A RECYCLING CENTRE IN HALIFAX: INTEGRATING WASTE AND COMMUNITY

by

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Submitted in partial fulfilment of the requirements
for the degree of Master of Architecture

at

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DEDICATION

For my dad, who taught me the value of imagination.

CONTENTS

ABSTRACT

The primary area of study for this thesis is waste management infrastructure. Through the study and critique of current waste management practices and facilities in Halifax, Canada, a new concept is developed.

Removed from the public realm, waste management facilities miss the opportunity to involve the general public. The proposed recycling centre, sited on Dalhousie University's main campus, intends to promote and demonstrate innovative waste reduction, reuse, and recycling methods through innovative programming and architectural expression. Ultimately, this thesis attempts to prove the environmental, social, and economic benefits inherent to the proposed recycling centre.

ACKNOWLEDGEMENTS

Thanks to my Mom and sister, for their love and support.

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CHAPTER 1: INTRODUCTION

Thesis Question

How can a site in a densely populated area in Halifax deal with recycling waste while fostering social engagement?

Area of Study

Industrialization, mass production, rapid urbanization, and more sophisticated forms of consumerism continue to increase the amount and toxicity of waste in cities. Looking to the future, it is evident that the complexities of modern waste management demand alternate approaches. Halifax is a city that has made progress in dealing with waste. However, the modernization of waste management practices in other cities has not kept pace with rapid growth. Many densely populated cities are now under pressure to “bring their waste streams under control, and shift from pure disposal to recovery of both energy and materials” (UN-HABITAT 2010, xxvi). The Industrial Revolution made mass production possible and technological advances diversified the material content of products. Inherently, municipal solid waste (garbage) “demands significant financial and logistical resources to control, collect, recycle and arrange final disposal” (Davies 2008, 3). Such constraints offer clues as to why the development of waste management practices have not progressed rapidly in some municipal systems. The complexity of dealing with modern garbage does not pose an easy or cheap solution. “Why should the authorities choose to invest in a waste system when such investment is likely to raise costs and offer competition

for scarce financial resources to other critical municipal systems, such as schools and hospitals?" (UN-HABITAT 2010, 21). The answer is simple: "poor solid waste management has direct impact upon health, length of life, and urban environment" (UN-HABITAT 2010, 88). "Waste collection represents both an essential utility function, together with electricity, gas and clean water, and a necessary part of urban infrastructure and services, alongside housing and transport, education and healthcare" (UN-HABITAT 2010, 88).

In general, modern societies lack progress in dealing with waste. The diversity of waste has become so vast so quickly that dealing with it has become an overwhelming task. The solutions seem to be as complex as the problem. The pollution of water, land, and air demands that waste be properly dealt with. As recycling becomes more highly developed, so will the value of recycled products. The diversion of valuable materials from disposal and conversion into resources protects the environment and society's quality of life. To achieve maximum possible diversion of resources from disposal, citizens must be educated and encouraged to adopt necessary lifestyle changes to move from a consumer society to a conserver society. Waste must no longer be regarded as such, but must be turned into resources to benefit both the economy and the environment. Jane Jacobs parallels this theory in her book, *The Economy of Cities:*

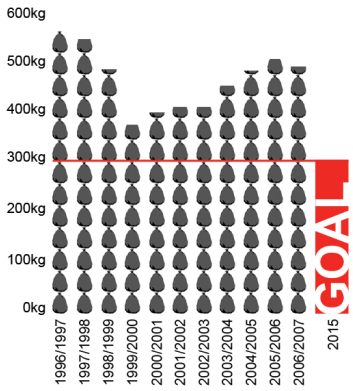
> One of the oldest forms of waste recycling is the reprocessing of waste paper. One producer of book paper advertises that its papers are more resistant to deterioration from humidity and temperature changes than paper made from new pulp, and accompanies these

> advertisements with striking photographs of New York City, which it calls its “concrete forests.” This fancy, that the city is another kind of paper-yielding forest, is rather apt; but the metaphor of the waste-yielding mine may be more comprehensive. For in the highly developed economies of the future, it is probable that cities will become huge, rich and diverse mines of raw materials. These mines will differ from any now to be found because they will become richer the more and the longer they are exploited. The law of diminishing returns applies to other mining operations: the richest veins, having been worked out, are gone forever. But in cities, the same materials will be retrieved over and over again. New veins, formerly overlooked, will be continually opened. And just as our present wastes contain ingredients formerly lacking, so will the wastes of the advanced economies of the future yield up ingredients we do not now have. The largest, most prosperous cities will be the richest, the most easily worked, and the most inexhaustible mines. Cities that take the lead in reclaiming their own wastes will have high rates of related development work; that is, many local firms will manufacture the necessary gathering and processing equipment and will export it to other cities and to towns. (Jacobs 1969, 111)

If waste is to be considered a resource, then the processes and facilities involved in waste management must be reconsidered.

Design Theory

Waste management infrastructure is an important aspect of any society. Facilities that deal with waste have been cast in public imagination as disruptive, hazardous, and unsightly. However, waste is a human by-product and should be dealt with responsibly where it happens, rather than shipping it away to be buried. Waste diversion from landfills requires a universal agreement on the definition of waste. Formerly defined as unwanted or unusable materials, waste must be thought of as a resource. Dealing with benign items formerly considered garbage would result in waste diversion from landfills.



Disposal rate (kg/person/year) Waste disposed of in Nova Scotia's municipal solid waste landfills. (Nova Scotia Environment, 6)

Unfortunately, today's disposable society deems waste as being worthless, "a by-product of living that not only holds no latent value but costs money to dispose of... trash is ascribed no value because we have no idea what to do with it" (Caine 2010a).

Furthermore, it is often cheaper for consumers to buy a replacement for their broken product than it is to fix it. Similarly, companies make more profit selling a mediocre product and replacements than building a quality item that requires less maintenance. However, beyond profit and affordability, society continues to contribute to massive waste streams that will sit in the ground indefinitely (Caine 2010b).

New products use new materials and new energy. The earth's resources are limited, and many items we discard are from non-renewable resources. Second-hand products possess energy that has already been invested in the product. Finding new uses for waste streams and then using that knowledge to revamp how our economy functions would result in a fundamental shift in thinking where waste has value.

To realize the importance of this fresh perspective on waste, the facilities and processes regarding waste must also be reconsidered. Could a new combination of architectural circumstances - a theory, a site, and a program - be environmentally, economically, and socially beneficial to the surrounding community? (Singer, Cruz, and Bregman 2007, 7). What is the potential of architecture to bring about social change? How can it foster the collective re-evaluation of the way we do things and

promote innovative thinking?

In order to rise above apathy towards environmental issues, it is necessary to educate the public and allow individuals to realize the impacts of their actions. Understanding the cause-and-effect relationship can alter how people perceive environmental problems in the context of their lives and consequently initiate change of behaviour (Hsu 2004).

This thesis not only questions *how* to design a building, but also *what* to design, *where*, and *why*. It attempts to transform an existing building type - waste management facility - into one that is not only expressive of its functions, but uses programmatic synergies to engage and enhance the public realm. The design for such a building is justified by the fact that waste management is a current and growing issue.

Stone sewer, typical in the 1800s. (Erickson 2005, 16)

CHAPTER 2: WASTE MANAGEMENT

History

1851

Prior to 1851, residents of Halifax disposed of their sewage, garbage, and other household waste into street gutters, to be washed by rain down into the harbour. Sewer pipes leading into the harbour were completed in 1851, using the incline of Citadel Hill to flush waste.

Africville dump. (Brooks 1965)

1958

In 1958 the city decided to move the town garbage dump to the Africville area at the north end of the peninsula. Residents, having no legal rights to protest, illegally salvaged the dump for usable goods and the area was labelled a slum.

1972-1977

By 1972, the town dump had shifted farther north towards the Bedford Basin. Unsorted rubbish was tipped there daily and as the dump grew, city bulldozers flattened the hills of garbage and pushed them towards the shoreline. Eventually garbage began to float and gather on the shores of the Bedford Basin. The city installed a floating boom that was continually extended to curb the escaping garbage.

Floating garbage boom. (Misztela 2002, 23)

1977-1997

Since 1977, all the garbage from homes and businesses in Halifax, Dartmouth, Bedford and Halifax County has

Typical landfill. (Save Lincolnville Coalition n.d.)

Typical waste management facility - tipping floor.

Otter Lake facility. (Mirror Nova Scotia 1996)

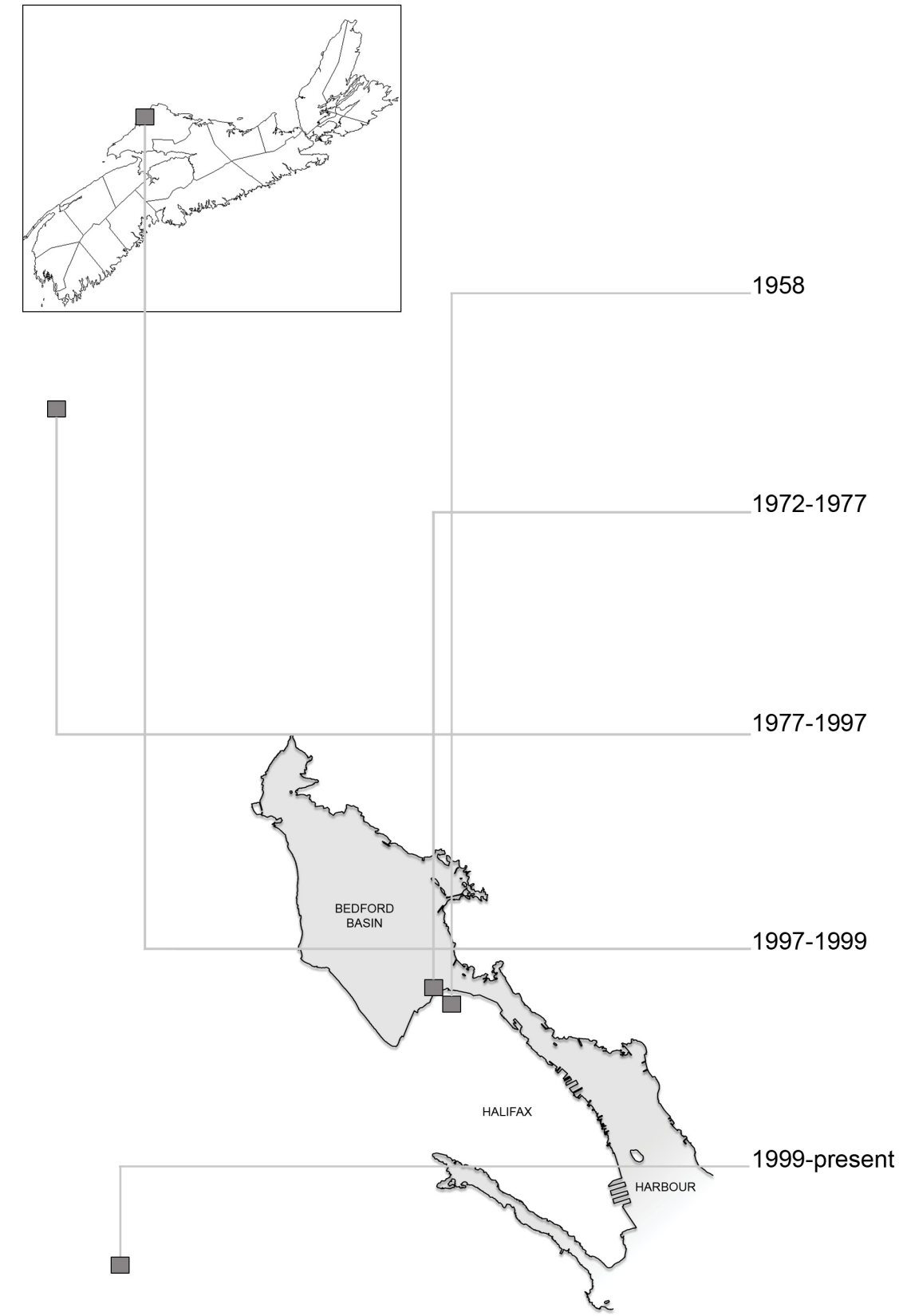
been disposed of at the landfill site on Highway 101 near Upper Sackville. However, the Sackville landfill was not properly managed. It took unsorted garbage, attracted thousands of pests, and wasn't properly lined, resulting in the contamination of a nearby river. The landfill was closed in 1997.

1997-1999

After the Sackville landfill closed, Halifax exported its trash to a faraway landfill in Cumberland County, at a cost of $1.2 million each month.

1999-present

In 1999, the Halifax Regional Municipality adopted an ambitious waste management program aimed at protecting human health and the environment. The Otter Lake facility, sited 15 km from the city, opened in 1999 and is the cornerstone of HRM's Integrated Resource Management Strategy. It manages only black bags (wastes not diverted by source separation programs) generated by HRM residents and IC&I (industrial, commercial, institutional) establishments. Workers and machinery sort through the garbage to remove materials for composting, recycling, re-use and hazardous waste management before it is put into the landfill. However, the majority is disposed due to contamination. The landfill is organized in 8 cells. Each cell costs $15 million to build and $6 million to close and seal. Each cell takes 3 years to fill. However, the city of 380,000 residents is filling each nine-hectare cell at a rate much faster than predicted. Cell 4 reached its capacity in June 2006, five years earlier than estimated. Projected to close in 2023,



Halifax - chronology of waste disposal.

the entire facility will close much sooner.

HRM's Integrated Resource Management Strategy

Halifax Regional Municipality (HRM) consists of four communities: Halifax, Dartmouth, Bedford and Halifax County. Its population of approximately 380,000 is spread over an area of 2,224 square miles and ranges from high-density urban settings to rural communities. HRM got serious about garbage in the early 1990s when the Sackville landfill was reaching capacity and began causing environmental problems. The odour from the site was such that numerous families had to be relocated and the community was awarded a large compensation fee for the nuisance.

In 1994, the proposal for a new incinerator to replace the landfill was rejected and the province introduced new legislation requiring source separation of waste. At this time, HRM invited the public to join a new Community Stakeholder Committee (CSC) to develop an alternative approach to the problem through a year-long consensus-based process. A core group of approximately 300 people formed the CSC. Extensive public input made clear a concern about the amount of waste being disposed of in the province, and its effects on the environment. "Nova Scotians also recognized that waste could be considered a resource, which can benefit both the environment and the economy" (Nova Scotia Environment, 3). On behalf of the CSC, the Government of Nova Scotia released a new Integrated Resource Management Strategy in March 1995. The mission statement of the strategy is: This Integrated Resource Management

Strategy (IWRMS) is designed to address the municipal solid waste stream, to achieve the maximum possible diversion of resources from disposal and to encourage citizens to adopt the necessary lifestyle changes to move from a consumer to a conserver society. The strategy is designed to be flexible enough to incorporate new, environmentally sustainable technologies that will move us towards our ultimate goal of “Zero Waste” (Community Stakeholder Committee 2007, 1). The principles and goals of the strategy are based on stewardship. “It places responsibility on everybody - because we all generate material that must be managed” (Community Stakeholder Committee 2007, 2).

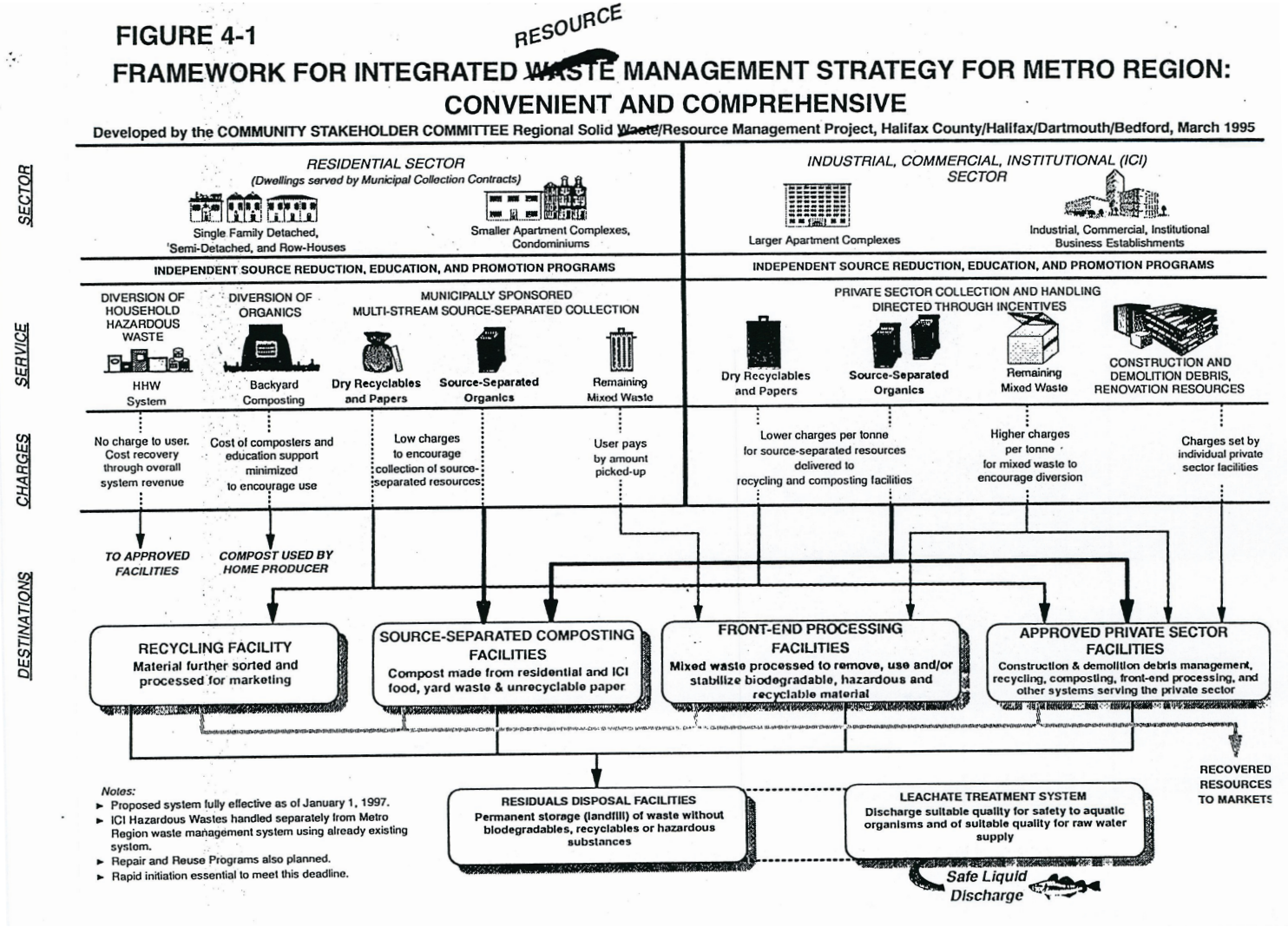
The strategy places emphasis on the diversion of the recyclable, toxic and organic materials that cause problems at disposal sites (Community Stakeholder Committee 2007, 3). Full implementation of the strategy included an expanded materials recovery facility, a household hazardous waste depot, the construction of two new compost plants and the Otter Lake waste processing and disposal facility. The Otter Lake facility is the centrepiece of the strategy. Located approximately 15 km from downtown Halifax, the facility processes about 150,000 tonnes of garbage a year, 300-400 truckloads a day. Recyclables, compostable substances and hazardous substances are extracted from the mixed waste. “This will not only capitalize on their resource value but will also ensure that no material is sent for residuals disposal (landfill) without processing. This will avoid problems such as toxic leachate and emissions, odors, or the attraction of birds and/or vermin. No material will be disposed of without processing. Free of toxics and organ-

ics, materials sent for disposal will be available for reuse by future generations" (Community Stakeholder Committee 2007, 4). "The success of the strategy is based on separating materials at the source and collecting and processing them separately and appropriately" (Community Stakeholder Committee 2007, 3).

The province also established the Resource Recovery Fund Board (RRFB) under the Environmental Act in 1995. RRFB Nova Scotia was given the following mandates:

- Develop and implement industry stewardship programs.
- Fund municipal or regional diversion programs.
- Develop and operate a deposit-refund program for beverage containers.
- Develop education and awareness of source reduction, reuse, recycling, and composting.
- Promote the development of value-added manufacturing in the province. (Nova Scotia Environment, 6).

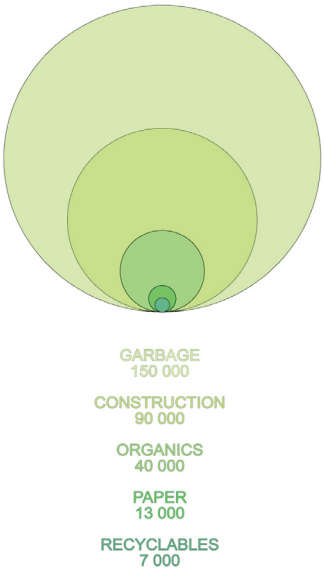
Where recycling and organics-diversion programs have been the priority of HRM's Integrated Resource Management Strategy, "RRFB Nova Scotia funding has been essential to the success of municipal, private sector, and citizen efforts in waste diversion" (Nova Scotia Environment, 6). Municipalities have implemented successful recycling and composting programs for most provincially banned material. "Other banned items such



Framework of the strategy developed by the Community Stakeholder Committee. (Community Stakeholder Committee 2007, 16).

as beverage containers, used tires, waste paint, and electronic products are managed through provincially regulated product stewardship programs, administered by the RRFB Nova Scotia" (Nova Scotia Environment, 8). RRFB Nova Scotia provides over 80 Enviro-Depots located throughout the province. All Enviro-Depots accept beverage containers and waste paint, while many collect additional materials, including electronic products, cardboard, newsprint, and car batteries (Nova Scotia Environment, 8). The depots are part of an extensive network of recycling facilities that accept, process and/or transport materials, diverting them from landfills.

Until 1995, less than 5% of the total municipal solid waste stream was recycled; over 95% was landfilled (Community Stakeholder Committee 2007, 6). HRM has been a leader in the field of waste management since the full implementation of the Integrated Resource Management Strategy in 1999. By the year 2000, the province had achieved a diversion rate of 50% since 1989, a rate that was 45 percent lower than the Canadian average. "This achievement was realized through the cooperative efforts of municipalities, the Resource Recovery Fund Board (RRFB Nova Scotia), industry, and citizens in reducing, recycling, and composting waste" (Nova Scotia Environment, 3). People were proud to be part of such a large and successful initiative, proving that a community-based waste diversion system can work in an urban setting.



Disposal rate (tonnes/year)
Waste received by HRM facilites based on 2009 statistics. Data from Marcel Maessen, Waste Resource Education Officer for HRM Solid Waste Resources.

Critique of the Strategy

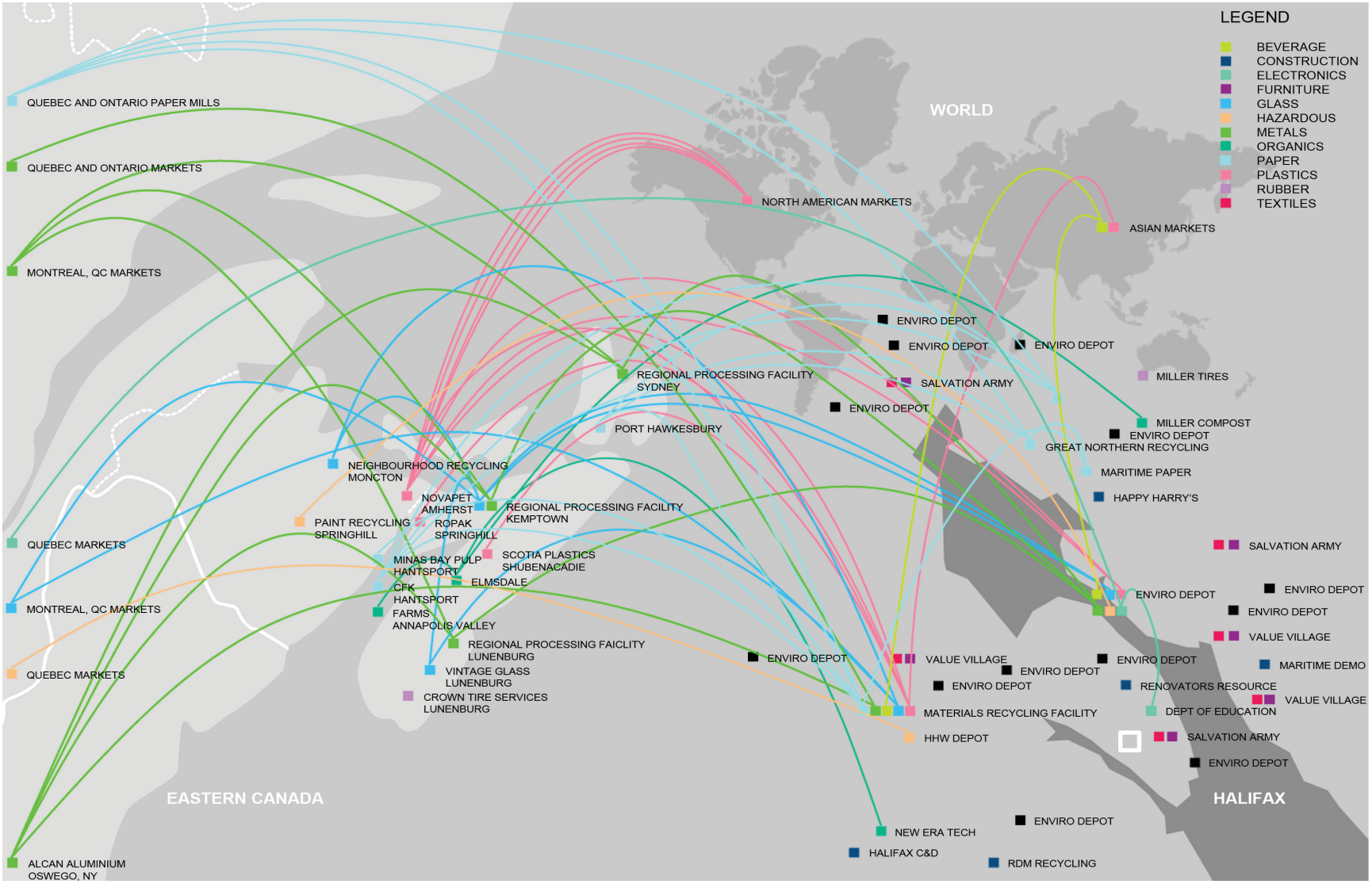
About 20,000 tonnes of recyclables are recovered each year. The city has two companies composting 40,000 tonnes of organics a year. Although these statistics seem promising, a large percentage of waste is still ending up in the landfill. This is largely due to contamination of otherwise recyclable products mixed in with landfill waste. The fact that the Otter Lake landfill cells are closing at a rate almost twice as soon as predicted is proof.

Nova Scotia diversion rate has been dropping as a result of other factors in recent years. “Economic growth in the province, changes in consumption patterns, and new products and product designs are all factors contributing to this increase” (Nova Scotia Environment, 5).

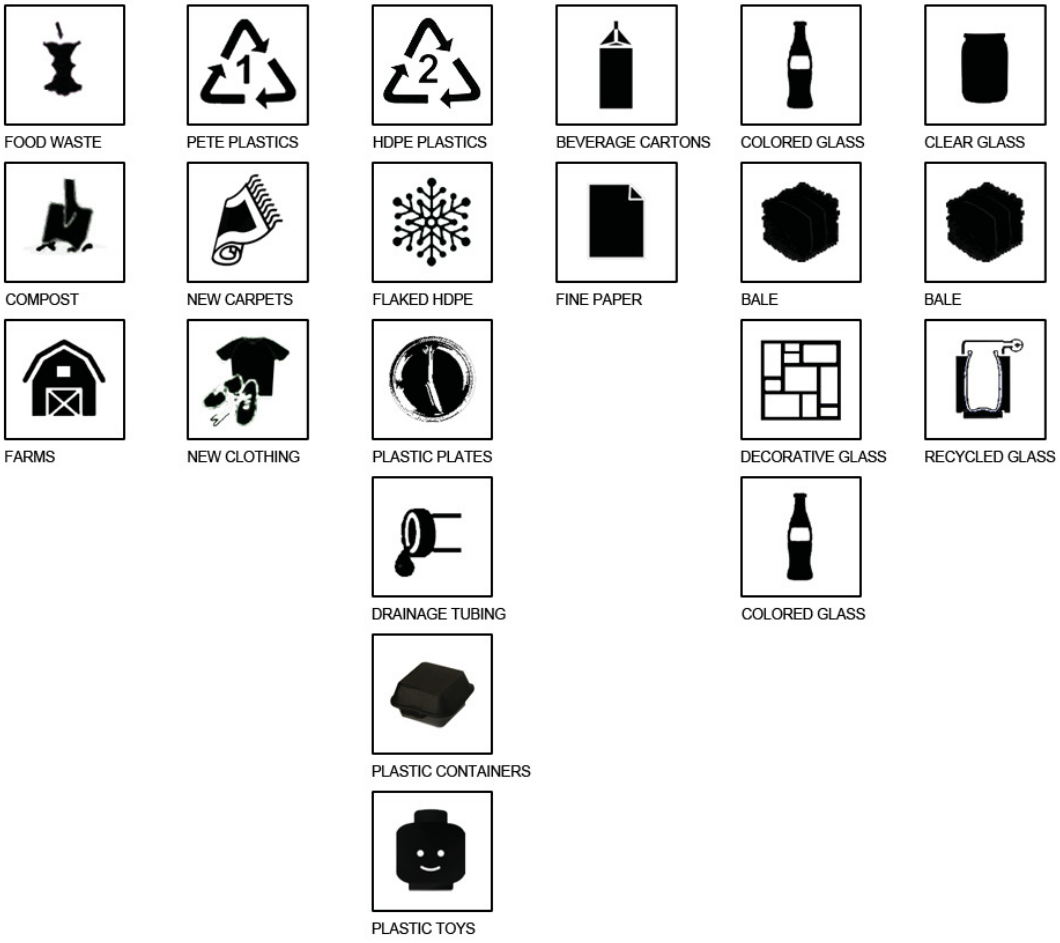
Although the network of waste management facilities that have developed since 1995 have substantially contributed to a higher rate of landfill diversion, there remain some issues. The major facilities responsible for such a high rate of diversion - the materials recovery facility, a household hazardous waste depot, two compost plants and the Otter Lake waste processing and disposal facility - are sited in industrial areas of HRM due to the scale of the facilities and processes they carry out. This removal from the public offers no opportunity for social engagement. Furthermore, smaller facilities, such as the Enviro-Depots sited in both urban settings and rural communities, are not appealing places to visit. They strictly provide a service without promoting a further understanding of the processes involved. Is an opportunity not missed?

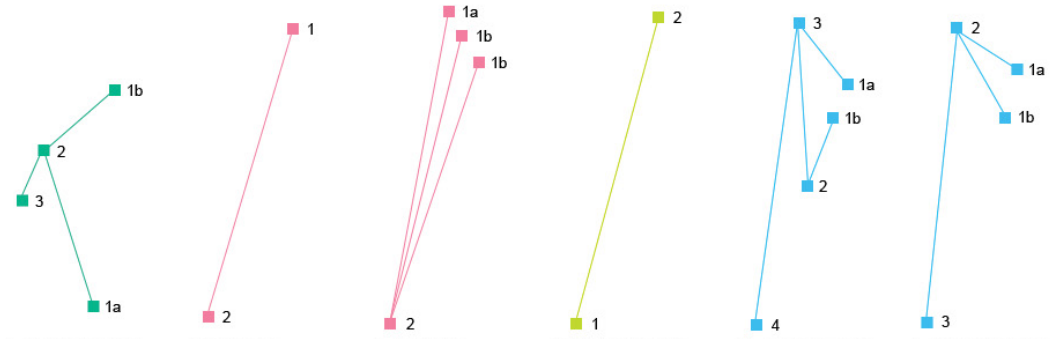
Otter Lake landfill.

Furthermore, a vast majority of facilities export products for further processing elsewhere. “The demand for recycled materials swelled abroad as markets globalized and manufacturing shifted abroad. Now, as energy costs rise, it gets more expensive to make goods from virgin materials, so companies are willing to pay more for what we toss in a blue bin” (Beeler 2011). Extensive recycling networks bring into question the large amount of energy required to transport recyclables and support such systems.



Recyclables - Existing paths





1a. NEW ERA TECH
1b. MILLER COMPOST
2. ELMSDALE
3. FARMS

1. NOVAPET
2. NORTH AMERICAN MARKETS

1a. NOVAPET
1b. ROPAK
1c. SCOTIA PLASTICS
2. NORTH AMERICAN MARKETS

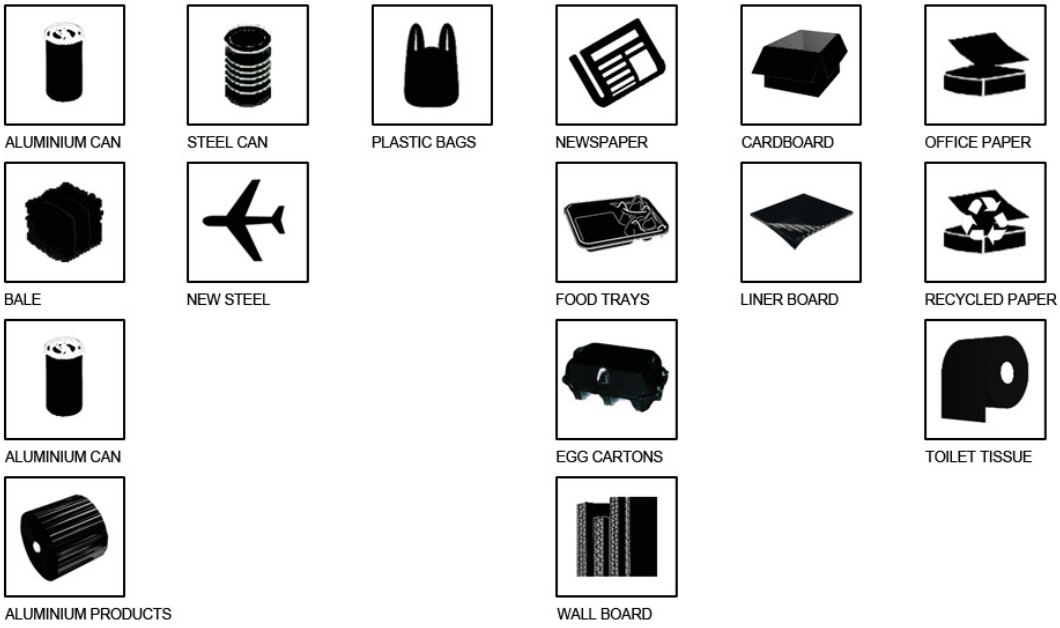
1. ENVIRO DEPOT
2. ASIAN MARKETS

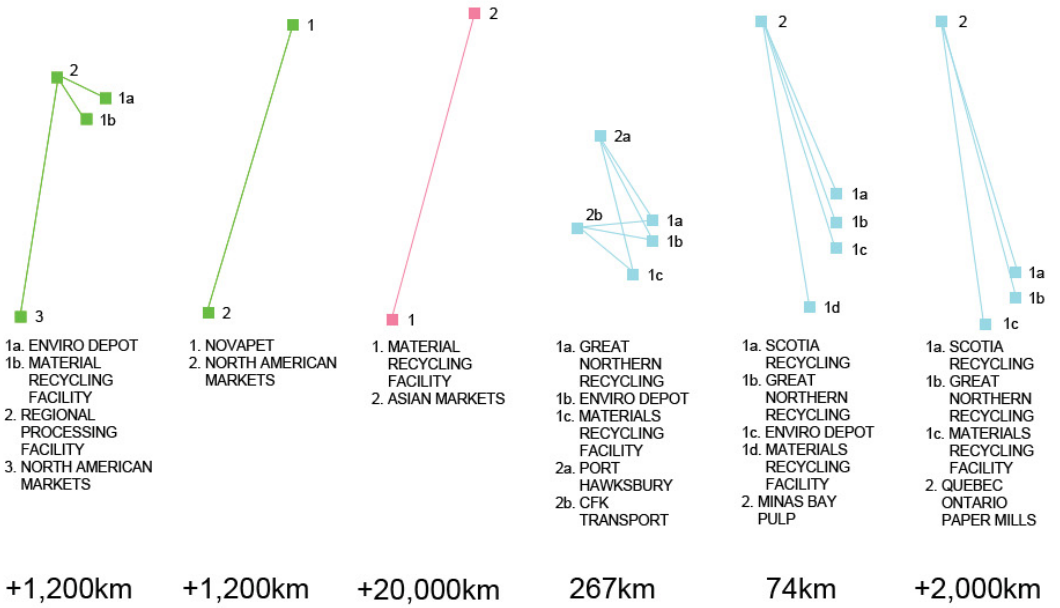
1a. ENVIRO DEPOT
1b. MATERIALS RECYCLING FACILITY
2. VINTAGE GLASS
3. REGIONAL PROCESSING FACILITY
4. NORTH AMERICAN MARKETS

1a. ENVIRO DEPOT
1b. MATERIAL RECYCLING FACILITY
2. REGIONAL PROCESSING FACILITY
3. MONTREAL MARKET

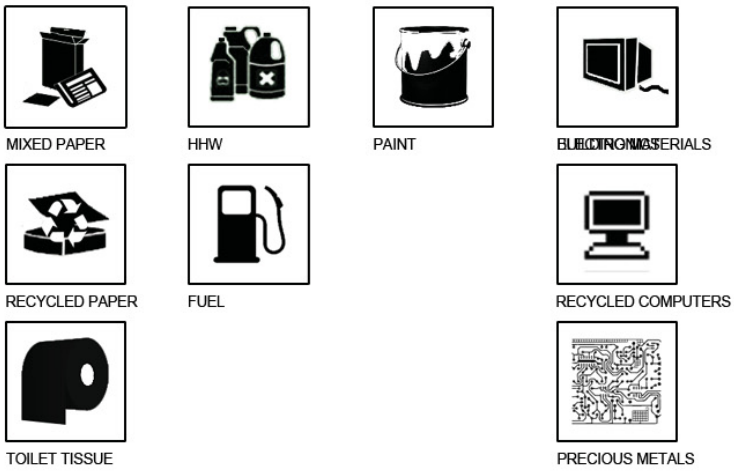
233km | +1,200km | +1,200km | +20,000km | +1,200km | +1,200km

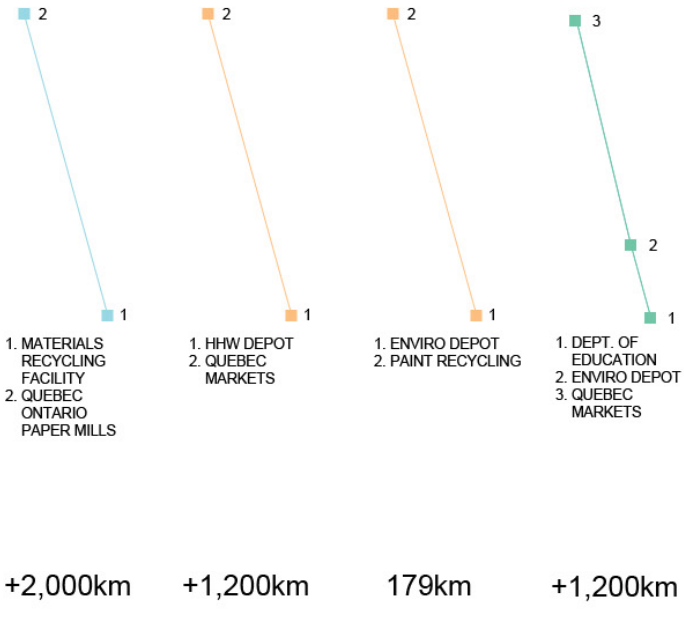
Recyclables - Travel routes from Halifax (1) to other locations (2,3, ...)





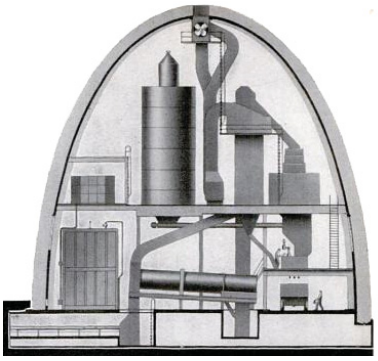
Recyclables - Travel routes





Recyclables - Travel routes

Municipal Asphalt Plant, New York (1941). (Perez Leighton 2010)



Section through the plant, showing asphalt-mixing machinery. (Popular Science 1941, 99)

Defining a Building Type for a New Era of Recycling

So the question becomes: how can an innovative project enhance an existing extensive and somewhat successful waste management system? It has already been established that there is opportunity to increase public engagement and reduce the amount of exported recyclables by dealing with waste locally.

The functional necessity of waste management services is indisputable. However, “these facilities are often planned and placed to be out-of-sight and out-of-mind... essential infrastructure is cast in the public imagination as disruptive, hazardous, and unsightly” (Singer, Cruz, and Bregman 2007, 5). However, this hasn’t always been the case regarding infrastructure. Some historical precedents demonstrate that a responsibility of infrastructure, beyond utility, was to provide an element of civic pride to a community. “The next generation of energy sources, water systems and waste facilities must be conceived of with the assumption that infrastructure represents an asset in each and everyone’s community” (Singer, Cruz, and Bregman 2007, 5).

Rather than disguising facilities, they should be integrated into the urban fabric to promote an understanding of the crucial role they have in supporting community.

The Municipal Asphalt Plant in New York, built in 1940, mixed asphalt to build roads in Manhattan. Aside from its function, the concrete structure was designed to harmonize with its surroundings, yet, as an identifiable figure on the urban landscape, it affected the way in which

industrial architecture was conceived and understood.

A New Kind of Recycling Facility

A lack of sustainable markets for materials continues to be a barrier to increased waste diversion in Nova Scotia. Research and development funding from the RRFB aims to support the development of new applications for waste materials (Nova Scotia Environment, 17).

Some municipal solid waste landfill sites, including Guysborough and Chester, make further efforts to promote a second life for materials by setting aside part of their facilities as “reuse centres.” Members of the public can pick up reusable materials for free at these centres (Nova Scotia Environment, 20).

Combining the processes associated with recycling certain materials into one facility would create synergies and offer both educational and economic opportunities. Waste would be converted into economic resources, while reducing natural resource and energy reuse.

> It is my belief that exciting things happen when a variety of overlapping activities designed for all people - the old and the young, the blue and white collar, the local inhabitant and the visitor, different activities for different occasion - meet in a flexible environment, opening up the possibility of interaction outside the confines of institutional limits. When this takes place, deprived areas welcome dynamic places for those who live, work and visit; places where all can participate, rather than less or more beautiful ghettos. (Serota and Sudjic 2010, 11)

This new concept requires the role of citizens and communities in the development, implementation and operation of such a facility.

CHAPTER 3: DESIGN

Site Selection

Site selection began with identifying evaluation criteria for siting a new facility. Criteria include:

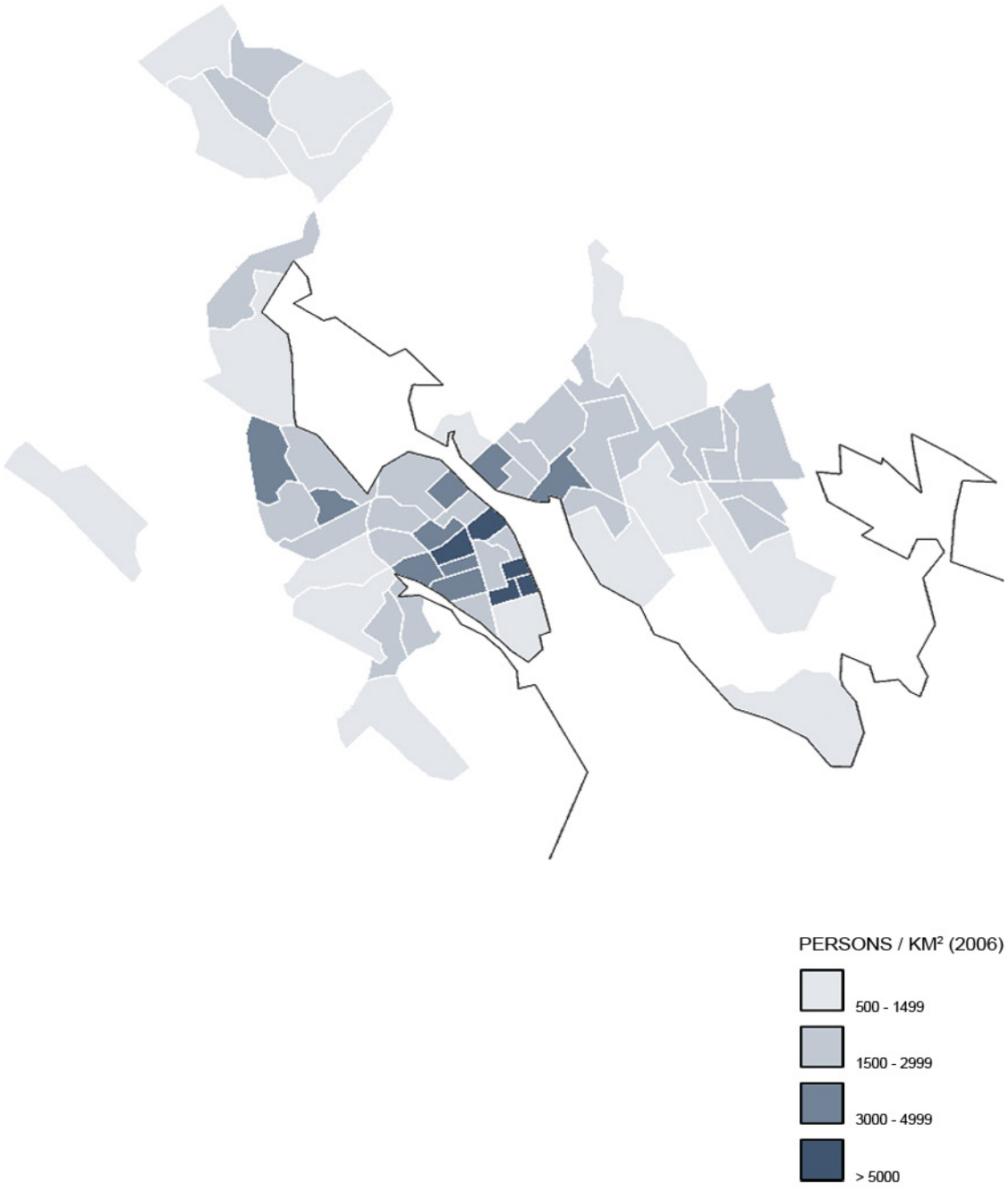
- Locating infrastructure near the population it serves, thus increasing efficiency and reducing energy consumption and long-term operational costs

- Using existing local infrastructure connections such as roads and utilities to avoid redundant networks

- Locating infrastructure next to an institution, such as a grocery store, mall, elementary or post-secondary school, for user convenience and cross-programming

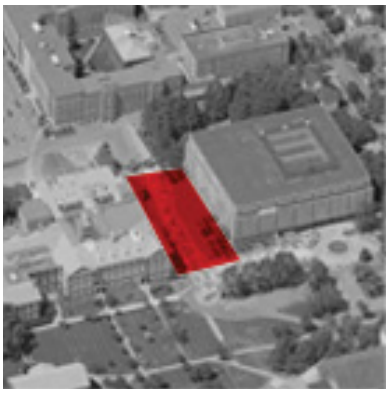
A new facility located within close proximity to densely populated areas means that more people would have access to it. Accessibility would promote use of such a facility. Census data from 2006 for urban areas and population densities in greater Halifax helped to determine optimal sites in Halifax. Each site would be approached based on its context, however the concept for the facility would fundamentally remain the same.

The site selected is located in the south end of Halifax, between the Killam Library and the Chemistry Building on Dalhousie University's Studley Campus. The site acts as a thoroughfare through the campus to the community beyond. An attempt to create a plaza with the aid of colourful deck chairs is unfortunately rather unsuccessful. The Killam Library houses the traditional programs



Greater Halifax - Population density. Adapted from Statistics Canada (2006) and Google Maps.

From Halifax Regional Municipality.



Selected site between the Killam Library and the Chemistry Building on Dalhousie University's Studley Campus. From Google Maps.

associated with any library: circulation area, learning commons, book stacks, study areas, and administrative space. The main feature of the library is a full-height atrium space in the centre of the building that creates a dynamic public space and brings daylight into the centre of the library on all floors. The Chemistry Building consists of classrooms, laboratories, storage, and supporting office space. The two buildings are linked by an underground passageway that is somewhat of a maze. The site boasts parking lot access on two sides, bike access, and pedestrian access both through the site and through the existing buildings. There is also access to an existing loading dock that connects to both buildings on the north side of the site.

The site presents an opportunity to reinvigorate the existing thoroughfare between the buildings, as well as the passageways inside, and create an urban gesture extending beyond the immediate site.

Site looking north.

Site looking south.

Site looking south at loading dock.

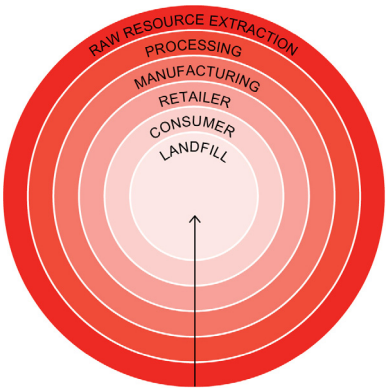
Killam Library. (Dalhousie Archives)

Chemistry Building. (Dalhousie University)

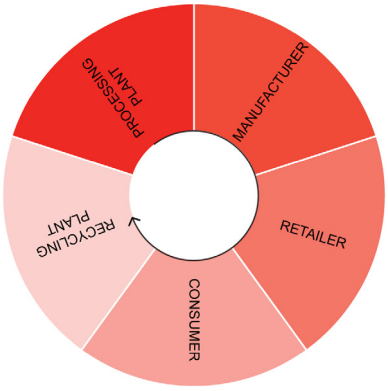
History of Selected Site

The construction of the Killam Library was completed in 1971. It replaced Dalhousie's Macdonald Library, which was small and inadequate. The Killam Library, a 230,000 square foot building, was designed to accommodate expected growth in the coming years and to be adaptable to future changes. The open courtyard was the primary source of light in the building, allowing daylight into surrounding spaces. Finished cost-effectively in pre-cast concrete, the Killam exemplified modern architectural features. In 1996 a glass roof was added to the courtyard, and the stone was restored after years of salting during the winter months. In 2002, the first floor of the library was remodeled to house the new Learning Commons. The Commons, a $1.2 million project, is a high-tech research and work centre for students, which includes 160 well-equipped computer workstations, support services, offices and group meeting rooms (Dalhousie Archives).

Construction of the Science Building (present Chemistry Building) began in 1912. In 1985, an extension and renovation of the Chemistry Building began at a cost of $9.8 million. The first phase was the addition of 20,000 square feet of well-equipped, new undergraduate laboratories on the north side of the building. This facility opened in October 1988, providing one of the most modern undergraduate chemistry laboratories in North America. The addition allowed for the second and somewhat more difficult task: the renovation of existing space to provide modern research laboratories in a modern building with traditional charm (Dalhousie University).



Waste cycle - directional



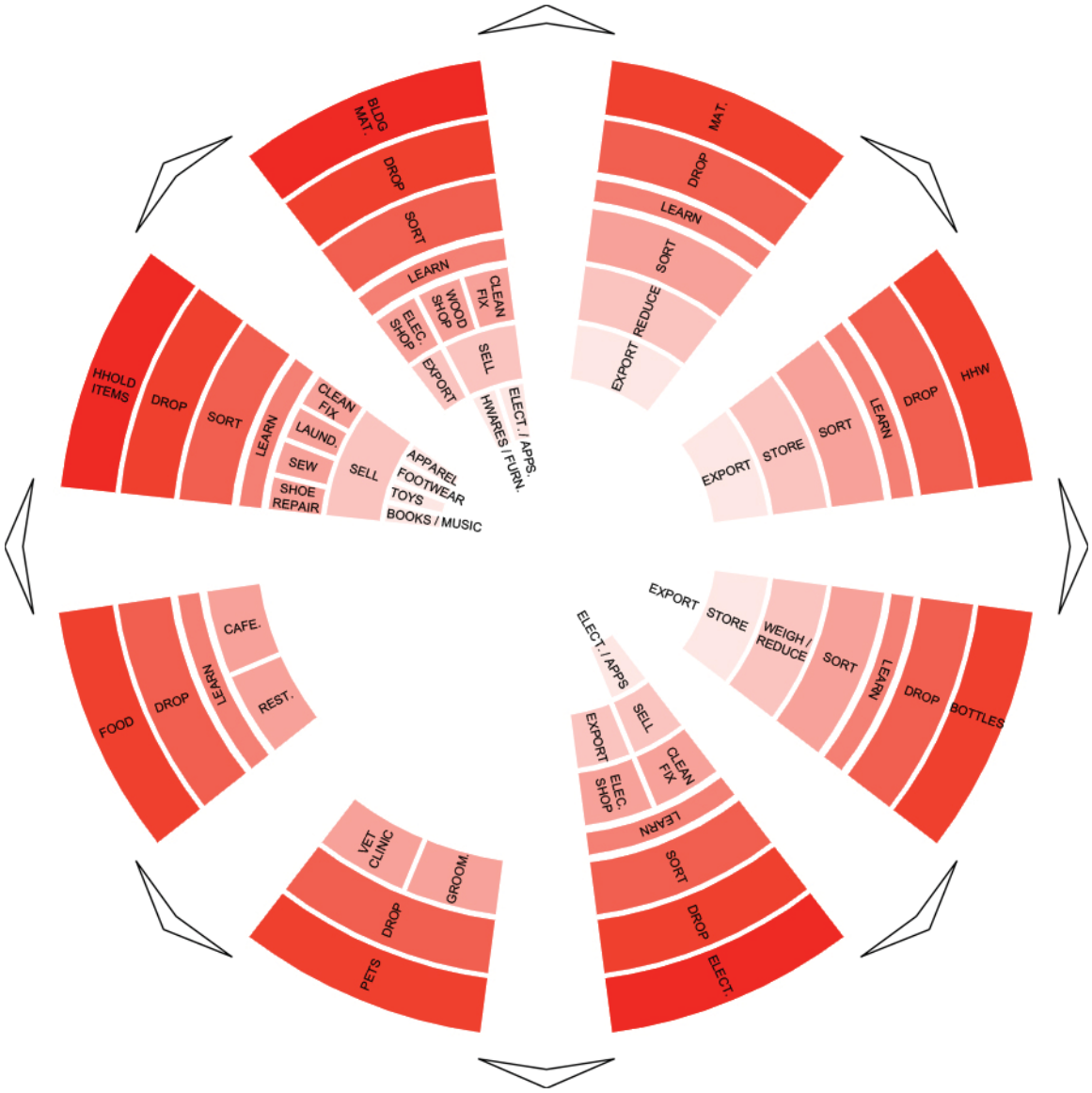
Waste cycle - closed loop

Proposed Program

Infrastructure projects, beyond utility, offer the opportunity to engage the community and encourage awareness of vital functions. This opportunity lies specifically in the program of the project. Society has a basic understanding of the systems involved in waste management, however people rarely have the opportunity to be involved, as facilities are usually sited far from urban hubs.

Dealing with benign items formerly considered garbage would unarguably result in waste diversion from landfills. Space requirements, undesirable traffic, noise, and bad odours are constraints typically associated with the design of waste management facilities. The scale of the site was the primary obstacle influencing the scope of what could be included. Processes of industrial facilities, including the materials recovery facility, household hazardous waste depot, and compost plant, are incorporated on a much smaller scale.

They are included to promote awareness of the processes involved, however the primary focus is on materials that can be processed more readily in an urban setting. The proposed project would deal with items under the following categories: materials, HHW, bottles, electronics, building materials, household items, pets, and food. Processing these products include such programmatic elements as dropping, sorting, cleaning, disassembling, fixing, selling, and/or exporting. The program is classified into four major categories with associated projected users:



Building program. Refer to Appendix for case studies of existing waste facilities in Halifax.

1. Drop-off (both residential and on campus)

2. Clean/Disassemble/Fix (employees - both residential and on campus)

3. Shop (consumers - both residential and on campus)

4. Learn (students - both residential and on campus)

By featuring the synergies that exist in the program, introducing new elements such as education, and retaining certain elements that add value, the project has the potential to develop economy. The amalgamation of existing recycling operations in a central location will promote the integration of waste management and community.

There are a few community programs in existence that parallel the proposed facility: Halifax Dump and Run and HRM's curbside give-away weekend, both held annually. The Halifax Dump and Run is an environmental initiative organized annually by Dalhousie graduate students in partnership with Saint Mary's University and community groups. The initiative has been held annually for 10 years. It relies on the community's donation of gently used items. The event is held at the gymnasium on Dalhousie University's Studley Campus. Admission is a non-perishable food item and all profits of the event are distributed to local charities. HRM's curbside give-away weekend event was held for the first time in 2010. It is advertised as a citywide treasure hunt. The initiative calls on residents to participate by placing re-usable household items at the curb in front of their homes for others to take. The aim of the event is to reduce the

Materials Recycling Facility, Halifax.

Clifton Street Enviro-Depot, Halifax.

Household Hazardous Waste (HHW) Depot, Halifax.

amount of garbage ending up in HRM's landfill.

Design Intentions

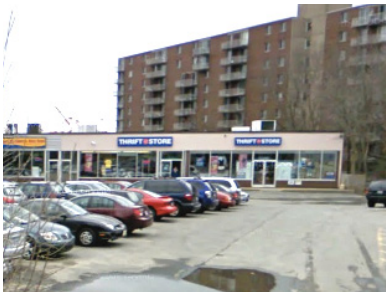
Designing in response to the needs and interests of local users cultivates positive relationships and addresses the common goals of the larger community.

In the same way a museum or monument announces something significant, relevant and specific about aspects of civic life, infrastructure facilities can offer a similar vision and impact, and encourage awareness of their vital functions. These facilities have the potential to provide even more than their obvious service; they can positively affect their social, economic, and environmental surroundings (Singer, Cruz, and Bregman 2007, 7).

The design should consider: energy efficiency, environmental impact, public safety, and community integration.

Maximizing design opportunities for natural air circulation, day-lighting, and water collection increases efficiency and reduces environmental impact (Singer, Cruz, and Bregman 2007, 5). By integrating educational opportunities for all ages and incorporating small business opportunities related to the waste, products, and community programs (people/processes/technology) into the facility there exists potential to be a public amenity. The design should not only be justified by the program, but be expressive of the program. It should express its function and include safe walkways and areas for visitors to view and understand the facility.

Renovators Resource, Halifax.



Green Street Salvation Army, Halifax.

Site Strategy

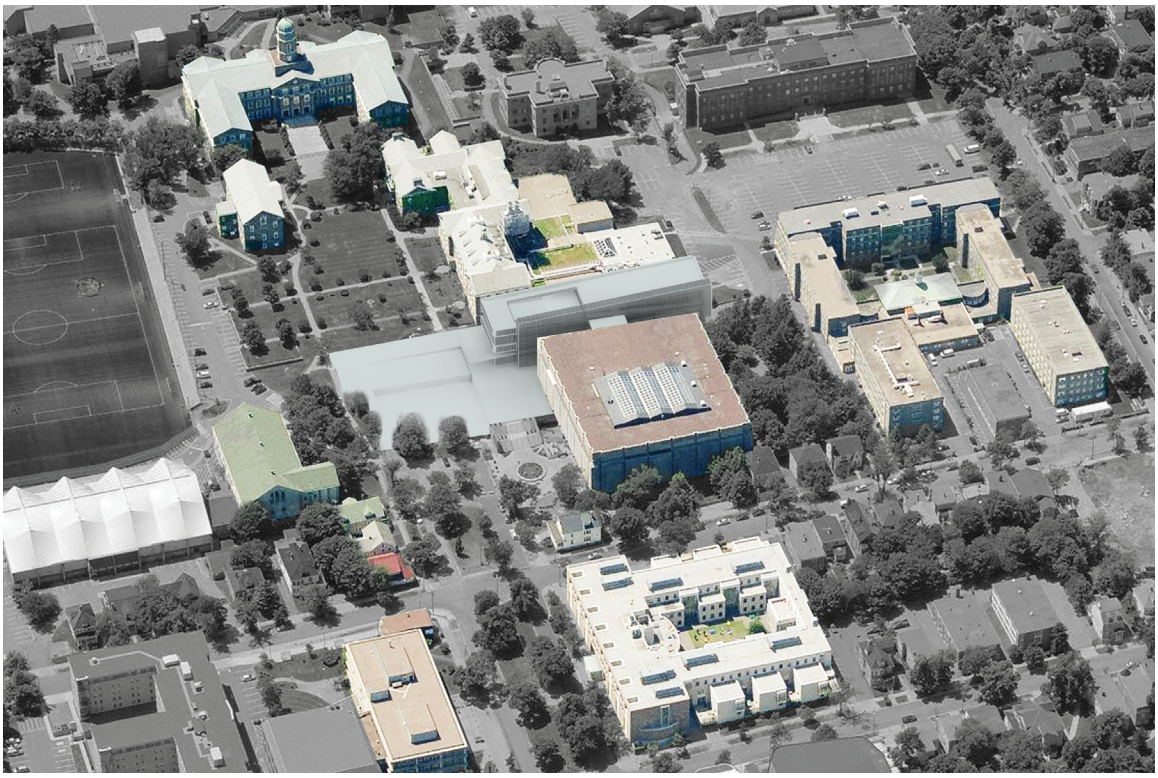
The primary objective in terms of the site is to retain the existing thoroughfare through it while emphasizing the route through the building. The secondary objective deals with visibility and access to the building, which is sited along a prominent axis.

The site is situated along University Avenue, a long axis lined with campus buildings leading to the Henry Hicks building at the top of campus. This axis is prominent as it is uninterrupted along its entire length. Thus, it is logical to respect the axis by maintaining the facade of the building flush with existing buildings. Instead, a landscape strategy is employed to enhance the space at the top of campus and direct visitors into the building. This landscape strategy consists of two moves: a cut in the slope up to the Henry Hicks building immediately beyond the row of parking at the top of campus to create a public plaza, and another beyond the plaza for a public garden. The public plaza physically links to the existing plaza in front of the Killam Library and provides access into the woodshop, located on the ground level of the Killam Library. The plaza serves as an outdoor space for many functions, including woodshop activities, the Halifax Dump and Run, concerts and various Dalhousie events. The public garden serves to provide organics to the cafeteria component of the program, which in turn provides the garden with compost. These landscape strategies are intended to retain the University Avenue axis, while enhancing the procession and encouraging use of the proposed recycling centre.

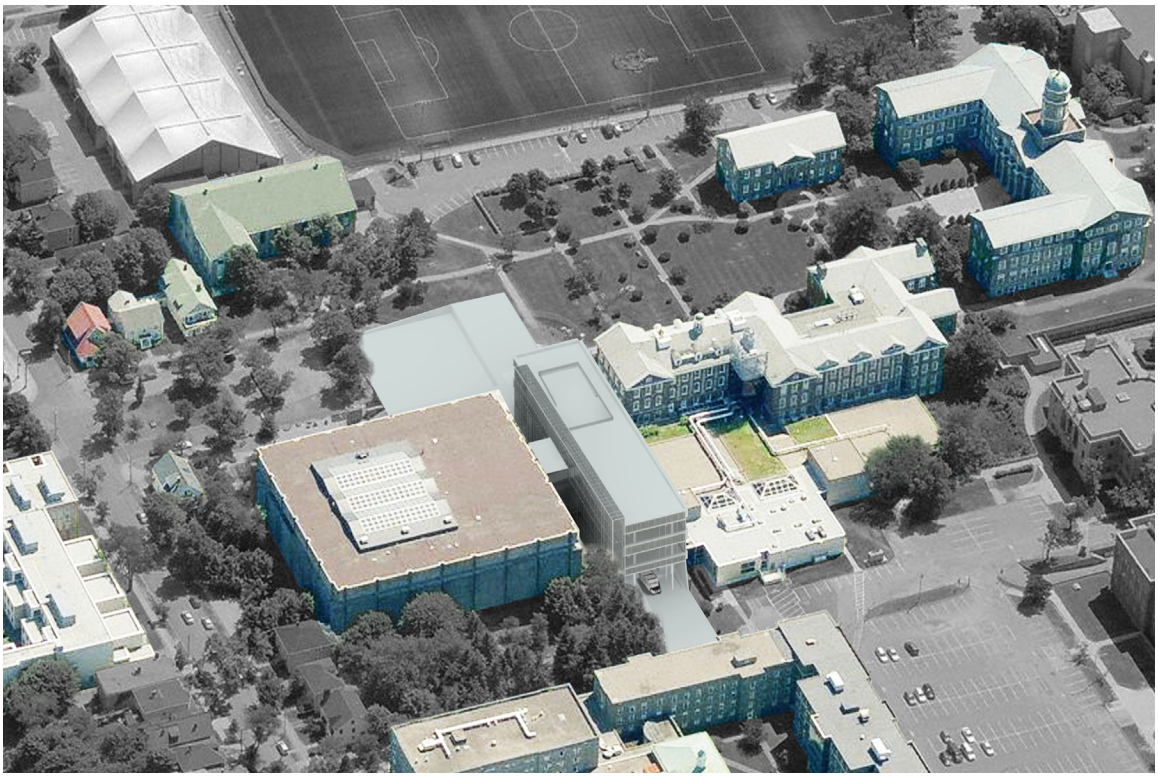
The strategy for the building is to take advantage of the

Location of the site on Dalhousie University's Studley Campus and surrounding neighbourhoods. Adapted from Halifax Regional Municipality.

Site showing University Avenue axis and existing pedestrian network. Adapted from Halifax Regional Municipality.



Building in context looking west, showing landscape strategy at the front entrance.



Building in context looking south, showing loading dock at the back entrance.

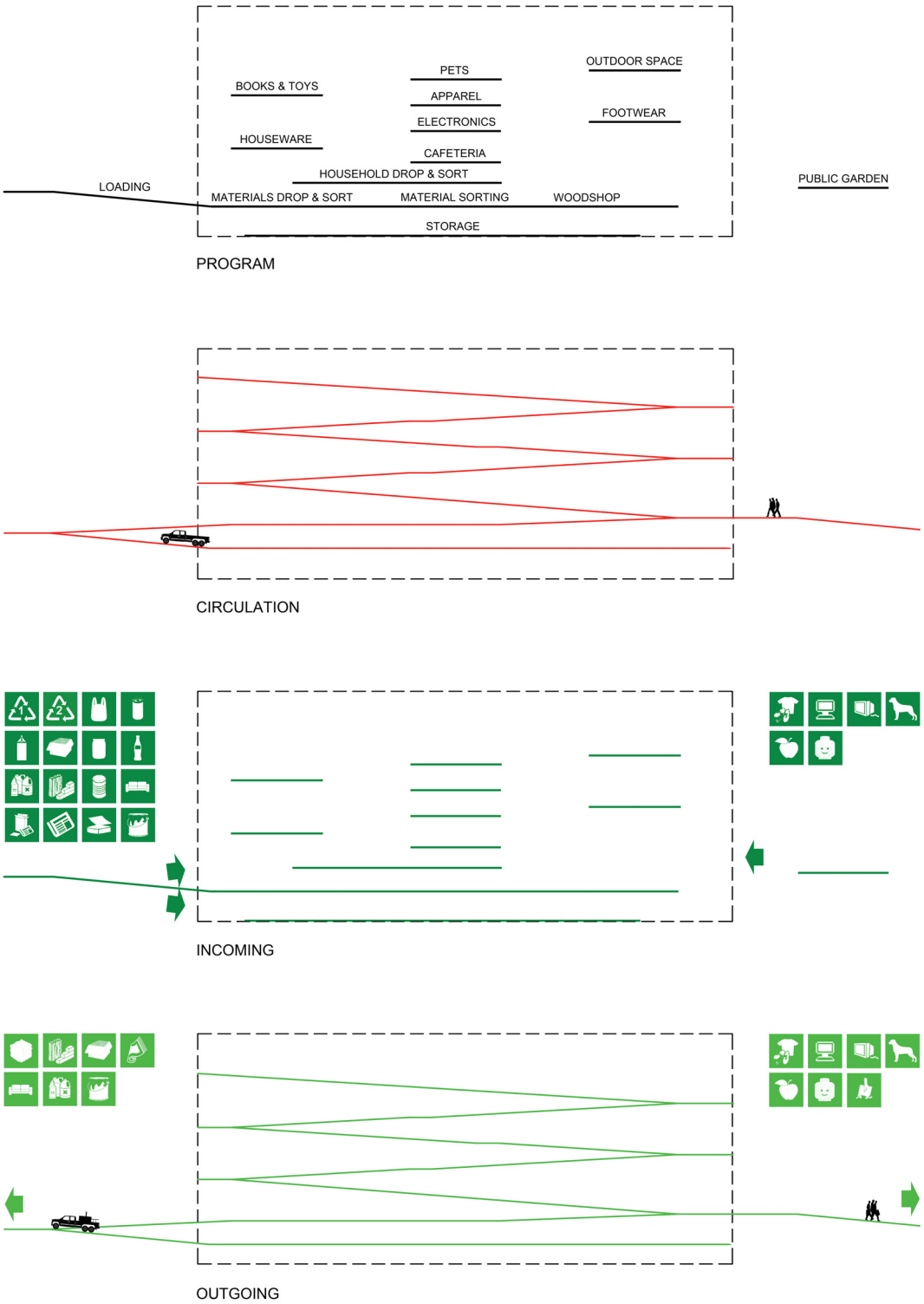
heavy pedestrian traffic through the site as a way of generating awareness and interest in the programming of the building. The nature of the site defines two points of entry: a front, public entry along the University Avenue axis, and a back entry adjacent to the existing loading dock at the north side of the site. Both facades of the building are treated similarly in an effort to respect the adjacent facades of the Killam Library and Chemistry Building. The front facade is intended to be inviting. It is primarily transparent, displaying the activities going on inside the building. There are two routes into the building from the front. One leads visitors down to a sorting platform and the other leads up into the building where the restoring, shopping, and learning components of the program exist. The back entrance opens onto the same sorting platform and provides a route through to the front of the building. Both entrances provide the option of simply passing through the building or continuing along the route up into the building.

Building Design

The main principle which informs the design of the recycling centre is as follows: create a public building which encourages and celebrates the processing of waste while respecting the scale and aesthetic of the surrounding context. This principle has two parts: program and architectural expression. Within this general principle, several specific objectives are manifest: amalgamate existing waste recycling processes, generate opportunities for interaction between projected users (visitors, employees, consumers, and students), and express the functions of the building architecturally.

Interior resolution of the program is fundamental to the design. Not only does the amalgamation of processes into a single building require a high level of organization, certain combinations and adjacencies provide synergies and potentially tell a story of the processes involved. The project is not approached as one part expresses the whole, but rather the whole is an expression of its function. This approach avoids the creation of spatial hierarchies, where one space is considered to be more significant than another. Rather, the spaces are to be understood as having a common function and the building a cohesive whole. The emphasis is on the movement of people and products (incoming and outgoing), therefore the route through the building is inherent to the resolution of the program (refer to the diagrams on the following page).

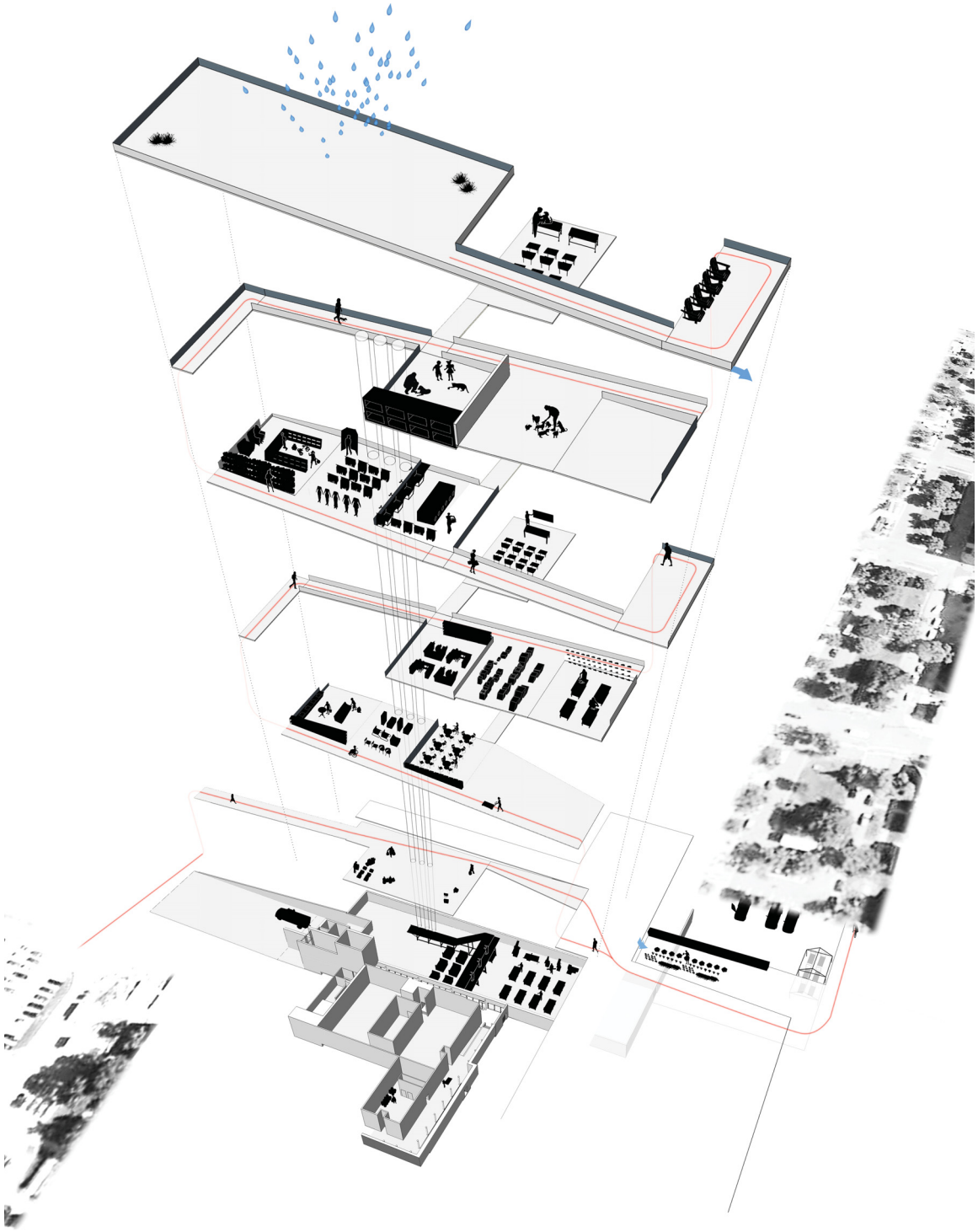
The site itself, which is extremely long and narrow, poses some challenges in terms of circulation, views within, and daylighting. In consideration of the movement of people and the products brought in and out of the building, a ramp is the primary device employed for the circulation through the building. Once inside the front entrance the floor splits: one side cuts down to the sorting platform where items such as furniture, housewares, electronics, clothing, books and toys are sorted, while the other cuts up into the building (refer to the images on p. 39-41). The loading dock at the back entrance is utilized for the dropping and sorting of items such as recyclable materials, household hazardous waste, and building materials. The ramp leading up into the building serves as the path along a spatial sequence through the building. The ramp is cut at intervals to create platforms. These



Concept diagrams of the building highlighting the movement of people and products.

platforms provide working spaces for the processing of items designated to that specific platform. They are unobstructed, save for plumbing and built-in counter space required for the designated program (refer to the image on the following page). In addition these platforms offer sufficient flexibility as tenants and uses might change over time. The spatial sequence is determined by the movement of people and products along the route. It is programmed so that heavier items are within closest proximity to the entrance, having the shortest travel distance along the path. Each platform has a designated space adjacent to it for the display and sale of restored items. The cafeteria, electronics, apparel and pet shop components of the program offer an educational layer to the overall program. Each platform designated to these components connects across via a bridge to the Killam Library. The cafeteria is linked to a kitchen where food is prepared and cooking classes take place. The electronics, apparel, and pet shop platforms link across to classrooms where one would learn how to repair electronics, sew, and treat animals. Every platform promotes an awareness and involvement in the processing of waste. Everywhere, the public encounters a process involved in recovering waste, whether it be dropping, sorting, cleaning, disassembling, fixing, selling, or learning. By providing such a broad array of processes and activities, the building serves to attract all classes of people.

The material palette for the building was kept to a minimum so that the people, products and processes are highlighted. The site, being long and narrow, restricts



Exploded bird’s-eye axo illustrating furnishings and activities.

Front entrance and public garden.

Ramp down to the sorting platform.

View to the materials sorting line from the sorting platform.

Sorting platform.

Ramp up into the building.

Cafeteria showing the herb garden and kitchen in the Killam Library beyond.

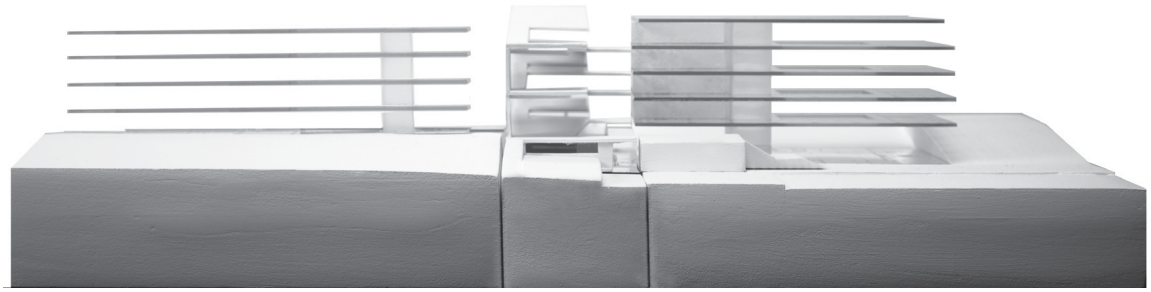
Ramp up to the electronics platform showing views beyond.

The classroom in the Killam Library bridged to the electronics platform beyond.

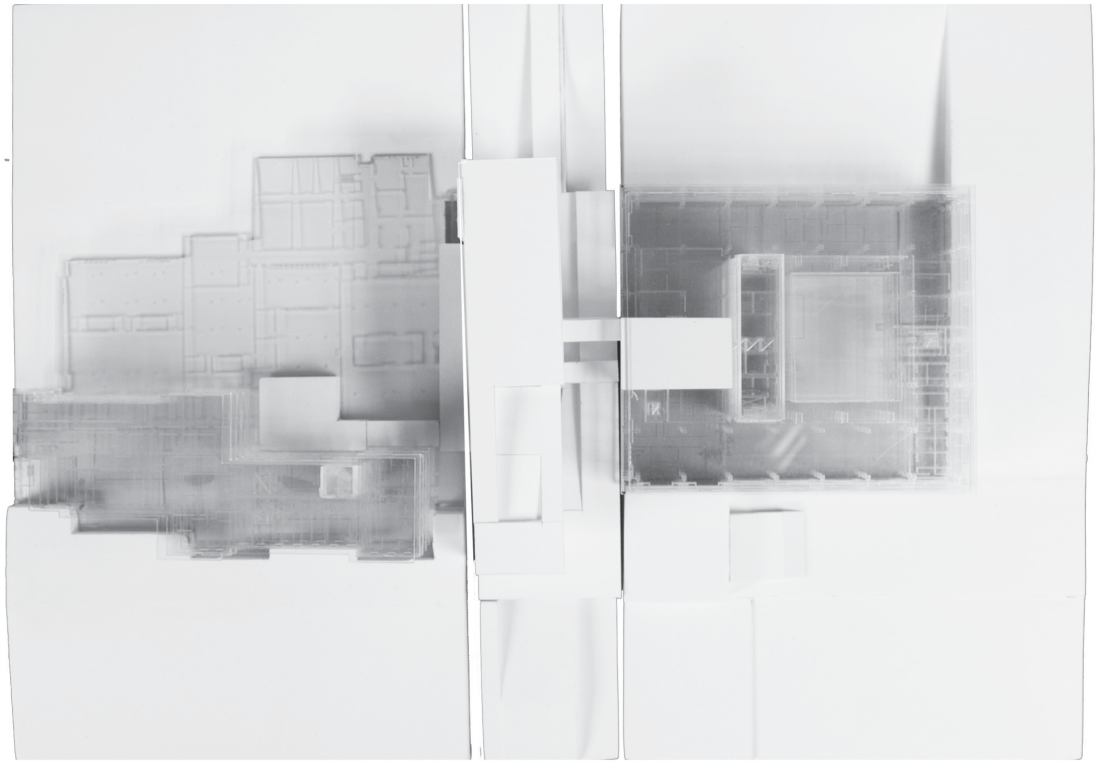
The apparel platform showing the sewing class in the Killam Library beyond.

Rooftop.

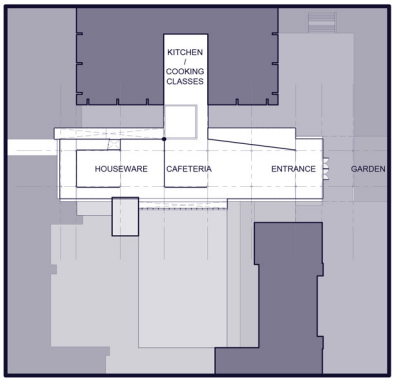
views into the building at the front and the back. This compromises expression of the interior functions of the building. However, this restriction is balanced by the extensive views once inside the building. The ramp is treated with polished concrete for ease of pushing heavy carts loaded with items. The platforms are treated with a material indicative of its designated program. For instance, the cafeteria and apparel platforms are tiled. The rooftop is a green roof that provides outdoor space for the animals housed in the nearby pet shop. The roof also collects and filters rain water for the the public garden below. Three large chutes provide every floor with disposal of paper and other recyclables which are delivered directly down to the sorting line at ground level.



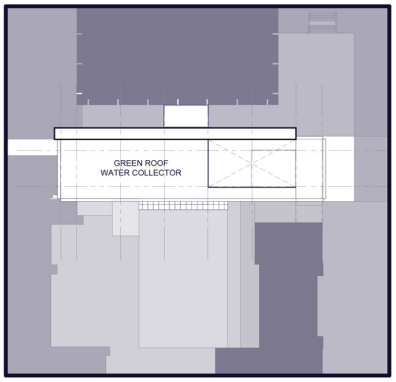
Model showing the building and its relationship to the Killam Library and Chemistry Building.



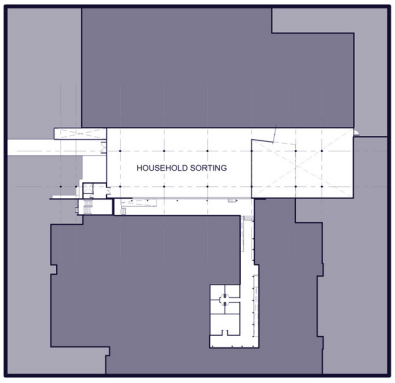
Model from above showing the building and connections to the Killam Library and Chemistry Building (both shown transparent).



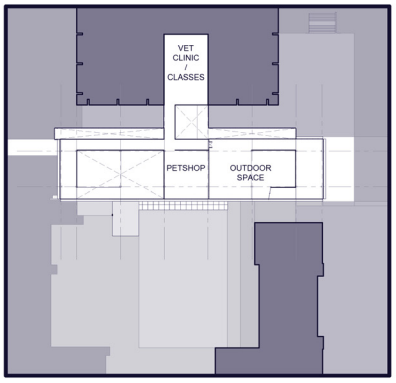
LEVEL 1



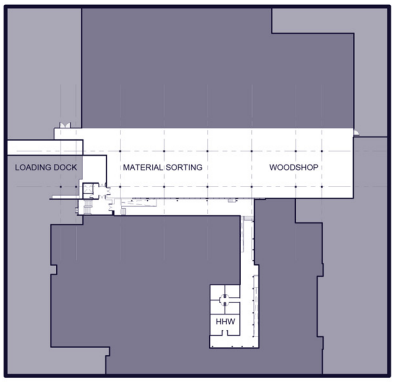
ROOF LEVEL



PODIUM LEVEL

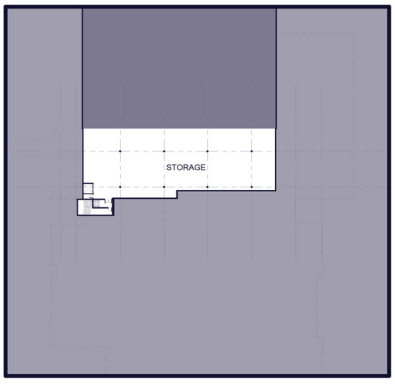


LEVEL 4

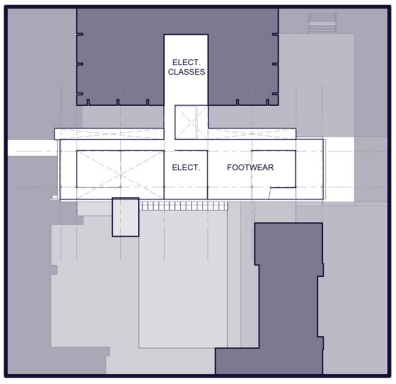


GROUND LEVEL

LEVEL 3

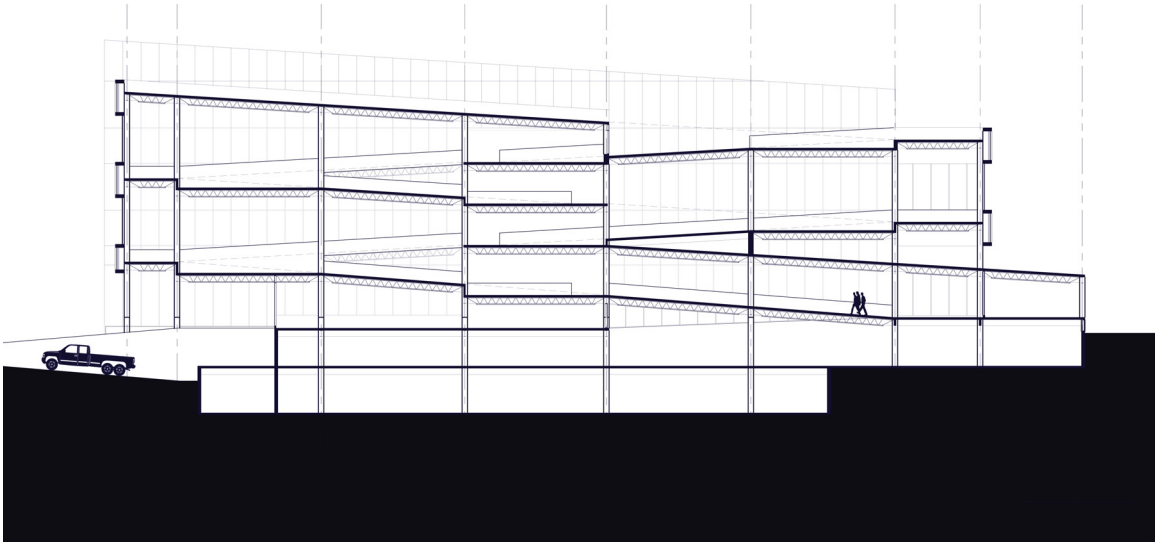


BASEMENT LEVEL

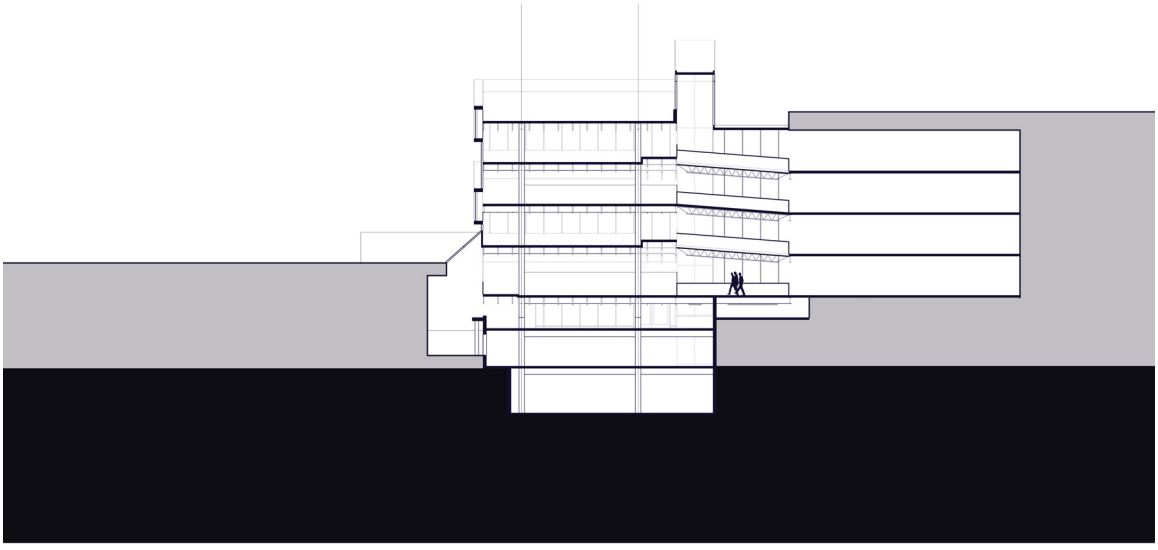


LEVEL 2

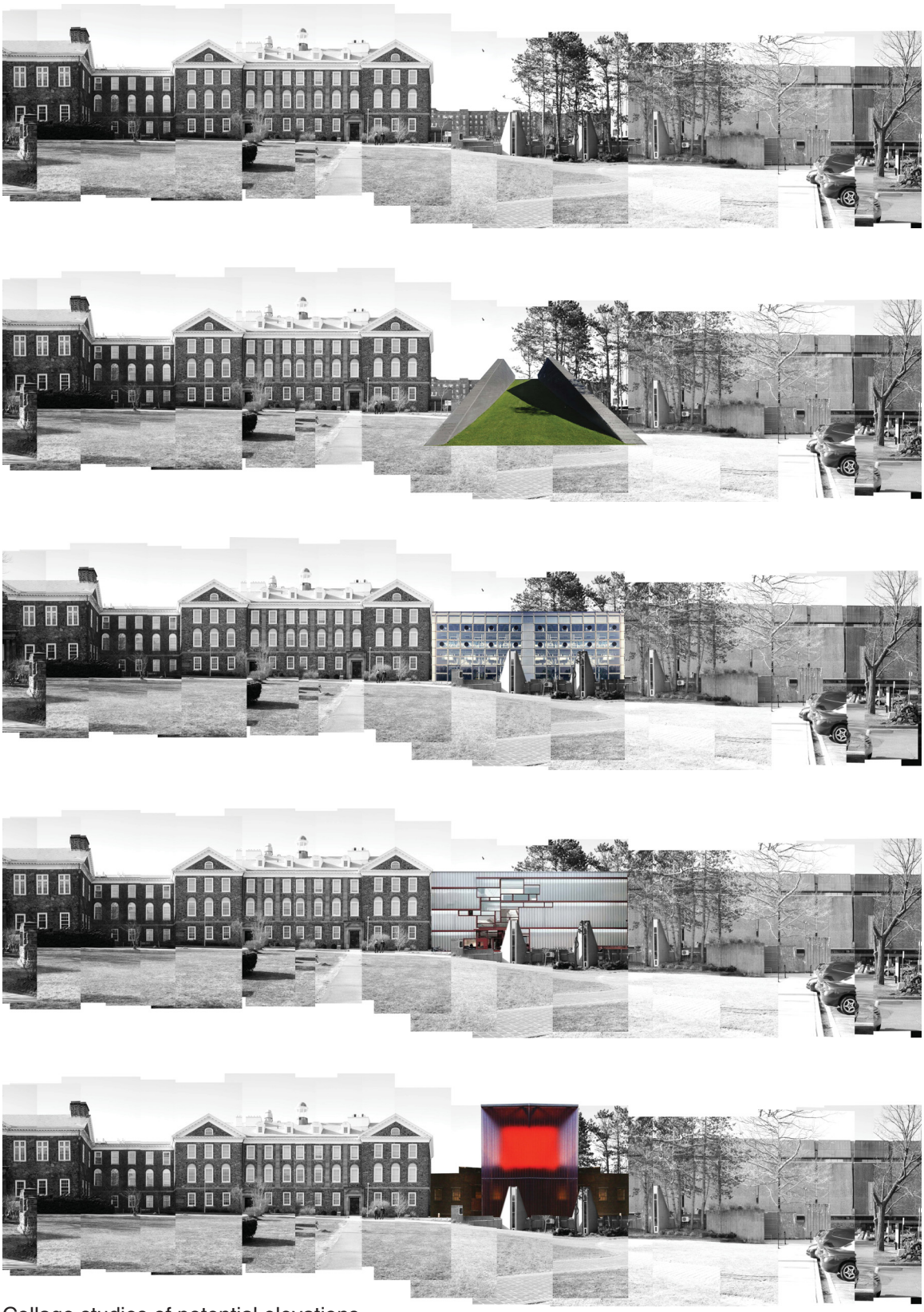
Floor plans



Longitudinal section

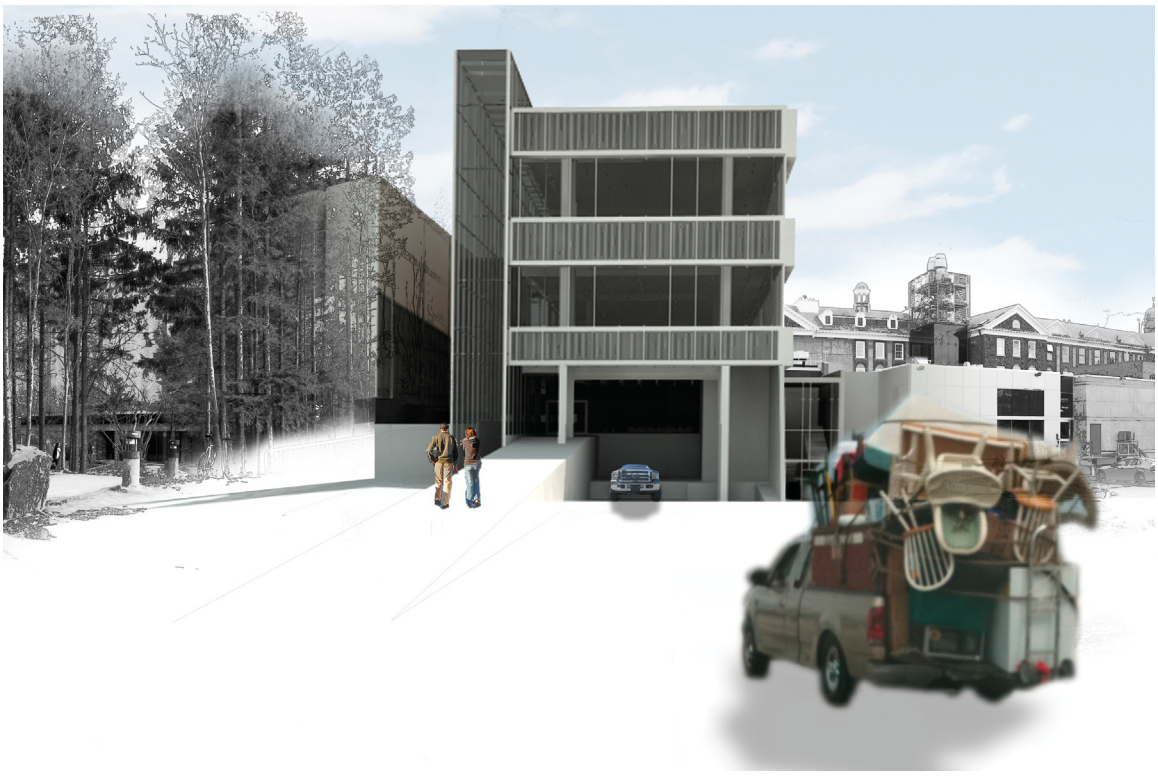


Cross section



Collage studies of potential elevations.

Approach



Rear approach

CHAPTER 4: SUMMARY

Throughout this investigation the emphasis has been on generating a new typological model for waste management infrastructure. Through visiting and forming an understanding of existing facilities in Halifax, an alternative concept was developed.

Waste management infrastructure is vital in supporting society. However, current public perception of facilities is that they are undesirable to have nearby and less so to visit. Thus, such facilities are far removed from the public. This has become the ordered social convention in terms of waste management, to disregard waste and take minimal personal responsibility in dealing with it. Furthermore, this lack of engagement results in apathy towards the issues surrounding waste management.

Although Halifax has developed an advanced system of waste management, the vast network of facilites requires an extensive amount of resources to support transport and operational costs. Furthermore, waste streams are not being fully capitalized. Finding new uses for waste streams would revamp how our economy functions.

> It should be pointed out from the start that the very idea of manipulating garbage - and moreover using ingenuity to turn it into something productive and beautiful - is extremely innovative and virtually contravenes social convention. In today's world, garbage is generally considered filthy, degraded, and useless, only good for being kept out of sight. (Bohamon and Sanjines 2008, 7)

A universal fundamental shift in thinking, where waste has value, would result in econmic, environmental, and social benefits. To promote this perspective, facilities

and processes regarding waste must be alternatively woven into the urban fabric so that waste can be dealt with locally and people have the opportunity to take an active role in processing waste.

The amalgamation of programs associated with recycling certain materials in the proposed recycling centre posed several challenges. Space requirements and circulation were the primary obstacles. Traffic, noise, and bad odours typically associated with certain waste management facilities were also considered. Such constraints molded the program in terms of the sorts of materials that could be processed more readily in an urban setting. Processes of industrial facilities were incorporated on a much smaller scale to promote awareness of the processes.

Educational and economic opportunities became apparent in the development of the program and were included to add value to the project.

Further investigation within the realm of waste management is endless. It is evident that current practices should be challenged. Many questions evolved in the process of developing this project:

What aesthetic should a recycling centre sited in an urban setting have?

How much should it respect its surrounding context?

What should the longevity of the building be?

The proposed recycling centre attempts to prove the en-

vironmental, social, and economic benefits inherent to combining the people and processes involved in waste management. The concept is to encourage innovative thinking in terms of waste management and by this means, initiate collective change of behaviour.

APPENDIX: CASE STUDIES OF EXISTING WASTE FACILITIES IN HALIFAX

Enviro-Depot
ACES (Atlantic Canada Electronics Stewardship) Drop-off Centre
2651 Clifton Street

hours	Mon-Sat: 8:30-5
employees	winter - 3 staff
services	Accepts, stores, and transports electronics to approved processing and recycling facilities
clientele	Consumers & businesses within the province
product inventory	• Desktop computers • Computer peripherals • Laptops • Desktop printers • Personal or portable audio/video systems • Vehicle audio/video systems • Home audio/video systems • Non-cellular telephones
recycling process	Manual and/or mechanical processing to recover raw materials such as metals, glass and plastics
environmental impact	Responsible recycling practices eliminate issues such as illegal dumping, shipping offshore to developing countries, improper handling/disposal of toxic materials, and inadequate health and safety systems for workers handling and processing this equipment
building requirements	• Large space for sorting/storing • Street level access for loading/unloading • Vehicular access to building (overhead doors)

Enviro-Depot
Clifton Recycling Centre
2651 Clifton Street

hours	Mon-Sat: 8:30-5
employees	winter - 3 staff summer - 10 staff
services	Enviro-Depots are paid a handling fee to accept and sort beverage containers from the public. The Clifton Street Enviro-Depot also accepts latex and alkyd household paint, electronics, and scrap metal

clientele	Residents of HRM
product inventory	• Gable top cartons • Tetra pak cartons • Glass beverage bottles • Plastic beverage containers • Steel beverage cans • Aluminum beverage cans • Refillable beer bottles
recycling process	RRFB Nova Scotia collects containers and ships them to processing centres where they are baled for shipment to market

environmental impact	Diversion of containers from the landfill and converting them into new valuable products
building requirements	• Large space for sorting/storing • Street level access for loading/unloading • Vehicular access to building (overhead doors)
equipment requirements	Forklift for moving pallets

HHW Depot
Household Hazardous Waste Depot
20 Horseshoe Lake Drive

hours	Select Saturdays: 9-4
employees	6 staff (Atlantic Industrial Services)
services	Providing a drop-off location for household hazardous waste
clientele	Residents of HRM
product inventory	• Batteries • Leftover liquid paint • Leftover corrosive cleaners • Pesticides/herbicides • Gasoline • Fuel oil & used motor oil • Solvents & thinners • Pharmaceuticals & drugs • Aerosol cans containing hazardous substances • BBQ propane tanks • Small propane cylinders

recycling process	Household hazardous waste is collected, sorted, and then shipped to recycling facilities to be processed
environmental impact	The program helps keep household hazardous waste out of landfills and the environment
building requirements	• Space for sorting and storing • Street level access for loading/unloading • Vehicular access to building (overhead doors)

equipment requirements	Forklift for loading barrels onto truck

Recycling Facility
20 Horseshoe Lake Drive

hours	Mon-Fri: 7:30-6
employees	
services	
clientele	Residents of HRM
product inventory	Blue bag recyclables: • All deposit bearing containers • Other plastic bottles & containers (only 1 & 2) • Glass bottles and jars • Steel & aluminum cans • Clean aluminum foil & plates • Milk containers • Mini Sips & Tetra Paks • Plastic bags including: grocery, retail, bread, dry cleaning & frozen food bags, bubble wrap Paper recyclables: • Dry & clean paper • Newspapers • Flyers • Glossy magazines • Catalogues • Envelopes • Paper egg cartons • Paperbacks • Phonebooks • Shredded paper Corrugated cardboard: • Appliance boxes • Pizza boxes
recycling process	
environmental impact	
building requirements	
equipment requirements	

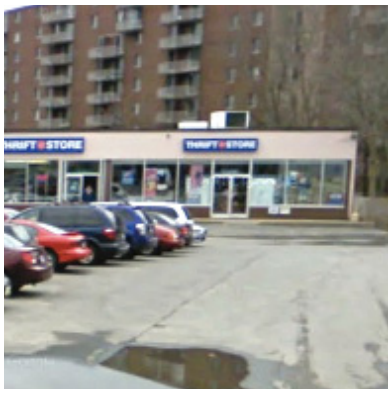
Renovators Resource
1257 Maynard Street

hours	Mon-Sat: 9-5
employees	2 staff (mother/son)
services	• Dismantling of residential, commercial, and industrial facilities • Providing an outlet for quality, reclaimed building materials at affordable prices • Advice on repair, refinishing or installation of used building materials

clientele	Homeowners/contractors
product inventory	Doors, windows, plumbing fixtures, period light fixtures, cabinets, hardware, fireplace mantels, wood flooring...
recycling process	Renovators Resource provides a dismantling service - a skilled demolition crew that carefully disassembles salvable parts of a building for resale.
environmental impact	Premium materials in older buildings are re-used, not thrown away

building requirements	• Large retail space • Storage • Wood shop • Street level access for loading/unloading • Universally accessible
equipment requirements	• Flat bed truck for transporting materials • Winches for lifting heavy plumbing fixtures • Standard woodshop equipment

Salvation Army
5280 Green Street



hours	Mon-Wed: 9-6, Thurs & Fri: 9-8, Sat: 9-6
employees	
services	Offering great quality second-hand merchandise at low prices. All proceeds generated are used to help fund a number of programs and services that assist those who need help in the community
clientele	The general public, primarily young adults and families starting out
product inventory	clothing, toys, and household goods
recycling process	Public donation of gently used goods
environmental impact	Donations extend the life of landfills in the province through the reuse of textiles and household items
building requirements	• Large retail space • Storage • Street level access for loading/unloading • Universally accessible
equipment requirements	• Outdoor drop-off bins

REFERENCES

Beeler, Carolyn. 2011. From your driveway to China. *Newsworks*. http://www.newsworks.org/index.php/local/item/14311-recycling

Bohamon, Alejandro, and Maria C. Sanjines. 2008. *Rematerial: From waste to architecture*. New York: Parramon Ediciones.

Brooks, Bob. 1965. Photographic Portrait of Africville in the 1960s. Nova Scotia Archives. http://www.gov.ns.ca/nsarm/virtual/africville/archives.asp?ID=3

Caine, Tyler. 2010a. Pricing trash out of existence. *INTERCON*. http://progressivetimes.wordpress.com/2010/10/25/pricing-trash-out-of-existence/

Caine, Tyler. 2010b. Transitioning to an economy of reuse. *INTERCON*. http://progressivetimes.wordpress.com/2010/12/07/transitioning-to-an-economy-of-reuse/

Community Stakeholder Committee. 2007. *Executive summary, an Integrated resource management strategy for Halifax County, Halifax, Dartmouth/Bedford.* http://www.halifax.ca/wrms/documents/070213cow4.pdf

Dalhousie Archives. n.d. The buildings of Dalhousie University. http://www.library.dal.ca/duasc/buildings/Killam.htm

Dalhousie University. n.d. Department history. http://chemistry.dal.ca/About%20the%20Department/Department%20History/

Davies, Anna R. 2008. *The Geographies of garbage governance: Interventions, interactions and outcomes*. Burlington, VT: Ashgate Publishing Ltd.

Erickson, Paul. 2005. *Underground Halifax.* Halifax: Nimbus Publishing Ltd.

Google Maps. Dalhousie University, Halifax (map). http://maps.google.ca/maps

Halifax Regional Municipality. 2010. Site in context, Halifax (GIS data).

Hsu, Shih-Jang. 2004. The Effects of an environmental education program on responsible environmental behaviour and associated environmental literacy variables in Taiwanese college students. *Journal of Environmental Education* 35, no.2: 37-48.

Jacobs, Jane. 1969. *The Economy of cities*. New York: Random House.

Maessen, Marcel (Waste Resource Education Officer for HRM Solid Waste Resources), email message to author, November 22, 2010.

Misztela, Ted. 2002. A look back. *Bedford newspaper,* April.

Nova Scotia Environment. *Final report on Nova Scotia's 1995 solid resource management strategy.* https://www.gov.ns.ca/nse/waste/docs/SolidWasteStrategyFinalReport1995.pdf

Perez Leighton, Lorena. 2010. George and Annette Murphy Center at Asphalt Green Sports and Arts Center. DOCOMOMO US. http://www.docomomo-us.org/register/fiche/george_and_annette_murphy_center_asphalt_green_sports_and_arts_center

Popular Science. 1941. Parabolic building houses asphalt plant. http://books.google.ca/books?id=UycDAAAAMBAJ&pg=PA99&lpg=PA99&dq=municipal+asphalt+plant+by+kahn&source

Save Lincolnville Coalition. n.d. Landfill dumped in back yard of Lincolnville (photo). http://www.shunpiking.com/ol0404/0404-AC-lincollandfil.htm

Serota, Nicholas, and Deyan Sudjic. 2010. *Richard Rogers + architects: From the house to the city*. London: Fiell.

Singer, Michael, Ramon J. Cruz, and Jason Bregman. 2007. Infrastructure and community: How can we live with what sustains us? *Environmental Defense.* http://www.edf.org/documents/7182_Infrastructure_and_Community.pdf

Statistics Canada. 2007. Halifax, Nova Scotia. http://www12.statcan.ca/census-recensement/2006/dp-pd/prof/92-591/index.cfm?Lang=E

United Nations Human Settlements Programme (UN-HABITAT). 2010. *Solid waste management in the world's cities: Water and sanitation in the world's cities 2010*. London: Earthscan.

Wells, Lynne. 1996. Otter Lake facility. *Mirror Nova Scotia,* January.