Habitat 2007

An adaptive conversion of Silo No.5 for Living in the City

by

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"The works of the past always influence us, whether or not we care to admit it, or to structure an understanding of how that influence occurs. The past is not just that which we know, it is that which we use, in a variety of ways, in the making of new work…. The typology argument today asserts that despite the diversity of our culture there are still roots of this kind which allow us to speak of the idea of a library, a museum, a city hall or a house. The continuity of these ideas of type, such as they are, and the esteemed examples which have established their identity and assured their continued cultural resonance, constitute an established line of inquiry in which new work may be effectively grounded."[1]

The works of the past have a direct influence on the architect engaged in adaptive reuse of defunct buildings, and the objective of the 2006 Central Glass Competition was convert existing architecture for 'living in the city'. The competition entry transforms the defunct Grain Terminal Elevator No.5, better known as Silo No.5, located at west side of the Port of Montreal, into sustainable housing and mixed-use development. By employing architectural techniques sensitive towards social, ecological and economic sustainability, the design strives to protect the complex from demolition and restore the site to profitable use. The competition entry addresses a global problem; as abandoned industrial relics burden post-industrial cities, the lands they occupy are usually contaminated, or adjacent to active industrial zones, impeding further development and readaptation. Unless landowners wish to quarantine potentially-valuable brownfields from the social and economic life of their city, then they must promote adaptive reuse –engaging the services of design professionals, urban planners, architects, and engineers –to envision new life for our industrial zones, to rejuvenate them with urban activity, and to secure a rich architectural legacy for future generations. Redevelopment proposals for Silo No.5 have generated contention between a preservation campaign by citizens who recognize its historical value, and those who call for demolition to liberate the valuable real estate upon which it is situated, engaging a decade-long debate over the building's fate. The site is adjacent to the city's new multimedia district (a former industrial zone), with a view to the picturesque St. Lawrence River, and within walking-distance to the city's historic center, owing to the desirability of its location and its suitability for residential use. The sensitive nature of this

Fig. 1: Aerial view of Silo No.5 complex with the mouth of the Lachine Canal. Photo by Docomono Quebec, 2000.

1. John E. Hancock. The Harvard Architectural Review. Volume 5. Precedent and Invention. Between History and Tradition: Notes Toward a Theory of Precedent.

Cover photo by author, 2006.

particular brownfield redevelopment calls for a design process that includes introspection into the history of the city and the site, analyzing its industrial past to qualify the artefact's significance, the economic factors that rendered the site defunct, and the new economies that are emerging to dictate the program and parameters for new construction.

Historians have suggested that the grain elevator was derived from an unprecedented typology. On the topic of Silo No.5, Nathalie Senecal states in her thesis: "At the end of the nineteenth century, the grain elevator was an entirely new and distinctly North American form. Although it was designed by engineers and its form evolved through imperatives of function rather than style, the elevator has been introduced into the canon of architectural history."[2] Yet even functional grain silos are influenced by works of the past, they descend from of one of humanity's most fundamental architectural works. From an anthropological standpoint, the preservation of civilization is indebted to two artefacts of human invention: the storehouse and the city.[3] A society that has the infrastructure to conserve foodstuffs has the ability to overcome famine, but this also necessitates individuals to ration agricultural production destined for storage, to ensure growers receive payment for goods held in state, to distribute reserves in times of need, and to manage a market or quota that supplies food to consumers. Therefore, the storehouse is an architectural work that spawns the very essence of civilization, in that cannot exist without a collective, individuals coming together and divvying tasks for the greater good. Silo No.5 is a conglomeration built across the span of a half-century, and whether or not the engineers who contributed their portion were aware of its historical lineage and influenced by it, the silo in the landscape is an icon of heroism; a symbol that reminds city dwellers –the majority of whom do not produce their own food –that they rely on these great storehouses to provide nourishment and sustain human life. Notwithstanding the architectural community's justifications for rescuing such a monument from demolition –attributed to its cultural significance, symbolic value, or brutal aesthetic –the Silo No.5 complex interacts with the city on a number of urbanistic levels. As a landmark, it stands as a bookend framing the 'Old Port' with Pont Jacques-Cartier at the opposite end. Its undulating concrete walls terminate the visual axis along McGill Street, and it forms the backdrop for pleasure boats plying through the locks of the Lachine Canal's lower basin. As a monument, it serves as a silent reminder to

Fig. 2: Sunset view of Silo No.5 complex at the mouth of the Lachine Canal. Photo by Docomono Quebec, 2000.

2. Nathalie Senecal. *The No.5 Terminal Grain Elevator in the Port of Montreal: Monument in a Shifting Landscape*. p.2

3. Lewis Mumford. *The City in History*. pp.13-15

the port's industrial past, one of the remaining few relics (and perhaps the largest) amongst a landscape of leisure. Moreover, it narrates aspects of Montreal's Old Port development and the evolution of grain-handling technology because the complex is composed of three discrete units constructed over a period of fifty years.

By performing a site analysis and dissecting the components of the Silo No.5 complex, one reveals the circumstances that brought about its existence and demise, a story connected with connections on a global scale. The compound's history is linked to the city's raison d'être, the very elements that led to the settlement of the land and the foundation of the city. In terms of natural geography and the accounts of Canada's earliest European explorers, Montreal is situated where the St. Lawrence River becomes shallow and ceases to be navigable by large ocean-going ships, as experienced by explorer Jacques Cartier in his serendipitous voyage of 1535. Some 75 years later, Samuel de Champlain sought to establish permanent settlement on the Island of Montreal, precisely at the mouth where a small creek emptied into the St. Lawrence,[4] just a stone's throw from the present site of Silo No.5. Eventually, as the town sprawled along the rivers edge, the banks of the creek were straightened and incorporated into the urban fabric (refer to fig.3); and superseded in 1825 by the Lachine Canal, forged through the Island of Montreal to divert steamships from the rapids of its namesake (refer to fig.4). The Lachine Canal necessitated construction of a jetty into the St. Lawrence River, separating the canal from the lower river-waters, with a series of locks and a ship basin at the canal side of the jetty. This jetty, known as Windmill Point, formed the spine for a series of lots reclaimed from the shallow riverbed, encompassing the current site of Silo No.5. The inauguration of the Lachine Canal was followed in 1829 by the Welland Canal connecting Lake Erie and Lake Ontario, then by series of canals connecting colonial Ontario and Quebec, opened between 1840 and 1845. The boom in canal construction provides evidence of a national desire to increase reliability and efficiency of waterborne transportation between Montreal and points upriver, attesting that Canada's economy and trade were evolving at a national scale. As settlements developed into cities and industry pushed westward, the landscape along the St. Lawrence and Great Lakes was engaged in agricultural, infrastructural and technological exploitation. The spread of agriculture in Canada coincided with unprecedented levels of

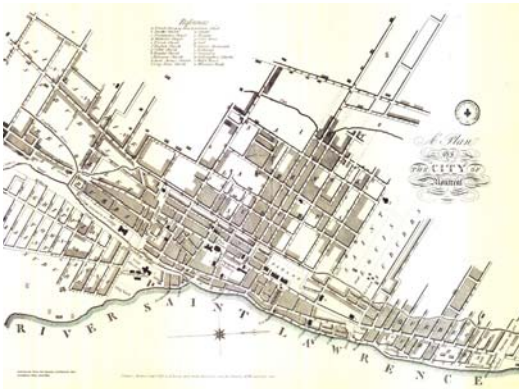

Fig. 3: 1823 Map showing the urbanization surrounding the natural creek.

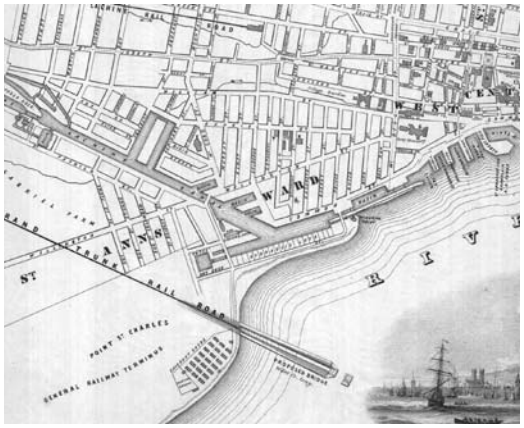

Fig. 4: 1852 Map the Lachine Canal, 'Hydraulic Lots' at Windmill Point, and the proposed alignment for the Victoria Bridge.

Fig. 5: Modern Aeral photo of the study area; Victoria Bridge is visible in the bottom left corner.

4. City of Montreal. "Centuries of History: Ville Marie" Old Montreal. http://vieux.montreal.qc.ca/histoire/eng/v_mara.htm

technological innovation and urban development throughout the industrial-colonial British Empire. Therefore, urban and rural became increasingly disparate on a global scale, as did society's proximity to food sources, necessitating the development of sophisticated methods to store and transport nourishment in bulk. It is within this context that grain elevators emerged along the nation's freight corridors, and the port of Montreal was forever transformed.

From 1872, the Montreal Warehousing Company (a subsidiary of the Grand Trunk Railway) operated the city's first grain elevator, a wooden one located at Windmill Point.[5] The site was chosen for its proximity to their rail yard and mainline at Point St. Charles, yet accessible to both 'laker' ships at the Lachine Canal, and ocean vessels on the St. Lawrence. The location proved to be advantageous, as Canada Maltage and Five Roses Flour built their silos and continue to operate mills a short distance further inland. Though Montreal's harbour was ice-clogged through the winter, Atlantic exports continued via the Grand Trunk's branch to the nearest ice-free harbour in Maine, crossing over the St. Lawrence on the Victoria Bridge. By the end of the nineteenth century, Canada's prairies were facilitated by two transcontinental railways, settled through an influx of European immigrants, and became agriculturally productive –particularly in grain crops. Faced with increasing exports of Canadian grain along Atlantic trade routes, Montreal's grain handling facilities were expanded and modernized through the later half of the nineteenth century, accommodating both ship-to-ship and rail-to-ship grain transfer. In 1903, the wooden elevator was replaced by a steel structure, known simply as the 'B', with patented rectangular bins composed of riveted boilerplate, rising from a fenestrated masonry plinth that accepted shipment by rail at a rate of twenty-five hoppers per hour. The elevator's simple rectilinear massing is derived from the volume of its storage bins; in that the walls of the bins, structurally reinforced to prevent bucking, also served as cladding panels (refer to fig.6). The design and patents were held by John S. Metcalfe, a Canadian who founded a multinational engineering firm with offices in Vancouver, Chicago, London and Montreal,[6] bestowing a legacy of grain elevators worldwide. At the time of its construction, the 'B' stood prominently as the city's tallest structure at twelve-storeys, triply exceeding Montreal's zoning restrictions,[7] and exists today as the oldest portion of the No.5 complex.

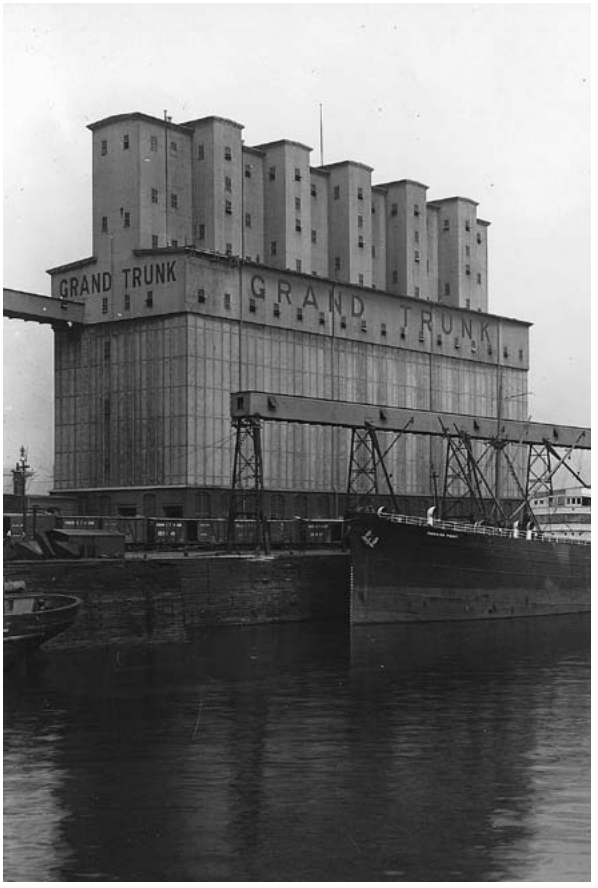

Fig. 6: Undated photo of the 'B' elevator by John Metcalfe. Source unknown.

5. Nathalie Senecal. *The No.5 Terminal Grain Elevator in the Port of Montreal: Monument in a Shifting Landscape*. p.14

6. Nathalie Senecal. *The No.5 Terminal Grain Elevator in the Port of Montreal: Monument in a Shifting Landscape*. p.22

7. Nathalie Senecal. *The No.5 Terminal Grain Elevator in the Port of Montreal: Monument in a Shifting Landscape*. p.25

A boom in grain production before World War I necessitated further expansion of the 'B', as Montreal had become a world-class grain handling port second only to New York City in terms of tonnage. The Grand Trunk called upon the services of Metcalfe once again, but within the span of a decade, advances in building construction prescribed reinforced concrete as the material of choice. The result is an 'Annex' of twenty-eight cylindrical silos standing in sharp contrast against its rusty predecessor to the north, with a connection to the 'B' by means of a corrugated metal gallery atop its roof (refer to fig.7). By the 1920s, ownership of the complex fell under public domain, administered by the Montreal Harbour Commissioners, and Montreal had become the world's most important grain-handling port, necessitating further expansion of the 'B'. Concrete silos were added to the Annex, but also a new marine tower (mobile on tracks) to unload ships, and a discrete elevated gallery running along the length of the pier, each having spidery metal exoskeletons designed by Metcalfe. In 1936, under the supervision of Transport Minister C.D. Howe, the Government of Canada dissolved the Montreal Harbour Commissioners and assumed control of the port, eventually renaming the 'B' to its current numeric designation.

The final expansion of Silo No.5 came about during 1958 in anticipation that the launch of the St. Lawrence Seaway would divert grain shipment from trade routes in the United States, and Howe, by this time Minister of Trade and Commerce, administered construction of the massive 'B-1 Annex'. As principal of an engineering firm that specialized in the design of grain elevators, Howe built similar examples along the length of the seaway, from its western extremity at Thunder Bay to ports east of Montreal. His professional expertise combined with his political influence proved to be beneficial in that the design of the B-1 Annex epitomizes the final solution for intermodal grain distribution and storage. The B-1 Annex is the most aesthetically impressive yet imposing portion of the No.5 complex, standing seventeen-storeys tall and six hundred-fifty feet in length.[8] Its internal operations were similar to its predecessors, as the B-1 Annex accepted grain from rail hoppers or the holds of ships. The grain was elevated to the top of the headworks, where it was weighed and transferred along the upper gallery conveyor for distribution, either immediately to an outgoing vessel, or to a designated bin. The grain would be stored based on harvest season and country of origin, and regularly redistributed to

Fig. 7: 2006 photo of the 'B Annex' by John Metcalfe. Note the hemi-cylindrical massing in concrete. Photo by author.

Fig. 8: Construction photo of the 'B-1 Annex' by C.D Howe. Source and date unknown.

8. David Clements. "The Silophone." BeConnected.org (August 2006). http://www.beconnected.org/feature1.html

nearby empty bins to prevent seed germination. The bins are emptied at the ground-level gallery and conveyed back to the headworks, where it is elevated, weighed and dispatched by rail or ship. The machinery to lift and distribute the grain is fully concealed within the building's concrete structural envelope, unlike its predecessors, where the machinery is contained within metal-clad appendages to the silo structure. The integration of equipment endows the building with a unified appearance, augmented by the exterior elevation's aesthetically-pleasing gentle corrugation, generated by its ingenious interlocking bin layout. The reinforced concrete bins are efficiently laid out in a double row of cylindrical volumes axially connected by slender shear walls, creating concave star-shaped bins along the building's central axis, and convex quarter-round bins along its perimeter, thereby maximizing storage space within the building's rectangular footprint. Compared to its predecessors, the B-1 Annex was designed to operate employing a crew half the size.[9] However, the existence of capable grain elevators east of Silo No.5 segues into the decline of Montreal's importance as an intermodal grain terminal.

Through the later half of the twentieth century, Pacific grain markets increased in importance while Atlantic exportation dwindled, curtailing operations at the Port of Montreal. Additionally, the construction of the Louis Hippolyte Lafontaine Tunnel underneath the St. Lawrence in 1963 severely limited the draught of ships destined for the Old Port of Montreal,[10] so the 'new port' facilities east of the tunnel benefited from the influx of seaway traffic, while Silo No.5 languished at its rail-oriented setting, inaccessible to larger vessels. These factors proved to be fatal since the seaway enabled efficient transport of grain from Thunder Bay to Montreal, such that rail transport to Silo No.5 all but vanished. Through the 1970s and '80s, the Lachine Canal closed to traffic; the once bustling warehouses, sheds and elevators of the Old Port fell into disuse; Silos No.1 and 2 –renowned by Le Corbusier in his *Vers Une Architecture*[11] –were demolished in 1983 to provide the city's historic core a view to the St. Lawrence; and a series of landscape projects and architectural interventions gradually transformed the old piers and quays into a landscape of leisure. Silo No.5 survived demolition partly because it was the most modern facility and could be operated efficiently, but also because it is situated on the periphery of the first wave of gentrification. After the collapse of the Soviet Union (one of Canada's most important

Fig. 9: 2006 photo of the 'B-1 Annex', with temporary landscape exhibit in the Lachine Canal basin. Photo by author.

9. Nathalie Senecal. *The No.5 Terminal Grain Elevator in the Port of Montreal: Monument in a Shifting Landscape*. p.14

10. Nathalie Senecal. *The No.5 Terminal Grain Elevator in the Port of Montreal: Monument in a Shifting Landscape*. p.53

11. Le Corbusier. *Vers Une Architecture*. p.20

grain importers) the most logistically efficient grain elevators further east could handle all the Atlantic tonnage, and Silo No.5 ceased operations in 1994.[12]

Since then, attention has been drawn to the Silo No.5 and its surroundings as the Lachine Canal reopened to pleasure craft in 2002, complete with bike paths along its banks, plus the introduction of new businesses nearby through the aforementioned Cite-Multimedia. While some developers called for the removal of the silos to provide a river view for the gentrified neighbourhood, demolition is expected to be an expensive and complicated endeavour,[13] and the building's absence would only expose the shed warehousing of the adjacent pier. In 1996 the architectural community engaged itself into the debate as the CCA's annual student charrette focused on the site, followed by Docomono's professional charrette in 2000, then the 'Silophone' intervention of 2001 that transformed the silos into a musical instrument, and finally the building's owners issued a call for proposals in 2005 to convert and reinhabit the building. To respond appropriately, one must address the shortcomings of the gentrified Old Port, and suggest programmatic applications to rebalance the cultural and economic diversity of the neighbourhood. Since the Old Port has become a popular destination for tourism and leisurely activities, there is a lack of affordable housing in the area, as formerly affordable apartments have been transformed into boutique hotels or luxury condominiums. The government ownership of Silo No.5 makes it a good candidate for subsidized dwellings, yet its desirable location is suitable for market housing, demonstrated through the success if Moshe Safdie's Habitat'67 a short distance away. The livability of the area has also been compromised, as Bonsecours Market, historically the community's farmers market, now houses art exhibitions, restaurants and boutiques that cater to tourists, but a modern supermarket has not emerged to serve local residents. Therefore, in order to convert Silo No.5 for living in the city, an approach towards social sustainability is necessary, not only making provisions for a vibrant economic mix amongst the residences, but also for commercial occupancies amenable for urban life.

The B-1 Annex, with its solidly integrated design, provided an architectural tripartite having the potential to support mixed-use development, and so the competition entry limited its scope to this building. The project is entitled *Habitat 2007*, with reference to the aforementioned

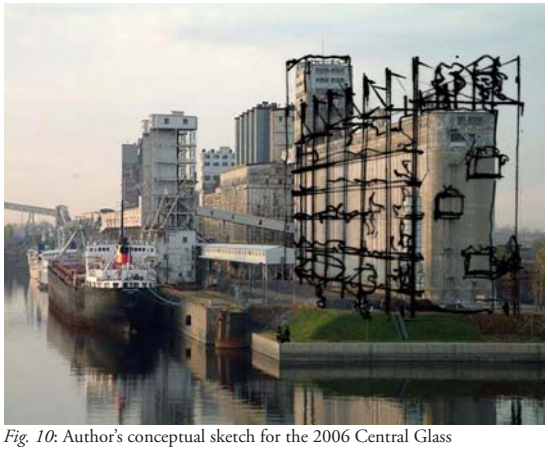

Fig. 10: Author's conceptual sketch for the 2006 Central Glass Competition.

Fig. 11: Author's conceptual sketch for the 2006 Central Glass Competition.

12. Nathalie Senecal. *The No.5 Terminal Grain Elevator in the Port of Montreal: Monument in a Shifting Landscape*. p.71

13. David Clements. "The Silophone." BeConnected.org (August 2006). http://www.beconnected.org/feature1.html

Habitat'67. The primary organization of the design stratifies the building into commercial, residential and institutional occupancies according to the stacked architectural composition of the B-1 Annex, comprising of a horizontal gallery at ground level, vertical grain storage bins, and two levels of upper galleries. However, the immense proportions of the building and the presentation limitation of one A1-sized panel presented a challenge as to which aspects of the design could be developed and presented at a detailed level, resulting in the prioritization of residential units, large-scale architectural devices to unify the programmatic tripartite, and a simple architectural principles to clearly distinguish new construction from the existing building. Since the B-1 Annex is concrete, the new design applies a complementary palette of materials, predominately weathering steel, glass and wood frame. The existing concrete is saw cut only for door and window openings, except for the demolition of two cylindrical silos to accommodate the design's most poetic feature, a living machine. Converting silos for human habitation necessitates a major upgrade to the building envelope, and the design solution creates opportunities for ecological devices and sustainable living.

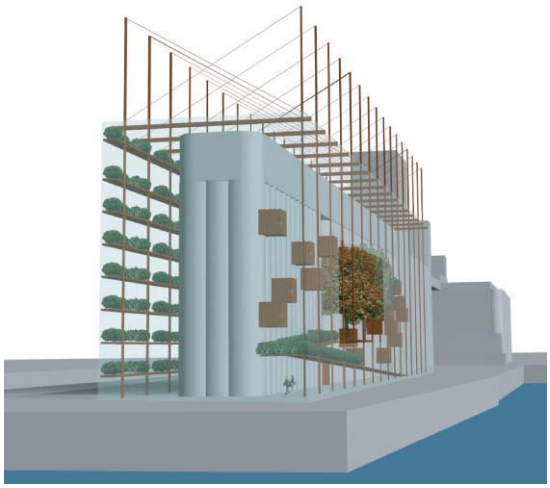

Fig. 12: Computer generated perspective by the author for the 2006 Central Glass Competition.

The silo's concrete envelope has the potential to act as a thermal mass, but the proposed program necessitates weatherproofing and insulation to achieve desired levels of comfort and energy efficiency. Cladding the concrete would impoverish the silo's distinctive aesthetic character, so the design employs a double skin of curtain walls and glazed roofing to barricade rain and snow, leaving the concrete exposed within a large unheated atrium that surrounds the building. The double-skin strategy also takes advantage of its thermal mass by permitting solar heat gain and passive cooling, incorporating architectural and horticultural devices, such as operable louvers and linear planters to control solar energy and wind. The building section and rendered perspective indicates deciduous vegetation to provide shade in the summer while permitting passive solar heating through the winter, and operable louvers at grade that allow fresh air to infiltrate the atrium, creating a stack effect that provides natural ventilation to the residential units. The second skin is supported by a structural exoskeleton, a gesture to convey that the new façade is independent from and does not interfere with the existing building. Admittedly impractical for the Canadian climate, the exoskeleton engages the building's industrial character through a dialogue with the existing

Fig. 13: Skeletal stuctures supporting elevated galleries leading to marine towers in the background. Photo by author, 2006.

marine towers on-site and the Jacques-Carter Pavilion within the old port (refer to fig.13), and further development would integrate structural dampers into its design to reduce structural stress attributed to thermal expansion and contraction of the envelope.

The territory claimed by the second envelope creates a generous hardscaped floorplane at grade that surrounds the existing grain elevator gallery (refer to fig.14). The gallery, large enough to accommodate a supermarket, is allocated for commercial and retail tenants with the potential to spill out into the atrium, transforming it into a large indoor market serving local residents. A small portion of the existing gallery is set aside for building services, specifically the anaerobic phase of water biofiltration. Above the service room, two cylindrical silos are removed to accommodate the core of the living machine, featuring aquatic animals and plants, situated along and a public path leading from the atrium to the elevator core. The living machine contains natural ecosystems engaged in biofiltration year-round to treat waterborne sewage and produced by the building. It may also be used to purify the outflows of nearby municipal storm sewers and the Lachine Canal, reducing further contamination of the St. Lawrence River. The plants also improve indoor air quality by scrubbing carbon dioxide and other toxins from the building's ventilation system. The water purified by the living machine is recycled for non-potable applications and dispatched throughout the building's greywater system. A greywater reservoir is accommodated in rooftop cisterns that also collect rainwater to support indoor gardens throughout the building. While the working intricacies of biofiltration require further elaboration beyond the scope of the competition entry, the presentation conveys design intent and adequate space is allocated for these systems to make them feasible. By integrating water in various forms throughout the project, an ecological narrative is established that unifies the multiplex development as a machine for sustainable living.

The living machine could not exist without human inhabitants, and the storage silos, which comprise the majority of the building, are allocated for residential occupancy. Since the silos are vertical volumes that impede horizontal circulation, and the gap between along the central axis of the grain elevator is too narrow for a public corridor, the typical double-loaded apartment block is turned inside out, as public corridors are cantilevered from the face of the concrete silos. The design proposes a mix of social and

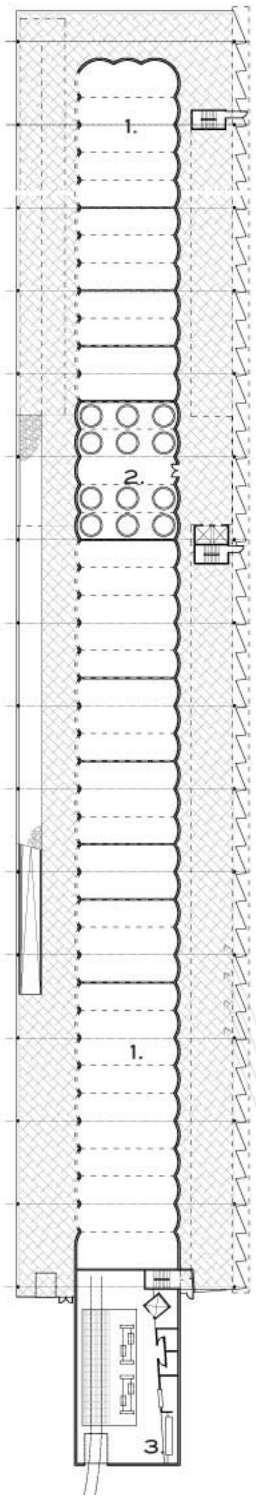

Fig. 14: Ground floor plan prepared for the Central Glass Competition by author, 2006.

market housing, indicating single-loaded row housing in plan, as units populate cylindrical and quarter-round bins with the option to append a modular bedroom or living room within a rectilinear steel pod cantilevered on the exterior of the structure. The cylindrical bins are twenty feet in diameter set twenty-four feet on centre, large enough to accommodate living rooms and kitchens with a dining setting. Sleeping spaces are accommodated on a mezzanine above the kitchen, while most of the living rooms are double-height spaces. The star-shaped bins are retained as light-wells and airshafts for natural ventilation and indoor gardens, but residential bathrooms and mechanical spaces use a slice of these volumes, taking advantage of their verticality for pipe chases. The section drawing indicates a greater variety of unit configurations, owing to the flexibility attributed to the silo's verticality. Affordable efficiency units are achieved by occupying only one cylinder per unit in a double-loaded typology. Taller, loft-like units can be achieved by occupying three storeys per dwelling in the double-loaded configuration, or as single-loaded luxury condominiums. Since the grain silos are spaced in even modules, the unit variations can be deployed anywhere within the B-1 Annex, generating a capricious pattern of doors, windows, and pods on the building's façade. All units have a view to the city or the river, and single-loaded dwellings have a view of both. Mutliplex housing has the advantage of creating a collective, bringing people together in sufficient numbers to support amenities benefiting the residents and the community at large.

The upper level galleries are set aside for amenities such as a daycare, an industrial interpretive centre housing mechanical artefacts, spaces for large-scale activities, and rooftop gardens. Coincidentally, as of 2006 the Montreal Museum of Contemporary Art is considering moving some of their permanent collection to the upper galleries,[14] so here the design is schematic to potentially to accommodate such an exhibition space. The interpretive centre is accessible to the public, with ground floor admittance at the base of the grain elevator headworks. Visitors are whisked up in glass elevators alongside the machinery that elevated grain to the top of the headworks, where they are treated to a view of the city, interacting with industrial artefacts to better understand the history of the building and it's relationship to the city with global implications. The art gallery, if implemented, would be an extension to the industrial interpretive centre. Portions of the upper galleries are carved to serve the residential units

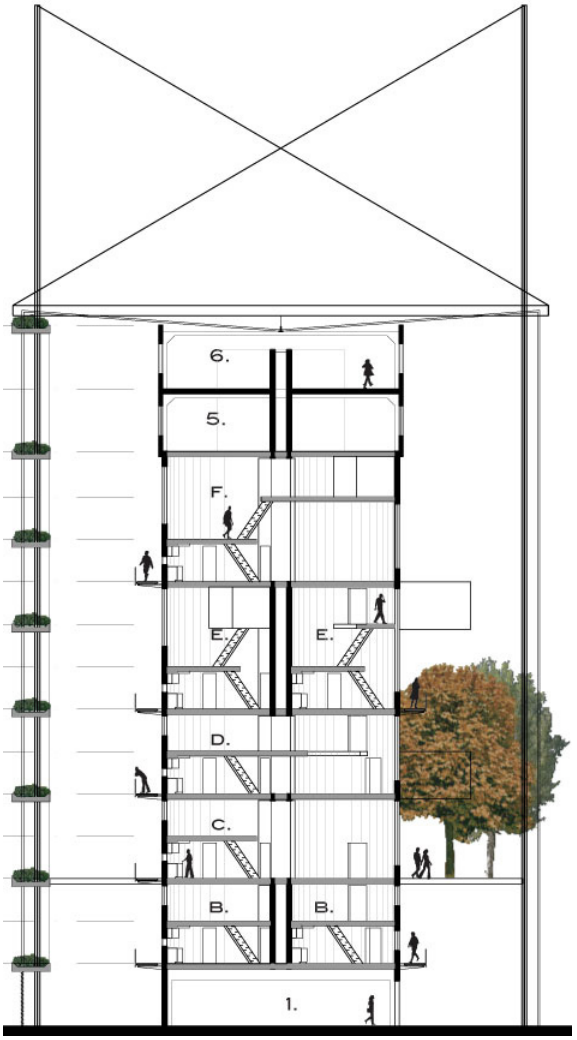

Fig. 15: Lateral section prepared for the Central Glass Competition by the author, 2006. Note the interior stair ladders to the mezzanines.

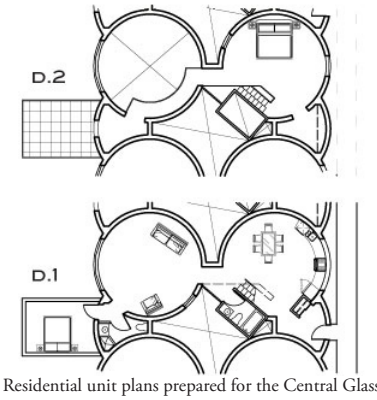

Fig. 16: Residential unit plans prepared for the Central Glass Competition by the author, 2006. D.1 is the main level, D.2 is the mezzanine.

14. Chris Hand. "The Musée d'Art Contemporain, Groupe Gueymard and Groupe Cardinal Hardy." Zeke's Gallery (December 2005). http://zekesgallery.blogspot.com/2005/12/muse-dart-contemporain-groupe-gueymard.html

below, as the openings of the star-shaped bins penetrate through the floors to receive daylight filtered through louvers that direct light vertically down to the bottom of the shaft. Near the residential elevator core, the concrete roof of the grain elevator is removed to transform the gallery into roof gardens and children's playgrounds. There is adequate space to accommodate a daycare and a fitness room for the residents towards the northern face of the building. The dust control units for the grain elevator, funnel-shaped steel drums sitting atop spidery metal legs, have the potential to serve as water cisterns to support the gardens, while their presence reminds visitors of the building's industrial past. In this manner, the entire project shows that it is influenced by works of the past, returning us to our original problem statement.

Habitat 2007 demonstrates that new work is influenced by the works of the past in three ways: Firstly, the design is influenced by the existing building as an artefact in itself; secondly, through contextual readings of neighbouring works; and thirdly, through empirical knowledge from fields both within and extraneous to architecture. As an artefact in itself, the building is a silent account of a period in our nation's history that forces us to recognize the value of our industrial heritage; to see the potential possessed by the works of the past for future generations. By understanding the history of Silo No.5 and the phases of its formation, one reveals a story that inspires and informs the design process. It stems from a time when Canada was a world leader in grain production, industrial design, and maritime exportation, as only a powerful nation could produce such a massive monument, and it will require a powerful nation to extend its useful life. While the building once served as a storehouse that nourished millions of mouths, the design draws from the building's heroism to show that it has potential to sustain lives once again. The attitude of heroism is extended through the introduction of new ecological technologies that not only sustain the lives of its residents, but also the lives of plants, fish, and entire ecosystems, protecting natural waterways from further pollution. Through an understanding of the building's former operations, metaphorical relationships can be tied to the new design; where grain once flowed through the building in every direction, the design threads a story through flowing water, circulating from bottom to top, and back down again. Secondly, contextual readings from the works of the past that surround the building can the guide form and composition of new work. To reiterate, the living

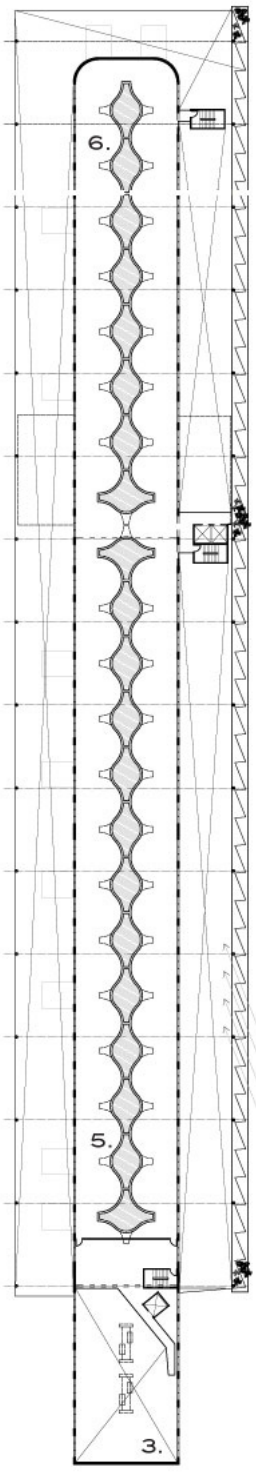

Fig. 17: Roof plan prepared for the Central Glass Competition by author, 2006. The interpretive centre is located at the base of the plan.

modules cantilevered from the concrete silos establish a discourse with the infamous articulations of Habitat'67, while there is a visual dialogue between the spidery exoskeleton and the marine towers nearby. These contextual relationships allow a building to integrate with its environment, but also allow it to express something of itself, having elements that enhance the building's industrial character or appendages that break-up its alienating mass to a more human scale, showing that it is inhabited. Finally, empirical knowledge proves to be the architect's greatest tool and most influential to new design. Without an knowledge of residential typologies as developed by architectural theorists and historians, or an understanding of air currents in a stack effect as studied by physicists through fluid dynamics, one could not predict that the design would function as expected. The past works from innumerable fields, and the knowledge they impart to our collective wisdom, empowers architects to implement new ideas and to have confidence in them, allowing our profession to progress in sync with emerging technologies, social demographics, and public opinion. These influential factors contribute to the strength of new work, and the architect that uses them to his or her advantage will find success.

Fig. 18: Conceptual rooftop sketch prepared for the 2006 Central Glass Competition.

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