

# Ecology based Humanism for Future Environmental Design

Tye S. Farrow / Farrow Partnership Architects

If embracing ecologically sound principles for design and the delivery of health care services share the common goal of improving our quality of life, then the importance of health care architecture has never been more vital. As key players in the theatre of our lives, hospitals can no longer afford to function as isolated facilities detached from the community; today a hospital should operate as a bio-diversified, ecological habitat promoting a strengthened relationship between nature and man-made environments with the ultimate intent of delivering a comprehensive supportive resource for everyone, beyond simply for healing the sick.

To enhance their meaning and relevance within the community they serve, and to minimize their "ecological footprint", hospitals must make their role as stewards for health and quality of life a first-order priority. To realize this goal, health care facilities must proactively embrace an *Ecology-based Humanist* paradigm of design and operations. For the purposes of this paper, Humanism sets as its focus the betterment of the healing process through the creation of positive health care environments. This is achieved through an awareness of the specific attitudes, cultural values and collective consciousness of the context in which the hospital resides, and is manifested through the use of materials and the design of spaces that reflect these values and indigenous attributes.

Additionally, this paper suggests that a means to foster sustainable design and ecological health from a holistic perspective, and one that is particularly relevant in the context of Canadian culture and geography is the utilization of rapidly renewable, local materials such as wood. As a renewable resource -and by default a sustainable building material- wood makes a significant contribution to the environment by reducing resource and energy use.

Two significant hospital projects each in different regional contexts are presented as case studies: The Credit Valley Hospital in Mississauga Ontario and the Thunder Bay Regional Health Sciences Centre. By examining the methods by which a similar Humanistic paradigm was employed, this paper sheds light on the benefits of embracing an ecological approach to design.

A common perception is that it is difficult to reconcile innovative wood designs with functionality and still realize quantitative results. The results indicate that when compared to a conventional steel structure, the cost of the wooden structures are often notably less while clearly providing superior aesthetic value along with providing a more positive environment for staff, patients and the community.

## **Introduction**

If embracing ecologically sound principles for design and the delivery of health care services share the common goal of improving our quality of life, then the importance of health care architecture has never been more vital. As key players in the theatre of our lives, hospitals can no longer afford to function as isolated facilities detached from the community; today a hospital should operate as a bio-diversified, ecological habitat promoting a strengthened relationship between nature and man-made environments with the ultimate intent of delivering a comprehensive supportive resource for everyone, beyond simply for healing the sick.

To enhance their meaning and relevance within the community they serve, and to minimize their "ecological footprint", hospitals must make their role as stewards for health and quality of life a first-order priority. To realize this goal, health care facilities must proactively embrace a Humanist paradigm of design and operations. For the purposes of this paper, Humanism sets as its focus the betterment of the healing process through the creation of positive health care environments. This is achieved through an awareness of the specific attitudes, cultural values and collective consciousness of the context in which the hospital resides, and is manifested through the use of materials and the design of spaces that reflect these values and indigenous attributes.

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## **Humanism and the Art of Ecologically Based Design**

Sustainable design is broadly accepted globally as the right thing to do. However, it has largely been co-opted by desires for quantitative returns such as LEED points or payback period. However, a more holistic approach to ecological design suggests that it is a canvas weaved from many threads (ecological and technological), each connected by the hands of many instead of a single measurable string as conceived by the isolated architect or engineer. Knowing that ecological design must thus be considered as part of a larger symbiotic process where appropriate responses to cultural identities are married with defensible engineering solutions, the weaving of the quantitative with the qualitative will result in a building or space that can be interpreted as a legitimate response to local place identity that is intrinsically linked to local geography, ecological gains, and historic cultural values.

The human connection between nature and healing is an intuitive and deeply spiritual link. Supporting this idea, a critical mass of related research supporting a methodology of regionally informed, ecological based architecture can be cited. Early references can be found in the work of German sociologist Ferdinand Tönnies wherein he identified *Gemeinschaft*, a process by which the character of a place yields both meaningful and functional associations and characteristics.<sup>1)</sup>

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1) Tönnies F., "Community and Society: *Gemeinschaft und Gesellschaft*", The Michigan State University Press. 1957

Harvard biologist E.O. Wilson posits in "The Biophilia Hypothesis" that it is impossible to detach from nature without also compromising human spiritual existence. In this seminal paper Wilson speaks of our deeper attachment to nature that extends well beyond the narrow technological demand for functional space to include a broader range of emotional spiritual and intellectual needs.<sup>2)</sup>

From a purely Canadian perspective, local architects Marco Polo and John McMinn also support this approach when they wrote, "the enduring presence of regionalism in Canadian architecture has been accompanied by, and is often linked to the development of sustainable green strategies. The two phenomena offer potential common ground for the pursuit of an architecture that addresses both local climatic and environmental conditions and cultural and material traditions.<sup>3)</sup> And furthering the joint eco-techno connection principle, Kenneth Frampton, in his 1983 essay "Towards a Critical Regionalism: Six Points for an Architecture of Resistance" also describes a regionalized style of architecture that dismisses a solely nostalgic approach in favour of responding with an architecture that is sensitive to the identity and language of local styles and design traditions.<sup>4)</sup>

With this in mind, and with the support of historical and contemporary peers, the broader question is not if we should embrace a more intuitive and ecological approach to sustainability and health, but instead by what means?

### **A Means to Ecology-based Humanism**

To achieve meaningful design in healthcare, one that responds to ecological principles, it is necessary that designers consider a proactive paradigm of Ecology-based Humanism. With a desire to heal the body, the mind and also the soul, Ecology-based Humanism speaks to the symbiotic relationship between the characteristics of context, the specific design of a healing space, and the overall psychological well-being of patients and staff. Fundamental to the process then is a belief that human values are of the utmost importance to the care of the sick. With this as at the core, Humanism bridges the gap between "the technology of science" and "the ecology of nature."

Each time we construct a building we impact the environment in some way. It is estimated that buildings use about 40% of our energy resources and contribute to global warming by releasing 35% of the total carbon dioxide emissions into the atmosphere.<sup>5)</sup> The key then is to minimize the ecological footprint of a building and positively contribute to the health of the whole, meaning community and patients alike.

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2) Wilson E.O., "The Biophilia Hypothesis", Shearwater, 1993

3) McMinn J. & Polo M., "41 to 66, Regional Responses to Sustainable Architecture in Canada", Cambridge Galleries, 2006, p.4

4) Frampton, K., "Towards a Critical Regionalism: Six Points for an Architecture of Resistance" in Hal Foster (ed.), *The Anti Aesthetic: Essays on Postmodern Culture*, Bay Press, 1983 (Referenced in: McMinn J. & Polo M., "41 to 66, Regional Responses to Sustainable Architecture in Canada", Cambridge Galleries, 2006)

5) Canadian Wood Council, "Green by Design", <http://www.cwc.ca>, 2006

While Ecology-based Humanism as a methodology for design serves to guide designers -and clients- in the search for a more relevant architecture, can these ideas move beyond the theoretical to deliver inspiring physical environments? The simple answer is yes. Humanism in healthcare can be achieved through a number of innovative and simple techniques at both the building and interiors level including:

- Creating internal light wells to bring natural light to internal spaces
- Provide verdant courtyards and animated water features, for patient and staff use
- Orient structures to maximize views to nature and aid in natural ventilation
- Provide photovoltaic panels to reduce energy demands
- Specify sustainable, locally harvested and renewable materials and finishes

The techniques to achieve a sustainable, ecologically sound design are vast and far too numerous to mention in detail. The common theme though is really that which we already know: a connection to nature makes us feel and heal better. Knowing this, the most salient means to foster sustainable design and ecological health from a holistic perspective, and one that is particularly relevant in the context of Canadian culture and geography is the utilization of rapidly renewable, local materials such as wood.

As a renewable resource -and by default a sustainable building material- wood makes a significant contribution to the environment by reducing resource and energy use.<sup>6)</sup> Structurally engineered systems such as glue-laminated trusses allow for larger clear spans requiring less material and with a long life-span replacement costs are potentially reduced. Energy costs should also be considered. Wood contains less embodied energy and produces less air and water pollution than the highly energy intensive manufacture of steel or concrete; is easy to fabricate; and provides far superior insulating value (R-value) than steel. Overall, a concrete building requires 1.7 times the energy of wood while steel requires 2.4 times the energy.<sup>7)</sup>

At the regional level the use of wood as a primary building material taps directly into the Canadian economic engine. Reflective of our economic association with the great northern forests that blanket the nation, wood has the power to drive and sustain local economies through a generational succession of woodworking trades, from logging to carpentry and millwork. It also has the power to generate tourism dollars as millions of visitors each year travel to northern Ontario to tour the great national parks. Additional justification for its use (and for its sustainable qualities) can also be found in the fact that building with wood is inherently a collective undertaking with collective returns at all levels including community, building and user. It is through this symbiotic relationship between community, building and user, that wood becomes even more attractive as a building resource, particularly in the healthcare setting where the mandate is universal health for everyone.

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6)Canadian Wood Council, "Green by Design", <http://www.cwc.ca>, 2006

7)Canadian Wood Council, "Green by Design", <http://www.cwc.ca>, 2006

Psychologically, wood is highly emotive and has the ability to foster a sense of community pride and place by connecting with our social and inner selves through communal images, feelings, meanings, and sentiment. Again, Polo and McMinn support the case for a broader measure of ecological design by writing, "to be truly sustainable, buildings need to remain relevant and functional to the community they serve. Energy efficient buildings that fail to address cultural needs and values may suffer premature obsolescence and invite major modifications or outright demolition or replacement.<sup>8)</sup>

### **Case Studies: Regional and Local Responses**

We have shown that ecology in design manifests itself at a variety of levels; at the regional level where a building's form, shape and design reflects the local economy or the geography of the region, and within the building itself where the choice of materials and intentional use of natural details improves the quality of the environment for its users and staff. As examples, two hospital projects are presented as case studies. While constructed in two vastly different contexts—one urban and the other rural- they share the common theme of Ecology-based Humanism in design.

The first case in point, the Thunder Bay Regional Health Sciences Centre in Thunder Bay Ontario can be described as the physical manifestation of the ecology of its context.<sup>9)</sup> Through its dramatic use of wood and natural light, the hospital makes a strong case for a regionally responsive, ecology-based solution rather than adopting the institutional model for health facilities.

Thunder Bay is a community of approximately 120,000 in Northwestern Ontario, on Lake Superior, close to the Manitoba border. Rich with the rugged vernacular of the Canadian north, Thunder Bay's history is deeply rooted in the pulp and paper industries and economically tied to the national railway that helped unify the country. The most responsive feature of the project is the means through which it reflects its unique geographical and social context and makes sensitive use of the indigenous natural features to advance the design.

Thunder Bay is the first hospital in the country to utilize wood as a primary structural element; a material with extremely limited applications in the provincial building codes. The project features a dramatic central concourse constructed primarily of wood members and trusses. Conceived as a path through a forest lined with trees, the dramatic three-storey wood and glass concourse curves to follow the path of the sun to allow deep penetration of light and enhance the comforting perception of the hospital. Additionally, the concourse—through its direct connection to the natural elements, once the lifeblood of the community—now doubles as a community centerpiece for gathering and social events.

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8) McMinn J. & Polo M., "41 to 66, Regional Responses to Sustainable Architecture in Canada", Cambridge Galleries, 2006, p.5

9) The Thunder Bay Regional Health Sciences Centre was designed by Salter Farrow Pilon Architects (Farrow Partnership Architects, Salter Pilon Architects successors) and completed in 2004. Tye Farrow of Farrow Partnership Architects was the Partner in Charge of Design for the project.

Beyond the physical construction of the concourse, the project also embraces ecology in design through a variety of natural interior finishes, details and in its landscape strategy. Running the length of the concourse is a highly emotive terrazzo floor that depicts seasonal changes. Embedded with symbols of ice, fish, leaves, and rocks, the seasonal concourse speaks directly to the human and global cycles of growth and rebirth. Wood is also used as a design feature in the main nursing stations and the radiation treatment rooms as it affords a warmer aesthetic and better reflects the history, culture, and economics of the north. It is also used throughout the hospital in its details including handrails and feature millwork.

Natural light also plays a key role in the design. Thunder Bay is the first cancer center in the Canada to incorporate direct light skylights within the radiation treatment rooms without compromising user safety while enhancing the therapeutic experience for patients. But, as much as do patients, hospital staff also require comfortable environments and a connection to nature. It is for this reason that the main nursing stations are oriented with direct views outside through three-storey mini-atriums in each of the inpatient areas.

The landscape design also takes its cues from the ecology of the region and is representative of the fractured, incision-like geometries created from the shear glacial forces. With an eye towards creating a more sustainable ecological environment, a series of connected bogs and wetlands divert storm water runoff and cleanse the water before returning it to the adjacent Mackentire River. The system also serves as a fish breeding area for cold-water species.

To date, the project has also been awarded some of the highest awards in Canadian architecture, having received the 2005 Ontario Association of Architects (OAA) Award of Excellence and the 2005 Royal Architectural Institute of Canada (RAIC) Gold Medal for Innovation in Architecture

The second case presented is the Peel Regional Cancer Centre and Ambulatory Care Centre at the Credit Valley Hospital in Mississauga.<sup>10)</sup> The hospital was under pressure to grow from several related fronts including profound regional growth and the increased demand for patient beds. These forces have taxed their facilities beyond capacity and required immediate action. Programmatically, the 386-bed, 320,000 square foot Ambulatory Care and Cancer Care facility includes Complex Continuing Care, Peel Regional Cancer Centre, Rehabilitation, Maternal Child Care, Laboratory Services, and Emergency Room Renovations along with extensive renovations to adjacent departments over three phases.

The central wooden atrium is another strong example of the benefits of utilizing wood in the health care setting. Here, the main lobby -or living room- is punctuated by a dynamic canopy of curving manufactured wooden beams. Conceived as trees in a forest, the vision for the lobby is that of a "village

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10)The Carlo Fidani Peel Regional Cancer Centre at Credit Valley Hospital was designed by Farrow Partnership Architects. Completed in 2005, it is the province's first fully integrated Ambulatory Care and Cancer Care facility. Tye Farrow of Farrow Partnership Architects was the Partner in Charge of Design for the project.

gathering place" linking the new Cancer Centre and the adjacent existing renovated spaces. As the structure gently bends like the branches of a tree, the sensation of an outdoor treed patio is created thus keeping patient's minds off why they are there. Flooded with light and softened by the warmth of the wood, the lobby is designed to become a congregational point for patients, staff and the community at large. Beyond the obvious aesthetics, the main lobby also serves as a functional hub from which front-of-house circulation routes and public programmes radiate.

Again aware of the benefits of natural light, the roof incorporates large triangular glazed sections at the structure's cleaves. Also, a series of smaller two-storey light wells, constructed in a similar fashion of laminated beams and glazing, permit direct natural light to penetrate deep into the main nursing stations in the Cancer Treatment waiting areas on the lower floors.

The atrium structure also makes a positive contribution to the environment through an eco friendly system of fire suppression. As wood is a combustible material, its structural use is limited. To achieve compliance ratings and illustrate that wood is an acceptable design and performance equivalent to steel, a unique fogging, or mist-system was specified. This was necessary as conventional sprinklers could not adequately protect the large amount of shielded surface on the curving beams. Approval was granted only after a full-scale mock-up of one of the trees was successfully fire tested by the National Research Council in Ottawa.

The mist heads are concealed in custom designed light standards at the base of each tree, and together with infrared detection technology, the mist successfully reduces the flame-spread and temperature ratings to within acceptable limits. Furthermore, the mist system offers an environmentally responsible alternative to ozone depleting chemical agents including Halon 1031 banned by the 1992 Montreal Protocol, and FM2000, a proven contributor to global warming.

From an urban design perspective, the new facility makes a contribution to improving the quality of life in the community/region by maximizing the usable site area, by minimizing impacts to existing landscaped areas, and by establishing a strong site planning and design framework to accommodate growth. Emphasis has been placed on the creation of a unique identity for the Hospital as the dramatic architectural and social centerpiece provides physical and visual civic linkages; creates design themes for entrances/gateways, arrival plazas, drop-off areas, landscape courtyards and healing and therapeutic gardens.

### **Proven Results**

A common perception is that it is difficult to reconcile innovative wood designs with functionality and still realize quantitative results. This is simply not true. When compared to a conventional steel structure, the cost of the wood concourse at Thunder Bay was notably less while clearly providing superior aesthetic value. And at only 1½% of total building area, the concourse provides daily functional, programmed space for 95% of the users. At Credit Valley,

again when compared to conventional steel, the cost of the wood structure was notably less while clearly providing superior aesthetic value. The project was also tendered under budget despite the complexity of the wood.

It is a proven fact that the physical environment of a hospital has a significant effect on the healing process. Again, our connection to nature through wood is so deeply cosmological that the priority must be to naturalize our healing spaces as much as possible. By doing this, we can create opportunities that foster positive social interaction and contribute to our mental and physical well-being which in turn will increase patient wellness during extended stays and reduce recovery times. Ecology-based Humanism also provides for the needs of staff and the organization by increasing user moral and pride and also decreasing absenteeism. At Thunder Bay, the organization was able to attract the best and brightest likeminded individuals and realize a staff new-hire waiting list; an unprecedented fact for a remote northern facility.

## **Conclusion**

When adopting ecological and green design principles, we must embrace at all levels the duty of stewardship bestowed upon us as designers if we are to create a cohesive system of wellness for the environment and the people who inhabit its spaces. Knowing that the advantages of using wood are numerous and well evidenced in built works, embracing it, particularly as a structural material in an institutional healthcare facility, is indeed an uphill charge that requires designers, clients and municipalities alike to dissolve their standard approaches and adopt new methodologies. Yet, when placed in the context of Wilson's Biophilia Hypothesis or demonstrated in the two projects outlined here, the validation of wood and its benefits to the community, the environment and to patients become self-evident.

It has become clear that the physical environment of a hospital has a significant effect on the healing process. Understanding this, the projects reviewed here both reach for a higher mantle by contributing to the mental, physical and spiritual growth of both the individual and the community they serve. And by further exploring the physical, spiritual and environmental connections between healing and the natural environment, these projects emphasize the creation of places critical moments and humanistic vignettes that move beyond simple efficiency to become places of spatial richness and cadence where people feel cared. And it is in these places, where the realms of public and private, of enclosure and exposure, of indoors and outdoors overlap, that opportunities to generate different activities and emotions for both the patients and staff are created.