LES FORGES DU SAINT-MAURICE BLAST FURNACE COMPLEX

Jean-Marie Roy and Laurent Goulard*

Summary

As outlined in the introduction by François Leblanc, the main objectives of this project were to preserve and exploit the ruins of Canada’s oldest industrial site by incorporating them in a building to be used as a historical interpretation centre. The new building was to be contemporary in appearance and materials, but whose composition recalled the pattern and functions of the original enclosure.

The design encloses and exhibits the ruins in earth covered underground spaces over which transparent space frame structures suggest the outline of major elements of the vanished complex (Fig. 1). In addition, the hydraulic mechanisms of the Forge’s stream (dam, reservoir, raceway) and the building’s principal machinery (waterwheel, gears, bellows) are rebuilt at their historical locations using contemporary materials (Fig. 2).

Historical Aspects of the Forges Related to the Architectural Problem

The Forges du Saint-Maurice operated from 1738 to 1883. During this period buildings and machinery underwent many changes due to technological evolution. After being shut down, the site was abandoned and the buildings were gradually demolished to ground level, materials being used for construction in the region.

Five structures, representing the major components of this early industrial village, were to be redeveloped (Fig. 3).

Archeological Ruins of the Blast Furnace Complex

The site contains three major types of ruins: the large central ruin of the blast furnace itself, the foundations of the peripheral buildings; and a zone of interesting industrial vestiges (Fig. 4).

The blast furnace itself was built of solid stone, 7.00m × 7.00m in plan and 10.00m high. Only its base remains, 1.50m high, and in the centre one can see a hardened mass of iron from the last casting in a crucible surrounded by its brick lining and the embedded tips of the bellows.

This stone mass was at the centre of an irregular cross-shaped complex which had housed several functions. The wings were barnlike wood structures on fieldstone foundations, of which remain but a few stone courses. As the superimposed ruins indicate, these wings and the machinery they housed were often enlarged or modified during the history of the Forges.

2. View of central furnace area, with ruins of stone base, brick crucible with embedded tips of bellows on top with congealed iron from last casting. The former arched openings of the furnace is represented by the curved metal tubes, the chimney, bellows and waterwheel are rebuilt in brightly painted steel.

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1. East elevation of the blast furnace showing all the major components of the project: the hydraulic mechanisms (spillway in foreground and concrete raceway to left), the machinery (steel waterwheel and chimney, both painted red), the stone ruins of the furnace on their underpinnings, the transparent aluminum structures representing vanished features of the building, and the combination of earth berms and the natural hillside concealing exhibition spaces.

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3. Sketch c.1845 of initial project showing expressive volume for the five major sites of the Forges (Parks Canada).
A zone in the south-west part of the casting shed contains an interesting concentration of ruins such as oven foundations, steel rails for carts, crane foundations.

Development of Concept

As discussed in François Leblanc's introduction to Les Forges, the development option recommended for this site was the use of "expressive volumes" which would optimize the exposure of the ruins and allow a flexible interpretation of the site. It was also felt this approach was more in line with the Charter of Venice on the Restoration and Conservation of Historical Monuments and Ruins which discourages hypothetical reconstructions, favours the respect of all periods present and which considers that complementary work should be treated as architectural composition carrying the mark of its period.

Very few specific constraints were given at the design competition that followed in order to more clearly see the possibilities of the idea of expressive volumes for the five major sites of the forges.

As a result, Gauthier, Guite, Roy, architects of Quebec City, were retained to produce a more detailed design for the blast furnace in 1979 and other structures at the site in 1980. The detailed programme requirements were jointly determined between the consultants and Parks Canada; design progress was reviewed at bimonthly meetings attended by the multidisciplinary development task group.

In 1980, public hearings were held to review the proposed development for the Park. As a result, the expressive volume approach was confirmed for the Blast Furnace and Upper and Lower Forges in the ravine, a historical reconstitution was retained for the exterior of the Grande Maison on the plateau and a transitional solution for Habitat and Services, also on the plateau.

Exhibit design for the interiors of the Blast Furnace was independently undertaken in 1981, as a result of which final adjustments were made to architecture and exhibition concepts prior to preparation of working drawings in 1981. Construction took place in 1982-83. The project was awarded Le Prix d'Excellence en Architecture 1985 by the Ordre des Architectes du Québec. It is interesting to note that the jury which awarded the Prix d'Excellence commented, "We must note the intelligence of the Canadian government's commission and the possibilities it afforded the architects."

Programme (extracts from Parks Canada guidelines for the development of the five sites)

- Architecture & Engineering section:
  Preserve and exploit the ruins in buildings to be designed as expressive volumes. They should symbolically express natural elements of the Forges, without direct relation to the historical forms and are to be contemporary constructions using current materials and techniques.

- Interpretation section:
  Even if the idea of a historical reconstitution has been rejected, it is essential that the impression of the new buildings recall the characteristics of the historical buildings, respect their original pattern and recall their functions. Give special attention to the ruins, only witnesses of the history of the Forges. Favour overall views of the ruins, use natural entrances and exits. Interior spaces are to be used as visitors' interpretation centre. Interpret each space inside the corresponding vestiges. Establish appropriate circuits. Redevelop the streams' hydraulic mechanisms and the buildings' machinery. Adapt natural lighting to each zone and to the nature of the exhibitions.

The Site

The building is located in a landscape of great beauty, on an open grassy plateau overlooking the St. Maurice River, and at the edge of a narrow wooded ravine in which flows the stream which supplied necessary power to the industrial buildings.

The project includes the reconstruction of the hydraulic mechanisms, as detailed in the article by Samson and Fontaine, necessary to the comprehension of the site. The raceway and discharge canal are already complete, while the dam and reservoir upstream are part of the next phase.
The Architectural Solution

Thus, we have now examined the considerations involved in the concept. To summarize, the building had to be contemporary in nature, while expressing a vanished historical complex, had to preserve surviving ruins and provide spaces appropriate for exhibitions. In addition to these requirements, we felt that a building's design should always respond to its setting, in this case, a park in a dramatic landscape.

It seemed that a conventional building, with walls, doors, windows, etc. ... would by its very physical presence overwhelm any historical allusion and might also merely intrude in the landscape. We thus arrived at the concept whereby the ruins are preserved in earth-covered spaces which are modelled on the adjacent escarpment and above which light, transparent structures suggesting the outline of vanished historical elements in the landscape; along with the operable waterwheel, the dam and raceway, no other elements are added to the park.

The vestiges are thus put back underground and are visited by entering a low and dark cellarlike space; this type of dark space also suited the exhibition requirements. Openings are placed only where necessary to show the relationship between certain elements displayed inside and outside such as the chimney or the wheel and its gears.

Emphasis is given to the central vestige by designing surrounding space as an amphitheatre. This space is high and naturally lit, in contrast with the low and dark peripheral wings.

The perimeter of the exhibition spaces follows the vestiges of the corresponding historical spaces. Service rooms are located in a core outside the historical perimeter.

Another objective was to exploit elements of the building's design in a way that provides visitors with a variety of interesting experiences; steps lead them down to a cool, damp stone enclosure under the bellows, a spiral stair leads to the loading platform providing an overview of the site, catwalks allow them to climb over the central vestige, and walk between moving gears and bellows (Fig. 5).

References:
- Les Forges du Saint-Maurice Development Concept, Parks Canada, 1978
- Plan Directeur, Les Forges du Saint-Maurice, Parks Canada, 1981 (contains an extensive bibliography on the Forges)
Appendix:
MATERIALS
Exterior volumes: aluminium space frame, light bronze anodized finish.
Historical mechanisms: zinc metallized steel, painted.
Interior: floor — trowelled mosaic epoxy finish;
walls — sandblasted concrete;
ceiling — steel space frame, colour similar to exterior.
BUILDING AREA AND BUDGET
Site: 60 hectare historical park.
Heated interior space: 950m².
Construction cost: $2,500,000 approx. (excluding future dam and interior exhibition modules)
CREDITS
Client: Parks Canada, Quebec Regional Office, 3 Buade Street, P.O. Box 6060, Haute Ville, Quebec City, PQ G1R 4V7
Architects: Gauthier, Guite, Roy, 7 avenue Sainte-Geneviève, Québec City, PQ, G1R 4A7
Structural, Mechanical & Electrical Engineers: Les Consultants Pluritec Inc.