Slow Architecture;
An Environmental Design Approach to Community Health

by

Rachel Elizabeth Hart

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Carleton University
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Abstract

Individuals spend excessively in an attempt to make themselves healthier, only for the purpose of extending their lives in the detrimental environments they have created. One day a time will come in which no amount of personal or collective wealth will allow us to continue our consumption at the rate we are exhibiting now. To ensure the future health of our society, changes must be made on an individual and collective scale which serve to contribute to the amelioration of environmental and communal health. Through design which incorporates ecologically mindful remediation processes and sustainable urban redevelopment in our existing environments, we can begin to make the changes necessary for health on an individual, community, and environmental scale. To achieve health along these three scales of impact we must first concern ourselves with the state of our environment; healthier environments lead to healthier and happier individuals. Providing community focused spaces that educate the public on the incorporation of sustainable technologies into our existing industries will enable a future which will be marked by positive environmental change, stronger communities, and a healthier population.

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Now Main Street's whitewashed windows and vacant stores
Seems like there ain't nobody wants to come down here no more
They're closing down the textile mill across the railroad tracks
Foreman says these jobs are going boys and they ain't coming back to your hometown
Your hometown
Your hometown
Your hometown

- Bruce Springsteen 'My Hometown' (1984)

Figure 1: Former GM Assembly Plant

Thesis Statement

Through the adaptive reuse and natural re-mediation of a former industrial site in Windsor, Ontario, this project will outline a Brownfield Remediation Strategy for the post industrial city which serves to ameliorate the conditions of health across the individual, communal, and global scale.

Introduction

The impact of human civilization on the planet is marked by phenomenal advances in technology and social progress. As we have advanced and embraced discoveries and processes which have helped to make our lives longer, healthier, and more prosperous, we have neglected certain aspects of the natural environment which we are dependent on for survival. In an ironic and selfish manner, we continue the attempt to ameliorate our lives at the cost of reducing the health and livelihood of future generations. Through this process, we are damaging the environments which contribute to our long-term survival. To ensure the success and health of our current and future society, changes must be made to create healthier environments. These changes must begin at the community level through the incorporation of renewable energy processes in a highly visible, educational, and enriching manner. By investing in these technologies and focusing on environmentally responsible urban redevelopment practices, we can provide a platform to educate the individual on their potential inclusion into everyday life. Through this we can make the necessary changes required for positive environmental change, and healthier populations.

The long term objective for the project will consist of the re-mediation of several under utilized and contaminated parcels of land surrounding the derelict Walker Power Building, located within the City of Windsor's heritage precinct of Walkerville. Through the progression of time and community engagement, the land will be shaped and regenerated using the ecologically beneficial re-mediation practice of phytoremediation. The culmination of the long term redevelopment of the site will result in a community centre and health park which addresses the amelioration of health on an individual, community, and global scale. Throughout the immediate redevelopment period of the Walker Power Building, short term uses and long term planning will be applied in a way that benefits local communities and the local ecology. The long term approach to the natural regeneration of a former industrial site not only provides

a cost effective alternative to conventional brownfield re-mediation practices, but will allow for the continued public use of land on the site. Through the application of ecologically and socially enriching re-mediation practices, this project is designed to create a multi-layered approach to ameliorating the urban condition of the surrounding environments, strengthening both local ecology and community.

The overall success of the proposed redevelopment of the Walker Power Building and site will be measured by the positive health impacts it produces on the individual, communal, and ecological scale. These three environments are all interconnected; in order to address any one scale of impact we must look at the status of the other two. Healthy individuals do not remain so in an unhealthy environment, and an unhealthy community will not produce healthy individuals. For this reason we must address all three scales of health when we want to make a meaningful and sustainable impact in our individual or collective lives.

Though all scales of impact are equally important when conceptualizing the project, a starting point and sense of direction must be identified. Commencing with the stabilization and regeneration of local ecology and environmental conditions, that is to say the physical ecology and environmental conditions of the site, we can begin the regeneration and strengthening process of not only the physical site but the surrounding communities.

Figure 2: Walker Power Building

Chapter 1: Addressing Health Across Three Scales

Health of the Environment

To ameliorate health on an environmental scale, the adoption of ecologically beneficial re-mediation practices and the application of closed loop resource consumption should be considered. Architecture must also encompass the design of spaces which provide enrichment to the occupant; this is accomplished through the balance of designing for humanity and habitat. Designing for these two factors includes the consideration of human habitat as well as habitat for non-human organisms; ‘poorly designed industrial systems and buildings greatly contribute to environmental and social degradation.’¹ In this, the health of the community, health of the individual, and global health are at stake; we cannot address one scale of impact without the consideration of the others. By adopting an ecologically responsible attitude towards resource consumption, urban redevelopment, and designing with consideration to the entire life cycle of a building, we can reduce the negative global health impacts our cities have on the environment.

Through a ‘cradle to cradle’ approach to managing resources, we can attempt to manage energy and materials in a sustainable way.² In part, this involves the reuse of materials in a way that once they have reached the end of their life cycle they can be reclaimed/recycled and used as input for another process. Alternatively, materials which can biodegrade safely and provide nutrients for natural processes are a part of this closed loop system.³ Renewable energy use such as solar and wind power compliment the closed loop systems, as their use is an integral part of conserving our non-renewable resources. These systems and closed loop resource management should be standard practice when undertaking any form of development, as their implementation contributes greatly to ameliorating the overall health of the surrounding ecology.

By adopting sustainable redevelopment practices that incorporate renewable and closed loop systems in a highly visible and stimulating way, occupants can experience the positive effects of these systems through immersion. Incorporating these systems in a manner which renders their impacts on health

1. Nathan Stegall, “Designing for Sustainability: A Philosophy for Ecologically Intentional Design” *Massachusetts Institute of Technology Design Issues*. Vol 22, No 2, Spring 2006.p.56

2. William McDonough, Michael Brungart “Cradle to Cradle: Remaking the Way we Make Things” *New York: North Point Press*, 2002

3. Ibid.

more palpable will encourage their use at both the community and domestic level. Through the design of enriching spaces which demonstrate the benefits of sustainable consumption and renewable energy systems, architecture can actively participate in a process which fosters health on the individual, communal, and environmental scale.

Health of the Community

To ameliorate health on a communal scale we must look at how the adoption of sustainable urban renewal practices can benefit the existing urban fabric of the city. For an industrial city such as Windsor, Ontario, many regions of the city will require costly re-mediation work in order to be redeveloped. Brownfield reclamation and urban renewal policies focused on adaptive reuse of built heritage will be a worthwhile effort and investment in the long term city building plan for Windsor. Through the reuse of the built environment and preservation of a city's built heritage sectors such as tourism and recreation can flourish; historic buildings are an indicator of a city's identity and culture, ingredients sought after when cities need to get exposure and demonstrate why they are worth visiting or relocating business to.⁴ The respect for the history of the urban fabric is also an important indicator of health at the community level; healthy communities are those which have access to environments which promote civic intercourse, and provide community strengthening public spaces. By approaching urban infill and redevelopment projects in a historically sensitive and community focused manner, the city of Windsor will actively work towards creating environments which will provide for the social needs of its occupants.

In addition to strengthening civic discourse and community health, brownfield restoration has a beneficial effect on the local economy. If left ignored, areas of urban blight expand and surrounding property values depreciate. The 'domino effect' that brownfield sites can have in the spread of urban decay further drives down adjacent property values and can result in entire neighbourhoods that become neglected. This causes serious problems from a public health and safety standpoint, while reducing the quality of life and access to services for residents of the decaying neighbourhoods. By 'focusing on the redevelopment of brownfield sites, planners can invest in long term infill projects that will increase surrounding property value.'⁵ This can lead to significant increases in property tax revenue and economic growth. Brownfield redevelopment,

4. Mattias Legnér. "Redevelopment Through Rehabilitation: The Role of Historic Preservation in Revitalizing Deindustrialized Cities" *Institute for Policy Studies Johns Hopkins University*. April 2007.p.9

5. City of Windsor Brownfield Redevelopment Strategy and Community Improvement Plan. *City of Windsor*, RCI Consulting. 2010.p.7

especially projects which seek the preservation and restoration of the built heritage of a city, provide a cultural connection and historical anchor for local residents while contributing to the strengthening of regional economic and community health.

Health of the Individual

At the individual level, a priority must be placed on incorporating sustainable living practices into everyday life. This can be done through education on the beneficial properties of natural ecological systems and how they can contribute to our overall health. Through immersive education and understanding the restorative properties of natural environments, people develop an appreciation for how nature and natural systems can enrich their lives.⁶ This leads to a respect for nature and desire to conserve these systems. By immersing the individual in the enriching conditions achievable by natural environments, we can promote ecological literacy and environmentally conscious change.

The incorporation of natural environments and systems in the built world has been proven to improve mental state, reduce stress, and reduce mental fatigue.⁷ Mental fatigue is caused by the everyday stressors and stimulus that we experience in our daily activities. Stress originating from mental fatigue has a profound effect on an individual's mental state and can lead to reduced tolerance, increased anxiety, increased frustration and reduced mental health. Providing spaces which have a 'strong connection to nature and natural processes can have a restorative effect on the mind and body, facilitating recovery from mental fatigue.'⁸ These ecologically minded spaces also serve an important role by providing the occupant with a place for *thinking*. Spaces which are 'devoid of specific function and devoted to thinking are inspirational and allow creativity and the search for wonder and happiness to take place.'⁹ These spaces mitigate frustration and foster self-reflection.

6. Nathan Stegall, "Designing for Sustainability: A Philosophy for Ecologically Intentional Design" *Massachusetts Institute of Technology Design Issues*. Vol 22, No 2, Spring 2006.p.60

7. Stephen Kaplan. "The Restorative Environment: Nature and Human Experience" in *The Role of Horticulture in Human Well Being and Social Development*. ed. D. Relf. (Portland, OR: Timber Press 1992), p.137

8. Ibid. p.138

9. Marco Frascari. "De Beata Architectura, Places for Thinking", Lincoln, June 2010.p.3

Figure 3: Health Across Three Scales

Chapter 2: Site Study and Proposed Redevelopment

Walkerville and the Walker Power Building

The Walker Power Building is a former industrial building constructed in 1911-13 for the Hiram Walker Distillery. Located along the Detroit River in the historic east neighbourhood of Walkerville, this building has served many light industrial and commercial uses. The four storey structure is currently on the city of Windsor's listed heritage, and brownfield redevelopment priority list.

Hiram Walker, American entrepreneur and founder of the Hiram Walker and Sons Ltd. distillery, established the town of Walkerville in 1858.¹⁰ The town, meant to serve as a model town for the workers and families of the distillery, was located to the east of the City of Windsor. The town and distillery quickly grew over the following decade and a railway was built to ship goods from South Essex (a neighbouring county) to the distillery. This rail road, The Lake Erie, Essex, and Detroit Railroad, brought goods in from the agriculturally rich farmlands surrounding Walkerville and terminated at the distillery, where there was a connecting ferry terminal for the shipment of goods across the river to Detroit.

In 1911 the Walker Power Building was constructed to serve as office space, storage space, and for industrial purposes associated with the distillery. Located next to the Walkerville train station, the Walker Power Building also once served as temporary storage and accommodations for incoming rail road crews. During the 1920s, as the automotive manufacturing industry rapidly grew in the City of Windsor; a larger and more centralized train station was built further inland of the Detroit River. By the 1940s, the Walker Power Building was used primarily as storage for the distillery.¹¹

Over the following decades the building was sold by the distillery and purchased for use as commercial and office space. Most recently, the Walker Power Building had been home to the Windsor Printmakers Forum (WPF). The WPF is a collection of local artists and craftsmen who had been using the space as an open artists studio. In 2005 the Walker Power Building was found to be in violation of numerous fire code regulations; tenants were promptly evicted and the Walker Power Building has remained vacant since this time. Currently,

10. 'Walkerville Ontario' City of Windsor Heritage Planning Department. Prepared for the Windsor Architectural Conservation Advisory Committee. 1997.p.2

11. Ibid.p.10

the township of Walkerville is working with municipal planners to develop a strategy for the acquisition of the Walker Power Building. The building is listed for sale in 2012, at the price of \$750,000CAD.¹² The City of Windsor and township of Walkerville would like to preserve the industrial aesthetic of the building due to the building's heritage listing and profound regional connection to community.

The Walker Power Building is located on a privately owned 0.7ac lot. The 1.5ac vacant lot directly south of the building is privately owned and also for sale. Two 0.8ac city owned lots are located to the west and south-west of the Walker Power Building. The land directly north of the building, parallel to Riverside Drive East, was formerly occupied by the rail line. The former rail corridor, which led to the now demolished ferry terminal, has been removed. The land is currently owned by the city. The City of Windsor VIA Rail station is located one kilometre south-west of the Walker Power Building.

12. Windsor Ontario News 'Funky Walker Power Building Still Very Much for Sale'. Dec 2013. <http://www.windsorontarionews.com/windsor-ontario-news-real-estate-walker-power.html>. Accessed October 2015

Figure 4: Walker Power Building - Existing Conditions

Figure 5: Walker Power Building Timeline

Figure 6: Site and Surrounding Infrastructure

Figure 7: Walker Power Building, 1975

Figure 8: Walker Power Building - Exterior

Chapter 3: Healing The Post Industrial City

City of Windsor Brownfield Re-mediation

All lots on the Walker power Building site are identified as brownfields by the City of Windsor, and contain an unknown degree of contamination from their former industrial usage¹³. As of 2015 no formal environmental assessment has been done on any of the properties. A structural assessment had been performed on the Walker Power Building in 2011 and ‘the building was found to be structurally sound.’¹⁴ In 2010 the City of Windsor ‘identified a total of 137 brownfield properties for its Redevelopment Opportunities Inventory (ROI). These properties represent a combined area of over 559 acres’¹⁵ A significant number of these sites consist of land formerly used by the city’s increasingly weakening automotive manufacturing sector.

13. City of Windsor Residential Intensification Analysis. *City of Windsor Official Plan Review*. Planning Department, City of Windsor. September 2008.p.15.

14. Funky Walker Power Building Still Very Much for Sale. Dec 2013. <http://www.windsorontarionews.com/windsor-ontario-news-real-estate-walker-power.html>

15. City of Windsor Brownfield Redevelopment Strategy and Community Improvement Plan. *City of Windsor*, RCI Consulting. 2010.p.6.

Figure 9: City of Windsor Potential Redevelopment Opportunities

In 2005 the City of Windsor prepared a *Brownfields Discussion Paper* which recommended the development of a Community Improvement Plan (CIP) to promote the re-mediation and redevelopment of the large number of brownfield lands.¹⁶ Resulting from these suggestions, the *City of Windsor Brownfield Redevelopment Community Improvement Plan* was published “to promote the remediation, rehabilitation, adaptive re-use and redevelopment of brownfield sites throughout the City of Windsor in a fiscally responsible and sustainable manner over the long term.”¹⁷

Figure 10: Windsor's Urban Built Area

Additional goals for the redevelopment of Windsor's brownfield properties include*;

- Improvement of environmental health and public safety
- Redevelopment that is consistent with sustainable growth policies such as the construction of buildings that meet Leadership in Energy and Environmental Design (LEED) standards
- Increased opportunities for new housing, commercial spaces, and employment
- The reduction of urban sprawl and its related costs
- Increasing community awareness of the economic, environmental and social benefits of brownfield development

*City of Windsor Brownfield Redevelopment Strategy and Community Improvement Plan. *City of Windsor*, RCI Consulting, 2010, p.10.

16. Ibid.p10.

17. Ibid.p10.

Redevelopment approaches must have a large scale of impact; not only to guide municipal planners and policy makers in the redevelopment of a city's brownfields, but to provide suggestions as to how the greater community can become involved in a city's brownfield redevelopment efforts. This approach furthers the strengthening of citizens' sense of belonging and collective pride of place.

The Walker Power Building is located in an 'up and coming' neighbourhood which has increasingly been recognized for its vibrant art scene. Home to many historic Victorian era residences, cultural landmarks, and festivals, Walkerville is becoming an increasingly popular neighbourhood for young working professionals and young families. As the township's population is growing, and much of the city's unused manufacturing infrastructure and brownfield sites are located in the region, the area of Walkerville has been identified as a key region for brownfield re-mediation.

Sustainable urban development must take into consideration the need for complete neighbourhoods; those that provide its residents with commercial, employment, residential, and transportation access. A development approach which favours adaptive reuse and infill construction can assist in achieving these goals; for Walkerville, the adaptive reuse of buildings such as the Walker Power Building will assist in the preservation of built heritage while allowing for connection and integration with the pre-existing infrastructure and transportation networks. The consideration of mixed use projects can provide employment and access to additional services for the surrounding neighbourhood, strengthening the local economy.

As Windsor shifts from a heavy manufacturing economy to a light and advanced manufacturing and personal services based economy, the population and subsequent demand for expansion of public services has been increasing.¹⁸ Based on these trends the city of Windsor has placed an emphasis on the redevelopment of brownfield sites, particularly those which are centrally located in areas formerly occupied by light industry.

The *City of Windsor Residential Intensification Analysis* of 2008 has identified the Walker Power Building as a property of interest for future development.¹⁹

18. City of Windsor Residential Intensification Analysis. *City of Windsor Official Plan Review*. Planning Department, City of Windsor. September 2008.p.8.

19. Ibid.p.15.

Based on existing structural data and the central location of the building, a mixed use development consisting of green space, commercial, and residential program should be considered. Though structurally the Walker Power Building has excellent adaptive reuse potential, the site has historically been used for industrial purposes. The adjacent Peabody Building (demolished 1985) had also previously been used in light industrial operations; although no formal environmental assessment has been done on either site, it is expected to be polluted with both heavy metal and petroleum based contaminants.

Figure 11: Network of Healing

The rail system in Windsor had historically been developed to accommodate the transportation of goods from these industrial sites. Since the collapse of the automotive manufacturing sector, many of the lines that once transported goods across the city now sit idle.

In the post-industrial city, these routes will serve new lives. Conversion of the City's brownfield sites into public spaces and institutions, the redevelopment of idle lines into light rail, and the establishment of a green corridor would provide transit infrastructure and a recreational network for the citizens of Windsor.

Network of Healing

The approach taken towards the redevelopment of the Walker Power Building will serve as a model for the re-mediation of Windsor's brownfield sites, furthering the environmental, social, and economic goals required for the creation of complete neighbourhoods. Rather than an isolated design, the approach and concept for the Walker Power Building will establish the site as the first node in a network of the hundreds of brownfield redevelopment projects which will take place in Windsor and the surrounding region.

As the industrial manufacturing rise and fall of Windsor, Ontario has been played out in many regions of the province, this approach to brownfield remediation has far greater applications than it's immediate context. The realities of our current global economy have left many former industrial regions with a surplus of industrial infrastructure. Many of these sites contain unique and viable structural components which lend themselves well for adaptive reuse. Most importantly, these sites often have a far reaching history and connection with the people who lived and worked in proximity to them. For some, the mills and assembly plants which now sit crumbling and rusted represent more than a place of past employment; they are the opportunities which allowed for the worker to buy a home, raise a family, and build a stronger community. For this reason any intervention or redevelopment of the site must respect the industrial nature and history of the structure.

As we approach the redevelopment of the Walker Power Building we are presented with a unique opportunity to preserve and celebrate the industrial past of an iconic heritage building and community landmark. Though the building is unique in its own right, there are many sites in Windsor which are equally as beautiful and significant to their communities. A design approach which celebrates their structural uniqueness while introducing community focused programming and services provides for community strengthening public spaces while providing visitors with a visual link to the region's history. The Walker Power Building provides the township of Walkerville with this design opportunity, lending itself to become the first implementation and flagship design for a brownfield redevelopment strategy for Windsor, the region, and the post- industrial city.

Figure 12: South Façade

Chapter 4: Redevelopment of the Walker Power Building

Reading the Landscape

Every landscape contains a narrative. To ‘read’ the landscape is an exercise in dissecting the social, geological, and historical layers that form it. These layers are not always apparent, and ‘no two individuals may *see* the landscape in the same way; we see the land as a system of organic processes, as a source of wealth, as habitat, as a problem needing correcting.’²⁰ As we gain much understanding of a place through experiencing the site and surrounding spaces, the ability of the landscape to convey a narrative can become a useful tool in reconnecting the visitor to past histories of a site.

What aspects of the landscape do we preserve? What past histories do we isolate or choose to focus the visitor’s attention on? The way we treat built history and the context in which it is situated reflects the narrative we wish to convey. For a city such as Windsor, the infrastructure remaining in brownfield sites can have multiple interpretations; for some, it is a reminder of the industrial past and economic prosperity of the manufacturing sector. For others, it is a bleak reminder of the current economic situation and uncertain future of the city’s industrial sector. The way we treat these sites and the extent to which we intervene in their original architecture speaks to our acknowledgement of the influences on the site.

The design approach to the Walker Power Building will be one which acknowledges the rich materiality of the building while engaging in interventions that allow for flexible community focused programming. The Walker Power Building’s original brick facade and uniform punched windows are a unique characteristic amongst Windsor’s remaining early 20th century industrial buildings. This materiality and building typology should be respected and incorporated into the language of future interventions on the site. When available, material which is true to the past uses and history of the site can and should be used, such as the re-purposing of the former rail line’s wooden ties in the construction of pavilions or enclosures. Through respect of the original material typology of the landscape we can celebrate the rich industrialist history of the site while providing program attune to the current needs of the community.

20. D. W. Meinig, “The Beholding Eye: Ten Versions of the Same Scene,” *The Interpretation of Ordinary Landscapes* (New York: Oxford University Press, 1979), p. 34.

Adaptive Reuse Strategy for the WPB

The redevelopment of the Walker Power Building will not follow conventional brownfield remediation practices; instead of intensive soil removal and disposal practices, the healing of the site will incorporate slower, ecologically mindful methods which take place over an extended period of time. This allows for a greater level of community interaction and engagement with the site throughout its redevelopment. The slow process of healing and high degree of visibility and interaction with the Walker Power Building will allow visitors to acquire a greater understanding of the ecological impacts that result from human intervention with the land. Adopting an ecologically mindful and gradual approach to soil regeneration provides an opportunity for the site and community to grow in parallel.

Throughout the process of healing of the site, the surrounding community of Walkerville and greater Windsor area will be encouraged to observe and engage in the regenerative process of the Walker Power Building. Through immersive and interactive education the community will better understand the beneficial properties that natural ecological systems can have on healing environmental conditions and strengthening community relationships. The remediation of the land will mark an important milestone in the project's development and will coincide with the City of Windsor's future expected community/recreational needs and policy towards brownfield redevelopment.

Figure 13: *Linaria vulgaris*

The City of Windsor's economy is slowly recovering from the economic collapse of the automotive manufacturing sector and shifting towards new economic drivers; a community engaging, environmentally sensitive, and cost effective approach to redevelopment will allow for the project to cope with the economic realities of the city while providing the surrounding community with short term uses on the site. By providing the region with ecologically enriching environments and recreation opportunities we can maintaining the public's interest and engagement in the re-mediation and redevelopment of the Walker Power Building.

Long term planning and program for the site is designed to be flexible and dictated by community need. The culmination of both short term use patterns and long term planning efforts will ultimately result in a development which provides recreational, community focused programming, and commercial opportunities for the township of Walkerville and surrounding region.

Phytoremediation

Conventional brownfield re-mediation practices often involve the removal of contaminated soil. This soil is 'excavated and transported to designated waste diversion sites where, depending on the level and type of contaminants, it is either contained or used as cover for other waste products.'²¹ Very rarely does the soil go through a recycling process at the designated disposal site and the contamination issue is thus unresolved. The newly excavated development is then left with a need for clean fill, further exacerbating the environmental and economic costs associated with brownfield re-mediation. Excavation, abatement, and transportation costs associated with these contaminated sites are major deterrents for development.

In the case of land which has formerly been used for industrial purposes, the level and complexity of contaminants can be high. The re-mediation of older buildings which have seen industrial use can be even more complex; with little to no regulation regarding hazardous substances or their proper disposal during their time of operation, many older buildings which would otherwise make excellent development prospects have been overlooked due to costly re-mediation requirements for development. These added complications causes the land value of the former industrial site to remain low; even at a fraction of

21. Dianne Saxe, Jackie Campbell. *Ontario's Soil Management Policy*. Saxe Law Office. Ontario Bar Association's Institute 2013. February 2013.

the cost of surrounding non-contaminated land, the health risk and unknown degree of contamination often acts as a deterrent for development.

Due to the increasing costs associated with contaminated soil removal and technological advancements in on-site soil re-mediation, bio-remediation processes have been gaining popularity. One such approach involves the use of phytoremediation to naturally cleanse the soil. Phytoremediation is the ‘process whereby plants are used to take up organic or inorganic contaminants from the soil and metabolize them in their root systems and tissue’²² This low impact and natural ecological process can ‘provide a cost-effective and attractive alternative to contemporary brownfield soil treatment, reducing soil re-mediation costs by up to ninety percent.’²³ The major disadvantage to this form of bioremediation is the duration of time needed to fully cleanse the soil. Depending on the type of contaminant and depth of pollution, the phytoremediation process can take years and even decades to fully remove contaminants from the site.

Suggested Plant Types

There are a variety of different plants that can be used in the phytoremediation process and certain types of vegetation are better suited at removing specific contaminants than others. A sample of the more resilient and popular varieties of plants include:*

Mustards: used in the removal of heavy metals

Legumes: used in the removal of PAHs, PCBs, PCTs and Petroleum based pollutants

Cottonwoods: used in the removal of Dioxins

Willows: used in the removal of PCBs and PCTs

Grasses: (barley, wildrye, fescus): used in the removal of metals, petroleum, PAHs, PCBs and PCTs

*Data obtained from *Phytoremediation Soil Treatability Study*. California Polytechnic State University Department of Civil and Environmental Engineering. 2013.p.5

Willow

Grasses

Field Mustard

Clover

22. Slegers, Frank “Landscape Frameworks for the Revitalization of Urban Neighbourhoods in the Context of Phytoremediation” from *Phytoremediation; Management of Environmental Contamination* Vol.1 Springer Publishing; 2015 edition.p.57

23. Ibid.p.57.

Phytoremediation can be classified into five different categories; all methods involve the removal of contaminants by plant matter, but the methods of metabolism of the plant vary. In some instances ‘the vegetation absorbs contaminants in the soil and breaks them down in the root structure. In some instances the vegetation absorbs the contaminants, processes them, and releases them into the atmosphere at a comparatively low concentration.’²⁴ In many instances the phytoremediation process can be accelerated by the harvesting of the plant matter and re-planting. This can provide an opportunity for community engagement and education into the progressive restoration of natural ecosystems in an urban setting.

Applications for the Walker Power Building

The gradual redevelopment of the Walker Power Building presents an excellent opportunity for the use of phytoremediation as the primary soil re-mediation technique. As the redevelopment will take place over an extended period of time, the longer time frame required for the bio-remediation processes can be achieved. This highly visible system has the advantage of acting as an

24. Ibid.p58.

Figure 14: Phytoremediation Processes

Phyto degradation

Plants absorb toxins and break them down through their metabolic process. Pollutants are incorporated into the plant or broken down in the soil

Phyto volatilization

Plant tissue absorbs contaminants and releases it into the atmosphere. Pollutants are released at a comparatively low concentration

Phyto stabilization

Plant roots immobilize contaminants by absorbing them and releasing a chemical which degrades the toxicity

Phyto extraction

Plants absorb contaminants through their root structures. The toxins accumulate in the leaves and stem; the plant is harvested and treated as special waste

interactive and educational opportunity to demonstrate to the community the restorative power of natural environmental systems while providing habitat for local ecology. The long time frame needed to sustainably restore natural environments will act as a testament to the fragility, but also strength of our natural environment, encouraging the community to preserve natural habitats and adopt a conservation mindset in their own day to day lives.

Shaping of Landforms

The terrain of the Walker Power Building will be dictated by the deposition of earth during the phytoremediation process. As the degree of contamination is not formally known, the amount of earth that is to be removed/remediated is speculation. What is certain is that the majority of the site will be subject to brownfield remediation. Conventional soil abatement methods merely displace contaminated soil rather than remove toxins and do not reflect the true amount of time or energy required to heal the soil; For this reason, all contaminated earth for the Walker Power Building redevelopment will be treated on site.

As phytoremediation is a gradual process, the land on the site will be healed in sections. Throughout the initial population of the site, contaminated land that is displaced by the construction of paths and installations will be moved to other areas of the site, creating landforms which reflect the magnitude of earth that is typically sent to a landfill during brownfield remediation processes. This changing landscape provides visitors with a better understanding of the immediate impact that pollutants have on the earth and the prolonged process of healing required to rectify them.

Figure 15: Abandoned Rail Spur

Figure 16: Shaping of the Landforms

Landforms on the Walker Power Building site will be created by the displacement and gradual bio-remediation of soil. This active ecological process offers visitors a visual understanding of the scale of impact that conventional soil remediation practices has on our landfills and environments while educating visitors about ecologically mindful remediation alternatives.

Figure 17: Building of Terrain

Greenhouses; Community Engagement

The use of phytoremediation in the Walker Power Building redevelopment provides an excellent opportunity for public engagement and the spreading of ecological literacy. For the most efficient application of phytoremediation on site, plants should have an ‘established root system and must be mature enough to remain viable in an outdoor setting subject to shifts in temperature and precipitation.’²⁵ For this reason, the plants which are used in the phytoremediation process on the Walker Power Building site would benefit from a primary growing period which sees the seeds started in greenhouses. Once viable, the seedlings will be transplanted to the site.

The Walker Power Building, as well as many of Windsor’s brownfield sites, has an abundance of space available for the establishment of portable greenhouse units. These units will be constructed of re-purposed materials and are designed and installed in a way that allows them to become either a permanent component of the site, or a temporary installation. The units will serve as the initial incubators for the plants which will be used in the phytoremediation process. When the time comes for the plants to be transplanted from the greenhouses to the site, the community will be invited to partake in the planting process. The direct impact that the individual has on the healing of the site will promote ecological literacy and will generate invested interest in the long term health and success of the project.

To assist with storm water management and greenhouse irrigation, a marsh will be located adjacent to the greenhouses. This wetland system will be stocked with aquatic life and beneficial bacteria, enabling the greenhouses to operate on a closed loop nutrient system. In this process, waste from the aquatic life provides nutrient input for the vegetation in the greenhouses, and nutrient output from the vegetation provides oxygen and nutrient inputs for the aquatic life. This symbiotic relationship will actively demonstrate to the public the importance and beneficial properties of southwestern Ontario’s wetland ecology.

The design of the greenhouses will be such that once the plants are mature and transplanted to the site, the greenhouses can be used for other purposes or shipped to the next brownfield location undergoing remediation. Greenhouses that remain on the site present an excellent opportunity for the establishment of a public gardening project, whereby individuals or community groups can

25. *Phytoremediation Soil Treatability Study*. California Polytechnic State University Department of Civil and Environmental Engineering. 2013

lease a greenhouse and use it for domestic food production. The reuse of the greenhouse unit is essential in the propagation of a consumer mentality which focuses on reducing waste and creating spaces and assemblies that serve multiple purposes. The greenhouse units of the Walker Power Building will further this mentality by taking on new lives as required, their programs dictated by and based on public need.

First Design

Second Design

Third Design

Figure 18: Greenhouse Process Work

The form of the greenhouses changed constantly throughout the design process. The intention was to imagine an enclosure which could ‘grow’ with the redevelopment of the Walker Power Building, serving multiple purposes throughout the different stages of redevelopment. For this reason, the greenhouses needed to strike a balance between efficiency, aesthetic quality, and modularity.

The final design for the greenhouses is one which adopts the material palette of Windsor’s early 20th century industrial landscape. Repurposed wood from the abandoned rail spurs combined with the Walker Power Building’s red brick blends together to create a greenhouse which is inviting, practical, and adaptable to the landscape of the post-industrial city.

Figure 19: Greenhouse Section and Axonometric

Chapter 5: Building and Site Program

Recovery Period

Health of the Environment; Immediate Concerns

The immediate concern of the Walkerville Power Building redevelopment and subsequent intervention will take place over the period of approximately 5 years. The first steps in the project will be the City of Windsor's acquisition of the building and surrounding property. The township of Walkerville is currently working with municipal planners in an attempt to develop an economically viable development proposal. Ideally, the land south of the Walker Power Building would be purchased and incorporated into the project, as it is currently listed for sale.

During this recovery phase of healing, the land will be slowly transformed through the phytoremediation process. Addressing health at the environmental scale in the context of the Walker Power Building redevelopment will focus on improving the health of the physical land while providing the community with public green space.

During the spring, a massive planting effort will take place. This process will involve the entire community and be led by regional experts in horticulture. Plantings from the on-site greenhouses will be transplanted to certain regions of the site, coinciding with areas that require remediation. Plantings of field mustard, willow, and native grasses will cover large swathes of the site to promote the bio-remediation process and provide habitat for local fauna. To allow for more intensive use in certain areas of the site during the initial remediation period, the landscape will be healed in zones. For the zones actively undergoing the healing process, a network of elevated paths will be established to allow passage without the risk of damaging the underlying plants.

Short Term Uses

The two city owned lots to the West of the Walker Power Building will be used in the establishment of a trailhead for the existing riverfront trail. Windsor's popular Riverfront Trail dissipates less than a quarter kilometre from the Walker Power Building site. Proposed is the extension of the trail into the Walker Power Building site and the establishment of a formal trailhead and supporting infrastructure. This route would allow for the future extension of the trail and connection with the unused VIA Rail corridor to the north-west of the site.

Trailhead

The addition of a trailhead and surface parking along the western, city-owned boundary of the site will provide visitors with the infrastructure required to explore the Walker Power Building and surrounding region. The City of Windsor has expressed interest in donating the two publicly owned lots for these facilities, as there is no current signage or pathway which allow visitors to gain easy access to the beginning of the trail.

Figure 20: Trailhead Axonometric and Plan

Walker Power Building
Site Plan - Recovery Period

Figure 21: Recovery Period- Site Plan

Walker Power Building Plan - Level 0

- Atrium
- Café
- Artist Studio
- Open Program Classrooms
- Building Services

The Walker Power Building will be stabilized and punctuated with glazed openings, allowing for access to natural light throughout the building. During the recovery period of the site, visitors will have access to the Walker Power Building's first and second floors, which will be populated with community focused program and small commercial spaces.

Figure 22: Recovery Period - Level 0

Walker Power Building Plan - Level 1

- Offices for Local Business
- Offices for Local Planners
- Artist Studio

Local businesses, planners, and community improvement associations will be granted office spaces. The Windsor Printmakers Forum, evicted from the building in 2005, will be returned to the building and given proper studio and gallery space. As the arts and music scene is vibrant and an already established attraction in the township of Walkerville, the local talent of the community will find a receptive outlet in the Walker Power Building's new program.

Figure 23: Recovery Period - Level 1

Figure 24: Walker Power Building - Recovery Period

Figure 25: Walker Power Building - Atrium Space

Figure 26: Sculpture Garden

The sculpture garden is located along the northern perimeter of the Walker Power Building site. The garden provides a corridor for future recreational connection from the former rail line, through the site, towards the existing Riverfront trail.

Long Term Planning

Allowing access to the site and building during the healing process is important for maintaining a community connection to the Walker Power Building. Too often, new constructions are rushed through demolition and the resulting building loses the cultural connection to the site; this accelerated and artificial process of ‘healing’ can be disorienting. Losing the visual connection to the former environment while retaining knowledge of past conditions can evoke a sense of loss. The intention for the Walker Power Building is not to create something entirely new but to heal and evolve from the inside out. The healing of the site will take place over an extended period of time to not only cope with economic realities of the city, but to allow for the community to grow and heal with the built environment.

Figure 27: Greenhouses and Market

Figure 28: Greenhouse Section

Figure 29: Greenhouse Interior

Stengthening Period

Health of the Community; Flexible, Demand Based Programming

Once the health of the landscape has achieved a level of stability which would support more intensive use and programming, the Walker Power Building will incorporate program which focuses on the amelioration of community and individual health. To assist in achieving this goal, a community health centre will become the central program in the long term redevelopment of the site. The community health centre is unlike many health care institutions in that the delivery of primary health care services is coupled with programs and resources which promote illness prevention and focus on community development. In doing so, the community health care centre ‘not only addresses individual health but advocates for initiatives that address social, economic and environmental problems negatively impacting people’s health.’²⁶ Future programs which are to be included in the Walker Power Building will work to meet the mandate of the community health centre and will actively engage the community in the adoption of new programs and services.

26. Association of Ontario Health Centres. Community Health Centres. Accessed January 2016. <https://www.aohc.org/community-health-centres>

Figure 30: East Entrance

Walker Power Building Site Plan - Strengthening Period

Figure 31: Strengthening Period - Site Plan

Short Term Uses

During the strengthening period of development, certain areas of the site may continue to heal through the phytoremediation process while other regions can be used for public recreation and entertainment purposes. The path network will remain on the site, as will the trailhead for the Riverfront Trail. Outdoor pavilions and shelters will afford visitors with a place for repose, while a bandstand framed by the Detroit skyline provides a venue for outdoor concerts and performances. The greenhouses which once served as incubators for the seedlings used in the healing of the landscape will be converted into publicly leased garden spaces and market stalls. Alternatively, as the model for the redevelopment of the Walker Power Building is intended to be applied to other former industrial sites, the greenhouses may be disassembled and shipped to the next remediation location.

The standard health care services provided by a community health centre are complimented by additional services based on community need. For this reason, the upper floors of the Walker Power Building will be allotted to the expansion and future programming needs of the community health centre. These programs will reflect the changing nature and requirements of the neighbourhood's residents; spaces which are dedicated to future programs will be designed in a flexible layout, allowing for rotational use.

Figure 32: Exterior Market Stalls

Figure 33 : Bandstand and Theatre

Walker Power Building Plan - Level 2

- Community Health Centre
- Counselling Services
- Urban Agriculture Centre
- Nutrition Education Lab
- Seed Bank
- Meeting Spaces

During the Strengthening Period of the site's transformation, the second level of the Walker Power Building will be dedicated to programming that ameliorates community health. Nutrition programming will be run by the Community Health Centre, providing the community with the education required to make sustainable, healthier decisions at home. A seed bank will allow visitors access to resources which would allow them to grow their own produce in the community greenhouses. Additionally, wildflower seeds will be distributed to support the local ecology.

Figure 34: Strengthening Period - Level 2

Walker Power Building Plan - Level 3

- Rotational Programming Spaces
- Greenhouses
- Food Security Centre
- Community Health Centre
- Roof Garden Access

The third level of the Walker Power Building will be used for rotational programming, dictated by the needs of the community and run by the Community Health Centre. The expansion of the Nutrition programs will see the incorporation of a Food Security Centre, for those who require emergency food assistance. Taking advantage of the natural light on the upper floor, two greenhouse rooms will be established to support the Centre's programs.

Figure 35: Strengthening Period - Level 3

Figure 36: Urban Ecology

Urban Ecology

The roof garden of the Walker Power Building will provide visitors with views of the surrounding area while providing support for local urban ecology. Wild grasses and flora will be planted to provide food for Southwestern Ontario's insect and bird species. Bat houses will be constructed to welcome the area's existing bat population.

Figure 37: Roof Garden at Night

Long Term Planning

Improving the health of the individual does not end with the application of basic health services; ensuring food security, access to mental health services, parenting education, cultural services, and drop in programs all have an effect on the health of the individual and long term health of the community. These programs may be introduced as temporary, but later become permanent services offered by the Walker Power Building Community Health Centre. The lower floors of the Walker Power Building will be dedicated to the community health centre's permanent functions and programs, as well as to house the artists studio and small businesses established in the preliminary intervention.

The regenerative process of the land and community focused programming efforts will serve to provide recreational value and the amelioration of community and individual health for the residents of Walkerville. Additionally, increasing the exposure of the unique heritage and arts scene of Walkerville will generate further interest in the community and draw tourism and business to the region. Acting as a model brownfield remediation project which serves to add value to local community and ecology, the Walker Power Building will serve as the primary implementation of a brownfield remediation strategy for the city of Windsor's unused industrial sites.

Figure 38: Greenhouse Occupying Urban Brownfield

Figure 39: Axonometric Section

Conclusion

The Walker Power Building will be redeveloped in a way that serves to ameliorate community, individual, and environmental health. Through the adaptive reuse of an iconic 20th century industrial building, ecologically mindful transformation of the landscape, and the focus on a community strengthening program, the Walker Power Building will assist in developing whole neighbourhoods.

The approach taken to the project should not be thought of as one existing within an isolated context; many regions of North America which once relied on their industrial sectors are now experiencing a shift in their economies and subsequent surplus of industrial infrastructure. To move forward and adapt to this changing environment we must appreciate the history of the built infrastructure which defined the landscape, while implementing new program that reflects the changing nature of the communities that surround them.

The City of Windsor will persevere long after the closing of the remaining manufacturing plants. The steadfast nature of its citizens and strategic location along North America's primary trade corridor is the silver lining to the otherwise ominous cloud cast over the post-industrial city and much of south-western Ontario. These cities will persevere, but must adapt to change. For this reason, planning efforts must address the needs of the current populations of the post-industrial city while recognizing their desire for growth and new opportunity. Above all, a holistic development strategy must retain the region's connection to its cultural and industrial past.

A brownfield redevelopment strategy focusing on the adaptive reuse of industrial infrastructure not only provides new life for built heritage, but can assist in the establishment and strengthening of healthy, whole neighbourhoods. Historic buildings 'help define the character of a neighbourhood by providing a tangible link with the past';²⁷ cultural monuments such as the Walker Power Building provide an excellent opportunity to strengthen this connection by opening an architecturally rich building up for public use.

As the post-industrial city evolves to engage in new economic opportunities, community objectives and development goals remain steadfast. The overarching

27. Cantell, Sophie Francesca. "The Adaptive Reuse of Historic Industrial Buildings: Regulation Barriers, Best Practices and Case Studies" *Virginia Polytechnic Institute and State University*. May 2005.p.2

mandate is the establishment of a formwork for the growth of sustainable neighbourhoods. Progression towards this goal will prove successful if we adopt renewal strategies which address and ameliorate the conditions of health across the individual, communal, and environmental scale.

Figure 40: Walkerville Mural

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Appendix 1

Process Work

Throughout the development of the thesis, many changes to the program and form of the interventions were explored. Sketching proved to be very beneficial throughout this process, as it allowed for rapid graphical reproduction of ideas and concepts.

Figure 41: Plan and Section Sketch

Figure 42: Bird's Eye View

Figure 43: Final Design Stage - Site Plan

Figure 44: Bird's Eye View 2

Appendix 2

Phytoremediation Study

In order to test the efficiency of phytoremediation on brownfield sites, a simulation was conducted using Brassica Rapa (field mustard) and heavy metal contaminants. Brassica Rapa seeds were purchased from a lab grade horticultural supplier and an indoor growing container was assembled. The seeds were planted then placed under a 150w compound florescent light for twenty four hours per day. This was intended to accelerate the germination of the seeds and achieve a simulated acceleration in re-mediation of the soil.

Once the plants have achieved their full height, they will be placed in a 'contaminated site' and subject to either mercury, lead, or petroleum based contaminants. There will be one control plant placed in clean soil for the purpose of enabling comparison. In collaboration with Carleton University's Department of Environmental Engineering, soil sampling and testing can be done to determine the degree of initial soil contamination. The plants will then be introduced to the contaminated soils and the reduction of contaminate levels will be determined after 60 days of growth.

Results

The laboratory equipment required to test the contamination/remediation of the soil became unavailable. Unfortunately this meant that there was no accurate way to determine the remediation capabilities of the chosen plant type. Though phytoremediation is a proven bio-remediation technique, I was unable to get a site specific reading of the healing potential of the Brassica Rapa plants.

Figure 45: Milk Crate Greenhouse

Figure 46: 10 Days of Growth