exterior sides of the sheds for small armsfire.⁸⁵ Most of the sheds used for storage. The south west shed, however, housed the trading room and on its exterior side was located the trading window where the Indians came to exchange furs for European goods.⁸⁶

The interior court of the factory was levelled and covered with a floor made of two or two and one half inch tongue and groove planks lain on sleepers.⁸⁷ The platforms would make easier the clearing of snow in winter, a very necessary winter occupation to avoid a minor flood in the spring, and would also keep the men out of the morass of mud, an inevitable aspect of a York Factory thaw. Wood and later stone gutters drew off the water.

Located in the Central Court was a brick and stone powder magazine. In 1748 the Committee sent out directions that stone should be collected for the construction of a powder magazine "to be made bombproof and to be done in a workman like manner."⁸⁸ The council at York pleaded want of materials—limestone would have to be collected and lime burned and for this there was a shortage of coals.⁸⁹ Construction did not actually begin until August 1750 when the men began collecting stones from the river banks.⁹⁰ The fur press which had formerly stood in the middle of the square was pulled down and the foundation begun. The excavation proved "troublesome on acct. of the quantity of water yt springs in from the former cellors of the old warehouse" which had stood on the site in previous factory.⁹¹ The foundation was built of stones gathered in the area of the fort, and in September a tent was erected

ted over the building site to protect the bricklayer from the weather while he built the foundations up to ground level before work was discontinued for the winter, on the first of October.⁹² In April construction was taken up once again when the joists of the floor were laid and the bricklayer began on the brickwork of the walls.⁹³ Throughout May and June, the carpenter framed forms for the arch of the magazine and was followed closely by the bricklayer constructing the dome in brick and the exterior in stone.⁹⁴ It was fitted with two doors: an exterior copper door sent out from England, and an inner door, faced with copper as well, built in the site. The passage between was lined with lead.⁹⁵ When completed the magazine could hold "upwards of 100 casks, besides shott, its well built, of sufficient strength & substance & intirely free from damp."⁹⁶

The magazine, a circular building with a diameter of approximately $12\frac{1}{2}$ feet, did not prove to be a very stable structure and required frequent and extensive repairs. In 1761, for example, a "great part of our magazine tumbled down" and had to be built up again.⁹⁷ Also the exterior had to be plastered almost annually. In addition, in spite of earlier reports it was damp which made necessary the removal of the powder to another building for part of each year.

In the fall 1750 "a raging tide" once again swept away all of the launches in front of the fort, an all too frequent occurrence. Isham and his council concluded "nothing will support our bank but a pier."⁹⁸ It was by far the most ambitious proposal for correcting the problem of erosion of the banks in front of the fort. The decision was reinforced the following year. In his general letter to the Governor and Committee Isham wrote:

have begun on a job not less material than the former which has been wanting many years to reserve our bank it continually falling when the force of the ice, tides, or rains that I do actually believe in 20 years more the water will be near our gates several methods having been

made use of, to no purpose, unless a strong wall, therefore have begun upon a wall last fall for a trial, and find this spring the ice had very little effect on it (tho at the same time tore away all our wooden launches, the ice being 16 feet above the top of our banks) therefore in proceeding upon the same wall which is built entirely with stone and mortar, is allowed by the council to answer the desired end.....⁹⁹

The wall, begun in September 1751, was six feet high and seven feet wide, with a four foot slope. In addition, stakes, watted with willows were driven in front of the base.¹⁰⁰ By 1753, 228 feet had been completed;¹⁰¹ 200 feet more were built by 1754¹⁰² and by 1755 the final 150 feet had been finished.¹⁰³ The area between the bank and the wall was backfilled.¹⁰⁴

A number of service buildings were located outside the main factory complex. Most important were the cook houses and tradesmen's shops which may have survived from the earlier factory.¹⁰⁵ There were two cook houses, one for the men and one for the Chief. (This in spite of committee orders that there should only be one when a fire which started in a cook house destroyed Moose Factory in 1735). The men's cook house which contained an oven, and fireplace for cooking and a copper for brewing beer was located east of the east flanker between the outer and inner stockades in the same complex of buildings as the smith's shop and warehouse-coop-erage. The Chief's cook room was in a similar position in advance of the south flanker and it shared a range of buildings with the shipwright's shop, carpenter's shop, and a small warehouse.

There were sound arguments for locating the cook houses and forges outside of the factory to help preserve it from the ever-present danger of fire. But in the decades following the completion of the factory they were joined by a number of other service buildings containing operations which apparently could not be accommodated within the factory.

In 1746 a hog house, later converted to a warehouse was erected¹⁰⁶ and in 1754 a cow house.¹⁰⁷ Both were log build-

ings. A provision shed 10 feet x 60 feet constructed of log with a shed roof covered with lead was built immediately in front of the factory in 1767.¹⁰⁸ Another shed 59 feet by 10 feet and similar in construction was added in 1768 for horses and cattle,¹⁰⁹ and in 1770 a rope shed. One of the more significant buildings was the boat house built between 1770 and 1773.¹¹⁰ It was one of the first buildings known definitely to have been built in frame. It was a large building 100 feet by 14 feet resting on a ground sill, framed with heavy posts and quarterings. The roof was covered with feather edge boards which were tarred. A cow house built in 1774 (32 feet by 17 feet) appears to have been constructed in log, although it too was covered with feather edge boards instead of lead sheeting.¹¹¹

Their location between the factory and the river was criticized by Andrew Graham.

The fort is greatly discommoded by the unnecessary outhouses that are now so thick set in front of the fort, and half way between it and the outer gate, that they obstruct the sight of the fort; and if we were attacked either by Indians or Regulars might be easily set on fire, as those sheds including the two Cook Houses, Coopers Shed, Carpenters Shed and Smiths Shop, etc., runs in a direct line 200 feet and covers the whole front, so that our close quarters are at present useless as no gun from the loop-holes would do execution. It is not only my opinion but the opinion of many others that it would be dangerous and ought to be put down. I can freely say they are useless for York Fort is and has been capable to contain 43,000 made beaver, and all provisions and stores belonging thereto.....¹¹²

It reflected perhaps a disregard of the criteria for defense which could also be observed in the haphazard approach (despite frequent reminders by the Committee) to defence in general by various factors at York.

York Factory outer defences were indeed rudimentary. There were two sets of stockades which surrounded it. The inner stockade erected in 1744 appears to have followed the line of

the old trench, now partially filled and "levelled."¹¹³ The outer palisade installed in 1745 enclosed the post at a considerable distance from the factory.¹¹⁴ Like the earlier palisade lines they consisted of principal posts of "king posts" erected at intervals joined with sawed rails or ribbons.¹¹⁵ The stockade posts were barked, cut to size, perhaps pointed and then spiked to the rails.

The palisades required typically a great deal of maintenance. By 1748, they had been so undermined, "all either more or less inclining," that they had to be newly set. And in 1761 "a hard gale blew down the north square of our rotten stockade" which led to an entire replacement of the rotten stockades under Ferdinand Jacobs.¹¹⁶

Throughout the winter the men were kept in the woods cutting stockades which were brought to the fort, trimmed and pointed. (Jacobs estimated it would take near 2000 posts to surround the factory and the front now alone required 447).¹¹⁷ Not until July could the men commence to dig the palisade trench which they did "as it thaws which is but slowly."¹¹⁸ Jacobs intended that the main posts would be planted four feet deep in the ground while the stockades would be 3½ feet deep. Above ground the stockade would stand 12½ feet high.¹¹⁹ The gate was heavy framed and the posts set four feet, nine inches in the ground.¹²⁰ Not until 1765 were both ranges of palisades completed. They were similar in construction to predecessors although perhaps a little more elaborate. In some instances if not all, the principal posts were squared and the ribbons framed in before the stockades were nailed to them.¹²¹ Jacobs also added a palisaded approach to the trading window from outer to inner palisade lines so that the Indians would not pass freely through the factory enclosure on their way to trade.¹²² He also constructed a plank walkway or floored the entire closed area.¹²³ In 1772 a small door was fixed in the palisades "for to trade brandy at during the time of trade."¹²⁴ Even the entire rebuilding in a substantial manner of the pali-

sades under Jacobs did not prevent rapid deterioration. In 1772 extensive repairs and resetting had to be undertaken and in 1775 whole sections had to be replaced.¹²⁵

The York Factory constructed in the 1740s was provided with numerous detached gun batteries even though they were scarcely ever in good condition. Two were erected in front of the factory in 1745-46 by Joseph Robson and a remote position, Cross Barr Battery or James Battery, was built opposite five fathom hole in 1750. The rebuilding of the batteries at the factory (one at least replaced an earlier one) was coincidental with the warning of the Governor and Committee of a possible French attack because of the resumption of hostilities between France and England and the arrival of Joseph Robson, mason and surveyor.¹²⁶ In 1745 Robson built a battery for two 9 pounders "to clear ye shore"¹²⁷ and in 1746 after pulling down "ye old battery" built a new battery of 10 guns (eight 9 pounders and two 12 pounders) "to command ye channel."¹²⁸ Basically these batteries were intended to defend the area in front of the factory, and much modified over the years, remained until the 1780s. Robson added a third in July 1746 when he built a four gun battery "in order to mount 4 nine pounders, which will command a ship all ye way up ye channel which is likewise a cover for ye fort against any shot that can be discharged from a ship untill she can come between ye 2 batterys."¹²⁹

The batteries all had ground platforms (planks on sleepers) and as such rotted quickly. All three were reshaped after Robson's departure; certainly in 1749 when the platforms were rotten and the battery itself threatened to wash into the river extensive repairs were undertaken.¹³⁰ And in 1752 because the battery "at the fort is half fell down the bank" James Isham staked out a new one to commence as soon as possible.¹³¹ This appears to have been built in a manner similar to its predecessor with a ground platform and a breast work of earth and turf.¹³² Graham described them ca. 1769

as "two fascine batteries with a good planked platform on which are mounted thirteen heavy cannon."¹³³ In 1770-71 the breastworks were made more substantial when the merlons were built up of stone.¹³⁴ It was also fenced in "to keep the natives and cattle from the Gun Platform."¹³⁵ These were probably basically the same as the batteries shown in Turnor's plan of 1778 although the two batteries indicated by Turnor have embrasures for seven and eight guns.

In 1747 the Governor and Committee instructed Isham and his Council to build a platform and battery in the marsh somewhere "near the White house of which you shall have our particular directions hereafter."¹³⁶ Isham recommended a position near the Cross barr.¹³⁷ And in August John Newton and Captain Spurrell and others from the fort resolved upon the bluff near the cross bar as the best position "to command the entrance of the river."¹³⁸ Nothing further was done however until 1750 when James Isham returned to York and sent home a plan of a proposed magazine and battery.¹³⁹ And in the fall, after the ship Captain, Isham and Richard Ford took another survey of the "bareings and distances from the five fathom hole the Beacon three fathm. hole and the point of stones to the place where ye new battery is to be erected."¹⁴⁰ Work began in September on the new battery under the direction of Richard Ford. Rather ominously, after working on the battery a great deal of the winter, Ford and his crew found in July that the edge of the bank in front of the battery had washed away and had to move the battery further back.¹⁴¹ From that point work moved quickly on the battery itself, the stone lodge house (intended to house the gun crew) and magazine. The latter was necessary because of the distance of the battery from the factory. Completed in 1752 when it was unveiled with elaborate ceremony the battery mounted ten 12 pounder guns on wooden garrison carriages on its ground platform (there were 10 embrasures shown on the plan).¹⁴² The breastworks were built of earth.

The battery was not a complete success. It was too far removed from the factory and was therefore very vulnerable. Also, the difficulties with erosion encountered in construction began its eventual downfall. In 1768 extensive repairs were carried out on the rotten and decayed battery which had been much damaged by the high tide.¹⁴³ The end of the battery came when Humphrey Marten inspected it in 1775.

This day roud down to the battery house which I found in the following condition four of the embrasures with half the platform washed away, four other embrasures so ruined as to be entirely unfit for service, the rest of the platform in many places quite born through in other hatcheted to pieces and hardly part of it sound, every rafter in the house cut away by the Indians for firewood, the door of the magazine gone, its flooring torn up and part of the walls broke down, the door posts of the house and jambs of the windows hatcheted in many places & flooring of the house gone, a large piece about 18 inches square cut out of the old oil kettle; spring tides flow almost into the house nor it is possible to repair it where it now stands, nor can I see of what benefit it ever was or could be of [in] the fort defence against an enemy of force, it could make none not having hands sufficient to work its guns, and then at the fort, yet its guns might be turned against the fort with too much success, its cannon being large, and those at the fort small, they might reach us, tho' we could not annoy them.¹⁴⁴

The battery was then stripped of all useful equipment and iron work and abandoned.¹⁴⁵

By the 1760 and 1770s the factory was fast reaching the limit of the expected life span of wooden buildings on the Bay. As early as 1762 when Ferdinand Jacobs had taken over as Chief at York he had complained that the fort was in "a very ruinous condition" and had commenced collecting timber for its repair or reconstruction.¹⁴⁶ The following year he added that "it has been very badly put together at first" but by this time was engaged in extensive repairs so that the post would stand for some time to come.¹⁴⁷ Andrew Graham noted in 1769 that "it is high time for a York Fort Factor either to repair this

[factory] or begin to collect timber for building a new one."¹⁴⁸
 In fact in the late 1760s and early 1770s extensive repairs were carried out.

Finally in 1776 Humphrey Marten complained once more to the Committee of the condition of the factory:

Again gentlemen the ruinous condition of the lower battery, the state of which will be found in Mr. Marten's journal of the 14th October last, the cooperage is actually falling down, the magazine must be speedily rebuilt. The platforms abreast the fort are entirely rotten, many dangerous chasms have been made by the spring thaws the outward north stockades almost falling down, the mens cook room and smiths shop, much gone to decay, the floor of the north flanker and the lining of the cellars in ruins and the window shutters rotten as they stand.....¹⁴⁹

In part the ruined state of the factory was attributable to the age of the buildings; built on ground sills they were very susceptible to rot. But in addition, years of clearing the surrounding underbrush to provide a clear field of vision and fire, had made the area about the fort vulnerable to extreme erosion.¹⁵⁰ Great chasms had opened in the flats and the creek which flowed close by the factory eroded its way closer to the buildings each spring (the south bastion for instance had sunk a good three or four feet). Also with the extreme erosion of the land around the factory, the masonry retaining wall, built primarily to protect against the river erosion, was undermined from the rear. The Governor and Committee heeded Marten's complaints and in 1777 sent out directions that "early attention to be given to collect a sufficient quantity of stones & to lay a foundation therewith of a new fort to the north east of the present & carry the same one foot above the surface of the ground yet by no means to enlarge the scale of the building....."¹⁵¹

Again the problems of distance intervened to prolong decision-making. Marten, when he received the committee's instructions, countered that it "will not cost one third the sum of money nor take one half the time to fully repair" the

factory to last twenty years.¹⁵² The fact that he had already begun extensive work on the existing factory may have played no small part in his advice. But he did begin to collect stones and timber as the Committee had directed. The Committee not convinced, reiterated more strongly its previous instructions: "In the order we gave last year for constructiong a new fort we attended not only to the ruinous state of the present, but to the possibility of securing its foundation and we therefore cannot be induced by any considerations of expense to think of suffering the old fort to remain...."¹⁵³ But in 1778 Philip Turnor, the company's newly appointed surveyor in company with the officers at York inspected the existing factory and the proposed new sites for building, and Turnor's report convinced the Committee to reverse its decision. Turnor's inspection indicated that there was no spot in the vicinity as good as the existing site of the factory (it had of course been chosen carefully by James Knight and made even higher by him); that the existing site could be rendered safer by diverting the creek and retaining its banks; that the nature of the soil about York would not allow of using stone foundations for the buildings which had been a major consideration of the committee's in proposing a rebuilding; that only parts of the factory required rebuilding—especially the mens flanker—and that fully three fourths of the factory required very little repair.¹⁵⁴ The committee, accepting Turnor's advice fully, ordered the repairs to be undertaken, substantially and expeditiously.¹⁵⁵ The repairs carried out included the rebuilding of the east flanker, the north east shed and the cooperage, the careful inspection and repair of the other sheds and flankers, and the building of two new substantial cellars (the linings in the existing cellars had competely rotted).

The rebuilding of the east flanker was the largest project undertaken at this time.¹⁵⁶ Timber was gathered during the winters of 1777-78 and brought to the fort so that construction could begin in the spring of 1779.¹⁵⁷ It was on a slightly

larger scale "the angles jeting out being advanced $3\frac{1}{2}$ feet to $7\frac{1}{2}$ feet and the outer angle advanced 6 feet" and consequently had bed places for 42 men instead of 28 as previously.¹⁵⁸ The building had a full cellar. Otherwise it appears to have been similar in construction to those flankers erected previously. The new cooperage was built in 1777.¹⁵⁹ The north east shed found to be "very rotten" was rebuilt, apparently on the same plan as before.¹⁶⁰ Each of the other flankers and sheds was carefully inspected the plaster stripped off in whole or in part so that the logs underneath could be examined.¹⁶¹ Where necessary, rot was dubbed off or logs replaced and the buildings replastered. The leads on all were checked and where necessary replaced. At least one watch house, that on the north west shed, was rebuilt¹⁶² and a privy which stood detached from the north west shed was replaced.¹⁶³ Even as the extensive repairs were underway, however, the magazine began to collapse but nothing could be done until a proper tradesman was sent out.¹⁶⁴

By the spring of 1782 most of the repairs of the factory had been effected and the tradesmen turned to the replacement of the plank on the gun platforms.¹⁶⁵ The move was timely although fruitless. In mid-August the French fleet under La Perouse appeared before the fort, fresh from its destruction of Fort Prince of Wales and although Marten reported "we put ourselves in the best posture of defence we could" he obtained terms and surrendered the fort 24 August 1782.¹⁶⁶ The next few days the French spent in making preparations "to blow up the magazine & burn the fort" and on 1 September as the company servants embarked with the French in the Severn sloop, York Factory was burned to the ground.¹⁶⁷

No time was lost in resettling York. In 1783 Marten was sent with a house prefabricated in England to enable him to establish himself in quarters at timber starved York before the setting in of winter.¹⁶⁸ The very fact that a house could be sent out ready to assemble underlined the importance of

the sea link with England and it was even more important in view of the total destruction by La Perouse of old York. Marten observed on landing on the Hayes:

a small part of the launch, the inner hoisting place, part of the boat house and some timber, salt, coals, many spikes, bricks, a few logsheads, much iron work 20 disabled cannon of different bores, a few maimed carriages, the old ruined magazine and 2 small boats, the gate with a part of the outer stockades, the ovens, were what struck my observation at landing. But the fort out Houses, inner platforms and stockades are no more.¹⁶⁹

Only the stone magazine which had been in a state of collapse before the arrival of La Perouse, and a "fine log tent" erected by the inlanders to store the furs they had brought down to York in the early summer, were standing on the site.¹⁷⁰

The house was apparently sent out complete, or was intended to be so, for Marten complained vehemently about boards not being provided for certain partitions and added that "we must gratefully and thankfully acknowledge your goodness in ordering a building for us that would have been comfortable had the materials contracted for been deliver'd to us....."¹⁷¹

The erection of the house began early in September upon arrival while Marten and his men lived in tents.¹⁷² By 10 October the roof was on and leaded and the brick nogging was almost finished.¹⁷³ Throughout October and November and even into December, work continued on the interior fittings although on 2 December the building was occupied.

All your honors servants except the six hunters slept in the House which was as soon as convenient places could be got ready, the house is not yet half finished, no partitions to the warehouse no guards to the stairs, no fillings for the joysts, not a window can be opened, not a shutter to any of them, indeed Cox himself is ashamed of the job.¹⁷⁴

The necessity of building in the late fall did cause some problems which Marten complained of in writing to Moose Factory:

.....We got the temporary House up but such thin Weather boarding I never saw before, mere paste-board! We filled up the quartering with Bricks

& Mortar which freezing before it was half dried has enclosed us in a House of Ice....¹⁷⁵

Even after the move inside there were many things to be done and as late as July 1784 men were "painting the House brot from England."¹⁷⁶ Also, later in 1786, the interior arrangements were altered to provide better accommodation.

The House was a two storey brick nogged building approximately 40 feet x 25 feet. The quartering of the exterior walls was filled with brick and clad with weather boarding. A number of the interior walls were also brick nogged. The roof which may have been low gabled was covered with lead. The floor plan and room allocations both before and after alterations can be seen in Joseph Colen's plan of 1786. Of interest to note are the separation of the chief's and officers quarters from those of the men and the contrast in size between the two. The house represented the bringing together under one roof of the several functions usually located in the flankers and sheds. The arrangements appear to have been similar although more limited in size.

Several buildings were added over the next two years to provide the necessary services which could not be accommodated in the house itself. The log tent 20 feet x 38 feet was used as a powder magazine.¹⁷⁷ To lessen the danger of fire, Marten had the men throw "snow and water on the log tent in which is the powder to prevent accident by the sparks from the chimblie flying on it...."¹⁷⁸ And later in the summer it was thoroughly plastered.¹⁷⁹ Late in the fall the men began clearing a piece of ground for the erection of a "cook room, armourer, cooper, carpenters and smiths shop 41 feet x 20 feet."¹⁸⁰ Construction actually began the following spring.¹⁸¹ It too was a frame building nogged with brick gathered from the chimnies of the old fort.¹⁸² The exterior was clad with weather boarding. The roof (which again may have been gabled or at least a shed roof) was planked and caulked and later covered with weather boarding.¹⁸³ In addition to housing the cooking

facilities for the men and the tradesmen's shops the building was altered to accommodate hogs and cattle. In the fall of 1785 work began on the shed 50 feet x 14 feet¹⁸⁴ intended for the storage of goods and also the trading room which had previously been located on the lower storey of the dwelling house.¹⁸⁵ It was a frame building, 18 feet in height, resting on a foundation. It was clad with weather boarding (feather edge boarding). The roof was tarred and covered with lead. A gallery ran along the second storey of the building and linked with the house so that the Chief could have direct communication from his apartment. A Chief's cook room, a one storey frame building on stone foundation was also constructed in 1785.¹⁸⁶

The house "brot out from England" was intended only as a temporary solution for the accommodation of the company's operations on the Hayes. Certainly Marten was early after his arrival back and complained that they were "cramped for room" in the building and required four times the space.¹⁸⁷ And in 1785 the Committee urged Marten to collect "articles for building."¹⁸⁸ As in the past, the problem of determining a safe site for the new factory, was a necessary first step. Joseph Colen who arrived in York in 1785 was instructed to survey the land surrounding the old factory in order to locate eligible building sites. He took test bores at various points, concentrating on the site which had been proposed by the Committee earlier, but like Turnor before him he found the soil

to be light sandy marle, for many feet within the surface, which desolve away in water like salt; Other places I tryed in vain, being disagreeable wet and swampy and unfit of the foundation of a lasting building As Ice (which the earth contains) would prevent piles being drove a sufficient depth to form a firm and good basis.¹⁸⁹

Colen concluded that "If there is a possibility of guarding against inundations occasioned by the breaking up of the rivers, the ground on which the old fort stood is, in my opinion, the only proper spot to erect a building on." Marten and his council however, preferred the site earlier recommen-

ded by the Committee which they argued could be rendered secure by raising the level of the ground. Their choice was influenced by the spring breakup in 1785 which had severely eroded the bank in front of the former fort and had threatened the buildings in which they lived.¹⁹⁰

Colen was made "resident" at York in 1786, and after once again examining the ground many miles up and down the Hayes, he concluded that the old site was still the most desirable especially in view of the steps he had taken to secure the bank by driving piles.¹⁹¹ The Committee, returning to an earlier building form employed at the beginning of the 18th century, authorized Colen to begin construction of "a square house with four flankers" on the most eligible site he could find.¹⁹² He therefore commenced construction immediately on the old site. Although he preferred a plan similar to that of the previous factory with the magazine in the central court surrounded by the flankers and sheds,¹⁹³ the final decision was left to the Committee. They accepted his proposal which was embodied in a plan forwarded by Colen to London in 1786.¹⁹⁴

The factory proposed by Colen and begun by him was very similar to the previous factory although it was better thought out, for instance all components were separated by brick or stone firewalls which introduced a fire safety factor (albeit slight) although it ruled out the convenience of internal communication.¹⁹⁵ The dwelling flankers for both officers and men were larger than those used for storage to offer better accommodation; and the sheds and offices located outside the factory itself were more conveniently arranged than those which had grown up haphazardly around the previous factories. But the greatest advance introduced by Colen—here his experience as a "mechanic" must have been brought to bear—was the use of frame construction, brick nogged and rough cast, for all components but the two dwelling flankers which were to be built in log "for warmth."¹⁹⁶ Colen also turned to composite type roofing in preference to lead.

The construction progressed quickly as Colen had predicted. He began with the west flanker and completed the cellar and drain in the fall of 1786.¹⁹⁷ By mid-October "the base plate" had been laid round the building, set temporarily on logs so that it could be underpinned the following spring when the danger of frost had passed.¹⁹⁸ At the end of October building stopped because the timber was "too full of ice to prosecute the building this season."¹⁹⁹ Work recommenced in the spring so that the flanker was complete enough the following fall to allow the men to occupy it in October.²⁰⁰ And in December Colen recorded:

I have the satisfaction of seeing finished the mens flanker replete with conveniences. The cabbins are roomy bed places for 50 men more decent than either Chief or Officers for upwards of 12 months after my arrival in this country. It gives me pleasure to here [sic] the old servants declare they have not better accommodations in their appartments than any since they resided in Hudson's Bay.²⁰¹

In 1787 Colen also completed the line of artificers shops he had proposed for the front of the factory.²⁰² The following spring Colen began framing and erecting the north and east flankers.²⁰³

Early in May the entire fort site was engulfed at the breakup of the river. The men were forced to flee to the woods as the ice and water threatened "destruction to us and our buildings."²⁰⁴ "The breaking up of the river ice" reported William Tomison, inland Chief of York, "caused almost universal destruction at this place which would be attended with too much labour ever to repair."²⁰⁵ At the height of the flood, 7 May, the inventive Colen embarked in a canoe to undertake a survey to locate a building site which was truly safe "as water is as true a level as can be found examined many places—at last met with a spot nearly one mile from the factory/more or less uncertain/the ground of which appears many feet above the surface of the water rose by this deluge & extends on a dry ridge upwards of a furlong in length from the

banks of the river."²⁰⁶ Later in May, after the water had subsided, he took a proper survey of the site and confirmed his original, or more unorthodox method.²⁰⁷ He found that the ground was ten to twelve feet higher than the existing site of York and just as important, soundings of the river indicated that there was sufficient water for the Severn sloop to unload at the launch. His choice was a good one, and just as Knight's site has provided the location for York throughout the 18th century, Colen's site became the location for York in the 19th century.

The building of the new factory went slowly—it took at least four years—in spite of Colen's anxiety and the unhealthy conditions at Old York. Because the buildings Colen had been erecting were of frame construction he hoped to be able to move them easily to the new site; even the mens flanker he planned to convert by reusing the logs.²⁰⁸ In May Colen laid out the ground for the buildings and began the foundation of stone and the cellars.²⁰⁹ Work continued throughout the winter with the dismantling of the frame buildings at the old fort and carrying them to the new. Also some of the frames for the buildings were prepared at the old fort where most of the men were still living before they were taken up the river for erection of the new fort.²¹⁰ The work was slowed in 1788-89 by a terrible outbreak of scurvy and by the usual shortage of timber.²¹¹ Although the work progressed steadily—Colen eventually moved down to new York himself in 1792 to keep an eye on the carpenters—the move to York was not entirely complete until spring 1792 when Colen gave the men "a treat as a housewarming at New York to which they went in procession with music playing & usual ceremonies observed."²¹²

Colen appears to have erected the factory he had planned to build on the old site. Certainly the type of construction he describes in his journal—the predominance of frame on stone foundations—indicates this. And the fact that he dismantled the buildings he had already erected at York and moved

them to the new site would require that he use a similar approach. Later descriptions in the early 19th century, when Colen's fort was still standing, indicate that it had a similar plan.

Colen's factory represented the ultimate evolution of the Company's 18th century factories. It was the last of the 18th century type of forts to be built at York and one of the last to be erected on the Bay. The "old Octagon" as it was affectionately described by fur traders at the turn of the century (so called because of the shape of the interior court formed by the sheds and bastions) was eventually replaced in the 19th century by the extensive depot, portions of which survive today.

Colen's use of frame construction was about the only feature which anticipated 19th century bayside building practices. In plan, his factory was definitely of the 18th century type, the third of three found at York in the century; the first had been the square house with attached flankers or bastions inherited by Knight from the French; the second, Knight's centrally located square house with detached bastions; and the third, the plan with four flankers linked by sheds also serving as curtains. The latter two especially were representative of factories built on the Bay in the 19th century, and all were found with variations at other post locations. The single unit house and flankers was favoured by the Committee at minor trading stations such as Severn and Richmond. The square house detached flanker design was employed early in the century at Albany and Churchill (primarily through Knight's influence) and was favoured by the Committee when Colen turned to the rebuilding of York in the 1780s. The four flanker-shed plan, utilized at York in the 1740s and in subsequent rebuildings, proved to be the accepted form for bayside building in the last half of the 18th century. The design was evolved at the Bottom of the Bay, at Moose and Albany, in the early 1730s and represented an application in wood of prevailing 18th century

fortification history.

Aside from plan, the building at York was representative of other aspects of 18th century building on the Bay. The relationship between Committee and local officers, the heavy reliance upon skilled tradesmen and the growing tendency to rely upon local officers especially towards the end of the century—when men such as Joseph Colen and Philip Turnor were recruited by the Company—were elements in evidence at other factories as well. Typical too was the type of construction. All of the Company's wooden factories used heavy squared logs, probably corner notched, resting upon ground sills to build the low, almost squat, buildings with slightly pitched roofs covered with sheet lead. All relied heavily upon imported materials such as lead for the roofs, bricks for stoves and glass for windows. Many of the problems at York were also experienced by other factories. The flooding of the Hayes for example, was not exceptional and at other posts the spring breakup was watched just as anxiously as at York. Other posts had to look forward to the replacement of their wooden factories every 30 or 40 years as they too were faced with slumping buildings, decaying walls and leaking roofs.

How well were the 18th century posts built at York adapted to the purposes for which they were erected? They were first and foremost trading posts. As such they offered storage for furs and goods and shelter, albeit not too comfortable, for the men. As structures they were not very adventuresome. Once the basic form had been established—a variant of the bastioned system—builders returned again and again to the same design, only occasionally altering it with small innovations such as internal communication or perhaps more important the use of sheds as curtains. In fact, conservatism was built into the company organization. The Committee, which had an important say in what was erected, all too often was inclined to stay with something it knew, although occasionally it was able to introduce innovations at posts by passing along to one an

improvement discovered at another. Also those in charge of posts during a rebuilding on the same site were inclined to repeat the pattern before them. Few adaptations appear to have been made to accommodate the North American environment. At York, for example, internal communication, a definite plus in the long winter, was not a feature common to all building phases. Stone or brick foundations repeatedly recommended by the Committee were not a good solution given the soil condition and permafrost on the Hayes. Log construction used nearly to the end of the century was not very practical in an area where timber was in constant short supply.

As defensive works their value was limited and yet defence was obviously the most important criterion consciously advanced by the Committee. They were intended to defend against Indian attack and against European assault by land or by sea. The first function was never tested and perhaps this in itself provides proof of their effectiveness. The inner factory, within which the factory contingent could withdraw in times of anticipated troubles, surrounded by one or two palisade lines covered by small swivels mounted on the shed roofs and in the bastions provided an effective deterrent to native attack which of course would be mounted without cannon. Against European attack it was a different story. As had happened in the 17th century with certain invariability the fort fell with predictable speed when attacked by the French force under La Perouse in 1782. Partly the poor record can be attributed to the isolation of York; when an enemy force appeared before the factory and threatened to lay a siege, the prospect of a long winter without sustenance, given the dependence of the factory on the surrounding countryside, was enough to bring surrender. There would be little hope for relief from a siege until the ships arrived the following August or September. But the factory also contained fundamental weaknesses of design; log construction could not withstand cannon bombardment without accompanying earthworks; the batteries, detached or in the

immediate vicinity of the fort could be too easily turned; the palisade lines, unflanked were a definite liability against an organized attack because they allowed too much uncovered and masked a well thought-out assault.

But the greatest weakness of York as at all factories on the Bay was the nature and number of the men who occupied them. Forts regardless of strength or design were only as strong as the defenders inside them. Although the Committee paid lip service to the question of defence as it planned its "forts" on the banks of the Hayes, they never provided the complement of men necessary to man the factory guns let alone those at the various detached batteries. More important there was an understandable reticence on the part of the men hired as fur traders, tradesmen and labourers to turn overnight into professional soldiers. The Committee directed that the men be drilled in the use of small arms and military discipline and offered as inducements an elaborate scale of compensation for the maimed or those slain in a possible attack but regardless of its attempt, a definitely non-military attitude prevailed.²¹³ At York it can be seen growing stronger as the 18th century advanced. In 1755 for example, the York Factory journal recorded "a misfortune happened to our Hee Goat today he was walking upon the Breast work of the sheds which is not above 9 inches over fell upon the lead of the sheds and broke his neck."²¹⁴ A goat parading on the roofs of the sheds on the eve of the Seven Years War does not inspire a feeling of vigilant military preparedness. Cross Bar Battery built as a major outer defence of the factory approaches was gradually stripped by natives seeking wood and ironware. Perhaps its effectiveness was summed up in 1766 when the four pounders were removed to the factory, partly because they would be of more service there but also because the Indian children playfully "runs them about the platform" at the battery.²¹⁵ At the factory itself in 1772 when Andrew Graham removed the swivels used to salute the Indians from the top

of the sheds he reasoned "the firing the cannon on the sheds being prejudicial to the fort, breaking the windows, cracking the beautiful outside plaistering, and damaging the building in every shape"²¹⁶ and made clear where his priorities lay.

The events of 1782 underlined the vulnerability of the Hudson's Bay Company posts on the Bay. Not only did York Factory fall easily to La Perouse but so did Prince of Wales Fort, the company's elaborate stone fortification at Churchill. The factories like the men housed in them were fur trade oriented. Fortifications and soldiers they were not.

Endnotes

- 1 Hudson's Bay Company Archives (hereafter cited as HBCA) York Factory Journal, B.239/a/1, fo. 19, September 7, 1714.
- 2 See descriptions by Andrew Graham, G. Williams, ed., Andrew Graham's Observations on Hudson's Bay 1767-1791 (London: Hudson's Bay Record Society, 1969), Vol. XXVII, pp. 249-251.
- 3 HBCA, A.11/116, fo. 153, Joseph Colen to Governor and Committee, September 8, 1785.
- 4 Colin, op cit.,; See also HBCA, A.11/116, fo. 47, Philip Turnor to Governor and Committee, September 9, 1778.
- 5 HBCA, B.239/a/1, fos. 38-39, York Factory Journal, May 7, 1715, passim.
- 6 Ibid., B.239/a/1, fo. 53, August 30, 1715; B.239/a/2, fo. 51, August 3, 1716.
- 7 Ibid., B.239/a/88, fo. 40, May 7, 1788, passim.
- 8 For examples of erosion see HBCA, York Factory Journal, B.239/a/8, fo. 23, September 23, 1723; B.239/a/8, fo. 60, 15 and 16 September, 1725; and B.239/a/13, fo. 28, July 11, 1731.
- 9 Ibid., B.239/a/2, fo. October 7, 1715.
- 10 HBCA, James Isham, A.11/114, fos. 146-150, General Letter to Governor and Committee, August 8, 1751.
- 11 HBCA, A.11/116, fos. 163-164, Joseph Colen to Governor and Committee, August 1786. Colen had the pile driver made himself at the fort. "The 4th Oct. it was finished and tryed with success many piles of large size were

forced from 6 to 8 feet into the ground; the river early setting in prevented doing much the distance already gone (being drove close to each other) forms a good piece of wharfing. Stones are laid against the bottom, next the river with Brush wood, and rubbish well rammed in behind them...." York Factory Journal, B.239/a/85, fos. 49, 51, September 20, 1785 and October 6, 1785; B.239/a/87, fos. 508, September 14, 1786 to September 28, 1786, especially September 28. "One range of piles (nearly fifty yards) is compltd. fixed with strong land ties & faced with slabs after the mode practiced in England on the Banks of the river Thames."

- 12 For permafrost see Rodger J.E. Brown, Permafrost in Canada, Its Influence on Northern Development (Toronto: University of Toronto Press, 1970).
- 13 HBCA, York Factory Journal, B.239/a/3, fo. 7, October 10, 1716.
- 14 HBCA, A.11/116, fo. 47, Philip Turnor to Governor and Committee, September 9, 1778.
- 15 HBCA, York Factory Journal, B.239/a/2, fo. 3, September 31, 1715.
- 16 See for example, *ibid.*, B.239/a/48, fo. 32, May 28, 1761. In 1749 the journal described a classic example of slump caused by the partial thaw of permafrost:

"the rest of the people employ'd Bringing in and spreading of Lyme Rubbish small pieces of Bricks & c (that the snow is melted away from) in order to bind the ground round the fort for the breadth of 3 or 4 feet as can perceive the outside to settle considerably, Especially ye So. Bastion & S.W. Curtain occasioned (I suppose) by the Ground being thaw'd low down in ye summer time by the heat of a Long & Strong sun laying against the Out-

side Ground whereas ye within is continually shaded and on that acct. up even to the surface always as hard as some sort of stone."

- Ibid., B.239/a/32, fo. 27, April 22, 1749.
- 17 Andrew Graham, op. cit., p. 128; and p. 128 n.l.
- 18 HBCA, York Factory Journal, B.239/a/1, fos. 304, James Knight to Governor and Committee, September 19, 1714; printed in Letters from Hudson Bay, pp. 34-37.
- 19 Ibid., entries B.239/a/4, fos. 28-29, June 23 to July 1, 1718. In 1719 Henry Kelsey described in detail the method for burning lime at the factory. Henry Kelsey to Richard Staunton, March 28, 1719, B.239/b/1, fos. 12-41.
- 20 HBCA, B.6/7, fo. 6, Governor and Committee to Thomas White, May 5, 1742; A.11/114, fos. 108-109, Thomas White, General Letter to Governor and Committee.
- 21 See Chapter II.
- 22 See York Factory Accounts,
- 23 See Knight's justification for the use of lead. Letters from Hudson Bay, James Knight to Governor and Committee, September 17, 1716, pp. 56-70.
- 24 HBCA, B.239/a/1, fos. 45-46, James Knight to Richard Staunton, June 30, 1715.
- 25 Letters from Hudson Bay, James Knight to Clifford Merry, September 19, 1714, p. 38; also Clifford Wilson, "Forts on the Twin Rivers," The Beaver (Winter, 1957), p. 5; HBCA, York Factory Journal, B.239/a/1, fos. 5-6.
- 26 Ibid., James Knight to Governor, B.239/a/1, fos. 3-4 September 19, 1714.
- 27 Ibid., B.239/a/1, fos. 304.
- 28 Ibid., B.239/a/2, fos. 79-80, James Knight to Richard Staunton or Commander at Albany, June 5, 1716.
- 29 Ibid., B.239/a/1, fo. 42, June 14, 1715; B.239/a/1, fo. 43, June 25, 1715.

- 30 Ibid., B.239/a/1, fo. 51, August 19, 1715; B.239/a/1, fo. 52, August 27, 1715; B.239/a/1, fo. 53, August 30, 1715.
- 31 Ibid., B.239/a/2, fo. 5, October 6, 1715.
- 32 Ibid., fo. 7, October 29, 1715.
- 33 Ibid., November 22, 1715.
- 34 Ibid., fo. 50, August 1, 1716.
- 35 "Wee have likewise sent you a Mason & Bricklayer in one persons who hath been abroad to help build a Fort at Newfoundland now we recommend to you to Build or Face two of ye bastions with Stone such two as you shall think most convenient, let ye walls be of Such thick-ness as you shall judge proper & to finish one Wall first round ye Bastion you shall think fittest for your security ye Chief design of ye wall to defend you from Fire Arrows &c wee doubt you will take all ye care you can to secure ye Foundations...."
- HBCA, A.6/4, fo. 73, Governor and Committee to Thomas Macklish and Council at York Fort, May 17, 1723.
- As far as I can determine, the walls were never faced with stone but the exteriors were lathed and plastered,
- 36 HBCA, York Factory Journal, B.239/a/2, fo. 7, November 22, 1715.
- 37 Ibid., B.239/a/3, fo. 45, April 25, 1717.
- 38 Ibid., B.239/a/4, fos. 19-23, April 2, 1718 to May 13, 1718.
- 39 Ibid., see entries, B.239/a/8. fos., 19-20, July 15, 1723 to August 5, 1723.
- 40 Ibid. See for example B.239/a/2, fo. 50, August 2, 1716, "fixing posts in the ground to put up rails to set up the pallisades even in a Range;" B.239/a/5, fo. 55, July 10, 1719, "barking stakes;" and B.239/a/7, fos. 27-29, entries July 17, 1722 to August 6, 1722, including "making spikes for the stockades;" "setting posts, barking and sawing the stakes;" "began to nail the stockades."

- 41 Ibid., B.239/a/2, fo. 55, August 22, 1716, "set the frame for the gate of the fort;" fo. 58, "barr'd our gates last night."
- 42 Ibid., B.239/a/9, fos. 20-30, entries May 2, 1727, to August 5, 1727; B.239/a/11, fo. 6, October 7, 1729, "at noon out shallop return'd and halled her upon the Bank at the Gun Battery, a batery a mile below the factory;" Letters from Hudson Bay, Thomas McCleish General Letter, August 16, 1724m pp. 97-101.
- 43 Ibid., B.239/a/22, fos. 33-40, entries May 13, 1741 to July 17, 1741.
- 44 Ibid., B.239/a/2, fo. 7, October 10, 1716.
- 45 Ibid., B.239/a/7, fos. 25-26, entries July 2, 1722 to July 13, 1722.
- 46 Ibid., B.239/a/2, fo. 4, September 28, 1715.
- 47 Ibid., fo. 21, April 16, 1716.
- 48 Ibid., B.239/a/4, fos. 3-8, entries September 23, 1717 to November 12, 1717.
- 49 Ibid., fo. 15, February 20, 1717-18.
- 50 Ibid., B.239/a/8, fo. 24, October 9, 1723; fo. 67, December 13, 1725; B.239/a/9, fos. 2-5, entries February 19, 1725 to October 5, 1726.
- 51 Ibid., B.239/a/19, fos. 33-37, June 22, 1737 to August 15, 1727; B.239/a/20, fos. 2-4.
- 52 Letters from Hudson Bay, James Isham, General Letter, 1737, pp. 229-231.
- 53 Letters from Hudson Bay, Thomas McCleish to Governor and Committee, August 23, 1723, pp. 92-96. McCleish had built Albany and was therefore bound to contrast York to his creation.
- 54 HBCA., B.239/a/7, fo. 26, July 10, 1722; B.239/a/10, fo. 27, July 19, 1728; for example of repairs and B.239/a/20, fo. 39, July 10, 1738. The creek running through a portion of the trench was particularly troublesome, especially when swollen by the spring runoff. A

- sluice was eventually constructed to direct the flow away from the buildings of the factory. See, B.239/a/19, fo. 5, September 22, 1736.
- 55 Ibid., B.239/a/20, fo. 39, July 17, 1738.
- 56 Ibid., B.239/a/21, fo. 41, July 20, 1739.
- 57 HBCA, A.6/6, fos. 73-77, May 1, 1740, Governor and Committee to James Isham. Churchill at the same time was asked if it could supply stone to York "for repairing their Factory." HBCA, A.6/6, fo. 81, Governor and Committee to Richard Norton, May 1, 1740.
- 58 Letters from Hudson Bay, July 27, 1740, James Isham and Council, General Letter, pp. 311-317.
- 59 HBCA, B.239/a/22, fo. 21, York Factory Journal, April 27, 1741.
- 60 Ibid., A.1/35, fo. 165, Minutes of Committee, April 3, 1741.
- 61 HBCA, A.6/6, fos. 100-103, Governor and Committee to James Isham and Council, April 23, 1741. Thomas White had been at York as early as 1719-1720 and had served for several years there in various capacities.
- 62 HBCA, A.11/114, fos. 104-107, Thomas White, General Letter to Governor and Committee, August 10, 1741.
- 63 HBCA, A.6/7, fos. 5-6, Governor and Committee to Thomas White and Council, May 5, 1742; A.11/114, fos. 108-109, Thomas White, General Letter to Governor and Committee, August 10, 1742; A.6/7, fos. 21-23, May 5, 1743, The Committee, a little vexed perhaps with the vacillation gave its approval in 1743 and urged Thomas White and his council to get on with the job. Governor and Committee to Thomas White and Council.
- 64 HBCA, B.239/a/24, fo. 2, York Factory Journal, August 16, 1742.
- 65 Ibid., B.239/a/24-26, entries August 16, 1742 to March 25, 1745, for the main period of construction. See also A.11/114, fos. 112-114, August 18, 1743, Thomas White's report to the Governor and Committee.
- 66 Ibid., A.11/114, fos. 116-118, Thomas White, General letter to Governor and Committee, August 27, 1744.

- 67 HBCA, B.239/a/66, fo. 8, York Factory Journal, October 2, 1771, "Myself [Graham] second and the other men looked over the warehouses. Removed the salt provisions from the back sheds in order next spring to repair the floor and make a communication with the trading shed, flanker and other warehouses appertaining to trade that they may be at all times under my immediate inspection."
- 68 See plan in Joseph Robson, An Account of Six Years Residence in Hudson's Bay From 1733 to 1736 and 1744 to 1747 (Johnson Reprint Collection, 1965), opposite p. 30.
- 69 HBCA, B.239/a/8, fos. 43-44, references to whitewashing and painting, July 31, 1761 and August 1, 1761; B.239/a/35, fo. 31, "Carpenter weatherboarding the flankers," May 4, 1752.
- 70 Ibid., B.239/a/34, fo. 8, October 2, 1750, The loopholes were apparently covered with parchment like windows.
- 71 Ibid., fo. 29, July 26, 1743.
- 72 Ibid., B.238/a/25, fo. 5, September 19, 1743; fo. 15, January 30, 1743-44, "the carpenter framing of wainscoting for ye inside of the masters house."
- 73 Ibid., fo. 29, August 2, 1744.
- 74 Ibid., August 4, 1744; B.239/a/78, fo. 22, February 28, 1780.
- 75 Ibid., B.239/a/25, fo. 28, July 17, 1744.
- 76 HBCA, York Factory Journal, B.239/a/24, fo. 2, August 1 1742; fo. 25, May 24, 1743.
- 77 Robson, op. cit., p. 30.
- 78 HBCA, York Factory Journal, B.239/a/35, fo. 16, December 17, 1751.
- 79 Ibid., B.239/a/66, fo. 44, April 20, 1772 "cover it with new lead; ibid., April 21, 1772, "....covered in the trading shed and from four inches descent which it had the wrong way they have given it four inches good the right way."

- 80 Ibid., B.239/a/24, fo. 19, March 7, 1742-43, "Ye carpenter making posts & rails for ye Gallerys round ye top of ye sheds on the inside;" B.239/a/39, fo. 32, June 18, 1755, "walking upon the breastwork of the sheds which is not above 9 inches;" B.239/a/48, fo. 36, June 15, 1761, "Labourers keeping watch upon the leads."
- 81 Ibid., B.239/a/39, fo. 28, May 17, 1755, "Mr. Ford shoring the watch houses upon the sheds between ye west and So. & N. & Et. flankers they leaning out much."
- 82 Ibid., B.239/a/26, fo. 16, April 17, 1744-45, "ye carpenters making gates for ye gun posts on ye top of ye shed;" Robson, op. cit., p. 30.
- 83 Ibid., B.239/a/24, fo. 11, November 29, 1742.
- 84 Ibid., B.239/a/25, fo. 7, September 23, 1743.
- 85 Ibid., B.239/a/26, fo. 18, May 23, 1745, "Ye gunner drawing & fresh loading ye flankers arms likewise 100 trading guns, 25 in each curtain, ye rest of our people stowing & clearing ye flankers & sheds that ye loop hole may be all clear in case of an attack."
- 86 Ibid., B.239/a/28, fo. 5, September 6, 1746, "Mr. Ford the Joyner & one man a making a gateway wth piles on each side of ye SWt. curtain opposite ye trading room window for the natives to trade at, which is better yn to come to ye front gate for several reasons as to ye Company interest, itt being in a manner seperating ye Inds. from the English--for yn. they can have no communication wth the factory, more yn to trade and come to the window, ~~w~~whereas before they were in _____ for men in going to cook & c cou'd not help crossing the trace, the Natives came in for to go to trade &c...."
- 87 Ibid., see for example, B.239/a/28, fos. 28, 30, May 2, 1747 and June 9, 1747; B.239/a/30, fo. 36, August 12, 1748; B.239/a/32, fo. 4, September 9 and 10, 1748; B.239/a/54, fo. 28, April 24 and 30, 1766.
- 88 HBCA, A.6/7, fos. 137-138, May 5, 1748, Governor and Committee to John Newton and Council.

- 89 HBCA, A.11/113, fos. 128-129, August 27, 1748, John Newton and Council, York Fort, General Letter to Governor and Committee.
- 90 HBCA, York Fort Journals, B.239/a/33, fo. 46, August 22, 1750.
- 91 Ibid., fo. 47, August 24, 1759; B.239/a/34, fo. 4, September 5, 1750.
- 92 Ibid., B.239/a/34, fo. 6, September 21, 1750, fo. 8 October 1, 1750.
- 93 Ibid., fo. 32, entries April 26, 1751 and May 13, 1751.
- 94 Ibid., fos. 34-41, entries May 13, 1751 to June 29, 1751. The committee had questioned the quantity of bricks requested in the indent from York. Isham defended the order:
- "Wee do assure your honours that so far from making any waste of the 6000 bricks sent last year that wee had but just enough to raise ye sides to the spring of the arch with a case of brick & single arch of bricks, ye rest being all stone, besides a considerable quantity of batts procur'd in places about the factory....."
- HBCA, A.11/114, fos. 146-150, August 8, 1751, James Isham, York Fort, General Letter to Governor and Committee.
- 95 Ibid., B.239/a/34, fo. 35, entries May 21 and 22, 1751.
- 96 HBCA, A.11/114, fos. 146-150, August 8, 1751, James Isham General Letter to Governor and Committee.
- 97 HBCA, York Fort Journal, B.239/a/48, fos. 32-35, May 28, 1761 to June 9, 1761.
- 98 HBCA, A.11/114, fos. 146-150, August 8, 1751, James Isham, General Letter to Governor and Committee.
- 99 HBCA, A.11/114, fos. 152-157, August 6, 1752, Isham and Council general letter to Governor and Committee.
- 100 HBCA, York Factory Journal, B.239/a/35, fo. 5, September

- 3, 1751, "the rest of our men at home building a stone wall under the bank, to keep the bank from falling, finding nothing else will uphold it, the wall is 7 foot wide, 6 foot high and 4 foot slope with stakes 18 inches asunder and 2 foot high at the base front of the wall, which is to be watted with willows."
- 101 HBCA, A.11/114, fos. 158-160, September 6, 1753, James Isham and Council, General Letter to Governor and Committee.
- 102 Ibid., fos. 162-165, September, 1754.
- 103 Ibid., fos. 184-188, September, 1755.
- 104 HBCA, York Factory Journal, B.239/a/36, fo. 5.
- 105 Ibid., B.239/a/27, fo. 5, The Cook houses and other service buildings may have survived from the earlier factory. Although see entry September 9, 1745, "pullg: down ye old cook room & smiths shop;" B.239/a/27, fo. 5, September 11, 1745, "Assisting Mr. Fort in carrying up a new cook room & smith shop."
- 106 Ibid., B.239/a/28, fos. 6-9, September 12, to September 29, 1746.
- 107 Ibid., B.239/a/38, fo. 32, August 7, 1754 to August 8 1754, "4 men in the long boat brought some moss to lay between the logs of the cow house."
- 108 Ibid., B.239/a/57, fos. 2-23, entries September 8, 1767 to May 20, 1768.
- 109 Ibid., B.239/a/60, fos. 5-13, entries September 19, 1768 to November 21, 1768.
- 110 Ibid., B.239/a/65 to B.239/a/68, fo. 6 to fo. 37, October 3, 1770 to May 11, 1773; HBCA, A.11/115, fos. 132-135, Ferd. Jacobs and Council to Governor and Committee, September 4, 1771.
- 111 HBCA, York Factory Journal, B.239/a/71, fos. 7-26, September 26, 1774 to May 1, 1775. Already in 1777 the new stable was "falling to pieces;" *ibid.*, October 31, 1777, B.239/a/75, fo. 13.

- 112 G. Williams, ed., Andrew Graham's Observations on Hudson's Bay, 1767-91 (London: Hudson's Bay Record Society, 1969), Vol. XXVII, pp. 249-250.
- 113 See for example HBCA York Factory Journal, entries B.239/a/26, fo. 3, September 5, 1744; B.239/a/26, fo. 5, October 8, 1744, "Levelling ye earth downe to ye foot of ye stockades from the side of ye works;" *ibid.*, fo. 15, April 6, 1745, "ye rest getting ye piles of ye old trench up in order that ye ground may thaugh to be leveled down to ye feet of ye inner row of stockades."
- 114 See for example, *ibid.*, B.239/a/27, fos. 2-4, entries August 6, 1745 to September 2, 1745.
- 115 *Ibid.*, B.239/a/32, fos. 7-36, September 28, 1748 to July 13, 1749.
- 116 *Ibid.*, B.239/a/48, fo. 38, June 30, 1761.
- 117 *Ibid.*, B.239/a/49, fo. 52, August 5, 1762; *ibid.*, fo. 53, August 7, 1762.
- 118 *Ibid.*, fo. 51, July 25, 1762.
- 119 *Ibid.*, fo. 50, July 19, 1762.
- 120 *Ibid.*, fo. 51, July 27, 1762.
- 121 *Ibid.*, B.239/a/50, fo. 14, November 25, 1762, "squaring principal posts for palisades."
- 122 *Ibid.*, fo. 25, May 30, 1762, "three men heading, pointing and squaring pallisades to put up each side of the passage to our trading room window; B.239/a/51, fo. 39, June 14, 1764.
- 123 *Ibid.*, B.239/a/51, fo. 43, July 16, 1764, "two men sawing two inch plank for flooring the new passage to the trading room window."
- 124 *Ibid.*, B.239/a/68, fo. 14, November 19, 1774.
- 125 *Ibid.*, see entries following B.239/a/68, fo. 6, September 14, 1772, *passim*; B.239/a/73, fos. 7-10, September 21, 1775 to September 30, 1775.
- 126 HBCA, A.6/7, fos. 39-41, May 10, 1744, Governor and Committee to Thomas White and Council. The committee

also added "We direct that you employ Joseph Robson and the other masons to make a horn work in the front of the factory between the bastions to be cannon proof facd. with stone to cover the face of the factory and the men, after which they are to build three other horn works between the bastions to be raised as high as the Factory House...."; A.6/7, fo. 53, May 14, 1744, Committee to Thomas White and Council. As far as I can determine these were not all constructed.

- 127 HBCA, York Factory Journal, B.239/a/26, fo. 21, July 1, 1745.
- 128 Ibid., B.239/a/27, fo. 21, July 3, 1746.
- 129 Ibid., fo. 22, July 14, 1746.
- 130 Ibid., B.239/a/32, fos. 33-35, May 10, 1749 to June 26, 1749.
- 131 HBCA, A.11/114, fos. 152-157, August 6, 1752, James Isham and Council to Governor and Committee.
- 132 HBCA York Factory Journal, B.239/a/39, fo. 5, October 4, 1754. See also *ibid.*, B.239/a/49, fo. 9, October 19, 1762, "bringing turf to repair the batterys the rest at work on them they being greatly gone to decay."
- 133 Grahams Observations, *op. cit.*, pp. 249-250.
- 134 HBCA, York Factory Journal, B.239/a/65, fo. 39, June 6, 1771.
- 135 Ibid., B.239/a/66, fo. 10, October 22, 1771.
- 136 HBCA, A.6/7, fos. 107-108, May 6, 1747, Governor and Committee to James Isham and Council.
- 137 Ibid., A.11/114, fos. 124-127, August 18, 1747, James Isham to Governor and Committee.
- 138 HBCA York Factory Journal, B.239/a/32, fo. August 23, 1748.
- 139 HBCA, A.11/114, fos. 138-142, n.d., James Isham to Governor and Committee, (1750).
- 140 Ibid., B.239/a/33, fo. 47, August 29, 1750.
- 141 Ibid., B.239/a/34 *passim*, fo. 3, September 3, 1750; *ibid.*, fo. 41, July 2, 1751.

- 142 Ibid., B.239/a/35, fo. 40, July 21, 1752; HBCA, A.11/114, fos. 152-157, August 6, 1752, James Isham and Council, to Governor and Committee.
- 143 HBCA, A.11/115, fos. 110-112, August 23, 1768, Ferd. Jacobs and Council to Governor and Committee.
- 144 HBCA York Factory Journal, B.239/a/73, fo. 13, October 13, 1775.
- 145 Ibid., fo. 33, March 11, 1776, and B.239/a/74, fo. 5, October 2, 1776.
- 146 HBCA, A.11/115, fo. 69, September 6, 1762, Ferdinand Jacobs to Governor and Committee.
- 147 Ibid., fo. 77, September 4, 1763.
- 148 Graham Observations, op. cit., pp. 249-250.
- 149 HBCA, A.11/114, fos. 9-11, August 21, 1776, H. Marten and Council to Governor and Committee
- 150 See for example, HBCA York Factory Journal B.239/a/75, fos. 2-8, August 30, 1777 to September 29, 1777.
- 151 HBCA, A.6/12, fos. 76-78, May 14, 1777, Governor and Committee to Humphrey Marten and Council.
- 152 Ibid., A.11/116, fos. 31-33, August 27, 1777, H. Marten and Council to Governor and Committee.
- 153 Ibid., A.6/12, fos. 105-107, May 13, 1778, Governor and Committee to Humphrey Marten and Council.
- 154 Ibid., A.11/116, fo. 47, September 9, 1778, Philip Turnor to Governor and Committee.
- 155 Ibid., A.6/12, fos. 133-136, May 12, 1779, Governor and Committee to Humphrey Marten and Council, Marten and his council were not a little resentful that Turnor's recommendations, which were basically the recommendation they had earlier offered to the Committee, were accepted while theirs had not been. See their reply, *ibid.*, A. 11/116, fos. 71-74, September 11, 1780, H. Marten and Council to Governor and Committee.
- 156 HBCA York Factory Journal, B.239/a/75, fo. 34 to B.239/a/78, fo. 35, entries March 11, 1779, to June 12, 1780.

- 157 Building timber as usual was a problem to obtain. Some indication as to size can be seen in reports on progress. For example, *ibid.*, B.239/a/75, fo. 21, December 12, 1778, "26 pieces of timber from 20 to 30 feet long and from 9 to 12 inches thick; and *ibid.*, fo. 36, April 8, 1779, "finished hauling the timber &c from the back of the Island there hath been hauled to the fort from that place since the 7th of January last 150 plank from 6 to 10 inches broad and from 12 to 17 feet long, 410 pieces of timber that will square from 8 to 14 inches in length from 10 feet to 20 do. Indeed a few of them will run 26 feet; also 100 pieces for sleepers to the platform from 5 to 9 inches thick and from 12 to 17 feet long."
- 158 J.B. Tyrell, ed., Journals of Samuel Hearne and Philip Turnor (Toronto: Champlain Society, 1934) Entry following July 15, 1779, pp. 256-257. HBCA York Factory Journal, B.239/a/78, fo. 22, February 25, 1780.
- 159 HBCA York Factory Journal, B.239/a/74, fos. 18-30, February 13, 1777 to June 3, 1777, *passim*.
- 160 *Ibid.*, entries B.239/a/78, fo. 26 to B.239/a/80, fo. 7, April 7, 1780 to September 15, 1781.
- 161 See for example, *ibid.*, B.239/a/80, fo. 67, June 17, 1782, "House carpenter and his mate finished renewing the lower logs of west flanker walls and afterwards examined the state of the whole by opening the pastering in many places found the N.W. side decayed much particularly near the top of the same angle but the remainder appears to be sound. Afterwards they examined the outward walls of North Flankers in the same manner the N.W. side of which is sound but the N.E. one is much decayed;" *ibid.*, fos. 58-59, May 27, 1782, "House carpenter joiner and one man employed in examining round the bottom of the wall of the south flanker, found it perfectly sound on the S.E. side except one course of the logs near the surface of

- the earth being decayed about the thickness of a quarter of an inch on the outside, which they dubbed off, the logs below and next above perfectly sound, on the S.W. side found two courses of logs one next above the other below the surface of the earth almost wholly decayed, one log the only course below that sound, and those next above the same. The carpenters cut out half the length of the two decayed courses and filled the space up again with new wood, tomorrow they will do the remainder;" *ibid.*, fo. 66, June 17, 1782, "Bricklayer repairing the plaistering of south flanker in places where it had been broken to examine the walls."
- 162 *Ibid.*, fo. 7, September 17, 1781, "Carpenters taking down the watch house of the N.W. Shed in order to build a new one, being quite decayed," *ibid.*, fo. 59, May 29, 1782, "they also leaded the flooring of the new watch house which was built on the above shed last autumn."
- 163 *Ibid.*, fo. 8, September 1781, "Rest of the men assisting the House carpenters in taking down the old necessary which stands detached from the North West Shed watch house and preparing the place for erecting a new one."
- 164 *Ibid.*, B.239/a/79, fo. 35, May 23, 1781, "About noon a part of our magazine fell down being old and crazy nor had or have we persons sufficient to repair or rebuilt it, the latter certainly is the most necessary in consequence of which and to prevent any damage that might ensue from the falling down of the remainder I ordered it to be pulled down, which was in part performed."
- 165 *Ibid.*, B.239/a/80, fos. 51, 52, April 30, 1782, May 17, 1782.
- 166 *Ibid.*, B.239/a/81, fo. 3, August 24, 1782.
- 167 *Ibid.*, fo. 5, September 1, 1782.
- 168 HBCA, A.6/13, fos. 76-78, May 21, 1783, Governor and Committee to Humphrey Marten and Council, York Fort.

- 169 Ibid., A.11/4, fo. 188, September 20, 1783, H. Marten private letter to Governor and Committee.
- 170 Ibid., A.11/116, fos. 121-123, September 22, 1783, H. Marten and Council to Governor and Committee.
- 171 HBCA York Factory Journal, B.239/a/82, fo. 9, October 27, 1783, also, B.239/a/83, fo. 10, October 27, 1783.
- 172 Ibid., entries B.239/a/82, fos. 5-33, September 19, 1783 to May 5, 1784 cover a great deal of the construction period. See also B.239/a/83, which covers the same period.
- 173 Ibid., B.239/a/82, fo. 7, October 10, 1783, "the rest with Cox at work on the house, this building now goes on but slowly, occasioned by the badness of the weather, however the roof is on and leaded, one of the chimbles nearly built, the other began, the quartering nearly filled up with brickwork, and a small part of the flooring laid."
- 174 Ibid., fo. 15, December 2, 1783.
- 175 HBCA, January 8, 1784, Humphrey Marten to Edward Jarvis; E.E. Rich, ed., Moose Fort Journals, 1783-85 (London: Hudson's Bay Record Society, 1954), pp. 179-180.
- 176 HBCA York Factory Journal, B.239/a/82, fo. 40, July 8, 1784.
- 177 For a description of a log tent see E.E. Rich, ed., James Isham's Observations on Hudson's Bay, 1743 (London: Hudson's Bay Record Society, 1949), pp. 90-91.
- 178 HBCA York Factory Journal, B.239/a/83, fo. 16, December 15, 1783.
- 179 Ibid., fo. 50, August 20, 1784.
- 180 Ibid., B.239/a/82, fo. 10, November 4, 1783.
- 181 Ibid., construction is covered in entries B.239/a/82, fos. 29-48, and B.239/a/82, fos. 608, April 12, 1784, to November 2, 1784; see also B.239/a/83, fos. 30-44.
- 182 This was only one instance of materials obtained from the destroyed fort. Nails, and other ironware were all salvaged. Lead roofing was retrieved and melted down

- into pegs to be sent back to England.
- 183 HBCA, B.239/a/86, fo. 36, May 18, 1786.
- 184 See HBCA York Factory Journal, entries B.239/a/85, fos. 48-83, September 19, 1785 to July 9, 1786; and B.239/a/86, fos. 31-54.
- 185 HBCA, G.1/110, A Ground Plan of York Factory. Joseph Colen was very critical of the building. "This was finished the latter end of July following and tho no more than 10 ft. 6 in., clear width inside, is 18 feet high; and was it not for the great weight of goods in the lower part thereof; the N.W. wind, would soon overturn it; as a platform covered with Lead, extends 5 feet from the Building 9 feet from the Ground supported only by the Joyce of the middle floor, this communicates to the Chief's room...."
- 186 HBCA York Factory Journal, B.239/a/84, fos. 32-40, June 8, 1785 to August 3, 1785; also entries for the same period, B.293/a/85, fos. 33-41.
- 187 HBCA, A.11/116, fos. 132-135, September 16, 1784, H. Marten and Council to Governor and Committee.
- 188 Ibid., A.6/13, fos. 128-132, May 4, 1785, Governor and Committee to H. Marten and Council.
- 189 Ibid., A.11/116, fo. 153, September 8, 1785, Joseph Colen to Governor and Committee.
- 190 Ibid., fos. 155-159, September 12, 1785, H. Marten and Council to Governor and Committee.
- 191 Ibid., fos. 163-164, August 1786, Joseph Colen to Governor and Committee. Colen had the pile driver made himself at the fort. "The 4th Oct. it was finished and tryed with success many piles of large sizes were forced from 6 to 8 feet into the ground; the river early setting in prevented doing much of the distance already gone (being drove close to each other) forms a good piece of wharfing. Stones are laid against the bottom, next the river with Brush wood, and rubbish well rammed

in behind them....

HBCA York Factory Journal, B.239/a/85, fos. 49, 51, September 30, 1785, October 6, 1785; also B.239/a/87, fos. 5-8, September 14, 1786 to September 28, 1786, especially September 28...."One range of piles (nearly fifty yards) is compltd. fixed with strong land ties & faced with slabs after the mode practiced in England on the banks of the river Thames."

- 192 HBCA, A.6/13, fos. 156-160, May 24, 1786, Governor and Committee to H. Marten and Council.
- 193 Ibid., A.11/116, fos. 163-164, August, 1786, Joseph Colen to Governor and Committee.
- 194 Ibid., A.11/117, fo. 5, September 6, 1787, Joseph Colen to Governor and Committee.
- 195 G.1/112, A Design for Building a Comodious Fort.
- 196 HBCA, A.11/117, fo. 5, September 6, 1787, Joseph Colen to Governor and Committee. Colen sent a plan as his counter proposal to the Committee's desire for a square house with flankers. "A rough sketch of plans of the Factory for your honors approbation is enclosed in the Packet - Want of proper instruments prevents its being more compleat. The mens flanker is erected which if your honors will permit me to prosecute the buildings as p. plan No. 2, I will venture to affirm will be sooner executed, and not attended with so much expense at the building a large square house with flankers as p. plan No. 4--the flanker D. and E with all the curtains F.G.G. H. are intended to be built in frame work without any other addition than that of Bricknoggin and rough cast outside--these will be equally lasting and strong as the flankers B & C which are to built with logs for warmth--between each curtain and flanker a stone or brick wall will be built to prevent fire communicating in case of accident (which God prevent)-- I hope to build up the two flankers D & E before the arrival of the ship next

- season: want of lead will prevent my compleating it. The square house can be added after the flankers are built." For foundations see HBCA, York Factory, *ibid.*, fo. 30, May 7, 1787, "Building up Flanker - Bricklayers & labourer under pinning do."
- 197 HBCA, York Factory Journal, B.239/a/87, fo. 9, October 7, 1786: "This week the cellar of flanker is built up to the surface of the ground which took up 54 pieces of timber—the open drain from the same is nearly compleat—these is made of piles drove obliquely forming a house ridge reversed—on the bottom a wood drain—so that the sun can have full power to reach & as the ground thaws the water will have free passage."
- 198 *Ibid.*, fo. 10, October 14, 1786.
- 199 *Ibid.*, October 28, 1786.
- 200 *Ibid.*, B.239/a/88, fo. 9, October 24, 1787.
- 201 *Ibid.*, fo. 16, December 20, 1787.
- 202 *Ibid.*, B.239/a/87, fos. 27-30, April 4, 1787, to April 28, 1787.
- 203 *Ibid.*, B.239/a/88, fos. 29-37, entries March 5, 1788 to April 19, 1788.
- 204 *Ibid.*, fo. 40, May 7, 1788, *passim*.
- 205 HBCA, A.11/117, fos. 11-12, July 20, 1788, Wm. Tomison to Governor and Committee.
- 206 HBCA York Factory Journal, B.239/a/88, fo. 42, May 9, 1788.
- 207 *Ibid.*, B.239/a/88, fo. 47, May 26, 1788, "...On taking a survey of the land this day arod. the new plantation find the level of the ground on the bank of the river to be 29 feet 4 inches perpendicular from low water mark and regularly ascends backwd. to the spot whereon I hope with the blessing of God to lay the foundation of new buildings (6 feet 4 inches) the centre of which is 157 yards from the banks edge behind which it falls off with an irregular descent."

- 208 Ibid., fo. 42, May 9, 1788, "...I acted with as much caution as I was master of and provided in the best I was able in case of accident, and had all the buildings I have hitherto erected so constructed and bolted together, that they can be removed at pleasure with only the trouble of taking down & putting up again. The mens flankers expected which is built with logs, even this I hope to force assunder & covert to the same use without loss of timber."
- 209 Ibid., fos. 44, 46, May 12, 1788 and May 26, 1788. The construction phase of new York is covered in York Factory, B.239/a/88, fo. 44 to B.239/a/92, fo. 27, May 12, 1788 to April 23, 1792.
- 210 See for example *ibid.*, B.239/a/89, fo. 8, October 4, 1788; also B.239/a/88, fo. 51, June 17, 1788.
- 211 *Ibid.*, B.239/a/90, fos. 14-15, December 2, 1789.
- 212 *Ibid.*, B.239/a/92, fo. 27, April 23, 1792.
- 213 HBCA, A.6/7, fos. 33-35, May 10, 1744, Governor and Committee, to Joseph Isbister and Council.
- 214 HBCA, York Factory Journal, B.239/a/39, fo. 32, June 18, 1755.
- 215 *Ibid.*, B.239/a/54, fo. 33, May 17, 1766.
- 216 *Ibid.*, B.239/a/66, fo. 41, April 13, 1772.

Figure 1 Map of the Mouths of the Nelson, Hayes, and
Fourteen Rivers.

(National Map Collection, Public Archives of
Canada, 97330)

Figure 2 Knight's York Fort on the Eve of Its Replacement,
26 July 1740.

This plan shows clearly the features of the four detached flanker-square house design. Of interest to note are the cook house in the lower right, the palisaded approach to the trading flankers, and the proximity of the creek to the west flanker. (Hudson's Bay Company Archives)

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PLACE _____

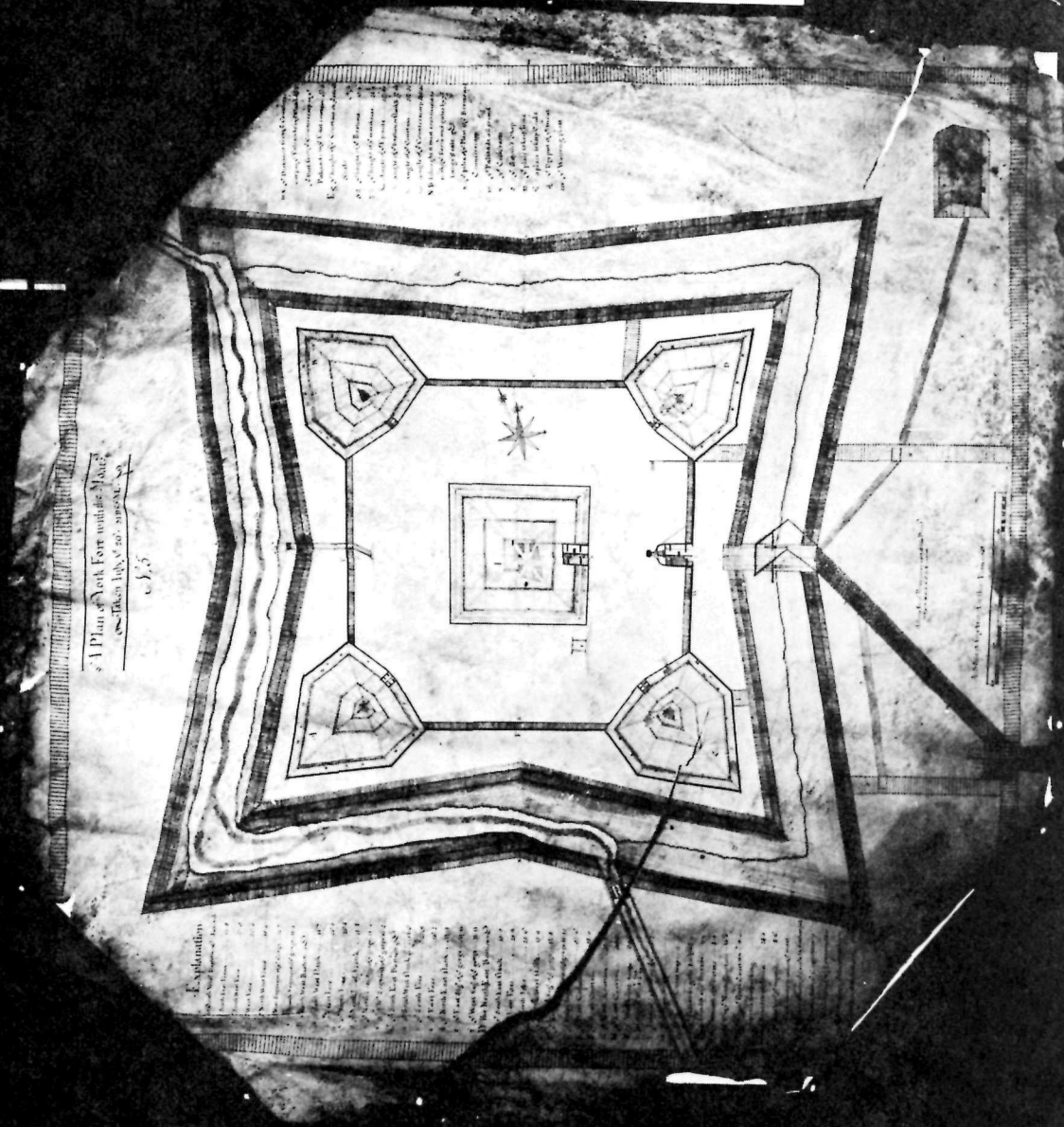
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Plan of Lock Fort outside Mack
ON TACON July 5th 1867. GENERAL. No. 1

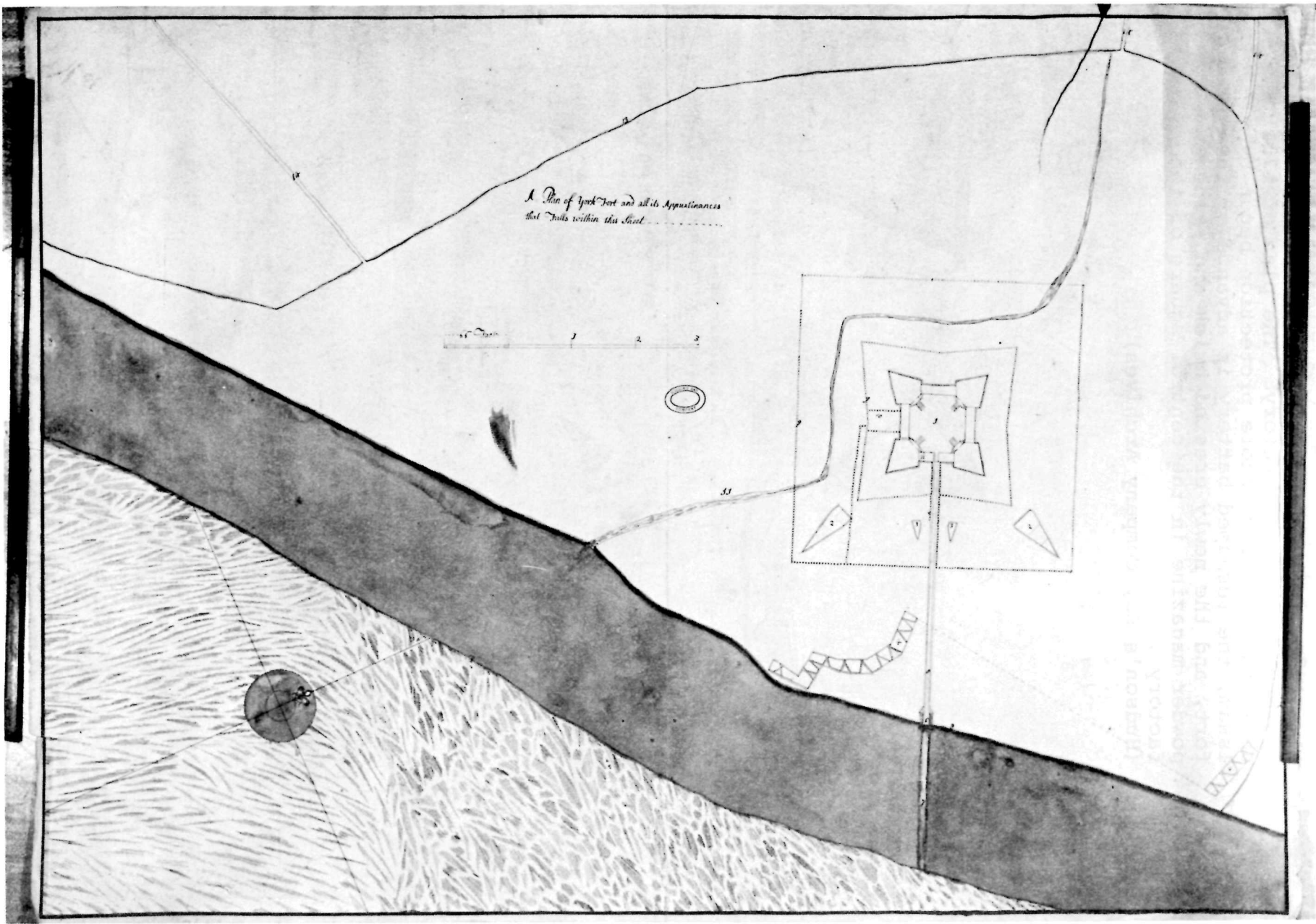
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Explanation

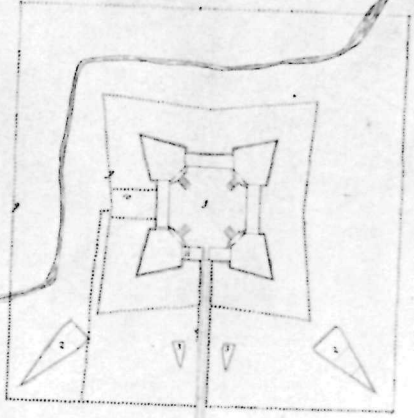
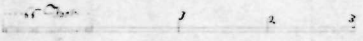
1. The outer wall is of masonry, 12 feet high, and 12 feet thick at the base. It is finished with a smooth surface, and is provided with a crenellated top. The bastions are of the same material, and are 12 feet high, and 12 feet thick at the base. They are provided with a crenellated top, and are connected to the outer wall by a series of walls, 12 feet high, and 12 feet thick at the base. The central square building is of masonry, 12 feet high, and 12 feet thick at the base. It is provided with a crenellated top, and is surrounded by a series of walls, 12 feet high, and 12 feet thick at the base. The moat is 12 feet wide, and 12 feet deep. The fort is provided with a series of bastions, each of which is 12 feet high, and 12 feet thick at the base. They are provided with a crenellated top, and are connected to the outer wall by a series of walls, 12 feet high, and 12 feet thick at the base. The central square building is of masonry, 12 feet high, and 12 feet thick at the base. It is provided with a crenellated top, and is surrounded by a series of walls, 12 feet high, and 12 feet thick at the base. The moat is 12 feet wide, and 12 feet deep.

Figure 3 York Fort, 1746

A plan by Joseph Robson showing York Factory after its reconstruction in the early 1740s. In advance of the factory are the service buildings, and the two batteries erected by Robson.
(Hudson's Bay Company Archives)



A Plan of York Fort and all its Appurtenances
that Falls within this Limit



York
Fort
The
Plan
of
the
Fort
and
all
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that
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Figure 4 York Factory, 1754

Already by 1754, a number of service buildings had grown up around the factory. The plan of 1754 shows the elaborate shore protection begun by Isham, the reshaped battery in advance of the fort, and the newly erected brick and stone powder magazine in the central square of the factory..

(Hudson's Bay Company Archives)

The Exposition of the ground Plans

1. The main wall of the fort
2. The ditch or moat of the fort
3. The bastion
4. The main gate
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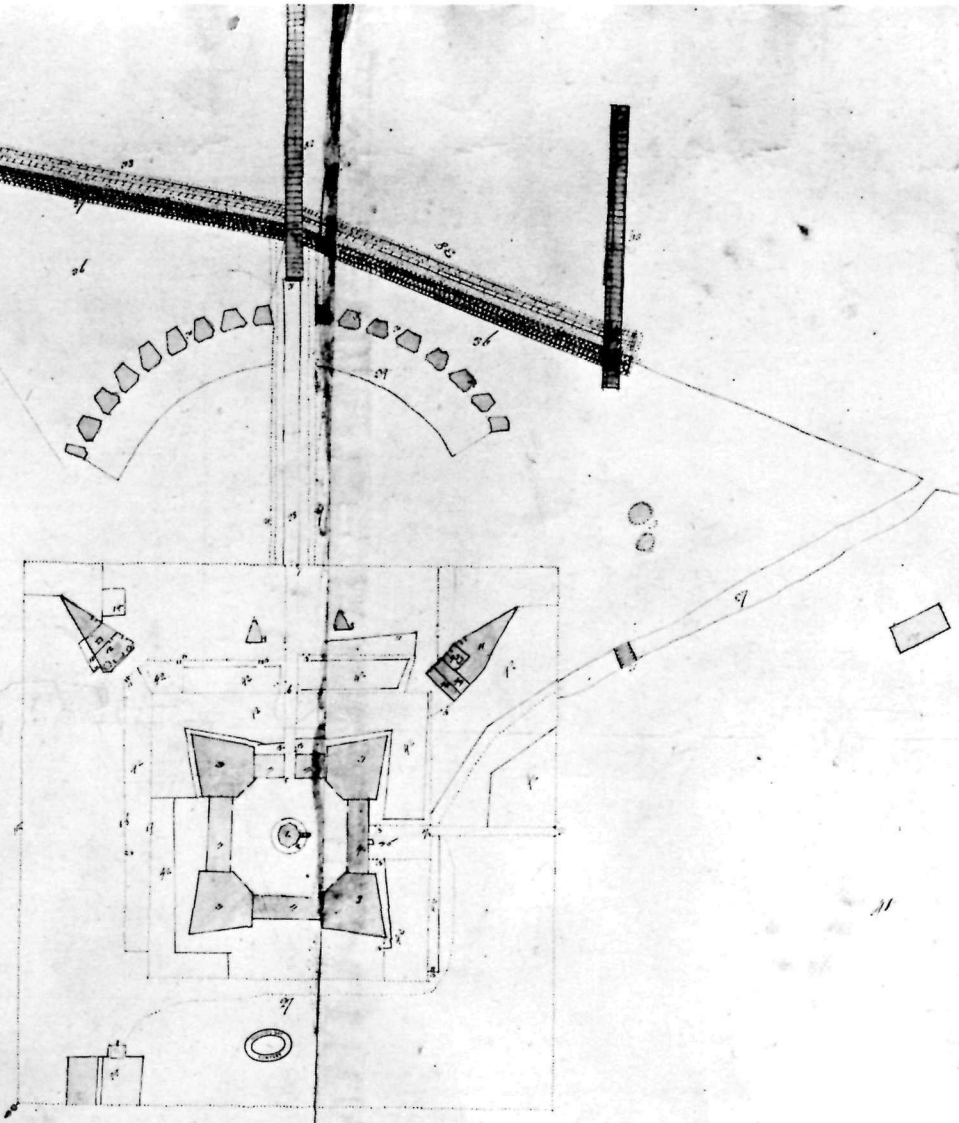


Figure 5 The ill-fated Cross Barr Factory soon after its completion.
(Hudson's Bay Company Archives)

A Plan of James Battery, Lodge House, Magazine, and White house near the Point of Mark

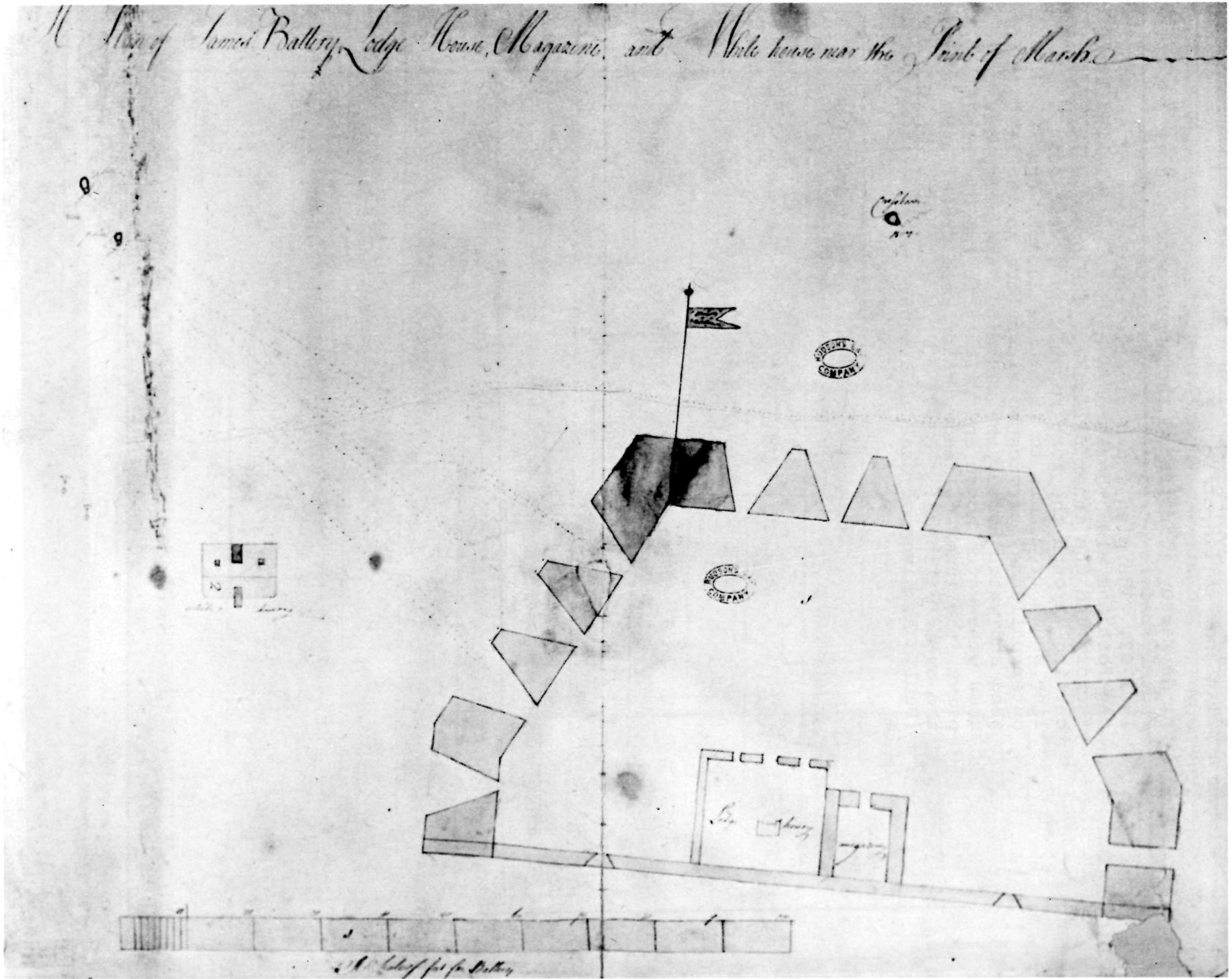
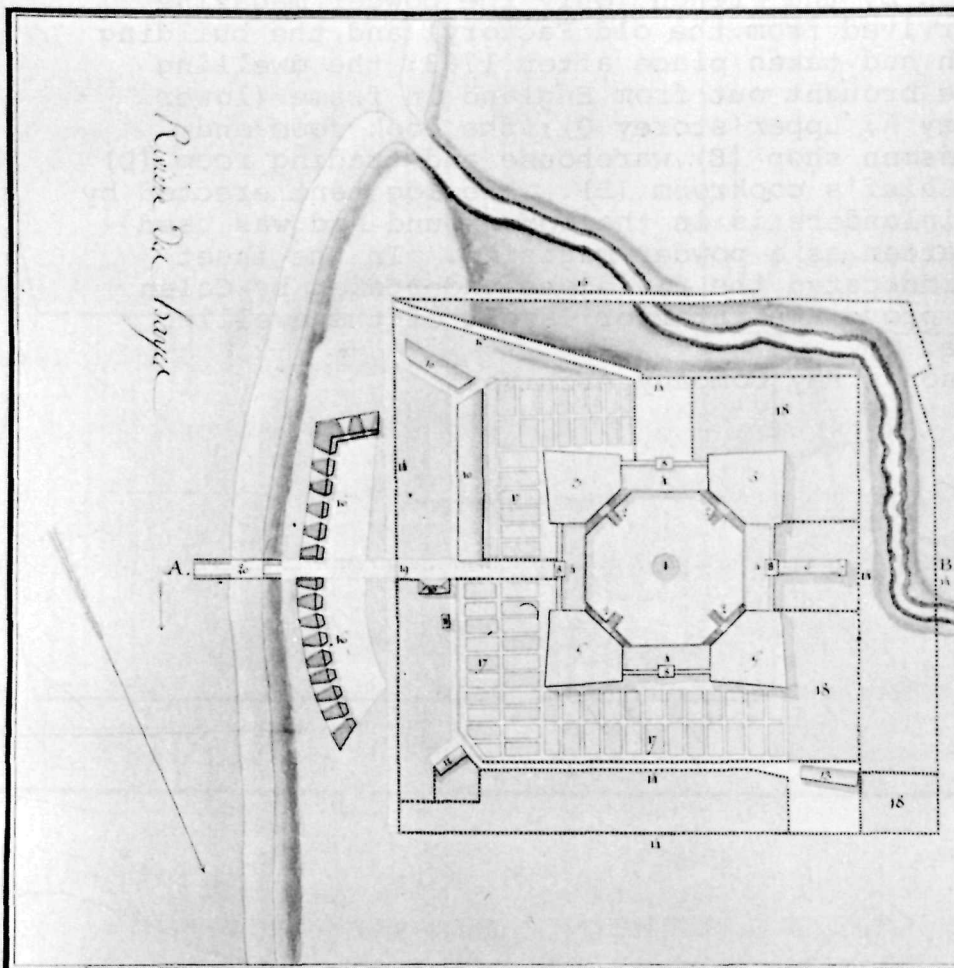


Figure 6 Plan and Profile of York Fort, 1783

M. de Mansuy illustrated the appearance of York Factory before it was destroyed by La Perouse in 1782. The plan shows clearly the layout of the fort and also the kitchen gardens between the factory and the inner palisade. The profile AB cutting through the fort roughly on a west-east line shows from left to right the launch, the outer palisade, service buidings, the southeast shed and watch house, the magazine, the northwest shed with watch house and walkway to the elevated privy, the inner palisade, Water Hole Creek, and the outer palisade.

(Public Archives of Canada, C16008)



Plan du Fort Mifflin
 Situé sur la Rivière de l'Appel de la
 Province de Pennsylvanie par les
 57° 13' de latitude & 75° 22'
 de longitude au Méridien de Paris
 Le 1. Mars 1758. par le
 Capitaine de l'Armée de France
 M. de Mifflin. Architecte de la
 Couronne. & de la Marine.
 Le 1. Mars 1758.

Legende

1. Casernes
2. Bâtimens pour le logement des Officiers
3. Bâtimens pour le logement des Soldats
4. Bâtimens pour le logement des Officiers de la Marine
5. Bâtimens pour le logement des Officiers de la Marine
6. Bâtimens pour le logement des Officiers de la Marine
7. Bâtimens pour le logement des Officiers de la Marine
8. Bâtimens pour le logement des Officiers de la Marine
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15. Bâtimens pour le logement des Officiers de la Marine
16. Bâtimens pour le logement des Officiers de la Marine
17. Bâtimens pour le logement des Officiers de la Marine
18. Bâtimens pour le logement des Officiers de la Marine
19. Bâtimens pour le logement des Officiers de la Marine
20. Bâtimens pour le logement des Officiers de la Marine

Echelle de 10 Toises

Profil pris sur la ligne A. B.

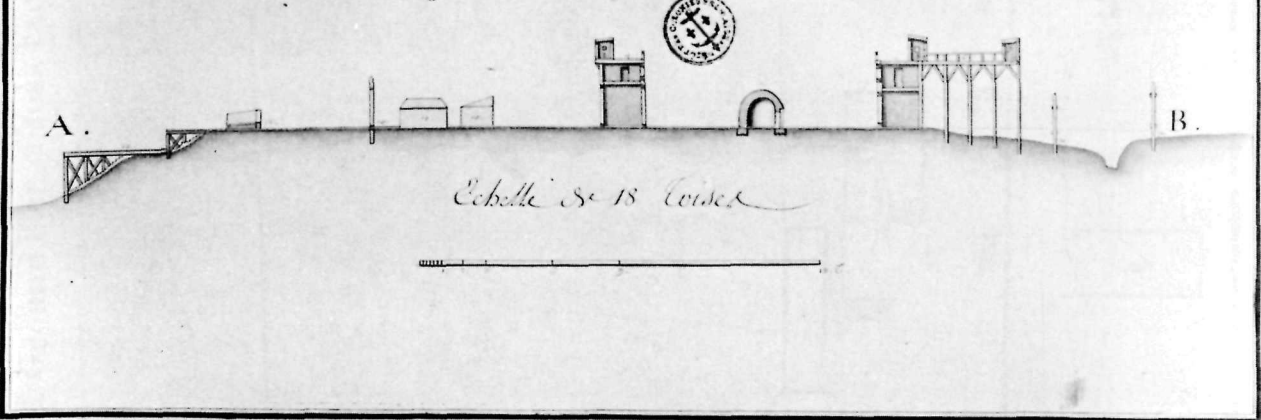


Fig. 7. York Factory as it appeared in 1786

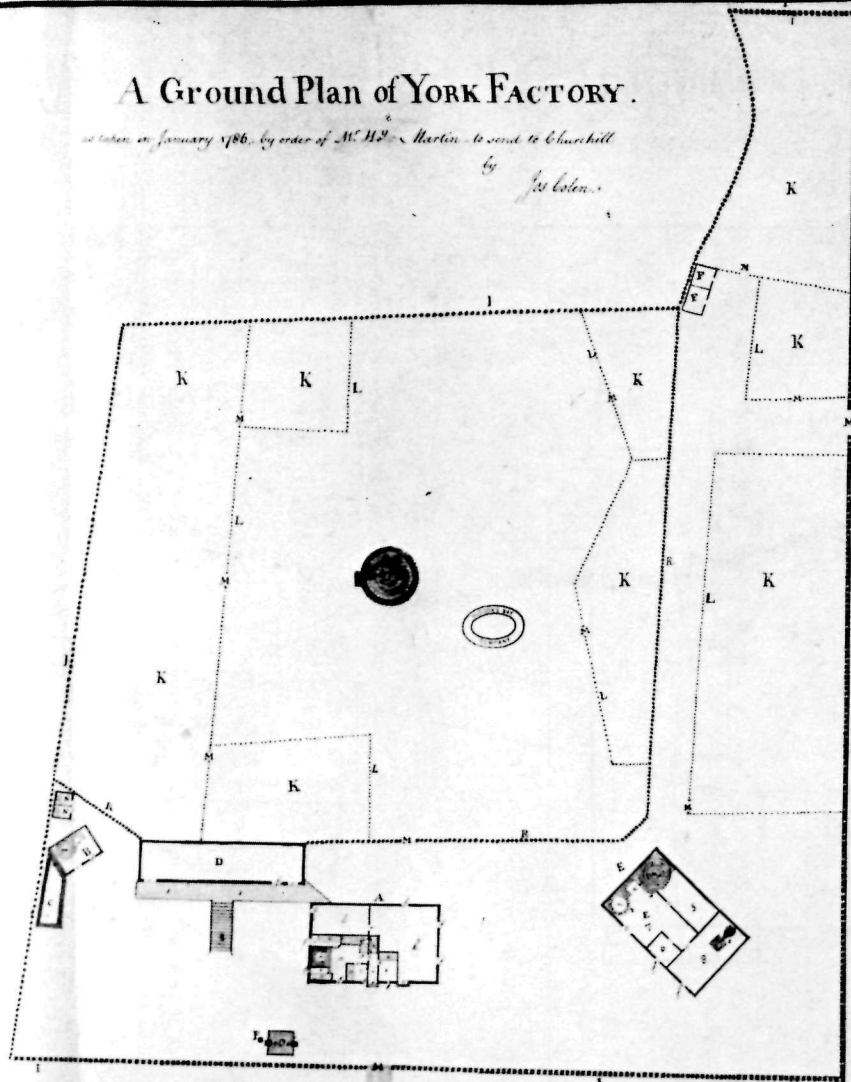
Joseph Colen's plan shows the extent of the devastation by the French (only the powder magazine G survived from the old Factory) and the building which had taken place after 1783: the dwelling house brought out from England in frame (lower storey A; upper storey Q); the cook room and tradesmen shop (E) warehouse and trading room (D) and Chief's cookroom (B). The log tent erected by the inlanders is in the foreground and was used by Marten as a powder magazine. In the inset are indicated the revisions undertaken by Colen to improve the interior layout of the dwelling house.

(Hudson's Bay Company Archives)

A Ground Plan of YORK FACTORY.

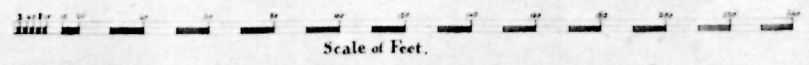
as taken on January 1786, by order of M^r H^{on} Martin to send to Churchill
by J^o Colen.

N^o 1.



- References**
- A Dwelling House - (Ground floor)
 - B Chief Cook Room - built in form of a shed
 - C A stone foundation for a long passage (or long passage) which is finished in the same Plan with out to support for a Man to work round a large tank.
 - D Foundation for the Building a lower passage.
This was finished the latter end of July following, and the same time of the same year with inside, a foot high, and was it not for the great weight of logs in the lower part thereof, the NW corner would have sustained it; as D a platform, covered with Lead, extends 3 feet from the Building up from the ground, supported only by the face of the walls floor, this communicates to the Chief Room @ above from 1783 to 1784.
 - One half of the lower part of the lower House is now converted into a Working Room.
 - E New Cook Room.
Y B in this the Men (Chief their butlers, the and the where the cattle D and the D are kept, and is the only flag for Cooper & Carpenter, Smith & Sawmill.
The enclosure for cattle was made, and when the flag was taken down, and
F Flag Pole B. The same pole is set up from the vicinity of the weather this last winter.
 - G Magazine.
 - H Log Shed without the Stockades this is built in form of a House Range, and was erected by the Garrison and Men in 1783, before the arrival of the ship of that year.
 - I Stockades around the works.
 - K Gardens
 - L Pleasants or Stockades around D.
 - M Gates
 - N Privy
 - O High for Packing Boxes - over this the large stream - built in 1784.
 - P Flag Staff by the side of D.
 - Q Upper floor of Dwelling House.
 - R Collet - lower Stockades.
 - S Platform to Stables.

- References to the Inside of Buildings**
- a Stone Foundation
 - b 41 Windows
 - c Bed Room
 - d Stone Passage and chimney
 - e Chimney
 - f Entrance
 - g Stone to Chief Room - under which stands the Stone
 - h Stone to lower Room
 - i Passage
 - k New Room
 - l Working Room
 - m Couch
 - n Copper
 - o Smith's Forge
- Q Upper story of Dwelling House**
- p Chief Room - formerly open to the top of the roof
 - q Bed Room
 - r Lockers, made round above, above this the wall of the Room is covered with English
 - s Chimney & the Stone - beneath the Stone which is paved with Brick & under the Stone is a half the Room
 - t Upper Working Room
 - u Case to Platform, that is
 - v Flag Pole to lower Working Room
 - w New Guard's Room
 - x Caskins
 - y Bed Room - in each corner - there are good windows in each Room
 - z Stone from Passage



Note: After the departure of the ship of 1786 great alterations were made in the plan, and the building was afterwards made more convenient for the service.

Figure 8 Joseph Colen's Proposal for a New Factory

Colen planned a factory on the four flanker-four shed design. His two dwelling flankers constructed on a larger scale than the others are shown in the foreground. Their interior layout with sleeping cabins ranged around the central heated room corresponds to the arrangements in previous factories. A noteworthy improvement was his careful arrangement of the service buildings around the factory.

(Hudson's Bay Company Archives)

N^o. 2. A DESIGN for BUILDING A COMMODIOUS FORT

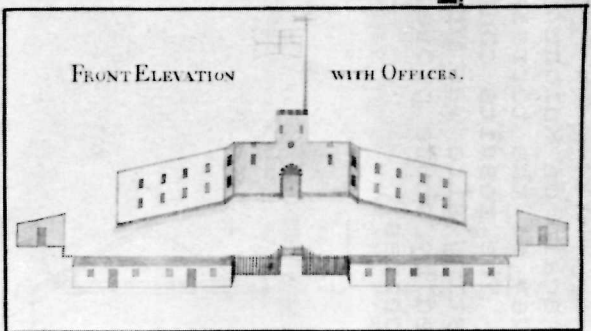
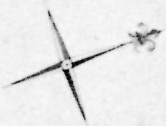
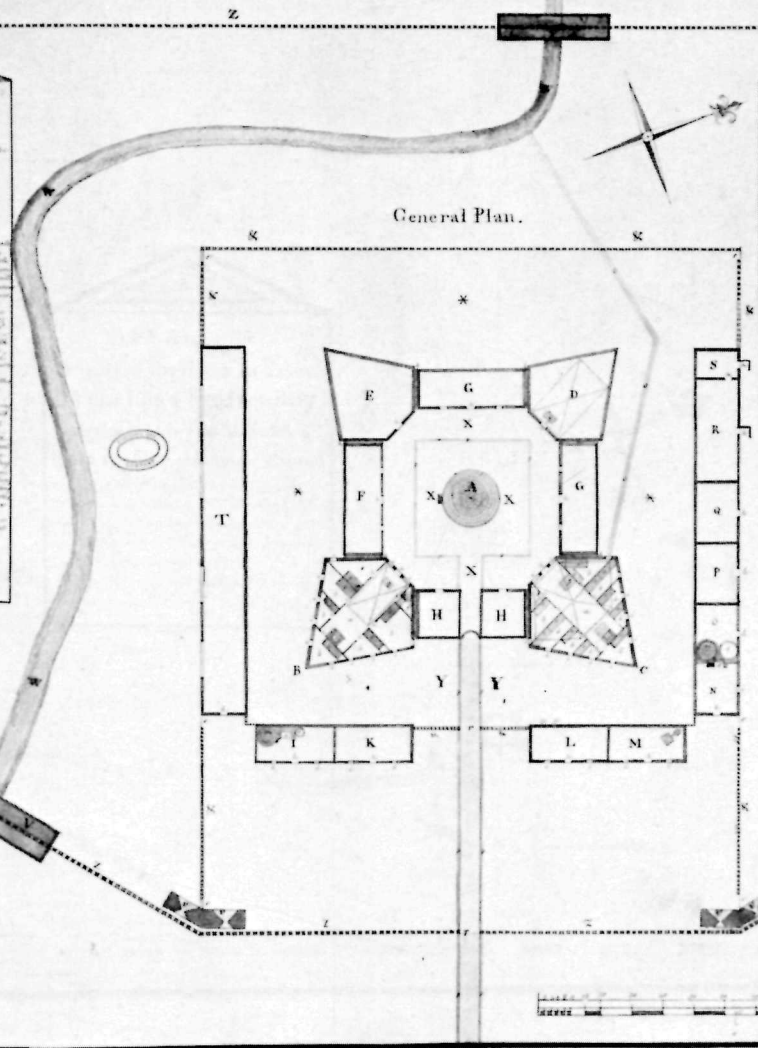
Shumbly submitted to the Governor Deputy Governor and Committee of the Honourable the Hudson

in Room of the present Ware Houses at YORK FACTORY North America.

Bay Company by their dutiful faithful and very humble Servant

Joseph Colen.

Remarks
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Remarks
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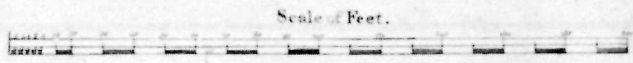


Figure 9 Colen's Proposed Factory in its Setting

Before deciding to build again on Knight's site, Colen made a careful survey of the terrain surrounding the factory. The results confirmed his opinion that the existing site was preferable if the bank was stabilized by shore protection. (Hudson's Bay Company Archives)

York Factory: A Structural History
by George Ingram
(January, 1979)

Prince of Wales's Fort: A Structural History

by George Ingram

January, 1979

1 Text

35 Endnotes

Prince of Wales's Fort: A Structural History

Begun in 1731, Prince of Wales's Fort, constructed of stone, was unquestionably the Company's most ambitious project on the Bay in the 18th century. During the long drawn out construction period which stretched endlessly from 1731 to 1771 it could almost be said that two stone forts were constructed; the first commenced by Richard Norton in 1731 was completed; in his opinion, by 1741; the second, involving the systematic rebuilding of Norton's first, was not finished until 1771. A scant eleven years later, Samuel Hearne quietly surrendered to the Comte de la Perouse who promptly destroyed the fort. It was never again occupied by the Company.

Prince of Wales's Fort is usually regarded as an aberration in the Company's approach to building, and in scale and in its stone construction, it can be so regarded. But in conception and in execution the fort rested firmly within the Company's 18th century building tradition. Herein lies the significance of Prince of Wales's Fort to a study of the Hudson's Bay Company approach to building for the stone fort illustrated very clearly all the weaknesses of that approach in the 18th century and defined its narrow limits.

The stone fort represented the third building effort at Churchill River. The Company had first approached the river in 1686 when it was explored by John Abraham and Michael Grimington. Drawn by their reports of the possibilities of trade and whaling, the Company had resolved to settle there in 1687. However, when finally in 1689 a house was erected, its destruction by fire soon after it was built led to abandonment. In the years following, the idea of a new settlement

was frequently revived but each time the expedition was postponed and with the occupation of York by the French plans had to be laid aside indefinitely. However, when Knight went out to take over York in 1714 he was resolved to establish a post to the northward.

Knight was drawn northward by the potential of the fur trade with the Northern Indians and the whale fishery, and perhaps more personally by the persistent Indian reports of northern copper deposits.¹ With the blessing of the Committee he took preliminary steps in 1715 and 1716 to re-establish the post at Churchill. Finally in 1717 with the construction of York well underway, he sent an advance party to gather timber and to select a building site, and in July he traveled there himself to personally supervise the establishment of the post. What he found on his arrival was discouraging. In spite of optimistic reports by Henry Kelsey, who had been there in 1689, provisions were scarce, the terrain impossible for building and timber difficult to find and inferior. After a great deal of searching Knight finally decided to build upon the Danes' wintering place as the most desirable of a poor selection of sites and sent his men into the bush to gather timber. Through the summer, he set about building a wooden factory with four detached flankers connected with a palisade, a plan very similar to the one which he had employed at York. At the end of the first summer, he had finished his flankers (intended for living space and storage). When he left the following year to return to England and then to embark on his exploration to the north from which he never returned, the factory was almost completed.

Throughout the 1720s the post, officially named Prince of Wales's Fort in 1719, operated as a sub-post of York.² Gradually it began to realise its potential in trade and the whale fishery although Thomas Macklish, then in charge at York, who looked upon Churchill as an unnecessary expense and a drain on his own returns, carried on a constant campaign

against the continuation of the post. In view of Macklish's opposition and the relatively minor nature of the post, the Committee's decision to rebuild there on an ambitious scale in stone seems quite extraordinary.

The rebuilding was prompted by the Committee's programme in the 1720s of renewing its factories and making them more defensible. As at other posts, the Committee in 1729 requested that Anthony Beale "send us an acct. of the condition of the fortification of the factory, and what you think is further necessary to be done in order to make the same stronger and more secure."³ Beale in his private letter to the Committee, apparently criticized both the situation and the condition of his factory.⁴ However, he personally seems to have planned to renovate the existing buildings for he ordered "a bricklayer and back hair" in order to "case" his factory.⁵ The committee had something more elaborate in mind and therefore did not "give any directions for the making any alteration [sic] to the present [factory]." They laid Beale's indent aside and intimated in their general letter that they were "having some thoughts of building another factory at Churchill River in a More Proper and Convenient place." Beale was directed to lose no opportunity to gather "stone timber and other materials for building" and was ordered to stockpile his building supplies "on the highest land on Uskemay point within the mouth of Churchill River opposite to Cape Marry, near which place we are inform'd, are great Quantities of stone and several other materials useful in building." The mention of Eskimo Point and Cape Merry indicate that already the Committee, perhaps at Beale's suggestion, had in mind a fort or factory on the west bank of Churchill River whose guns could co-operate with those of a battery on the point of land to the east to defend the approaches to the river.

Beale lost no time in obeying the Committee's instructions and early in September, following the dispatch of the Company's

ship, he sent men into the bush to collect timber.⁶ The Committee moved at a more leisurely pace. Not until mid-March of the following year did it commence detailed consideration of the new factory. First, a sub-committee studied a plan of Churchill River drawn by Christopher Middleton, and concluded "that the most proper and convenient place for building a fort at the said river both for ye advantage of the Compy. trade as well as defence was upon Eskimay Point near the entrance of that River."⁷ One week later on 25 March, the sub-committee again took up the question and after discussion, Richard Norton, who had previously been in charge of Churchill and was then in London after the expiration of his period of service at York, was asked to prepare an indent of such utensils and stores necessary for the erection of a new factory.⁸ Upon the basis of Norton's list, submitted 1 April, the sub-committee decided to send 24 men to Churchill and then asked Norton to prepare an indent of the necessary provisions.⁹ Norton had also submitted a plan of the proposed factory to the 1 April meeting. The Committee men, probably seeking a choice (quite wisely for Norton was the greenest of all in fort planning), asked Captains Spurrell and Middleton to also submit proposals. All three were considered on 8 April when the meeting decided that Middleton's plan "was the most proper & suitable for the Companies Purpose."¹⁰ Captain Spurrell was directed to make a model based upon the plan and this was approved with alterations when it was submitted one month later.¹¹

In a period of less than two months the Committee had wrapped up its consideration for the new factory at Churchill. There is no indication that the Committee men themselves had in mind a mighty stone fortress on the shores of the Bay although the factory was about twice the size of anything constructed at York. Their deliberations had not been long and involved; in fact they had been left to a brief two months before shiptime. The procedures for considering the new factory were identical to those followed for the relatively minor

post of Moose Factory one year earlier; again they relied upon their captains and their own resources in deciding upon the factory to be erected. Even the choice of stone for the material of construction was not exceptional. As other factories the Committee had urged the use of stone construction in the interest of permanence of construction and of defence against fire arrows. At Churchill where timber was extremely scarce and stone all too plentiful it was a logical choice. The approach indicates that the Committee looked upon their new factory at Churchill as a stone version of their wooden factories at other bayside locations and naively believed that it would be quickly and inexpensively erected.¹² They least of all realized that they had embarked upon a massive construction project which would be forty years in execution.

Richard Norton was given the responsibility for implementing the plans evolved by the Committee. There was little in his background to prepare him for the venture.¹³ Joseph Robson later remarked critically that "he was an absolute stranger to the rules of building."¹⁴ Nothing in his subsequent career indicated that he would learn. Norton had been apprenticed to the Company in 1714 at the age of 13 and sailed with James Knight to receive York Factory from the French. He was at York during the initial reconstruction after 1714 and travelled as one of the advance party to Churchill to prepare for the erection of the new factory there in 1717. At Churchill his main accomplishments appear to have been in the areas of travel, trade and Indian relations. He served his apprenticeship at Churchill and in 1721 was made a full servant. In 1723 Norton became chief trader under Nathaniel Bishop, then in charge of Prince of Wales's, and with Bishop's death in the same year was placed in charge of the factory. When his performance indicated that he lacked perfect knowledge of the methods of trade, Norton was shifted to York in 1727 to serve under the tutelage of Thomas Macklish.¹⁵ There he made out

well and went home in 1730 recommended by Macklish.¹⁶ Oppor-
tunely then he was in London at the time the Committee took
up consideration of the question of the new factory at Churchill,
and being familiar with local conditions there, was brought
into the discussions. His contribution was rewarded at the
end of April when he entered into a new contract to serve
as Chief Factor and Commander at Prince of Wales's Fort.¹⁷

Because he had been a party to the committee discussions,
there was little need to give detailed written instructions
to Norton.¹⁸ He was directed to construct the fort "upon the
most proper and convenient place and that the same may be con-
trived so as to command and defend the mouth or entrance of
the river." The committee, noting that "a Draught and Model
of the particular Dimensions of the sd. Fort and Factory,"
had been prepared ordered Norton to take "especial care that
the same be exactly built according to the Form and Dimensions
of the said model and draught." The work was to commence as
soon as possible.

Norton arrived at Churchill 29 July and attacked his new
project with enthusiasm.¹⁹ Eskimo Point he found "to be a
sufficient breadth to build the fort to the full dimensions,
and very commodious for the command of the river's mouth and
entirely clear the bay at the back of Cape Merry insomuch that
the smallest boat cannot land but that our cannon might play
on the same." He immediately staked out the fort "(it con-
sisted of a polygon 100 yds. square the exterior sides) and
tested for footings."²⁰ "We find the soil to be gravel and
sand and very loose till about seven feet down," he reported,
"then comes to the frozen ground which is excessive hard and
never thaws lower that depth which a consequence is a never-
failing foundation in these parts." Thus did Norton skate
over the perils of permafrost. His masons upon investigating
the rocks available at Churchill informed Norton that they
were "too hard a nature for their tools to cut into any shape
or form" and Norton in the absence of expert advice—his head

mason Thomas Kalay had died upon stepping ashore—accepted their findings uncritically.²¹ The fort would consist of random stone construction instead of regular courses of squared stone (ashlar). This innovation, representing perhaps a desire on the part of the masons to avoid the laborious task of shaping stones, presented an ominous first departure from the original scheme.²² The Committee, like Norton, ignored the implications.

For the next two years Norton was able to work ahead without interference. Immediately after the departure of the ship in 1731, he began digging the foundation trench 9 ft. wide and 7 ft. deep for the southeast face and flank of the south bastion which was completely excavated when weather forced cessation of work 10 September.²³ In the meantime, the masons opened a quarry near the old factory to obtain stone for the eventual construction above ground. The old factory still had to serve as headquarters during the construction phase and in the late fall and winter, renovations were made to accommodate the swollen complement of men and stores, including the construction of a storehouse and three storey house which measured 24 feet square.²⁴ In anticipation of the construction season of 1732, Norton's carpenters prepared the frame for a house to accommodate the work crew on Eskimo Point.²⁵ In March, this was hauled down to the site and near the end of April, Norton sent down a crew to assemble the building and clad it with boards.²⁶ By 8 May when the gang of workmen was dispatched to the point, the building was complete with the exception of the chimney and oven.²⁷ There was very little the main crew could accomplish in the cold weather of early May. The trench dug the previous fall was cleared of snow, and stones and clay were hauled to the site in anticipation of the thaw.²⁸ Finally, 3 June Norton ceremoniously "laid ye first stone in ye foundation of our new fort & gave our people some liquor in wch wee all drank a health to our masters success to ye building."²⁹

The work on the foundations continued over the next year. The masons first finished the south bastion to ground level, the foundation being eight feet wide and consisting of random stone bedded in clay or mudd mortar and perhaps laid in rough courses.³⁰ Earth was then backfilled between the wall and the side of the nine foot trench.³¹ In the meantime, the labourers were excavating the southeast curtain and the east bastion and a considerable quantity of stone and clay was brought to the side of the trenches before the crew retired to the old factory 27 September.³² In 1733 the masons began to fill these foundation trenches 21 May (this time building nine feet wide which was the full width of the trench) and when the ship arrived 2 August the foundation of the southeast curtain and the flank and face of the east bastion had been completed.³³ By the time that the crew retired from the site 28 September, the trench for the northeast curtain and face and flank for the north bastion had been "cleared" and a start made on the northwest square.³⁴ In 1734 these foundations were presumably completed and a start made on the northwest curtain and the west bastion.

By 1734 the work had assumed a certain routine. The months from May to the end of September were spent in busy activity at the site; labourers cleared the way for the line of the outer wall and where necessary excavated the foundations, hauled stones and clay to the work site or assisted the masons, who whenever possible were employed in laying the foundations. When not building, the masons laboriously split large rocks for stone to proceed with the construction. Norton, stationed at the old factory, made frequent visits to Eskimo Point and in 1734 "perceiving our masons can make but little hand at splitting rocks with wages &c he gave orders to ye masons to drill holes in ye rocks in order to burst ym with Gunpowder."³⁵ The experiment was successful and in future the large rocks were broken down by blasting. At first Norton himself undertook the task, but later various labourers were given extra wages to do the dangerous work. And it was dan-

gerous. Norton was knocked down by a blast in the first few days of experimentation and later others were severely injured by premature explosion when driving in the wooden plugs.³⁶ The winter months were spent at the old factory undertaking repairs and new building (the frequent repairs to the old factory underlined Beale's call for a replacement in 1729) or in preparing for the following construction season by quarrying, gathering timber or repairing tools. All in all, Norton and his crew appeared to be settling down to a long term construction project.

The Committee had been remarkably silent regarding the construction and had without question filled Norton's requests for men and supplies.³⁷ Its desire to see the work completed was indicated in 1733 when it sent a gentle reminder to Norton to undertake the work as quickly as possible.³⁸ This Norton promised to do and rather casually added his estimate that the four masons and a total crew of from 84 to 109 men, depending on whether there were two or four draughts of cattle, should be able to finish the stone work "in six or seven years time at farthest."³⁹ Of the number of men required to fill between the rampart walls as the masons built them he had no idea. His projection provoked an immediate response from the committee.

Norton had in effect indicated that it would take a minimum of six or seven years just to finish the stone work and even to meet this time schedule he would require additional men and draught animals. By 1733 he had already been engaged two years on the project and had not even completed the foundation for the outer rampart wall; in fact, there was nothing yet showing above ground. The Committee men huddled in worried sessions in March 1733 and 1734 and reconsidered the original plan.⁴⁰ Because it would "require a longer time to complete the same and be a much greater expense to the Company than was at first apprehended" the sub-committee now reduced the work although it planned to use the foundations already com-

pleted by Norton. Captain Spurrell was directed to prepare two copies of the plan as modified. By the time that the general letter to Churchill was draughted 3 May, yet another plan was devised.⁴¹ The Committee in effect offered two options to Norton. The first, indicated on Plan A. involved building up the two sides of the fort facing the river into a battery behind which would be erected a wooden factory. This would be entirely enclosed by building a fortified stone wall connecting the two ends of the battery and thus defending the rear or sea side of the factory battery. The Committee added that

a fort finish'd in this manner will be almost as defencible as a fort built after the first model and will be finished in a sixth part of of the time and at a sixth part of the charge for wee apprehend the wooden fort will tike up but about the same proportion of work as the severall places woud do that were intended to be built within the present fortification.⁴²

The second option, indicated on Plan B, was to be adopted if Norton had completed the foundations for the "Westermost flanker and northermost curtain." Norton was instructed to consult with Captain Spurrell if he had any questions but it was made very clear that he was to chose one of the two options, and once the choice was made "upon no pretence whatsoever to vary in the least" from it.

Norton's letters from 1734 have not survived and therefore, his choice is not definitely known. However, he had done considerable work on the west flanker and the north curtain and therefore in accordance with the Committee's instructions he was to adopt Plan B. In fact, he may have adopted neither for a council was held at the factory when the ship arrived from England and the council may have made modifications to Plan B. Nevertheless, the day that the Hudson Bay sailed for England, Norton went down to Eskimo Point with "ye new plan of ye Building" and "sett ye masons to work on ye square next to ye River side...."⁴³ From that point, the

masons commenced to build up the rampart walls.⁴⁴ Norton had also been directed to erect a battery of six guns on Cape Merry, a simple blockhouse affair to be manned two months of the year when there was a threat of an attack from the sea.⁴⁵ Actually Norton instead commenced a battery on the same side of the Churchill as the new fort, perhaps explaining his divergence from the Committee's instructions in his missing letters of 1734.⁴⁶

Norton's acceptance or rejection of Plan B. is not overly significant for during the winter 1734-35 the Committee devised yet another plan, Plan C, which was a modified version of Plan B.⁴⁷ The new version involved the completion of the outer works in their original shape but scaled down considerably in size. Whereas before the ramparts were to be over 40 feet in width at the base they were not to be only 24 feet and the height was almost halved to ten feet.⁴⁸ Within the outer fortifications a factory constructed in wood or stone ("as may be found proper") on the four flanker-four shed design similar to the 1740s plan of York was to be erected with a powder magazine in the centre. Again the Committee ordered that the plan

strictly be observ'd & followed in every part and you are not very from it on any pretense whatsoever and wee expect you will with the utmost expedition to finish the said work, having supplied you with everything necessary for carrying on the same.⁴⁹

Norton himself had little time to implement the Committee's Plan C for in the summer of 1735 he sailed home on leave to England. Over the course of the winter there was yet another modification to the plan for Prince of Wales's Fort probably through Norton's intervention and his appearance before the Committee. This solution which would govern Norton's approach to the building throughout the rest of 1730s represented a compromise between Plan C and perhaps the original proposal of 1730-31. The exterior ramparts as modified in Plan C were retained but the small factory planned for the enceinte was

omitted and instead a number of stone buildings would be erected. In the spring, Spurrell submitted a plan for one of these, the dwelling house, but probably on Norton's recommendation its construction was postponed until the rampart walls were completed. Norton had apparently vindicated himself and his approach to the building in his appearance before the Committee and he returned to his former position at Churchill in the summer of 1736.⁵⁰

During the next five years Norton proceeded steadily upon the work at Churchill, while the Committee growing increasingly impatient as the construction of even the modified version of the fort went on endlessly, became more and more critical. The first priority was the rampart walls.⁵¹ This involved the construction of outer and inner walls while filling up the interval between them with gravel. When Norton returned in 1736 he found work proceeding on the south and east bastions and the connecting southeast curtain. Norton pulled the masons off to do work at the old factory and to erect a new lime-kiln while the labourers collected stone for the construction next season. The following spring he started work on the northwest square (the north and west bastions and the connecting northwest curtain) and in 1738 he began work on the northeast square. By 21 August Norton recorded proudly in his journal that he had completed the interior and exterior casings of all four bastions and northwest, southeast and half the southwest curtain ten feet high.⁵² There remained to build only one half of the southwest curtain and the northeast curtain.

The Committee did not share his pleasure with the progress of the work. Already in 1737, the year after Norton's trip to England, it reminded him that he had been directed to complete the walls as soon as possible so that a start could be made on the Factory House.⁵³ The latter became the focus of the Committee's discontent. Construction at Churchill had been commenced a long and expensive six years before

and the fort was still uninhabitable. Until the house was completed a permanent move from the old factory was impossible. In 1738 the Committee, growing disenchanted with Norton's management in other areas, became even more direct in its criticisms of the slow progress in building.⁵⁴ First Norton was brought to task for employing the masons in the summer and fall, 1736, on repairing the old factory and building a new lime-kiln "notwithstanding our positive orders to him here to carry on the new building with the utmost expedition."⁵⁵ A plan for the factory house and warehouse was sent out with Captain Spurrell in the spring of 1738 and Norton was ordered to commence digging the foundations for it as soon as the ship arrived. Anticipating arguments from Norton that the rampart walls would have to be completed first, the Committee now sent out a new engine for raising stone which would mean that the house construction would provide no impediment to other construction.

Norton's view prevailed in the end. When the Committee's instructions arrived, he immediately asked the factory council to consider the points raised in the general letter.⁵⁶ The council defended Norton's use of the masons in 1736 and after considering the factory house in great detail, it agreed with Norton that it should be postponed until the following year, when the ramparts would be completed. The council argued that the ramparts were very close to completion and would be held up considerably if men were shifted to work on the house, but more important, the site for the factory house was covered with materials gathered for the construction of the ramparts. It would take as much time to move them as it would to use them in the construction of the ramparts. Norton added that he would have the ramparts finished by the following July and that a start would be made immediately then to the factory house.⁵⁷

As Norton had promised, the rampart walls were completed in the summer of 1739 and a start was made on the factory

house.⁵⁸ The carpenters, Richard Ford and William Grant were sent out in 1739, and did much to expedite the work.⁵⁹ In the summer 1740, the ships were unloaded at the new factory and in August, Norton himself moved down permanently.⁶⁰ Although the carpenters were still working on the interior fittings Norton held a house warming 27 September.

I gave our men liquor for housewarming with which wee all drank the following healths, and discharged a vollie of small arms and 3 pieces of cannon at each health vizt. to church and king, to the Prince of Wales and the Royal family, to the Honble Hudson Bay Compy, to success to the fort against all Enemies, to all the Comp. as servants in genll and concluded the Evening with Repeating ye Honble Y Govr. ye 61
Depty Govrs and Committees healths separately.

After the new factory was occupied, the tempo of the work picked up. The heavy time-consuming construction was now out of the way, for the ramparts by the fall of 1740 were completed to their intended height of ten feet and lacked only some gravel fill and the parapet. The factory house and warehouse required only interior finishing. There were incentives to get on with the work. The Committee's letter of 1740 brought news that war had been declared against Spain with the possibility of war against France as well.⁶² Norton, with the advice of his council, cancelled the northern expedition for 1741 to concentrate on making the new fort defensible.⁶³ In the summer of 1741, he hired Indians to work on the construction, an apparent last resort to increase his work force which had not been attempted earlier in the decade.⁶⁴ Norton seemed personally eager to speed along the construction. He had applied for leave to return to England in 1741 at the expiration of his five year contract. His commitment to the Committee in 1736 is not known but it very likely involved a promise to complete the works by the end of his contract. He would need to make full use of his time 1740-41 in order to be able to present to the Committee a good progress report when he appeared before them.

During the last frantic year of construction there was concentration in two areas: the defences and the addition of necessary service buildings. The ramparts still required gravel fill and throughout the last months of 1740 and spring and summer months of 1741 the men were busily employed at the wheelbarrows hauling fill to dump between the rampart walls.⁶⁵ But the most serious deficiency was the lack of a parapet. Norton had concentrated on carrying the walls up to a defensible height of ten feet so that the house could be constructed and the fort occupied. It was planned that a stone parapet would then be added. But Norton had indicated in 1737 that he did not think that the walls could carry the weight of a stone parapet and had suggested bricks as the lighter alternative.⁶⁶ Now with the declaration of war he was able to choose another way out; in the interest of immediate defence he erected a parapet of wood five feet high and three feet thick at the base tapering to one foot thickness at the top, the whole filled with gravel, completely around his works.⁶⁷ It was pierced with 48 "port holes" for cannon and Norton now began to mount pieces of ordnance sent out from England or scrounged from the old factory.⁶⁸ In addition he requested two more six pounders and 18 twelve pounders.⁶⁹ Those he had on hand he mounted on wooden ground platforms hastily constructed by his carpenters.⁷⁰ He also quickly finished the gates and gateway and to complete the defences 30 April 1741 Norton "delin-
 enated a Ravelin before our principle Gates designing to build it with heavy stone and Gravell its use is to prevent an Enemies Battering on our Gates...."⁷¹ This was almost a token filling out of the original plan to indicate that he had done all that had been asked.

On the interior of the fort, Norton put the finishing touches to the factory house and warehouse; men were employed installing cabins, building stairs, and giving a flourish to Norton's own quarters.⁷² In the summer of 1740, he then turned to the construction in stone of a range of buildings along

the northeast curtain accommodating a smiths shop, cook room, brew house, bake house and provision shed.⁷³ Late in May he made a start to the brick and stone powder magazine in the north bastion and at the end of July, two days before he embarked for England, Norton moved the powder into it.⁷⁴

On 31 July 1741 Norton set sail for England on the Sea Horse, Captain George Spurrell commanding.⁷⁵ It was apparent, that he felt the construction was completed. The carpenters, Richard Ford and William Grant, were sent to York as the Committee directed, there being no further need for them at Churchill.⁷⁶ More remarkably the masons William Huntington and Robert White sent out from England that year were sent home again. They had inspected the stone available at Churchill and had concluded that it was impossible to build a parapet in stone and their advice was confirmed by a hastily called factory council. There was, therefore, no further need for masons at the works. Norton's tone in his general letter seemed almost triumphant. In his mind, the stone fort was finished and this he could report personally to the Committee. Unfortunately, or perhaps fortunately as the events of the following year would prove, he was denied the opportunity for he died soon after stepping ashore 3 October 1741.⁷⁷

The Committee had seemed quite content with the construction at Churchill after it had been pacified with the much delayed start of the factory house. Its annual letters expressed satisfaction with Norton's reports of steady progress. Over the winter of 1741-42 however, it was suddenly made aware of the true state of affairs at its new factory at Churchill. Robert Pilgrim, Norton's second, refused to sign the general letter sent from the factory in 1741 and sent home a private letter in which he apparently criticized the decision of the factory council not to build the parapet in stone and also pointed out weaknesses in the construction of the fort.⁷⁸ With Pilgrim's complaints in hand, the Committee began to make inquiries of their own, including talking to the

masons who Norton had sent home.⁷⁹ Probably too with the death of Norton, Captain George Spurrell and Richard Ford, who was at home on leave in London, finally felt free to come forward to give "informations" to the Governor and Committee.⁸⁰ The Committee responded with all the rancour of the deceived. The general letters of Spring 1742 was scathing in its criticism of the completed factory and furthermore indicated that the Committee felt that it had been deliberately misled:

We observe what you write concerning the present state of our Fortifications and we are very sorry to find by the informations we have received, it doth not answer our expectations, nor the great charge we have been at.....⁸¹

The Committee was quite correct in its indictment of Norton who through ignorance or design had been responsible for many of the mistakes of Churchill but it conveniently ignored that it too had to shoulder a part of the blame.

The factory could be criticized on two grounds: basic design and workmanship. In design the ramparts were far too narrow to accommodate a proper parapet and still leave enough room for working the guns. The Committee did not seem to realize the dimensions had been based upon a plan (Plan C) drawn up by Spurrell and approved by it in 1734-35. Norton had warned as early as 1737 that there was not enough room on the ramparts and his requisition of 12 pounders as the "properest" guns for the new fort instead of 24 pounders should have been an indication to the Committee that something was basically wrong.⁸² The jerry-built parapet of wood, which the Committee rightly observed was "not strong enough for a defence against an enemy's cannon," was erected by Norton partly because there was simply not enough room for a proper parapet. As for the masons' excuse that it was impossible to find stone suitable for the parapet, later events proved that this was probably a deliberate attempt to mislead, perhaps even with Norton's collaboration as the Committee implied.⁸³ Norton knew better than anyone that the rampart walls were simply too weak to bear a heavy stone parapet. He had said as much in 1737 when

the Committee had chosen to ignore him and even now the Committee did not seem to be fully aware of the shoddy nature of the masonry walls, although they had been told that part of the walls were not bedded in mortar and that already lengths of wall had fallen down. Here was a case of poor execution which dated as far back as the first year of construction when Norton had been advised by the masons that the stone was too hard to work properly and consequently Norton had turned to rough coursing, almost random stone construction. Here too the Committee should have known what was happening for Norton reported fully on the change in plans and had requested four Oxford masons experienced in rough laying, which request the Committee had filled. The decision not to use lime mortar had probably grown out of the first, and with the exception of a short period when Joseph Robson apparently bedded the stone in lime mortar, it was not used in any of the walls.⁸⁴ Finally, the Committee, blissfully ignorant of the problems of erecting a stone fort on the shores of the Bay, had pushed Norton relentlessly to forward the construction. It is not surprising then that Norton "seemed more desirous to have much work done, than to have it well done" as he in turn pushed his workmen so that he could send home pleasing reports to the Committee.⁸⁵ Even in 1742, with critical reports in hand, the Committee was not fully aware of the magnitude of the problems at Churchill and for almost a decade ordered stop-gap remedies to attempt to patch up their slipshod fortification.

In its general letter 1742, the Committee directed that immediate steps be taken to remedy the defects of its new fort.⁸⁶ First it ordered that the interior rampart wall of the southeast curtain (the curtain facing the river) be taken down and rebuilt eight feet further to increase the width sufficiently to allow for the construction of a proper stone parapet and still leave enough room for the operation of the guns. Next it ordered that the flanker containing the magazine be filled up with gravel to the height of the rampart gun

platform, thus creating an area sufficiently large for mounting and operating ordnance. In each of the other three bastions, the interior walls were to be taken down and vaulted storerooms constructed in the gorge so that gravel could be placed on top thus creating an adequate platform. Finally, a parapet built of stone laid in mortar was to be constructed on the two bastions and curtain next to the river. Thus the Committee began its reformation of the stone fort, believing that minor adjustments would be sufficient to correct its weaknesses.

James Isham, who had replaced Norton in the charge of Prince of Wales's Fort, had the responsibility for carrying out the Committee's directions. Probably in consultation with Spurrell and Ford, Isham and his council somewhat altered the Committee's proposals.⁸⁷ The interior wall of the curtain facing the river would be moved in 16 feet at bottom and slope in four feet to the top so that the new rampart wall, allowing six feet for the parapet, would have "30 foot for ye guns to play upon." They also modified the dimensions of the storerooms for the vacant flankers to allow two feet of gravel over the arch.⁸⁸ The magazine flanker would be filled immediately after shiptime. Isham also proposed to construct a stockade around the works to prevent the men from trading with the Indians at times when the snow allowed free intercourse between fort and the outside. All these projects would be extensive and Isham requested additional men and horses. His pleas, repeated year after year, went unanswered. The Committee after pouring men and resources into the initial construction project were not prepared to continue doing so through the 1740s.⁸⁹

Isham moved quickly into the repairs. By the late fall he completed the storeroom in the south flanker, had backfilled the gravel to the level of the ramparts and had laid four platforms on which he mounted guns.⁹⁰ Immediately he began work on the storeroom for the east bastion.⁹¹ The following spring and summer he simultaneously worked on the east bastion, the

west bastion and the passageway to the magazine, the latter being necessary to reach the magazine once the north flanker had been filled with gravel.⁹² In the meantime, he also gathered materials for his proposed stockade. In September he cleared the ground to prepare to lay the foundation for the new interior wall of the southeast curtain and managed to begin the work before the frost ruled out the use of mortar.⁹³ At the same time, the labourers collected stone for the parapet. In the spring, he continued his ambitious pace. He began work immediately on the southeast curtain and by mid-July the masons had finished and had begun work on the parapet.⁹⁴ When the ship arrived 1 August Isham could report considerable progress.

The general letter from the committee brought yet another project for Isham's crew.⁹⁵ England was now engaged in war with France and to strengthen Churchill's defences the Committee wanted a battery of six guns built immediately on Cape Merry. Two of the guns were to defend the river entrance, the other four to be positioned to fire on shipping which successfully entered the river and passed the factory. The battery was to have a proper breast work and a barracks or lodge house to accommodate 12 men who would be stationed at Cape Merry from the break-up of ice to the last day of September. Spurrell and Coats would advise as to the proper location for the battery, construction of which was to begin immediately.

Isham obediently pulled his men off all the other works and applied them to the construction of the new battery at Cape Merry. The masons were sent over to begin the work 23 August, and Isham, plan in hand, went over himself 27 August to "draw ye work out."⁹⁶ In the meantime, the carpenters prepared the frame for the square lodge house at the stone fort and at the end of August hauled it over to Cape Merry.⁹⁷ By mid-September, all work ceased for want of boards to cover the guard house and because it was "to cold to work with mor-

tar."⁹⁸ In the spring, work recommenced. The cannon which had been landed on the fort side by mistake were hauled across to Cape Merry.⁹⁹ Near the end of April, men were sent over to finish the breast work and the lodge house.¹⁰⁰ At the end of June, the masons had finished the breast work and gun ports as well as a small magazine.¹⁰¹ In July Isham was mounting the guns.¹⁰²

The completion of the battery at Cape Merry was another accomplishment added to a long list of achievements by Isham in the four years he had been in charge at Prince of Wales's Fort. He had rebuilt the southeast curtain wall, filled up the ramparts and made a start on the parapet; he had built the storehouses in three bastions, filled up the magazine flanker and had done a thorough job in building gun platforms and mounting cannon on the ramparts. He had also completed a stockade around the works, attempted unsuccessfully to provide an internal water supply by digging a well and had carried out numerous other renovations to make the uncomfortable fort more inhabitable. And yet when Isham left in 1745 on leave to England, the Committee was less than happy. In 1744 Isham had reported that the magazine was so damp that it was not fit to store powder.¹⁰³ In fact all the storehouses in the bastions had proved to be useless in summer when the water dripped from the walls.¹⁰⁴ The Committee would simply tolerate no mistakes at Churchill and certainly no more expense. Isham and his Council were chastized for being "so careless & neglectful in building the Powder magazine" and directed to rectify it immediately.¹⁰⁵ In response to a request for horses, the Committee refused and suggested that he try to obtain fawns and raise them to supply the place of horses as they did in Russia and Siberia. Probably with relief, Isham, who had been ill with gout much of his time at Churchill, received permission to return to England.

Robert Pilgrim, James Isham's second, took over from Isham in 1745. During the three years he was in charge, not a great deal was accomplished in the building way and at

least the last two years were spent in acrimonious debate as to how the building should proceed. The remainder of the season 1745 and a good part of the spring and early summer 1746 Pilgrim spent in making the magazine usable.¹⁰⁶ The gravel was all stripped off the building, and the magazine extensively rebuilt from the ground up, this time being provided with better ventilation. Lead sent out from England in 1746, was applied to make a watertight roof.¹⁰⁷ Pilgrim then turned to coping the interior wall of the southeast curtain and made preparations to proceed with the parapet.¹⁰⁸

At this point Pilgrim's progress ground to a halt. Two men were sent to Prince of Wales's in 1746 both of whom changed drastically the course of work. Joseph Robson "an expert mason" was transferred from York to become supervisor of building at Churchill.¹⁰⁹ Robson had been at the fort between 1733 and 1736 and during the one year he returned to Prince of Wales's in 1746-47 he was locked in constant debate with Pilgrim as to how to proceed with the construction. At the same time, Robert Evison "engineer" was sent out from England "to train up your people to make a gallant defence if attacked."¹¹⁰ This he did faithfully exercising the men in small groups or large (weather permitting) and also attempting to teach the men how to fire the cannon, with discouraging results.¹¹¹ But Evison was also instructed to inspect Cape Merry battery to ensure that the guns were properly placed "to prevent an enemy from entering the river."¹¹² Evison did not think much of the battery and said so to the Committee; in fact, he thought it would be better located on the same bank of the river as the fort.¹¹³ But the Committee concluded that Isham had wrongly placed the battery on the cape and consequently in 1747 ordered it rebuilt so that the entire construction season of 1747-48 was spent at Cape Merry instead of on the fort walls.

Robson had not been at the fort three weeks before he and the Governor were at loggerheads. In the late summer, when he

arrived the masons and their helpers were constructing the parapet on the southeast curtain. Robson was convinced that the embrasures were being built incorrectly and proposed a shape used "in the modern fortifications at Portsmouth and other places" and he initially believed that the Governor was in agreement with him.¹¹⁴ Consequently, the masons began shaping the stones according to Robson's directions. Robson soon discovered that Pilgrim did not agree—in fact, Pilgrim was following the original scheme as approved by the Committee—and further, Pilgrim regarded Robson as a challenge to his authority. There followed a winter of paranoia possible only in a community as isolated and introverted as a Bayside fort. Robson was dropped from the Governor's soirees as was Evison who at first sided with Robson but later wisely switched to the side of the Governor. Both sides built models to support their case and Pilgrim even went up on the ramparts to test a cannon in the embrasure already completed. In the end, it was the Governor's authority which prevailed. He ordered the masons to cut the stones his way, even going to the point of ordering those already cut to be changed. And at shiptime, 1747, Robson was without notice ordered home.¹¹⁵ The Committee eventually upheld Pilgrim by endorsing his method of constructing the embrasures, although Pilgrim's shift to Moose in 1748 may have been attributable in part of his difficulties with Robson.¹¹⁶ It was an unfortunate affair for Robson, who was a capable mason, although perhaps not quite as capable as he himself would have liked to believe. He could have made a real contribution to the renovation of the mouldring fort.

Work did begin on the parapet in the spring 1747 despite the dispute between Pilgrim and Robson. In preparation the necessary stone was removed from the southeast to the northeast curtain and at the end of April the carpenter was "pulling down some part of ye wooding parapet of ye S.E. courtain in order for ye masons to go to work as soon as yt thaws."¹¹⁷ Finally at the end of May, a start was made on construction.

The beginning was ominous for Pilgrim discovered that before the parapet could be constructed several of the stones had to be taken out of the wall and newly bedded in mortar and others replaced completely.¹¹⁸ In effect, it meant rebuilding much of the old exterior rampart wall before a parapet could be put in place and as Isbister discovered later, the southeast curtain was no exception.

The parapet along the curtain was completed, aside from the coping, by the end of July.¹¹⁹ Before the masons could turn to the next section the general letter arrived from the Governor and Committee ordering that the battery be rebuilt on Cape Merry.¹²⁰ Contrary to their instructions the battery had been built in such a way that the guns could be turned on the factory.¹²¹ Pilgrim, Evison and Fowler, the ship captain, were to decide upon a new location on Cape Merry and commence construction immediately. The project monopolized all the resources of the tradesmen. From 17 August 1747, when Evison and the masons went over to the cape to begin the new battery until July 1748 when the guns were mounted, little else was done in the way of construction.¹²² The battery was Pilgrim's last project for by the general letter 1748 he was sent to take charge of Moose and was replaced by Joseph Isbister.

Isbister arrived at his new charge 17 August 1748 and noted in his journal:

At my landing I found the factory in good order and ye battery at Cape Merry finished but the walls of ye fort itself in a bad condition. Several parts in ye exterior wall ready to tumble down and must be all of it taken down to the foundation before any parapet can be built upon it.....¹²³

The Committee was "surprised and concerned" to discover the state of its factory, "to find that the Building of Prince of Wales's Fort is in some places so ruinous already notwithstanding the great expence we have been at to have it finished in a workmanlike manner."¹²⁴ Nevertheless it directed Isbister to repair its defects and to ensure "what new work is made

be done in the strongest and best manner as possible...." Little did it realise what this would entail. An indication was given in the fall 1749 when Robert Evison returned to London and apparently at the request of the committee drew a plan which pointed out the condition of the rampart walls.¹²⁵ However, Evison was willing to concede that parts of the wall were "pretty good for not being laid in mortar" and only specifically mentioned small sections which would have to be completely rebuilt. For those on the spot, however, as they took steps to install the parapet, total rebuilding seemed to be the only solution.

Under Joseph Isbister, the serious reformation of Prince of Wales's began. Isham's work had been cosmetic and confined to correcting some of the serious defects in the original design. Pilgrim, in attempting to put the stone parapet in place, had seen that it was impossible unless the outer rampart wall was considerably strengthened. But he had made only a modest beginning to reconstruction on the southeast curtain. To Isbister and his successors Ferdinand Jacobs and later Moses Norton fell the laborious task of methodically moving around the trace of the fort, dismantling the outer rampart wall (the parapet wall), rebuilding it, putting the parapet in place, and then rebuilding the interior rampart wall to give sufficient width to the ramparts for the guns to work. In effect, the entire fort was reconstructed and not until 1771 would the work finally be completed.

Remarkably, after 1748 the Committee did not hound the Governors in the same way as it had Norton, Isham and Pilgrim. The mistakes and the expense of correlation were blamed upon "the neglect of our former chiefs" and the Committee seemed resigned to a work of long duration.¹²⁶ It contented itself with the occasional prod to get the work moving and frequently expressed satisfaction with the progress. But it was also not overly generous in supplying draught animals, masons and labourers. At first it stuck with its resolve to have the

factory train fawns for drawing the stone and only after repeated arguments from Churchill that this was impossible did it reluctantly send out draught horses in 1750.¹²⁷ Seldom were there more than two masons working at any given time and mostly there were fewer, forcing Isbister, Jacobs or Norton themselves to work upon the walls. The complaints about the quality of the masons were frequent. In 1751, Isbister complained that the mason sent out was so "much addicted to liquor that little can be expected from him."¹²⁸ Dominique Manners, a mason who had served at many posts on the Bay in the first half of the century had become so infirm by 1754 when he returned to Prince of Wales's Fort that "the cold weather has so great an effect on him that he spends three quarters of the day at the fire warming himself" instead of working stones. He struggled on until 1757, however as there was no replacement available, until finally Jacobs considered him "superannuated" and sent him home on the ship that summer.¹²⁹ There were complaints too about the need to train the masons for they changed frequently, few staying out more than the three years called for in the standard contract. In 1750 Jacobs found that two masons recruited by the ship Captain in the Orkneys had no experience in hewing heavy stone and muttered in his Journal "I have spent 4 years here & have not done half ye work I could have done, had I had horses & workmen in time to have carried on the building."¹³⁰ A part of the difficulty was the problem in recruiting tradesmen; year after year, especially in the 1750s the Committee found that masons and carpenters were simply not available to send out to the Bay.¹³¹ The complement of men assigned to Churchill in these years was held to around 46 and for them building was only one of the many activities which had to be performed. The shortage of men and skilled workmen meant that the rebuilding proceeded at an extremely slow pace.

The actual building took up only a small portion of the

masons' time and must have provided a welcome relief from the monotonous working of stone. Most of the stone hewing took place over the winter when construction with mortar was impossible and, according to Jacobs, when the stone, full of frost, was brittle and easy to hew.¹³² The masons worked in sheds (or at one point, in a tent) erected for that purpose on a hill behind the fort or later within the fort walls. The rough stones were taken out and placed near the section of the wall to be rebuilt and replaced with a fresh supply of rough material. Two types of stone were used in the construction, "blue stone" for the ashlar wall coursing and "white stone" for the highly worked sections of the parapet and coping. Blue stones were found in the terrain surrounding the fort; they do not appear to have been quarried although they may have been collected by Norton for the earlier work. It was an extremely hard stone—in fact Norton's masons had maintained in 1731 that it could not be worked—and a slow process for the mason with his helper striking to him to shape into square blocks. Two masons with helpers could only square from 20 to an exceptional 60 running feet in a five and one half day week in spite of the incentive offered by Jacobs of a quart of brandy made into bumbo for each 20 feet produced.¹³³ The white stone was drawn up from river tidal flats and, being soft, could be easily worked. Once enough stone had been worked for the section designated for reconstruction, the masons turned to building.

Only sections of the wall were rebuilt at a time. A flank and face of a bastion or in some cases, a whole curtain wall were selected and the stone prepared for its reconstruction. When possible the stone for the parapet was shaped at the same time and in one case at least, the parapet was pre-assembled on the ground to ease its placement in the actual construction work. Usually in the late spring or early summer, the selected portion of the wall and the wooden parapet were dismantled and the gravel fill and other debris cleared away.

Isbister especially did not allow the occasion to pass without comment and his journal usually registers his disgust

our work must be taken down to ye ground other wies it will fall of its self for ye whole length of the curtain & both sides of ye gateway for as it is it will not beare the weight of a parrept (I should have likt it much better if there had not been one stone laid in ye part that fell to my share to do it would have been more to my credit & not so much trouble to me as it now is in takeing down bad walls & to be lumberd with the stones that are of no service only to burry in ye insid of ye walls & rubish to carry away (this S.W. Curtin is ye wrost of all which my predecessors did not care to undertake beginning at the best part to carry round ye parrept.¹³⁴

Sheers and blocks and tackle were repaired and put in place and construction of the wall begun by carefully laying the first course. The wall to the parapet was six courses high, each course consisting of carefully squared stones all bedded in mortar. The mistake of laying the stone dry in the first construction was well noted and lime was burned regularly in a large kiln near the factory. The fill for the ramparts this time appears to have been rubble stone with a gravel topping backfilled as the masons carried the walls up. After the walls had been completed, the parapet was added immediately if the stones had already been prepared, or as soon as possible afterwards. Once the interior rampart wall had been constructed, the rampart was topped and levelled with gravel and wooden ground platforms installed for the guns. The process of systematic reconstruction was time consuming and the Committee must have waited anxiously each year for the general letter from the factory recording the achievements of the previous year.

A brief chronology indicates the slow progress of the work. Isbister between 1748 and 1752 had time only to complete the river side of the east bastion and the southwest curtain from the flank of the south bastion to the gate. Ferdinand Jacobs picked up where Isbister left off and by

1757 had finished the outer work for the southwest square of the fort. Jacobs then turned to build "ye interieur wall of the said S.Wt. coutain to the same thickness of the S. Et. east coutain that the guns which are on the S.Wt. courtain may have room to recoil, it being now much too narrow for them should we have occasion to make use of them."¹³⁵ This represented an important departure in the process of reconstruction. Following the Committee's direction of 1742 only the river curtain was to be widened but Jacob's decision to widen the southwest curtain as well as later extended to the other two curtains so that ultimately all four curtains were rebuilt. The southwest curtain was completed by 1759 and Jacobs began the northwest square of the fort so that when he was transferred to York, in 1762, most of its exterior was finished. There remained the north bastion and the northeast curtain in addition to the inside rampart walls of the northwest and northeast curtains "without wch our guns on those curtains will not have above 14 foot play whereas ye S.W. & S.E. curtains has 30 foot from ye inside of ye parapet to ye top of ye inside rampart wall."¹³⁶ It took Moses Norton, Jacobs successor until 1769 to complete these last portions because the masons were taken off to complete a range of offices and other work apart from the walls. In 1770 one mason was retained to build a half moon battery (probably the ravelin) before the gate. Finally in 1771 when the mason Robert Brander was sent home after three postponements, Norton considered the work completed.

The reconstruction work had been over twenty years in execution. Most of the time and energy had been developed to rebuilding the rampart walls and the installation of the parapet and gun platforms. In addition, however, there was some new work undertaken in connection with the buildings. A new cook room and a larger stable were built by Jacobs to replace that of 1753 erected by Richard Norton.¹³⁷ Jacobs also completed a warehouse near the launch erected by Isbister in

1750.¹³⁸ Also Moses Norton had the masons erect in stone "a new cook room Smith Shop & other offices"¹³⁹ for the accommodation of the various services of the factory. This last involved diverting the masons from work on the walls which caused some concern for the Committee again eagerly awaiting word that the fort had been completed. More discouraging must have been the frequent reports during the reconstruction period, that elements of Richard Norton's factory, other than the fortification walls, were either faulty in design or had decayed to the point where replacement was necessary. In 1761, it was found for example that the deep snow on the warehouse-trading room and the dwelling house was causing the roof to settle.¹⁴⁰ The snow was shovelled off and the carpenters installed posts to brace the girders inside the buildings but as a more permanent solution, the flat roofs were all rebuilt in the gable style with a nine inch pitch on either side. At the same time, they were all covered again with sheet lead sent out from England. In addition, there was a constant round of repairs to the chimneys and stoves, replacement of palisades and various alterations to the buildings to make them habitable. For the Committee to hear that their uncompleted factory was already undergoing the process of decay must have been discouraging.

Norton's report in 1771 that the work was completed, thus ending a construction period of 40 years, must have given some satisfaction to the Committee. It had patiently waited through the rebuilding period and from time to time, had received assurances from the governors on the Bay, that the new construction was substantial and sound. After completing the southwest curtain and a portion of the west bastion in 1754, Jacobs had reported that this "part of the building is very strong, regular and well built and makes the front of the factory appear grand & beautiful and I will venture to say will stand to the end of many ages."¹⁴¹ And there is no question that Jacobs honestly felt that his work was well executed for his journal

is sprinkled with comments indicating his pride with work just completed. But the Committee, having once received similar assurances from Richard Norton should have been cautious. Neither Moses Norton who remained in charge of the completed Prince of Wales's Fort until he died in 1774 or his temporary replacement Andrew Graham reported any shortcomings in the completed factory. Certainly Norton, who had supervised a good deal of the rebuilding, would not be expected to do so. However, Samuel Hearne, who arrived to take permanent charge of the factory, early in 1776 immediately requested an additional mason "for the walls of the fort stand need of so much repair & the season proper for using mortar is so short that one mason will not be able to repair them as fast as the other parts give way."¹⁴² His assurance that with two masons "they will be able in 2 or 3 seasons to give it such a thorough repair that little will be wanted for many years after" must have provided little security for the Committee. It must have occurred to them that the search for a strong and structurally sound fortification was an elusive one.

The Committee discovered in 1782 that the fortification, not very strong structurally, was also weak defensively. In August 1782 a French squadron under le Comte de la Pérouse appeared before the stone fort and Samuel Hearne surrendered immediately without even offering token resistance.¹⁴³ The odds were formidable. The complement of men at Prince of Wales's Fort numbered only about 40 while la Perouse had ten times that number. Guns alone were not enough—Prince of Wales's Fort at this time mounted an impressive 42 cannons—for the small garrison at Hearne's disposal was scarcely adequate, even had it known how, to adequately man the guns.¹⁴⁴ Added to this were the inherent weaknesses of any post on the Bay: the isolation, the absolute impossibility of receiving reinforcements for at least one year and the dependence of the factory on the countryside for provisions, and in the case of Prince of Wales's Fort, for water. Finally, there was the question

of attitude and training. The servants recruited by the Company had little appetite or aptitude for fighting, except perhaps among themselves. They had been hired as labourers or tradesmen and few felt that their contracts implied an obligation to defend the Company's forts. Regardless of the strength of fortification walls—in the case of Prince of Wales's Fort, even these were suspect—and the number of guns; it was the nature and number of the defenders rather than the defences which mattered in the end.

The French stayed only a short time at Churchill, but long enough to plant charges to blow up key points in the factory. Hearne and his men were taken on board the French vessels to be carried to France. Hearne eventually made his way back to England where over the winter plans were evolved for re-establishing on Churchill River.¹⁴⁵ As at York, a house was pre-fabricated in England to erect immediately when Hearne and his complement of men arrived at Churchill. Men were recruited and supplies requisitioned in order to begin again. The precautions were necessary, for Hearne when he arrived in 1783 reported that "it is almost impossible for anyone to describe the destruction the french have made at the stone fort."¹⁴⁶

The Committee probably with Hearne's advice, had already decided not to relocate in the stone fort. In his instructions Hearne was directed to "make a choice of the most convenient situation above Cucolds Point near or upon the place where the old wooden factory stood (5 miles higher up the river than where the stone fort was built)."¹⁴⁷ Hearne selected "the very spot where the old wood fort stood" and added that it was "far preferable in point of situation to that of the stone fort being much nearer to the woods, water, hunting grounds &c."¹⁴⁸ There he erected his pre-fabricated house and in the years following added other wooden buildings to accommodate his men and the various services required for the factory. The stone Prince of Wales's Fort was left to decay on Eskimo Point.

The decision to abandon the stone fort was admission, albeit tacit, that its construction had been a mistake in the first place. The location had been chosen on defensive grounds, as with a battery on Cape Merry it would command the entrance to Churchill River. The site had little to offer. Knight had remarked in 1717, that Eskimo Point was "impossible for any European to live at;"¹⁴⁹ exposed and barren of foliage it offered little in the way of protection from the elements. Brief glimpses of life inside the buildings of the fort indicate that it must have been close to unbearable: James Isham huddled in his apartment close to his fireplace while suffering from gout, Joseph Robson straining over his draughting board searching vainly for a spot free from water dripping down from above, stone walls of storerooms and living quarters alike which ran with water in summer and were encrusted with hoarfrost ("rime") in winter for which lining the walls with boards seemed to make little difference. The drifting snow piled up against the fortifications and the buildings inside, darkening the interiors so that at times it was impossible to see. There was no source of firewood close at hand. Even fresh water had to be drawn from the vicinity of the old fort nearly six miles away. Attempts had failed to obtain a water supply within the fort walls and therefore water had to be hauled to the factory in casks or in winter snow was melted for all the factory needs. Hay for the horses and cattle was obtained in the marshes near the old factory and the construction there of a combined house and stable in 1752 was an early admission that it was perhaps after all, a preferable site. Living conditions were almost impossible on the Point and defensive considerations which had been paramount in the choice of Eskimo Point and also the design of Prince of Wales's Fort must have seemed less important to the Committee, in view of the events of 1782. Even its most elaborate fortification had failed to withstand an European attack.

There were other more fundamental conclusions to be drawn

from the experience of building the stone fort. The project had pointed out the weaknesses and certainly the limits of the Company's whole approach to building. The Company had employed in the planning for and construction of Prince of Wales's Fort, the same approach it had used at its other bayside posts. The Committee had taken an active hand in designing the fortification and had turned to its captains to provide expertise when required. Both demonstrated the limits of their knowledge and mistakes in design could be traced directly to them; their knowledge of fortification theory was weak as was their knowledge of the building conditions on the Bay. But equally important, their Factors at Churchill did not have the specialized knowledge necessary to advise the Committee regarding stone construction on the Bay. While the two Nortons, Jacobs, Isham, Isbister and Pilgrim may well have had experience with wooden construction, stone construction was simply beyond their competence. None knew fully the effect of frost on mortar or the influence of permafrost on the heavy stone walls. They could not evaluate the advice of their masons, none of whom themselves had had experience in building in similar conditions. The Committee attempted to apply at Churchill 18th century fortification orthodoxy and, not having itself full knowledge or not calling upon those who did, applied it in form rather than substance. While it had done the same at other posts at the Bay, there it was a matter of scale. At Churchill the size of the project magnified the weaknesses to the extreme and brought them home once and for all.

Endnotes

- 1 James F. Kenney, ed. The Founding of Churchill, Being the Journal of Captain James Knight, Governor-in-Chief, in Hudson Bay, from the 18th of July to 13th of September, 1717 (Toronto: J.M. Dent and Sons, 1932)
- 2 Hudson's Bay Company Archives (hereafter cited as HBCA) A.6/4, fos. 30-31, Governor and Committee to Richard Staunton or Chief at Churchill River, 4 June 1919. Throughout the century the post was known variously as Churchill River, Prince of Wales's Fort, or on occasion Prince of Wales Fort.
- 3 HBCA, A.6/5, fos. 29-30, Governor and Committee to Anthony Beale and Council, 21 May, 1927.
- 4 Beale's private letter of 1729 has not survived but Thos. Bird the secretary replied to it, "What you mention in the sd. letter relating to the factory you will find answer'd in a paragraph in the General Letter." HBCA, A.6/5, fo. 43, Thos. Bird to Capt. Beale, 15 May 1730. The meaning of the private letter is reconstructed from the Committee's general letter of 1730.
- 5 HBCA, A.6/5, fos. 42-43, Governor and Committee to Capt. Anto. Beale and Council, 15 May 1739.
- 6 Ibid., B.42/a/11, fos. 5-6, Churchill Journal, entries 17 September to 29 September 1739.
- 7 Ibid., A.1/143, fo. 78, Minutes of a sub-committee, 18 March 1730-31.
- 8 Ibid., Minutes of a sub-committee, 25 March 1731.
- 9 Ibid., fo. 79, Minutes of a sub-committee, 1 April 1731.
- 10 Ibid., Minutes of a sub-committee, 8 April 1731.

- 11 Ibid., A.1/143, fo. Minutes of a sub-committee, 6 May, 1731.
- 12 See Richard Glover's "Introduction" to K.G. Davies, ed., assisted by A.M. Johnson, Letters from Hudson Bay 1703-40 (London: The Hudson's Bay Record Society, 1964), pp. lviii to lx.
- The company documents are strangely silent concerning the role it projected for the stone Prince of Wales's Fort. This in itself can be interpreted I believe as an indication that no grand role was planned for the stone fort and that over the years what was in inception another factory on the Bay turned into the stone fortress which sparked the imagination of later historians. Explanations such as that advanced by A.S. Morton appear almost as a search by the Committee for a role after the fact.
- 13 See biographical note in Letters from Hudson Bay, p. 87 n. 1.
- 14 Joseph Robson, An Account of Six Years Residence in Hudson's Bay from 1733 to 1736 and 1744 to 1747 (Johnson Reprint Corporation, 1965), p. 10.
- 15 Ibid., p. 121, n. 1.
- 16 HBCA, Thomas Macklish to Governor and Committee, 16 August 1730; *ibid.*, p. 15-.
- 17 Ibid., p. 160, n.1. At the same time, Prince of Wales's was made a charge separate from York Factory.
HBCA, A.6/5, fos. 49-50, Governor and Committee to Thos. Macklish and Council, 20 May 1731.
- 18 HBCA, A.6/5, fos. 51-52, Governor and Committee to Richard Norton, 20 May 1731.
- 19 Richard Norton, General Letter (1731), Letters from Hudson Bay, pp. 161-163.
- 20 HBCA, B.42/a/11, fo. 2, Churchill Journal, 6 August 1731.
- 21 Ibid. See Norton's General Letter (1731), *op. cit.*, and *ibid.*, 2 August and 5 August 1731 for the masons searching for rocks. Their contention that the stone could not

- be worked was of course contradicted during the reconstruction of the 1750s and 1760s when both "blue stone" and "white stone" were shaped by the masons.
- 22 Richard Norton, General Letter (1732), Letters from Hudson Bay, pp. 174-178. Norton in the following year signalled the change when he requested, "four masons that is brought up to rough laying which must be had in the country, particularly near Oxford. The masons that is there are brought up to mallet and tool, so are altogether strangers to the aforesaid rough laying, except John Tutty who is well aversed in a quarry and our sort of masonry work....The other masons are sufficient men for ornamental work but the masonry work that is to be done at this building is quite out the their sphere...."
- 23 For Norton's report on the progress of construction see the Churchill General letter, 1732, Letters From Hudson Bay, pp. 174-178; Also HBCA, B.42/a/12, fo. 4, Churchill Journal, entries 23 August and 24 August 1731, and B.42/a/12, fo. 6, entry 10 September 1731.
- 24 General Letter, 1732, Letters from Hudson Bay, pp. 174-178.
- 25 HBCA, B.42/a/12, fo. 19, Churchill Journal, 25 January 1731-32; Ibid., 7 February 1731-32, "our Joyner made an end mortising &c ye frame house till such times he setts it together for good."
- 26 Ibid., B.42/a/12, fo. 22, 20 March 1732; *ibid.*, fo. 26, 29 April 1732.
- 27 Ibid., fo. 27, 8 May 1732; later tarred, *ibid.*, fo. 29, 24 May 1732.
- 28 Ibid., fo. 27, 8 May 1732.
- 29 Ibid., fo. 30, 3 June 1732.
- 30 Ibid., fo. 33, 1 July 1732; *ibid.*, fo. 37, 28 July 1732.
- 31 Ibid., fo. 34, 12 June 1732.
- 32 Ibid., fo. 36, 26 July 1732; *ibid.*, fo. 4, 4 September 1732; *ibid.*, B.42/a/13, fo. 5, 7 September 1732.

- In some instances, it was not necessary to excavate a full seven feet, rock being encountered at the four foot level; B.42/a/13, fo. 5, 7 September 1732; B.42/a/13, fo. 7, 27 September 1732.
- 33 Ibid., B.42/a/13, fo. 28, 21 May 1733; *ibid.*, fo. 36. 24 July 1733; *ibid.*, 25 July 1733.
- 34 Ibid., B.42/a/14, fo. 4, 23 August 1733; *ibid.*, 29 August 1733.
- 35 Ibid., fo. 33, 30 April 1734.
- 36 Ibid., fo. 34, 8 May 1734, Richard Norton and Council, General Letter, 17 August 1736, Letters from Hudson Bay, pp. 210-216.
- 37 For example see HBCA, A.1/114, fo. 20, 8 March 1732-33, Minutes of a sub-committee.
- 38 HBCA, A.6/5, fos. 60-62, 11 May 1732, Governor and Committee to R. Norton and Council; and *ibid.*, fos. 75-77, 10 May 1733, Governor and Committee to Richard Norton and Council.
- 39 Richard Norton, General Letter, 16 August 1733, Letters from Hudson Bay, pp. 184-187.
- 40 HBCA, A.1/144, fos. 39-40, 7 March 1733-34, Minutes of a sub-committee.
- 41 HBCA, A.6/5, fos. 87-89, 3 May 1734, Governor and Committee to Richard Norton and Council. The origin of the second proposal is not clear. At the meeting of 7 March Spurrell was asked to "make two draughts of the plan now agreed to one of which is to be sent over by the next shipping and the other to remain here....," HBCA, A.1/144, fos. 39-40, 7 March 1733-34. On April 11 he handed in "two draughts of a plan," *Ibid.*, A.1/144, fo. 42. However 2 May he was given a gratuity for making "a Draught of Churchill River for the Committee and several other draughts by their order." A.1/144, fo. 44.
- 42 *Ibid.*, A.6/5, fos. 87-89.
- 43 *Ibid.*, B.42/a/15, fo. 3, 8 August 1734, Churchill Journal.

- 44 Ibid., B.42/a/15, fo. 3, 9 August 1734, "Masons working on S.Et. casing of ramparts."
- 45 The decision was made in sub-committee, 7 March 1734, HBCA, A.1/144, fos. 39-40. "We do hereby order and direct that you erect a small stone battery of six guns in the form of a blackhouse upon Cape Merry to prevent an Enemy's coming that way to annoy the fort upon the point, the said battery to be of triangular form with only the side that commands the Isthmus or neck of land to be fortified." HBCA, A.6/5, fos. 87-89, 3 May 1734, Governor and Committee to Richard Norton and Council.
- 46 HBCA, B.42/a/15, fo. 4, 14 August 1734 *passim*, Churchill Journal.

This may have been changed from Cape Merry as a result of a council at Prince of Wales. In his general letter of 1735 Norton reported, "In meantime according to the order of the Council I turned my thoughts on a gun battery which I lined out in the form of an half-moon battery, finding it be the most proper form for our guns to command all parts of the River," Norton, General Letter, 16 August 1735, Letters from Hudson Bay, pp. 201-204.

- 47 The progress of the work at Churchill was considered at a meeting of the sub-committee, 24 April 1735 at which "it was resolved to make some alterations to ye plan sent over last year (markt No B) in order to reduce the work; and another plan was agreed to, marked No. C which is to be sent over this year with Directions for their further proceeding in building the said Fort." HBCA, A.1/144, fo. 58, 24 April 1735, Meeting of a sub-committee; In its general letter the Committee noted that they had "consider'd ye acct. you give us relating to the progress you made in building the New Fort and your further Intentions to procede on the said work both in the general letter and the council held for that purpose; and are come to a Resolution to make some alterations in the plan

sent you last year mark'd B in order to reduce the work." HBCA, A.6/5, fos. 98-99, 2 May 1735, Governor and Committee, to Richard Norton and Council. This is usually interpreted to mean that the Committee reduced the work even further from Plan B. which had already reduced the scale from the original proposal. Another possible interpretation (subject to having access to analyze Plan B) is that Norton and his council upon receipt of Plans A and B from the Committee in 1734 decided that neither suited their needs and therefore decided upon a Plan which represented a modification from the Committee's plan B in 1735 the Committee could have devised Plan C to take into account Norton's objectives so that there could be a reduction of the original work.

48 See inset in Plan C (G.1/87).

49 HBCA, A.6/5, fos. 98-99, 2 May 1735, Governor and Committee to Norton and Council.

50 The progress of the work at Churchill was considered by the sub-committee 20 February 1735-36 and again 9 March 1735-36, HBCA, A. 1/144, fo. 76, Minutes of sub-committee and A.1/144, fo. 74, Minutes of sub-committee.

At the end of April, Norton who had been rehired to the charge of Prince of Wales, was called into the Committee meeting and the construction project was discussed in detail. It was decided that Norton would proceed with "ye utmost dispatch" to finish the walls around the fort to the height of 10 feet and that the construction of the factory house, which Norton recommended should be placed in the middle of the square, would be postponed until the walls were nearly completed. The decision to build the factory house represented a departure from Plan C which had proposed a complete wooden factory for the enceinte and probably corresponded more closely to the original proposal.

HBCA, A.1/144, fo. 84, 29 April 1736, Meeting of a sub-committee.

- 51 HBCA, A.6/5, fos. 24-26, 20 May 1737, Governor and Committee to Richard Norton and Council.
- 52 HBCA, B.42/a/19, fo. 4, 21 August 1738, Churchill Journal.
- 53 Ibid., A.6/5, fos. 124-126, 20 May 1737, Governor and Committee to Richard Norton and Council.
- 54 The general letters from the Governor and Committee in 1738 and 1739 indicate that Norton was in trouble with the Committee regarding his attitude toward the factory council and in his administration of charge. Their attitude could be attributed possibly to Norton's letter of 1737 in which he first raised serious questions concerning the fortifications as erected. He pointed out that it might be impossible to build a proper stone parapet and suggested that brick be used instead as it would be lighter and offer more room for the working of the guns. He suggested that timber be worked into the parapet to offer support for the parapet and for the platforms and identified the need for ring bolts in the parapet to keep the guns from recoiling off the ramparts when fired. Norton to Governor and Committee, Letters from Hudson Bay, 23 August 1737, pp. 237-242. However, the Governor and Committee did not make references to his 1737 criticisms in subsequent letters to him.
- 55 HBCA, A.6/6, fos. 3-9, 18 May 1738, Governor and Committee to Richard Norton and Council.
- 56 Letters from Hudson Bay, George Spurrell, William Coats, Richard White, Thomas Lukyn to Governor and Committee, 1 August 1738, pp. 243-248.
- 57 Letters from Hudson Bay, Richard Norton, 17 August 1738, pp. 249-259.

While Norton no doubt welcomed the council's support of his position regarding the factory house, he resented very much the infringement of his authority which he felt the council represented. His tirade in the general letter may have been directed against the council held 6 August

which went into a number of questions affecting the day-to-day operation of the fort.

- 58 HBCA, B.42/a/19, fo. 31, 26 June 1739, Churchill Journal.
- 59 HBCA, A.1/34, fo. 231, 28 March 1739, Minutes of a Committee.
- 60 Letters from Hudson Bay, Richard Norton and Council, General Letter 9 August 1740, pp. 318-322; HBCA, B.42/a/22, fo. 2. 12 August 1740, Churchill Journal.
- 61 HBCA, B.42/a/21, fo. 18, 27 September 1740, Churchill Journal.
- 62 Ibid., A.6/6, fos. 77-80, 1 May 1740, Governor and Committee to Richard Norton and Council.
- 63 Letters from Hudson Bay, Richard Norton and Council to Governor and Committee, 9 August 1740, pp. 318-322.
- 64 HBCA, A.11/13, fos. 68-69, 1 August 1741, Richard Norton to Governor and Committee.
- 65 Ibid., B.42/a/22, fo. 28, Churchill Journal, the ramparts were given a finish of "turffs & green swards,"; "finding it impossible to gett gravel sufficient on ye ramparts to fill up ye platforms & parapet, & to gett ourselves in a posture of Defence, otherways wth what hands we have gott by ye usuall time of ye ships arrivall, therefore to facilitate our putting ourselves in a good posture of Defence I have this morning agreed with 8 Indian men to work from 6 o'clock in ye mornng til 6 at night wth our men at carrying ye gravel & con to ye ramparts at ye rate of one Beavr skin value in trade pr. day." Ibid., B.42/a/22, fo. 28.
- 66 Letters from Hudson Bay, Richard Norton, General Letter, 23 August 1737, pp. 237-242.
- 67 HBCA, A.11/13, fos. 68-69, 1 August 1741, Richard Norton and Council to Committee; Timber for the parapet was taken from the old factory, HBCA, Churchill Journal, 7 April 1741, fo. 35, B.42/a/21. The wood parapet remained up for some years but was not too substantial. See for example "ye men a heaving snow from of ye rampert,

- otherwise the parapet or sand troff would fall with ye weight of snow," *ibid.*, B.42/a/24, fo. 26, 11 March 1742-43.
- 68 HBCA, B.42/a/21, fo. 28, 29 January 1740-41, Churchill; "a lineing ye fort gates wth Iron work on ye house to make them musquet shott proof," B.42/a/22, fo. 31, 16. July 1741; B.42/a/21, fo. 32, 11 March 1740-41, mounting 24 pdrs.
- 69 *Ibid.*, B.42/a/22, fo. 28, 4 June 1741, Churchill Journal.
- 70 Letters from Hudson Bay, Richard Norton and Council, 9 August 1740, pp. 318-322.
- 71 *Ibid.*, B.42/a/22, fo. 27, 25 May 1741, Spurrell arranged to have the gates made in England, A.1/34, p. 225, 14 March 1738-39. Minutes of a sub-committee; B.42/a/21, fo. 37, 30 April 1741, Churchill Journal.
- 72 HBCA, B.42/a/22, fo. 7, 22 September 1740, Churchill Journal.
Ibid., B.42/a/21, fo. 20, 22 October 1740, "Carpets on ye staircases & lining ye window shutters,"
ibid., fo. 21, 17 November 1740, "our carpets preparing wainscotting for my apartment, one mason preparing a chimney pece for Do,"
ibid., fos. 25, 22 December 1740, "carptr, lyning the wall of ye dwelling house & finishing my apartment."
- 73 HBCA, B.42/a/22, fo. 2, 8 August 1740, Churchill Journal.
- 74 HBCA, A.11/13, fos. 68-69, 1 August 1741, Richard Norton and Council to Committee. "This summer built & compleated a very good Powder Magazine ye Exteriour side of it is of stone, ye interiour side of it is of Brick, ye thickeness of ye roof is 6 foot at ye springing of ye arch & is in ye clear 24 foot long 12 foot wide & 9 foot high wch we conceive is sufficient bomb proof," HBCA, B.42/a/23, fo. 3, 29 July 1741, Churchill Journal, "compleated ye magazine & we got ye powder into it."
- 75 HBCA, B.42/a/23, fo. 2, 31 July 1741, Churchill Journal.

- 76 HBCA, A.11/13, fos. 68-69, 1 August 1741, Richard Norton and Council to Committee.
- 77 Letters from Hudson Bay, p. 322, n.2/.
- 78 Pilgrim's letter has not survived but its contents can be surmised from the reply of the Governor and Committee, see HBCA, A.6/7, fo. 8, 5 May 1742, Governor and Committee to Robert Pilgrim; Pilgrim apparently had no compunction about secretly reporting his chief and continued to do so after Isham was placed in charge of Prince of Wales Fort.
- 79 The Committee hinted in its letter at "the informations we have received" and noted "we are fully informed and convinced by some of the masons that signed the council of 28th July last and by other intelligence" that there was stone available suitable for building the parapet. HBCA, A.6/7, fos. 7-8, 5 May 1742, Governor and Committee to James Isham and Council.
- 80 HBCA, A.6/7, fos. 7-8, 5 May 1742, Governor and Committee to James Isham and Council. Richard Ford was home on leave in 1741-42. He was highly respected by the Committee which had engaged him at 45 pounds, nearly twice as much as it usually paid carpenters. He was in contact with the Committee while in London for his contract was renewed for an additional three years. He and Spurrell were to advise the factory council at Churchill as to how they should proceed.
- 81 HBCA, A.6/7, fos. 7-8, Governor and Committee to James Isham and Council, 5 May 1742.
- 82 Letters from Hudson Bay, Richard Norton, General Letter, 23 August 1737, pp. 237-242; Richard Norton, General Letter, 9 August 1740; *ibid.*, pp. 318-322.
- 83 HBCA, B.42/a/22, fo. 32, Churchill Journal, 24 July 1741, "all ye masons a searching for proper stone to build ye parapet," Norton had reported in 1741 "ye masons cannot nor will not undertake to build a firm parapet with any stone that can be got here on acct. of ye

- Irregularity of it as they have testified...." HBCA, A.11/13, fos. 68-69, Richard Norton and Council to committee, 1 August 1741.
- 84 Robson, An Account of Six Years Residence, p. 13.
- 85 Ibid., p. 13.
- 86 HBCA, A.6/7, fos. 7-8, Governor and Committee to James Isham and Council, 5 May 1742.
- 87 HBCA, A.11/13, fos. 74-78, James Isham and Council to Governor and Committee, July 1742.
- 88 The Committee had directed that "you build in each of the three vacant flankers store rooms of nine and a half foot wide twenty four foot long of the stone that the interior walls of the flankers is now built with which are to be taken down for that purpose, the walls of which store rooms we direct to be six foot high to the first springing of the arch which is to be three foot high in the crown, the said arches must be turned with stone taken from the quarry at the old factory which down you are to fill up all the vacant space level with the ramparts with the same shingle as ye rest is done with." HBCA, A.6/7, fos. 7-8, Governor and Committee to James Isham and Council, 5 May 1742. Isham proposed to make the rooms 10 by 40 feet long "wch store Rooms is to be 4 foot high to the springing of ye arch & ye arch 3½ foot ye substance of ye arch 18 inches wch is in all 9 foot by wch there will be 2 foot substance on ye top of ye arch to make level with the ramparts...." HBCA, A.11/13, fos. 74-78, Isham and Council, general letter, July 1742.
- 89 HBCA, A.6/7, fos. 23-24, Governor and Committee to James Isham and Council, 5 May 1743; A.11/13, fos. 74-78, Isham and Council, general letter, July 1742.
- 90 HBCA, B.42/a/24, fos. 2-12, Churchill Journal, entries 30 July 1742, to 14 October 1742.
- 91 Ibid., B.42/a/24, fo. 12, 14 October 1742.

- 92 Ibid., various entries, B.42/a/24, and B.42/a/25, The passage to the magazine was "6 foot wide $3\frac{1}{2}$ foot high to ye spring of ye arch & ye 3 foot wch is $6\frac{1}{2}$ foot clearn in Hight $\frac{3}{4}$ $31\frac{1}{2}$ foot long," ibid., B.42/a/24, fo. 31 27 April 1743; for Isham's report of progress see HBCA, Isham and Council, General Letter, A. 11/13, fos. 80-82, 8 August 1743.
- 93 HBCA, B.42/a/25, fo. 6, Churchill Journal, 8 September and 13 September 1743.
- 94 Ibid., B.42/a/25, fo. 29, 7 May 1744; Isham gave dimensions of his parapet as "the Base of ye parapet 6 foot high 6 foot, ye interieur side to be carried up straight 2 foot then to slope 1 foot, the top ? $1\frac{1}{2}$ foot, by wch ye Exteriour wall will be $4\frac{1}{2}$ foot from ye base, or $1\frac{1}{2}$ foot lower than ye Interiour side. The with of ye or ports on ye inner side 2 foot, on ye outer side 12 foot, ye hight at ye bottom of ye port on ye inner side 2 foot & ye outer side one foot...." B.42/a/25, fo. 38, 19 July 1744.
- 95 HBCA, A.6/7, fos. 42-44 Governor and Committee to James Isham and Council, 10 May 1744. The battery had been a part of the original scheme when first projected. Norton had been directed to construct it but instead had built the battery on the factory side of the Churchill.
- 96 HBCA, B.42/a/27, fo. 2, Churchill Journal, 23 September 1744.
- 97 Ibid., 24 August 1744, 28 August 1744.
- 98 Ibid., fo. 4, 15 September 1744.
- 99 Ibid., fo. 21, 25 March 1745, 27 March 1745.
- 100 Ibid., fo. 25, 25 April 1745.
- 101 Ibid., fo. 32, 22 June 1745.
- 102 Ibid., 15 July 1745.
- 103 Ibid., A.11/13, fos. 84-86, James Isham and Council, General Letter, 18 August 1744.
- 104 Ibid., B.42/a/25, fo. 40, Churchill Journal, 6 August 1744, "moved our dry provisions out of ye vaults of ye houses on ye hill the vaults being too damp to keep dry provisions in."

- 105 HBCA, A.6/7, fos. 75-76, Governor and Committee to James Isham and Council, 3 May 1745, Norton, not Isham, had been responsible for the construction of the powder magazine but filling the gorge of the bastion had probably exaggerated the problems.
- 106 HBCA, A.11/13, fos. 96-99, Pilgrim to Governor and Committee 20 July 1746; B.42/a/28, fo. 3, Churchill Journal, 5 August 1745, passim.
- 107 HBCA, A.6/7, fo. 94, Governor and Committee, to Robert Pilgrim and Council, 30 April 1746.
- 108 HBCA, B.42/a/29, fo. 3, Churchill Journal, 18 August 1746, B.42/a/28, fo. 39, 25 July 1746, passim.
- 109 HBCA, A.6/7, fo. 94, Governor and Committee to Robert Pilgrim and Council, 30 April 1746.
- 110 Ibid.
- 111 See for example, HBCA, Churchill Journal, 3 September 1746, "in ye afternoon all hands at exercise of small armes & Great guns the Engineer fir'd three pound shott at a Butt 6 foot diameter and about 400 yds. distance & mist it," B.42/a/29, fo. 6.
- 112 HBCA, A.6/7, fo. 96, Governor and Committee to Capt. Robert Evison, 30 April 1746.
- 113 HBCA, A.11/13, fos. 96-99, Pilgrim to Governor and Committee, 30 July 1746; A.6/6, fos. 109-119, Governor and Committee to Pilgrim and Council, 6 May 1747.
- 114 Three weeks after he arrived, when he discovered the governor was "an odd sort of man" Robson began a journal which he kept through the winter months faithfully recording his feud with the governor.
- 115 HBCA, B.42/a/20, fo. 29, when the Hudson Bay arrived 6 August, Robson was ordered aboard directly.
- 116 HBCA, A.6/7, fos. 140-142, Governor and Committee to J. Isbister and Council, 5 May 1748.
- 117 Ibid., B.42/a/29, fo. 31, Churchill Journal, 25 April 1747.
- 118 Ibid., fo. 34, 21 May 1747. The exterior side of the south

- east curtain, built by Pilgrim was the only exterior wall of the fort not rebuilt by Ashlar.
- 119 HBCA, B.42/a/29, fo. 43, Churchill Journal, 24 July 1747.
- 120 Ibid., A.6/7, fos. 109-110, Governor and Committee to Pilgrim and Council, 6 May 1747.
- 121 Ibid., fo. 109, Governor and Committee to James Isham 6 May 1747, Isham was blamed for not placing the battery where Captain Spurrell had indicated.
- 122 Ibid., B.42/a/31, fo. 1, Churchill Journal, 17 August 1747, A.11/13, fos. 104-107, Joseph Isbister and Council, General Letter, 5 September 1748.
- 123 Ibid., B.42/a/32, fo. 2, Churchill Journal, 17 August 1748.
- 124 Ibid., A.6/7, fo. 157, Governor and Committee to Joseph Isbister, 16 May 1749.
- 125 A draught of Prince of Wales's Fort, October 4, 1749.
- 126 HBCA, A.6/8, fos. 48-51, Governor and Committee to Joseph Isbister and Council, 21 May 1750.
- 127 Ibid., fos. 16-19, Governor and Committee to Joseph Isbister and Council, 16 May 1749; *ibid.*, fos. 48-51 Governor and Committee to Joseph Isbister and Council, 21 May 1750.
- 128 Ibid., A.11/13, fos. 118-120, Isbister, General Letter, 21 August 1751.
- 129 See for example, HBCA, B.42/a/44, fo. 17, Churchill Journal, 14 January 1755; *ibid.*, B.42/a/48, fo. 23, 4 February 1757; *ibid.*, fo. 49, 21 August 1757.
- 130 Ibid., fo. 56, 25 July 1752.
- 131 See for example, HBCA, A.6/9, fos. 113-114, Governor and Committee to F. Jacobs, 17 May 1759.
- 132 HBCA, B.42/a/44, fo. 13, Churchill Journal, 21 January 1755.
- 133 Ibid., B.42/a/46, fo. 20, 26 January 1756.
- 134 Ibid., fo. 17, 26 October 1750.

- 135 HBCA, A.11/13, fo. 144, Ferdinand Jacobs to Governor and Committee, 18 August 1757.
- 136 Ibid., A.11/14, fo. 194, Moses Norton to Governor and Committee, 6 September 1763.
- 137 Ibid., A.11/13, fos. 128-129, F. Jacobs and Council, General Letter, 7 September 1754.
- 138 HBCA, B.239/b/6, fo. 21, J. Isbister to James Isham at York Factory, 17 January 1751-52. The Committee, familiar with the problems at York warned of the dangers to the launch of the ice going out. HBCA, A.6/8 fos. 70-72, Governor and Committee to Isbister and Council, 16 May 1751. At Churchill the heavy seas of fall caused the greatest difficulties and finally as at York Factory, a launch was devised which could be dismantled each fall.
- 139 Ibid., A.11/14, fos. 24-27, Norton and Council, General Letter, 13 September 1765.
- 140 Ibid., B.42/a/55, fo. 22, Churchill Journal, 27 January 1761; A.11/13, fos. 164-166, Jacobs and Council; General Letter, 24 August 1761.
- 141 Ibid., A.11/13, fo. 134, Ferdinand Jacobs to Committee, 2 September 1754; See also Jacobs to Committee, *ibid.*, A.11/13, fo. 138, 6 August 1758; *ibid.*, fo. 144, same to same, 18 August 1757; A.11/14, fos. 18-19, Moses Norton to Governor and Committee, 1756.
- 142 HBCA, A.11/15, fos. 31-32, Samuel Hearne and Council, general letter, 21 August 1776.
- 143 The most thorough account of the expedition is found in E.E. Rich, The History of the Hudson's Bay Company, 1670-1870, Volume II: 1763-1870 (London: The Hudson's Bay Record Society, 1959), pp. 83-89. Rich here and elsewhere has dealt rather harshly with Hearne, perhaps overestimating as others have, the strength of the fortifications at Churchill. For a defence of Hearne see Richard Glover's introduction to A Journey from Prince

of Wales's Fort in Hudson's Bay to the Northern Ocean 1769, 1770, 1771, 1772 (Toronto: Macmillan, 1958), pp. xxxiii and xxxiv.

- 144 "An Account of Cannon mounted at Prince of Wales's Fort, Churchill River, September 2nd 1776," fos. 27-28, A.11/15, enclosed with HBCA, A.11/15, fos. 31-32, Samuel Hearne and Council, General Letter, 31 August 1776. Glover notes in his introduction that a gun crew was usually reckoned at a minimum of 10 men. Glover, "Introduction," op. cit., pp. xxxiii, xxxiv, note 100.
- 145 Rich, op. cit., pp. 83-89.
- 146 HBCA, A.11/15, fos. 99-100, Samuel Hearne to Governor and Committee, 25 September 1783.
- 147 Ibid., A.6/13, fos. 78-81, Governor and Committee to Hearne and Council, May 1783.
- 148 Ibid., A.11/15, fos. 99-100, Samuel Hearne to Governor and Committee, 25 September 1783.
- 149 Kenney, Founding of Churchill, p. 119.

The North West Bastion Bakehouse, Lower Fort
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Preface

North West Bastion and Bakehouse Study

In 1977 Philip Goldring prepared a brief historical summary of the bakehouse located within the North West Bastion at Lower Fort Garry. In the following two years as-founds of the structure were prepared by the Engineering and Architecture Division of Parks Canada and archaeological investigations were completed by John Dewhirst and his team. In 1977 the restoration of the bakehouse was initiated under the direction of project manager, Henry Van Der Putten.

Further information on the structural features of the bakehouse were requested by Engineering and Architecture division. This report concentrates upon major physical features of the structure such as the ovens. The sections discussing the operations and furnishing of a 19th century bakehouse were included to provide information for the Interpretation section if they decide to implement the facility into Lower Fort Garry's Interpretation program.

This study would not have been possible without the benefit of the excellent research done by John A. Hussey on the bakery at the Fort Vancouver National Historic Site. I am also indebted to the archivists at the Hudson's Bay Company Archives for their advice and patience as I worked through the company's extensive collection. I should also like to thank Carol Preston and Gillian Mars at Hudson's Bay House for permission to use the photo collection for research purposes.

Introduction

When Governor George Simpson began to build Lower Fort Garry in 1830-31, he planned to make it the headquarters of the Hudson's Bay Company's activities in the Red River district. Almost as soon as it was finished, however, the Governor realized that its remoteness from the centre of settlement and from the busy forks made it a less than ideal location for the head post of the district. When Upper Fort Garry was built at the forks in 1834-35 the company was left with a post which served no important function in spite of its attractive residence and substantial storehouses. For a decade the lower fort served a residual function, receiving the overflow from the upper fort, and providing a residence for visitors to the settlement.

By the 1840s, Lower Fort Garry's eventual role in the fur trade was gradually taking shape. Above all, it had an excellent location for the development of the various provisioning functions required by the Hudson's Bay Company. Besides its excellent agricultural potential and warehouse facilities, Lower Fort Garry was the embarkation point for the Hudson's Bay Company brigades bound for the Interior of Rupert's Land. To supply provisions for the York boat brigades, the Red River freighters, and the schooners which sailed between the lower fort and Norway House, a substantial quantity of food was required annually. While the Hudson's Bay Company purchased wheat and other agricultural products from the local settlers, they also cultivated and produced a considerable proportion of the required food at Lower Fort Garry itself. One such item was hard-tack biscuit; an important

ingredient in the fur traders's diet, particularly during a long trek or voyage. After 1847 a major source of biscuit was the bakehouse located within the North West Bastion at Lower Fort Garry.¹

The North West Bastion was the last of the four bastions to be erected. Its exact date of construction has not been determined, but most historians of Lower Fort Garry agree that it was probably built about 1848 during the latter part of the fort's occupation by the Royal First Warwickshire Regiment of Foot. After the bastion was completed, part of the wall was removed and the bakehouse was built to serve the historical function. It provided hard-tack biscuit for the Hudson's Bay Company's Northern Department and the Red River posts for nearly thirty years, and the bakery apparatus was not dismantled until 1911. Since then it has served various minor functions; first, as an ice house for the Motor Country Club, and then during the 1960s as a workshop for the National Historic Sites personnel during the restoration of the Big House and the Sale-shop—fur loft building.

This structural and use study of the North West Bastion is not the first attempt to record the building's history. During the 1930s Manitoba historian Margaret A. Macleod conducted interviews with surviving members of the Spence family, whose father James Spence was the baker at Lower Fort Garry during the 1860s and early 1870s.² Macleod interviewed James Spence's son Jacob and his two daughters, (presumably) Sophie, born 1861 and Nancy, born 1862. While Jacob had no firm recollection of the bakehouse, his two older sisters recalled incidents which placed the bakery "in the stone building beside the west gate" or the Men's House.³ An older brother at Lac Du Bonnet (Alex Spence, born 1854, or Robert, born 1858) informed Macleod, however, that his sisters were misinformed. Indeed, he quite vividly recalled the baking activities in the North West Bastion:

I was my father's helper in the bakery as soon as
I was old enough to shoulder a bag of biscuit or

a sack of flour. After the biscuit was made and cold, it was packed up in sacks that I carried over to the store [probably the Northern Department warehouse at the east gate], there to be put up in cargoes for shipping. From the store I carried back to the bakery a sack of flour and I can remember carrying 16 sacks in one day. I remember this number because it was a heavy task in the day's work of a growing boy.⁴

If we can assume that the "growing lad" was about twelve years old, this recollection can be dated approximately to 1866-70, depending upon which son it was.

Mrs. Macleod also traced the eventual fate of the ovens in the North West Bastion through a former servant of the Hudson's Bay Company; possibly Alfred Franks who was employed at Lower Fort Garry from 1873 to 1911. When Macleod first examined the bastion there was no trace of a bakery "not even that a bakery had ever been established there."⁵ When she indicated her puzzlement to the former company employee he replied immediately:

Of course there isn't! In preparation for the Lord Strathcona's visit to the Fort just before it was closed, the master of the Fort had me clean the bastion out thoroughly so that no trace of any bakery, ovens, chimney, nor tables was left, no, not a thing was left to show that a bakery had been there.⁶

Little did he know that nearly seventy years later, Parks Canada would move to restore the North West Bastion to its original function.

In his report on Industrial and Agricultural Activities at Lower Fort Garry, historian George Ingram referred to the lack of detailed information on the history of the bakehouse. He noted briefly that "each spring the oven in the bakehouse would be prepared [for] the making of 'biscuit for importation,' and from March through June the bakers would be busy at their task. The biscuit was then packed up in casks for some of the posts such as Norway House, or in bags, for others such as Upper Fort Garry."⁷ In June 1971 Philip Goldring completed a brief structural and functional history of the North West Bas-

tion.⁸ This was complemented two years later by John Dewhirst's archaeological investigations in the same bastion and the bakehouse.⁹ Although both are excellent studies, they do not provide enough detailed historical information to allow for a comprehensive reconstruction and interpretation of the bastion in its principal fur trade function as a bakehouse.

This report is an attempt to expand upon the framework of information provided by Margaret Macleod, Philip Goldring and John Dewhirst. Because detailed documentation on the function of the bastion does not exist, comparative material forms a major proportion of this report. The Hudson's Bay Company had bakery operations at several other trading posts in Rupert's Land; most notably York Factory and Fort Vancouver. York Factory's development is particularly well documented in the Hudson's Bay Company's archival collection in Winnipeg. The daily journal, for instance, described the construction of a bakehouse during the summer of 1834.¹⁰ It is significant that Belonie Gibeault, the French Canadian mason responsible for the construction of that bakery facility, was employed by the Company at Red River fifteen years later when the Lower Fort Garry bakehouse was built. More than two thousand miles westward, Fort Vancouver also supported a substantial bakery located in its own building. Fortunately, in his structural history of Fort Vancouver, John Hussey includes a history of the bakery at this Hudson's Bay Company's major depot west of the Rockies.¹¹ He discusses its operation, construction details and furnishings.

In his history, Hussey emphasized the need for additional research into the design and equipment of bakeries and bakeovens in the late 18th and 19th centuries. Then, in 1973, Hussey fulfilled this task himself when he completed his "Historic Furnishing Study" for the bakery at Fort Vancouver.¹² This study of the Lower Fort Garry bakehouse depends heavily upon the comprehensive research of John Hussey. Combining comparative data from British, French, American and Canadian

sources with specific available data on Fort Vancouver, Hussey made recommendations for the reconstruction of Fort Vancouver baking facility. He included chapters dealing with the baking process during the 1840s, comparative data on ovens, as well as the bakery layout, equipment and furnishings. This study adapts the comparative approach taken by Hussey while referring specifically to the Lower Fort Garry bakehouse wherever possible. Obviously one must be very careful when one discusses technological and structural details such as the construction of a bakeoven. What was common practice in English commercial bakeries was perhaps impossible to implement in an isolated baking facility in Rupert's Land in the mid-19th century. Nevertheless, without the careful integration of relevant external sources, the comprehensive renovation of the Lower Fort Garry bakehouse would not be possible.

Two other comprehensive studies of baking facilities in the 19th century emerge from two very diverse sources. In 1976 the National Museum of Man published Les Fours à Pain au Québec by Lise Boily and Jean-François Blanchette; a comprehensive and systematic study of bakeovens in 19th and 20th century French Canada.¹³ Boily and Blanchette applied a scientific methodology to their historical documentation and then examined the oral tradition of the Québécois to support their thesis that bakeovens were an integral part of Québec culture.

Il y a plus; le four à pain en tant qu'élément matériel issu de la culture témoigne des autres sous-systèmes culturels tel l'économique, le social, le langage, le psychologique et les croyances.¹⁴

This study is complemented by an American source, Jerome A. Green's Historic Furnishing Study of the restored bakery at Fort Laramie National Historic Site in Wyoming.¹⁵ Of course the American army's approach to food supply and specifically to the baking of bread was applied on a grander and more highly organized scale. Green's research into the breadmaking process and the bakehouse procedure present some important insights

into the possible operation of a Hudson's Bay Company bakehouse.

During the mid-19th century the Hudson's Bay Company did not maintain a comprehensive record of building procedures or techniques. We can, however, on the basis of existing evidence, arrive at some important decisions regarding the reconstruction and interpretation of the North West Bastion at Lower Fort Garry. For the sake of organization, this report is divided into four sections. The first will present an historical survey of the bakehouse from its construction to the termination of the Hudson's Bay Company occupation in 1911. The second discusses structural features of the Lower Fort Garry bakehouse with particular emphasis on the ovens. This chapter will include the As-Found drawings prepared by Engineering and Architecture division of Parks Canada in 1972. From this concentration on structural detail, the report will turn to the function of the Lower Fort Garry bakehouse in relation to the overall operation of the Hudson's Bay Company from 1821 until 1875. This will involve discussion of the tradesmen and labourers who worked in the company bakehouses, the scale of operation and the problems involved in provisioning an expansive fur trade network. The final section will outline briefly the possible furnishings of the North West Bastion with particular emphasis upon the necessary tools and equipment required for the baking of hard-tack biscuit. Any supplementary information will be included within the appendices.

The operation of a bakehouse was a very specialized function during the fur trade era. While many Hudson's Bay Company posts had exterior ovens to produce bread and biscuit for the company mess, only Fort Vancouver, York Factory and Lower Fort Garry had large baking facilities. Certainly the bakehouse was a symbol of the increasing specialization of the Hudson's Bay Company's post operations. This is a sharp contrast to the less specialized function of the bakeoven at Prince of Wales's

Fort early in the 18th century, where it doubled as an oven and as a dwelling for the more unfortunate labourers:

....Our masters come here & found y^e Oven without Doors to be Very Commodious for ye men's Lodgings & has ordered a shead to be built over it when Necessarys Can be provided.¹⁶

Part I The North West Bastion Bakehouse Historical Survey

The North West Bastion at Lower Fort Garry was the last of the four bastions to be built. It links the north and west walls, which were not completed until late 1847 or 1848 when the Royal Sixth Regiment of Foot occupied the fort, requiring the Hudson's Bay Company to move its operation to the buildings located on the creek south of the establishment.¹ In 1847 George Finlay, a member of the detachment forming the garrison at Lower Fort Garry, sketched the north west-corner of the fort, presumably from the upper storey of the Big House annex. Finlay's sketch, reproduced here, is conclusive proof that the north-west corner was the last section of the wall to be built, and it further indicates that the North West Bastion, enclosing the bakehouse, was built in 1848 or shortly thereafter.²

Where the Hudson's Bay Company baked its bread and biscuit before the construction of the lower north west bastion is not known, but it may well have been in some other area of the fort grounds. One possibility is the wooden building standing in the north west corner of the fort as depicted in the 1847 sketch.³ Certainly, there must have been bakery facilities at either Lower or Upper Fort Garry long before the arrival of the troops. The quantity of biscuit to be supplied by the Red River district was determined annually by the council of the Northern Department, beginning in 1836.⁴ This quantity of biscuit had to be ready for dispersal throughout Rupert's Land by the time the York boat brigades left in early June. One must also remember that besides the biscuit listed below,

| Year and Reso- lution No. | Amount of Bis- cuit in Cwt. | Year and Reso- lution No. | Amount of Bis- cuit in Cwt. |
|------------------------------|--------------------------------|------------------------------|--------------------------------|
| 1836 - #46 | 20 | 1856 - #41 | 30 |
| 1837 - #45 | 20 | 1857 - #40 | 40 |
| 1839 - #37 | 20 | 1858 - #41 | 46 |
| 1840 - #37 | 30 | 1859 - #41 | 46 |
| 1841 - #35 | 30 | 1860 - #42 | 46 |
| 1842 - #38 | 30 | 1861 - #47 | 46 |
| 1843 - #34 | 50 | 1862 - #44 | 46 |
| 1844 - #42 | 50 | 1863 - #45 | 50 |
| 1845 - #40 | 50 | 1864 - #42 | 50 |
| 1849 - #43 | 30 | 1865 - #40 | 50 |
| 1850 - #44 | 30 | 1866 - #40 | 45 |
| 1841 - #45 | 40 | 1867 - #41 | 46½ |
| 1852 - #47 | 50 | 1868 - #40 | 45 |
| 1853 - #40 | 26 | 1869 - #41 | 46½ |
| 1854 - #43 | 26 | 1870 - #41 | 46½ |
| 1855 - #44 | 26 | | |

the bakery facilities at Lower or Upper Fort Garry were required to produce sufficient biscuit for consumption in the Red River district itself.⁵

The arrival of the troops in the fall of 1846 coincided with a serious crop failure throughout the Red River settlement. Alexander Christie, the Hudson's Bay Company's Chief Factor in charge of the Red River district, was particularly perplexed by the problems involving the feeding of the troops. Surplus cattle, he thought, could be kept

below the lower fort where hay is plentiful....we might procure fuel from the lakes, or Buffalo meat from the plains, but according to the regulations of the army, no such substitute could be allowed, the actual ration being 1 lb. Fresh beef, with 1 lb. Bread for each man per day, purchasing afterwards such vegetables as can be procured.⁶

If these ration levels were actually met, it meant the soldiers mess at Lower Fort Garry was consuming approximately

150 pounds of bread each day. It is highly probable that the troops provided the large majority of their own footstuffs. When Andrew Beatty, Commanding Royal Engineer, Hudson's Bay Company Territory, arrived at the fort in July, 1846 with Lieutenant Hampden Moody and supervisor of works, Mr. J. Constable, they immediately prepared for the erection of a cook house, bakery and wash house. The cook house and wash house were apparently placed in the south-west bastion, the only roofed bastion at the lower fort, and the bakery was situated close by.⁷

The construction of the bakery by the British regiment delayed the need for a permanent bakehouse in one of the fort's bastions. The planning of the walls and bastions had begun in 1838 when Simpson decided that the lower fort should "be defensible or secure from attack from Indians or others" and that the defences should be "of such extent as to become the stronghold of the settlement."⁸ In his directions to Chief Factor Christie he noted:

.....as it is desirable to put the lower establishment in a defensible state, I have to beg you will get stones quarried and hauled so as to form a strong wall round that establishment with flank-ing [sic] bastions for Protection.⁹

Captain Cary and his crew at the company's experimental farm were to assist in the construction when not employed at farming.¹⁰ By 1841 construction of the wall had commenced but it was a slow and laborious process. They were still not finished in 1845 when Christie, with a keen sense of priorities, pulled the tradesmen off work on the wall and put them to work at the foundations of the distillery-brewery building. With the arrival of the troops imminent in December, 1845, Simpson again requested that the walls and bastions be finished but the following spring Christie complained that the defences "cannot be completed with the few men we can employ for at least two years to come...."¹¹ This in fact was the case. When Major Crofton arrived in the autumn of 1846 he reported

that "the walls are....not finished and the Round Bastions at the 4 angles not completed."¹² By the winter of 1847, however, (either the winter of 1846-47 or 1847-48) the south west bastion was finished and was sketched by George Finlay.¹³ By the time the troops left in the summer of 1848, the walls had been finished (as finished as they ever would be), by the sappers and soldiers. The powder magazine in the north east bastion was then added in 1852 thus completing the ambitious construction program commenced ten years earlier.

It is not clear which masons and carpenters were responsible for the construction of the North West Bastion. When Alexander Christie took charge of the Red River district after 1834 he showed a marked preference for tradesmen of his own nationality.¹⁴ Although Belonie Gibeault, the mason, and Jean-Baptiste Derosier, a carpenter, resided at Red River during the 1840s, with surprising rapidity the Canadian names were replaced with those of Orcadian and Hebridian craftsmen.¹⁵ These included the masons Duncan McRae, William Morrison, Magnus Scott, John Knarston, John Linklater, John Clouston, Joseph Halcro, Thomas Scott and Alexander Wilson, as well as the carpenters William Drever, James Spence, Samuel Leask and John Bias.¹⁶

The question of who was responsible for the construction of the bakehouse is important because the Orkney and Hebridian masons may have applied different building techniques than their French Canadian colleagues. We do know that the Scottish stone masons Duncan McRae and John Clouston were both involved in the construction of the lower fort's walls as well as much of the stone work around Upper Fort Garry from 1841 to 1848.¹⁷ Certainly, by the time the North West Bastion was built they had extensive experience building with stone in the Red River district. On the other hand, French Canadian mason Belonie Gibeault was probably involved or at least consulted in the construction of the bakehouse as he had been responsible for the construction of the bakehouse at York Factory in 1834.¹⁸

The construction of a stone bakehouse within the North-West Bastion was only logical. Besides the surplus of knowledgeable tradesmen, limestone was readily available along the banks of the Red River and lime for mortar was easily attainable from the establishment's lime kiln. Wood for building supports and the roof could be collected in the neighbourhood of the fort or rafted downriver from other areas of the Red River settlement. Only bricks posed a real problem if they were, in fact, used in the construction of the ovens. The bricks used at York Factory and Fort Vancouver bakehouses were imported from England but overland hauling was another issue. According to Alexander Ross's Red River Settlement, published in 1856:

brick-making has hitherto been entirely neglected here; a few attempts at different times have been made, sufficiently only to test the quality of the clay, which in many places had been found good; but with the exception of a few brick chimneys; we have nothing as yet constructed of that useful article....¹⁹

It would appear then that if brickwork was to be used in Red River the Company would have to transport bricks inland from York Factory by the brigade boats or the skilful Red River freighters who made annual trips to the coastal depot. Whatever the source, the Hudson's Bay Company supplied the Royal Engineers with thirty-five hundred bricks at Lower Fort Garry in September, 1846.²⁰ The bricks may have been used to re-erect the oven complex for the Sixth Regiment of Foot located beside the south west bastion; and any surplus may have been used to build the ovens in the North West Bastion bakehouse a few years later.

As only one daily journal for Lower Fort Garry has survived for the fur trade period prior to 1870,²¹ it is not possible to describe the construction or operation of the bakehouse in the North West Bastion in any detail. Only isolated references in personal correspondence and account books provide useful clues to its probable scale of operation. After the sol-

diers left Fort Garry in August, 1848 the Hudson's Bay Company moved its operation back within the walled areas and continued to expand the industrial area of the creek. During the early 1850s, William Lane, clerk in charge of the stone fort, was responsible for overseeing the annual preparation of biscuit. Lane received some indication as to the quantity of the biscuit required for the Northern Department nearly a year before it was needed. For instance, in early September 1852, Upper Fort Garry chief trader, A.W. Buchanan informed Lane that the Northern Council had decided

50 cwt of biscuit will be required for Norway House next summer to which we may add 12 or 15 cwt for own consumption making a total of from 60 to 65 cwt required to be made next spring which please attend to.....²²

The following May or June, Lane would have to supervise the making of the biscuit in the fort's bakehouse.

Like so many daily functions at a fur trade post, the operation of a Hudson's Bay Company bakehouse received scant attention unless it was not operating smoothly. In July, 1854 Lane received notice from John Ballenden, chief factor located at Upper Fort Garry, that he had received some harsh complaints concerning Lower Fort Garry biscuit sent northward that spring. Mr. Barnston, the chief factor at Norway House, was irritated because the biscuit sent out that summer had proved to be "of very inferior quality, mouldy and badly baked and complained of by all, in fact a whole bag was rejected this evening by the schooner and crew."²³ Ballenden warned Lane and told him to have the biscuit bags carefully examined before they were placed on board the schooner or the York boat. The problem with the biscuit may have stemmed from the quality of the flour, most of which was sold to the company at this time by a local settler named James Tait.²⁴

Biscuit was a major form of sustenance for travellers in 19th century Rupert's Land. Lower Fort Garry clerks were frequently requested to prepare some biscuit for company officers or servants. The biscuit was transported in bags or, if

required in great quantities, casks were used. A typical reference to biscuit at Lower Fort Garry is found in a request directed to William Lane in June, 1854:

I find we shall require some biscuit immediately say 2 cwt. and therefore wish you would send the boat tomorrow with that and the other articles mentioned. Some of the biscuit is wanted for Mr. Pelly's journey.²⁵

Once the biscuit was baked it was removed from the bakehouse to either the retail store or, more likely, the stone warehouse located nearby. Because the latter structure was so close, it was the logical storage area for country produce such as biscuit.

When William Lane was appointed postmaster at White Horse Plains post in 1855, an excellent source of information for Lower Fort Garry in these transitional years was lost and we can only speculate on the operation of the bakehouse. Obviously all was not well, for in May 1859 William Mactavish informed Lane that "the Baker has deserted from the Lower Fort."²⁶ Baker was not a common occupation at Hudson's Bay Company posts. In fact, because of the seasonal nature of the task, the baker was usually a common labourer either trained at the post or with previous experience. Actually alternative evidence exists which confirms that the bakery at Lower Fort Garry was operated by the 1860s by settlers living in the neighbouring parishes of St. Andrews and St. Clements. The Spence family was closely connected with the operation of the bakehouse. On April 15, 1868, young Jacob Spence was paid four shillings for two days of cutting wood for the "Bake house."²⁷ That same day Duncan McRae, former Company mason, was paid ten shillings for two days spend repairing the oven.²⁸ This is an interesting occurrence because Duncan McRae was an employee of the Hudson's Bay Company when the North West Bastion and its ovens were built in the late 1840s.

By April the bakery process was ready to begin. In April

1869, for instance, one man was "heading up biscuit barrels"²⁹ while three men, James Daniel Senior, Thomas Lyons Jr. and the supervisor, Peter Spence, were busy baking. By May 11, 1869, enough biscuit was ready for transportation to employ one man packing biscuit in casks destined for York Factory and a smaller quantity in Osnaburg bags for Upper Fort Garry.³⁰ When the schooner left the lower fort for Norway House the three men continued to bake steadily five days a week until June 10 when they stopped and were assigned other duties by chief trader Flett.³¹

In 1870-71 the same process took place.³² Three men were directed to work full-time at the bakery operation. If they did not commence in April, they waited until June or July to complete the necessary complement of biscuit. By 1871 Peter Spence was assisted at the bakery by two of his sons, John and Alex.³³ They were paid only three shillings a day while the more experienced James Daniel was demanding four.³⁴ That year the bakery did not commence until July 8, finishing on July 22. This was curious because during the winter of 1870-71 the lower post served as a barracks for a detachment of the Quebec Rifles. Traditionally military troops consumed considerable rations of bread and biscuit. Another market for the Hudson's Bay Company's biscuit after 1871 was the federal government's occupation of the stone warehouse building as a penitentiary.

In 1872 the bakery operation was launched on June 8, a comparatively late date, but indicative of the diminishing scale of the annual boat brigades to Norway House and other northern posts.³⁵ The three contract workers were now paid in Canadian currency. Peter Spence now received one dollar, James Daniel 90¢ and Peter Spence's son, Alex, 75¢ per day.³⁶ They did not work continually at the bakery although they did average four days a week until the required amount was finished in late July.³⁷ During the baking period, the men received allowances of supplies which included tea, sugar, tobacco and

rum as well as necessities for the bakehouse such as cotton wicks, soap and hogs lard.³⁸

In 1873-74 Lower Fort Garry became the first administrative headquarters of the North West Mounted Police. According to Philip Goldring's study of the North West Mounted Police residence at the lower fort, the police force's activities were carried out in building already leased by the federal government.³⁹ These consisted of a small structure between the men's house and the bakery, and a large guardhouse beside the river gate.⁴⁰ The small building was extensively modified by the addition of a kitchen and washroom, and served as an infirmary. Unlike the sixth Regiment of Foot thirty years before them, the Canadian force apparently did not build their own ovens although when the men's house was adopted as a canteen bakeovens were built into the southwest wall.

The Hudson's Bay Company did not suffer by the police occupation, for in addition to three thousand dollars rent, they were awarded a contract for supplies which included foodstuffs; fresh beef and mutton, flour and bread, salt, pepper and potatoes for the men, hay, straw, oats and bran for the horses.⁴¹ Certainly the logical place for the Hudson's Bay Company to prepare the necessary bread was the bakehouse in the North West Bastion.

Throughout the 1870s the fort's baking facilities were used periodically to produce bread and biscuit. Mr. Hamilton, who occupied the Big House during the mid-1870s consumed a small quantity of biscuit as did Mr. Abell, the company engineer who resided with his family in the cottage by the creek.⁴² The general mess was the largest consumer of biscuit within the fort but by Outfit 1877 they only used fifty-three pounds of biscuit.⁴³ However, the quantity of biscuit provided for the steamer Colville during the operating season from June until October was immense by comparison.⁴⁴ During outfit 1876, Lower Fort Garry provided the Colville with 1,161 pounds of biscuit; a quantity that may have justified the continued

seasonal operation of the bakery.⁴⁵

By 1880, it is highly unlikely the bakehouse was still in operation. By 1875, the traditional trunk route from York Factory to Norway House had been superceded by the St. Paul trail. A second transportation revolution from 1877 to 1893 changed both the routes and technology of transport in the Northwest. This period of transportation was symbolized by the railway, and its advent brought the steady decline and obsolescence of Lower Fort Garry. Once it was decided that the transcontinental line would pass through Winnipeg rather than Selkirk, it was clear that primacy in the fur trade belonged to the old centre of the Hudson's Bay Company's activities at the forks.

There was no mention of the Lower Fort Garry bakehouse in the Day Book for 1877-80,⁴⁶ nor are biscuit or bread listed under the heading "country-produce" in the company's inventories.⁴⁷ By 1880, John, Magnus and Jacob Spence were still temporary labourers at the fort but there is no indication that they carried on their father's tradition.⁴⁸ The historic function of the bakehouse in the North West Bastion had ended. Nevertheless, its solid stone construction guaranteed its survival at a time when the Hudson's Bay Company was dismantling various structures inside and outside the fortress walls.

In its declining years, Lower Fort Garry was frequently inspected by the Company to estimate costs and repairs. In 1889, for instance, W.H. Adams inspected the post and recorded the following information concerning the four bastions.⁴⁹

The bastions are utilized as follows:

1. Bakehouse, square building, stone, shingle roof, constructed inside bastions, out of repair.
2. Whole bastion built up and used as storage for sundries, lumber, etc.
3. Ice house, square building, stone, shingle roof, constructed inside bastion out of repair and useless as an ice house.

4. Powder magazine, square building, stone, tin-covered roof, constructed inside bastion. Too damp to be of use. Ten years later, a Lower Fort Garry inventory mentioned that the old bakehouse was empty and the roof was leaking.⁵⁰ Obviously, the bastion was falling into a serious state of disrepair. With a limited staff of chief trader William McLean, two clerks and one full time labourer, Alfred Franks, there was little available manpower to perform the necessary work. During the 1890s the North West Bastion was certainly no longer used as a bakehouse. In fact, according to Lower Fort Garry accounts, by 1896 the structure was actually being used as a stable. The 1896 inspection report included the following information:

Four bastions, May 31, 1896:

One used as Ice House

One used as old Stable (bakehouse)

One used as Lumber Room - New Roof

One not used - Basement part requires repair on walls."⁵¹

Finally in October, 1899 the Hudson's Bay Company allotted funds to repair the "North Bastion house."⁵² They repaired the shingled roof as well as other structural defects.

In the next decade reports on the condition of Lower Fort Garry were prepared periodically by Inspector J.S. Braidwood.⁵³ While the major buildings showed evidence of varying degrees of decay and required fairly expensive upkeep, the stone walls and bastions by this time were well maintained at a small cost annually "and the whole interior presents a smart and well-kept appearance."⁵⁴ Obviously, the Hudson's Bay Company had realized the potential of the site as a possible summer and tourist retreat several years before it was taken over by the Motor Country Club. Perhaps they even realized that modest upkeep would enhance the historic value of the stone fort.

Part II Structural Features of the Bakehouse in the North West Bastion

The bakehouse structure, located within the North West Bastion at Lower Fort Garry, has experienced several renovations commensurate with its changing functions. Originally the North West Bastion was constructed in a circular shape similar to the other bastions at the fort. When the Hudson's Bay Company decided to erect a bakehouse they altered the front and interior of the bastion to support the new structure.¹ The bakehouse provided hard-tack biscuit for the Hudson's Bay Company's Northern Department from the 1840s when it was constructed until 1875 when it was relegated to use as a storage area. Like other buildings at Lower Fort Garry, the change of function for the bakehouse after 1875 dictated far greater modification of the building's interior than of its exterior. Before the building can be effectively restored to its original fur trade function as a bakery, one must identify these significant alterations.

The bakehouse at Lower Fort Garry was utilized on a seasonal basis from April through July to prepare biscuit for the company's brigades, schooners and freight boats travelling to the Interior. The building had no other recognizable function. When the Hudson's Bay Company no longer required the bakery operation, the building was probably used for storage until the 1890s when it was transformed into a stable.² This has important implications for the interior layout of the structure as its use as a stable presumably necessitated the removal of the baking equipment and other interior features. The bakeovens, however, were not removed at this juncture. They survived until 1911

when they were allegedly removed in preparation for Lord Strathcona's visit to Lower Fort Garry.³

With the baking apparatus out of the way, the building was easily converted to an ice house for the Motor Country Club. They maintained the building until the mid-1960s when National Historic Sites personnel used it as a construction shed for the making of shingles and other material for the restoration of the Big House and the Salesshop-Furloft building. In the interim, however, some interesting alterations were made to the building. In 1955-56 Harold Johnson, a stone mason, reconstructed the ovens and the chimney in the bakehouse.⁴ This strongly implies that all traces of the bakery complex were not removed in 1911. When two employees of the Fort Vancouver Preservation team visited Lower Fort Garry in September, 1967, they noted that the two stone and brick ovens in the Lower Fort bakery were like its Fort Vancouver counterparts in a number of respects. Historian John A. Hussey recorded the following description of the Lower Fort Garry ovens:

The ovens were vaulted inside and out, being placed side by side with a common wall between them. Each oven had only one entrance, a small square door placed two-feet above the gravel floor. The floors of the ovens were level with the bottoms of the doors. A flue led in a slanting direction from the top of each oven to a common chimney at the front end of the ovens. Air spaces at the sides and rear of the joined ovens separated the heated elements from the wall of the bakery.⁵

Hussey and Koue also noted that the Lower Fort Garry oven complex was considerably smaller than that at Fort Vancouver, the outside dimensions of the foundations being about 14'9" x 8'8".⁶ Each of the two baking chambers was rectangular in shape, 5' long and 4'3" wide with a vaulted ceiling about 3'3" high at the top of the arch.

Obviously the ovens had been constructed on the basis of some structural evidence. In his comprehensive study of the Bakery at the Fort Vancouver National Historic Site, John

Hussey commented that the Lower Fort Garry bakehouse so well correspond with general descriptions of the bakeovens of the period that apparently a serious effort was made to achieve some accuracy in their reconstruction.⁷ It is obvious, however, that the reconstruction was not intended to be functional. The height of both oven hearths above the bakery floor was a back-breaking twenty-four inches above the floor while the ovens in the Men's House were sixteen inches higher. The implication is that a further reconstruction of the ovens cannot be achieved on the basis of historical evidence directly related to as-found material. Fortunately there is considerable comparative material on bakehouses and their structural components. Much of this information is drawn from the Hudson's Bay Company bakehouses at Fort Vancouver and York Factory as well as relevant material from British, French, French Canadian and American sources. There is also an excellent report prepared by John A. Hussey entitled Historic Furnishing Study, Bakery, Fort Vancouver National Historic Site. Completed in 1973, it contains a useful description of the bakery process, the ovens and the bakery layout as well as equipment and furnishings.

Exterior General

A rectangular shaped building surrounded by the North West Bastion, the exterior of the bakehouse has not been altered substantially since its construction. Like the neighbouring warehouse building, the main walls were constructed both of rubble and cut quarried limestone and mortar, all obtained in the vicinity of the fort.⁸ It is widely recognized that stone construction was not the usual Hudson's Bay Company building practice with the general exception of powder magazines. The bakehouses constructed at York Factory and Fort Vancouver in 1834-35 and 1844 were the usual Hudson's Bay Company style, with heavy upright grooved posts set at inter-

vals of approximately ten feet along massive sills, the spaces between the posts being filled with horizontal squared timbers to complete the walls.⁹ However, with readily accessible building material and the expertise of stone masons such as Duncan McRae, John Clouston and Belonie Gibeault, it is not surprising that the Hudson's Bay Company decided to build a permanent structure for baking with stone.

The southern elevation of the bakehouse is dominated by the main door and a single sashed window. The 1972 as-found drawings, numbers eleven and twelve, record the structural details of these features.¹⁰ As there are no historical photographs of the bakehouse, it is difficult to ascertain whether or not they represent the original door and windows. Certainly, the axe-hewn oak lintel strongly suggests that the door has not been altered to any extent since the 19th century. There is some evidence of modern repairs on the door. For instance, the door jambs are not the original pieces of lumber, and gaps in the door frame have been filled with pieces of board and cement mortar.¹¹

In 1973 John Dewhirst and the Lower Fort Garry archaeological team dug under several flagstones outside the bastion to determine the evolution of floors, the remains of an earlier door sill, and a path or walkway.¹² Directly below the sod close to the sill was a layer of small stones, rubble and a few artifacts in black earth. This one foot lens, which does not extend far from the building, is rubble from construction of the bakehouse walls and persons using the entrance.¹³ Beneath this layer was a small band of beige sand, mortar and small rocks deposited during construction of the bastion foundation. Beneath this band is damp black earth with no artifacts. According to the archaeologists the layer of small stones, rubble and artifacts was gradually built up since the bakehouse was built and it may represent a dirt pathway to the structure.¹⁴

The Roof

The simple hipped roof of the bakehouse is shown in as-found drawings number six and seven.¹⁵ Again, the basic structure has not been altered significantly since the building was erected. The brick chimney at the north end of the bakehouse, for instance, is presumably an original feature except for the mortar at the base of the chimney. Presently, the roof is covered by cedar shingles painted a reddish brown. As-found drawing number eight indicates that a stack of oak shingles had been left inside the bakehouse,¹⁶ and, of course, the building has probably been resingled several times since 1850, but there is no actual information on the original roofing material. The York Factory bakehouse roof consisted of wood planking covered by an exterior layer of tin.¹⁷ The Lower Fort Garry powder magazine located in the North East Bastion was also covered by a tin roof, but this does not represent sufficient evidence to suggest that the original roof of the bakehouse was tin.

The West and East Elevations

The North West Bastion encloses the bakehouse and two lunettes; each accessible by a window, one on each side of the bakehouse.¹⁸ The window on the west elevation near the main entrance has been blocked up for many years, but the main east window is still open to lunette. In 1973 the archaeologists excavated both lunettes to determine the evolution of ground level, and to reduce the ground to the earliest occupation.¹⁹ When the as-found drawings were prepared in May, 1972 it was noted (#6) that there was an ash dump below both windows. Upon further investigation, the archaeology team noted that the east lunette, due to its proximity to the visitor's parking lot and to the fort's interior, contained more garbage and deposition than the west lunette.²⁰ An exploratory trench was dug across the middle of the west lunette to determine the

east-west soil profile. Beneath the top layer was a thick layer of black soil with many lenses of orange, black and grey ash. This ash may have come from the ovens which were operational until 1911. This soil profile and the collection of artifacts represent fairly substantive evidence that the two windows should be restored in the locations identified in as-found drawing numbers four and six.

The Interior

No historical or photographic evidence has survived for the structure, features or layout of the Lower Fort Garry bakehouse. There is, however, enough comparative data and specific historic information on the bakery operation to make recommendations concerning structural details. For instance, we know that during the 1860s the baking operation involved three men working within an area approximately forty by fourteen feet. This working area was restricted by the location of the ovens in the north end of the bakehouse. Unquestionably, the ovens represent the most complex problem for the restoration of this baking facility. How accurate was the reconstruction during the mid-1950s? What was the thickness of the oven walls, the interior shape and dimensions of each oven, the height of the oven floors above the ground, the height of the oven arches? Were the chimney entrances within or without the oven doors, were there arches under the ovens, and how far apart were they? In a reconstruction of the Lower Fort Garry bakehouse such features will have to be designed upon the basis of the general practice of the time.

The Floor

A comprehensive record on interior structural details can be found in the 1972 as-found drawings. Drawing number four of the Main Floor Plan shows that the modern flooring consisted of one-half inch aggregate loose gravel over compacted dirt.²¹ The 1972 archaeological team limited its interior excavations

to a pit in the southwest corner and another rectangular pit in the area of the oven foundations.²² Inside the doorway no remains of stone or wood flooring were found. In 1978, however, Archaeology revealed 3' x 15' spruce floor beams at the 3'0" on centre. Such remnants of spruce floor joists toward the middle of the structure strongly suggest that the working area of the bakehouse had a wood floor at one time. This possibility is reinforced by the fact that wood floors were a standard feature of British and American bakeries in the 19th century.²³ Furthermore, there is evidence that the Hudson's Bay Company bakehouse at Fort Vancouver also had a wood floor.

Certain interior structural features have obviously remained intact since the initial construction. For instance, if one refers to as-found drawing number five, the rafter plan, one can see that the stonework extends to the underside of the roof boards.²⁴ Most of the original axe-hewn oak rafters, collar ties and ceiling joists are also intact and the use of oak and spruce as building material is well documented by William Lane in his business papers.²⁵ Several times he ordered considerable quantities of oak, spruce and other wood for construction of the Men's House and other fort facilities. While the restoration of the bakehouse will require the introduction of modern materials to stabilize the rafters, joists and beams the as-founders have identified the historic building material and do not require further elaboration here.

The Ovens

Obviously the oven or ovens were the most important structural features within the Lower Fort Garry bakehouse during the fur trade period. In 1911 they were apparently removed for appearance and in 1955-56 they were reconstructed. The historical evidence used for this reconstruction is unavailable but according to historian John Hussey and architect A. Lewis Coue, the rebuilt bastion ovens corresponded closely to general descrip-

tions of bakeovens of that period. These two experts assumed that a serious effort had been made to achieve some accuracy in their reconstruction. It is clear however, that the oven size and their height from the floor were wrong.

Structural details of the Lower Fort Garry ovens were recorded in as-found drawings number nine and ten.²⁶ Before a discussion of the accuracy of the reconstruction it would be useful to repeat Hussey's description.²⁷ The rebuilt ovens were built largely of stone, though some brick was used above the oven entries. The ovens, vaulted on the inside and outside, were placed side by side with a common wall about three feet thick. The side and rear oven walls were more than a foot thick, while the common front wall was about 2'8" through. The hearth or base of the baking chambers was level with the bottoms of the doors. A flue slanted from the top front of each oven to a common chimney at the front end. Air spaces at the sides and rear of the joined ovens separated the heated sections from the walls of the bakery.

The archaeological team working on the Lower Fort Garry bakehouse in 1972 investigated the possible presence of a hearth in front of the reconstructed ovens and oven foundations.²⁸ A rectangular pit was dug to the bottom of the oven foundations in the north west corner of the bakehouse room, so that a six foot long profile at right angles from the middle of the west oven would also be exposed. The dig revealed no hearth remains. It did demonstrate, however, that the oven foundation abuts the wall foundations and also rests on the footing of the wall foundation.²⁹ Furthermore, the north-south profile coming off the left oven at right angles shows that a shallow trench was made to install the oven foundations. After the oven foundation was built, the trench was backfilled with black topsoil and gumbo, mortar and rubble at the base of the wall.

When the reconstructed ovens were removed by the restoration crew in 1978 some interesting features were uncovered. The stone on the face of the north wall was blackened or burnt on

the rear of the east oven but the stone on the west portion was relatively light in colour. This may represent important historical evidence as to the original location of the ovens or it may simply be a result of the oven's use by the restoration crew during the 1960s and early 1970s. The wood rafter beam above the ovens also shows evidence of burning below it.

Comparative Data: Ovens

This section will concentrate on comparative historic data relevant to the restoration of the Lower Fort Garry ovens. While Hussey's Historic Furnishing Study of the Fort Vancouver Bakery is the major source, Hudson's Bay Company archival material and the study by Lise Boily and Jean-François Blanchette on Quebec ovens also deserve careful consideration.

According to the Hussey Study, the basic design of wood-burning ovens did not change greatly during the 18th and 19th centuries.³⁰ Hussey does emphasize, however, that the cultural heritages reflected in design can be marked by certain features. This observation raises some interesting questions. Did the ovens at Lower Fort Garry reflect the national background of the predominantly Scottish officers in charge of the Red River district or of the French Canadians and English half-breeds who operated and may have constructed the bakery? Hussey is inclined to believe that the officers did the actual designing, perhaps on the basis of some English precedent, plan or manual. Recent research reinforces this possibility. When scientist John Lefroy arrived at Fort Simpson in the remote Mackenzie river district in 1844 he found John Loudon's Cyclopedia of Villa and Farm Architecture "fresh and new" in the officers' quarters.³¹ This book contained a comprehensive plan for a "common country oven," which he described as "a rude kind of oven adapted for new countries."³² While it is not known whether Loudon's plan was followed by the Hudson's Bay Company, the presence of his book at a Hudson's Bay Company post is sig-

nificant. However, although the company officers were ultimately responsible for the successful completion of a structure, they seemed to give the tradesmen considerable leeway in terms of building techniques and material used in construction.

The York Factory bakehouse is an interesting case study that one can follow through the Hudson's Bay Company post journals and account books. In the summer of 1834 the labourers at York Factory were reported to be busy constructing a new bakehouse and kitchen.³³ First, the carpenters and labourers erected the wood frame of the bakehouse. By September 25, 1834 the carpenters had begun to plank the roof of the building before work was discontinued for the winter months.³⁴ By May 12, 1835 work on the new bakehouse had proceeded to the point where the carpenters were ready to cover the roof with tin,³⁵ thus involving the blacksmiths who did the iron work for the new facility.³⁶

Not until the structure was built did the mason, Belonie Gibeault, begin the ovens. On May 25, 1835, he and André Benoit, the baker began the oven work.³⁷ Benoit, from the parish of Longueuil in Lower Canada, joined the Hudson's Bay in 1824 specifically "de travailler à son métier de Boulanger."³⁸ He was the baker at York Factory from 1824 until 1836 when ill-health forced his early retirement.³⁹ Belonie Gibeault was a French Canadian from Montreal who joined the Company as a labourer and mason in 1823.⁴⁰ Gibeault spent the early years of his career at York Factory as a mason and mess butler and then was reassigned to the Red River district. In fact, there is evidence to suggest that Gibeault was doing mason work at Lower Fort shortly before the time that the Lower Fort Garry bakehouse was probably constructed. A Mr. Gibeault was working at Lower Fort Garry for Captain Beatty of the Sixth Regiment of Foot in 1847 when the oven complex beside the South West Bastion was constructed.⁴¹

As both Benoit and Gibeault were from French Canada where

bakeovens were a traditional structure in most homes and communities, one must consider the possibility that they applied traditional techniques learned in French Canada. Of course their approach to the oven's construction was also influenced by the Company's requirements and the building materials available to them. Again, the question of building techniques probably differed between Scotland and French Canada but the dissimilarities are very difficult to identify. At the York Factory bakehouse Gibeault and Benoit first of all supervised the carting of "earth and bricks" to the building.⁴² By June 4, 1835, a little more than a week after they had begun, "Gibeault, Benoit and party" had finished "building the ovens and chimney in the new bakehouse."⁴³ The final touch to the new York Factory bakehouse was the painting which took place on June 5, 1835.⁴⁴

While the description is not detailed it does provide a few interesting clues with regard to the ovens operated by the Hudson's Bay Company. The oven itself was probably constructed primarily of brick. The use of earth and rough stone was a favourite French Canadian technique for building foundations. The reference to "building the ovens and chimney" suggests that there were two ovens serviced by a single chimney. This is similar to the reconstructed ovens at Lower Fort Garry but different from the archaeological evidence for the 1844 Fort Vancouver bakery which contained two brick ovens, each having a chimney.⁴⁵

The fabric of the Lower Fort Garry bakeovens is an important issue. At York Factory bricks were definitely used in the construction of the ovens. Doubtless these bricks were imported from England as the York Factory post journal for September 7, 1834 records the arrival of "The Beaver" with a cargo of "casks, bricks and coal."⁴⁶ We also know that bricks were used to construct fireplaces and chimneys in other buildings at the bayside depot. Bricks were also employed in the construction of company ovens at Fort Vancouver.⁴⁷ On September 17, 1844

clerk Thomas Lowe at Fort Vancouver noted in his journal the arrival of a barge from the vicinity of an Oregon City with five thousand bricks on board. It is almost certain these bricks were intended for the ovens in the bakery because on October 10, Lowe recorded, "The New Bakehouse is also nearly completed."⁴⁸

The inventory of "new stores" made at the Fort Vancouver Depot in the spring of 1845 listed "450/1,000 M Tiles, p. ovens."⁴⁹ It would appear, therefore, that tiles were also used in the Fort Vancouver ovens, but whether 450 indicates the number of tiles to be used to line the ovens or merely the remainder after the ovens had been completed is not evident. Oven tiles are also listed in the Indents of goods imported to York Factory. According to the Hussey study the use of tiles in the fabric of the ovens was a frequent practice at bakeries in the mid-19th century.⁵⁰

At the Fort Vancouver bakery, archaeological excavations in 1970-71 discovered no bricks in situ in the bakery area, nor were any complete bricks recovered; but brick fragments were scattered about in relative abundance.⁵¹ Based upon composition and relative hardness, these fragments comprised nine types or classes of brick. One of the types most abundantly represented appears to correspond to bricks 8½" x 4" x 2½" excavated at Fort Vancouver during the late 1940s or early 1950s.⁵² Since these dimensions are the same as those established by statute for bricks made in England, the Fort Vancouver archaeologists speculated that bricks of this type were imported by the annual supply ships from London. The most abundantly represented type of brick had similar dimensions—1¾" and 2¼" thick, 3¾" or 4¼" wide, with length unknown.⁵³ The origin of these bricks is not known, but they could have been from the Willemette Valley, where bricks may have been made on a small scale as early as 1841.

Although there is no substantive evidence, bricks were probably the main building material for the ovens in the Lower Fort Garry bakehouse. The source of bricks, however, is open

to debate. We know conclusively that they were imported from England to coastal posts such as York Factory and Fort Vancouver. The Hudson's Bay Company could have transported them inland but their weight and bulkiness would tend to discourage this procedure. There is also conflicting evidence concerning the possibility that the bakeovens at Lower Fort Garry were fashioned from brick made at the Red River Settlement. John Codling was among the company servants who arrived at York Factory in September, 1835.⁵⁴ Destined for the Red River experimental farm, Codling was considered to have a thorough "knowledge in flax dressing, soap boiling and brickmaking."⁵⁵

According to Alexander Ross's Red River Settlement,

brickmaking has hitherto been entirely neglected here; a few attempts at different times have been made, sufficient only to test the quality of the clay, which in many places has been found good; but with the exception of a few brick chimneys, we have nothing as yet constructed of that useful article....Sir George Simpson some years ago, brought a professional brickmaker from Russia but he had soon to leave for want of employment.⁵⁶

One suspects that Ross is referring perhaps to the homes of settlers when he discusses the infrequency of brick-making in the Red River colony. If, indeed, the clay was suitable for production, the Hudson's Bay Company may have produced enough fireoven bricks for the Lower Fort Garry oven complex by using local material.

Other structural details of the Lower Fort Garry bakeovens also remain open to conjecture. The masons who built the original ovens had a wide variety of building material available. Stone could be quarried in the immediate vicinity of the fort and lime for mortar could be obtained from the kiln at the creek. One must remember that the ovens reconstructed in the Lower Fort Garry bakehouse were built of quarried blocks and field stone, with brick being limited to the areas about the oven entries. At least the foundation of the restored ovens should be constructed of stone. The ovens at Fort Vancouver were placed side by side on cobble-stone foundations 1.6 feet

to 2.0 feet wide. They were formed of "rounded cobbles averaging about 0.7 feet in diameter."⁵⁷ They were laid in a single course without sub-footings. Lime mortar, possibly of Hawaiian coral, was present on top and in between the cobbles but not underneath.

The height of the ovens above the floor has to reflect a logical level for bake-work. The reconstructed ovens in the North West Bastion were only twenty-four inches above the floor. The oven hearths in the Lower Fort Garry Men's House are forty inches above the floor—a much more suitable height for a bakery operating on a large scale of production over a short period of the year.

An "Ordinary" British Baker's Oven

At this point it is necessary to turn to specific comparative data on ovens possibly related to the type, size and function of the Lower Fort Garry bakehouse ovens. The major sources are British, French and American, but Canadian sources include information on bread ovens in Quebec. John Hussey also included in his Fort Vancouver bakery study an analysis of various British sources which included descriptions of British ovens.

According to the Encyclopedia Britannica, the "ordinary" baker's oven in Britain contained a vaulted chamber, about ten feet long, eight feet wide, and thirty inches high at the top of the arch.⁵⁸ Other sources confirmed this general observation but added the fact that the baking chamber was sometimes oval in shape and sometimes rectangular, one not being preferred more than the other.

A very useful historical source is John Claudius Loudon's book, Cottage, Farm and Villa Architecture, published in 1844.⁵⁹ A compiler of handbooks on agriculture and architecture, Loudon presented a plan for a "common country oven," which he described as "a rude kind of oven adapted for new countries, where it is frequently necessary to use for fuel green boughs."⁶⁰

According to Loudon, "the ordinary size of Baker's ovens is from eight to twelve feet square....The height of a baker's oven is about eighteen inches in the centre, in ovens of the smallest size, and two feet in those which are larger."⁶¹

"The lower and flatter the arch," Loudon argued,

the more easily is the oven heated and the more equally does it give out its heat. The sides of the oven need never be higher than a foot....and there can be no reason why the roof of the oven should be higher in the centre than at the sides, except that it is impossible to build the soffit of an arch perfectly flat. The floor of the oven is laid with tile, and the arch is formed of fire-brick, fire-stone or trap, set in fire-clay, or in loam mixed in with powdered brick."⁶²

Loudon's description of his "oven for Green Wood" includes certain features identifiable in the Fort Vancouver bakeovens, particularly the tile for the oven floor, the arch of fire-brick and the surround of common brickwork. For comparative information, Loudon's design for an English "common country oven" is included in the appendices, with the accompanying explanation of how it works.

A French Bake Oven c. 1760

Although it describes ovens dating from a period earlier than the Hudson's Bay Company bakehouse at Lower Fort Garry, Denis Diderot's description in his Encyclopédie of a French commercial bakery in the mid-18th century is worth repeating here.⁶³ A copy of a plate from Diderot's Encyclopédie illustrates a plan of a typical French bakeoven of the period.⁶⁴ It should be emphasized that the chimney in Diderot's French oven is placed outside the oven door and that there is no flue connecting the baking chamber and the chimney. Also, unlike the Loudon plan, there are no air holes leading from the arch under the oven to the baking chamber. The oven door for the French oven was a sheet-iron plate which dropped down.⁶⁵ Other French ovens, however, had side-opening iron doors quite similar to those

generally found on British ovens.⁶⁶ No historical record or archaeological evidence has survived which described the composition of the Hudson's Bay Company oven doors. The quantity of sheet and flat iron used for the York Factory bakehouse certainly suggests that the door and possibly the frame of the oven was constructed of iron.⁶⁷ The restoration team at Lower Fort Garry discovered an iron oven frame in the bakehouse that may date from the original ovens. It should be noted, however, that the doors of the oven in the Men's House and the exterior oven behind the Big House are both constructed of wood.

Wood-Burning Ovens operated by the American Army

The American National Parks Service has restored two military bakeries; one at Fort Laramie, Wyoming to the 1876 period and the other at Fort Scott, Kansas. The Fort Laramie bakery opened on a much larger scale than the Hudson's Bay Company baking facilities, but the research into its operation uncovered some useful comparative information.⁶⁸ A manual, Bread and Bread-Making, published in Washington, D.C., in 1864 for the use of army subsistence officers, contained plans and specifications for a wood-burning bakeoven.⁶⁹ By 1882, when the same plan appeared in another handbook, this type of oven was described as an "old style wood burning oven."⁷⁰ The National Park Service historian and architect who studied the Fort Laramie bakery was not able to determine how extensively the plans for this type of oven were actually employed by the army. As Hussey wisely points out, this 1864 plan may also represent an ideal which was seldom realized in fact.⁷¹ Nevertheless, no other source provides such a detailed plan or dimensions for 19th century wood-burning ovens, and therefore they are reproduced in the appendices. It must be borne in mind that American army ovens were designed to supply the troops solely with bread. At Fort Laramie, in the 1870s, for instance, the troops comple-

ment ran between five and ten companies, demanding the presence of two bakers most of the time.⁷²

The American plan for wood-burning ovens was definitely more complex than those in general use, particularly in isolated areas such as Lower Fort Garry. For instance, for a single oven of the size indicated by the American plan, 13,716 bricks, 14 barrels of lime and 210 bushels of sand would be required.⁷³ For two adjoining and united ovens the materials needed would be 23,848 bricks, 24 barrels of lime and 360 bushels of sand.⁷⁴ To accumulate those materials would have placed a near impossible strain upon the Hudson's Bay Company's labour force and resources. Nevertheless, the suggestions put forward by Major George Bell in Bread and Bread Making may be useful in the restoration of Lower Fort Garry ovens.

Bell recommended that fire brick be used wherever there was contact with flame. He does admit, however, that common brick could be used if the tenant was willing to replace it after three years.⁷⁵ Ordinary mortar was considered best for use in ovens except where it would be touched with fire. In the heated area fireclay was recommended by the American manual. With regard to reinforcing this type of oven it was emphasized that both wood and coal ovens require additional strengthening. "The best method, perhaps, is by passing ties of wrought iron through the masonry, transversely and from front to rear....If round, they should be at least 7/8 inches in diameter, if rectangular, about 1½ inches x 5/8 inches. Between the washers and the masonry, on each end, pieces of scantling or timber, about 4 inches thick, should be introduced. The expansion caused by heat will affect the oven to such an extent as to require frequent attention to these ties."⁷⁶

The author of the pamphlet advised that the height of the oven arch was crucial to operation of the oven.⁷⁷ If the arch was too high the biscuit or bread would be overcooked on the bottom while the top would be raw. When making the arch, the

first six courses of brick from the side walls should be laid in mortar. The remainder of the arch should be laid dry and the interstices filled in with grouting of mortar or cement.⁷⁸ The arch of the American oven was laid over a removable frame.

On the basis of studying drawings of military ovens dating from the post-1850 period, the historian for American National Parks Service, James Sheire, and Architect, Charles S. Pope, concluded that at that time, period oven design almost always located the chimney at the front of the ovens.⁷⁹ The hot air from the fire circulated around the oven, front to back and back to front and out the flue. Partly on the basis of Sheire and Pope's findings, Hussey concluded that ovens such as those described by Loudon and the American Manual, with their multiple flues and larger size, were definitely more complex than those in general use, particularly in frontier localities such as York Factory, Fort Vancouver and Lower Fort Garry.

French Canadian Ovens

One cannot dismiss the influence of French Canada when one discusses the bakeovens used by the Hudson's Bay Company in the 19th century. It was French Canadians, Belonie Gibeault and André Benoit, who constructed the York Factory ovens in 1835. When the third bakery was completed at Fort Vancouver in 1844, it was under the immediate supervision of the fort's baker, Joseph Petrain, a French Canadian from Sorel Parish.⁸⁰ His successor, Joseph Raymond, was also a native of Canada. While it is not known to what extent these men dictated the design of the company ovens, they probably introduced techniques familiar in their French Canadian culture.

Two recent studies, Alain Rainvilles Le Four à Pain à Québec, A un XVII^e et XVIII^e Siècles,⁸¹ and L. Boily and J.E. Blanchette's Les Fours à Pain au Québec⁸² both examine bread ovens as a domestic tool and as an integral part of French Canadian culture. In the words of Boily and Blanchette, the

bread oven "more than being simply an object, reflects a technique, a physical milieu, a way of life, a spatial organization, a perception of things, a way of life."⁸³ In the course of their research, Boily and Blanchette discuss the structural features of the different oven types, the construction of an earth bread oven at Rivière à Mars, the technique of breadmaking, and the oral tradition surrounding this important cultural fact in French Canada. One must emphasize that the ovens described by the two Quebec studies are domestic ovens designed to produce bread on a comparatively small scale. The majority were built into or attached to the homes of the Quebecois.

In their chapter devoted to the examination of the oven's structural details, Boily and Blanchette began by making a distinction between the ovens made of brick, those of earth and those of stone.⁸⁴ This differentiation refers principally to the material composing the vault or ceiling of the bakeoven. In Quebec, the principal building material depended primarily upon the financial circumstances of the people and the presence of convenient building materials in the immediate vicinity.⁸⁵ In order to construct an oven without too much expense, what better material than clay or stone? Availability of materials certainly played an important part in the composition of the ovens at Lower Fort Garry.

The Boily-Blanchette study distinguishes between ovens on the basis of location. Outside or exterior ovens were totally separate structures located in the yard and protected by a simple shelter.⁸⁶ In every region of Quebec one might find the oven not far from the house, but situated in such a way so that the prevailing wind did not blow the smoke or the sparks toward the house. The fire-conscious Hudson's Bay Company also located the Lower Fort Garry bakehouse a safe distance from other dwellings. French Canadian "interior" ovens were those ovens found either on the ground floor, in a cellar or a lean-to. In every case they were constructed

completely or partially inside the main structure or domicile and were connected to a chimney.⁸⁷

The Lower Fort Garry bakehouse ovens do not fall neatly within either French Canadian classification. In the fact that the ovens were connected to a chimney they resemble the "interior" Quebec ovens. On the other hand, the bastion ovens, like the "exterior" ovens in Quebec, were located in a separate building totally divorced from the domestic cooking facilities in the Big House and Men's House. Furthermore, the Lower Fort Garry ovens were designed to produce biscuit on a larger scale than the domestic ovens of 19th century Quebec. Nevertheless, the comprehensive description of how the "exterior" and "interior" ovens were constructed in Quebec isolates basic characteristics of oven construction that one might apply to the reconstruction of the Lower Fort Garry bakehouse ovens.

The most common "exterior" ovens in Quebec were made primarily of earth.⁸⁸ Of simple composition, they only required a foundation, an insulating layer (solant), a hearth or fireplace, a door, a vault or ceiling and a shelter. The foundation was usually erected on a level piece of ground and constructed of wood, stone or of cement. Among the woods used, cedar was preferred because of its resistance to rot and its durability. Other wood used included the pine, cypress, ash and fir trees. The platform or footing of the ovens were also made of field stone held together by clay or mortar. For this foundation, they dug out the earth at least one foot down to ensure the footing of the masonry. They also placed sand between the stones to act as a buffer.

It is interesting to note that the French Canadian ovens sometimes had some form of insulation between the frame and the hearth.⁸⁹ A large flat stone served as a plate between the hearth and the doors; more recently, this stone surface was replaced by a plaque of cast-iron or of corrugated iron. They also applied directly on the apron a layer of earth mixed with straw, a row of bricks, or cut stones held together by clay.⁹⁰

The hearth, or more precisely the platform upon which one placed the bread to bake, was generally composed of a thick blue clay accumulated locally on the river banks.⁹¹ Of course, the composition, quality and durability of the clay varied from one region to another. Once the clay or loam was gathered at the site of the oven, it was pounded and mixed in a trough by the workmen who often used their feet for this function. Once the clay was suitably worked over, the mixture was applied on top of the foundation and then allowed to dry in the open air. During their research, Boily and Blanchette noted a definite diversity in the materials used for the hearth. The Quebecois used flat fieldstones held together by mortar made of limestone, sand and water, or by clay. They also used bricks supported by loose gravel or fire-clay. The joints of surviving ovens are full of mortar, dry grass, sand and crude cement.⁹²

Once the builders had finished the hearth or fireplace, they proceeded to put the doors in place. Generally made of cast iron, the doors played an important role in the orientation and outline of the oven vault or roof. They always put the door on the front of the hearth before they proceeded with the scaffolding of the oven proper. The Boily-Blanchette study discusses the various models and forms of the oven doors, but it is not particularly relevant to this study.⁹³ The Hudson's Bay Company either imported their doors or instructed the blacksmiths at the larger posts to produce the needed entranceway. When the York Factory ovens were under construction, the blacksmith was involved with some ironwork, which may have been for the doors to the oven; unless, of course, the doors were made of wood.

The oven hearth door and foundation intact, Boily and Blanchette then proceed to describe in detail the construction of the oven vault or roof.⁹⁴ Basically, the artisan fashioned a frame or shelter out of older wood which ran the length and width of the oven frame. Once this support was in position, the workers applied the "brique de terres" which consisted of

earth mixed with hay, gravel and sand. This process is discussed in detail in Chapter 2. In the summer of 1971 Boily and Blanchette observed the construction of a bread oven by M. Simard at Saint-Pierre de Bagotville. It was interesting to note that the two historians felt the construction of the "gabarit" or oven frame was where the considerable skills of the artisan came to the fore.⁹⁵ The artisan had to intertwine all the areas before the alder frame dried and hardened. The form of the frame had to be larger, rounder and higher toward the back than at the front to facilitate the flow of the heat into the end of the oven and allow the vault to heat uniformly.

The French Canadian exterior brick ovens are perhaps more applicable to this study of the Lower Fort Garry bakehouse ovens simply because brick was the usual building material at Hudson's Bay Company baking facilities.⁹⁶ Because of the brick's oblong shape, the exterior ovens built of this material were designed along more simple lines. More expensive than the "four en terre," they required a solid foundation of stone, cement or heavy wood and the adaptation of a very resistant frame.⁹⁷ They built the platform in the same manner as those designed for the earth ovens. The hearth is formed of a paving of bricks on the narrow or flat side, held together by mortar of quick lime, sand mixed with water or by a common cement.⁹⁸ Again, sometimes they used surfaces of fieldstones held together by mortar, or to some extent bricks filled in with clay. As for the frame, it was not possible to limit it to an assembly of alders. Instead, they cut arcs of wood to fit the dimensions of the vault, then erected a dome of planks 2 inches by 4 inches on a frame of metallic half-circles. The bricks then were piled one upon the other up the support vault, extending outward as they approached the top of the vault because of their breadth. They used small stones and some mortar to hold the bricks in the arc-shaped opening and to fill in the seams.

They covered the oven vault with a layer of mortar, clay, cement or diluted lime to preserve the brick and retain the heat. For further protection, they often juxtaposed, beside the vault, a wall of fieldstones mortared together and at least one foot thick. On some occasions, they enclosed the oven completely in a masonry of large stones and only the examination of the interior through the door opening exposed the real dimensions of the oven vault. A wall of brick often formed the façade. Another characteristic of the French Canadian brick ovens was a small hole at the back or at the top of the vault to allow the air to circulate through the oven. As for the durability of the brick ovens, Boily and Blanchette concluded that it was largely dependent upon the quality of the mortar used for the joint.¹⁰⁰

Boily and Clanchette did extensive field research throughout rural Quebec. During their extensive travel they came across numerous surviving brick ovens but curiously no remains of a stone oven. They knew that the stone ovens existed at one time because they are mentioned in the notary registers of the French Regime. As early as 1667 a notary Bénigne Basset recorded the plan for a stone oven.¹⁰¹ More than twenty years later, notary Antoine Adhémar registered two new plans for limestone ovens. The availability of quarried stone and lime in quantity at Lower Fort Garry raises the possibility of ovens built with limestone but it does seem more likely the Hudson's Bay Company preferred the more conventional and utilitarian brick as the main structural material for the bakehouse ovens.

Boily and Blanchette's field research also uncovered numerous models of what they refer to as "Les Fours d'intérieur" or interior ovens.¹⁰² These ovens, which ranged in construction from the mid-18th century to the beginning of this century, were located in cellars, on ground floors, and in semi-detached shelters connected to the main residence. These oven types were almost always possessed of chimneys which led into the hearth and the door which, in turn, opened into the inhabited

section of the house or building where they were located.

The diverse parts and material of the interior French Canadian ovens did not differ to any extent from those of the outside or "exterieur" ovens described above. Boily and Blanchette noticed a regularity in the foundation which almost always consisted of large stones held together by mortar. There were a few exceptions where the base was built of squared wood. The hearth was made of flat stones, brick or simply of beaten earth. The arched vault of the oven was usually made of bricks or, very rarely, a symmetric superimposition of "torchis," which was the clay-like substance made from mixing earth, mud, hay and other ingredients.¹⁰³ The actual ovens in the "interieur" ovens were placed either at the rear of the fireplace or immediately beside it. In either case, it was always necessary to enter the hearth in order to reach the main oven. Again, Boily and Blanchette examined some exceptions where the ovens connected with the chimneys by a passage. The surviving chimneys were made of field stone held together with mortar, but the French Canadians also made the chimneys with a mixture of hay, clay and mud.

Summary

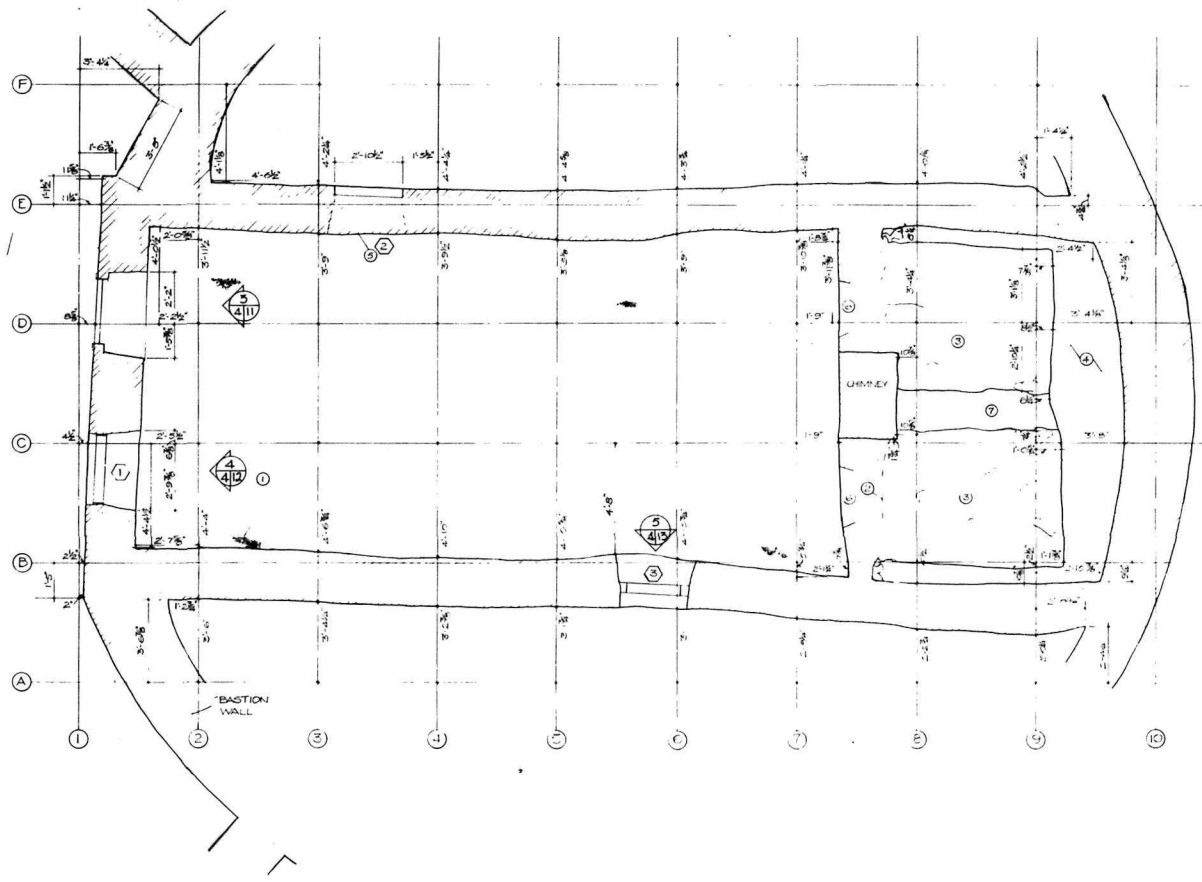
The diversity of design and variety of building materials used in the French Canadian domestic ovens further illustrates the complexities involved in the reconstruction of the Lower Fort Garry bakehouse oven or ovens. None of the ovens described earlier in this section correspond exactly to the few facts which are known about the ovens at Lower Fort Garry or what can logically be deduced from the available data on the bakery operations. Furthermore, the bakehouse and its equipment probably did not reflect the latest technological advance in the baking process. Therefore, the reconstructed ovens at the Lower Fort Garry bakehouse should be of a simple straightforward construction, a compromise between what little is

known of the typical British country oven and the more sophisticated models described by Loudon and the U.S. army subsistence Departments. The structural detail of the ovens emphasize again our limited awareness of how and to what degree the Hudson's Bay Company adapted technological knowledge in its North American operations.

The exterior and interior details of the Lower Fort Garry bakehouse are identified precisely in the as-found drawings prepared in 1972. It appears that the windows on the east and west elevations were original features and should be restored. As for the original roofing material, oak shingles may have been used originally. Large supplies of oak shingles were kept at Lower and Upper Fort Garry during the 1840s and 1850s.¹⁰⁴ Furthermore, the as-found team discovered oak-shingles stored within the building. As for the exterior finish of the bakehouse structure, a lack of photographic or documentary evidence prevents any recommendations concerning its original state.



AS FOUND BAKE HOUSE LOWER FORT GARRY, SELKIRK, MANITOBA



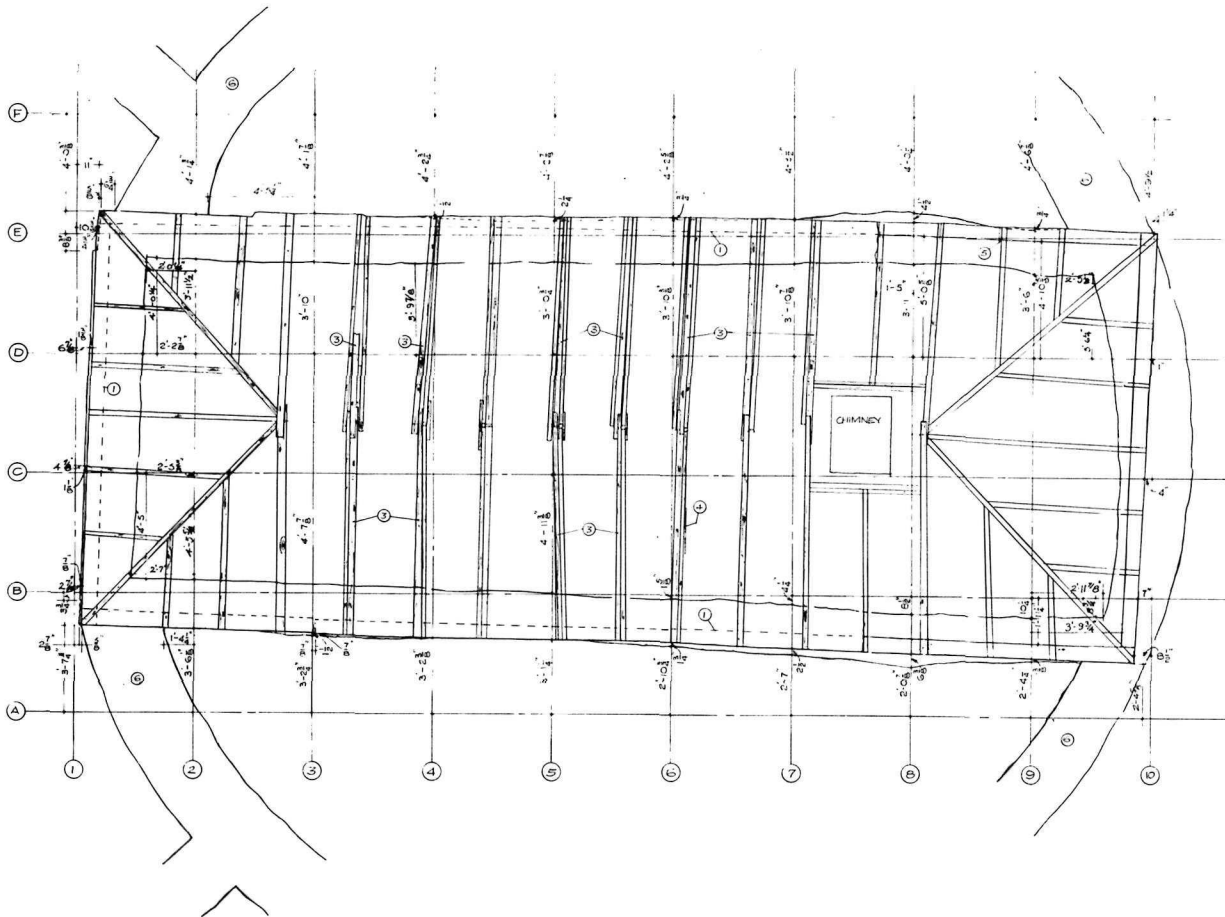
NOTES

- 1-FLOORING CONSISTS OF MAX 1/2" AGGREGATE LOOSE GRAVEL OVER COMPACTED DIRT.
- 2-LIFE OF WALL ABOVE BAKE OVENS
- 3-TOP OF BAKE OVEN REPAIRED IN ABOUT 1969 WITH LARGE STONES MORTARED IN PLACE OVER THE SEVERE CRACKS. MOST OF THE TOPS OF OVENS HAVE BEEN RE-MORTARED.
- 4-SPACE BETWEEN OVENS AND WALL FILLED TO A DEPTH OF 1' OR MORE WITH DIRT AND STONE.
- 5-FILLED-IN WINDOW OPENING
- 6-BAKE OVEN OPENINGS
- 7-FLAT PORTION BETWEEN OVEN ARCHES

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| A detail on _____ detail on _____ B location, date, no. / see details on _____ detail on _____ C drawing on _____ | |
| drawn by / dessiné par A. SHEPMAN | scale / échelle 1/2" = 1'-0" |
| checked by / vérifié par _____ | |
| job number / numéro du projet A. SHEPMAN MAY /72 | |
| responsible architect / architecte responsable, date A. SHEPMAN | |
| project title titre du projet AS-FOUND BAKE HOUSE LOWER FORT GARRY NATIONAL HISTORIC PARK | |

AS-FOUND
 BAKE HOUSE
 LOWER FORT GARRY
 NATIONAL HISTORIC PARK

drawing title titre du dessin
MAIN FLOOR PLAN



NOTES

- 1- WALL PLATE IS NOT VISIBLE. STONEMWORK EXTENDS UP TO UNDERSIDE OF ROOF BOARD.
- 2- RAFTERS FASTENED WITH NAIL WROUGHT NAILS.
- 3- ORIGINAL ROOF RAFTERS HAVE BEEN TRIMMED DOWN DURING REPAIR WORK, AND THEIR AS-BASE SIZES ARE GIVEN. NEW ORIGINAL RAFTERS AND COLLAR TIES CONSIDER 12" X 6" SPRUCE.
- 4- NEW AND HEAVY COLLAR TIES (IN USE OF NEWER).
- 5- ORIGINAL AND NEWLY SAW CEILING JOISTS STILL REMAIN, OTHER UP TO AND ROUGH SAW SERVICE.
- 6- BASTION WALL.

A. Detail on. Detail on
 B. Sectioning, elev. on. / see details on
 C. Sectioning on.

drawn by / made par. made / schéatisé
 R. VEKINSKI / 12-1-00
 designed by / dessiné par

checked by / vérifié par

job number / numéro de projet. date
 A. SHERMAN / MAY / 72
 consulting engineer / ingénieur responsable. date
 R. VEKINSKI / 11.06.73

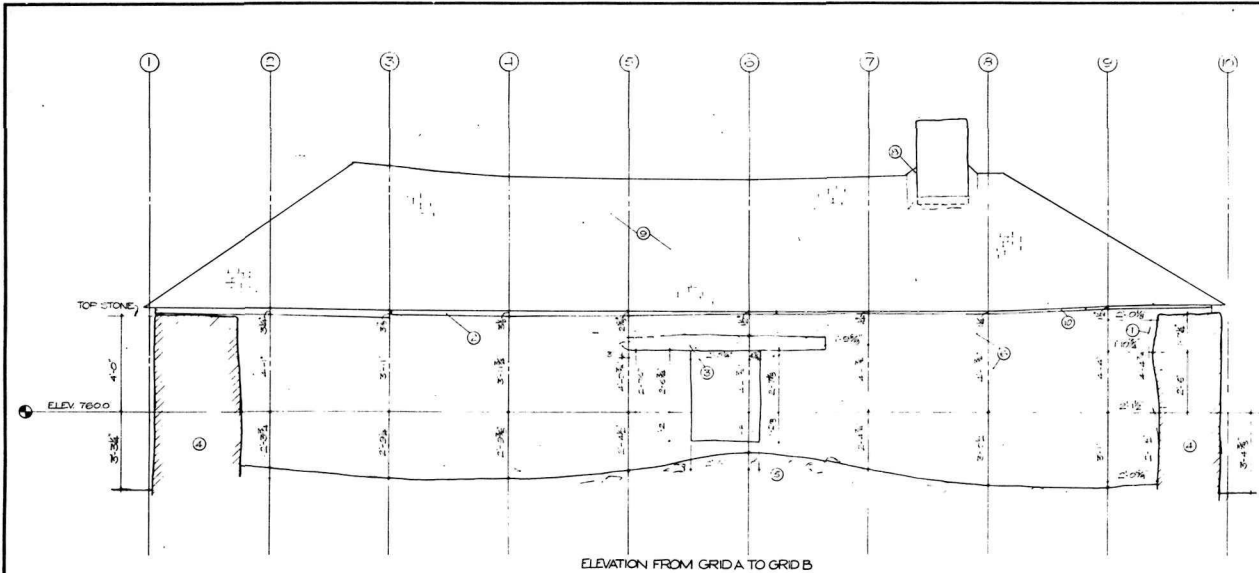
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AS-FOUND
 BAKE HOUSE
 LOWER FORT GARRY
 NATIONAL HISTORIC PARK

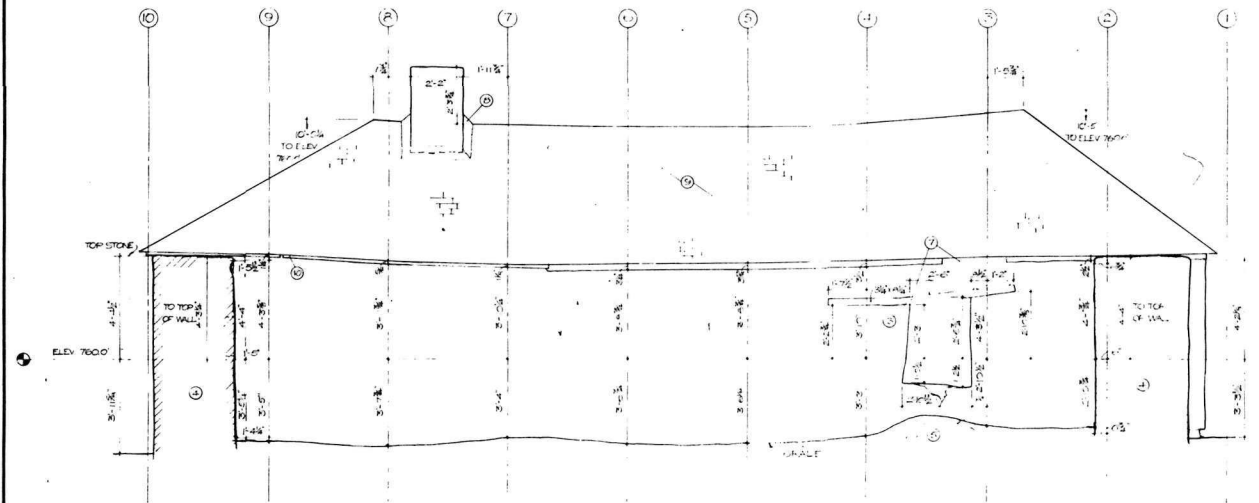
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RAFTER PLAN

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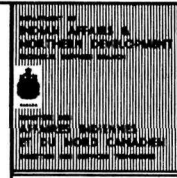
ELEVATION FROM GRID A TO GRID B



ELEVATION FROM GRID F TO GRID E

NOTES

- 1-1/2" CRACK IN WALL PATCHED SEVERAL TIMES WITH CEMENT MORTAR.
- 2-REPLACED WALL PLATE BUTT JOINTED AT BOTH ENDS. OTHER PLATES ARE ORIGINAL AND ARE AXE HEWN OAK.
- 3-OAK AXE HEWN UNTEL OVER WINDOW.
- 4-BASE OF WALLS IN SECTION.
- 5-UNEVEN GRADE. THERE APPEARS TO BE AN ASH DUMP BELOW BOTH WINDOWS. THE FILL AT THE WINDOW AT GRID 6 IS QUITE LARGE AND EXTENDS TO THE INSIDE PERIMETER OF THE BASTION WALL WHERE IT IS APPROX 2' LOWER.
- 6-WALL IS PUSHED OUT 6"-7" FROM THE WALL PLATE.
- 7-BUILDING HAS SHIFTED CONSIDERABLY AS CAN BE SEEN ON THE WINDOW UNTEL. WALL PLATE HAS ROTTED OUT AND BEEN REPLACED WITH STONE AND MORTAR.
- 8-MORTAR AT BASE OF CHIMNEY IS NON-ORIGINAL.
- 9-CEGAR SHINGLES EXPOSED ABOUT 4" TO THE WEATHER. SHINGLES ARE PAINTED A REDDISH BROWN.
- 10-SPLICED WALL PLATE JOINTS.



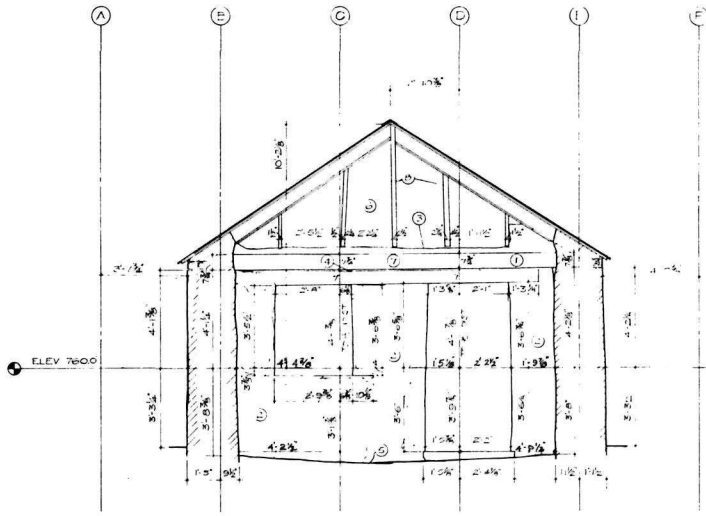
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| <p>A ARCHT. IN CHARGE</p> | <p>DATE: _____</p> |
| <p>B ARCHT. DRG. IN CHARGE</p> | <p>DATE: _____</p> |
| <p>C ARCHT. DRG. IN CHARGE</p> | <p>DATE: _____</p> |
| <p>DESIGNED BY / DRAWN BY A. SHERMAN</p> | <p>SCALE / SHEETS 1/4" = 1'-0"</p> |
| <p>CHECKED BY / REVISED BY</p> | <p>DATE</p> |
| <p>JOB CAPTION / SHEET NO. OF PROJECT</p> | <p>DATE</p> |
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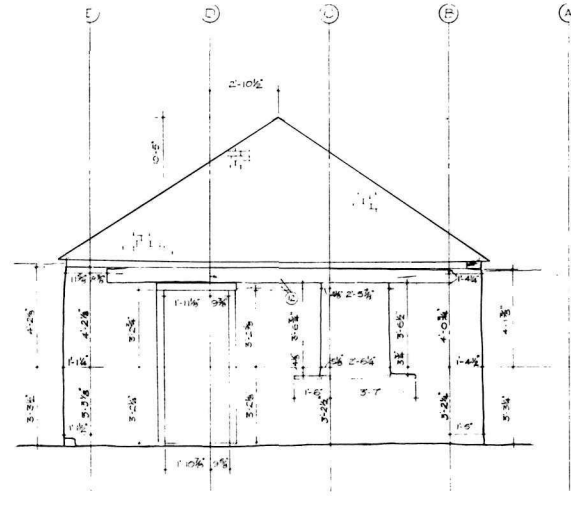
AS-FOUND
BAKE HOUSE
LOWER FORT GARRY
NATIONAL HISTORIC PARK

EXTERIOR ELEVATIONS

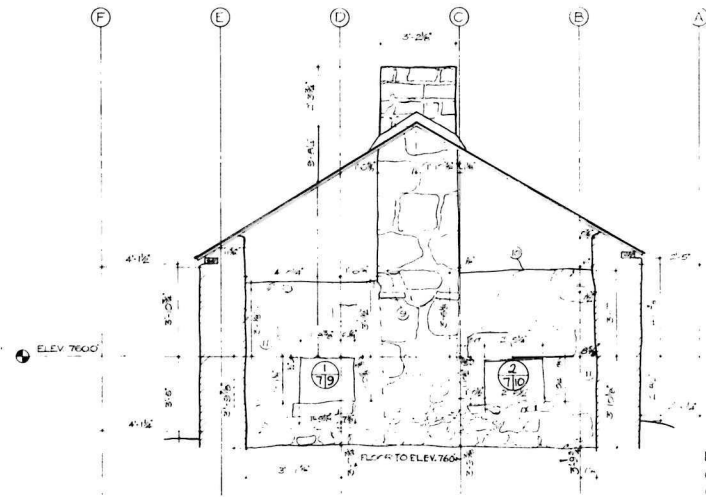
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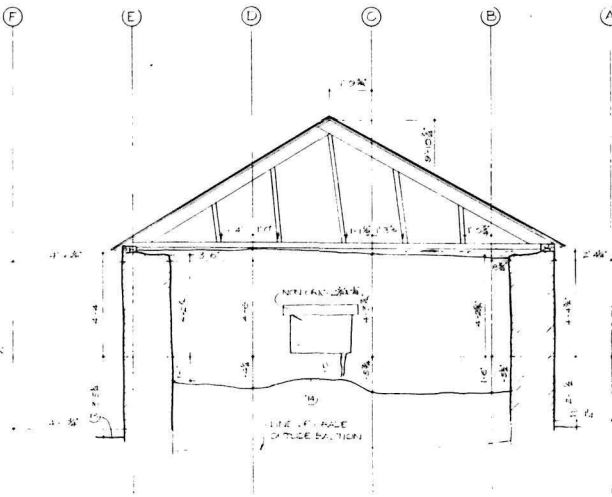
ELEVATION FROM GRID 2 TOWARD GRID 1



ELEVATION FROM GRID 1 TOWARD GRID 2



ELEVATION FROM GRID 7 TOWARD GRID 8



ELEVATION FROM GRID 9 TOWARD GRID 10

NOTES

- 1- ONE COAT OF LIMEWASH AT THIS END OF THE ORIGINAL JOIST
- 2- TWO OR THREE COATS OF LIMEWASH (CREAM COLOR), OVER ONE COAT OF GRAY OVER A COAT OF PLASTER WHICH IS ON THE STONE
- 3- TOP OF STONE WALL AT INSIDE FACE. IT IS BUILT UP ABOUT THREE INCHES HIGHER WITH MORTAR AT A SLOPE TO THE UNDERSIDE OF THE ROOF BOARDS
- 4- SMALL NOTCH REMAINT OF WHAT APPEARS TO HAVE BEEN A CEILING BOARD. TRACES OF LIMEWASH ARE ON ITS

- UNDERSIDE AND IS FASTENED WITH 2 1/2" HAND WROUGHT NAILS. MANY NAILS ARE STILL LOCATED IN THE UNDERSIDE OF THE JOIST
- 5- 1/2" AGGREGATE LOOSE GRAVEL OVER COMPACTED DIRT
- 6- UNFINISHED SURFACE. SOME BEARDS ARE WHIP SAWN
- 7- SAWN THIS FACE, AXE HEWN TOP, BOTTOM AND BACK SIDE
- 8- SAWN ONE FACE, AXE HEWN OPPOSITE SIDE AND BOTTOM
- 9- TWO CUT STONES THIS FACE AND A LARGE CUT STONE APPEARS ON THE OPPOSITE FACE, AT APPROX THE SAME ELEV

- 10- TOP OF WALL COVERED WITH CEMENT MORTAR. PATCHING IS ALSO DONE WITH CEMENT MORTAR
- 11- SEVERAL PLACES SHOW TRACES OF LIMEWASH AND PLASTER ON STONE AS MENTIONED IN NOTE 2 THIS SHEET
- 12- PATCHED WITH CEMENT MORTAR, AXE HEWN OAK UNTEL
- 13- LINE OF GRADE BETWEEN BASTION WALLS AND THE BAKEHOUSE
- 14- LINE OF RUBBLE AND DIRT GRADE BEHIND THE BAKE OWENS

NATIONAL HISTORIC PRESERVATION ACT

 NATIONAL HISTORIC PARK

 NATIONAL HISTORIC PRESERVATION ACT

DRAWING TITLE:

 DATE:

A: DRAWN BY:

 B: CHECKED BY:

 C: DESIGNED BY:

DRAWN BY / CHECKED BY:

 DESIGNED BY:

 CHECKED BY:

JOB NUMBER / SHEET NUMBER:

 DATE:

PROJECT TITLE:

 AS-FOUND BAKE HOUSE

 LOWER FORT GARRY

 NATIONAL HISTORIC PARK

DRAWING TITLE:

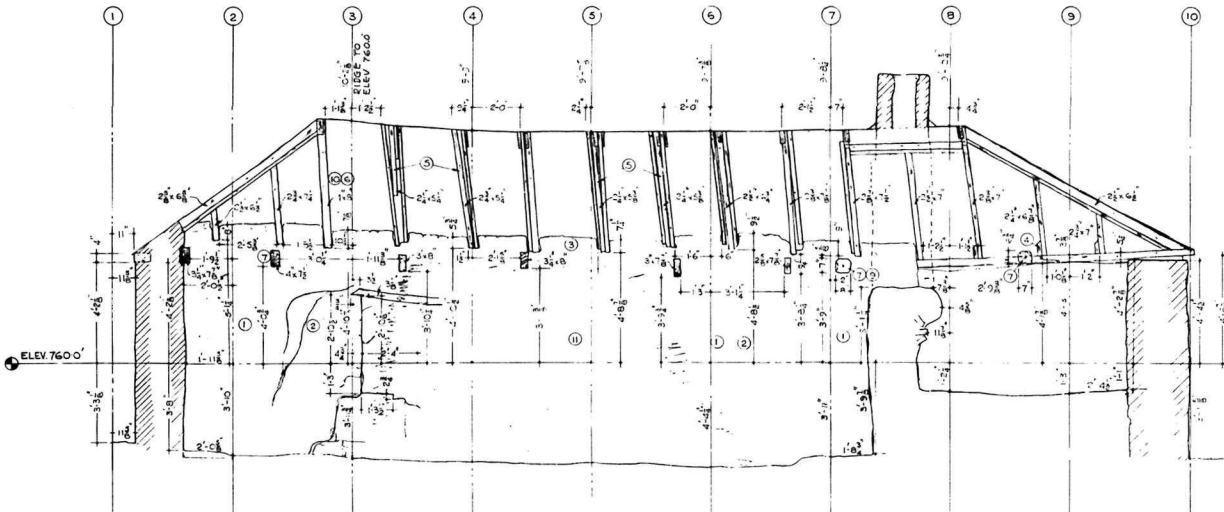
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EXTERIOR & INTERIOR ELEVATIONS

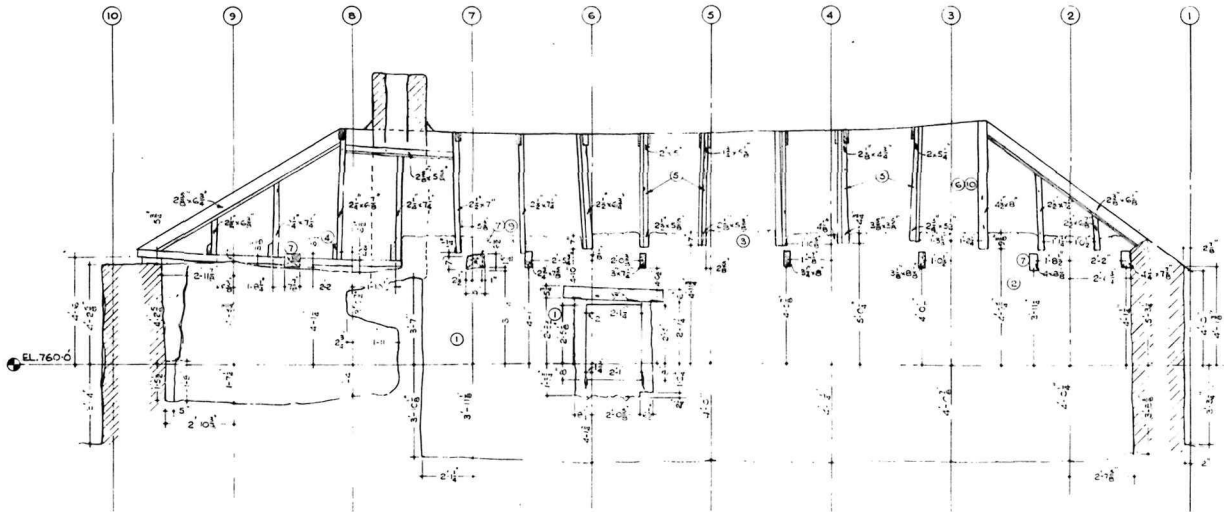
DRAWING NO.:

 SHEET NO.:

 HWFA 7/11/07



ELEVATION FROM GRID D TO GRID F.

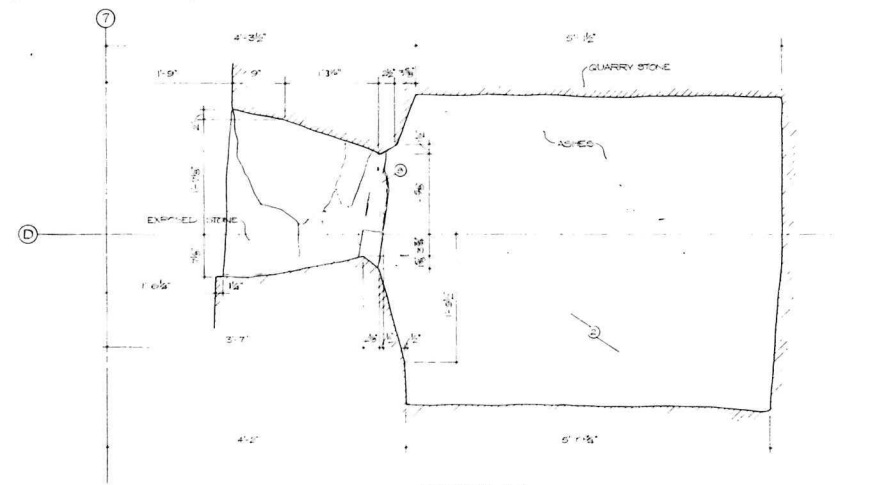
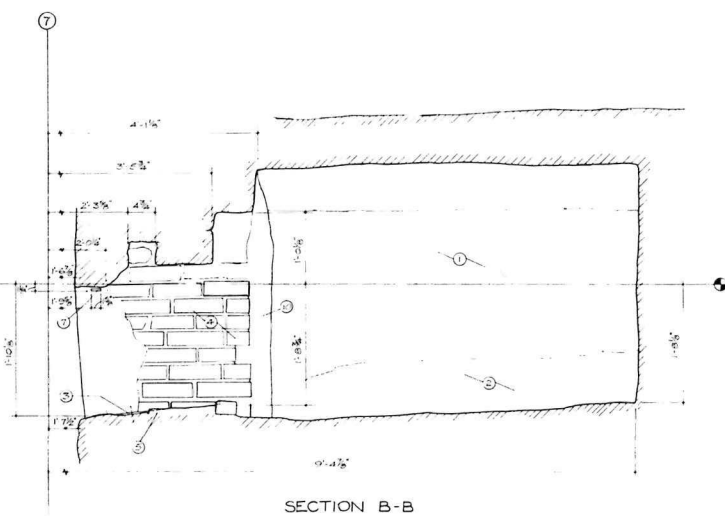
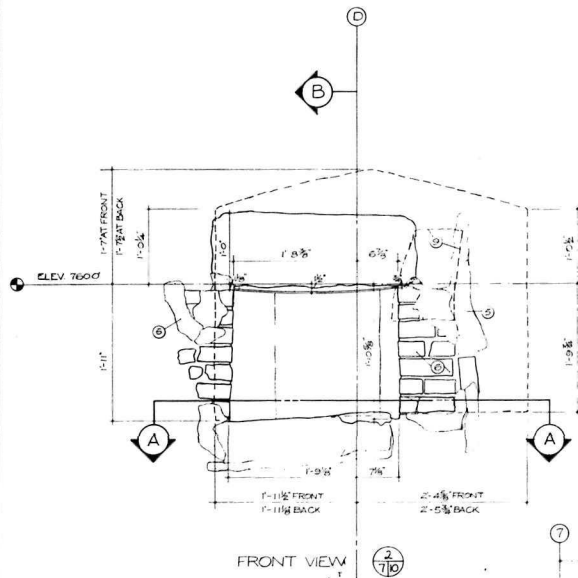


ELEVATION FROM GRID C TO GRID A.

NOTES

- 1- THIS AREA IS COVERED WITH MORTAR AND SEVERAL COATS OF WHITWASH.
- 2- THIS AREA REPOINTED SOME PARTS RECENT (CEMENT USED).
- 3- WALLPLATE IS NOT VISIBLE. STONEWORK RIGHT UP TO ROOFBOARDS.
- 4- OUTLOOKERS FASTENED WITH HAND WROUGHT NAILS.
- 5- ORIGINAL OAK RAFTERS HAVE BEEN TRIMMED DOWN DURING REPAIR WORK AND THEIR AVERAGE SIZES ARE GIVEN. NON-ORIGINAL RAFTERS AND COLLAR TIES CONSIST OF 1 1/2" x 5 1/2" SPRUCE.
- 6- OAK AXE HEWN COLLAR TIES.
- 7- 3 REMAINING CEILING JOISTS ARE OAK REPLACEMENT JOISTS ARE ROUGH SAWN SPRUCE.
- 8- NOTCH 3" DEEP, FLUSH WITH WALL AND IS 7" LONG, NOTCH IS AXE CUT.
- 9- NOTCH 1" DEEP, 3" FROM WALL, AND IS 1'-3" LONG, NOTCH IS AXE CUT.
- 10- ALL COLLAR TIES ARE ON GRID (C) SIDE OF RAFTERS (NORTH SIDE).
- 11- STACK OF OAK SHINGLES

| | | |
|---|---------------------------------|------------------------------|
| <input type="checkbox"/> A detail on <input type="checkbox"/> B location map, etc. / sur details en <input type="checkbox"/> C drawing on | | Date en MAY 1972 |
| Drawn by / dessiné par R. MERRINGS | Scale / échelle 1/2" = 1'-0" | |
| Checked by / vérifié par | | |
| Job number / numéro de projet A. SIEPRYAN | | Date MAY 1972 |
| Responsible official / officier responsable [Signature] | | |
| Project title AS-FOUND BAKE HOUSE LOWER FORT GARRY NATIONAL HISTORIC PARK | | |
| Drawing title INTERIOR ELEVATIONS | | |
| Reference no. / no. de référence HWFG 72/1107 | | Sheet no. / feuille no. 8 |

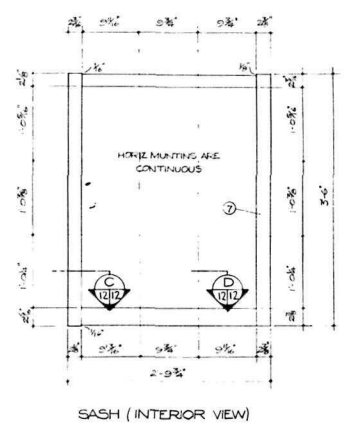
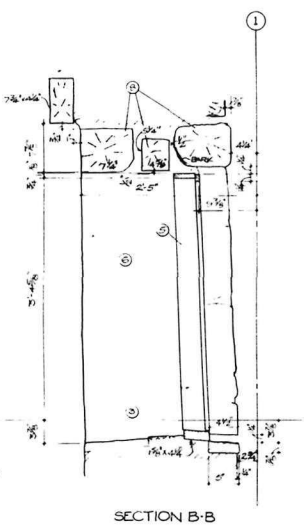
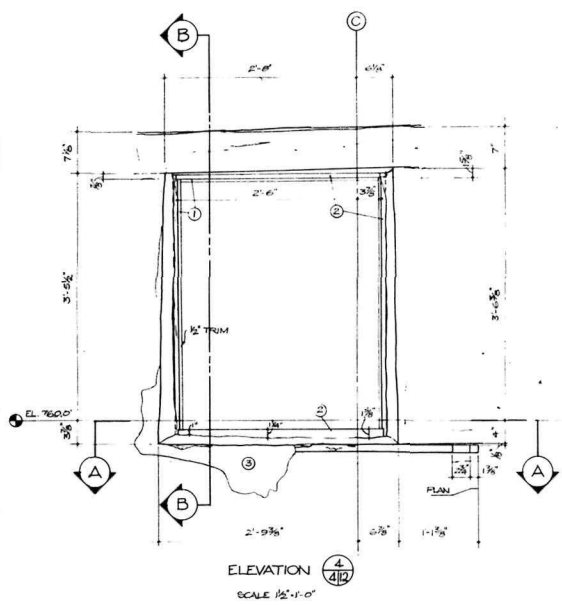


- NOTES**
- 1-NO LINING IN BAKE OVEN STONES ARE EXPOSED AND SLIGHTLY COVERED AT JOINTS WHICH ARE MADE WITH RECENT CEMENT MORTAR.
 - 2-BAKE OVEN, DUE LARGELY TO USE WITHIN THE LAST FEW YEAR, HAS A LAYER OF 5" OR MORE OF AGES AND RUBBLE.
 - 3-LINE OF BOTTOM OF OVEN MOUTH AT THE BRICK SIDE OF OVEN MOUTH (NOT AT SECTION).
 - 4-MODERN BRICKS 2 1/2 X 3 3/4 X 1 1/2" MAKE UP THE REBUILT BAKE OVEN MOUTH.
 - 5-RECENT CEMENT MORTAR PATCHWORK.
 - 6-FACE OF BAKE OVEN CONSISTS OF RELAID ORIGINAL BRICK.
 - 7-HAND WROUGHT 1/2 X 1 1/2" IRON BAR.
 - 8-DETERIORATED ORIG. BRICK SILL ACROSS BAKE OVEN MOUTH.
 - 9-DOTTED LINE SHOWS LOCATION OF FLUE. IT IS CONNECTED DIRECTLY TO THE CHIMNEY FLUE.
 - 10-ANGLED INSIDE FRONT FACE OF BAKE OVEN.

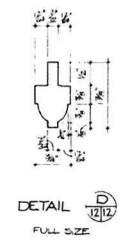
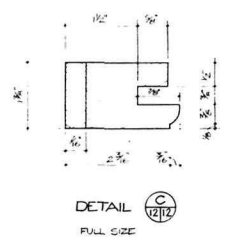
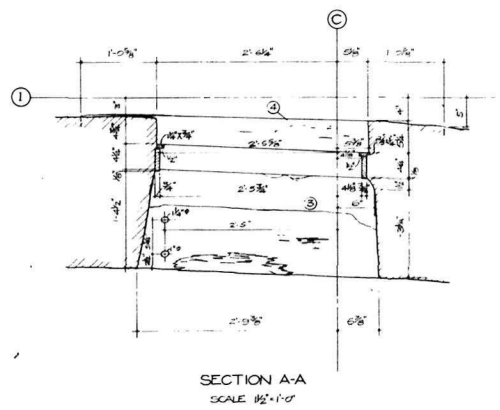
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| B location map on | map detail on |
| C drawing on | drawing on |
| Drawn by / dessiné par A.P. SHERMAN | Scale / échelle 1/2" = 1'-0" |
| Designed by / dessiné par | |
| Checked by / vérifié par | |
| Job number / numéro du projet A. SHERMAN | Date MAY 1972 |
| Responsible officer / officier responsable A.P. SHERMAN | |
| Project title AS-FOUND BAKE HOUSE LOWER FORT GARRY NATIONAL HISTORIC PARK | Site de projet |

AS-FOUND
 BAKE HOUSE
 LOWER FORT GARRY
 NATIONAL HISTORIC PARK

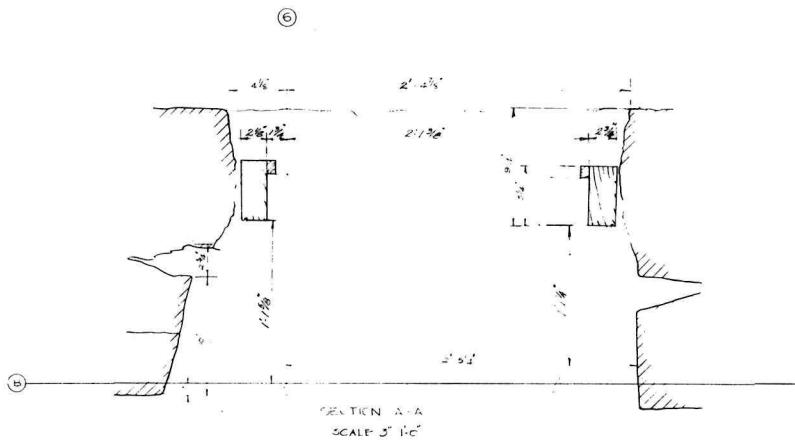
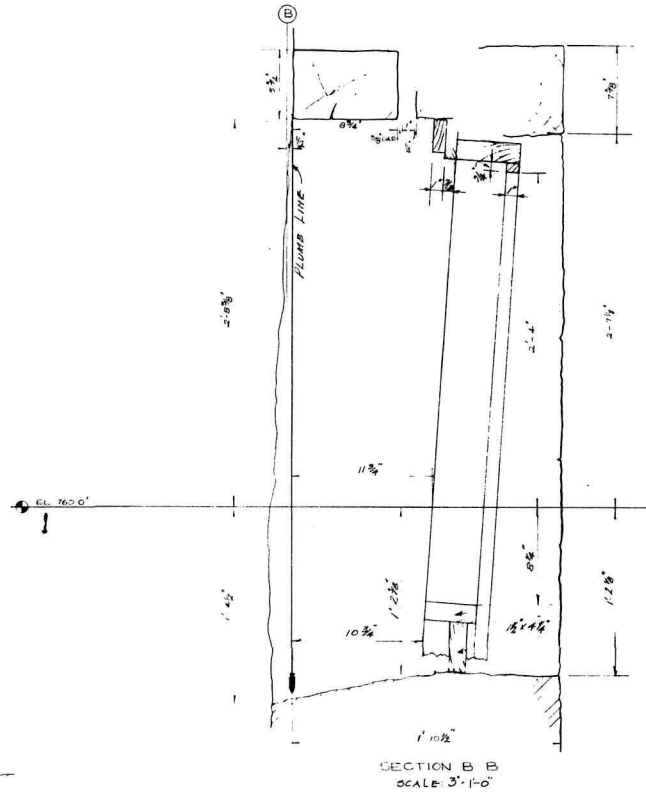
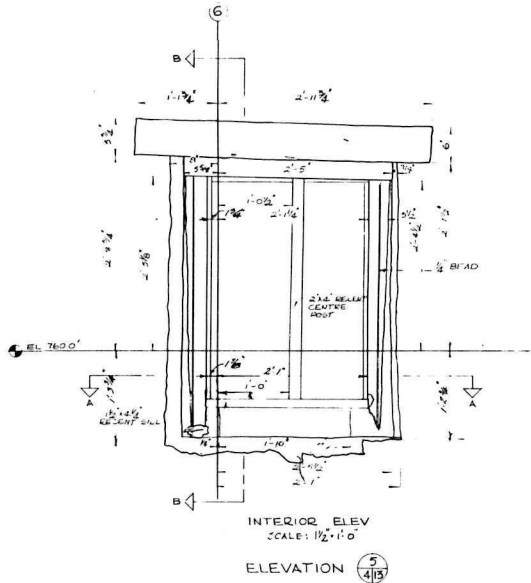
BAKE OVEN DETAILS
 AT GRID D & GRID 7



- NOTES**
- 1-1/2" TRIM PIECE AND WINDOW STOP (RECENT)
 - 2-RECENT JAMB, HEAD AND PART OF SILL.
 - 3-RECENT CEMENT MORTAR.
 - 4-ORIGINAL EXTERIOR SILL, IT IS BADLY ROTTED AND IS PAINTED A REDDISH BROWN.
 - 5-1" STRIP OF GREEN PRINT AROUND ENTIRE FRAME.
 - 6-SEVERAL COATS OF LIMEWASH REFER TO NOTE NO 2 ON SHEET NO. 7.
 - 7-SASH IS ALSO MODERNIZED NOT PAINTED THIS SIDE.
 - 8-OK ARE HEAVY LITELS.



| | |
|---|--------------------------------|
| A detail on... detail on B location dep. on / sur details on C drawing on... drawing on | |
| drawn by / dessiné par A.P. SERPAIN | made / établi AS SHOWN |
| designed by / établi par checked by / vérifié par | |
| job number / numéro du projet A SERPAIN MAY /72 | |
| responsible officer / officier responsable A.P. SERPAIN | |
| project title AS-FOUND BAKE HOUSE, LOWER FORT GARRY NATIONAL HISTORIC PARK | |
| drawing title WINDOW NO. 1 DETAILS | |
| reference no. no. de référence HWG 79/1107 | sheet no. feuille no. 12 |



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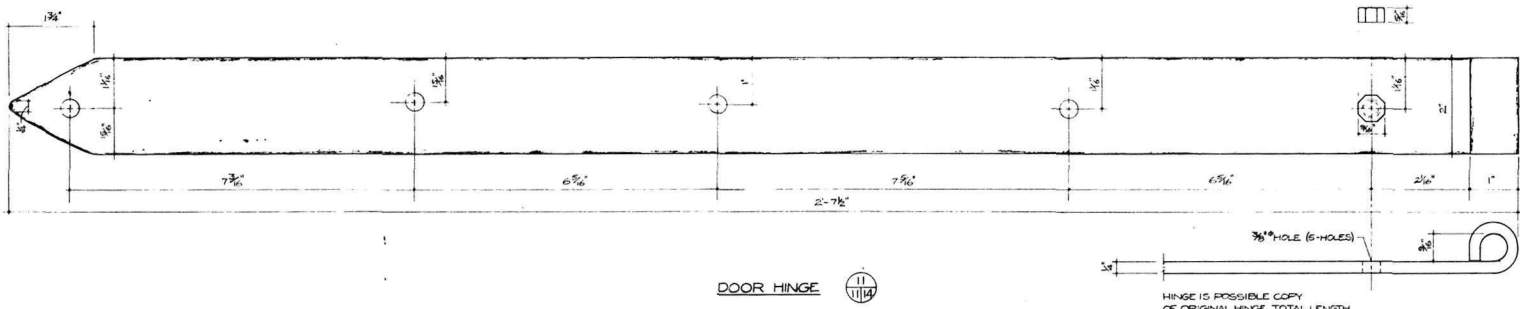
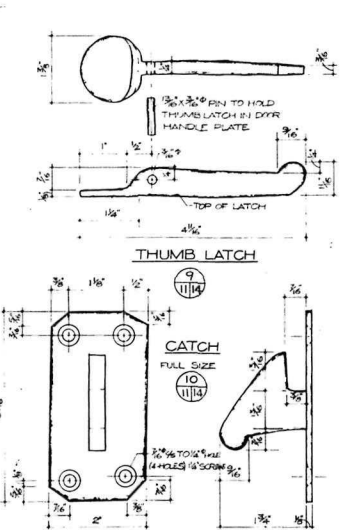
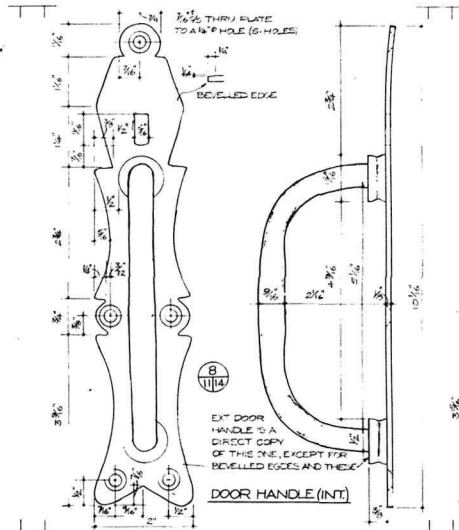
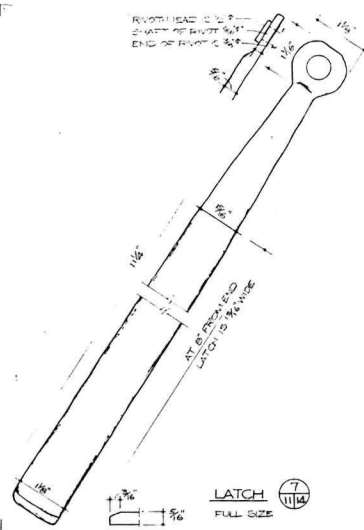
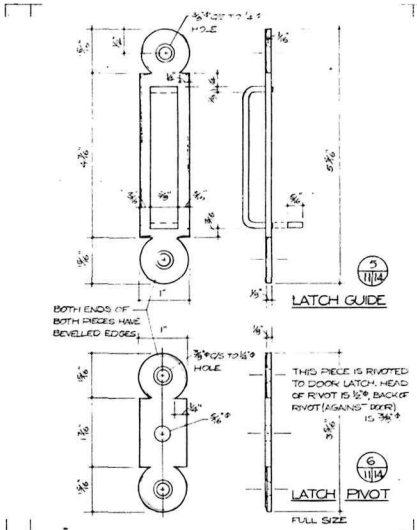
Drawn by / scaled per scale / details
 designed by / scaled per
 checked by / scaled per

Job number / sheet no. Date
 A. SIEPMAN MAY/12
 responsible architect / architect responsible date
 project title name of project

AS-FOUND
 BAKE HOUSE
 LOWER FORT GARRY
 NATIONAL HISTORIC PARK

Drawing title name of detail
 WINDOW NO. 5
 DETAILS

reference no. Proj. no.
 univ. de référence détail no.
 HWFG 72/1127 13



HINGE IS POSSIBLE COPY OF ORIGINAL HINGE. TOTAL LENGTH OF BOT HINGE IS 2'-8" HINGES SECURED BY $\frac{3}{8}$ " BOLTS AND $\frac{1}{2}$ " NUTS (ACROSS FLATS)

DEPARTMENT OF INDIAN AFFAIRS & NORTHERN DEVELOPMENT
INDUSTRIAL SERVICES BRANCH

INDIAN AFFAIRS
AFFAIRES INDIENNES
ET DU NORD CANADIEN
INDUSTRIEL ET SERVICES

revision date

A detail no. detail no.
B location dep. no. / rev details no.
C drawing no. detail no.

drawn by / dessiné par name / initials
A.P. SEPPMAN FULL SIZE

designed by / dessiné par

checked by / vérifié par

job number / numéro de projet date
A.P. SEPPMAN WJN/72

project title titre de projet
AS-FOUND
BAKE HOUSE
LOWER FORT GARRY
NATIONAL HISTORIC PARK

drawing title titre de dessin
HARDWARE

reference no. / numéro de référence
HWFG 72/H107

sheet no. / numéro de page
14

Part III The Baking Operation at Lower Fort Garry

The Baking Process

Interior work at a 19th century Hudson's Bay Company post, was directed toward a variety of activities. The sawyer and assistant prepared timber for building; the blacksmith made nails and other tools in the forge; and the carpenter erected shelves in the officer's kitchen. While the officers and clerks frequently mentioned the pursuit of these functions in the Company's journals and accounts, they rarely described in any detail the techniques involved. The operation of the Lower Fort Garry bakehouse is no exception. We do know that it was a seasonal operation that involved at least three men by the late 1860s. The baker and his assistant were interested principally in the production of "hard-tack" biscuit for the consumption of the annual brigades and interior posts. Beyond these basic facts, one must turn primarily to the comparative sources to piece together a detailed picture of the baking process in Rupert's Land in the 19th century.

The Hudson's Bay Company either imported biscuit from England to coastal depots such as Fort Vancouver or York Factory or produced it themselves at chosen locations. The imported biscuit fell into three main categories, "Brown Common" biscuit, "brown second" biscuit, and "fine" biscuit.¹ A survey of the 1830s showed that the approximate annual importation of these different varieties to York Factory was thirty barrels of the common biscuit, twenty barrels of the "second" biscuit and only eight barrels of the "fine" biscuit.² It is not known how much biscuit was contained within

each barrel. According to the York Factory provision book, the company servants and homeguard Indians usually were issued either "common" or "second" biscuit, with the "fine" variety being reserved for the officers' mess.³

At York Factory the imported biscuit consumed by the men was supplemented by the biscuit and bread produced in the York Factory bakehouse. As bread would not keep well during shipment, one can assume that most of the bread consumed at Company posts was baked in small oven complexes located at the post or at one of three recognized company bakehouses capable of production on a larger scale: York Factory, Fort Vancouver and Lower Fort Garry. Most Hudson's Bay Company establishments probably had smaller ovens sufficient for the post's needs. Lower Fort Garry, for instance, boasted additional ovens in the Men's House and on the north-western side of the Big House.

The Hudson's Bay Company did not have professional bakers. For the most part, the baking of biscuit and bread was a seasonal task performed by servants of the Hudson's Bay Company. At different times, however, there were individuals who were familiar with the skills of the baker as a craft. One such man was André Benoit. A native of Longueuil parish in Lower Canada, Benoit signed a contract for three years service with the Hudson's Bay Company in 1824.⁴ Two things are significant about his first contract. First, his contract specifically stated that he was to reside at York Factory in order "de travailler à son métier de Boulanger."⁵ Second, the fact that he signed his contract with an "x" strongly suggests that he had received little or no formal education. Obviously, the Hudson's Bay Company hired Benoit because he was familiar with the traditional baking process followed in French Canada. While one cannot document it, he probably applied the techniques of baking familiar to most rural habitants in Lower Canada while at York Factory.

While at York, the Hudson's Bay Company gave Benoit the

title of baker, but his salary was not that of other tradesmen. In 1827, he signed another contract in the capacity of labourer and baker at an annual salary of £18/15 sterling.⁶ That rate was about ten pounds less per year than a carpenter or other tradesmen of similar experience. Not until 1834, when he signed his last contract with the company, did Benoit achieve tradesmen status. By this time he was able to supplement his baking responsibilities with carpentry work. Unfortunately, Benoit was a victim of the disease that plagued York Factory from 1834 to 1836 and he was obliged to retire from the company's service when he returned to Montreal.⁷

The bakers at Fort Vancouver during the 1840s and 1850s had also learned the baking craft in French Canada. In 1844, Joseph Petrain succeeded Bazil Poirier as the depot baker.⁸ Petrain was a French Canadian from Sorel Parish who first appeared on the Fort Vancouver records as a middleman during outfit 1837. By outfit 1843 he was elevated to "Middleman & Baker" at £20 per annum, an advance of three pounds on his previous salary.⁹ After he became depot baker Petrain's salary was raised to £25 annually which placed him in the monetary status of other tradesmen. This remuneration, however, was not enough to assure his loyalty once the news of the California gold discoveries reached Oregon. After his name on the roll for outfit 1848 appear the words, "gone to California, wages to 7 March '49." Petrain was followed as baker by Joseph Raymond, yet another Canadian who began as a labourer and eventually assumed the baker's responsibilities.

Because it was primarily a seasonal task performed during the spring and summer months, the Hudson's Bay Company did not retain many bakers on a permanent basis. They preferred to train servants acting in the labourers' capacity or hire local free-men and settlers. The Abstract of Accounts for the Lower Red River district, which include Upper and Lower Fort Garry, does not list a baker for the 1850-70 period among the full-time employees.¹¹ In fact, references to bakers at the Red River

posts are scarce indeed. In July, 1847 Chief Factor Alexander Christie wrote George Simpson from Upper Fort Garry advising him "that a Baker should come forward....for the purpose of getting the Flour baked into biscuit on the spot;—under existing circumstances no dependence can possibly be placed, upon obtaining any description of supplies from here...."¹² Christie was responding to the tremendous pressure exerted on the Hudson's Bay Company to supply provisions to the Sixth Regiment of Foot. While it is not known whether a baker was sent to Red River in 1847, somebody with baking skills was located at or near Lower Fort Garry by the early 1850s. William Lane, postmaster in charge of Lower Fort Garry from 1851 to 1855, began to receive correspondence concerning the Lower Fort Garry bakery operation in 1852.¹³

It is possible that the baking operation at Lower Fort Garry was performed throughout the 1850-70 period by local settlers retained on a daily and weekly basis. By the 1860s most of the labour functions at the fort were performed by residents of the adjacent parishes of St. Clements and St. Andrew's. It is known conclusively that the baker at Lower Fort Garry during and perhaps before the 1860s was Peter Spence. Born about 1828, Spence was an English-speaking half-breed or "country-born" who lived near the fort in the parish of St. Clements.¹⁴ For his labours Spence received the relatively high wage of 3/6 per day, a sum seldom equalled except by the more highly skilled tradesmen.¹⁵ Spence supplemented his income from the Company by performing other tasks about the fort and at least on one occasion by serving as a tripman on the 1868 brigade to York Factory.¹⁶ It should be emphasized, however, that Spence was not one of the Company's regular servants.

According to the 1870 census for Red River, Peter Spence was married and the father of five children.¹⁷ Several of his sons also worked at the lower fort. On April 15, 1868 a Jacob Spence was paid four shillings for two days of cutting

wood for the "Bakehouse."¹⁸ By 1871 Alex Spence, then seventeen years old, was assisting his father in the bakehouse at a salary of three shillings per day.¹⁹ Most of the time, however, Spence was assisted by two other local settlers, Thomas Lyons Jr. and James Daniel Senior.²⁰ They were both paid the standard daily wage of 2/6 per day to act as the baker's assistants.

Preparation for the baking season at Lower Fort Garry usually began in February or March when a company servant or local settler began to haul wood to the bakehouse for drying. The loads of wood were placed outside the building or immediately inside the door so as not to interfere with the working area. One of the more curious account books for York Factory is a record of the wood collected and hauled to the depot's buildings for the years 1834-43.²¹ During that period the bakehouse received an average of twenty loads during February and March to fuel the ovens through the ensuing season.²²

Other preparations were necessary before the baking began in late April or early May. A sufficient quantity of flour had to be transferred from the warehouse building to the bakehouse. Alex Spence recalled carrying as many as 16 sacks of flour to the bakery in one day.²³ Before the Lower Fort Garry steam operated grist mill was put into operation in 1865 the Company either purchased its wheat from local settlers or sent to it private millers.²⁴ In 1851 Andrew McDermot, a prominent Red River merchant, erected a water mill at Sturgeon Creek on the Assiniboine in exchange for the right to grind the Company's wheat for the next ten years.²⁵ Simpson worked out a similar agreement in 1853 with another settler by offering a loan for the erection of a water mill. Almost daily in the spring and fall, boats left the Lower Fort for McDermot's mill or Tait's and Hay's water mills located a few miles from the Fort on small streams running into the Red River.²⁶

Once the necessary supplies were in the bakehouse, the baker was ready to proceed. A perusal of 18th and 19th century treatises on baking illustrates that there were numerous formu-

las and methods for making bread and biscuit. The diversity began with one of the very first steps in baking, the preparation of the yeast mixture or brew. During each succeeding step in the process the individual preferences of the baker are evident, though in certain operations, such as the actual baking, there was less latitude. Indeed, in a trade characterized by so many variables—the quality of the flour, weather conditions, water content of the fuel, strength of the yeast—a large degree of flexibility was a necessity. "In the light of these difficulties," noted William Panschar in Baking in America, "it is a tribute to the skill and patience of the professional baker that he was able to bake as well as he did. The craft tradition remained strong because of these difficulties which only ability and skill could handle. One became a baker literally by growing up in a trade....What, therefore may seem to have been daily trial and error was really the result of constant watchfulness on the part of an experienced craftsman."²⁷

When Spence and his assistants were ready to begin the baking procedure, their first task was to fire the oven. The time for firing the oven each day, and the number of times it was fired during each twenty-four hours, varied in relation to the routine of the particular bakery.²⁸ The type and quantity of the produce were the important determining factors, though different bakers approached even similar problems in different ways. Often the oven was fired in the evening of the day before the products were to be baked. That may explain why Peter Spence and his helpers periodically were issued small supplies of tea, sugar and tobacco at the height of the baking season.²⁹ For English country bakeries five a.m. was the common hour to fire the ovens.

Usually a single firing would suffice for the day's output. Since the oven held a good degree of heat for several hours, a succession of products could be baked without refiring.³⁰ In large bakeries, and evidently in those producing biscuit, the oven was kept hot constantly during the baking process.

In such cases frequent refirings were necessary.

The firing of a wood-heated oven was an arduous and frequently unpleasant job. In Britain the common fuel was faggots, tied bundles of twigs and branches, which went into the oven whole.³¹ It is unlikely, however, that this type of fuel was used at Lower Fort Garry since pine, spruce or birch was preferred in Canada. The quantities of wood required were not insignificant. According to United States army estimates, it took 3/16 of a cord (24 cubic feet of wood) to heat a cold oven to bread-baking temperature (about 550 to 580 degrees).³² Once the oven was heated it could be brought back to baking temperatures twenty-four hours later with only 3/32 of a cord (12 cubic feet). However, if twelve hours separated the batches almost 12 cubic feet of wood would be required for each heating. If the ovens were fired more than twice a day, 1/32 of a cord, would be needed for each heating.³³

It took nearly two hours to bring the oven to cooking heat. Although the temperatures for various types of bread were sometimes listed in degrees in baking manuals, very few bakers in the 19th century used thermometers.³⁴ These devices were used by the Hudson's Bay Company at coastal depots to record daily temperatures but it is not known if they were adapted by the bakers. It is more probable that the company baker simply looked inside the oven. If there was soot on the bricks the baker knew the temperature was too low. If the bricks glowed and had a white appearance, the oven was ready. When a more precise test was required, some bakers threw a few pinches of flour on the oven hearth.³⁵ If, after a few seconds, the flour turned a light brown, the temperature was correct. At Fort Colville on the Columbia River the baker tested his oven by thrusting in a piece of paper. If it turned brown, the bread was put in the oven.³⁶

Whatever test was used, when the right temperature was reached the ashes were drawn to the front by a long rake or rooker and placed in buckets or a similar container for dis-

posal. Then a hoe, which resembled a garden hoe in shape, was employed to scrape out the remaining ashes and dust. A swab, sometimes called a "scuffle" in the United States, was dampened in a pail of water and "swung round and round" the oven until the bottom or hearth was clean.³⁷ The swabbing also served to reduce the oven temperature to the correct heat for baking.

The firing of the oven was definitely a dirty process. Often smoke escaped into the open working area of the bakehouse, forcing the men to work in suffocating conditions. The ashes were also hot and dusty. On one occasion, an English baker recalled how "the whirling scuffle" had drawn out a hot coal which went down the assistant's shirt. The resulting outburst was probably graphic.³⁸ When the oven was clean, most bakers placed the dough in the oven immediately. Others preferred to shut the door and damper and allow the heat to circulate for about two hours. When this "equalization period" was completed, the oven was ready for baking.

The manufacture of hard bread, also known as ship bread, sea biscuit, pilot bread and later, hard-tack, was in many respects a simpler operation than the baking of bread, since no leaven (fermented dough or yeast) was involved in the most frequently used recipes.³⁹ Basically, the hard-tack biscuit was a mixture of flour and water baked crisp in an oven. Some formulas provided for the addition of salt which improved the taste but increased the possibility of moisture absorption.

Biscuit was made in a wide variety of shapes and forms. In Colonial America, biscuit was a "large, round, dry, crisp, wafer."⁴⁰ An expert on bakeries in Massachusetts described it as "a large round, clumsy, crisp affair."⁴¹ The ideal sea biscuit was light yellow in colour. Although it would readily and thoroughly soften in the mouths," it was supposed to float and hold its shape if immersed in water.⁴² This was an important qualification for the Hudson's Bay Company as their inland brigades frequently were confronted by treacherous

travelling conditions which damaged susceptible provisions. Above all, biscuit was meant to last and provide nourishment for many months if properly stored. A second type of biscuit known as a cold water cracker began to appear in America early in the 19th century. It was unleavened and much like the usual ship biscuit but smaller in size, more compact in texture, and of greater hardness. Perhaps it corresponded to the "fine" biscuit imported to York Factory from England.

By the 1830s a degree of mechanization was introduced into the biscuit making process in England. Hand operated mixers, rolling machines to thin out the dough, and a stamp to cut the dough into a number of biscuits speeded the process, as did oven racks which permitted several tiers of biscuit to be baked at once.⁴³ By 1851 steam and horse power were also being employed to drive fairly sophisticated machinery. It is highly unlikely any of these mechanical innovations were introduced at Lower Fort Garry. The problem of transporting heavy machinery and the small scale of production did not warrant the investment in these technological innovations. John Hussey includes a description of the biscuit-making process before the introduction of machinery in his "Historic Furnishing Study, Bakery, Fort Vancouver National Historic Site."⁴⁴ He derived his description of the steps in the process and the quantities of the ingredients from instructions for preparing United States Army hard-tack. Except for the mechanical devices involved, the procedures followed after the 1840s do not appear to have altered considerably from those followed in the days of hand work.

Mixing

A barrel of flour (196 pounds) was placed in the mixing trough.⁴⁵ Then, depending on how much the flour would absorb, eight or nine gallons of water were added gradually and thoroughly mixed with the flour. The baker continued this mixing until the dough was completely free of lumps. Too much kneading was ill-advised.

Breaking of Rolling

After the mixing was completed, the dough was ready for immediate use.⁴⁶ The baker broke it up into pieces which were weighed and shaped into sheets the size of the finished biscuit. The ideal thickness of the dough at this stage was 3/8 inch. A piece of dough that size would "spring" during or after baking to a thickness of about 1/2 an inch. Most important, it would produce a biscuit both digestible and transportable.

Stamping

After the rolling, each piece of dough was stamped in pairs by a biscuit stamp which impressed it with any necessary distinguishing markings and at the same time punched a number of holes through each biscuit to prevent puffing during baking.⁴⁷

Baking

Two men were required to load the oven or ovens.⁴⁸ One picked up the stamped pieces of dough and, in some bakeries, tossed them several feet to the peel held by the other baker. In the fur trade bakehouses this peel was usually made of wood. Each biscuit was then transferred by the peel to a place on the oven floor, which was often covered by tile.⁴⁹ The required temperature for baking biscuit was lower than that for bread. The biscuits were baked about thirty minutes at a temperature of 450 degrees fahrenheit.⁵⁰ One 196 pound barrel of flour produced about 180 pounds of hard bread or biscuit.

Drying

In some bakeries, particularly in England, the baker transferred the baked biscuit to dry out for two or three days.⁵¹ Hard bread treated in that way tended to resist mold better than the biscuit packed immediately after baking. There is evidence to suggest that the Hudson's Bay Company bakers did not always pursue the different baking procedures diligently. On more than one occasion during the early 1850s postmaster William Lane received complaints concerning Lower Fort Garry biscuit.⁵²

As biscuit was a staple food for the men working the schooners on Lake Winnipeg the quality of the biscuit must have been poor.

Packing

At the Lower Fort Garry bakehouse the biscuit, after it cooled sufficiently, was placed in bags and carried to one of the stores or warehouses, where it was "put up in cargoes for shipping."⁵³ These biscuit bags were made at Lower Fort Garry by women from the neighbouring parishes. In June 1871, Flora Hope received 9s/4 p. sterling to produce forty-five biscuit bags.⁵⁴ The production of biscuit bags was also carried out at York Factory where it was a winter project for the storesmen and women living at the depot. According to the York Factory work Book for 1825-31, these biscuit bags cost 2s/4 p sterling per bag to produce.⁵⁵ They consisted simply of osnaburg cloth sewed together with a strong thread. The following material was used to make forty large biscuit bags at York Factory in 1828:⁵⁶

| | | |
|-----------------------------|---|-----------|
| 106 2/3 yds. flax Osnaburgs | - | £ 3/2/3 |
| Brown thread | | /4 |
| Tailors needles | | /1 /1 |
| 1 lb. bees wax | | <u>/3</u> |
| | | £ 3/2/11 |

After the biscuit was cooled and placed in bags, it was transferred to casks for transshipment. One cask contained approximately fifty-five pounds of biscuit.⁵⁷ The Hudson's Bay Company usually measured biscuit by the hundredweight.⁵⁸ Beginning in 1836, the council of the Northern Department determined the quantity of biscuit to be supplied by the Red River district. In 1853, for instance, the Northern Department required twenty-six hundredweight from Red River,⁵⁹ well within the capacity of the Lower Fort Garry bakehouse. In the same year, William Lane was under orders to produce a total of 6,500 pounds of biscuit at Lower Fort Garry.⁶⁰ Obviously, the baking operation was producing biscuit for the Red River district and settlement as well as the interior posts.

No comprehensive record of the quantity of biscuit produced at Lower Fort Garry has survived. In fact, the York Factory bakehouse book for 1862-63 is the only account in the Hudson's Bay Company archives which records the production rate.⁶¹ It is interesting to note that they were baking bread as well as biscuit in the York Factory facility. Again, the bakehouse operation at the major depot was primarily a seasonal one commencing in June and finishing by September. This York Factory document is reproduced on the following pages.

| <u>Date</u> | <u>Casks English Flour</u> | <u>Loaves</u> | <u>Pound Weight</u> |
|-------------------|----------------------------|---------------|---------------------|
| June 23, 1862 | 7 | - | - |
| June 24, 1862 | - | 67 | 206 |
| June 30, 1862 | 7 | 74 | 217 |
| July 1, 1862 | - | 86 | 216 |
| July 7, 1862 | - | 77 | 182 |
| July 15, 1862 | 7 | 62 | 157½ |
| July 21, 1862 | - | 74 | 177½ |
| July 26, 1862 | - | 66 | 159 |
| July 28, 1862 | 7 | - | - |
| July 29, 1862 | - | 71 | 168 |
| August 12, 1862 | - | 73 | 174 |
| August 14, 1862 | 7 | - | - |
| August 15, 1862 | - | 70 | 179½ |
| August 16, 1862 | - | 77 | 167½ |
| August 18, 1862 | 1 | 74 | 200½ |
| August 19, 1862 | - | 64 | 162½ |
| August 20, 1862 | - | 66 | 193¼ |
| August 21, 1862 | - | 60 | 169 |
| August 22, 1862 | - | 69 | 213 |
| August 25, 1862 | 7 | 67 | 187 |
| August 26, 1862 | 7 | 79 | 215 |
| August 27, 1862 | - | 77 | 214 |
| September 4, 1862 | - | 59 | 158 |
| September 5, 1862 | - | 67 | 187 |

York Factory Bakehouse Book IIOutfit 1863

| | | | |
|-----------------|---|----|------|
| June 15, 1863 | 7 | - | - |
| June 16, 1863 | - | 38 | 117½ |
| June 22, 1863 | - | 37 | 96 |
| June 23, 1863 | - | 41 | 100 |
| June 24, 1863 | 7 | 49 | 110 |
| June 25, 1863 | - | 74 | 167 |
| August 14, 1863 | - | 72 | 172½ |

| <u>Date</u> | <u>Casks English Flour</u> | <u>Loaves</u> | <u>Pound Weight</u> |
|--------------------|----------------------------|---------------|---------------------|
| August 28, 1863 | - | 83 | 177 |
| August 29, 1863 | - | 73 | 203½ |
| August 31, 1863 | - | 77 | 170½ |
| September 1, 1863 | 7 | 86 | 184 |
| September 2, 1863 | - | 77 | 166½ |
| September 3, 1863 | - | 90 | 182½ |
| September 7, 1863 | - | 47 | 119 |
| September 8, 1863 | - | 68 | 150 |
| September 10, 1863 | - | 69 | 152 |
| September 11, 1863 | - | 74 | 164 |
| September 14, 1863 | - | 50 | 129 |
| September 17, 1863 | - | 70 | 170¼ |

The relatively small number of loaves produced at York Factory in 1862-63 suggests that the baking facility was not operated to produce for export to the interior. It may also mean that the baking operations followed by the Hudson's Bay Company throughout Rupert's Land were not particularly sophisticated. The company was interested in the production of enough bread for individual posts and sufficient biscuit for the brigades and others involved in the transportation network. Once the baking facility was established in the North West Bastion at Lower Fort Garry, it operated annually without a great deal of supervision or internal difficulty. The required flour was accessible from either the company's farm or from the local settlers. Baking expertise was provided by company servants or, by the 1860s, local settlers such as Peter Spence. It was simply another seasonal provisioning function of a Hudson's Bay Company post in the 19th century.

Part IV Furnishings

The furnishing of a Hudson's Bay Company bakehouse in the 19th century represents a special challenge to the historian. While the furnishing of a company living quarters reflected the status, wealth and material culture of its occupant, the bakehouse, like other working areas of the post, should correspond closely to the tools and technological knowledge available to the Hudson's Bay Company at that time. The technological expertise brought to Rupert's Land by the Hudson's Bay Company officers and servants from the British Isles had to be adapted to the isolation of the fur trade posts, the transportation difficulties and the peculiar skills of the company's Canadian and native employees. It is highly unlikely the baking operation at Lower Fort Garry was as sophisticated as a British commercial bakery operating in the 19th century.

The Lower Fort Garry bakehouse should contain the basic equipment required for a baking operation involving three men. No record of "articles in use" for the Lower Fort Garry bakehouse has survived so once again one must depend primarily upon comparative information available in the Hudson's Bay Company archives. Two major posts, York Factory and particularly Fort Vancouver, supported bakehouses for which more comprehensive historical documentation has survived.

During the mid-1830s a new bakehouse was constructed at York Factory by Belonie Gibeault, André Benoit and other Company tradesmen. It was in operation annually but a comprehensive list of furnishings has not yet surfaced. In 1843 the inventory of articles in use in the York Factory bakehouse was limited to one wooden hay rake and two large

baking troughs.¹ Fortunately, the following year the clerk at Fort Vancouver prepared a more comprehensive list of Company owned items in the major Columbia depot "BakeHouse."²

- 1 round head axe
- 1 water bucket
- 1 candlestick
- 2 dough cutters
- 1 tin kettle 8 gns.
- 2 tin pots
- 1 tin scale
- 2 biscuit stamps
- 1 steelyard 100 lbs.
- 3 lead weights

The Fort Vancouver Inventory for 1845 listed practically the same items with the exception of a few variations:³

- 1 axe
- 2 buckets
- 1 candlestick
- 3 pln. (plain blankets) 2½ pts. (points)
- 1 dough cutter
- 1 tin kettle 8 gns.
- 1 tin pot 3 qts.
- 1 pr. tin scales
- 1 biscuit stamp
- 1 lead weight
- 1 pr. steelyards

The inclusion of blankets suggests that the upper story of the Fort Vancouver post may have been used as a living quarters for the baker and his assistants. As James Spence and his assistants lived in the vicinity of the Fort it is highly unlikely that the men stayed overnight in the North West Bastion. In case of an emergency, the Men's House was available.

The 1848 Fort Vancouver inventory of "articles in use" in the bakehouses is the most comprehensive list of Company owned equipment in such a facility.⁴

Fort Vancouver Bakehouse:

2 large square headed axes
 1 iron weighing beam and tin scales
 5 plain blankets 3 points
 2 water buckets
 1 tin candlestick
 2 duck sheeting table cloths, 42 yards
 2 dough cutters
 1 hammer
 2 tin kettles
 2 tin pans
 1 Jack Plane
 2 tin pint pots
 1 hand saw
 1 iron shovel
 3 biscuit stamps
 1 pr. beam steelyards to weigh 110 lbs.
 1 pr. beam steelyards to weigh 1400 lbs.
 1 Canada single stove 3 ft.
 3 tables
 2 yeast tubs

The Fort Vancouver Inventories provide a basic list of the equipment found in a 19th century Hudson's Bay Company bakehouse. The working area of the North West Bastion bakery should include the majority of these items with certain modifications. As there is no physical or historical evidence to suggest that anyone resided in the bakehouse, the inclusion of a bed, blankets and other domestic possessions is not particularly feasible with regard to the Lower Fort Garry baking facility. On the other hand, the Fort Vancouver inventories do not include some items considered essential for the operation of a mid-19th century bakery. For example, no mention is made of peels, the long wooden paddles used to put bread and biscuit into the ovens and to take them out again. J. Hussey assumed that such equipment as peels, rakes and swabs were in use at

Fort Vancouver but for some reason they were not included in the inventories.⁵ This may be explained by the practice of clerks to omit "country-made" articles. These items, often made at the post itself, sometimes comprised the greater part of a building's furniture and equipment. Therefore, when in the process of furnishing any Hudson's Bay Company facility, the surviving inventories should be supplemented by a list of items that could have been manufactured in situ.

Comparative Information

Various sources provide a detailed list of utensils and equipment contained in the bakehouses of a particular period. John Hussey included a selection of these lists in his Fort Vancouver bakery furnishing study.⁶ As he was able to acquire historical texts not available to this writer, this section is basically a summary of his information.

Charles Tomlinson's Cyclopedia of Useful Arts, published in 1854 in England and America, recorded the utensil of the Bakehouse as follows:⁷

- The seasoning - tub
- The seasoning - sieve
- Wire Sieves
- A bucket
- A bowl
- A spade or shovel
- A salt-bin
- A yeast-tub
- A dough knife
- Scales and weights
- A scraper
- Four or five peels
- Tins, or Iron plates
- Coarse thick flannels
- A rasp
- The Scuttle [sic] of swabber

Set-ups
 The rooker
 A hoe

Earlier we discussed the manual, Bread and Bread Making in relation to the ovens of the Lower Fort Garry bakehouse. Issued for the guidance of U.S. army subsistence officers in 1864, its anonymous author recorded the following list of utensils "required for the bakery proper."⁸

| | <u>One Oven</u> | <u>Two Ovens</u> |
|---------------------|-----------------|------------------|
| Pans | 70 | 140 |
| Rakes | 1 | 1 |
| Tables | 1 | 1 |
| Peels | 2 | 4 |
| Troughs | 1 | 1 |
| Scrapers | 2 | 4 |
| Sieves | 1 | 1 |
| Scales | 1 | 1 |
| Shovels | 2 | 2 |
| Scrub Brushes | 1 | 2 |
| Brooms | 2 | 4 |
| Hatchets | 1 | 1 |
| Axes | 1 | 1 |
| Wood Saws | 1 | 1 |
| Counter Brushes | 1 | 1 |
| 80 gallon cauldrons | 1 | 1 |
| Buckets | 4 | 4 |

One should note that the operation of two ovens did not alter the required utensils except for the need for twice as many practical baking tools such as peels, troughs, scrapers, scrub brushes and brooms. Hussey emphasized that thermometers would never have been used in a small baking operation in the mid-19th century.⁹ The temperature of the ovens was measured by the improvised method of the baker without the benefit of a thermometer.

Bakery Equipment - Function and Description

This section describes the uses and appearances of the principal items in the lists given above with particular emphasis upon the Fort Vancouver bakehouse inventories. On the basis of this comparative information, one can speculate on what items were possibly in use in the Lower Fort Garry bakehouse between 1850 and 1875.

Axes

The Fort Vancouver bakehouse inventory of 1844 lists one "round head axe," while that of 1848 records two "large square headed axes."¹⁰ A quick perusal of any Hudson's Bay Company inventory will show that axes of various shapes and sizes were in evidence within most post buildings.¹¹ The heavy dependence upon firewood for heating and cooking fuel was the major reason for the extensive use of the axe. The Company headquarters in London annually exported a large number of axe types and sizes for use at its many overseas posts.¹² Round-headed axes, for instance, came in large, half and small sizes. Square-headed axes were "large wedged," half or small. Axes were also assembled at the company depots, particularly the trade axes preferred by the Indians. By the 1840s, the blacksmith shop at Lower Fort Garry was probably producing axes on a regular basis. A variety of Hudson's Bay Company axes are contained in the Hudson's Bay Company collection at Lower Fort Garry.

Biscuit Stamps

The Fort Vancouver bakehouse held from one to four biscuit stamps during the 1840s. As the Lower Fort Garry bakehouse produced biscuit for export throughout Rupert's Land, the facility may have contained this item. In his research, John Hussey corresponded with biscuit manufacturers and museums in both America and Britain, but he obtained no specifications, pictures or an even good description of the single, hand-operated stamps probably used to turn out hard-tack at Lower Fort Garry, York Factory and Fort Vancouver.¹³

As early as the 1830s, the victualling yards in England that prepared hard bread for the Royal Navy were accustomed to the use of mechanical stamps.¹⁴ These devices, with one stroke, cut 24 whole hexagonal biscuits, punched the air holes, and impressed each biscuit with "the broad arrow of Her Most Gracious Majesty."¹⁵ Whether the Hudson's Bay Company placed any initials or other distinguishing marks upon its biscuits is not known, but it was logical to punch the air holes with the stamp or, as in France, separately by the point of a hot iron rod.¹⁶

The Hussey Report contains a photograph of several 19th century biscuit stamps currently in the Museum at the Royal Pavilion, Brighton, England.¹⁷ Unfortunately, these stamps were not for sea biscuit, and none appeared to have sharp point for punching air holes. According to Hussey, their sole purpose was to impress a design upon the dough. The stamping process, however, probably affected the texture of the finished product but to what extent is not known.

Buckets

The Fort Vancouver inventories record from one to six buckets or water buckets as being among the bakery furnishings between 1844 and 1848, the number varying with the year. The 1839 Inventory for Lower Fort Garry also lists the presence of buckets in the kitchen and pantry of the Big House.¹⁸ These items were usually made at the post by the cooper or the carpenter. In the Lower Fort Garry bakehouse, buckets would have been an essential commodity as there was no immediate source of water for the baking process. Water had to be hauled from the river bank or from the well near the creek.

Candlestick

Windows on three elevations provided the Lower Fort Garry bakehouse with natural light. Supplementary lighting for the interior baking operation was essential, however, and probably was provided by candlesticks or tin lamps located throughout the working area.¹⁹ Tin candlesticks were made in large numbers

by the tinsmith at York Factory. Of the simplest design, these candlesticks and holders should be located strategically throughout the working area.

Cauldron

It is curious that the Fort Vancouver inventories do not include any reference to the existence of a cauldron in the bakehouse. The cauldron was a large vessel holding up to 120 gallons which could be placed over a fire for a substantial supply of hot water.²⁰ According to the American army baking manuals, "the best cauldrons which can be used are those holding 80 or 90 gallons or more. By purchasing the bowl without the furnace and stand, and having it cased in brick work, it will be more economical in fuel, and more advantageous in other respects."²¹ In the latter part of the 19th century, cauldrons were sometimes built into the ovens or placed on separate brick "furnaces."²² Hussey concluded that if one of these large cauldrons was employed in the Fort Vancouver bakery, it would simply have been listed in the inventories.²³ Neither is there any historical or archaeological evidence to suggest a cauldron was permanently located in the Lower Fort Garry bakehouse. On the other hand, they needed some form of container in which to heat the water. One could argue that the physical evidence for a permanent cauldron may have been removed in 1911 when they cleared out the working area of the bakehouse.

Dipper

Although not mentioned in the Company inventories, a wood or tin dipper would have been a very useful utensil for the baking process which required the transfer of various quantities of warm water from one container to another. Fur company tradesmen could easily have fashioned this utensil from wood or tin.

Dough Knife

According to A. Edlin's 1805 A Treatise on the Art of Bread-Making, the dough knife or dough cutter was "usually of the

size of a large carver, with a round point and blunt, like a painter's pallet knife."²⁴ It was used to cut the dough, before the bakers threw it over to the sluice board. It was also used to divide the different portions of biscuit before they were put on the weighing scale. If the Hudson's Bay Company employed this highly useful tool it is likely that they imported it from England. However, it does not appear on the York Factory scheme indents for the 1830s.

Hoe

Edlin's 1805 Treatise described the hoe used in British bakeries as "a piece of iron, similar to a garden hoe, fixed in a handle, partly wood and partly iron."²⁵ It was employed by the baker's assistant to scrape up ashes and loose dust. A hoe may have been the device used at Lower Fort Garry to dump the ashes and other refuse outside the window on the east elevation. Steeled garden hoes appear on the Lower Fort Garry inventories of "company made articles" in 1840.²⁶

Kettles

Kettles were a prominent trade item as well as a useful utensil employed in a wide variety of uses throughout the post. The Fort Vancouver inventories of 1844-48 all list either one or two tin kettles, usually with the added note that they held a capacity of eight gallons.²⁷ Hussey put forward an interesting theory about kettles which may help to resolve the debate over cauldrons and their possible existence at Lower Fort Garry. Since the pots listed in the Fort Vancouver inventories seem to have been of smaller capacity, ranging from one pint to three quarts, Hussey suggests that the large eight gallon kettles at Fort Vancouver served the same purpose as the cauldrons or warming pots generally found in bakeries of the period.²⁸ The Hudson's Bay Company Collection at Lower Fort Garry is a potential source for the kettles used by the Hudson's Bay Company in the mid-19th century.

Peels

The peel has been defined as "a sort of shovel, with a long

handle, used to set the bread and baking containers in the oven, and also to take it out."²⁹ While peels were made from a single piece of wood, those used for handling tins, pans and making biscuit often had iron blades. Peels were also made entirely of wrought iron. The blades, whether of wood or iron, were flat and as thin as practicable. Again, A. Edlin's study of bread-making offers the most detailed description of the types of peels in use in England in the early 19th century:

There are usually four peeles [sic] kept in a bake-house, viz the quartern peel, to set the quartern loaves; the half quartern peel for the half quartern loaves; the drawing peel for drawing out the bread, and the peels for placing and removing tins. The quartern peel is a pole about eight feet long, with a wooden blade, about a foot wide and sixteen inches long, fixed at the end with strong screws. The half quartern peel is of the same kind, about half the length, and much smaller. The drawing peel is a strong pole, ten feet long, with a blade, thicker, broader, and longer than the others and the peel for setting in the tins has a strong blade of iron, instead of wood which is fixed with screws into the handle.³⁰

Peels designed for the American army in the 1860s were the following specifications: "size of blade—10 in. wide, 24 in. long; pole, long, 16 feet, short, 10 feet long."³¹ This rather obscure description does not distinguish whether the blade was one piece with the pole or separate. Hussey speculated that because the army peel was largely for handling pans, the blade was probably made of iron.³² The specifications in Bell's 1882 Notes on Bread Making are also vague: "blade 20 inches by 10 inches attached to a ten foot pole for removing bread from the oven."³³

Diderot's Encyclopédie contains a drawing of the peel, used in France at the end of the 18th century.³⁴ This peel, made from a single piece of wood, was introduced to Canada during the French Regime and remained in wide use during the 19th century. A reproduction of this type of peel is demonstrated at Fort York in Toronto. Carved from a single

piece of soft pine, the dimensions of the Canadian peel are:³⁵

| | |
|---|---------------|
| Width of blade | 8 - 1/8" |
| Length of blade | 16" |
| Overall length of blade and handle | 66 1/2" |
| Thickness of blade at top | 1/4" |
| Thickness of blade at base of handle (pole) | 3/4" |
| Cross section of handle (oval in shape) | 7/8" x 1 5/8" |

Rasp

A. Edlin defined the baker's rasp as a "large, coarse, broad, flat, steel, file with a wooden handle that runs over the back."³⁶ It was used for rasping the burnt crust off the bread and was still in use by the U.S. army in 1882.³⁷ Diderot's section on the "Boulangier" also discussed and illustrated the rasp employed by French bakers. It consisted basically of a wooden handle and back, and resembled a grater more than a file. While there is no evidence of this tool at the Hudson's Bay Company posts, it was a logical, inexpensive item that perhaps should be included within the restored Lower Fort Garry bakehouse.

Rooker

As the Lower Fort Garry ovens required pre-heating before the biscuit was baked, the men would place the cut wood in the back of the oven heat the hearth to the required temperature, and then rake the ashes out the front door or into an ash pit. In England the device used to draw out the ashes was known as a rooker. Edlin described a rooker as "a long piece of iron, in shape somewhat resembling the letter L, fixed in a wooden handle."³⁸ American army manuals for the latter half of the 19th century do not list rookers among the required bakery utensils, but they do mention rakes, which probably served the same purpose.³⁹

Scales, Steelyards and Weights

Weighing devices were to be found at every Hudson's Bay Company

establishment in Rupert's Land. Besides their use to weigh fur bales and provisions in the company's warehouses, scales were a necessary tool in the kitchens of the officers and men. The Fort Vancouver inventories reveal that the processes of bread making and biscuit making at that depot involved the use of a diverse assortment of weighing devices. A pair of "tin scales," a pair of steelyards capable of weighing up to one hundred pounds, and from one to three lead weights were located in the working area of the bakehouse in 1844, 1845 and 1846.⁴⁰ The Inventory for 1848 was more specific. It included "1 iron weighing Beam and tin Scales, 1 pair beam steelyards, to weigh 110 lbs., and 1 pr. beam steelyards, to weigh 1400 lbs."⁴¹ Weights were not mentioned but are an obvious item.

Scales, steelyards and weights were in evidence at Lower Fort Garry long before the bastion bakehouse was built. The 1839 inventory of "articles in use" reveals the presence of "1 pair steelyards 2 cwt." in the cellar of the Big House "wooden measures" in the "House Garret," 2 pairs beams and scales in the sales Shop, and 1 pair beam and scales in the "Provision Shop" and a pair of small scales in the "Pantry."⁴² The 1842 "Inventory of Sundries" at Lower Fort Garry contains 3 different sets of iron weights ranging from seven to 56 pounds and one set of brass weights for precise measurements.⁴³ Obviously, weighing devices were employed at Lower Fort Garry, although precise patterns and manufacturers are not known. Before 1860, these items were imported from England by York Factory. Whether they were assembled at York Factory or inland depended upon the level of expertise of the tradesmen. The blacksmith's and coppers at York Factory were capable of producing some fairly sophisticated equipment by the 1830s during the winter season. Further investigation of York Factory tradesmen accounts in the Hudson's Bay Company Archives will shed further light on these questions.

We do know that the weighing beam was perhaps the most

common type of equal arm balance. It consisted of a rod or beam, supported in the centre by a cord or some type of bearing, with pans suspended from the two ends, one pan to hold the weights and the other the material being weighed.⁴⁴

The steelyard was another traditional weighing device which integrated the principle of unequal arm balance or the lever.⁴⁵ In its simplest form it consists of a rod or bar suspended from a hook fixed near one end. The object to be weighed is suspended from another hook hanging from the short side of the bar. The longer end of the bar is marked with notches to represent units of weight; and a moveable weight or counter-poise is moved along the marked arm until equilibrium is achieved. By keeping the hook for the object to be weighed close to the fulcrum, this kind of scale can be constructed to weigh very heavy pieces. According to Bruno Kisch's study Scales and Weights, in the early 19th century steelyards were hand-forged and stamped with the capacity of the scale.⁴⁶ John Hussey's Volume II of the Historic Structures Report, Fort Vancouver, contains illustrations of weighing devices used by the Hudson's Bay Company.⁴⁷

Scoop

Hudson's Bay Company inventories examined do not mention the use of scoops in baking facilities or kitchens. This is curious, because of its usefulness in measuring and handling various amounts of flour, salt, and other ingredients. A scoop was among the items specified by the U.S. army in 1864 for use in the yeast room but, of course, this is not conclusive evidence that the Hudson's Bay Company used scoops⁴⁸ in bakeries. They did, however, import tin shop scoops from England to York Factory.⁴⁹

Scraper

During the archaeological investigation of the Lower Fort Garry bakehouse and lunettes, a scraper, presumably associated with the use of bakeovens, was unearthed.⁵⁰ This scraper is

currently in the possession of Parks Canada either in Ottawa or Winnipeg. A. Edlin, in his 1805 Treatise, claimed that the scraper was "like a garden hoe, fixed in a short wooden handle," used "to scrape the sides and bottom of the trough, to prevent the dough from adhering and drying there."⁵¹ The scrapers recommended for use in American army bakeries were 6 inches long by 4 inches wide and made of steel.⁵²

Sheeting

The Fort Vancouver bakehouse inventory for 1846 reported "18 yds. duck sheeting" and that for 1848 listed "2 duck sheeting table cloths - 42 yds."⁵³ The form of sheeting used in Red River in 1842 was described as brown Russia sheeting.⁵⁴ Obviously sheeting of different varieties was used for various purposes at Hudson's Bay Company posts. Women used sheeting to make flour and biscuits bags at York Factory and Lower Fort Garry. The duck sheeting in the Fort Vancouver bakehouse perhaps was used to cover the working tables where the men prepared the dough for baking. The use of sheeting for cleanliness was possible, but again its precise use is not known. If the complaints about Lower Fort Garry in the early 1850s are any indication, the baker and his assistants did not go out of their way to ensure the purity of their ingredients.

Shovel

An iron shovel was another tool in use in the Fort Vancouver bakehouse.⁵⁵ This was a common item in use at Hudson's Bay Company posts and at least one shovel was probably retained in the Lower Fort Garry bakehouse. In English and American bakeries, shovels were used to transfer flour during the various phases of the dough-making process. The shovels were also used for removing coals from the ovens to be placed in buckets for disposal.

Sieve

Wire sieves were a common utensil in 19th century bakeries. Included among A. Edlin's list was a "brass-wire sieve,"

described as a "large round sieve, covered with a sheet of exceedingly fine, wove, brass-wire."⁵⁶ It was employed to sift the flour before it was kneaded as well as to detect any lumps or impurities contained in it.

Table

The bakehouse at Fort Vancouver never held less than three tables. The working area at Lower Fort Garry could also include several tables. There is no way of determining the exact design and dimension of these tables, but it is highly probable that they were made at the post with wood available in the vicinity of the fort or that had been rafted down river. In the 1839 inventory of "articles in use" at Lower Fort Garry the majority of tables were built of pine.⁵⁷ Tables recommended for U.S. army bakeries in 1864 were 4 feet wide, 14 feet 10 inches long, and 2 feet 10 inches high.⁵⁸

Trough

In 1839 the Big House pantry at Lower Fort Garry contained "1 pine baking trough."⁵⁹ It is assumed that "trough" in this case referred to a wooden container used to prepare food. According to Hussey's study, the "trough," "kneading trough" or "dough trough" was an essential feature of any commercial bakery, and its use continued beyond the introduction of mechanical mixers.⁶⁰ In 1805, Edlin described the ideal "kneading trough" as being "about seven feet long, three feet high, two feet and a half at top, and sixteen inches at bottom, with a sluice board to pen the dough up at one end, and a lid to shut down like that of a box."⁶¹ The Lower Fort Garry bakehouse required a trough but it is doubtful if it was large as the wooden one described above.

The 1864 American baking manual contained an even more specific description of a trough than those in most small English bakeries. "Troughs should be made of 2½ inch pine planks, 15 feet 8 in. by 2 feet 6 in. at top, 22 in. at bottom, and in 18 in. depth, inside measurement, and top of Trough, 2 feet 10 in. from the floor. Trough top should be in two

equal sections; two sets of boards are needed in each trough for separating Flour, Sponge, and Dough."⁶² Both this trough and the English ones appear to have rested on legs.

Yeast Tubs

The Fort Vancouver bakehouse contained "2 yeast tubs" in 1848.⁶³ A. Edlin described the yeast tubs as "a common, six-gallon cask with a large bung hole and cover....used for preserving the yeast."⁶⁴ The yeast tubs in the restored bakery at Fort Laramie, Wyoming were made of unpainted wood secured with metal bands and about two-thirds the size of a whiskey barrel, with handles on the sides.⁶⁵ Usually the dimensions of the yeast tub were twice that of the yeast it would contain in order to allow for expansion through fermentation. Certainly, the tradesmen at Lower Fort Garry or Upper Fort Garry had the necessary building materials to construct tubs similar to those described by Edlin or Jerome A. Greene.

Stove

The production of biscuit required the heating of a considerable quantity of water. There were several alternative methods available to the bakers working in the Lower Fort Garry bakehouse. They may have heated the water in the Men's House or Big House kitchens and then transported it across the compound to the bakery, an awkward and time-consuming process. The two alternatives both involved heating the water inside the bastion itself. One possibility was a cauldron erected in the working area of the bakehouse. John Hussey argued against the use of a cauldron in the Fort Vancouver bakery on the basis that an object that size surely would have been included in the bakehouse inventories. Furthermore, cauldrons were not listed in the indent of goods imported by the Hudson's Bay Company. The other alternative heating source was a stove.

The Fort Vancouver bakehouse inventory for 1848 lists "1 Canada single stove 3 ft."⁶⁶ There is considerable confusion among scholars about the Canada stove and its use by the

Hudson's Bay Company. The "Canada" stove either referred to a stove produced and assembled in Canada or one produced for the Hudson's Bay Company by Carron Company or Falkirk, Scotland. It is very possible that Canada stoves were made in Canada. According to Marcel Moussette's article in The Canadian Antique Collector simply entitled "Stoves," there were stoves manufactured in the province of Quebec at the St. Maurice ironworks as early as 1742.⁶⁷ Until 1883 the St. Maurice operation produced a great number of stove models; at least 15 different single stoves, two double stoves, two "large-room stoves," three kitchen stoves, fancy stoves, Franklin stoves, coal stoves and airtight stoves.⁶⁸ The "Canada" stoves referred to in the Hudson's Bay Company inventories were either "single" or "double," which probably referred to the size of the stoves.

The Hudson's Bay Company also imported Carron stoves from Scotland in the 19th century. Carron stoves came in several sizes and shapes but the form most favoured by the Hudson's Bay Company was an oblong box mounted on short, curved legs.⁶⁹ As it came in six pieces, the Carron could be disassembled for easy transport and storage. In August, 1841, the Reverend Henry Harmon Spalding ordered a Carron stove from Fort Vancouver and described it as follows: "one 6 plate stove, complete with the middle plate which is wanting in ours here. A stove consists of 2 sides, 2 ends, top and bottom, 4 legs, 4 rods, 2 middle plates. Also put in bundles of 12 plates of sheet iron for pipe."⁷⁰ If stoves were used in Lower Fort Garry bakehouses, they may have been assembled simply for the baking season and then relocated somewhere else in the fort. According to Hussey, the stoves generally stood on a thin platform of metal or stone to protect the floors from fire.

Summary

The restored Lower Fort Garry bakehouse should attempt to re-

create the atmosphere of a small commercial bakery in the mid-19th century. The baking process generally was a messy operation. Usually a good deal of smoke escaped into the bakery and the men were forced to work in a "choking, eye-smarting" atmosphere. This situation was compounded at fur trade bakeries because the men performed the baking duties during the hot summer months. While allowing the ovens to smoke and the dust to accumulate in the restored bakehouse is not realistic from a practical point of view, by combining the items listed in the Fort Vancouver and York Factory Bakehouse Inventories with those included for typical English and American bakeries of the period, one can arrive at a comprehensive list of possible furnishings for the Lower Fort Garry bakehouse. One must bear in mind that the Lower Fort Garry bakehouse did not serve as accommodation for the men. Nor did it produce great quantities of bread for the fort employees. Taking into consideration these limitations, the following list of items might serve as a rough guideline for refurnishing the ground floor of the restored bakery:

- 2 large square-headed axes
- 2 biscuit stamps
- 1 broom
- 4 buckets (2 for water, 2 for ashes)
- 2 tin candlesticks
- 1 Counter brush
- 2 dippers
- 2 dough cutters
- 1 hoe
- 2 tin kettles - 8 gallon capacity
- 2 tin pans
- 4 peels
- 1 peel rack
- 2 tin pots (one 1 pint, one 3 quart)
- 2 rasps
- 1 rooker

1 saw
 1 pair scales (iron weighing beam, tin pans, 1 set weights)
 2 small scoops
 2 scrapers
 2 scrub brushes
 2 strainers
 Duck or Russia sheeting table cloth
 1 large wooden shelve
 2 shovels
 2 wire sieves
 1 stock yeast tub
 1 single Canada or Carron stove
 1 swabber
 2 tables
 1 kneading trough
 4 barrels or casks

The Hussey study contains a furnishings floor plan based upon the general practice in British bakeries in the mid-19th century.⁷¹ One must remember that the Lower Fort Garry bakehouse working area is much more restricted in terms of floor space. Quite possibly the peel and other utensils were stored overhead on a rack suspended from the beams. The broom, hoe, rooker, and shovel may have leaned against a wall near the ovens. The axes probably were kept near the door, handy for use at the main wood pile which might have been immediately outside the bakehouse. The weighing beam and tin scales were perhaps kept out of the central working area either on a floor or a table.

It was logical that several of the smaller items, such as sieves and tin pans, would be hung on nails or hooks attached to the stone walls. Other utensils such as scrapers, dough knives and biscuit stamps possibly were scattered about on the tables. Buckets, kettles, yeast tubs and other larger items may have been kept under the tables or beside the walls when

not in use. Probably several bags or barrels of flour were kept inside the bakehouse for ready use and then transferred back to the warehouses after the baking season.

The ovens and heavy furniture made up the central components of the work area. The two main pieces of furniture were the kneading trough and a strong pine table upon which to prepare the biscuit dough. The molding or kneading tables in the restored Fort Laramie bakery stood 15 feet long, 4 feet wide and 2 feet 10 inches high.⁷² At posts with few bakers employed, a flange might have been added along one side to prevent dough from sliding onto the floor. The kneading trough at Fort Laramie was built of pine, measuring 15 feet in length, 2 feet 6 inches in width at the top and 1 foot 10 inches at the bottom, and 1 foot 6 inches deep.⁷³ This kneading trough was larger than those recommended by Hussey for the Fort Vancouver bakery. The latter rested on legs, which were 7 feet long, 2 feet 10 inches high, 2½ feet wide at the top, 19 inches wide at the bottom and 18 inches deep.⁷⁴ If a kneading trough is included within the Lower Fort Garry bakehouse, a compromise solution will have to be met with regard to its dimensions.

The furnishings of the Lower Fort Garry bakehouse should not attempt to reflect a neat and orderly operation. Troughs, tables, and other utensils should show signs of hard usage. Floor dust and smoke blackened walls and ceilings were characteristic features of 19th century bakeries. Above all, there should be no frills such as pictures, chairs and curtains. The Lower Fort Garry bakehouse was a working environment for three men involved in intense labour for three or four months each year.

Conclusion

Very few fur trade posts in Rupert's Land enjoyed as many baking facilities as Lower Fort Garry. With two ovens in the Men's House, a sturdy oven structure behind the Big House and the bakehouse in the North West Bastion, the stone fort was well equipped to meet its oven needs as well as those of other districts. From 1850 to approximately 1875 the Lower Fort Garry bakehouse was one of three major baking operations annually preparing hard-tack biscuit for use by the company's brigades and interior posts. The Fort Vancouver baking facility served the Columbia district, the York Factory oven complex the posts on Hudson's Bay and the Lower Fort Garry bakehouse provided biscuit for the Red River area and posts as far west as Fort Edmonton.

The Lower Fort Garry bakehouse was operated during the fur trade period by three men on a seasonal basis. Commencing with the cutting of sufficient wood for fuel in February and March the men baked biscuit daily until the amount determined by the annual council of the Northern Department was attained. Usually this goal was reached by July and then the men were assigned other duties. Although York Factory and Fort Vancouver both retained permanent servants trained as bakers and paid the equivalent of tradesmen, there is no record to suggest that Lower Fort Garry supported a full-time servant. We do know that by the 1860s local settler Peter Spence, an English speaking half-breed living in the neighbouring parish of St. Clements, was hired as the chief baker on a seasonal basis. His background knowledge of the baking process is not known but for a decade he faithfully performed the biscuit baking function at

the lower fort. Certainly it was not an easy task to perform as the fort's biscuit frequently received complaints from employees in the 1850s and in 1859 the fort's baker felt compelled to desert from the company's service.

A precise description of the baking process at Lower Fort Garry has not survived. On the basis of comparative information, however, one can arrive at a fairly comprehensive description of the baking operations. The manufacture of hard bread or hard-tack biscuit was a relatively simple operation involving the mixture of flour and water baked crisp in an oven. Above all, the biscuit produced by the Hudson's Bay Company posts was meant to last and provide nourishment for several months. By the 1850s a considerable level of mechanization had been introduced into the biscuit making process in England and the United States. Hand operated mixers, rolling machines as well as steam and horse power to drive the innovative machinery, speeded the baking process. It is doubtful any of these mechanical innovations were introduced at Lower Fort Garry. The problem of transporting heavy machinery and the comparatively small scale of production did not warrant the introduction of these technological innovations. Furthermore, the Hudson's Bay Company had a large labour force available in the immediate vicinity of the lower fort.

In terms of architectural significance, the bakehouse corresponds closely to the other stone buildings at Lower Fort Garry—the big house, sale shop, warehouse, cottage, the walls and the other bastions with their enclosed structures. The fact that they were all built of limestone puts them all outside the main Hudson's Bay Company tradition of wood construction but at the same time they all possess characteristics common to Hudson's Bay Company buildings constructed during the post-coalition period. The bakehouse was simple in design, fairly substantial in size and above all, functional in operation. The exterior features of the bakehouse have not been altered to any extent since its construction. The windows

on the west and east elevations should be restored and the lunettes stabilized. With regard to the interior, the ovens are the most complex problem confronting the building's restoration. Above all, the ovens should be functional. Historical research has shown that the bakehouse and its equipment did not reflect the ~~latest~~ technological advances in the industry. It seems logical, therefore, to recommend a comparatively simple type of oven, a compromise between what little is known of the typical British country oven and the more sophisticated models favoured by Loudon and U.S. Army Subsistence Department. In the final analysis, the design of the ovens depended largely upon the background of the responsible masons and the supervising officer. The appearance of Loudon's Encyclopedia of Cottage, Farm and Villa Architecture....was but one indication that the Hudson's Bay Company sent out British manuals for use in Rupert's Land. At the same time, the tradesmen at company posts operated with a fair degree of independence, and to what extent they adapted technological knowledge from external sources remains open to conjecture.

The bakehouse at Lower Fort Garry will add yet another dimension to the interpretation of Lower Fort Garry as an important Hudson's Bay Company provisioning post in the mid-19th century. In terms of the daily routine of a fur trade establishment, it complements the other specialized functions such as the blacksmith shop and fur loft/retail store. The restored bakehouse also provides an excellent opportunity to impress upon the visitor the close working relationship between the local settlers of St. Andrew's and St. Clements and the Hudson's Bay Company's operation at Lower Fort Garry.

Endnotes

Introduction

- 1 See Philip Goldring, *The Doctor's Office, Walls and North-West Bastion at Lower Fort Garry*, Manuscript Report Series No. 51, National Historic Parks and Sites Branch, Parks Canada (Ottawa, 1971), Section IV, "The North-West Bastion or Bakehouse," pp. 26-35.
- 2 Provincial Archives of Manitoba (hereafter cited as PAM), Margaret Arnett Macleod Papers, File 30, "Sleuthing About the Bakery at the Fort."
- 3 Ibid.
- 4 Ibid.
- 5 Ibid.
- 6 Ibid.
- 7 George Ingram, "Industrial and Agricultural Activities at Lower Fort Garry," Canadian Historic Sites, Occasional Papers in Archaeology and History, No. 4, p. 83.
- 8 Philip Goldring, op. cit.
- 9 John Dewhirst, *Archaeological Investigations in the North-West Bastion and Bake House, Lower Fort Garry, 1973*, Manuscript Report Series, No. 114, National Historic Parks and Sites Branch, Parks Canada (Ottawa, 1973).
- 10 Hudson's Bay Company Archives (hereafter cited as HBCA), B.239/a/148, York Factory post journal, 1834-35.
- 11 John A. Hussey, historic structures report, *Historical Documents, Vol. 1, Fort Vancouver National Historic Site*, Washington, U.S.A., Department of the Interior, Denver, June, 1972. See Chapter III, "Bakery," pp. 47-61.
- 12 John A. Hussey, *Historic Furnishing Study, Bakery, Fort*

- Vancouver National Historic Site, Washington, U.S. Department of the Interior, Denver, December, 1973.
- 13 Lise Boily and Jean François Blanchette, Les Fours à Pain au Québec, National Museum of Man, Ottawa, 1976.
 - 14 Ibid., p. 3.
 - 15 Jerome A. Greene, Restored 1876 Old Bakery, Fort Laramie National Historic Site, Wyoming, U.S. Department of the Interior, Denver, October, 1974.
 - 16 HBCA, B.42/a/16, fo. 11, Prince of Wales's Fort journal, September 23, 1735.

Part I The North West Bastion Bakehouse Historical Survey

- 1 Philip Goldring, op. cit., "The Walls," pp. 23-25. The walls of Lower Fort Garry were built between 1841 and 1848, principally by the Scottish stone masons, Duncan McRae and John Clouston who also did much of the stone-work at Upper Fort Garry.
- 2 See Photograph Number 1.
- 3 This wooden building appears in a number of the earlier photographs of Lower Fort Garry. It has not been examined by the archaeologists as yet. According to the 1839 Inventory there was a carpenter shop at the fort which this building may have housed. Certainly it warrants closer archaeological investigation.
- 4 HBCA, B.239/k/2-3, Minutes of Council of the Northern Department, 1832-1870; see B.239/k/2, fo. 130. A few features of this list are irregular. The Minutes of Council for 1838 are not entered into the Minute Book. There is no requisition of country produce in 1846 and 1847, presumably because all food produced at Red River was required to feed the troops. Country produce was requisitioned in 1848 but the list did not include biscuit.
- 5 Philip Goldring, op. cit., p. 27.
- 6 HBCA, D.5/18, fo. 393-394, Alexander Christie to George Simpson, November 23, 1846.

- 7 George Ingram, South West Bastion: Structure and Function, National Historic Sites Report, No. 273, p. 3.
- 8 HBCA, D.4/23, fo. 119, George Simpson to Alexander Christie, February 20, 1838.
- 9 Ibid.
- 10 HBCA, D.4/23, fo. 122, Simpson Correspondence Outward, G. Simpson to George Cary, 28 February 1838.
- 11 Ibid., D.5/14, fo. 194, A. Christie to G. Simpson, 28 July, 1845.
- 12 George Ingram, South West Bastion: Structure and Function, op. cit., p. 2.
PAC, Crofton to Somerset, 15 September 1846, W.O.I., vol. 557, pp. 199-209.
- 13 See Photograph number 1.
- 14 "The Christie Family and H.B.C.," The Beaver (August, 1923), pp. 417-419.
- 15 See George Ingram, "Building the Stone Fort, A Study in Fur Trade Architecture," unpublished Paper presented to the North American Fur Trade Conference, 1970, p. 10.
- 16 Ibid.
- 17 Philip Goldring, op. cit., p. 23. "The Walls," Also see Robert Watson, Lower Fort Garry: A History of the Stone Fort, Hudson's Bay Company, Winnipeg, 1928, p. 9.
- 18 See HBCA, B.239/a/148, York Factory Post Journal, 1834-35; *ibid.*, B.32/30, Hudson's Bay Company Servants Contracts. Gibeault signed a number of contracts with the company as a mason both at York Factory and later at Red River.
- 19 Alexander Ross, The Red River Settlement, Its Rise, Progress, and Present State, republished by Hurtig Publishers, Edmonton, 1972, p. 393.
- 20 HBCA, B.235/d/99, fo. 75, September, 1846, Lower Red River District Transfer books, 1846. The cost of the bricks issued to the Royal Engineers was 44 shillings per thousand and came to a total of £7/1/14.

- 21 HBCA, B.303/a/1, Lower Fort Garry post journal, 1868-74.
- 22 PAM, William Lane Correspondence and Papers, Correspondence Inward, A. Buchanan, Upper Fort Garry to W. Lane, September 2, 1852.
- 23 Ibid., Roderick McKenzie Junior, Norway House to W. Lane, Lower Fort Garry, July 1, 1854.
- 24 Ibid., A.V. Buchanan, Upper Fort Garry, To W.L. Lane, Lower Fort Garry, August 2, 1852.
- 25 Ibid., J. Black, Upper Fort Garry to W. Lane, Lower Fort Garry, June 13, 1854.
- 26 PAM, William Lane Papers, Correspondence Inward, 1857-1865, Reel 3, William Mactavish to W. Lane, May 9, 1859.
- 27 HBCA, B.303/d/44, fo. 17d, April 15, 1868; Cash Payments for Labour at Lower Fort Garry, 1868-1871.
- 28 Ibid., fo. 18d, April 18, 1868.
- 29 Ibid., B.303/a/1, fo. 24, April 9, 1869.
- 30 Ibid., fo. 27d, May 11, 1869.
- 31 Ibid., fo. 29, May 29, 1869.
- 32 Ibid., fos. 66d, 67, 97d, 98, 98d, 99; B.303/d/63, fos. 17d-18, Cash Payments for Labour, Lower Fort Garry, 1871-76.
- 33 HBCA, B.303/d/63, fos. 17d-18, Cash Payments for Labour, Lower Fort Garry, 1871-76.
- 34 Ibid., fo. 18, July 22, 1871.
- 35 Ibid., fo. 43d, June 8, 1872.
- 36 James Daniel - 6 days baking, \$4.50
Peter Spence - 8 days baking, \$8.00
Alex Spence - 5½ days baking, \$4.12.
- 37 Ibid., fos. 43d, 47, 4d, June 8, 1872; June 26, 1872; July 18, 1872; July 24, 1872.
- 38 HBCA, B.303/d/65, fos. 2d, 4, 4d, District Expenses, 1872-73.
- 39 Philip Goldring, The First Contingent: The North-West Mounted Police, Manuscript on file, to be published in Occasional Papers: Canadian Historic Site, pp. 41-42.
- 40 Ibid., p. 42.
- 41 Ibid.

- 42 HBCA, B.303/d/102, fos. 6d, 12d, Abstract of Mess Expenses, Outfits 1874 and 1875.
Hamilton's mess consumed ten pounds of biscuit for Outfit 1874 while Abell's mess lists no biscuit for that Outfit.
- 43 HBCA, B.303/d/137, fo. 19d, Hudson's Bay Company Mess At Lower Fort Garry, Outfit 1877.
The men absorbed 53 pounds of biscuit at $6\frac{3}{4}$ ¢/lb., total consumed /3.48.
- 44 Ibid., B.303/d/119, Recapitulation of Provisions, Groceries, supplied from Lower Fort Garry for steamer Colville during the Running season, Outfit 1876.
- 45 Ibid., fo. 22, Biscuit.....
Biscuit - 163 pounds - June
" 425 pounds - July
" 235 pounds - August
" 170 pounds - September
" 165 pounds - October
" 1161 pounds - Season
- 46 HBCA, B.303/d/149, Lower Fort Garry Day Book, 1877-80.
- 47 Ibid., B.303/d/170; B.303/d/192; B.303/d/148;
B.303/d/159b.
- 48 Ibid., B.303/d/150b, fo. 3, Lower Fort Garry Labour Book, Outfit, 1879-80.
- 49 Ibid., B.303/e/2, fo. 2, Lower Fort Garry Report, 1889. W.H. Adams, Inspecting Officer, 17th to 18th of May.
- 50 Ibid., B.303/d/219, fo. 35, Lower Fort Garry Inventory, 1890-91.
- 51 Ibid., B.303/d/256, Lower Fort Garry Accounts, May 31, 1896.
- 52 Ibid., B.303/d/16, fo. 532, Expenditures for Repairs made to Buildings at The Lower Fort Garry Outfit, 1899.

- 53 Ibid., A.12/s/518, fo. 1, Inspection Reports, 1905-12; January 8, 1910.
- 54 Ibid., Inspection Reports, Lower Fort Garry, 1908.

Part II Structural Features of the Bakehouse in the North West Bastion

- 1 This statement is based upon the investigation of the bastion by Peter Priess, an archaeologist with Parks Canada and Lorne Campbell, the restoration architect working on the project.
- 2 HBCA, B.303/d/256, Lower Fort Garry Account Books, May 21, 1896.
- 3 PAM, Margaret Macleod Interviews, File 30.
- 4 Interview with Henry Sprong, maintenance superintendent Lower Fort Garry National Historic Park, taken in October, 1978.
- 5 John A. Hussey, Historic Structures Report, Volume 1, op. cit., p. 54.
- 6 Ibid., p. 57.
- 7 John A. Hussey, Historic Furnishing Study, Bakery, Fort Vancouver National Historic Site, op. cit., pp. 56-57. (hereafter cited as "Bakery Furnishing Study, Fort Vancouver.").
- 8 This section is based primarily on the "As-Found" drawings, Engineering and Architecture, Bakehouse, Lower Fort Garry National Historic Park. 1972.
- 9 John A. Hussey, "Bakery Furnishing Study, Fort Vancouver, op. cit., p. 2.

- 10 As-Founds, Bake House, Lower Fort Garry, Numbers 11 and 12.
11 Ibid.
12 John Dewhirst, op. cit., p. 12.
13 Ibid., pp. 12-13.
14 Ibid., p. 13.
15 As-Founds, Bake House, Lower Fort Garry, Numbers 6 and 7.
16 These oak shingles were stored in the bakehouse in the late 1960s when the shingle making crew used the buildings for a work shop. The shingles were used on the warehouse and the south west bastion.
17 HBCA, B.239/a/148, fo. 52d, York Factory post journal, May 15, 1835.
18 See As-Founds, Bake House, Lower Fort Garry, Numbers 6 and 7.
19 John Dewhirst, op. cit., p. 3.
20 Ibid., pp. 4-5.
21 As-Founds, Bake House, Lower Fort Garry, Number 4.
22 John Dewhirst, op. cit., pp. 12-15.
23 John A. Hussey, Bakery Furnishing Study, Fort Vancouver, op. cit., p. 2.
24 As-Founds, Bake House, Lower Fort Garry, Number 5.
25 PAM, William D. Lane Papers and Correspondence, Miscellaneous Business Papers.
26 As-Founds, Bake House, Lower Fort Garry, Numbers 9 and 10.
27 John A. Hussey, Bakery Furnishing Study, Fort Vancouver op. cit., p. 57.
28 John Dewhirst, op. cit., p. 14.
29 Ibid., p. 14.
30 John A. Hussey, Bakery Furnishing Study, Fort Vancouver, op. cit., p. 55. See Chapter III, "Comparative Data: Ovens."
31 John Henry Lefroy, In Search of the Magnetic North, A Soldier-Surveyor's Letters from the North-West 1843-1844, Edited by George F.G. Stanley, Toronto, Macmillan of Canada, 1955, p. 107.

- 32 John Claudius Loudon, An Encyclopedia of Cottage, Farm, and Villa Architecture and Furniture; Containing Numerous Designs for Dwellings....New edition, London, Frederick, Warne & Co., 719-720. An earlier edition of this work was published in 1835. It must have been the edition at Fort Simpson.
- 33 HBCA, B.239/a/148, fo. 8d, York Factory post journal, 1834-35.
- 34 Ibid., fo. 16, September 25, 1834.
- 35 Ibid., fo. 52, May 12, 1835.
- 36 Ibid., B.239/d/508, York Factory Tool Room Blotter, 1831-1837.
- 37 Ibid., B.239/a/148, fo. 54, York Factory post journal, May 25, 1835.
- 38 Ibid., A.32/21, fo. 318, Hudson's Bay Company Servants Contracts.
- 39 Ibid.
- 40 Ibid., A.32/30, Hudson's Bay Company Servants Contracts.
- 41 Ibid., D.4/69, fo. 2, Governor George Simpson's Public Correspondence, 1847-48.
- 42 Ibid., B.239/a/148, fo. 54d, York Factory post journal, May 29, 1835.
- 43 Ibid., fo. 55d, York Factory post journal, June 4, 1835.
- 44 Ibid., June 5, 1835.
- 45 John A. Hussey, Bakery Furnishing Study, Fort Vancouver, op. cit., pp. 4-8.
- 46 HBCA, B.239/a/148, fo. 12d, York Factory post journal, September 4, 1834.
- 47 John A. Hussey, Bakery Furnishing Study, Fort Vancouver, op. cit., p. 5.
- 48 Provincial Archives of British Columbia, Thomas Lowe, Private Journal kept at Fort Vancouver, Columbia River, 1843-1855, MS, pp. 5-7.
- 49 HBCA, B.223/d/160, fo. 130, Fort Vancouver Account books, 1845.

- 50 John A. Hussey, *op. cit.*, p. 6.
- 51 *Ibid.*, p. 7.
- 52 *Ibid.*
- 53 *Ibid.*
- 54 HBCA, B.239/b/92, fo.30, James Hargrave, York Factory, to B. Harrison, Hudson's Bay House, September 8, 1835.
- 55 *Ibid.*
- 56 Alexander Ross, The Red River Settlement: Its Rise, Progress and Present State with some Account of the Native Rones and its General History to the Present Day, New Edition, Hurtig Publishers, Edmonton, 1972, p. 393.
- 57 John A. Hussey, *op. cit.*, p. 54.
- 58 *Ibid.*, p. 60.
- 59 *Ibid.*, p. 61. This is the book identified by John Lefroy at Fort Simpson in 1844.
- 60 *Ibid.*, p. 60.
- 61 John Claudius Loudon, An Encyclopedia of Cottage, Farm and Villa Architecture and Furniture....., *op. cit.*, pp. 719-720. A copy of the book is available at the Architecture Library, University of Winnipeg, Manitoba.
- 62 *Ibid.*, pp. 719-720.
- 63 John A. Hussey, *op. cit.*, pp. 64-65.
- 64 See John A. Hussey, Bakery Furnishing Study, Fort Vancouver, *op. cit.*, p. 66.
- 65 *Ibid.*, p. 67.
- 66 *Ibid.*
- 67 See Appendix number
- 68 See Jerome A. Green, Restored 1876 Old Bakery, Fort Laramie National Historic Site, Wyoming, *op. cit.*
- 69 John A. Hussey, Bakery Furnishing Study, Fort Vancouver, *op. cit.*, p. 66.
- 70 *Ibid.*
- 71 *Ibid.*, p. 68.
- 72 Jerome A. Greene, *op. cit.*, p. 9.
- 73 John A. Hussey, Bakery Furnishing Study, Fort Vancouver, *op. cit.*, p. 71.

- 74 Ibid., p. 71.
- 75 Ibid.
- 76 Ibid.
- 77 Ibid., p. 72.
- 78 Ibid.
- 79 John A. Hussey, *op, cit.*, p. 74.
- 80 Ibid., p. 13.
- 81 Alain Rainville, *Le Four à Pain à Québec, Aux XVII^e et XVIII^e Siècles*, Manuscript Report Number 235, Two Volumes, National Historic Parks and Sites Branch, Ottawa, 1977.
- 82 L. Boily and J.E. Blanchette, *Les Fours à Pain au Québec*, *op. cit.*
- 83 Ibid., p. 3.
- 84 Ibid., p. 11.
- 85 Ibid.
- 86 Ibid., pp. 11-27. This study also contains some excellent photographs of the various types of "fours d'extérieurs."
- 87 Ibid., p. 11.
- 88 Ibid., p. 12.
- 89 Ibid., p. 15.
- 90 Ibid.
- 91 Ibid.
- 92 Ibid.
- 93 Ibid., pp. 16-18.
- 94 Ibid., p. 20.
- 95 Ibid., p. 51.
- 96 Ibid., p. 22.
- 97 Ibid.
- 98 Ibid., p. 24.
- 99 Ibid.
- 100 Ibid.
- 101 Ibid.
- 102 Ibid., pp. 28-32.
- 103 Ibid., p. 28.

Part III The Baking Operation at Lower Fort Garry

- 1 HBCA, B.239/m/4, fo. 49d, York Factory Scheme Indents, 1834.
- 2 Ibid., B.239/m/4-7, York Factory Scheme Indents, 1834-1839.
- 3 HBCA, B.239/d/364, York Factory Provision Book, 1830. This is one of several account books for York Factory which provides a comprehensive breakdown of food and other supplies issued to the various messes. For instance, during March, 1830, 95 pounds of common biscuit was issued to the men and their families and eighteen and one-half pounds of the common biscuit variety to the Indians. These provision books were also kept for the company's interior posts. See, for example, HBCA, B.239/d/54, Fort Chipewyan Provision Book, 1834-37.
- 4 HBCA, A.32/21, fo. 318, Hudson's Bay Company Servants Contracts.
- 5 Ibid.
- 6 Ibid.
- 7 Ibid.
- 8 John A. Hussey, Historic Structures Report, Fort Vancouver Volume 1, op. cit., p. 50.
- 9 Ibid., p. 50.
- 10 Ibid.
- 11 See HBCA, B.239/g/30-40, Abstract of Accounts, Lower Red River District, 1850-1860.
- 12 HBCA, D.5/20, fo. 47d, Alexander Christie to George Simpson, July 27, 1847.
- 13 PAM, William Lane Papers, Correspondence Inward, 1850-56. See, for example, A.V. Buchanan, Upper Fort Garry to William Lane, July 14, 1852.
 "It is not only my intention to get biscuit baked next spring, but I should also require some made immediately to complete the Norway House requisition for this season. Will you get some made as soon as possible. The last was not very good.

- 14 Philip Goldring, *op. cit.*, p. 28.
- 15 HBCA, B.303/d/13, fo. 32, Lower Fort Garry Account Books. Spence was paid one shilling more per day than his assistant presumably because he performed the necessary supervisory capacity.
- 16 HBCA, B.303/d/33, fo. 36, Lower Fort Garry Account Books.
- 17 PAM, Manitoba Census, 1870, MG9, E3, Volume 3. Another Peter Spence of St. Clements appears in the 1870 census, but he was a much older man and not a likely prospect for arduous brigade trips to York Factory in 1868. Furthermore, only one Peter Spence appears in the Lower Fort Garry saleshop accounts during the period, and he definitely is the baker.
- 18 HBCA, B.303/d/44, fo. 17d, Cash Payments for Labour at Lower Fort Garry, 1868-71.
- 19 *Ibid.*, B.303/d/63, fo. 18, Cash Payments for labour at Lower Fort Garry, 1871-1876.
- 20 *Ibid.*, B.303/d/44, fos. 19, 20d, 22, 24, Cash Payments for Labour at Lower Fort Garry, 1868-1871.
- 21 *Ibid.*, B.239/d/628, York Factory Account Books, Sawyers Wood Book, 1834-1843.
- 22 *Ibid.*, fos. 75-83, Sawyers Wood Book, 1835. The York Factory bakehouse account book is referred to as the "summer ovens." This document is also useful in that it identifies the various residences at York Factory. For instance, we know that the senior tradesmen such as the blacksmith and the carpenter had their own living accommodations.
- 23 PAM, Margaret Arnett Macleod Papers, File 30, *op. cit.*
- 24 George Ingram, "Industrial and Agricultural Activities at Lower Fort Garry," Canadian Historic Sites: Occasional Papers in Archaeology and History, No. 4, Department of Indian Affairs and Northern Development, Ottawa, 1970, p. 79.
- 25 *Ibid.*, p. 79.

- 26 PAM, W. Lane Papers, Correspondence Inward, A.V. Buchanan to William Lane, August 2, 1852. "I trust Tait or others in your neighbourhood will be able to supply as much as possible (wheat) during the ensuing week to enable us to send out the quantity required for Norway House by this trip of the schooner and the freighters.....When the schooner comes in get her off again as soon as possible with the following cargoes, namely the 4 cwt Biscuit that you have disposable...."
- 27 William G. Panschar, Baking in America, Vol. I, Northwestern University Press, Evanston, Illinois, 1956, p. 36.
- 28 John A. Hussey, Bakery Furnishing Study, Fort Vancouver, op. cit., p. 29.
- 29 HBCA, B.303/d/65, fos. 2d, 4, 4d, District Expenses, 1872-73.
On June 3, 1872, for instance, the bakers were issued $\frac{3}{4}$ lb. of tea, $1\frac{1}{2}$ lb. of sugar and 1 ball of cotton wick. Other items they received included tobacco, soap, lard and rum.
- 30 John A. Hussey, op. cit., p. 30.
- 31 Ronald Sheppard and Edward Newton, The Story of Bread, Routledge & Hagan Paul, London, 1957, p. 110.
- 32 John A. Hussey, op. cit., p. 32.
- 33 Ibid. p. 33.
- 34 Ibid.
- 35 Ibid., p. 34.
- 36 Ibid.
- 37 William G. Panschar, op. cit., p. 36; Sheppard and Newton, op. cit., p. 10.
- 38 John A. Hussey, op. cit., p. 35.
- 39 Ibid., p. 45.
- 40 William Panschar, Baking in America, I, op. cit., p. 29.
- 41 John A. Hussey, op. cit., p. 46.
- 42 Ibid.
- 43 William Panschar, Baking in America, op. cit., p. 33.
- 44 John A. Hussey, op. cit., p. 48-51.

- 45 Ibid., p. 48.
- 46 Ibid., p. 49.
- 47 Ibid.
- 48 Ibid.
- 49 HBCA, B.239/m/4, fo. 44d, Scheme Indents, York Factory, 1834.
- Oven tiles were imported from England in 1834, presumably for the bakeries constructed at York Factory in 1834-35.
- 50 John A. Hussey, op. cit., p. 50.
- 51 Ibid.
- 52 PAM, W. Lane Papers, Correspondence Inward, Roderick McKenzie, Jr., Norway House, to W. Lane, Lower Fort Garry, July 1, 1854.
- 53 Philip Goldring, The Doctor's Office, Walls and North-West Bastion at Lower Fort Garry, op. cit., p. 29.
- 54 HBCA, B.303/d/63, fo. 15, Cash Payments for Labour at Lower Fort Garry, 1871-76.
- 55 HBCA, B.239/d/377, fo. 24, York Factory, Work Book, 1825-1831.
- 56 HBCA, B.239/d/377, fo. 40, York Factory Work Book, 1825-31.
- 57 PAM, W. Lane Papers, Correspondence Inward, Magnus Linklater, Upper Fort Garry, to William Lane, May 22, 1855.
- 58 HBCA, B.235/d/106, fo. 77; Ibid., B.303/a/1, fo. 27d. May 11, 1869.
- 59 HBCA, B.239/k/2-3, Minutes of Council of the Northern Department, 1832-70.
- 60 PAM, W. Lane Papers, Correspondence Inward, A. Buchanan to W. Lane, September 2, 1852.
- 61 HBCA, B.239/d/1065a, York Factory Bakehouse book, 1862-63.

Part IV Furnishings Section

- 1 HBCA, B.239/aa/105, fo. 2, York Factory Inventory of Articles In Use, June 1, 1843.

The bakehouse would have contained more tools and items than those listed in this inventory. The clerks for no apparent

reason, often excluded certain company buildings when compiling these lists of "articles in use."

- 2 HBCA, B.223/d/155, fo. 165, Inventories, Fort Vancouver 1844.
- 3 HBCA, B.223/d/160, fo. 143, Inventories, Fort Vancouver 1845.
- 4 HBCA, B.223/d/181, fo. 162, Inventories, Fort Vancouver, 1848.
- 5 John A. Hussey, *Bakery Furnishing Study*, Fort Vancouver op. cit., p. 24.
- 6 Ibid., pp. 75-118.
- 7 Ibid., p. 84.
- 8 Ibid., pp. 84-85; Bread and Bread Making, pp. 37-38.
- 9 Ibid., pp. 85-86. See also Allan Jobson, "Art of Bread-Oven Baking," in Country Life (February 25, 1949), pp. 420-421.
- 10 HBCA, B.223/d/155, fo. 165; B.223/d/181, fo. 162, Inventories, Fort Vancouver, 1844, 1848.
- 11 See HBCA, B.239/d/79, fo. 285, Upper Red River District Account Book, 1840.
Large and small "round head" and "square head" axes are listed among the "country-made" articles at Lower Fort Garry in 1840.
- 12 HBCA, B.235/m/6, York Factory Scheme Indents, 1836.
Every year the York Factory scheme Indents record the goods received from London for the use of the Hudson's Bay Company in the Northern Department.
- 13 John A. Hussey, *Bakery Furnishing Study*, Fort Vancouver, op. cit., p. 88.
- 14 Ibid.
- 15 Ibid.
- 16 Ibid.
- 17 Ibid., p. 171.
- 18 HBCA, B.235/d/87, Winnipeg: Lower Red River District Statement, Outfit 1839.

- 19 HBCA, B.235/d/79, fo. 285, Transfers, Lower Red River District, Outfit 1840. Tin lamps were listed as "country-made" articles at Lower Fort Garry as early as 1840. They were the variety with only one spout.
- 20 John A. Hussey, *Baking Furnishing Study, Fort Vancouver* op. cit., p. 92.
- 21 Ibid., p. 93.
- 22 Ibid; Also George Bell, Notes on Breadmaking, Permanent and Field Ovens and Bake Houses, Washington, D.C. 1882, p. 84.
- 23 John A. Hussey, op. cit., p. 93.
- 24 A. Edlin, A Treatise on the Art of Breadmaking, op. cit., p. 160.
- 25 Ibid., pp. 160-161.
- 26 HBCA, B.235/d/79, fo. 285, op. cit.
- 27 John A. Hussey, *Baking Furnishing Study, Fort Vancouver*, op. cit., p. 95.
- 28 Ibid.
- 29 Charles Tomlison, Cyclopedia of Useful Arts, Mechanical and Chemical, Manufacturing, Mining and Engineering, II vols. London and New York, George Virtue & Co., 1854, p. 179.
- 30 A. Edlin, A Treatise on the Art of Breadmaking, op. cit., p. 161.
- 31 John A. Hussey, op. cit., p. 98; Bread and Bread Making, op. cit., p. 38.
- 32 Ibid., p. 98.
- 33 George Bell, Notes on Bread-Making, op. cit., p. 84.
- 34 John A. Hussey, op. cit., p. 99; Diderot, Encyclopédie, I, section on "Boulangier."
- 35 John A. Hussey, op. cit., p. 98.
- 36 A. Edlin, A Treatise on the Art of Breadmaking, op. cit., p. 159.
- 37 John A. Hussey, op. cit., p. 101; George Bell, Notes on Bread-Making, op. cit., p. 84.

- 38 A. Edlin, op. cit., p. 101.
- 39 John A. Hussey, op. cit., p. 102; Bread and Bread-Making
op. cit., p. 38.
- 40 Ibid., p. 103.
- 41 HBCA, B.223/d/181, fo. 162, Inventories, Fort Vancouver,
1848.
- 42 See Gregory Thomas, The Men's House, Lower Fort Garry, Its
Furnishings and Place Within the Hudson's Bay Company
Post Environment, Manuscript Report Series No. 246,
National Historic Parks and Sites Branch, 1978,
Appendix "A," pp. 67-73.
- 43 HBCA, B.235/d/86, Winnipeg: Lower Red River District
Statement, Outfit, 1842-43.
- 44 John A. Hussey, op. cit., p. 104.
- 45 This information on scales and weighing devices is based
largely upon Albert R. Eaches, Scales and Weighing De-
vices: An Aid to Identifications (American Association
for State and Local History Technical Leaflet 59, Nashville
Tenn., 1972), and Bruno Kisch, Scales and Weight, (New
Haven: Yale University Press), 1965.
- 46 Ibid.
- 47 John A. Hussey, Historic Structures Report, Fort Van-
couver, Vol. II, op. cit., p. 104.
- 48 Ibid., p. 105; Bread and Bread-Making, p. 38.
- 49 HBCA, B.239/m/4, fo. 36d, Scheme Indents for York Factory,
1834.
- 50 John Dewhirst, Archaeological Investigations in the North
West Bastions and Bake House, Lower Fort Garry, 1973, op.
cit., p. 107.
- 51 A. Edlin, op. cit., p. 160.
- 52 John A. Hussey, op. cit., p. 106; Bread and Bread-Making,
p. 39.
- 53 John A. Hussey, op. cit., p. 107.
- 54 HBCA, B.235/d/86, Winnipeg: Lower Red River District
Statement, Outfit 1842-43.

- See Gregory Thomas, *op. cit.*, p. 80.
- 55 John A. Hussey, *op. cit.*, p. 107.
- 56 A. Edlin, *op. cit.*, p. 159.
- 57 HBCA, B.235/d/76, Winnipeg: Lower Red River District Statement, Outfit 1839. See also Gregory Thomas, *op. cit.*, pp. 65-90.
- 58 John A. Hussey, *op. cit.*, p. 112; Bread and Bread-Making, p. 38.
- 59 Gregory Thomas, *op.cit.*, p. 71.
- 60 John A. Hussey, *op. cit.*, p. 113.
- 61 A. Edlin, *op. cit.*, p. 154.
- 62 John A. Hussey, *op. cit.*, p. 114; Bread and Bread-Making, *op. cit.*, pp. 38-39.
- 63 HBCA, B.223/d/182, fo. 162, Inventories, Fort Vancouver, 1848.
- 64 A. Edlin, *op. cit.*, p. 160.
- 65 Jerome A. Greene, Restored 1876 Old Bakery, Fort Laramie National Historic Site, Wyoming, U.S. Department of the Interior, Denver, October, 1974, p. 46.
- 66 HBCA, B.223/d/181, fo. 62, Inventories, Fort Vancouver, 1848.
- 67 Marcel Moussette, "Stoves," Canadian Antique Collector (May-June, 1974), pp. 78-82.
- 68 *Ibid.*, p. 82.
- 69 John A. Hussey, Historic Structures Report, Fort Vancouver, *op. cit.*, p. 144.
- 70 John A. Hussey, Bakery Furnishing Study, Fort Vancouver, p. 110.
- 71 *Ibid.*, p. 138.
- 72 Jerome A. Greene, Restored 1876 Old Bakery, Fort Laramie National Historic Site, *op. cit.*, p. 44.
- 73 *Ibid.*
- 74 John A. Hussey, Bakery Furnishing Study, Fort Vancouver, *op. cit.*, p. 137.

Appendix A York Factory Tool Room Blotter, 1831-37
B.239/d/508

This account book provides a comprehensive record of the materials used by the Hudson's Bay Company at York Factory when they were constructing a new building or repairing an existing structure. The most common entries were for the "carpenter's shop," cooper's shop and tinsmith's shop.

In 1834 the tool room blotter began to list the materials used in the construction of the new York Factory bakehouse. This information is recorded below.

fo. 58 "supplied new bakehouse"
29 lbs. round bar iron $\frac{1}{2}$ in.
47 lbs. nail rod iron $\frac{1}{2}$ in.

fo. 59d 4 lbs. nail rod iron

fo. 64d 27/9/1834 "for new bakehouse"
25 lbs. flat bar iron $\frac{7}{8}$ x $\frac{1}{4}$ in.
3 lbs. nail rod bar iron
6 lbs. flat bar iron
2 lbs. sheet iron

fo. 67 6/11/1834 new bakehouse
3 lbs. patent cut nails $2\frac{1}{2}$ in.
3 lbs. patent cut nails 3 in.

fo. 67 7/11/1834 "new bakehouse"
1 pair Garnet hinges 18 in.

fo. 68 7/11/1834 "new bakehouse"
1 double pad lock

fo. 68 12/11/1834
10 lbs. flat iron $\frac{7}{8}$ in x $\frac{1}{4}$ in.
2 lbs. nail rod iron $\frac{1}{4}$ in. square

3 lbs. round iron $\frac{3}{8}$ in.
fo. 78d 13/5/35 "new bakehouse"
supplied with 7 lbs. 20^d clasp nails
fo. 79 15/5/35 Bakehouse
28 lbs. tinned nails
cases roofing tin
fo. 79 18/5/35, Bakehouse
4- doz. squares window glass 7 in. x 8 in.
14 lbs. putty
fo. 79d 19/5/35, bakehouse
28 lbs. 20^d clasp nails
6 lbs. 30^d flat nails
fo. 79d 20/5/35 Bakehouse
14 lbs. 2 $\frac{1}{2}$ in. patent cut nails
fo. 79d 9 cases roofing tin,
3 doz. 6 in. spike nails
fo. 80 27/5/35 Bakehouse
1 lb. 30 d flat nails
fo. 81 12/6/25, Bakehouse
1 lb. tinned nails
fo. 81 13/6/35 Bakehouse
47 lbs. flat iron 2 $\frac{5}{8}$ in. x $\frac{1}{2}$ in.
6 lbs. flat iron 1 $\frac{7}{8}$ in. x $\frac{3}{8}$ in.
6 lbs. flat iron 4 $\frac{1}{2}$ in. x $\frac{1}{4}$ in.
fo. 103 18/6/36 Bakehouse
1 6 gallon kettle

Appendix B

John Hussey included several extracts in his study of the Fort Vancouver bakery taken from 19th century encyclopedias. The description of the biscuit making process is explained in greater detail. One must remember, however, that the British biscuit manufacturers operated on a larger scale and with the benefit of more sophisticated equipment than probably in use at Lower Fort Garry.

A. From article on "Biscuit (Sea)" in John Mason Good and Others, Pantologia: A New Cyclopaedia....(12 vols.... London: G. Kearsley, et al., 1813), II, pages not numbered:

.....The process of biscuit-baking for the British navy is as follows.....large lumps of dough, consisting merely of flour and water, are mixed up together and as the quantity is so immense as to preclude by any common process a possibility of kneading it, a man manages, or, as it is termed, rides a machine which is called a horse. This machine is a long roller, apparently about four or five inches in diameter, and about seven or eight feet in length. It has a play to a certain extension, by means of a staple in the wall, to which is inserted a kind of eye, making its action like the machine by which they cut chaff for horses. The lump of dough being placed exactly in the centre of a raised platform, the man sits upon the end of the machine, and literally rides up and down throughout its whole circular direction, till the dough is equally indented; and this is repeated till it is sufficiently kneaded, at which time, by the different positions of the lines, large or small circles are described, according as they are near to or distant from the wall

The dough in this state is handed over to a second workman, who slices it with a prodigious knife; and it is then in a proper state for the use of those bakers who attend the oven. These are five in number; and their different departments are as

well calculated for expedition and correctness as the making of pins, or other mechanical employments. On each side of a large table, where the dough is laid, stands a workman; at a small table near the oven stands another; a fourth stands by the side of the oven to receive the bread; and a fifth to supply the peel. By this arrangement the oven is regularly filled, and the whole exercise performed in an exact time, as a military evolution. The man on the further side of the large table moulds the dough, having previously formed it into small pieces, till it has the appearance of muffins, although rather thinner, and which he does two together, with each hand; and as fast as he accomplishes this task, he delivers his work over to the man on the other side of the table, who stamps them with a docker on both sides with a mark. As he rids himself of this work, he throws the biscuits on the smaller table next the oven, where stands the third workman, whose business is merely to separate the different pieces into two, and place them immediately under the hand of him who supplies the oven, whose work of throwing, or rather chucking the bread upon the peel, must be so exact, that if he looked around for a single moment, it is impossible he should perform it correctly. The fifth receives the biscuit on the peel, and arranges it in the oven; in which duty he is so very expert, that though the different pieces are thrown at the rate of seventy in a minute, the peel is always disengaged in time to receive them separately.

As the oven stands open during the whole time of filling it, the biscuits first thrown in would be first baked, were there not some counteraction to such an inconvenience. The remedy lies in the ingenuity of the man who forms the pieces of dough, and who, by imperceptible degrees, proportionably diminishes their size, till the loss of that time, which is taken up during the filling of the oven, has no more effect to the disadvantage of one of the biscuits than to another.

So much critical exactness and neat activity occur in the exercise of this labour, that it is difficult to decide whether the palm of excellence is due to the moulder, the marker, the splitter, the chucker, or the depositor; all of them, like the wheels of a machine, seeming to be activated by the same principle. The business is to deposit in the oven seventy biscuits in a minute; and this is accomplished with the regularity of a clock; the clack of the peel during its motion in the oven, operating like a pendulum.

B. From article on "Baker" in G. Gregory, A New and Complete Dictionary of Arts and Sciences....(1st American ed., 3 vols., Philadelphia: Isaac Pierce, 1816), I, pages not numbered:

The process of biscuit baking, as practised at the victualling office at Deptford, is curious and interesting. The dough, which consists of flour and water only, is worked by a large machine. It is then handed over to a second workman, who slices it with a large knife for the bakers, of whom there are five. The first, or the moulder, forms the biscuits two at a time; the second, or the marker, stamps and throws them to the splitter, who separates the two pieces and puts them under the hand of the chucker, the man that supplies the oven, whose work of throwing the bread on the peel must be so exact, that he cannot look off for a moment. The fifth, or the depositor, receives the biscuits on the peel and arranges them in the oven. All the men work with the greatest exactness, and are, in truth, like parts of the same machine. The business is to deposit in the oven seventy biscuits a minute....

C. From article on "Biscuit-Making" in The Edinburgh Encyclopaedia....(1st American ed., 18 vols., Philadelphia: Joseph and Edward Parks, 1832), III, 520.

As the process of making biscuits for the navy is rather curious, we shall endeavour to lay before our readers a very short account of it. After the meal and water are combined into large lumps of dough, it is kneaded by means of a machine, which consists of a roller, about six inches in diameter, and seven feet long. One of its extremities is fixed into the wall, so as to have a certain degree of play, while a man rides, as it were, on its other end. The lump of dough is then placed below it, and the man puts the roller into action, till the dough is sufficiently kneaded. In this state it is given to a second workman, who slices it with a large knife, for the use of the bakers who attend the oven. The rest of the process is effected by four [sic] workmen, two of whom take their station, each at the end of a large table that holds the dough; the third stands at a small table near the oven; the fourth stands at the oven, and the fifth supplies the peel. The dough is then moulded into something like muffins by the person on the farther side of the larger table. He then throws them to the man at

the other end of the table, who puts the proper stamp upon them, and throws them upon the small table, where the third workman separates the different pieces into two, and places them under the hand of the fourth baker, who throws the bread upon the peel. The fifth workman receives the biscuits on the peel, and arranges them in the oven. All these successive operations are performed with such activity and exactness, that seventy biscuits are thrown in during a single minute. It is evident, that the biscuit first thrown into the oven would be baked sooner than the others; but this effect is obviated by the workman who moulds the dough, and who proportionally diminishes the size of the biscuits; so that those which are last thrown in require less heat than the others. The biscuits thus made are placed in drying lofts above the oven and are packed into bags, of one hundred weight each and removed to the warehouses.

D. From Article on "Biscuit" in The Penny Cyclopaedia of the Society for the Diffusion of Useful Knowledge (27 vols., London: Charles Knight, 1833-43), IV (1835), 452.

.....at Deptford....Meal and water being mixed together in proportions necessary for giving the due degree of consistency to the dough, it is kneaded in the following manner: —The dough is placed upon a wooden platform, about six feet square, fixed horizontally a few inches above the floor of the bakehouse, and against the wall. A wooden roller, or staff, five inches in diameter, and eight feet long, has one end fixed by means of a staple and eye to the wall, at a convenient distance, at the middle of that side which is against the wall, above the level of the platform, and its other end overhangs, by two feet the outer edge of the platform. Having a certain play by means of the staple and eye, this roller can be made to traverse the surface of the platform, and when the dough is placed upon it, the roller is used so as to knead it by indenting upon it lines radiating in a semi-circle from the staple. To perform this kneading process, a man seats himself upon the overhanging end of the roller and proceeds with a riding motion backwards and forwards through the semicircular range until the dough is sufficiently kneaded.

In this state the dough is cut by large knives into slices, which are subdivided into small lumps each sufficient for making a biscuit. In moulding

these lumps, which is done by hand, the dough undergoes a further degree of kneading, and at length receives the form of a biscuit. The men who thus fashion the dough make two of these cakes at the same time, working with each hand independently of the other. When this part of the work is completed, the two pieces which have been simultaneously prepared are placed one on the other and handed over to another workman, by whom the two together are stamped with a toothed instrument, the use of which is to allow the equable dissipation of moisture through the holes from all parts of the biscuit during baking. The biscuits are then separated by another workman, who places them on a particular spot of a small table standing close to the mouth of the oven, so that each biscuit can be taken up in its turn without the necessity of his looking for it, by the man who supplies the oven. The office performed by this man is that of chucking the biscuits in succession upon the peel, which is held by another man whose business is to arrange them in the oven. This peel is a flat thin board, a few inches square which can, by means of a long handle, be slid over the floor of the oven, so as to deposit and arrange the biscuits thereon....The oven is.... supplied at the rate of seventy biscuits a minute.

E. From article on "Manufacture of Biscuits" in Encyclopaedia Metropolitana; or, Universal Dictionary of Knowledge....

(29 vols., London: B. Fellowes, et al., 1845), VIII, 801-802.

.....While the steam-engine and machinery have been introduced in almost every other Art, that of biscuit making has, till very lately, been performed by hand. So recently as the year 1833, the first application of these means has been had recourse to for this purpose....at present our object is to explain the manual process, which, is extremely curious. This process is of course somewhat, but very little, different in its minutiae in different offices [of his (sic) Majesty's Victualling Office]; we shall confine our description to that followed in his Majesty's Victualling Office, Deptford. The corn [wheat] is received from the markets, and is cleaned, ground, and dressed.... The flour used in the manufacture of biscuit for the Royal Navy consists of a mixture of flour and middlings, or it is the flour which remains after the pollard and bran only have been extracted, the corn being highly dried, before it is ground.

The baking establishment consists of two long buildings.....with six ovens in each.....The kneading troughs and kneading boards, or breaks, are arranged round the outside walls of the building, one opposite each separate oven. The ovens are all wrought iron.....The furnaces, which are on the sides of the ovens, are also of iron, and are heated by a powerful Welsh coal, which gives out a strong flame, and is conducted all round the oven. The number of men required to work each oven is five; these form a gang, and are denominated the furner, furner's mate, the driver, breaker, and idleman.

Process — The first operation is that of kneading, in which there is nothing remarkable. The proper quantity of flour is put into a trough, furnished with a cock for a supply of water, and here it is kneaded by the driver with his naked arms till it assumes the rough form of dough. In this state it is removed from the trough and deposited on a strong wooden platform or table, called a break, to be operated upon by the breaksman, who, seizes a strong lever called a break-staff, with which he presses down the dough, sits with his weight upon it, and, with a rapid jumping and most uncouth motion, carries the lever over the whole surface. It is then transferred to the moulding board, a strong table near the mouth of the oven. Here it is cut into slips, and divided into lumps of the proper size for a biscuit. It is then moulded by the hands into its circular shape, laid in pairs one on the other, and subsequently docked, that is pierced with holes by an instrument called a docker; this stamp contains also the number of the oven, D for Deptford, and the usual King's mark. This number and the initial of the yard are specified, in order that, if any defect should be observed in the bread, it may be known where the fault rests. The biscuits, being stamped, are thrown six or eight at a time upon another table nearer the oven's mouth, where are placed the other three men, one called the furner, another the furner's mate, and the third the idleman, who separates the double biscuit, hands them singly to the furner's mate, who, with great dexterity, and even with elegance, pitches them into the oven upon the peel, handled with equal dexterity by the furner, who places the biscuits as he receives them side by side throughout the whole area of the oven, drawing back his peel a short distance each time to receive the next biscuit. The speed and facility with which this process is carried on are very striking to the eye of a stranger. It of course varies a little, but frequently more than

one hundred biscuits are thus pitched in and properly placed in a minute. It may be observed that, with the greatest dexterity, those biscuits first placed in the oven must be the most baked; and to equalize this unequal effect the first are made larger than the others, so that the heat may be proportionally distributed; the oven, being filled, is closed for about ten minutes, when it is again opened and the biscuits withdrawn. During the time the oven is closed, and while the bread is being withdrawn, the process of kneading is going forward by the men not employed at the oven, to be ready to commence again as soon as it is empty.

The quantity baked each time, which is called a suit, is about 112 pounds weight before being placed in the oven, and which comes out 100 pounds about 9 per cent of weight being lost in the process. The number in this weight of biscuit is about five hundred and eighty, that is one with another; there are about six biscuits to a pound...

The usual number of suits which each oven bakes in a day is twelve, and on extra occasions they can bake sixteen or seventeen.....On a stranger entering the door.....he is struck with the perfect order and dexterity of the six divisions of the men, each attired in a clean checked shirt white linen trowsers, apron, and cap, and all plying their several avocations with a steady rapidity, but without noise or the slightest appearance of hurry or confusion.

Appendix C

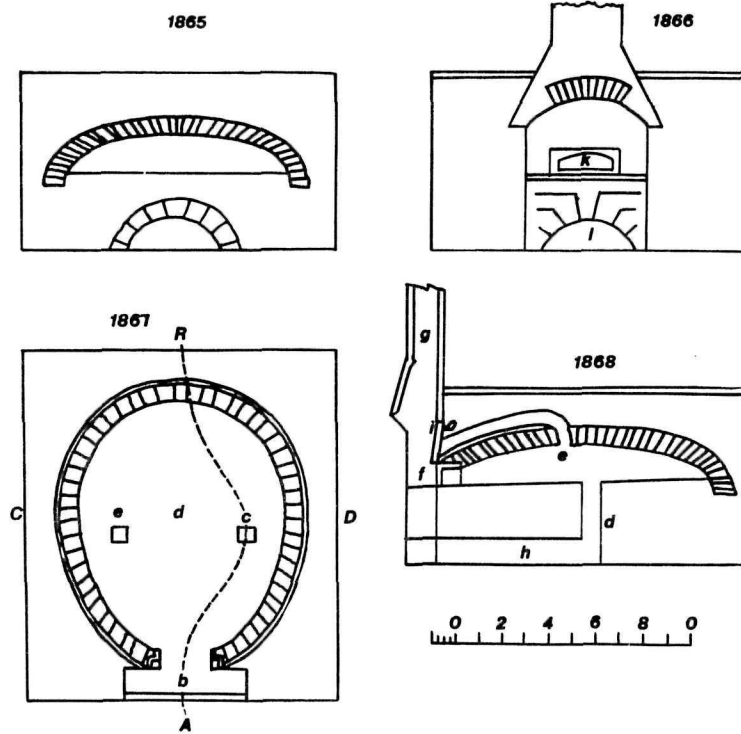
John Claudius Loudon included a description of an "oven for green wood" in his 1844 publication of An Encyclopaedia of Cottage, Farm and Villa Architecture and Furniture...As this manual was sent to the Northern Department of the Hudson's Bay Company it may have been used in the design of bake-houses. Loudon's description is recorded below with a copy of the accompanying ground plan of the "common country oven."

Oven for Green Wood. Fig. 1367

is a ground plan of a common country oven, in which a is the floor of the oven; b the sill of the floor; and c c, holes in the floor, communicating with a tunnel below, for the purpose of admitting air to urge combustion, when green wood is burned. Fig. 1368 is a longitudinal section on the line A B, in which d is one of the openings for the introduction of fresh air to the green fuel, but which is closed by a fire-brick, or by building up the entrance to the funnel, b [sic, h?], when dry fuel is used; e is a flue from the highest part of the arch of the oven, for conveying away the smoke to the chimney, g, when green fuel is used, but which is closed by a stopper at i, when the oven is heated by dry fuel; f is the door to the oven, and g the chimney. When dry fuel is used, the orifices at d and i are closed, and the fuel being introduced at f, is ignited there, and pushed forward to the centre of the oven, where it burns till consumed, or till the oven is sufficiently heated; the smoke passing out by the upper part of f, and ascending the chimney, g. When sufficient heat has been obtained, which is between 205 and 300 degrees, and which the baker knows by experience, never using a thermometer, the floor of the oven is cleaned out, and the bread introduced; the door, f, and the stopper, i, are then closed for a short period; after which a very small opening is made, by loosening the stopper, i, to admit the escape of the vapour exhaled from the bread. This vapour, or whatever proceeds from the door, f. when it is opened either

to examine or to take out the bread, ascends by the open chimney, g. Fig. 1365, is a transvers section on the line C D; and fig. 1366 is a front elevation, showing the door to the oven, k, and the opening to the tunnel below, l. Ovens of this description are in general use in France; but in those of Paris, where dry wood is always used, the funnels d and e, are seldom made use of, but to cool the oven, or to admit of the escape, of the vapour from the bread. It may be observed, also, that, in some of the ovens of Paris, the fuel instead of being burned on the general surface of the hearth, is consumed in iron gratings or baskets, placed over the openings, c c, which is found a more rapid and economical mode of heating, than that of making a fire on the floor of the oven.

**Design for an English "Common Country Oven"
for green wood c.1830-1860.**



Appendix D Wood-Burning oven recommended by the Subsistence Department, U.S. Army, 1864

A manual, Bread and Bread Making, published in Washington, D.C. in 1864, for the use of army subsistence officers, contained plans and specifications for a wood-burning bake-oven which was said to "have been advantageously used" for baking bread by the Subsistence Department. By 1882, when the same plan appeared in another handbook issued by the Commissary General of Subsistence, this type of oven was described as an "old style wood burning oven." Perhaps, like Loudon's oven, this one represented an ideal which was seldom realized in fact. But the dimensions among the few available for nineteenth century wood-burning ovens, and they are therefore reproduced here.

The dimensions and other specifications for the oven pictured in Figure 9 are as follows:

| | | |
|---|---|-------------|
| Foundation (g) of brick, or rubble stone masonry, | | |
| depth | | 18 inches |
| Body of Oven (a) | $\left\{ \begin{array}{l} \text{Length in clear} \\ \text{Width in clear} \\ \text{Height from hearth to crown} \\ \text{(in centre)} \end{array} \right.$ | 12 feet |
| | | 9 ft. 4 in. |
| | | 23 inches |
| | | |
| Arch underneath Oven (c) | $\left\{ \begin{array}{l} \text{Width of span} \\ \text{Height at Centre} \\ \text{Height from hearth} \\ \text{Length from front to rear} \end{array} \right.$ | 8 ft. 5 in. |
| | | 3 ft. 8 in. |
| | | 18 inches |
| | | 14 feet. |

| | | | |
|---|---|------------------|------------------------------|
| Arched entrance to Oven | In front i.e. flush with front face | Width | 5 feet |
| | | Height at centre | 2 ft. 6 in. |
| | In rear i.e. flush with Oven door | Height at sides | 18 inches |
| | | Width | 2 ft. 8 in. |
| | | Height at Centre | 18 inches |
| | | Height at sides | 14 inches |
| Main flue (d) | | | 14 inches x 14 in. |
| Back flue (e) | | | 9 inches x 5 in. |
| Smoke flue | | | 14 in. x 4½ inches |
| Distance from front of main flue to oven door | | | 4 inches |
| Distance from back of back flue to back wall | | | 2 feet |
| Distance from back of smoke flue to oven door | | | 2 inches |
| Oven door, (b), cast iron | | | 2 feet wide x 14 inches high |
| Hearth of Oven above floor | | | 3 feet x 4 inches |
| Height of mass of masonry above foundation | | | 6 feet x 8 inches |
| Distance from front to rear of same | | | 15 feet x 6 inches |
| Thickness of side and back walls | | | 18 inches |
| Thickness of division wall between two adjacent ovens | | | 14 inches |
| Maximum thickness of front wall | | | 27 inches |
| Chimney, exterior dimensions | | | 2 feet 7 inches x 22 inches |
| The <u>height</u> of the chimney to be regulated by circumstances, such as draft, nature of roof, &c, &c | | | |
| Dimensions of brick used | | | 8½ x 4½ x 2¼ |
| In case the bricks employed are of different dimensions from the above the necessary allowance must be made. | | | |

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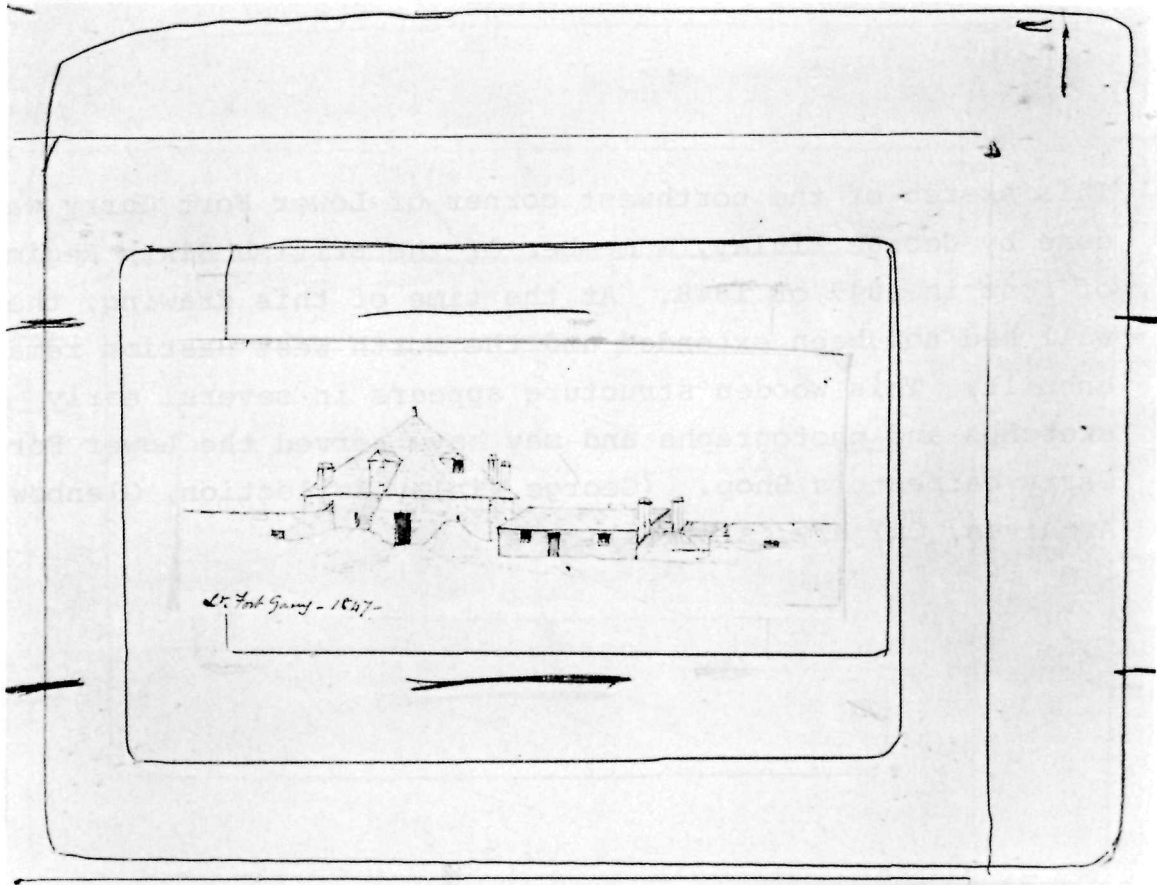
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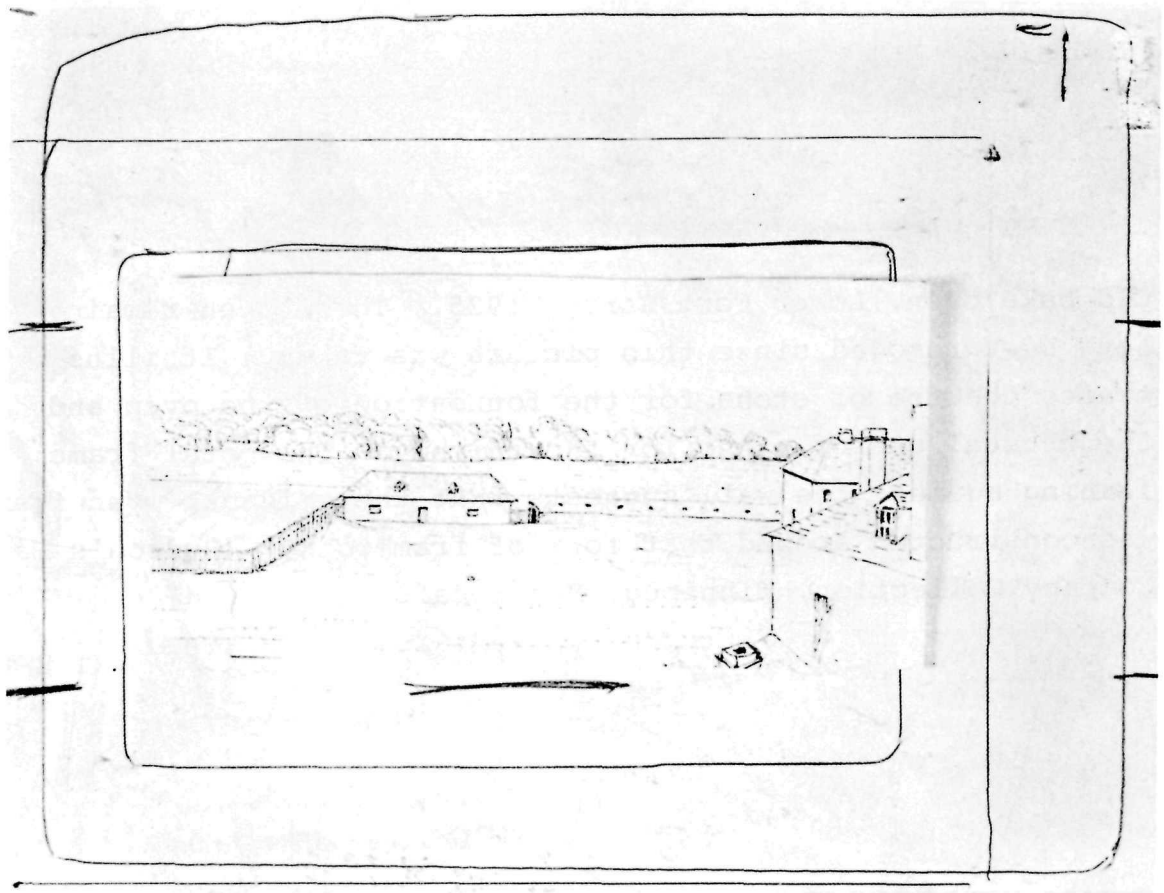
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George Finlay Sketch of the south-west bastion of Lower Fort Garry in the winter of 1847. This sketch clearly shows the oven complex erected by the Royal Engineers at the north end of the building adjacent to the south-west bastion. The two chimneys suggest the presence of two ovens within the structure. The presence of these bakeovens delayed the need for a permanent bakehouse. (George Finlay Collection, Glenbow Archives, Calgary, Alberta)



This sketch of the northwest corner of Lower Fort Garry was done by George Finlay, a member of the British Sixth Regiment of Foot in 1847 or 1848. At the time of this drawing, the wall had not been extended and the North West Bastion remained unbuilt. This wooden structure appears in several early sketches and photographs and may have served the Lower Fort Garry carpenters Shop. (George Finlay Collection, Glenbow Archives, Calgary, Alberta).



Old bake oven, Lower Fort Garry, 1935. These oven remains have been removed since this picture was taken. It illustrates the use of stone for the foundation of the oven and the unusual use of stone for the chimney. The metal frame leaning against the wall suggests that the original oven frame was constructed around that form of framework. (Hudson's Bay Company Collection, Winnipeg, Manitoba).



