

The Future of Inner-City Farming: Through the Urbanization of the Central Experimental Farm

by

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Dalhousie University is located in Mi'kmaq'i,
the ancestral and unceded territory of the Mi'kmaq.
We are all Treaty people.

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Abstract

The Central Experimental Farm, a 988-acre plot of farmland for agriculture research, is located within the suburbs of Ottawa. The city is evolving but the farm is living in the past. Land developers will start looking to the farm for available land following the approval of the new Ottawa Civic Hospital on the farm's property. To prevent this the identity and cultural landscape of the farm will be redeveloped, and new urban farming systems will be introduced to modernize its agricultural practices. Programs are created to engage the farm with new urban actors such as local organizations, community groups, and local wildlife. Refocusing the farm provides the facility the opportunity to reconfirm its position within the city and continue to provide necessary resources to the provinces and territories of Canada. The new programs will develop solutions to climate change issues, food insecurity, and green infrastructure to unify the farm.

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Chapter 1: Introduction

On a global scale, cities have been making a slow recovery to a more sustainable way of living. The efforts the cities are making can often be minimal in comparison to the amount of pollution and waste that still comes out of them. Ottawa Ontario is just one such example. The city sees itself as a model for the rest of the country, however, policies and movements toward sustainable programs and developments are very slow in the capital (Skura 2023). Ottawa is fortunate enough to have a unique situation, that being the experimental farm, which can project the city into a sustainable and food-secure future.

The Central Experimental Farm will employ new urban farming programs to solidify a connection to the local community to prove its significance to the city's framework. The resurgence of the farm will create resources for the city to begin making much larger steps towards reducing food deserts, providing affordable local food resources, and supplying easily accessible agricultural education for its community. In turn, it will bring new life into a dying site and unify its cultural identity which has been lacking in the eye of the public. Urban farming is a key part of innovative sustainable cities (Newman 2010,155), The Central Experimental Farm offers the city acres of existing open farmland within the city limits that can promote research and education to help the public in producing its own resources. This encourages self-sufficiency and local production across Ottawa.

My thesis intervention will have the farm address issues of food security, urban renewal, and agricultural education. Canada is beginning to struggle with food insecurity with

its rising immigration rates. Citizens are having a hard time housing and feeding themselves and their families. The city needs to turn to local urban farming to help produce more affordable food options. This is one of the first steps the city needs to take to make a positive change. Additionally, the city must undergo an urban renewal. Many elements of the city create a physically and mentally unhealthy environment. New principles need to be applied to the infrastructure of the city to create a safer and healthier environment. Educating the community is just one step towards creating a more self-sustaining city. Not enough citizens know about how they can participate in urban farming. Either through their own food production or through jobs in urban farming. There needs to be more awareness of opportunities to create a healthier and stronger city.

I will break down the history of the farm, to create an understanding of the importance it has in the city. I will create an awareness of the farm's achievements in seed variation experimentation, frozen food production, as well as herbicides. The research discoveries at the farm have created Canada as a nation and without the farm our global farming economy would not be nearly as successful. Regardless of its importance to the nation, the farm is at risk due to its location within the city. The farm was not always at risk, it was once a part of a rural environment which was quickly consumed by the expansion of the city. Now that the farm is surrounded by suburban neighborhoods, the property is highly sought after for its land value. Many citizens believe the land would be better used for more traditional urban programs, but it is within the city's interest to leave the farm where it is. Due to the fact that a physical move would be too expensive for the government and the

farm can add value to the city that it might not yet realize. The farm will offer the city new educational opportunities in agriculture, it will create areas for connection or information exchange within the community, and by adapting some of the research plots it will provide local food resources. There is no reason for the farm to leave. It is exactly what the city needs but does not yet realize.

To understand what needs to change at the farm to allow it to be an important system within the city, my thesis will break down the goals of the project. Such as the inclusion of urban farming systems, agricultural education, and more naturalistic green spaces for mental and physical health as well as wildlife habitats. The redevelopment of the farm with a greater focus on community engagement will change the city's mind on the farm's stance in the urban environment. Architectural theories such as the actor-network theory, adaptive reuse, and green city movement are used to adapt the farm to its environment and address the sustainability standards the farm will uphold. These principles are reflected in the design of my thesis' architectural interventions. Through my consideration for the community needs in my design, by reusing existing site buildings that were underutilized and the importance of green and blue spaces across the site plan.

My design will occur at three different scales. The city, the master plan, and the research center. The scale of the city will address the different policies and farming practices that have been developed at the farm such as allotment gardens and vertical farming systems that can be established across the city. The master plan discusses the important elements that will be added to the site. Such as programs connecting the farm to local organizations, land on the farm that the

community can take ownership of, and ordinary activities to draw the general public onto the farm. The research center concentrates on education and experimentation of urban farming strategies and how they can positively affect the city like the traditional farming practices affect the nation.

Finally, the thesis will conclude by discussing the future direction of the farm and the impact the farm's programs such as urban farming strategies and sustainable building policies will have on the rest of the city. The focus of the farm is to scale down and address the local area, however, the principles of the farm can still be used as a foundation for similar systems across the nation.

Chapter 2: Concepts



Issues to Address: the collage represents the many different issues that the farm will be addressing and providing solutions for. Issues include: food security in Ottawa, a need for an urban renewal and the need for more agricultural education.

Food Security

In recent years Canada has seen a dramatic increase in its population leading to a skyrocket in the housing market, making it difficult for Canadians to rent or buy. “With the cost of living continuing to rise, spending more to buy less food is a reality for an increasing share of Canadian families” (Statistics Canada 2023b). Statistics Canada states that most of those families in a food insecure household are above the poverty line because income is not the only factor in determining food insecurity. Single mothers and racialized families are some of the highest affected groups.

The price of food continues to increase each year in Canada. Unfortunately, this is not the market for companies to take advantage of their customers as these are essential needs, and if the price of food increases in Canada, the citizens cannot opt out of purchasing. In 2022, 18.4% of Canadian



Photography of Urban Farming in Havana, Cuba (Clouse 2014).

citizens are living in a food insecure household (PROOF 2023). The country is currently importing more of its produce than it is exporting which can explain the increased cost of groceries. If food was being produced in abundance locally then there can be cuts made to transportation and importation costs. If more households knew how to grow produce on their own property it would be easier to meet household needs through locally sourced food production.

Cities today can be self-sustaining enough to support their people with minimal to no importation. Cuba is an example of a country which had no choice but to become self-sustaining. Cuba relied heavily on trade from the Soviet Union and agreed to a deal in which their food production was very limited. When the Soviet Union fell in 1989, Cuba was left with minimal resources to sustain itself. Due to the fact that 57% of its food was imported (McNamara 2017). The country was left extremely isolated and they resorted to growing in empty urban lots, in cities such as Havana, to begin to produce food for themselves. “The agricultural systems developed during this period were devoid of pesticides and fertilizers by necessity, and therefore Cuba’s emerging farming practices were organic by default” (McNamara 2017). This organic urban farming system that they developed was called organopónicos. By 2001 Cuba was able to become food secure with the help of government supported urban farming practices. They were able to produce an estimated 50% of Havana’s fruits and vegetables within the city. With enough interest and research urban farming, alongside local farmsteads, will be able to supply enough food for a city to sustain itself with minimal to no importation.



Ottawa has several parks and green spaces across the city, but none come close to the size of the farm. The benefits of this size of green space is very important for the city. Photograph of Centre Block (NCC n.d.).



A map of Ottawa with all existing parks. The CEF is easily recognized as the largest part in the centre of the map.

It is not out of reach to be able to develop self-sustaining cities. However, it must be noted that for a city to be comfortably self-sustaining it is important to include locally sourced food production as well. Urban farming should work in tandem with local farming practices to be able to keep up with increasing food demands and prevent the decline of greenbelt farms. Local farms are threatened by the aging population as well as high importation of food. Traditional farms may be able to produce different variations or types of produce as well as meat and dairy production that cannot be done within the city as well.

Urban Renewal

The urban landscape is in desperate need of a change to help combat the ongoing global warming crisis. Cities are major developers of air pollution due to the industrial regions, the heavy use of automobiles and their paved surfaces which cause stormwater complications as well as create heat islands (Sinnett, Smith and Burgess 2015). It is essential to the health of both humans and the environment for there to be a major change in the way that the city operates. Green spaces are essential to creating positive change in the city. “Green spaces are good for physical activity, restorative effects, and social cohesion” (Sinnett, Smith and Burgess 2015). Specifically, nature and green spaces have been said to provide a relief to mental fatigue, a sense of safety and views of nature from a hospital will shorten the stay of its patients (Waliczek and Zajicek 2016). Green spaces in the city are active solutions to many of the problems caused by the city itself, reducing the negative effects from the pollutants. Bioswales are able to clean stormwater runoff and strip the water of the chemicals that are absorbed from emissions, and “tree canopy over roads

impede the dispersion of vehicle emissions pollutants” (Waliczek and Zajicek 2016, 18). Cities are beginning to implement urban planning strategies in order to incorporate more green spaces and low impact development.

Green Urbanism and its Application to Singapore by Peter Newman discusses seven different types of green urbanism that can be easily applied in different cities across the world based on the different types of sustainable goals each city wants to highlight. The types of green urbanism include; The Renewable City, The Carbon- Neutral City, The Distributed City, The Biophilic City, The Eco-Efficient City, Placed Based City, and The Sustainable Transport City. Some of the city types have overlapping principles such as locally developed renewable energy sources, incorporation of green infrastructure, reduction of human waste and making transportation more sustainable. Whether that be by reducing the use of cars or sourcing foods and goods locally to decrease long distance transportation of goods. Newman introduces urban farming as a method of green urbanism



Urban Renewal: The urban environment needs to make a transformation, inclusion of green infrastructure and more green or turquoise spaces are needed for the future success of cities.

in his biophilic city typology. The reduction of food miles is essential to reducing our impacts on global warming. Food development should be incorporated into the infrastructure of the city. "Growing food within cities and urban (and suburban) environments can take any number of forms. Community gardens, urban farms, and edible landscaping are all promising urban options" (Halweil and Nierenburg 2007). Being able to grow food in the city not only supports local businesses by creating jobs and it will decrease costs in food production, making it easier for people to be able to afford to live in the cities. On a larger scale, by being able to produce more food locally the city will no longer be reliant on imports. Therefore if anything were to happen on an international scale, such as the incident with Cuba, the city would be able to support itself.

Urban agriculture is not always seen as a benefit to all residents. The article "What's the Problem with Urban Agriculture?" Posted to Landscape Architects Network is an outspoken opinion of many of those within the city (Baskoro 2015). The author chooses to discuss two significant problems with the implementation of farming within the city. They state that there is a lack of space in the city for farming, and urban agriculture uses up too much of the city's water. According to the author, there is a lack of space and that cities are struggling to provide green space. The author says that "the government usually believes that - urban farming may be an economically or environmentally inefficient use of the property." If there is a concern with use of land, food can be grown on rooftops, in backyards or through the reuse of empty lots within the downtown fabric. Urban farming does not need to take any additional land, by placing urban farms on rooftops and in backyards they are not taking up any

profitable space. "Rooftop farms reduce summer cooling load. Insulates in winter. To reduce urban heat islands. Waste heat can heat greenhouses" (Thomaier et. al 2015). Abandoned lots can easily become new eco-villages which can provide new opportunities for food growing. City lots are known to sit empty due to an undesirable location for a business or the high cost in the downtown land. By turning the lots into usable land for food production, it is creating more income and job opportunities for people in the city. The government is not against practices like these, they are in support of them (Despommier 2010). The author's second point states, that urban agriculture uses up too much of the city's water. It can be noted that urban farming practices use about 70-80% less water than traditional farming practices and the urban farming systems are able to treat grey water within the city (Despommier 2010). Therefore, the farm is able to create its own water supply through water that was deemed unusable. The unusable water which was created by the city's pollutants. In addition, they are also saving significantly more water than traditional farming practices which waste "on average, 109,128 cubic metres of water for irrigation" (Statistics Canada 2010), in a year.

This author did not hold any arguable points against why urban farming should not be included within the city, however, this is the view of many individuals. It is not an opinion we can ignore without addressing. Others do not see the positives of farming in the city and stand by their point that the land could have been better used for housing or other upgrades to the city infrastructure. It is important to address this concern and make the community members aware of the importance of urban farming in the city and that

land is not a waste. It is an integral piece to the future self-sufficiency of the city.

Agricultural Education

Agricultural education occurs in different ways. Whether that is through the education of the household and addressing agriculture as gardening or addressing agricultural education as a career. Some of those careers include; a horticulturist, a farmer, soil or plant specialist or an agricultural engineer.

It is essential for households to be made aware of possibilities to grow their own produce, due to the increase of price in food at grocery stores. Only “1.7% of Canadians are able to supply their monthly fruit and vegetable consumption at home” (Mullins et al. 2020). Of the individuals who know how to grow gardens at home, the majority of them hold a university degree. Resources to learn how to grow crop plants should be more readily available for people of any background in Canada. This is an opportunity for programs to be offered to the general public or for agricultural education programs to be incorporated into school boards at a younger age. Educating the community and creating involvement is an important part in becoming self-sufficient. Urban farming cannot be done alone by systems such as Z-Farming. Everything needs to work in partnership. It is important to include local traditional farming, urban farming and household farming practices. Agricultural education does not only include learning how to grow, it also involves teaching individuals how to cook. Especially individuals in the city with easy access to fast-food and restaurants through Uber Eats and similar companies. The public does not always know how to cook, or know about kitchen safety. Cooking education is also important for the youth of

the city. Schools often offer cooking class opportunities to their students that could benefit from a blend of learning experience with gardening and learning to use produce that can be grown at home. It is important to incorporate these principles into the school board sooner than later.

On the subject of agricultural jobs, Canada has an abundance of opportunities. For years the country has been creating job opportunities and investing money in educating the youth in the agricultural field in hopes to draw interest in the agriculture and agri-food line of work. An interview was conducted with Johanne Ross, the executive director of Agriculture in the Classroom Canada. She noted that, “Nowadays, it’s talking about the environment and sustainability, and food sovereignty and food security, and food safety — all those areas connect to agriculture,” she said. “That’s where we are definitely focusing a lot now. And we still have a lot of work to do in all areas, but we’re going to keep going” (Logan 2021). Progress is being made and progress will continue to be made in educating those on job opportunities in agriculture. In 2022 agri-food systems provided 1 in 9 jobs across Canada (Government of Canada 2023), therefore interest and engagement should be kept up in order to have individuals qualified to fulfill the jobs available. By continuing to offer jobs in agriculture and agri-food, more food options can be produced locally across the country. This will continue to reduce the need for imported food and the country can move towards a more self-sustaining mentality. With the rise of urban agriculture, this creates new and unique job opportunities in the agricultural sector within the city. If there is a high enrollment rate in students in the agricultural sector there will be no issues filling the new incoming jobs in urban agriculture with

educated and well trained employees. Existing interest in the field and pre-qualified individuals makes the transition into city farming much smoother.



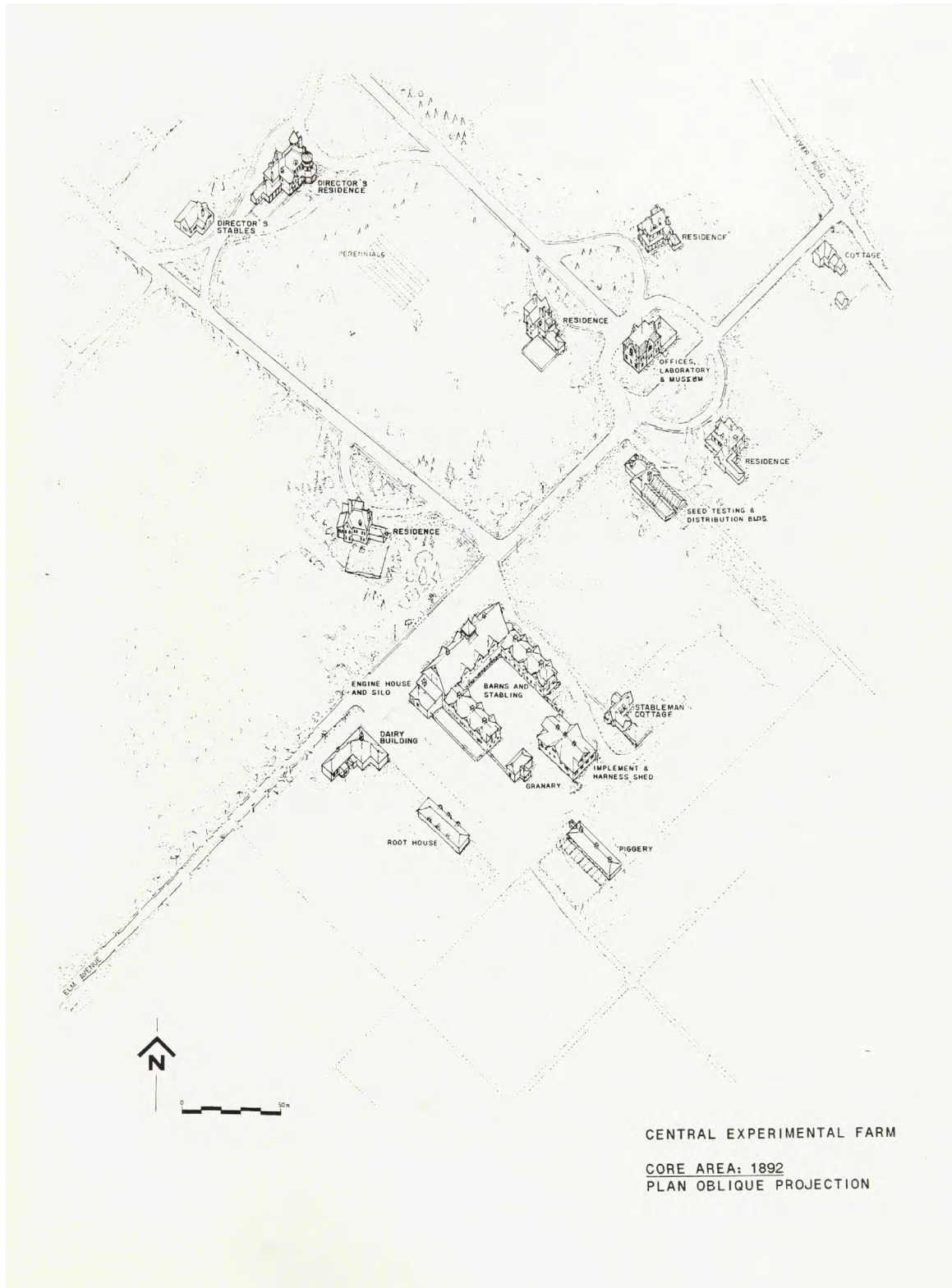
Map of Experimental Farms Across Canada. All 20 farms listed.

Chapter 3: Background

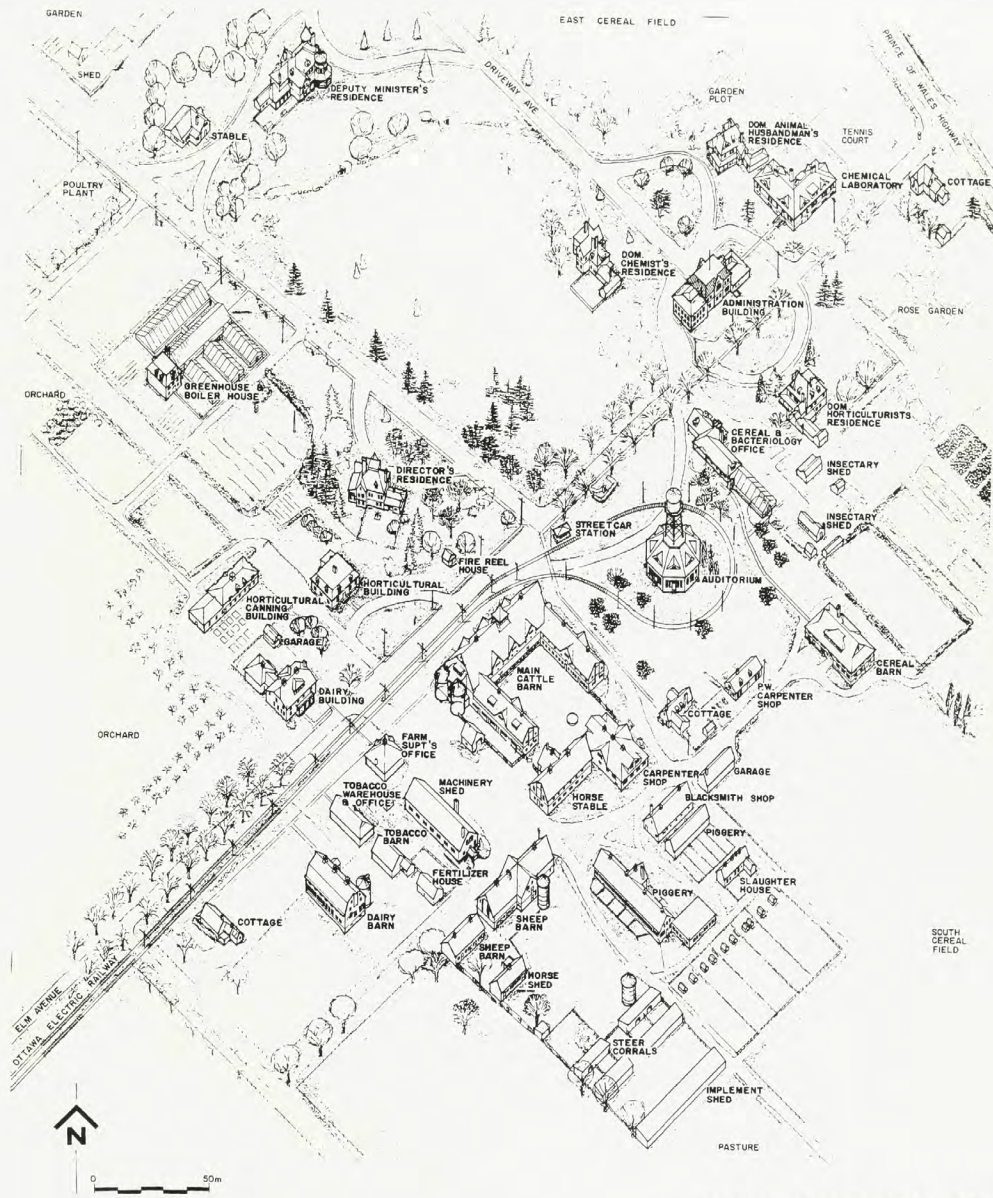
History of the Central Experimental Farm

The Central Experimental Farm was developed in the late 1800s to create new agricultural farming techniques and plant diversities to survive and thrive in all the different environments across the country after colonial settlers moved to Canada from Europe (Anstey 1986). Multiple plots of land outside of the city of Ottawa were bought and flattened for the purpose of creating large research fields. Throughout the years, a campus of buildings was constructed to house on-site staff, research facilities, barns for animals, and administration offices. The farm is responsible for the success of farming in the prairies, development of the dehydration and preservation of fruits and vegetables sent out during war efforts, fertilizers, new highly efficient grass for livestock feed and Canada's first frozen food production (Deschênes, Martel and Corbeil 2013). The farm was very successful till the late 60s when organizational and department changes began to happen. The identity of the farm began to fragment due to the lack of unity in the site's program. By early 2000s, the department noticed that the farm needed assistance and development of a site management plan for the future of the farm was established (Government of Canada 2004). The plan encouraged the farm to cut ties with some of the other departments and bring a focus back to the original research division for traditional farming practices. The management plan was not able to be completed and it is unclear to the public if there are any current intentions to update the farm.

The farm still operates as originally intended and new research is actively being produced for different regions across the country. This includes research on crop seed



The main campus of buildings at the Central Experimental Farm in 1892 (Bouse 1993).



CENTRAL EXPERIMENTAL FARM
 CORE AREA: 1926
 PLAN OBLIQUE PROJECTION

The main campus of buildings at the Central Experimental Farm in 1926 (Bouse 1993).



CENTRAL EXPERIMENTAL FARM
 CORE AREA: 1992
 PLAN OBLIQUE PROJECTION

The main campus of buildings at the Central Experimental Farm in 1992 (Bouse 1993).

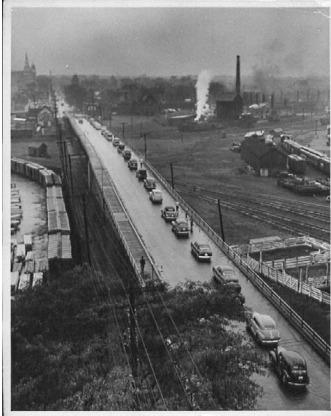
that can survive the ever-changing harsh global conditions (Government of Canada 2022). Although it is still functional the community is often unaware of its current production. Aside from a small community run organization “Friends of the Farm” and the Museum of Agriculture, the purpose of the rest of the facility is hidden behind the curtain of the Canadian Government. Due to the lack of understanding of the farm, many developers see the thousand acres of land as potential development for the city. As of the fall of 2023, the Civic Hospital has closed the proposal for the new hospital development which will be taking 60 acres of the Central Experimental Farms land (Infrastructure Ontario 2023). Although the farm continues to produce research each year, there needs to be additional programming incorporated into the facility to directly speak to the local food security concerns. The farm has adapted over the last hundred or so years to the changing agricultural needs of the country.



Central Experimental Farm Promotional Image (AAFC 1890).

However, it needs to reconsider its physical position and acknowledge on a smaller scale the local community and urban environment that it is now surrounded by.

City Development



Commute into the city over the Bayswater railway yards. Photograph of the Wellington Viaduct (Lost Ottawa 2020).

When construction on the farm first started in the late 1800s the farm was positioned outside of the city limits of Ottawa. Staff would live and work on the farm and they would raise their families on the site. Those who worked on the farm that lived outside the property in the late 1800s were located in a small community called Bayswater, by the year 1907 the community was consumed by the city limits. In the following year, the streetcar or locally called the toonerville trolley was introduced to the city and a line was created to connect the city to the farm (Smith and Bramley 1996). This encouraged employees to live in the city and commute into the farm. The streetcar was the main mode of transportation into the farm during the first half of the 1900s, it became more packed each year as the farm expanded and gained more employees. The increased staffing was caused by the increase in land and research advancements at the farm. There were a few major expansions to the south up until the 30s. When the automobile became economical for the average citizen, the streetcar system became underused. This led to its shut down and removal in 1956 (Smith and Bramley 1996). It became much easier to travel further distances and the city continued to expand. Now that the car was a common household item, more people were able to commute into the downtown core of the city. This led to the fast development of the suburbs surrounding Ottawa, during this time the farm became fully surrounded by homes. The farm currently finds itself surrounded by a completely different environment than where it started. The suburbs have built up so much that the

farm now finds itself surrounded by multiple major transit corridors. Some commuters use the major roads through the farm to be able to skip the traffic and make it home on time. The farm can no longer ignore its surrounding context since the city has found itself incorporating the farm into its infrastructure. But the farm still needs to create a reciprocal relationship with the city.

Land Value

The farm cannot continue to ignore the city. The need for traditional farming research is still active. However, the farm has already placed the country in a comfortable state in which farming is successful across many of the provinces and territories. Due to the current success, the importance of the site may not be acknowledged in everyone's eyes. The farm is just less than a thousand acres in a prime location in the city. The land is considered to be very high value. With Canada in the middle of a housing crisis, people believe that it would be more important to develop the land into more housing or implement more of the city's infrastructure, such as the hospital. In regards to the placement of the new hospital there were many locations suggested in different areas of the city, some of the other locations would involve the demolition of existing buildings. Therefore the city believed that it was the best move to place the, much needed, hospital on what was often considered underutilized land on the farm's property. The public must be made aware of the importance of the site as green space within the city, why the Central Experimental Farm cannot be moved outside of the city limits and how the farm has played an important role in the development of the nation.

The most important aspect of the farm in its current state is the amount of green space that it offers the city. The farm has an arboretum with a series of exotic tree types, natural forests and plant cover, as well as, huge plots of open land that is unpaved. During the development of the city there was a public interest in a large city park and the farm became considered a significant portion of Ottawa's park system (Smith and Bramley 1996). The green space offers the city with health benefits, as well as, environmental benefits. Green spaces within the city can help with both physical and mental health problems caused by the urban environment. "Typical reduction in the risk of mortality from cardiac-respiratory disease of 5-10 per cent [happens] in urban populations with good access to natural environments compared to those with poor" (Sinnott, Smith and Burgess 2015, 15). In addition, green spaces provide the urban environment with areas for physical activity, areas of relaxation to reduce stress levels and places for social cohesion. It is crucial for cities to preserve the green space they have because, once it is lost, it is often very difficult to regain. If buildings become unused they are often left as empty paved lots. Recreating open green space is not common and takes a significant amount of soil regeneration, as well as, plant growth. As mentioned previously, cities are the main cause for a large series of environmental factors including air pollution and heat islands which contribute to the rising temperature of the planet. "WHO estimates that outdoor air pollution caused 3.7 million premature deaths globally in 2012," (Sinnott, Smith and Burgess 2015, 30) and these pollutants can cause major health concerns such as cancer, cardiovascular and respiratory disease. Implementation of green spaces, especially the addition of



Durham College currently has a horticulture program at their Whitby campus. Additionally, they are developing an urban agriculture education centre, the Barrett Centre. Photograph of W. Galen Weston Centre for Food (Durham College n.d.).



Green roof research being conducted on Highland Hall at U of T, Scarborough Campus (Campbell 2021).

trees to the urban environment can help reduce the amount of air pollutants. “Urban tree canopy removed an average of 10.8 grams of atmospheric pollution for each m² of urban tree canopy cover” (Sinnott, Smith and Burgess 2015). The shade created from trees can help reduce the effects of urban heat islands and temperatures in cities with lots of densely populated trees have proven to be reduced by 2 to 8 degrees. It is essential for Ottawa to allow the farm to continue to operate as a green space and as a working farm. Urban infrastructure needs to continue to develop because the current model is not the most beneficial for its citizens. Implementation of more green infrastructure and more urban farming practices is important for the future of the city. Whether that takes the form of a multi-storey tower for food production or a large plot of land. Cities need to be more accepting of urban farms because the land has the potential to produce a significant amount of local produce and other food goods for the citizens. Especially if the farm is government run and supported. It can provide the population with affordable options in combination with a minimal carbon footprint. Farms should not be pushed out of the city to make room for more development. They should be supported as they are becoming an important part of the future of city infrastructure. It is not only more sustainable but it creates food security, provides educational opportunities and cultivates stronger and blended communities (Chomsky 2023).

Canada has a future in urban farming practices as they are beginning to pick up in major cities like Vancouver, Toronto and Halifax. By leaving the farm where it is, this supports the much needed urban renewal that cities like Ottawa need. In addition to supporting farms within city walls, the

farm cannot easily be moved to a plot of land outside the city limits, as many citizens would much prefer. It would be extremely expensive to move all of the farm's resources to a site outside of the city and to rebuilding all the necessary research facilities. It also must be noted that there are almost 30 heritage buildings scattered across the site that would need to be built around or developers would have to pay to relocate. The farm is a massive plot of land with over eighty buildings in the site's campus, as well as, across the fields. Relocation would take years to do, and it would use a significant amount of the taxpayers money, as well as, time away from researching that the country may not have. Additionally, the site was chosen specifically for its soil characteristics. Since the site has been in active use over the last hundred or so years, "research scientists know everything about its topography, soil composition, carrying capacity, weather and other characteristics" (Harris 2014). It can be very difficult and time consuming to re-establish all of these conditions and develop a baseline to ground the new research. This would also take a significant amount of time and resources. If the system is already set up and has been actively in use for such a long period of time, there is



Site Management Plan's proposed: Overhead Perspective of Centre Campus Area. (PFS Studio n.d.)

no reason to take valuable resources away from other major issues across the country. Just to build over the largest green space in the city. Especially during a time where 1 in 7 households in the city are struggling with food security (Ottawa Public Health 2023).

The farm has always been an essential food resource for Canada. The farm was developed during the colonization of Canada to create a more efficient way to generate large quantities of produce in each of the unique province conditions. It has grown and adapted throughout the last hundred or so years to meet the research needs of the country. By 1998 the farm was designated as a National Historic Site of Canada (Government of Canada 2004, 5). It was designated due to its distinct cultural landscape, its connection to 19th century agriculture. Its historic contributions to agricultural research that provided Canada with a united scientific experimentation system, and the fact that it's a very rare example of a farm within the city. The site itself is significant due to the amount of detail put into the landscaping, architecture and programming of the farm as well as the cultural value that was established. Whether that is its beautiful scenic park landscape, or the sense of community that was created by those who worked on the site (Smith and Bramley 1996). The concept of the farm and the decades of work that had been produced for the nation has a huge effect on the food industry across the country. Without a central source to produce research information during the early development of the country, farming knowledge would not be common knowledge and farming may not have taken off like it did. Our country may have had to rely more heavily on its international trade connections. The farm continues to produce for the nation and it should

be more recognized and understood than it currently is. The historical and cultural value of the landscape is extremely important and the public should be made more aware of it. The farm is not just an open plot of land waiting to be redeveloped.

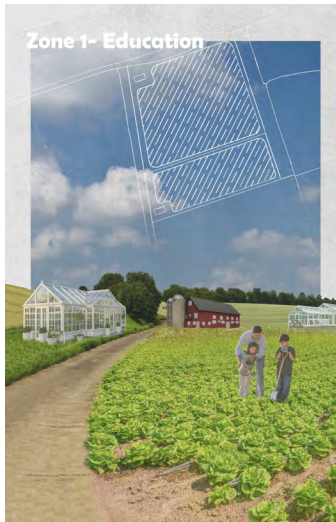
Chapter 4: Methodology

Project Goals

For the farm to be successfully integrated in the fabric of the surrounding city framework there must be several changes to the facility to encourage new use and a reorganization will promote better use of buildings. In the master plan, the farm will modernize its technologies, it will need to have buildings moved, some of the buildings will be adapted for new functions, new buildings on the site will have sustainable properties, the new programs will create reciprocity with the community and the landscaping will be reformed to allow for more organic and less English garden inspired spaces.

To modernize the farm, it must incorporate programs that focus on urban farming research and less traditional farming. Some existing urban farming practices worth incorporating are vertical farms, mushroom cultivation, roof gardens and aquaculture (Bhat and Paschapur 2020). A research centre needs to be established on the farm that can better accommodate new innovative urban farming techniques and advancements to some of the existing practices.

The farm has many heritage buildings that can be reused to rebrand the farm by connecting the history of the farm with its new programs. Some of the existing heritage buildings are being used for storage when their strong architectural identity can be used under new programs that can attract the public to the farm and uphold the site's identity. Heritage buildings can be moved to different areas of the farm that are better suited for the program and create easier access from the city's transportation corridors.



A wish image of an early concept for the master plan. Displaying educational barns and fields for students and families.



A wish image of an early concept for the master plan. Displaying commercial businesses that the farm can run, using heritage buildings.



A wish image of an early concept for the master plan. Displaying a mix of traditional and urban farming research.



A wish image of an early concept for the master plan. Displaying a new indigenous centre facing towards the east.

Said heritage buildings can be altered to better host the new programs. Adaptive reuse projects will be introduced to the site, to retain the existing buildings and give them a new life that can attract more interest to the farm. Reusing the buildings is significantly more sustainable than building new. By adapting the existing building much of the construction is already completed and very few resources need to be brought onto the site and materials removed in the adaptation can be reused elsewhere in the project (Merlino 2018, 7). Throughout the history of the farm, heritage buildings have always been adapted to fit new programs depending on the farm's needs. Such as Building 54, which was once a residence and now operates as offices. Therefore by continuing to adapt, the future development of the farm will follow systematic change that it is familiar with.

Some of the new construction on the site should incorporate green infrastructure principles. Ottawa "is committed to reducing greenhouse gas emissions from its operations to zero by 2040" (City of Ottawa 2023). To complete this goal, they are requiring any city buildings larger than 500 square meters to be of minimum LEEDS certified standard. The farm will go above the existing city goals to set an example for other "city" buildings. The end objective will be for new policies to be launched to oblige all public and private developments to be designed with standards that exceed LEEDS'. These principles are important for the sustainability goals of the city, and they will provide safe spaces and habitats for the other non-humans in the city as well. For example, rooftop meadows, living walls and bird-friendly glazing patterns.

The farm is designed based on English garden landscaping, the style is very aesthetic, giving the farm a coherent look.



A wish image of an early concept for the master plan. Displaying a view from within the green corridor.

However, it is highly manicured which makes it harder to maintain (Government of Canada 2004). New naturalistic landscaping will create safe spaces for wildlife in the city. Incorporation of a green corridor will allow for beautiful walking paths and much needed habitats for the non-human inhabitants of the city. Additionally, low impact development such as bioswales, will be introduced to the site to reduce impervious surfaces and increase stormwater runoff (Department of Environmental Resources 1999, 1-3). Similarly, to the sustainable new construction on the site, the incorporation of LID should encourage the city to develop needed policies to use these principles not only on the site but all across the city.

Throughout all the new programs on the farm there will be reciprocity between the farm and the city around it. The new programs created by the farm will stimulate involvement with the local communities encouraging education in agriculture and food. It will offer the public opportunities and encouragement to take up farming on their own. Industrial and self-sufficient urban farming will be the future of inner-city food production and it will aid local farming operations. Programs should be offered to local schools to educate children on agriculture and encourage interest at an early age, either as a career or at leisure. Furthermore, space will be given back to the local Indigenous community on the land to allow for teaching, prayer, and celebration. The Anishinaabe have a spot on the Central Experimental Farm, but a singular facility and a small garden is insufficient for the community (CBC News 2022).

Site Analysis



Photograph of The Small Dairy Barn (1912) at the Central Experimental Farm in Ottawa, Ontario (Ullysses 2019).



Photograph of The Arboretum Building, #74 (Google Maps 2023a)



Photograph of the Dominion Observatory building at the Central Experimental Farm (McGrath 2022).

The Central Experimental Farm as a site, is a complex cultural landscape with architectural elements that have been meticulously planned over the decades. The farm was developed with strict rules regarding the type of landscaping and architecture. The goal of the farm was to create an articulated picturesque site. The landscaping of the farm was focused on “curving roads, spacious fields, sweeping lawns, and treed areas” (Hinchcliff and Jasen 2021). In the management plan developed in 2004, it was essential for the farm to continue to reinforce these design requirements such as walkways, curbs, groomed bushes and well maintained floral gardens. As the farm developed most of the architecture was designed with a blend of the Queen Anne revival, shingle style, Tudor revival, Romanesque revival, collegiate Gothic and the International style. The intention of the styles was to create a campus of buildings that reflected a romantic fondness. Since the early 2000s very few projects have taken place on the farm. There has been a handful of modern additions added to buildings and much needed maintenance to some of the older facilities. The farm has been known for adapting its existing buildings as it progresses. Many of the original or early residences are no longer used by on-site staff, however, they have been adapted into offices for different departments and organizations. Additions and alterations are common on site, to create spaces that fit the new functions of the farm. In the past some of the buildings have even been physically moved across the site such as Building 77: The Potting Shed. The shed was originally a stable for the directors horses located by the William Saunders Building, which used to be the location of the Directors Residence



Photograph of The Rear View of the Potting Shed, #77 (Parks Canada Agency 1995).



Photograph of The Booth Barn, #118 (Google Maps 2023b).



Photograph of the Main Greenhouse Range 2, Central Experimental Farm (Payne 2014).

(Hinchcliff and Jasen 2021). When the director's residence was demolished the stable had no more reason to be in the area and was moved close to the existing Cereal Building, where it could be reused as a gardening tool storage for the flower beds close by. This shows evidence that the farm is familiar with adapting and moving buildings to fit the new program of the site best. Therefore, it would not be out of character for my intervention to adapt and move buildings to new locations so that they could provide better programs to involve the surrounding community better. In view of the fact that the farm holds a strong architectural identity, this is a strong factor in retaining the site's identity. In order for the site to appear united, a strong site identity will continue to be needed in order to sustain the operations of the farm. Therefore, my intervention will continue to hold onto the farm typology which is a strong factor in the majority of the buildings across the farming campus. The intervention will include similar forms to that of the barn or farm buildings, using wood construction in the design, as well as, complementary materials and colours. By continuing to follow some of these key design guidelines the thesis intervention will be able to blend into the fabric of the farm. The intention is to change the program to re-condition the farm whilst respecting the intricately developed site identity.

The physical representation of the site is only one aspect of its identity. Its reputation on a national scale has been incredibly important to the site. The site was developed to be able to produce new agricultural technology and techniques for the entire country. When it was created in the late 1800s it was an intrusive act of colonization. The farm's research led to "the rapid expansion of agriculture in the Maritime provinces and Upper Canada" which consequently led to

the decimation of “the forests that had occupied these lands for thousands of years,” (Williams 2014) destroying many natural ecosystems. The farm cares deeply about its national reputation as it believes that the research it produces will affect the ongoing and future development of agriculture. If the farm cannot produce the necessary resources for the nation, how will our farming industry be able to thrive? The farm continues to focus on traditional farming practices but needs to shift its focus towards its surrounding context. The farm needs to take on the new sustainable city mindset that some of the other major cities across Canada are now approaching. There needs to be a change in how the farm approached its program and where it will focus its impacts. The farm needs to focus more closely on its local impact. Due to the farm being within the urban fabric of the city of Ottawa, the farm needs to more actively address its urban context through programming. The intention of my thesis is to reduce the scale of the farm, to focus on the local needs and directly address local circumstances. Each city is unique and with the rise of urban farming there needs to be programming to allow these new technologies to be blended and refined to best fit its circumstances. The farm can still act as a model to the rest of the country but it would be best if it stepped back a bit on the national scale. Each city must come up with its own solutions and the farm can only effectively handle the community it directly engages with. By focusing more closely on urban farming, there will be less need for such extensive amounts of farm plots across the countryside. The redirection of the farm’s programming may consequently aid to the revitalization of the natural landscape across the country and the revival of many ecosystems.

Design Method

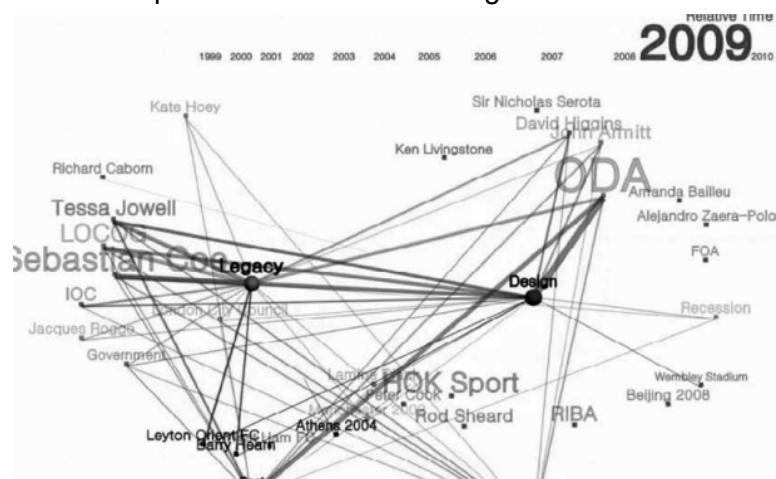
There are a series of design principles which impact the direction of my thesis project. They are essential to the approach taken to the site and the issues at hand, as well as, the development of the thesis design. The actor network theory was important in understanding which factors the farm will have a reciprocal relationship with. The farm needs to engage actively with different local factors within the city. It is key to understand who is involved with the farm currently and who needs to be involved with the farm in the future, for the facility to secure its new place in the city. In regards to the design of the thesis. It was essential to touch on sustainability, adaptive reuse, and the green city movement. Sustainability exists on different levels, sustainability in respect to material choice is important as well as the sustainability of the culture of the farm, the land as a public space and the heritage of the country. Adaptive reuse, as mentioned, has been a significant part of the growth of the farm over the years. It is a key part of the farm's future and aids in the farm's sustainability directive. Finally, the green city movement is essential to the development of the farm as a green space, as well as, what impacts need to occur across the city.

Actor Network Theory

Actor Network Theory is explained in depth in *Mapping Controversies in Architecture* by Albena Yaneva. She breaks down the importance of involving different actors in the design process of an architectural project. She states that "architecture appears to be an impersonal process over the course of which a building is composed," (Yaneva 2012, 3) however there are always several actors involved

in the process. It is not just the architect who decides how a building should look and what it needs. The architect cannot construct the building all by themselves. They need a project management team; the client will be involved, and the engineers are crucial to create a structurally stable and safe project. Outside of the actual construction of the building, there are different external factors. She uses the term Actor Network Theory, when talking about the relationship between each of these external factors and the project (Yaneva 2012, 4). Each of these external factors have their own inputs on the project and the actor network theory helps make connections between the needs of these actors or to highlight differences and controversies between other actors. Understanding these different relationships will help the design determine what actions are best, based on the relationships between the different actors. It is not just in the architect's interest anymore. The project should be about the people and groups that use the space or are affected by the space.

With a new concentration on the city and community, The Central Experimental Farm will integrate new actors from



Parametric animation of the 2012 London Olympic Stadium controversy; copyright- the University of Manchester. A visualization of the Actor Network Theory (Yaneva 2012, 97).

throughout the city onto the site. The farm is a government run facility, with public programs limited to the Agricultural Museum and Friends of the Farm, which only bring awareness to a small portion of the farm. They do not interact with the ongoing research division. The organizations either provide community events unrelated to the research or they use heritage resources to educate visitors on traditional farming practices of Canada. For the farm to continue to be successful in its new urban environment it needs to collaborate more with existing institutions and community groups in the city. The different actors in the city must feel that they are accepted and welcome to come to the farm to take part in activities related to its research. Some actors that are important to the new intervention on the farm include the local community, the schools and universities, the civic hospital, the Anishinaabe community, and the farmers markets across the city. These institutions and local groups are important to the integration of the farm into the urban setting. By connecting the farm more to the local community, the Anishinaabe, schools and universities it will establish a more public and inclusive facility. It will enable anyone to come in and learn. By involving the general public, it attracts interest and promotes understanding. The community will no longer feel that the use of the space is unclear or wasteful. The hospital is an active actor on the farm before the introduction of the thesis intervention. The hospital is seen as a controversy as it is taking land away from the site. However, it is essential to understand the complexities of the actors and work on ways of allowing these different actors space for collaboration or space of seclusion when required.

Sustainability

Sustainability argues that, “the design of buildings, ecosystems and infrastructures must take place considering climatic and environmental conditions, with the primary goal of minimizing the impact on the surroundings while achieving the desired level of flexibility and adaptability of the designed facilities” (Frigi and Kolisnychenko 2022). It is important to continue designing buildings while minimizing the harm done on the environment. Sustainable architecture curates unique spaces and works in a way to allow for a world that future generations can still enjoy. Steps to decrease our impact on the environment includes sourcing local materials to decrease the amount of carbon emissions created in transportation. As well as, using sustainable materials in the construction process that have been sustainably harvested and can sequester carbon during their life span within the building. Implementing systems within the building that reduce energy demands (Frigi and Kolisnychenko 2022, 82). Sustainability is not just limited to these factors and there are ongoing studies to continue to make buildings more sustainable. The goal is to create buildings that are made of sustainable materials, produce their own energy and do not emit any greenhouse gases.

The new construction in this thesis intervention will be conducted in a sustainable way. All materials will be sourced locally, with minimal effects on construction emissions. The local materials will be selected based on durability, longevity, sustainability harvesting and recyclability. The farm is known for always adapting and that often means moving or demolishing buildings. If the farm continues to develop and evolve over the years there is a chance that the research center will need to be adapted or demolished. It is important

that the materials are able to be reused or recycled at the end of the building's life cycle. It cannot be expected that the building will always be there based on the type of changing built environment we are dealing with currently. The full life of the building should always be considered in the design process, as you cannot predict what will happen to it after the construction phase is finished.

Adaptive Reuse

Adaptive Reuse has always been around, buildings have constantly outgrown their original function and if the building is well-loved it will take on a new function and continue operations. Recently, "with a global focus on the conservation of resources, there are now, more than ever, concerted efforts to evaluate the potential of existing and outdated structures for reuse rather than to demolish and build anew" (Wong 2016,6). There is a significant amount of resources wasted to demolish an existing building and to reconstruct something new again. Adaptive reuse recycles the existing building and adaptations are made to the structure to better suit its new function. Additions or changing interior walls often have a lighter environmental impact than new construction, although sometimes repairs can be more costly than constructing something new. Aside from the environmental factor, existing buildings are often reused for their historic or architectural value. Adaptive reuse buildings should respect the host building and embrace the history of the site whilst still producing a usable space for the future (Wong 2016, 126).

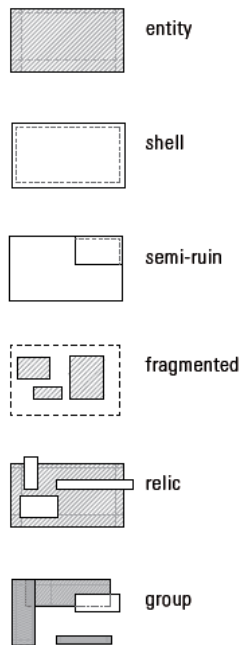


FIG.3: Host structure types.

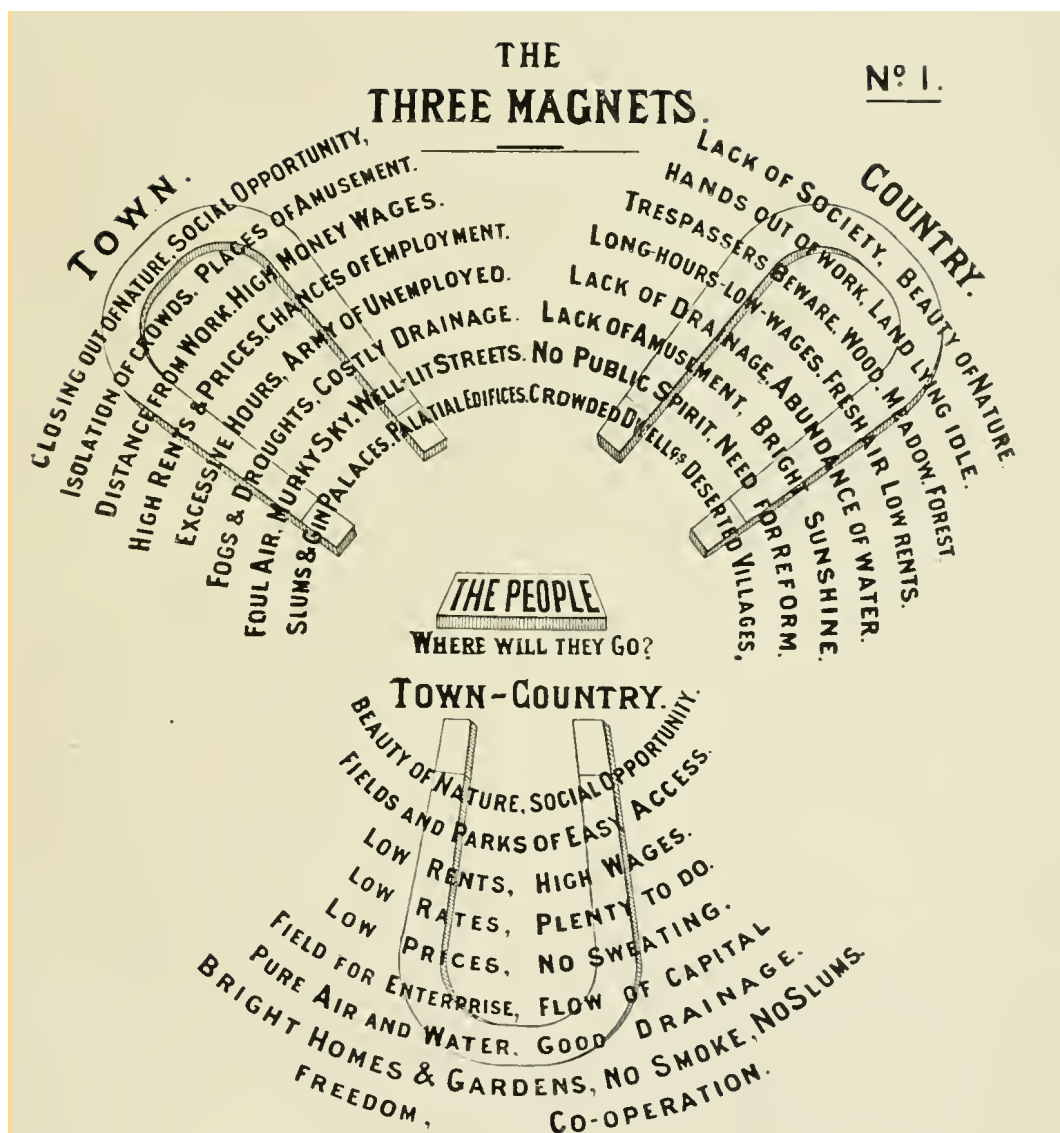
Diagrams of host structures in adaptive reuse projects. (Wong 2016, 106).

At the farm there is an important architectural presence and the styles were particularly chosen to create a picturesque experience. The site has been recognized for its historical

significance and there are twenty-nine recognized heritage buildings on site. The site itself has been designated a national historic site. As the farm developed some of these buildings have been transitioned into storage buildings or implementation sheds. In my thesis intervention the farm will be taking on a new outlook and some of the new functions can benefit from the already existing buildings on site that do not have a strong purpose. However, they have a strong connection to the sites identity. By adapting these existing buildings and giving them an applicable function, it will provide a bridge between the heritage of the site and the new urban farming program. The history of the site is important to the farm and by continuing to reuse the existing buildings, the future of the farm will carry parts of its historic vision. It celebrates the past but encourages the future.

Garden City Movement

The Garden City Movement was developed by Ebenezer Howard in the late 1800s. The focus on his novel, *Garden Cities of To-Morrow*, was to describe the perfect plan for a garden city. Howard created the perfect garden city, and specified the location of all homes, and businesses as well as where industry and agriculture could or could not go. He gave a detailed explanation of how much space should be designated for green space in the form of parks and agricultural land (Howard 1902, 22). He notes that the zoning and space requirements are suggests, however, the intention of my thesis intervention is not to copy or to replicate Howard's garden city. It is the principles that he advocates for are what I believe is important about his writing. These principles are not limited to their use in the garden city, they can be beneficial for other cities around the world. Howard's goal was to create a space that had both the positives of the

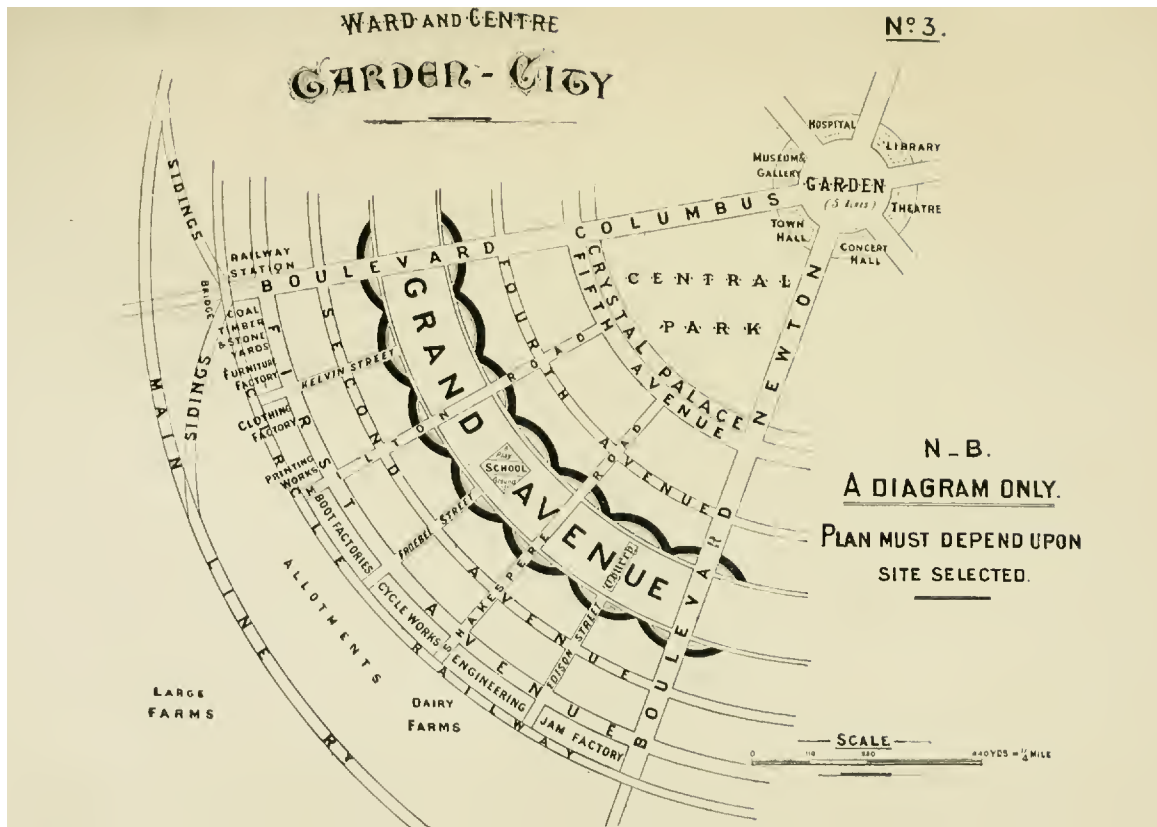


The Three Magnets. The town, the country and the town-country. The later being the perfect blend of both urban and rural (Howard 1902, 17)

life in the city and the life in the country. The Garden City is “all the advantages of the most energetic and active town life, with all the beauty and delight of the country” (Howard 1902). His hope was to blend the economic benefits of the city with the freshness and health benefits that come with the natural environment. The garden city was designed to be self sustaining, the industrial and agricultural zones would be fruitful enough to provide for the citizens in the city. His hope was to create a community that would end capitalism

and encourage the expression of production and exchange (Clark and Howard 2003, 92). Garden cities were designed to promote healthy and happy living for the residents and to reduce pollutants on the land to increase the wellness of the environment through new technologies.

Howard's focus on the well-being of the people and the communities of the city by reincorporating nature into the urban environment are the principles I intend on carrying into my design intervention of the farm and its impacts on the greater city of Ottawa. The farm itself is already green space within the city, the goal is to create programming that is focused on the prosperity of the communities. Cities need large green spaces that can be used to help self-sustain and promote better mental and physical health. In addition, group and community driven programs get the people more involved with the land. It creates stronger communities and draws more attention to the benefits of the land and programs that can be offered through the farm. The community has minimal connections to the farm currently and often see it as a waste of land. They need to be re-introduced to the farm and the new programming will change their perspective of the use of the space. In addition to the farm itself, some of the main principles and technologies that are to be produced at the farm will be designed specifically to help benefit the rest of the city. Experiments on urban farming and low impact development strategies start at the farm and when proven successful they can be implemented throughout the city. Creating a self-sustaining environment as well as reincorporating nature through the city web. This will reduce pollutants and health risks in the urban center, just how Howard intended with his Garden City.



A diagram which outlines what a selected portion of the Garden City could look like (Howard 1902, 22-23)

Chapter 5: Design

Process

For my thesis intervention, I intend on reorganizing the site plan for the Central Experimental Farm to place emphasis on urban farming and more community engaged programs. In more detail I will address a new research center that will be integrated into the existing campus of research buildings. To support the new changes to the farm an information box will be created as a testing ground for technologies and building programs that may be introduced onto the farm. The urban farming program initiatives at the farm do not end at the edge of the site. Research solutions and architectural design ideas tested on the farm will be integrated into necessary areas across the city and municipal policies.

In addition, it must be noted that my thesis intervention and the incorporation of urban farming is not to replace the traditional farming research at the Central Experimental Farm. Traditional farming research is still a necessity, the facility will not halt its current operations. The new farm will have additional program to enhance the farm's connection to the local community and culture whilst traditional research will continue to occur through most of the existing fields on the site. The two main research divisions do not operate independent of each other. Research solutions found that can benefit both divisions is encouraged and tools can be shared between the two major programs.

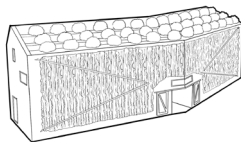
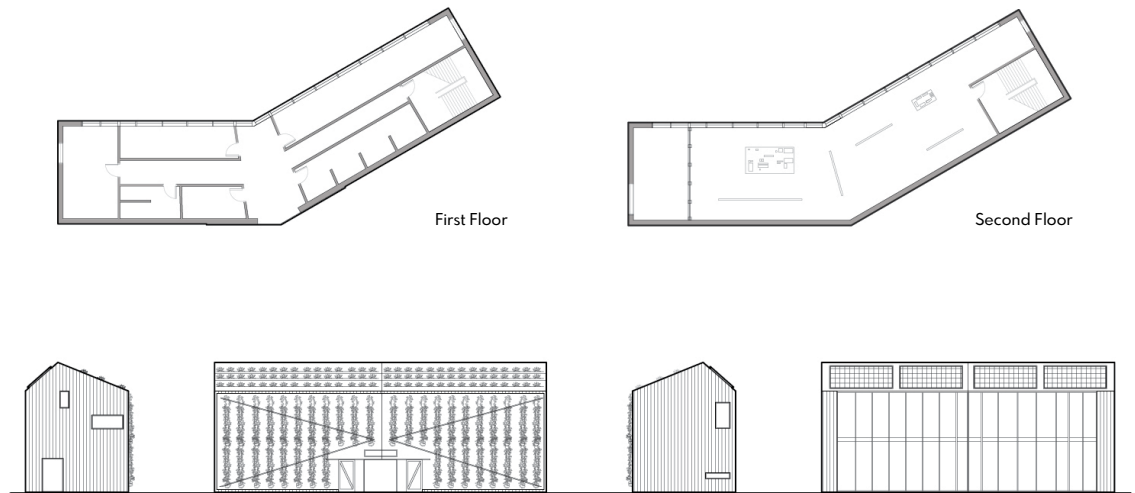


Diagram: An axonometric view of the design for the information box.

The information box is located on the south east corner of the site at the intersection of Prince of Wales Drive and Baseline Road. The general plan of the building is a bent L-shape, created with the intention of the two outward facing



The information box is located at a underutilized section of the site the intersects with major transitways. The building is used to experiment with programmatic and architectural ideas.

facades to be parallel to the major roads. There is very few buildings on this side of the site and most of the community in the south direction has minimal correlation with the farm. I wanted to place one of the pillar buildings of the site on the side that previously had minimal communication to the farm. The intersection that the building sits at is well traveled and the roads are important parts of the Ottawa transportation system. Addressing this section of the site can be beneficial for the new project. Large windows are placed along the exterior facades that face inwards towards the farm to provide visitors with a undisturbed view of the land that will be directly affected by the ideas displayed in the information box. The information box is set up to showcase the thesis designs on all scales. The research centre, the site, and the city. Additionally, the building will operate as a testing facility for features that have been implemented at the research centre. It will continue to adapt and create new research concepts that may be successful or unsuccessful before they can be implemented on the site. Some of the programmatic spaces

that have been experimented with include, innovative grow light strategies and organic herbicide research. Some of the architectural experimentation that occurs at the info box includes: a staggered green roof and a self-sustaining green wall on the front facade which utilizes collected rainwater.

The Site Plan

The master plan for the site provides an explanation for larger goals and programs that will be placed across the property to better connect the farm to the surrounding community. The site plan will address the relationship that the farm will have to the new civic hospital going up on the north east corner of the site. Along with the addition of more green initiatives and resources to create strong relationships with local organizations. Some of the new factors added to the site's master plan include:

New Entry Thresholds

The Central Experimental Farm used to have entry gates to welcome people onto the farm. However, when the roadways around the farm expanded to make up for the growing population, the entry gates were removed (Smith and Bramley 1996). Aside from the sudden jump to farm land there is no identifying factor on the property lines to let people know that they are entering or passing the farm. Entry gates will be added to major roadways such as Prince of Wales Drive and Fisher Avenue as well as at entry points to the farm's green corridor to give the farm more street presence. It will allow the people to understand the site better and it connects the farm more with the peripheries. In addition, the gates will be designed to allow for animal crossings. It will act as a bridge across the road to reduce the amount of roadkill seen in the city. The farm has extensive patches

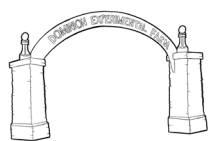
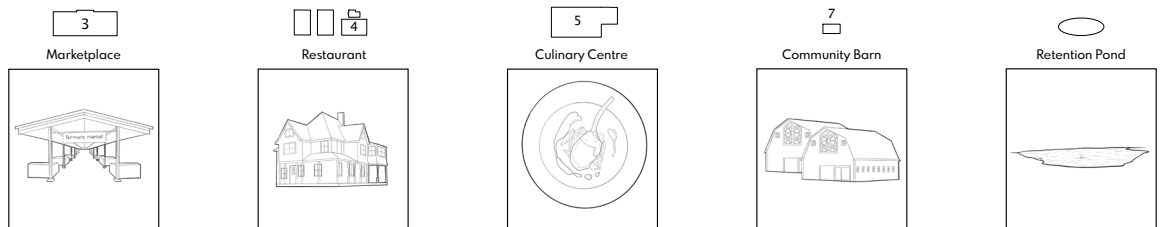


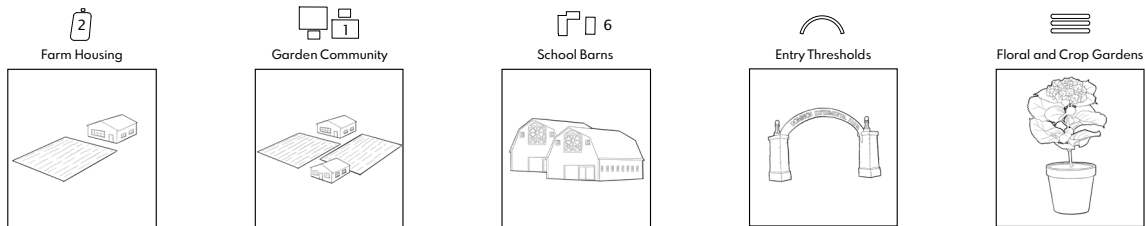
Diagram: Heritage Entry Gate, this is a reference for what the new entry gates may look like.



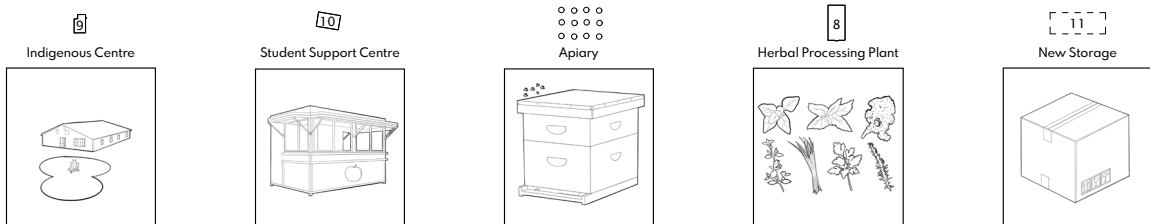
Central Experimental Farm Site Plan.



Central Experimental Farm Site Plan with Legend, focus on the north-west corner of the site.



Central Experimental Farm Site Plan with Legend, focus on the central to south end of the site.



Central Experimental Farm Site Plan with Legend, focus on the east side of the site. The research centre is marked in the dashed box. This is the main thesis intervention.

of forest, trees and fields. It is often the home of many wild animals in the city. But the farm has harsh road borders and even the case of a major road that runs through the middle of the fields. The gates create a space for animals to cross over the roads without immediate danger. The gates will beautify the city and save lives.

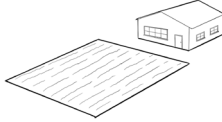


Diagram: Farm Housing. A detached family home with a large gardening plot.

Farm Housing

A few dwellings on the site will allow for community members to be more involved in agriculture. The housing moves residents onto the farm and given them the ability to produce crops at a greater scale, that can be sold for profit. It provides the city with the opportunity to see a larger sized plot of land, in the dense urban fabric, being used for personal or commercial agricultural purposes. The housing is experimental to see if this new type of lifestyle is sustainable. It will also create a direct connection between the city and the farm that allows them to claim part of the land as their own.

Garden Community

There will be a collection of garden homes that will be lined up along the south side of the property. They will face the south neighborhood that borders the farm, which is a dense suburb. It creates a space of blending between community and farm. Similar to the farm housing it will allow the community the opportunity to be a part of the farm directly by living off the land. However, in this case the plots are much smaller and they have slightly larger amounts of land than the parallel neighborhood on the other side of the road. This is a blended approach to country and city living. The land is not big enough to make it profitable but there is a significant amount of space to be able to self-sustain. These

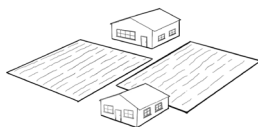


Diagram: Garden Community. Detached family homes in a cluster with personal gardening plots for each.

types of neighborhood have already appeared in different areas of Germany (Grenier 2018).

Marketplace



Diagram: A public marketplace where the farm and local vendors can sell fresh produce all year round to the city.

The marketplace will be a building that is operable all year round and every day of the week. It will be a farmers market, allowing local farmers to bring in produce or goods to sell within the city. It also offers the opportunity for the farm to sell some of the produce that has been developed for research once it is no longer needed. The city of Ottawa has several farmers markets across the city but aside from Byward Market they are not all year round and all of the farmers markets have limited availability through the week. This makes it incredibly difficult for the people in the city to consistently buy locally produced food. The marketplace will offer availability and hours just like any grocery store. It will provide the community with the opportunity to regularly shop local.

The Restaurant



Diagram: An existing heritage building from the site will be adapted into a farm-to-table restaurant.

On the north end of the farm, there will be a restaurant established. The location is along one of the major transit corridors, it will be close to the existing hospital grounds and many medical buildings. This area is the most developed of all of the peripheries of the farm. The restaurant will be located in a heritage building from the site. It is currently being used as offices but there is more potential to use it as a restaurant and connect the new programs with the cultural and architectural history of the site. The restaurant will be a farm-to-table experience. It will provide the community with a low commitment opportunity to interact with the farm. Community members are more likely to go dine at a restaurant on their day off than drive all the way into the

main campus of the farm to learn about the research. It is a very day-to-day activity that is designed to draw people in without forcing them to learn about the research. They will dine on food produced by the experimental farm and they have the opportunity to learn more about how their dinner was produced if they so choose.

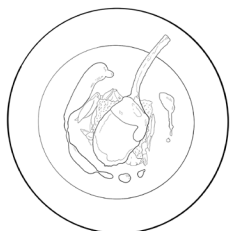


Diagram: A culinary centre offers a space for cheese-making and guest chef master classes.

The Culinary Center

The center is another commercial business similar to, but has slightly more commitment, than the restaurant. There will be space for cheese making and for the community to engage with how the process works. In addition, the culinary center will also provide spaces for master classes with guest chefs. It will provide education on cooking to the community whilst informing them on the different programs and opportunities available at the farm. Guest chefs can either be sourced locally or they can be brought in from across the country. Which will continue to promote the farm's national relationship but on a smaller scale.

Community Barns

There will be two different community barns located on the farm. One of the community barns will be for the local neighborhoods. It will provide spaces for people to keep livestock if they desire and allotments will be available, that can be rented out for those that might not have the space to do the gardening that they need at their own household. The second community barn will be for the local school systems. There will be areas to hold culinary classes or home economics for the high schools. Fields are available to teach the students about agriculture and gardening. There will also be spaces for livestock to teach some of the younger students and get them more engaged with agriculture at



Diagram: Barns and allotment fields are offered to community members and classes for children.

a younger age. These barns and plots will be built on the west edge of the farm. They will be located near the closest schools to the site, easily within walking distance. Therefore trips and engagement can be more frequent if a large field trip does not need to be planned.

The Herbal Processing Plant

The plant will work in combination with a large field of native medicinal plants. The plants will be harvested on the farm and the processing plant will break them down into natural medicines. Experimentation for better combinations of native medicinal plants can be conducted here but it also offers an opportunity to have a partnership with the new civic hospital. The processing plant will be located close to the new hospital to provide easy access to the herbs. Natural medicine is still very new and often not accepted in health care practices, however, the processing plant will provide the opportunity to explore that avenue more to see if there can be value of mixing traditional and modern medicine. This plant will establish a connection between the farm and the hospital. The farm has many opportunities to help the hospital with its programs and natural environment. Additional, research of indoor plants for positive mental health and clean air distribution can really benefit the hospital.

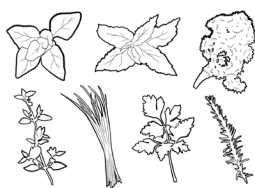


Diagram: The herbal processing plant will process native herbs grown on the site into natural medicines for the hospital.

The Indigenous Center

The farm has always had an indigenous center and in more recent years they just received a newly renovated space (CBC News 2022). The farm is located on the unceded land of the Anishinabe Algonquin Nation. During the colonization of Canada the government decided to claim the land for the farm from the local indigenous population. Unfairly, they have been stripped from their land and the landscape was



Diagram: The new indigenous centre will offer more space and create better opportunities for teaching and celebrating the local Anishinabe culture.

changed dramatically by the colonizers. They were forced out of the developing city and into reservations across the country (Williams 2014). Nothing can make up for the amount of damage that has been done to the indigenous population and providing them with a very small space on the farm is a very small band aid fix to the issue. I do not propose that my solution is the only one, or even the best one, however, they deserve more space to celebrate and share their culture. I have chosen to move the indigenous center to the east side of the property. It is now located beside Dow's Lake, where they can participate in their 'sunrise ceremony' properly as they are to celebrate to the east (Quinlan 2012). Additional land and the herbal gardens will be designated to the indigenous community. They will have a greater opportunity to be involved with the farm and its new goal to reach out to the community. They will have significantly more opportunities to educate and share their culture at their new centre.

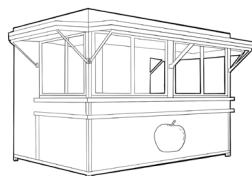


Diagram: A student support centre offers discounted health meals made from produce on the farm to students of Carleton University.

The Student Support Center

A small booth will be opened near the canal crossing, the closest point that the farm has to Carleton University. The university is located directly on the other side of the canal and many of the students pass through the farm to get back to their living accommodations. The booth can provide the students with the opportunity to get a discounted meal with fresh produce and goods that were grown on the farm. It is difficult for students to eat affordable and health meals and their physical health often suffers because of it. Giving them the opportunity to get the meals they may not be able to afford at the grocery store should increase their quality life and benefit their education.

Apiary

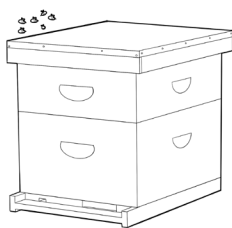


Diagram: The apiary should be reintroduced to the site to continue the research on honey bees and pollinators in the city.

The Friends of the Farm, take care of the bees at the Central Experimental Farm. They are a fantastic community organization that cares for our pollinators. The research division for the bees has not been active in a few decades. Pollinators are incredibly important for the environment, however, the colony populations are going through a decline. In 2022 the national colony loss has almost doubled the annual losses reported in the past 14 years (CAPA 2022). Their populations are suffering and much of the loss comes over the winter. Research is still necessary in pollinator care and the farm needs to reopen its pollinator research division. In the master plan the existing building which was once used for the apiary research is still standing and the current operations are not clear. The division should resume in its old location to sustain any remaining resources or connections to past research. It is necessary for the future population of the bees and the growth of the city.

Floral Crop and Gardens



Diagram: Gardens with crops and flowers will be added to the farm to provide neighboring high rises with gardens.

Existing floral gardens are marked across the site, however, the site would benefit from additional floral gardens, especially less decorative and more functional. Flowers can aid in the health of crop plants just by incorporating them into the garden. They attract pollinators which will help pollinate both the flowers and the crop plant. They are a form of pest control because their nectar attracts valuable insects that will eat pests and they can control weed growth due to the fact that they grow together very densely, leaving no space for weeds (Priya 2021). These types of gardens would work well next to some of the high-rise apartment buildings located close to the farm. Similar to

the 'Three Sisters' technique developed by the Indigenous population the flowers and the crops have a complementary relationship that help each other's growth. The corn, squash and beans were grown together and supported the growth and development of each other (Williams 2014). Using the Three Sisters approach, apartment managed gardens would need less attention and care. This method is easier to sustain for a larger complex of many different residents, because splitting up garden tasks can be difficult.

Green Corridor

Further incorporation of trees and vegetation would benefit the farm as a green space in the city. A green corridor is implemented across the farm. A walking path will be at the center of the green corridor to allow more useable green space for the community. The green corridor will connect the major entry points of the farm and replace some of the road systems to create a safer environment and reduce the amount of opportunities for the city traffic to use the farm as a shortcut. Corridors will be wide enough to create a sense of interior habitat to allow safe spaces for local wildlife. The human path through the corridor facilitates movement of the animals. The path and the green corridor will benefit from each other. Nodes, or denser areas of tree line, create less of an edge effect and make deeper shelters and spaces to forage, some will be located closer to the center of the farm and away from the dangers of the city (Anderson and Jenkins 2006). Additionally, the added tree line will be good for the research crop development as it controls harsh winds.

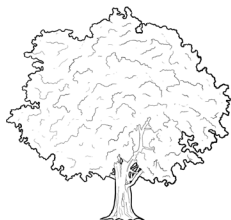


Diagram: Some larger roads will be removed from the farm and replaced by a green corridor system. Good for Ottawa's park system and it creates habitats for native animals.

New Storage

Over the past few years the farm has added many small and very utilitarian buildings across the farming campus to act as

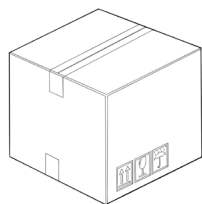


Diagram: A new storage facility will be built to replace the utilitarian “boxes” placed around the campus that take away from the experience.

additional storage. The small storage buildings do not appeal to the rich architectural history of the site. The buildings will be removed and all of the storage will be relocated into a new space. Removing some of the tension on the site. The new space would help preserve the historical and cultural identity of the farm and strengthen the complex. Enough space would be added to allow the facility to fit all the current storage needs and additional future needs. To prevent the reintroduction of the unfavourable storage containers.

Retention Ponds

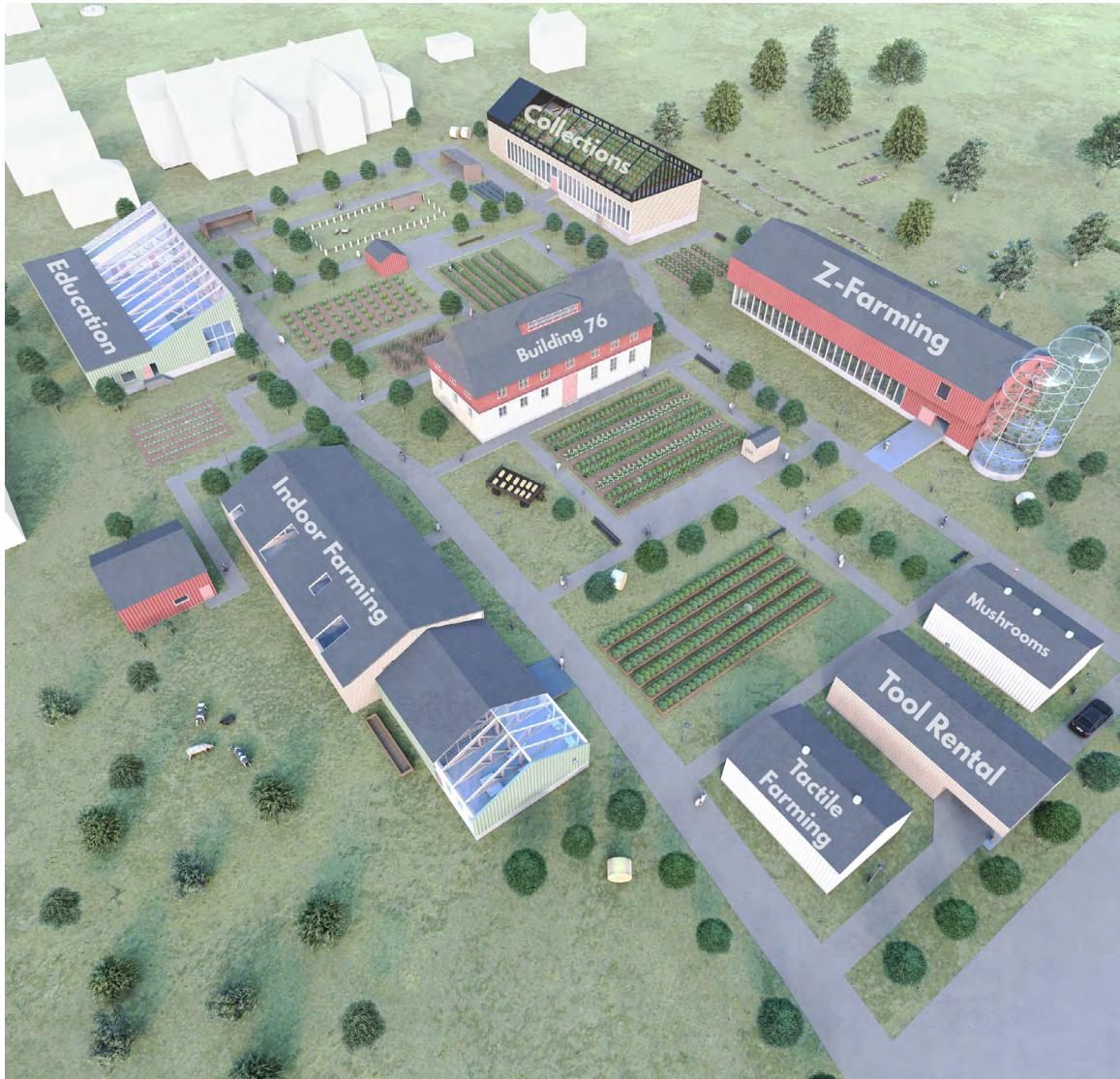
Retention ponds are added across the site in order to create spaces to store contaminated stormwater. The ponds are important for the control of stormwater in the urban environment and for the urban ecology. Planting native vegetation around the pond helps clean the pollutants out of the water and provide habitats for native wildlife (AVP Finance and Operations, 2011). The ponds are functional for the city and the turquoise infrastructure is healthy for the community as water is great for attracting people into the city’s green spaces (Sinnott, Smith and Burgess 2015).



Diagram: Multiple retention ponds will be added across the site. The ponds good for managing stormwater and provided new spaces for local wildlife habitats.

Research Centre

With the introduction of the research center I want to integrate urban farming research into the Central Experimental Farm’s research division. The goal of the urban farming research was to address three different groups through specialized programs. The individual, indoor residential urban farming techniques. The family, small plot, or backyard farming practices and finally the industry. That would provide spaces to develop upcoming urban farming techniques for restaurants and food production businesses. These three groups break down how the research center will address



Axonometric view of the research centre. Captures the diverse facades of each of the different buildings and the connections that the buildings have to the inner barnyards.

the different communities and businesses across the city of Ottawa.

Indoor Farming



Diagram: Research will be done on indoor (kitchen) farming to provide necessary education to the community.

Ottawa is always developing, and high-rises are a popular choice for increasing density in the city. At the corner of Carling and Preston the intersection at the north-east corner of the farm, the Claridge Icon stands at forty-five storeys tall. Although it finished construction only within the last few years. Plans for competing towers are on the rise with one proposed plan for a fifty-five storey residential tower and another at sixty-five storeys (Bagnall 2019). Aside from all the new proposed towers, most of the existing downtown is filled with high rise residential towers. With over 76,000 residents in apartments that have five or more storeys there is a large market for indoor gardening (Statistics Canada 2023a). There is a predicted growing interest with a compound annual growth rate of 4.87% from 2023 till 2030 for indoor gardening (Data Bridge Market Research 2022), but many residents are unaware how to grow crop plants indoors or how to care for them properly. Technologies have come out for indoor farming such as self-watering and smart sensing indoor gardening systems to make it easier for individuals to grow their own crops (TBRC Business Research PVT LTD 2023). New technologies will make it much easier for households to start indoor farming, however, there needs to be options available for those who cannot afford the systems.

Backyard Farming

In contrast to apartment living, there are over 170,000 single-detached houses in the city of Ottawa not including other types of properties with an open yards (Statistics Canada

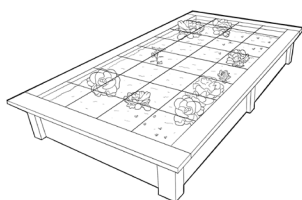


Diagram: Raised garden bed research will be done to better inform the community about techniques to successfully farm on their property.

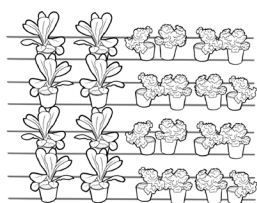


Diagram: Tactile farming research will provide knowledge to local restaurants looking to grow their own produce in very small spaces they have available.

2023a). Backyards are often used for flower gardens, yard work, lounging, entertaining, cooking or exercising. There is already a growing interest in gardening in Canada, with 76% of yard owners investing in landscaping and gardening over the last two years (OPEIC Canada 2023). Giving households resources to successfully farm on their own properties will make them much more self-sufficient and it can subsidize the costs of groceries. Lack of knowledge and time are some of the main reasons that families do not grow in their yards currently. Providing a facility to make them more informed will encourage more users to participate.

Commercial Farming

Ottawa, like many major cities, has several vacant lots in its downtown core. Buildings have not been able to survive, and lots or warehouses have been emptied with no future plans. Valuable downtown land will go years with no use. In addition to all the empty property, “Ottawa-Gatineau had the highest quantity of vacant residential land, both in terms of proportion (18 per cent) and overall area (162,000 acres)” (Rana 2023). Existing land or empty properties can be redeveloped into community gardens or spaces for urban farming practices. By creating urban farming spaces within the downtown, we can avoid food deserts that are beginning to develop in neighborhoods such as West Centretown, Chinatown, Little Italy, and LeBreton Flats (Jensen 2023). Or these systems can provide more healthy and affordable food for low-income neighborhoods such as Carlington, West Centretown, Sandy Hill and Overbrook-McArthur (Ottawa Neighbourhood Study 2019). In addition to new sites for urban farming practices, restaurants can benefit from inhouse urban farming technologies. Producing their own resources for the kitchen can limit the amount of

importation and the quality or freshness of the food would not be compromised by preservatives or freezing when everything is grown inhouse (Hearthstone Kitchen and Cellar 2018).

Design Factors

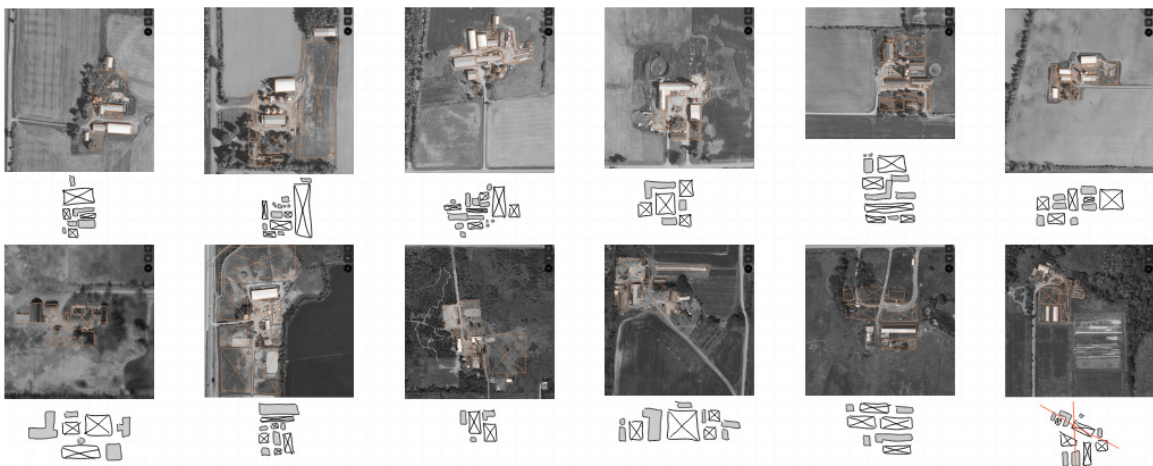
When designing the research center there were three main driving factors behind the initial design decisions. The design needed to connect to the idea of campus. Seeing as the research division of the farm was already a well developed campus that has changed throughout the years. It needed to connect to the farm typology and how space is created in the farm yard. Finally, it needed to connect to the history of the site.

Campus originates from the Latin language, it can be translated to mean 'field'. It is often referred to land with various different buildings (Vocabulary 2024). The centralized group of buildings at the Central Experimental Farm is considered a campus. They are several buildings with similar or complementary programs which are connected together through well use and developed open space. The research center needed to fit into the campus of existing buildings. The site for the center was picked out based on existing framework at the farm and where there was room for expansion on the site's campus. To complement the existing scale of the site the research center was broken out into 8 different buildings and charged courtyard spaces were created within the new research complex.

The Central Experimental Farm is a research campus, however, due to the type of research that is conducted the Central Experimental Farm is also in fact, a farm. Many of the existing buildings are barns and implementation sheds

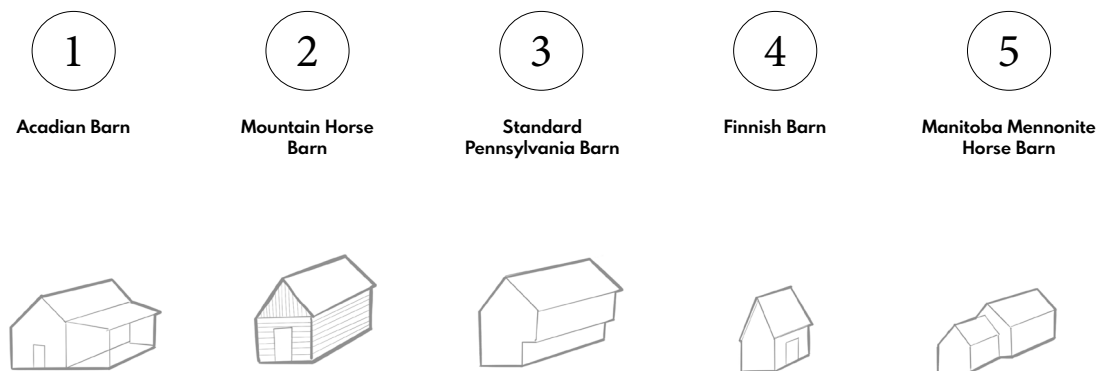
that were used as references for different types of farm structures across Canada. It was important to continue the narrative of the farm into the research center. I studied different farm layouts across the surrounding Ottawa areas to analyse how farmyards are organized, in the local area. Farms are a form of campus, they are a blend of outdoor spaces and programmatic buildings. These spaces are often more blended than campuses because the program has a direct effect on the interior and exterior spaces. Whereas other campuses, like universities, use outdoor spaces but they are often yards or areas to relax, that are disconnected for the building functions. Barns and fields are used in collaboration to shelter and feed livestock. The program is blended between the inside and the outside. When designing the research center my intention was to create a farmyard of buildings. The programs within the buildings often leak into the barnyard spaces. The barnyards are directly connected to the function of the research center. The border between the interior and the exterior is intentionally blurred.

Additionally, I wanted to reference different traditional barn styles in the research center's architecture. I wanted to

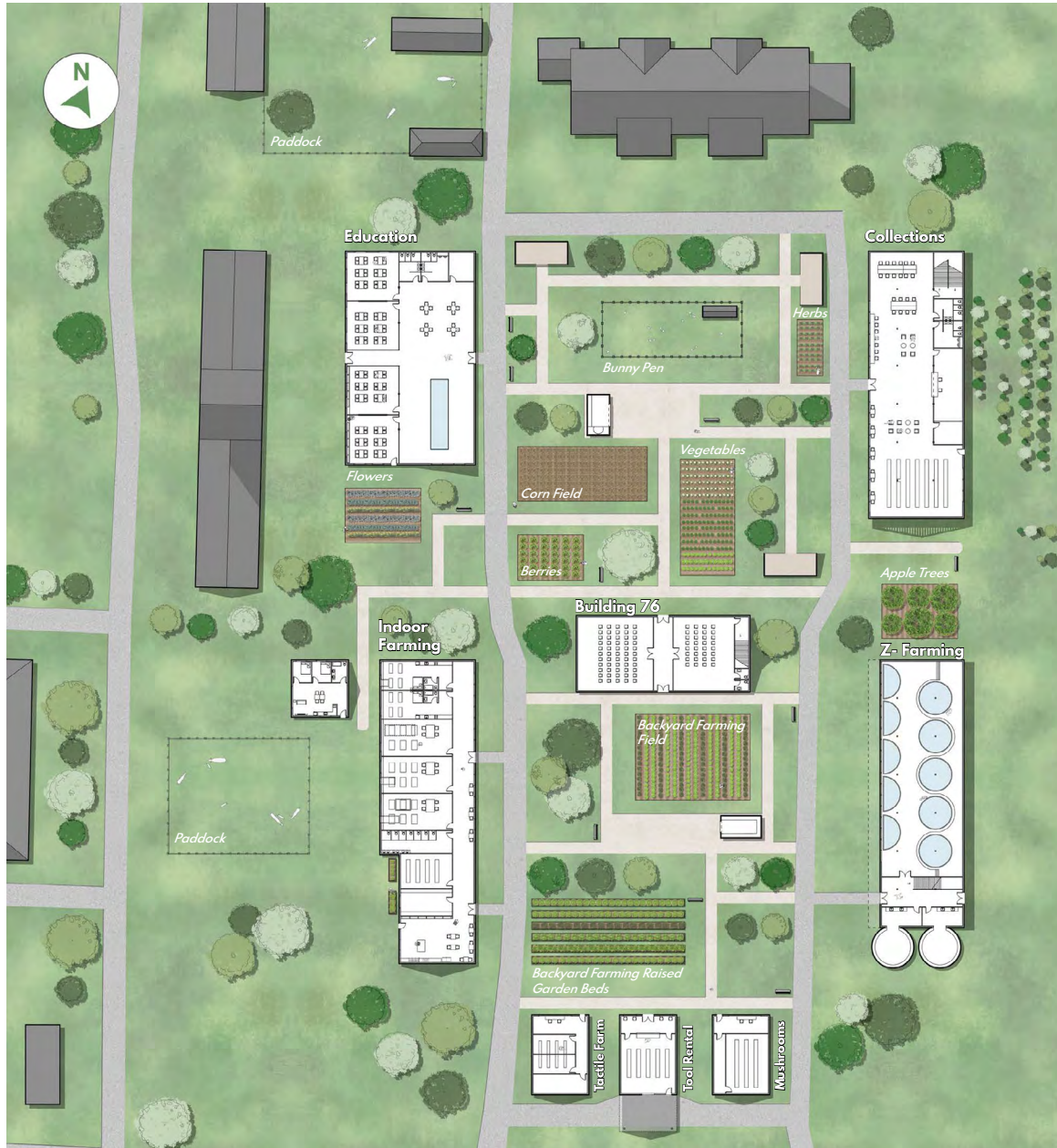


Studies of local barns in the Ottawa area. Studies show the different type of spaces, the connections between interior and exterior and where certain building types would be placed. Sketches by author (Google Earth n.d.).

implement a specific barn type from each of the provinces that there was an original research center. When the Central Experimental Farm was established there were four additional centres developed across the country with the intention of the research being properly testing on the exact land and soil conditions. The research centres were set up in Agassiz British Columbia, Indian Head Saskatchewan, Brandon Manitoba and Nappan Nova Scotia. When designing the research center I incorporated a barn style from each of these areas, including the Ottawa area. The educational centre references the Acadian Barn from Nova Scotia in plan, it was often a wide and low building. The collections references the Mountain Horse Barn from British Columbia in elevation and general massing. The Z-Farming building references the Standard Pennsylvania Barn from Saskatchewan, through its form. The barns often had recessed lower level which was incorporated into the design of the z-farming building. This provided the entry way of the building to have a cantilever and created a connection between the barnyard and the entrance of the building. The mushroom cultivation, tool rental and tactile farming buildings reference the Finnish building from Ontario which were often



References for the 5 different barn styles that are incorporated into the design of the research centre.



Research Centre Plan.

smaller and thinner buildings. This style worked best for some of the programming that needed more independent space or needed less area and light. Finally, the indoor farming building references the Manitoba Mennonite Horse Barn from Manitoba. The style was designed so that the family house was connected to the horse barn. I reference the multi-functionality, incorporating living quarters and a kitchen into the programming.

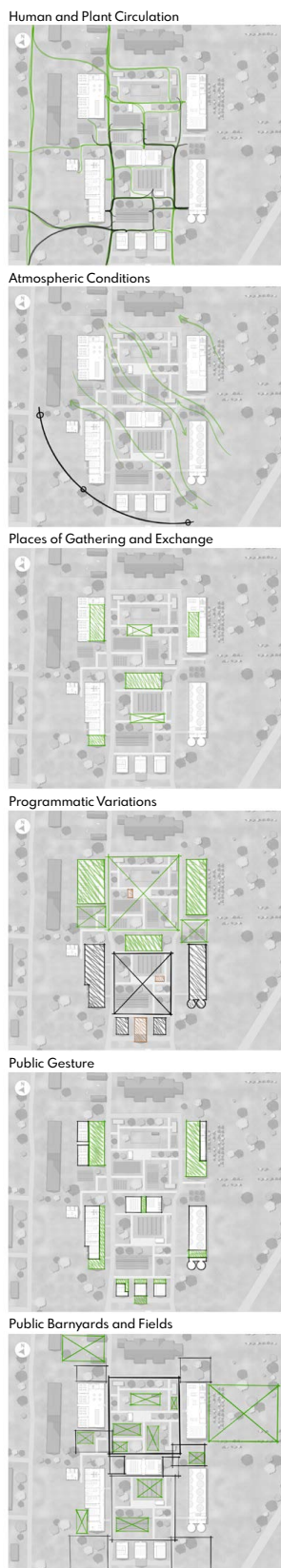
Building 76 was an existing building that was already located on the farm. I decided to adapt the existing Building 76 to become the central building of the research complex. I not only moved the location of Building 76 to fit within the research center better but the program of the building will be adapted from a wedding venue to a space for lectures and administration. The cultural and architectural identity of the farm has always been a leading factor of the site. I intend on connecting the research centre to the farm's greater vision as well as creating a connection between the existing and the new functions of the farm. Integrating the existing building directly into the new programming will be the first step to connecting the site physically to urban farming.



Building 76 at the Central Experimental Farm. Photograph of the Cereal Building (Ndh3 2013).

Program

The research center is divided into two main sectors. The educational sector where the research will be taught to the community and the scientific sector where the research will be conducted. In the complex, the educational sector is positioned to the north of Building 76. It's primary function, will be to educate the public and offer spaces to collaborate and interact with the farm. These principles are applied in the educational centre, the collections and the north barnyard. The programs are located in the north of the research center



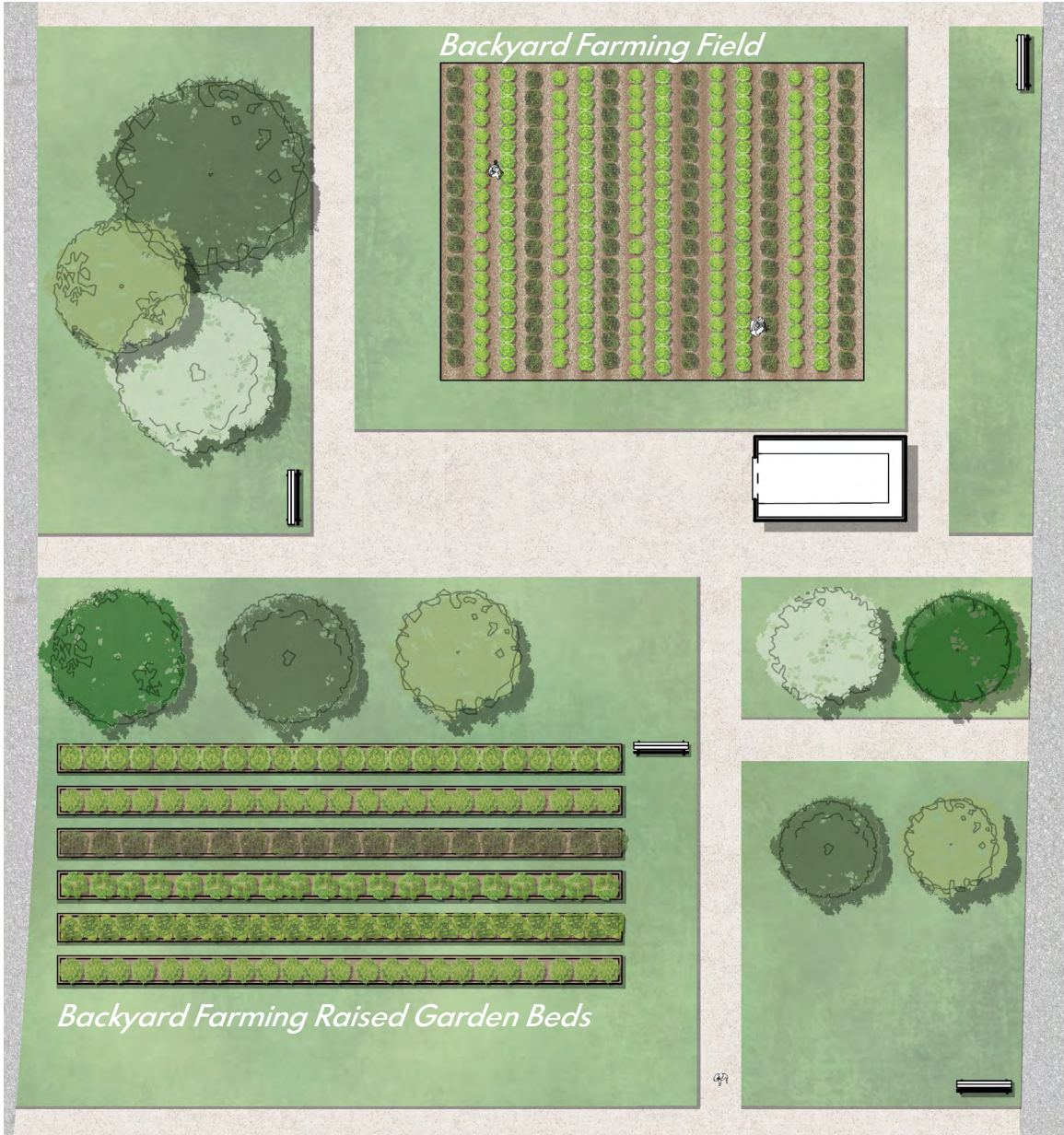
Diagrams: Urban Systems within the Research Centre.

to place the educational facilities closer to the museum and the other existing educational opportunities offered at the farm. If visitors want to stop by different classes or activities they will be close and easy to find. The south side of the research center is closer to the research fields placing the indoor farming, z-farming, tactile farming, and mushroom cultivation buildings close to similar programming on the site. The south barnyard space is divided up to accommodate the outdoor research programs needed for the center. In each of the barnyards is a small commercial booth. Each booth is small business that is a staple to the Ottawa area, these booths are located in small courts in the middle of the barnyards. They create a space for people to collect and exchange ideas. In the north public barnyard is Kettleman's bagels and in the south research barnyard is a BeaverTails. The shops draw visitors in to the research centre to grab a popular treat and encourage them to explore the new facility.

The north public barnyard will have small fields that the public can interact with. They will have orchard trees and berry bushes to be able to sample from. Additionally, there will be fields for the visitors to experience different aromatics or for people in the city to interact closely with crop plants such as corn or wheat. There will also be a pen for rabbits. The rabbits are there for the interest of visitors and their children but they also represent an important part of the crop cycle. Their droppings are often used as manure or compost which can be a great fertilizer for plants. The barnyard creates a space for interaction and for community to form while educating visitors on the plant cycle and giving urban families the chance to create a relationship with their food source.



The public barnyard in the Research Centre Plan.



The research barnyard in the Research Centre Plan.

The south research barnyard will have two different types of fields. The traditional in ground field for crop production as well as the raised garden beds. These will be monitored by the researchers and the production that comes from these crop fields will help create education for backyard farming. The research will teach residents about local pests, fungi and the different techniques for watering outdoor plants. Similar to the existing farms traditional farming research, the center will adapt its findings based on the changing global conditions, to best help the local community.

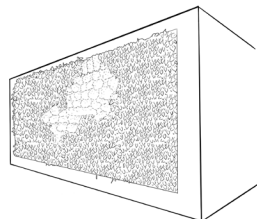


Diagram: Green wall research tests crop plant production in a dense and co-dependant environment.

The educational centre offers different types of classrooms for teaching the community on how to care or take part in different types of urban farming. Specific classrooms with equipment will be set up for backyard farming as well as indoor farming. Additional classrooms are available for multi-purpose activities and can adapt with the building as the future of urban farming changes or they can be designed to directly address concerns in which the community needs special spaces for. The front facade of the educational centre is designed around the green wall. Crops plants are grown on the interior facing green wall under a controlled environment while native plant species are grown on the exterior facing green wall to create habitats for local wildlife.

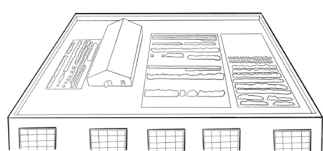


Diagram: Roof farming research tests for appropriate roof material and techniques for farming.

The collections house any research conducted at the center, here all the records will be available. Similar to a library, the collections will have computer lab areas to access resources, as well as, areas for physical books. On the roof of the collections is the roof garden. Research will be conducted here to help with the development of roof farming throughout the city. The roof garden is surrounded by framing to help control light and wind.



Diagram: Aquaculture research tests the reciprocal relationship between crop plants and fish.



Diagram: Vertical farming research tests for efficient ways to farm crop plants vertically without soil.



Diagram: Balcony farming research tests different balcony concepts that best supporting farming.

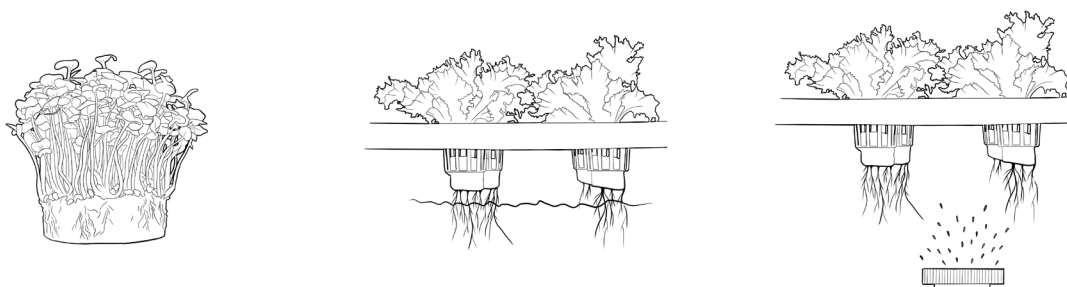
The Z-Farming building focuses on zero-acreage farming. On the main floor, there is an area for aquaculture, where research will commence on the symbiotic relationship between plants and fish. The tanks will be set at different levels to prevent cross contamination between the different environments. To the south will be the vertical farm towers. Silo shaped protrusions from the building will house the main vertical farming research, the silos will be completely clear giving the vertical farm full access to the natural south facing light. Additionally, on the second floor more typical z-farming research such as hydroponics, aeroponics, micro greens and small scale vertical farming will take place with east facing spaces for balcony farming research.

The mushroom cultivation facility is a small controlled environment. They need dark and moist spaces to grow, making the small building with no windows the perfect spot to conduct research. The tool rental building is open to visitors that can walk in and ask to rent gardening tool for use on their personal plots or they can drive through the carport to pick up what they need. The tactile farming building is beneficial for the back-of-house kitchens at restaurants. They have minimal space for food production and productivity can be maximized through the use of tactile farming techniques. Tactile farming will test how much produce and plant production can occur efficiently in the smallest amount of space.

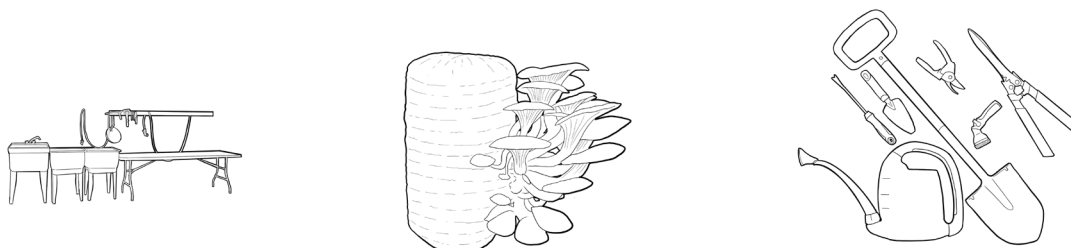
The indoor farming building is a research facility that blends public and private programs. There will be two live-in units where citizens of different generations and backgrounds can assist in the research development of indoor farming. To diversify the situations of indoor farming that can occur across the city. The additional research rooms for the indoor

farming will be given different types of light access to address various needs and conditions of the plants. The building will also house a refrigerated storage, a wash and pack station for food preparation, as well as, a public kitchen.

Finally, Building 76, the heart of the center, will be used to host lectures for the public. When new scientific research is released to the greater public or to host guest lectures from across the country. The administration will operate from the top floor. The smooth running and planning of the research center's future should be at the center of the project. The farm was not proactive in the past and did not address the city's needs. Causing the farm to fall out of the public's interest. The future success of the farm and the community should always be a central focus at the experimental farm.



Diagrams: Micro greens are researched to develop faster grow periods with higher yields (left). Hydroponics research tests the most efficient way to grow farm crops in water instead of soil (middle). Aquaponics research tests the capabilities of growing farm crop plants using mist (right).



Diagrams: Wash and Pack stations are important in any farming facility to prepare produce for distribution after harvest (left). Mushroom cultivation research tests for the most effective ways to farm mushrooms at a residential scale (middle). Tool Rental stations can help community households get a start that they might be avoiding due to take of resources (right).



Rendered view of the roof farming above the collections. Experimentation will be done on the roof garden beds to test for best technologies to implement roof farming throughout high-rise buildings in downtown Ottawa.



Rendered view of the indoor farming space. Herbs and crop plants will be monitored in indoor spaces under different lighting types to determine how to best care for the plants in each unique condition.



Rendered view of the aquaculture facility. Tanks of fish with floating plants allow the two to benefit from their mutualistic relationship. Tanks are placed at different elevations to prevent cross contamination.



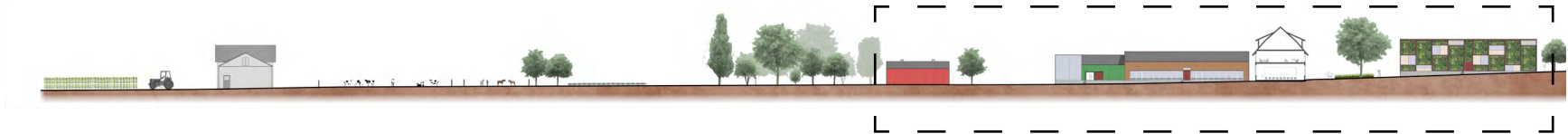
Rendered view of the green wall on the educational centre. Image includes some of the pathways and fields in the public barnyard.



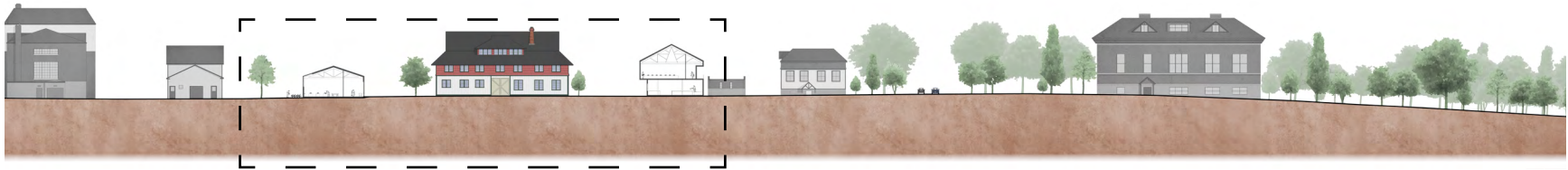
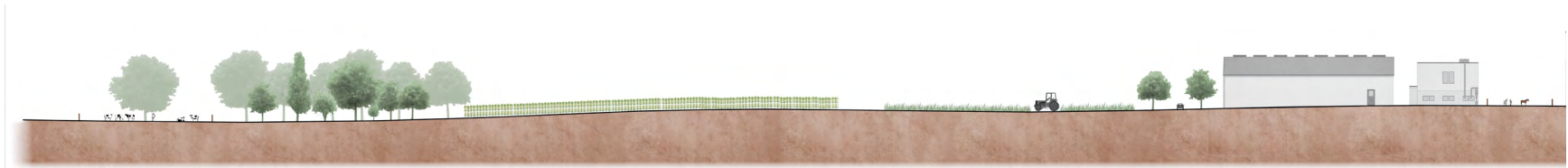
Rendered view of the vertical farming silo. Hydroponic systems wrap around the exterior of each of the silos, positioned to absorb the maximum amount of south facing light.



Rendered view of the public kitchen space at the research centre. The kitchen is used to test food produced on the farm.



Section drawing from North to South. Capturing the interior of Building 76. Lecture Halls have been set up on the ground floor and administration offices are located on the upper level. In the foreground of the section is the Tool Rental, the Indoor Farming Building and the Education Centre.



Section drawing from East to West. Capturing the interior of the Indoor Farming Building with views of the indoor farming room and the Z-Farming Building with views of the aquaculture room, the micro green experimentation room and the experimental balconies. In the foreground of the drawing is the front elevation of Building 76.

The City

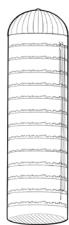


Diagram: Vertical Farming systems should make use of abandoned lots and warehouses in the downtown area.

The urban farming programs and non-human design criteria is not limited to the use at the farm. The site plan of the farm has created many opportunities to bring in local organizations and households from the community. Whereas the urban programs and design standards developed at the farm will be sent out into the city framework. Some of the principles from the farm that need to appear throughout the city include:

Vertical Farming Systems

Vertical farm systems should be placed throughout the city. Zero-acreage farming makes it easy to place structures on small plots of available land. Empty lots and abandoned warehouses are commonly found in the downtown core and are underutilized, these would make perfect spots for vertical farming systems. Introduction of vertical farming systems in neighborhoods with high food insecurity would also be very beneficial.

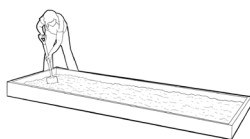


Diagram: Community allotment gardens should appear more in low income and food desert neighborhoods.

Community Allotment Gardens

Community allotment gardens should be more accessible across the city and offered in neighborhoods with lower income and food deserts such as West Centretown, Chinatown, Little Italy, and LeBreton Flats (Jensen 2023). It provides the community with more opportunities to grow their own food for their households without relying solely on grocery store prices.

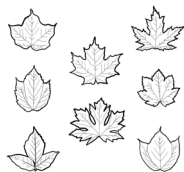


Diagram: Native tree species reduce urban heat islands and filter pollutants from the air.

Native Tree Species

Further incorporation of native tree species along walking paths and motorways is important for the city. Native tree species with a wide spanning canopy are great ways to

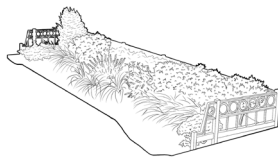


Diagram: Bioswales filter pollutants from stormwater.



Diagram: Farming friendly balconies should be mandatory design standards.

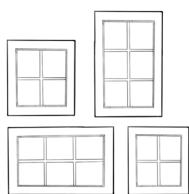


Diagram: Windows to support indoor farming should be implemented across the city.

prevent urban heat islands as well as filter out the pollutants in the air created by car emissions. They can remove on average, 10.8 grams of pollutants from the atmosphere (Sinnott, Smith and Burgess 2016). Additionally, greenery is great for the mental and physical health of the people in the city.

Low Impact Development

Incorporation of low impact development techniques can help manage stormwater in the city naturally. The plant life within strategies such as bioswales can be good at filtering out the pollutants that collect in the water on the city streets (Department of Environmental Resources 1999). Integration of the natural plants beautifies the edges of the streets while managing the city's water efficiently. The city should also include more permeable surfaces to prevent the risk of flooding.

Farming Friendly Balconies

Balconies should be farming friendly to allow households more opportunities to grow at home and be more self-sufficient. Balcony options made of full glass or concrete make it difficult to hang plants and allow for water drainage. Balcony designs made with railings are simple enough and allow for a variety of farming options. Research at the farm could encourage new balcony design ideas that do not just allow for farming but encourage it.

Windows to Support Indoor Farming

Similar to balconies, window designs and placements should take into considerations some of the requirements that are needed to farm indoors efficiently. Research that comes from the indoor farming building on the farm can go towards



Diagram: All new buildings in the city should be designed to exceed the LEEDS standards.

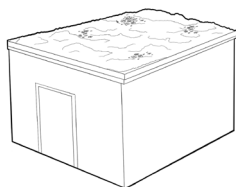


Diagram: Roof meadows support habitats for pollinators.

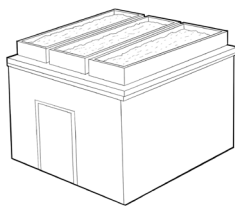


Diagram: Roof gardens create autonomy and income.

making policies for window designs in new residential construction in the municipality than can encourage certain window systems that benefit indoor farming during any season.

Increased Design Standards

Design standards should exceed expectations needed to achieve LEEDS. LEEDS standards are a starting block for sustainability standards in design, however, new standards are needed that are less forgiving. Which will force new builds to comply with sustainability guidelines that promote a healthy future. Sustainability standards in Ottawa are only necessary for city buildings with a square footage greater than 500 but they need to be applicable to all new construction (City of Ottawa 2023).

Roof Meadows

Incorporation of roof meadows where spaces is available is very important for the sustainability of pollinators in the urban environment. These spaces can easily be added to rooftops of high rise buildings in the downtown core where the roofs are only occupied by mechanical systems. Roof meadows with wild flowers allow pollinators spaces to forage and to create necessary habitats which they have been losing rapidly across the city (Blackledge, Horrox and Eldridge 2022).

Roof Gardens

Roof gardens can be established on accessible rooftops with large spans of suitable space. Roof gardens can be beneficial for residents of high rise residential buildings. It gives them an opportunity to building a community and make connections with the neighbors and taking care of a

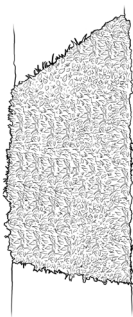


Diagram: Green walls beautify the city and provide habitats.

garden will give them autonomy. Roof gardens on top of commercial buildings can be sold locally to reduce the cost off food production and offer affordable and health food options for those who live in the downtown area.

Green Walls

Green walls can beautify the urban environment by placing them on the exterior of the buildings. These green walls can help purify the air from pollutants much like the introduction of the native tree species. These spaces outside also have the potential to create more habitats for the urban pollinators (Blackledge, Horrox and Eldridge 2022). Indoors a green wall can be used as a decorative element to the building increasing the mental health of the visitors and they can also be used to grow produce that can be sold locally.

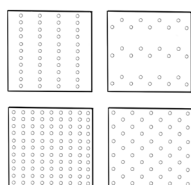
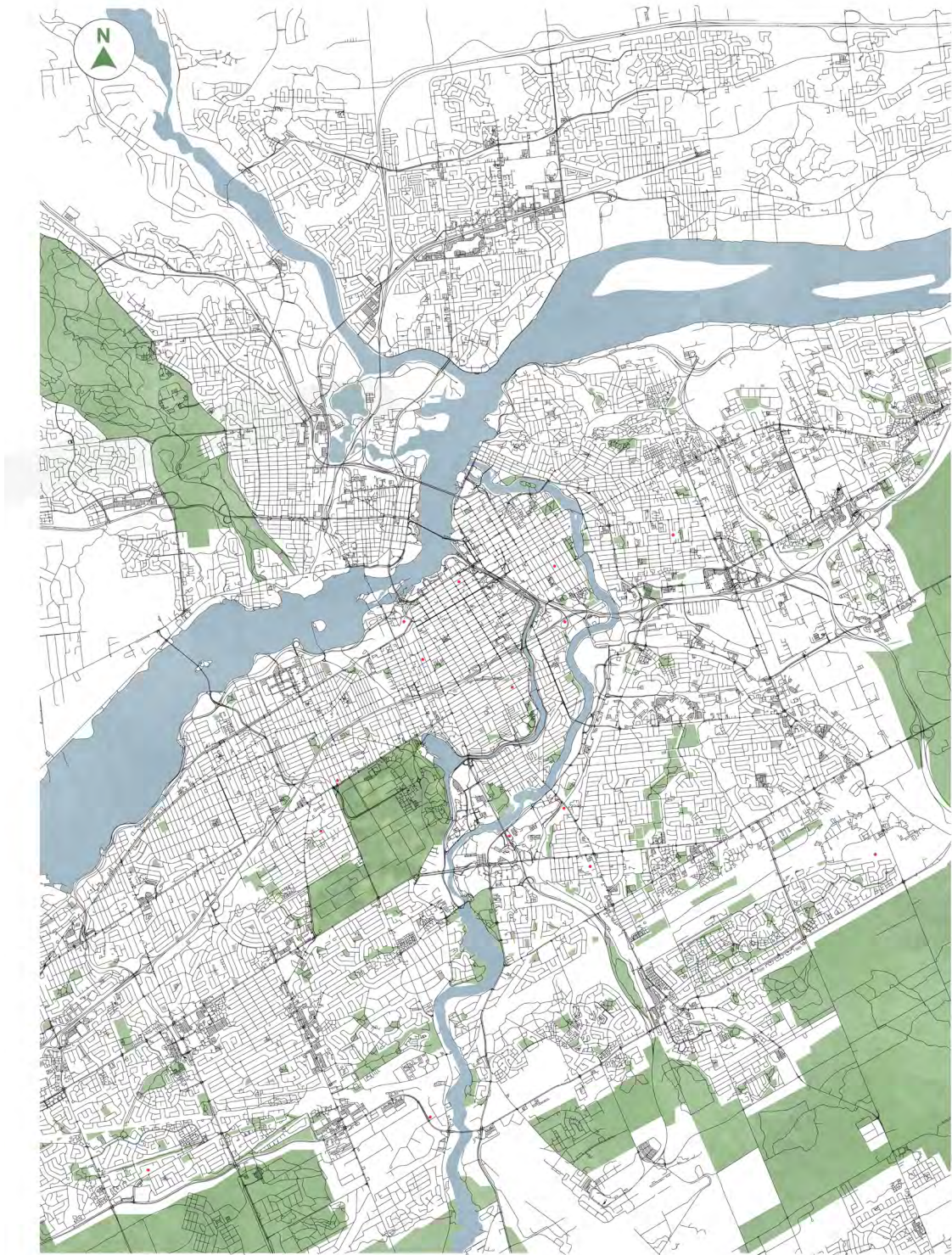


Diagram: Bird safe glazing design guidelines will reduce bird collisions with glass.

Bird Safe Glazing

Birds are an important part of the ecosystem and cities can be a dangerous environment for them, from the threat of outdoor cats to harsh lighting conditions at night and transparent glazing on buildings. In Ottawa alone there have been 250,000 bird collisions with clear and reflective glazing on buildings in a single year (Laucius 2022). The city must implement high standards for bird safe glazing in all new construction to limit the amount of accidents in the city.



Map of the City of Ottawa. The Image highlights the green spaces throughout the city including the greenbelt outside of the city limits. The CEF is clearly identifiable as the largest green space within Ottawa. Neighborhoods with food deserts or insecurity as well as major roads in need of more native tree species are noted with red dots.

Chapter 6: Conclusion

Discoveries

Urban farming is still an evolving technology and there are many opportunities to work with architecture. Urban farming can be known to be easily adapted to residual spaces in the city, but there is also the opportunity to create architecture that benefits urban farming. For example, window sizes or positions, and balcony materials and shapes can promote urban farming in the residential atmospheres. Or the adaptation of different types of architectural screens can determine how much wind and sun can be accessed on rooftop farms. Architecture can determine if urban farming is successful or not. Architectural designs should take more liberty to create a relationship between buildings and urban farming.

Additionally, it is important to understand how great of an effect the external actors have on a design. The master plan was constructed based on the needs of the communities and local organizations in the city. The farm lacked this connection to its surroundings in the past and that harmed its future. It is necessary when implementing a design strategy to acknowledge these external factors. This was the issue the farm had back in 2004 when they implemented the site management plan. They still needed the connection with the community and the plan was never fully accomplished. All future plans for the farm need to highly consider the external factors and surrounding context of the site through each stage in the design process.

Difficulties



My indoor tomato plant grown from seed throughout the thesis process. Personal urban farming research had its difficulties.

Within the thesis intervention, it was difficult to create a space that could accommodate the research needed for the farm to address urban farming practices and create spaces that would not become obsolete. Everything changes, especially research. Over time the farm will continue to grow with the city and it will need different types of research spaces. In my thesis intervention, I created custom spaces for ongoing urban farming research while also providing more adaptable spaces for education and research. I tried to create a blended space that is open for future adaptation and change. But I can only speculate what the farm might need in the future.

Additionally, it can be difficult to predict what the community will want. Future projects for the farm must involve the community consistently through the design process. Currently, the community has mixed opinions on the farm. Some understand the importance of the farm as a research site and as a heritage site. However, others do not see it as important for anything but its land. Will the intervention be enough to change the attitudes of those who do not believe in the farm? Is the engagement directed enough towards all different community members? Changing everyone's opinion can never be achieved but it should not stop the farm from trying.

Direction to Pursue

My thesis intervention covers three major scales. The planning of the thesis tackles the site using a master planning strategy. Individual theses could be written on each

of these different scales and further research and details can be put into each of the sections. For the future direction of this thesis, I will continue to work on the master planning scale of the farm.

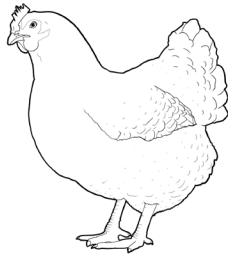


Diagram: Livestock research is in the near future for the CEF. The citizens want chickens but the city is not on board yet.

The major focus of my thesis intervention was the crop research and development of urban farming. However, the practice of urban farming is not limited to plants. The city of Ottawa has limitations to the types of livestock that can be owned privately and there is very little access to livestock animals. There are very few organizations outside of the Central Experimental Farm that are allowed to own and care for livestock. However, the citizens have other ideas. Over the years several households in Ottawa have owned chickens against the city by-laws (Martin 2023). It is an active interest in the community to own and care for livestock. Once the city of Ottawa changes its by-laws to allow personal ownership of livestock animals the research center at the farm should expand into research on the care and maintenance of livestock animals. The city should be educated on the responsibility of caring for livestock and what type of space requirements and food requirements are needed for each type. Additional research could be done to develop affordable plans for livestock shelters or affordable feed options or general care that may lead to better egg or milk production. The city is still learning and growing and there are so many opportunities for the farm to grow with it.

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