

UBC Social Ecological Economic Development Studies (SEEDS) Sustainability Program

Student Research Report

Connecting People with Places Biodiversity Design and Build

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University of British Columbia

LFS 450

Themes: Biodiversity, Climate, Community

April 4, 2019

Disclaimer: "UBC SEEDS Sustainability Program provides students with the opportunity to share the findings of their studies, as well as their opinions, conclusions and recommendations with the UBC community. The reader should bear in mind that this is a student research project/report and is not an official document of UBC. Furthermore, readers should bear in mind that these reports may not reflect the current status of activities at UBC. We urge you to contact the research persons mentioned in a report or the SEEDS Sustainability Program representative about the current status of the subject matter of a project/report".



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Biodiversity Design + Build

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Biodiversity Enhancement

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The University Neighbourhoods Association (UNA) in partnership with Land and Food System 450 class worked to create a biodiversity installation which will engage the community with biodiversity and food. Our biodiversity installation is placed in Hawthorn Community garden which is centrally located in the University of British Columbia (UBC) along Main Mall Greenway, and within a stone's throw distance from Old Barn Community Centre. This provides our group a great opportunity to engage the broader UBC community that frequently passes the garden with our installation. Engaging the broader community will bring awareness to the community gardeners and provide an opportunity for engagement with one another. In this report it will discuss the community of the Hawthorn garden and the importance of its biodiversity within this context. We will also explore the benefits that an increase in biodiversity will bring to the garden and the community.

Four different methods of data collection were used for this research which include a focus group, an online survey, interviews and secondary sources. The focus group and survey followed similar designs asking for weighted criteria and feedback from the initial concept designs. The interviews and secondary sources were used to inform best practices and attributes of a successful installation in terms of community involvement with mason bees.

The results from this research project are divided between results from the community members, and the best practice from experts and secondary research. The finding from the community members showed that they wanted the installation to prioritize the enhancement of biodiversity and the education of children. From the concept designs, the community members showed an equal preference for two designs highlighting that they wanted visually appealing installation and the opportunity for information. From the interview of experts and secondary sources, the study found that a successful installation should be east facing, have proper access to food, water and clay, and for the bees and, have an active amount of community engagement and interaction.

From the findings, the study discusses the implications of the installation design and how the feedback impacted the final design. This report is concluded with both long- and short-term recommendations for the community. For the short-term recommendation, there needs to be an active maintenance plan and monitoring in place in order to see the success of the bees in the installation. For the long-term recommendations, there should be a plan to support more native species of pollinators and continue to add biodiversity installations that promote these pollinators and continue collaboration with local conservation groups.



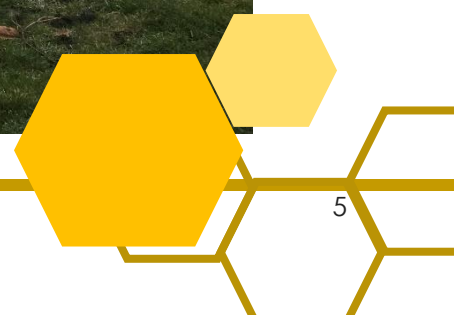
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2. INTRODUCTION

2.1 RESEARCH TOPIC

Biodiversity can be defined as the variety of life in the world or in a particular habitat or ecosystem, and it plays a fundamental role for the social, economic, and ecological well-beings of the nearby community (Faith, 2007). Since urbanization leads to rapid reduction of biodiversity (Mckinney, 2002), maximizing the potential of our urban environments to be rich in biodiversity is a great challenge that we encounter. However, it offers us opportunities to apply knowledge in sustainability and establish stewardship towards biodiversity enhancement. The Social Ecological Economic Development Studies (SEEDS) reports have shown that community gardens are an opportunity to improve biodiversity in urban areas. Hence, our project is to build an installation based on biodiversity and connecting people with spaces.

The SEEDS is a program that aims to forage partnerships with UBC students, faculty, staff and community members to create innovative and impactful projects. It initiates unique connections which enable students to apply research projects under the supervisions of a faculty member, to support the University's efforts to advance operational priorities and to harness the opportunities of enhancing sustainability.

As a part of the SEEDS program, our aim is to enhance biodiversity in Hawthorn Community Garden, the first and largest UNA garden, developed in 2008, within the UBC community, which is the home to 12,500 residents. Hawthorn Community Garden contains 78 garden plots with over 90 gardeners. The UBC community consists of residences from

variety of ethnicities and occupations, for our project to be successful it should be able to engage the whole community. However, complex the demographic, this project has the potential to lead a well-rounded understanding on biodiversity and provide a seed to generate greater thoughts and diverse conversations for further biodiversity development.

2.2 RELEVANCE TO SUSTAINABILITY

As a world leader in research and sustainability, UBC hosts several projects in regard to sustainability and our project is one of them. Sustainability is defined as "developments that meet the needs of the present without compromising the ability of future generations to meet their own needs" (McGill University) and it is achieved through the following interconnected domains of environment, economy, and society (McGill University). Therefore, bringing benefits to the local environment and society while being economic efficient is the key for our project to sustainably achieve biodiversity. Our mason bee installation is how we will accomplish these goals. Mason bees are people-friendly, as they do not actively sting people unless they feel threatened, they can be placed in the Hawthorn Community Garden and it will be a successful example to promote local biodiversity.

In regard to environmental sustainability, mason bees play a fundamental role in pollination especially for spring flowering fruit, nut trees, and spring berry plants (USDA). According to research, they are three times better pollinators than honeybees. Honeybees are more interested in the nectar than pollen, which



means less pollen is transferred to neighbouring plants. Wild native bees are mostly pollen collectors which enhances pollination (USDA). Mason bees are also crucial in pollination. Effective pollination of spring flowering fruit, nut trees, and spring berry plants ensures sufficient food sources are available for other animals such as humans, insects, birds and rodents. Birds and rodents are food sources for larger predators, and together they build a resilient food-web.

The mason bee installation will be made of sustainable and environmental-friendly materials that are suitable for Vancouver weather. Sustainable and environmental-friendly materials are defined as recyclable, renewable, and purposeful. These materials are easily found in the household and/or are accessible to the general public.

In the 20-Year Sustainability Strategy listed, that “innovative engagement programs strengthen linkages across the campus to generate a sense of place and support the creation of a vibrant, animated, and sustainable live-work-learn community” (UBC, 2014) as strategies to create sustainable communities. This Project will address this strategy by creating community engagement, visual stimulation and learning opportunities. Beautifully designed Mason Bee hives with educational prints outside the box and interventional boards can attract people especially, families to come to learn and act as a seed to cultivate greater ideas or further conversations on biodiversity. They inspire the engagements and connections of people within the food production process as well as providing opportunities for people to re-establish links to food and access lifelong learning.

Since there are currently members of the Hawthorn Community garden that are bee experts and they are making their own project to enhance mason bee population, this mason bee installation will be a perfect alliance of the community interests and our course project. Thus, our project will receive greater support, maintenance, and participations throughout the course and after. Overall, the maintenance for mason bees is low, which makes the project economically sustainable.

Although we are not the only sustainable project in the campus, we demonstrate sustainability in a different perspective and provide a successful example for the future projects to follow.



Figure 1. Mariana giving a presentation to the focus group.

2.3 PROJECT CONTEXT

The importance of our project can be viewed in different scales. Locally, installation of the bee house could enhance pollination through the preservation of native bees and establish a robust ecosystem within and around the garden. Broadly, it inspires community engagement and educates people to acknowledge the importance of bees in our ecosystem and how they are beneficial to gardens. On a larger scale, this project aligns



with urban sustainable policies and strategies. As the UBC's Campus Biodiversity Initiative has put plans and strategies in place to address the biodiversity crises in our environment which emphasizes the importance of connecting people with places, that provide greater safety, support, and an opportunity to learn from one another. Our project functions as an important component of this and commits to provide values like leadership, education and promotion of a sustainable community life

2.4 PROJECT GOALS AND OBJECTIVES

2.4.1 OBJECTIVES

- Maintain and enhance biodiversity
- Provide a seed to greater thought or further conversation on biodiversity
- Offer a shared experience with fellow community members
- Provide an opportunity to educate children
- Facilitate emotional connection to one's physical community space
- Make intentional use of sustainable materials
- Encourage moments of mindfulness and meditation

Although our main objective is to provide a conversational topic for the community members and engage the residents in identifying, maintaining and enhancing biodiversity in relation to food, we also try to achieve as many objectives as possible to make our project multifunctional. These are seven objectives that were set for us by our stakeholder with the UNA. Since this is a community-based project, community preferences are important to incorporate into our design. Therefore, we created an interactive dialogue with gardeners to gather their opinions, so that we can identify the priority of each objective.

3. METHODS

3.1 METHODOLOGY

Having an initial meeting with stakeholders from the UNA and SEEDS Development Program highlighted the objectives of our project and gave opportunity for our team to survey the Hawthorn Community garden area for an ideal location of the biodiversity installation (E. Lomax, personal communication, February 5, 2019). A second meeting with stakeholders decided that the best approach to having a successful biodiversity installation would be to build on the gardeners' interests and a workshop being presented by members of the Hawthorn Community garden in "mason bee nest making" (E. Lomax and D. Gill, personal communication, February 15th, 2019).

Preliminary research was conducted by interviewing experts in the field of bees and in particular mason bees, to gain insight on how to best build, maintain and engage the community with a mason bee habitat. Our first interview was with the gardeners hosting the "mason bee nest making" workshop (D. Scarth and J. Scarth,



personal communication, February 15th, 2019) and this provided insight and the framework for the direction of our project. From this meeting we composed our main questions to ask experts in the field of bees.

As there were seven research objectives provided to us by our stakeholders for our biodiversity design build and installation, our team decided to host a focus group for the UNA community gardeners at the Old Barn Community Centre to gain insight into which of the seven objectives are most important to them. This also gave our team the opportunity to present our three concept designs and obtain feedback and determine which design concepts were most favoured and what should be adjusted in the design. Discussions were organized at the end of the focus group to gain additional opinions. Interviewing the UNA community gardeners was important, since the success of the engagement and longevity of the biodiversity installation would be dependent on the interests and ongoing involvement with the gardeners. As the number of participants from the UNA community gardens was lower than we anticipated for the focus group, and we wanted to obtain input from the gardeners that were not able to attend our focus group, a second survey was conducted via an emailed sent to all UNA gardeners through our UNA stakeholder.

Research in secondary sources was conducted to determine which materials are best to use in the construction a bee habitat, all the concerns that need to be taken into consideration, such as which direction the habitat should be facing, protection from weather, pests, disease and food source proximity. Some of our secondary sources were

used for the facts that are present on the information panels of the mason bee habitat, which includes a detail explanation of the mason bee life cycle.

Permits are required for all installations and/or changes to the UBC landscape, and certain requirements need to be met in order to obtain a permit from UBC Campus and Community Planning. As part of the requirements we met with the UBC Landscape architect and present our design and location for installation. Other sources were contacted or consulted for the location, structure safety and stability, in consideration for meeting permit requirements.

To fit the project objective of making use of sustainable materials and to keep within our budget of \$2000 our team began our materials search by looking for repurposed items such as recycling shelving, pallets or other suitable materials. However, our primary and secondary research conducted reported that local untreated wood and weather resistant material was the preferred for the attraction a maintenance of a mason bee habitat and life cycle. To meet all the criteria for safety, longevity and bee friendly materials, we choose to focus on sourcing sustainably sourced and untreated cedar wood. Additional construction material was sourced based on low environmental impact, and availability. To minimize the environmental impact techniques such as ink transfer to wood in lieu of PVC boards for the information panel on the mason bee habitat were explored.

3.2 METHODS

3.2.1. PRELIMINARY INTERVIEWS



After our initial interview with the Hawthorn community gardeners that were hosting the “mason bee nest making” workshop, we conducted an additional five (n=5) interviews with bee experts that we either already knew or that were referred to us by our instructors, garden stores that run bee workshops, and connections made through biodiversity groups at other universities. We also reached out to individuals who had completed similar projects to ours. The response rate for interviews was 50%. Interviews were either in person, over the phone or through email, depending on how easy they were to reach, and they were we asked our series of five questions. The five questions can be found in the appendix. At the completion of the interview, responses were uploaded to our google drive for further review and analysis. A coding system was used to determine which trends and factors are most important in the success of a community garden mason bee habitat. From the information obtained through our preliminary research our team configured three viable designs for a mason bee habitat. These designs took into consideration the objectives presented by our stakeholders, how to engage the community and support the lifecycle of mason bees. Dimensions of the mason bee habitat were based on the size of the nests made in the workshop hosted by the UNA and mason bee experts

3.2.2. FOCUS GROUP AND SURVEYS FOR COMMUNITY FEEDBACK

Communication to the gardeners about our team conducting a focus group was an email flyer sent to the UNA gardeners via our stakeholder (E. Lomax, personal communication,

February 21st, 2019), flyer can be found in the appendices. The flyer clearly indicated the topic and goals of the focus group which was biodiversity enhancement, date, time and location. Snacks and refreshments were freely offered in order to attract more attendants. In the focus group, we introduced our team and the biodiversity research project that we are conducting and building, research objectives, and an explanation of the concept designs. Waivers were distributed for permission of use of information, and five out of six participants signed and returned the waivers. Each participant was given five dot stickers and was asked to place a dot on the objectives they felt had the most value. Participants were explained that they could place more than one sticker on each poster if they desired. The objective was to see where the weight of importance was placed on each objective.

Following this activity, we handed out a questionnaire relating to three concept designs for each participant to fill out. The questionnaire asked them to rank the designs from one to three; one being most favourable, three being least favourable, to determine which design was most favoured. The questionnaire also asked opinions from each participant and questions included what was liked, disliked and what can be improved for each concept design, this determines if adjustments need to be made to the designs, and if there was something that we overlooked in our initial designs. There was also a final question at the end of the survey that asked what types of plants species would be beneficial in the design (edible/ non-edible), this was asked as typically edible plants require more maintenance and attract animals of the human



and non-human kind. In addition, this provided further insights into the gardeners' desires for their garden community. This questionnaire was intended to be holistic and unbiased in nature. After the community members completed the concept design feedback form, we had a group break-out discussion where we asked questions relevant to the community garden and gardening practices. Notably, we asked introductory questions, like how many years members had been involved at the community garden. Similarly, we understood where members obtained their plants, soil, and gardening advices. A critical question asked was which plant species should be in the installation, from this we gained insights into the rules and regulations of the gardens and the desires of the gardeners. Plantation of perennial shrubs are not allowed in the Hawthorn Community Garden since they are hard to be removed and they cast shade to the nearby plots. Hence, this installation offers opportunities to the community members to plant perennial crops such as blueberries. In addition, these questions sought to better understand the background of the local environment and values of stakeholders. All questions asked are included in the appendix.

An invitation was sent to all the UNA community gardens, roughly 360 adults, for the focus group through our community stakeholder. Due to the participation being lower than we anticipated, as our focus had only five participants, we chose to email a similar survey to the gardeners, to gain more feedback. Our team received 10 responses from the email survey. The survey included a ranking of the seven research objectives, where

respondents were asked to rank the objective from one to seven, with one being the most favorable and seven being the least favorable. The same question was presented regarding ranking the design concepts from one to three, where one is most preferred and three is least preferred. We also asked participants to provide opinions in regard to what was liked, disliked and what can be added to the design concepts. We inquired once again whether the community members wanted the plants to be edible or non-edible. All data, verbal and descriptive feedback and input was coded and sorted, as shown in the results section. The information was essential in finalizing our design.



Figure 2. Christine and Eva preparing for focus group.

3.2.3. SOURCES OF MATERIALS USED

Wood materials for the side planks of the design were sourced based on size availability and sustainably sourced cedar. The primary contact that we explored was The UBC Centre for Advanced Wood Processing in the faculty of Forestry, however they did not have stock of required size of wood for our design and the cost of shipping was between \$80 - \$100. A second source, PowerWood Corp, provided by one of the team members was explored for sustainably sourced cedar, and prices that fit within the



budget. As the design evolved and the needs for the project material became more specific, time sensitive and cut to specific dimensions, additional materials were sourced from local lumber stores, and hardware stores. Other materials such as concrete and low VOC water-based wood finishes, and glue were also from local lumber stores, and hardware stores. Online searches were conducted for the process and instructional videos on how to transfer ink to wood.

Once suggestion from the landscape architect where incorporated into the design and detailed drawings along with dimensions and full description of the structure, price breakdown including cost allocation for remediation to the property, who will be building the structure, community support from stakeholder, photo of location and underground utilities map provided, we were able to apply for a permit, which was successfully obtained.

3.2.4. SECONDARY DATA COLLECTION RESEARCH METHODS

During our preliminary interviews we were often directed toward or given articles to review for further information on building a successful mason bee habitat. Secondary sources were also found through online searches, UBC library research searches, and government websites by using keywords such as “how to support local pollinators”, “mason bee life cycle”, “mason bee habitat”, and “Canadian bee population.” We also referred to movements in the city of Toronto and Victoria for increasing the population of pollinators and their resources indicated on the municipal websites. Secondary research was mostly focused on mason bee populations, and what concerns we need to take into

consideration when building a mason bee habitat. The research papers, government websites, municipal websites and publications were coded for descriptors and information on location, habitat specifications and environment, materials, and concerns for installing a mason bee habitat. This information was used in confirming the location and finalization of the design. Codes can be found in the appendix.

4. RESULTS

The following are the results from online survey that was emailed out to all UNA community gardeners, and responses that were recorded and surveyed at a focus group where all UNA community gardeners were invited to attend and provide their feedback.

4.1 RESULTS FOR OBJECTIVE PREFERENCES

4.1.1. RESPONSES FROM ONLINE SURVEY EMAILED TO GARDENERS

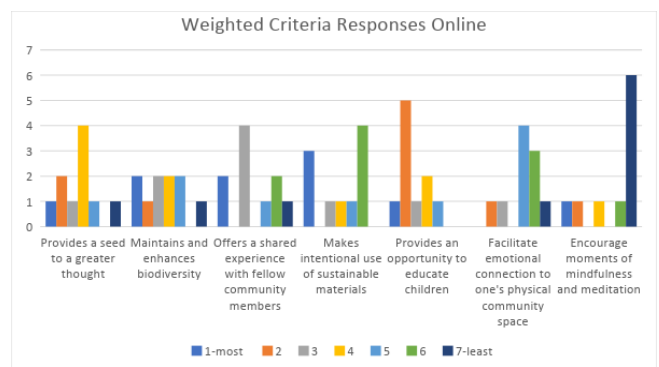


Figure 3. Gardeners force preference ranked project objective in order from one to seven.

To determine which objectives were most meaningful points were attributed to each value, for example 1-most preferred was given seven points, 2 was given six points, ..., 7-least preferred was given one point. The results are provided below.



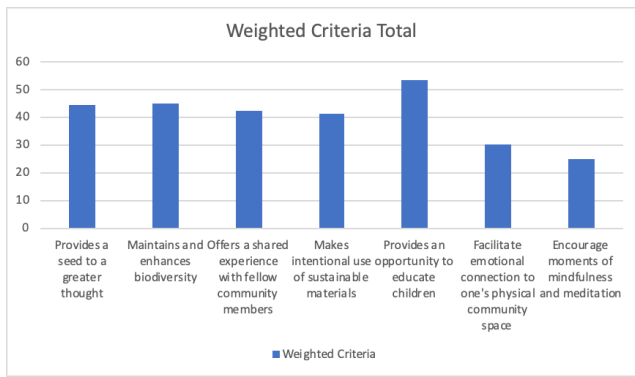


Figure 4. Totalled weighed results from online survey.

The most preferred objective was “provides an opportunity to educate children”, and least preferred was “encourage moments of mindfulness and meditation”.

4.1.2. RESULTS FROM FOCUS GROUP STICKER VOTING

The six participants in the focus group were each given 5 stickers to place on sheets individually posted with the seven criteria. Five people participated and the table represents the results

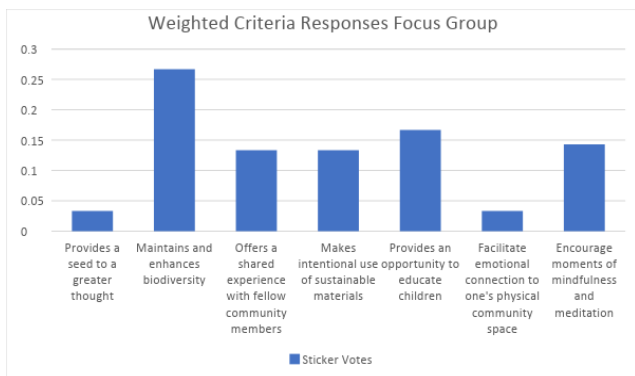


Figure 5. Totalled weighed results from the focus group.

According to results the most preferred objective is “maintains and enhances biodiversity”, and least preferred is “facilitate emotional connection to one’s physical community space”.

4.1.3. COMBINED RESULTS

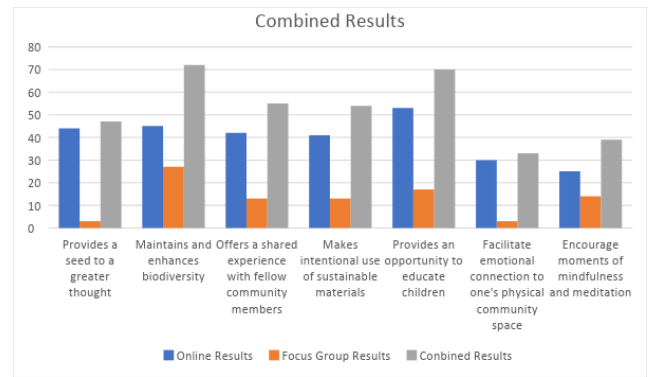


Figure 6. Totalled weighed results from both survey and focus group.

The combined result indicates that “maintains and enhances biodiversity” is the most preferred objective, and “facilitate emotional connection to one's physical community space” is least preferred.

4.1.4. LIST IN ORDER OF PREFERENCE

1. Maintains and enhances biodiversity
2. Provides an opportunity to educate children
3. Offers a shared experience with fellow community members
4. Makes intentional use of sustainable materials
5. Provides a seed to a greater thought
6. Encourage moments of mindfulness and meditation

4.2 RESULTS FOR CONCEPT DESIGN PREFERENCES

4.2.1. ONLINE RESULTS FOR CONCEPT DESIGNS

Gardeners' preferences ranked concept design in order from one to three.

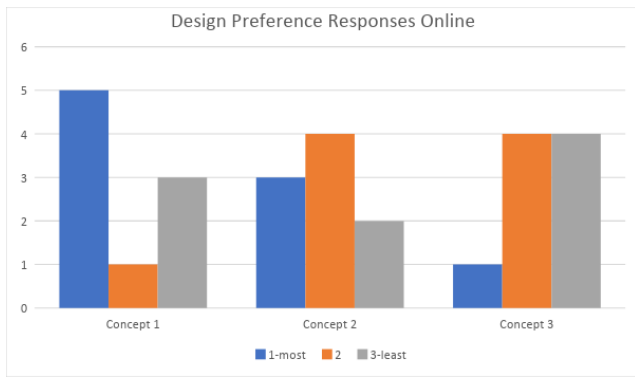


Figure 7. Graph of concept preferences from online surveys

4.2.2. ANALYSIS OF RESPONSES REVEALED FROM ONLINE SURVEY

To determine which concept designs were most preferred points were attributed to each value, 1-most preferred was given three points, 2 was given 2 points, and 3-least preferred was given one point. The results are provided below.

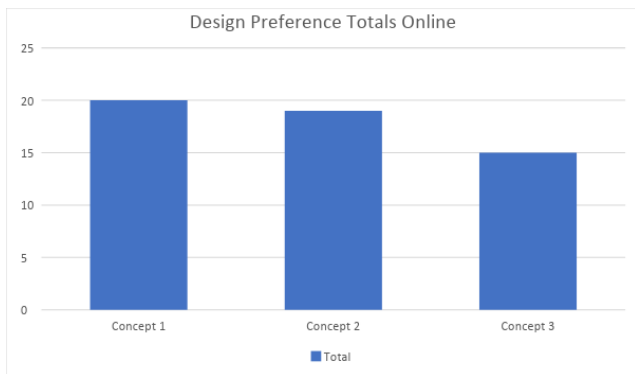


Figure 8. Graph of concept preferences from online surveys totalled preferences

For online results, concept 1 is the most preferred design and concept 3 is least preferred

4.2.3. FOCUS GROUP RESULTS FOR CONCEPT DESIGN

Gardeners force preferences ranked concept design in order from one to three.

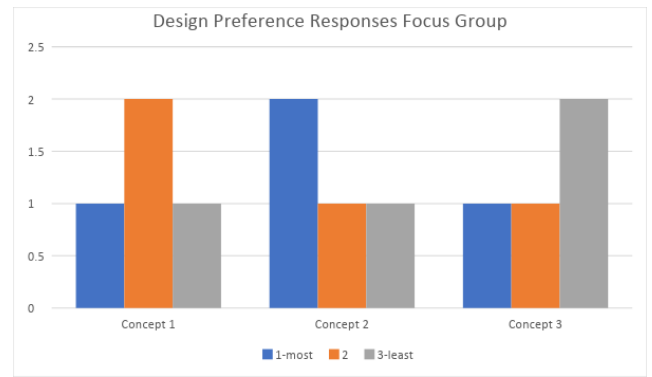


Figure 9 : Graph of concept preferences from focus group.

4.2.4. ANALYSIS OF RESPONSES REVEALED FROM FOCUS GROUP RESULTS

To determine which concept designs were most preferred points were attributed to each value, 1-most preferred was given three points, 2 was given 2 points, and 3-least preferred was given one point. The results are provided below.

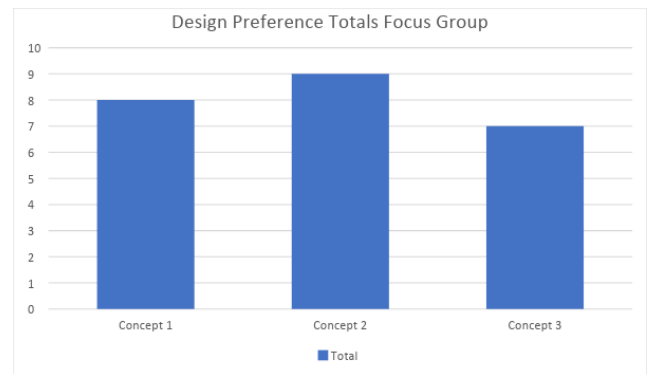


Figure 10: Graph of concept preferences from focus group totalled preferences.

For focus group, concept 2 is the most preferred design and concept 3 is least preferred.

4.2.5. COMBINED RESULTS FROM FOCUS GROUP AND ONLINE SURVEY

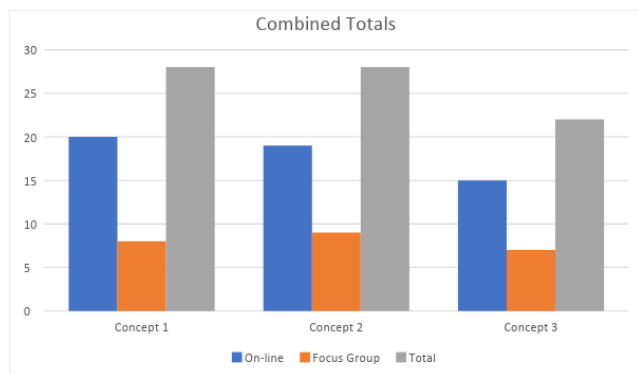


Figure 11. Graph of concept preferences from online surveys and focus group.

Both design concepts 1 and 2 were the top choice, and concept 3 was least preferred

4.2.6. RESULTS FROM FOCUS GROUP FEEDBACK ON SURVEY

| Person | Like | Dislike | Improved | Plants |
|----------|-------------------------|----------------------|----------------------|-------------------------|
| Person 1 | 1 honey comb | N/A | N/A | milk wheat, bio-diverse |
| | 2 house like shape | chalk box | no loose items | |
| | 3 bee nest board | overused board | hexagon shape | |
| Person 2 | Like | Dislike | Improved | Plants |
| | 1 Design | not streamlined | main structure only | edibles |
| | 2 clean look | N/A | permanent | |
| | 3 clean look | too busy | doublesided info | |
| Person 3 | Like | Dislike | Improved | Plants |
| | 1 N/A | expensive, time | no chalk board | edible, flower |
| | 2 easy maintain | info board too big | both sided board | |
| | 3 beautiful arrangement | expensive | N/A | |
| Person 4 | Like | Dislike | Improved | Plants |
| | 1 hexagon shape | no info board | protective structure | edible |
| | 2 space for info | taking more room | simplify it | |
| | 3 practical | N/A | N/A | |
| Person 5 | Like | Dislike | Improved | Plants |
| | 1 design | flowers on top | flowers on bottom | non-edible, flowers |
| | 2 info and paint board | N/A | N/A | |
| | 3 space saving | too close, no plants | separated | |

Figure 12. Table with results from feedback for the 3 concept designs.

4.2.7. RESULTS FROM MASON BEE INTERVIEWS WITH EXPERTS IN FIELD

| Jess - (Uvic) | | | | | | | | |
|---------------|-------------------|------------|-----------------------|--------------------|-----------|--------------|-------------|-------------|
| | # Codes | Plants (6) | Plant Preference (10) | Kids Interest (14) | Care (18) | Habitat (19) | Advice (21) | Safety (24) |
| Question 1 | 6, 10, 18, 19, 21 | X | X | | X | X | X | X |
| Question 2 | 21, 14 | | | X | | | X | |
| Question 3 | 6, 14, 21 | | | | | | X | |
| Question 4 | N/A | | | | | | | |
| Question 5 | 6, 21, 24, 18, | X | | | X | | X | X |

Figure 13. Table of the coded interview from expert Jess from UVIC

| Maria Jude (Ryerson) | | | | | | | | | | | |
|----------------------|------------------------|--------------------|---------------|--------------|-----------|--------------|-------------|----------------|-------------|----------------------|---------------|
| | # Codes | Kids Interest (14) | Workshop (15) | Success (16) | Care (18) | Habitat (19) | Advice (21) | Materials (23) | Safety (24) | Food Insecurity (25) | Problems (27) |
| Question 1 | 14, 15 | X | X | | | | | | | | |
| Question 2 | 14, 16, 21 | X | | X | | | X | | | | |
| Question 3 | 14, 15, 18, 19 | X | X | | X | X | | | | | |
| Question 4 | 15, 19, 23, 24, 25, 27 | | X | | | X | | X | X | X | X |
| Question 5 | 14, 15 | X | X | | | | | | | | |

Figure 14. Table of the coded interview from expert Marie Jude.



| Marika - (bee expert) | | | | | | | | | | |
|-----------------------|-------------------|-----------|---------|-----------------|---------------|--------------|--------------|-----------------|-------------|---------------|
| | # Codes | plant (6) | bee (7) | unity engagemer | workshop (15) | success (16) | habitat (19) | life cycle (20) | advice (21) | material (23) |
| Question 1 | 14,15,16,19,21,23 | | | X | X | X | X | | X | X |
| Question 2 | N/A | | | | | | | | | |
| Question 3 | 6, 7, 19 | X | X | | | | X | | | |
| Question 4 | 7, 19 20 | | X | | | | X | X | | |
| Question 5 | 21 | X | | X | | | X | | X | X |

Figure 15. Table of the coded interview from expert Marika.

| Margaret | | | | |
|------------|---------|-----------|--------------|-----------------|
| | # Codes | time (11) | habitat (19) | life cycle (20) |
| Question 1 | 11 | X | | |
| Question 2 | 20 | | | X |
| Question 3 | 19 | | X | |
| Question 4 | | | | N/A |
| Question 5 | 20 | | | X |

Figure 16. Table of the coded interview from expert Margarete.

4.2.8. RESULTS FROM SECONDARY RESOURCES

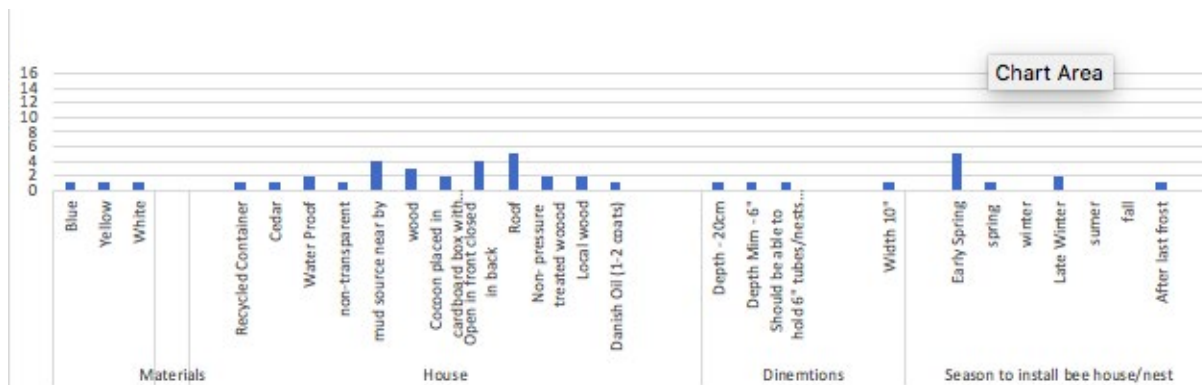


Figure 17. Table of the coded interviews from all experts: Part 1.

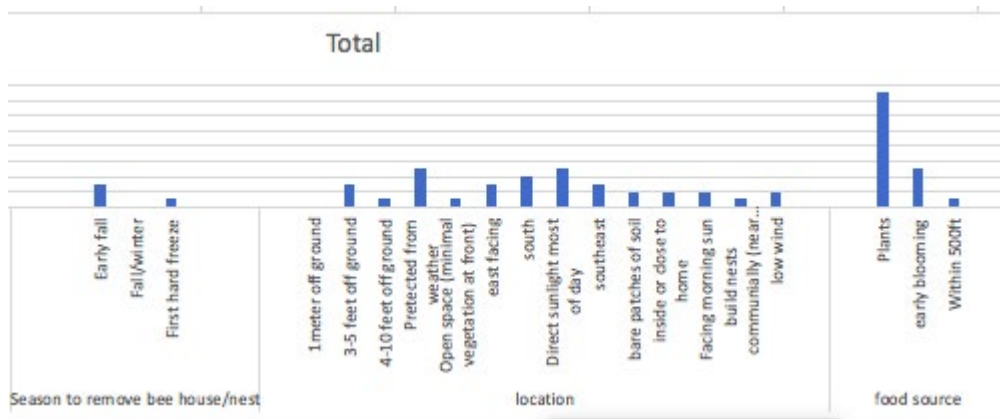


Figure 18. Table of the coded interviews from all the experts: Part 2.

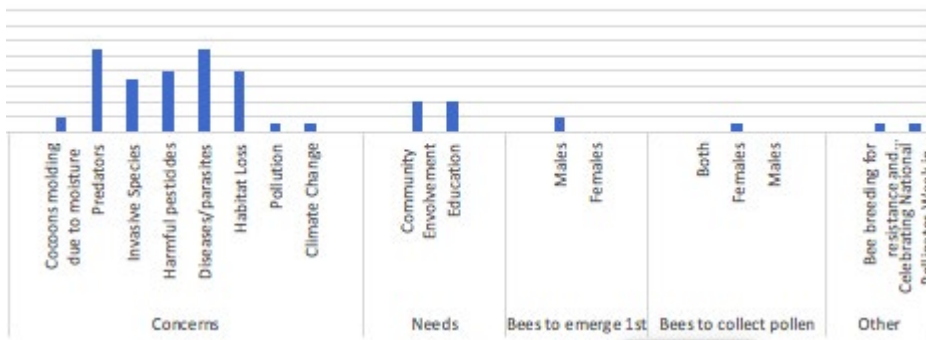
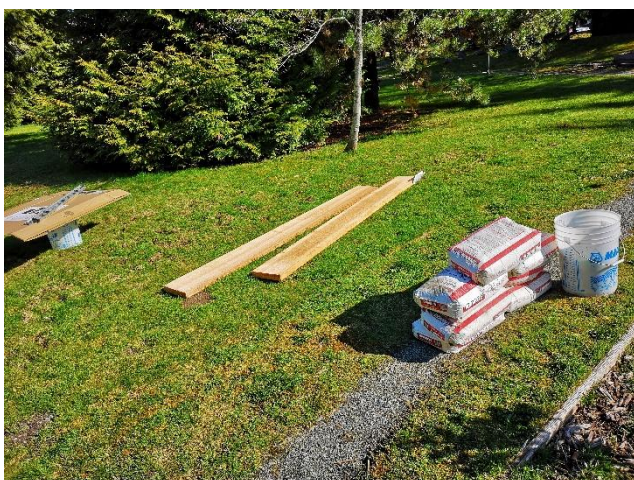


Figure 19. Table of the coded interviews from all the experts: Part 3.

4.3 MATERIALS

Wood materials were sourced from PowerWood Corp. that has certification that states that this business meets the requirements for the chain of custody of forest-based products requirements from The Programme for the Endorsement of Forest Certification (PEFC). PEFC is the world's leading forest certification organization, and is an international non-profit, non-governmental organization dedicated to promoting sustainable forest management (PEFC, n.d.).



5. DISCUSSION

5.1 FOCUS GROUP

There was much feedback to take into consideration from the focus group when designing the installation. For the third design, people did not like that there was three information boards, and since the first design was complicated to install, we chose to have something incorporated the first two designs. People wanted plants in the design, so we made sure to include highly visible plants. Flowers were requested to be at the bottom, and people wanted edible plants to be included. We were able to accommodate these requests in our final design. Participants liked the honeycomb shape, so we have octagon-shaped boxes in our design. Recently all bushes were removed from the UNA gardens, due to difficults with managing divided spaces, and garden turnover of members. In consolation to this, with suggestion from our stakeholder we decided to plant blueberry bushes beside the installation (E. Lomax, personal communication, March 4, 2019).

In addition, these blueberries act as a food source for the mason bees in the garden, and the fruit will be edible for the visitors each year, which will provide additional value.

5.2 SURVEY

In the analysis of the online results, the lower the mean of the question, the more important the question was to the participants. It was found that providing an opportunity to educate children was valued the most. Our design will have easy to read signage educating community and children on biodiversity and pollinators, and it is built out of sustainably sourced cedar. Education and sustainability are central themes to our study.

For design 1, some feedback was a concern for the lack of an information board. Taking this into consideration, we have included an information board. Additional feedback was the preference for the shape, function and aesthetic, of the honeycomb shapes in design 1, so we included two octagon shaped boxes in our final design. For design 2, some people had concerns that it was too high for children to interact with, and that it was also too large, so we also took this into consideration and made the design closer to the ground and smaller design. Design 3 was described as educational and it was not a liked design. Additional feedback was concern for about having sufficient educational content without sacrificing the functionality of the design. This was addressed in our final design. The information panels and beehives were strategically placed, having the hives located higher for adults to access, and panels lower for children to easily read. Most respondents preferred edible plants nearby, which is accommodated with blueberry bushes on the sides of the installation. We incorporated all of

the likes and dislikes of the concept and built a final design with these comments in mind.

5.3 INTERVIEW

The interview questions had significant implications in the adjustment of our structure. We consider all responses to be of equal value and did not discount the responses with less details and depth. Most of the community members have participated in projects regarding mason bees. This is significant in spreading the awareness and significance of mason bees. Of those who have experience with bees, most of them participated in projects of considerable length and complexity. A common technique to engage the public was to have them involved in the planning of them. Similarly, a strong and specific marketing plan helps in a greater integration of the public. Methods to increase biodiversity typically include planting a variety of plant species by community members. It is important to note that the quantitative measures of increasing biodiversity by members is difficult to prove. The stakeholders describe different ways in how to prevent making mistakes regarding the installation of community gardens. Themes include greater education, consistent maintenance and keeping the process simple. Recommendations are also variable between participants. Many answers emphasize communication and relations between groups need to be focused on. Some respondents believed that the structure should be made of cedar and be over one meter above the ground to accommodate the mason bee's biological needs and preferences. Similarly, the smell of cedar would not deter the bees, according to some respondents, so it is a safe material to use.



On March 13th, we created designs for the information board to educate children and community members. Having the design be appropriately educational for children was the top priority from the list of the feedback. Hence, we put it as the main priority of the installation. As a group, we established ideas, and designs on the print that could be educational to children.

We decided to put an information board on both sides of the installation, which included figures and explanation of the life cycle of the mason bee, and how bees interact with the environment as they are considered important in the literature (Bauer et al, 2015). We were also advised that the mason bees need the morning sun in order to wake up from dormancy. We made the decision to make the installation to face east, and far away from the trees. Therefore, the mason bees could get enough sun, and not be shaded by the trees.



5.4 SECONDARY SOURCES

A secondary source regarding the life cycle of the bees (Beediverse, 2019) was used as an inspiration for creating content for the children's educational content. It illustrates the four seasons and the events within each season. This allowed for a greater understanding of the content

compared to if only words were used to describe the components of the life cycle. In relation to the wood for bee-related structures, Bauer et al. (2015) understand that pressure-treated wood is important to avoid. They portray the chemicals used in such process may be harmful for the species when they nest (Bauer et al., 2015). As such, people attempting to build bee houses from scratch need to carefully look at how wood products are treated. Correspondingly, cedar that is seasoned is appropriate to utilize (Bauer et al, 2015), so our materials included cedar for this reason. Our design of the mason bee structure is a hex nest hotel. Essentially, has two octagon-shaped structures that will be able to cradle a hex nest made in the UNA workshop, for the mason bees to thrive in. This concept was also inspired by the Environmental Youth Alliance (EYA), who describes how to make bee homes out of reusable materials. The structure should have a small overhang to receive sunlight each morning and be protected from the elements via a shelter (EYA, n.d.a).



5.5 OVERALL

From the feedback of the focus group, surveys, and interviews, we decided to put life cycle of a mason bee, how to build a mason bee nest, and interaction of mason bees with the environment as a food for thought to the community members. There



was also a picture stating that mason bees do not have queen bees as an example. All the pictures are either designed by the group members or retrieved online from vector pictures.

6. CONCLUSION

In response to the SEEDS' culture of sustainability, our installation of a low maintenance mason bee house aims to develop a sustainable community through promoting Eco systematic services brought by mason bees, strengthening the awareness of biodiversity, and enhancing community engagement. Since the inherent nature of the project is based on the community's preferences and profound knowledge on mason bees, we had conducted a series of community-based research including a focus group and residential surveys to analyse their interests and opinions collected on our designs and objectives. In addition, we implemented secondary research including interviews with experts and online research to understand the living conditions that are suitable for the bees.

For the objective and design part, we found that "maintains and enhances biodiversity" and "provides opportunities to educate children" are most preferred following with "offers a shared experience with fellow community members" and "makes intentional use of sustainable materials". "Facilitate emotional connection to one's physical community space" is the least

preferred. Community members desire design one and two instead of the number three.

With respect to mason bees, the installation should face east towards the sun with clay and water as the nest structure, plenty of food source, and environmental-friendly materials that safe for the bees.

Overall, our project could introduce and preserve mason bees in the Hawthorn Community Garden. With the collective efforts between our team, community member, and the UNA association, we will create an attractive, educational, and astonishing final installation.

7. RECOMMENDATIONS

For future caretakers of the mason bees and members of the community garden, it is important to consult some of our secondary sources. In each of the season, there are different tasks that need to be completed in order to ensure the bees remain healthy. According to the Environmental Youth Alliance, during late winter/early spring it is important to properly place the bee house to meet a list of certain conditions (n.d.). Similarly, it is important to place the cocoons out in February/March after the last frost. In spring, watch for flies and prepare leafcutter cocoons and incubate them. In fall/winter, take down the bee house and separate the tubes (EYA, n.d.). For additional details, see



the complete document (EYA - seasonal stewardship practices document).

7.1 BEST PRACTICE:

1. Ample amount of time in the planning phase for the permit
2. Provide adequate sunlight (East Facing)
3. Provide Water
4. Spread the Word (Get the Community Involved)
5. Access to specific experts on campus collaborations
6. Connect the stakeholder to a Seeds or Club Liaison.
7. Contingency Plan

Using the smart goal approach, we have come up with a list of actionable goals that can ensure successful maintenance for Mason Bees. After a literature review on the subject we have composed a short list:

7.1.1. SHORT TERM GOALS

1. Protect the bee nesting habitat.
 - a. Providing maintenance for the nest is essential to increase effectiveness and productivity of the bee residence. The nest should be visited every few days to ensure they have an adequate water supply.
 - b. The availability of soft clay

mud is a must to reassure that mason bees will use your nesting area. Soft clay also known as Mason Mud, can be purchased at the nearest West Coast Seeds.

2. Establish a monitoring program to observe if the project has long-term potential in the Hawthorne Community Garden.
 - a. Mason bee populations are best analysed in the fall when the bees have fully developed in their cocoons.
 - b. Bosch and Kemp suggest obtaining reliable estimates researchers must examine anywhere between 40 and 50 nests.
 - c. Document each tube monitoring for the number of eggs and the sex which can be easily observed by the size of the cell and its position in the tube.
3. Check-in with the local community members to see if they are experiencing any difficulties maintaining their nest or in need of a follow up workshop.

7.1.2. LONG TERM GOALS

1. Plant more native species in the



Hawthorne Community Garden

- a. David Suzuki Foundation has created a list of viable food sources along with the season the flower.
2. Install more projects that can increase biodiversity
 - a. Bug Hotel
 - b. Pollinators
 - i. Birds
 - ii. Butterflies
3. Forming allies with local community gardens conservation groups play a large part in the successful establishment of projects for native bees. Community groups that share similar interest surrounding conservation, gardening, and food production can assist with;
 - a. pollinator education
 - b. native bee outreach

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COMMUNITY GARDEN

Designing an installation for biodiversity enhancement in Hawthorn Garden

Workshop goals:

- Learn about your priorities, ideas and suggestions for a biodiversity installation
- Get feedback on initial student-led concept design

Date: Tues February 26th

Time: 7:00pm-8:00pm

Location: Meeting Room 2
Old Barn Community Center

Kids are welcome

Snacks & refreshments provided

SEEDS Sustainability Program: This is a student-led project in collaboration between UNA and Faculty of Land and Food System's students
Inquiries can be sent to LFS Professor Liska Richer liska.richer@ubc.ca



YouTube Video Links

5 ways to print on wood

<https://www.youtube.com/watch?v=xHOWUR8vTvo>



Concept Design Feedback

Please rank the following designs from 1 to 3 in order of preference. (1 being the highest and 3 the lowest)

Concept 1: _____ (Rank 1-3)

What Do you Like?

What do you Dislike?

What can be Improved?

Concept 2: _____ (Rank 1-3)

What Do you Like?

What do you Dislike?

What can be Improved?

Concept 3: _____ (Rank 1-3)

What Do you Like?

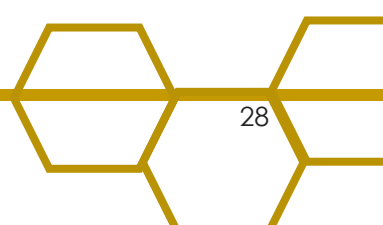
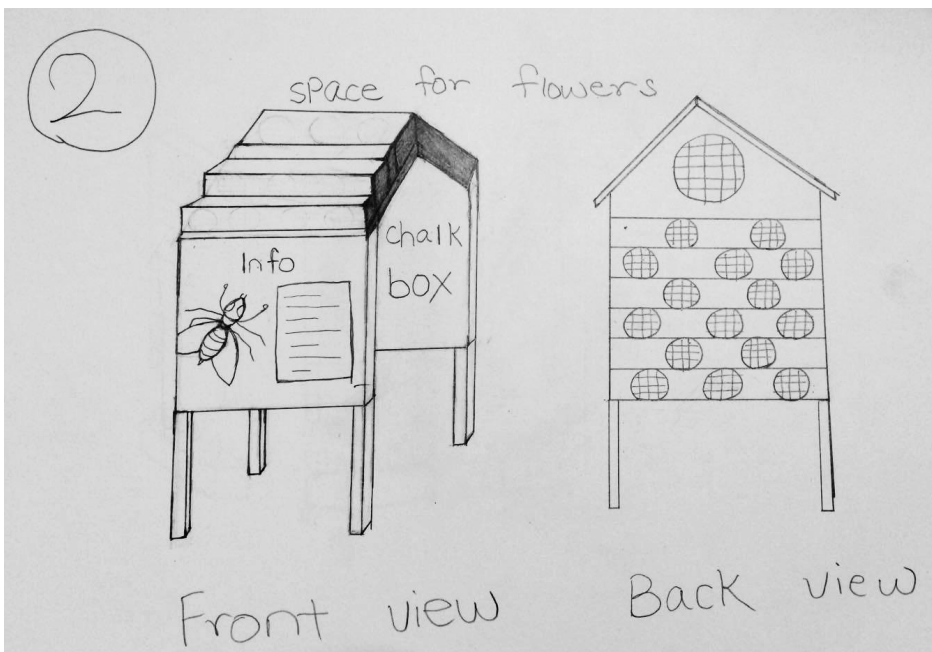
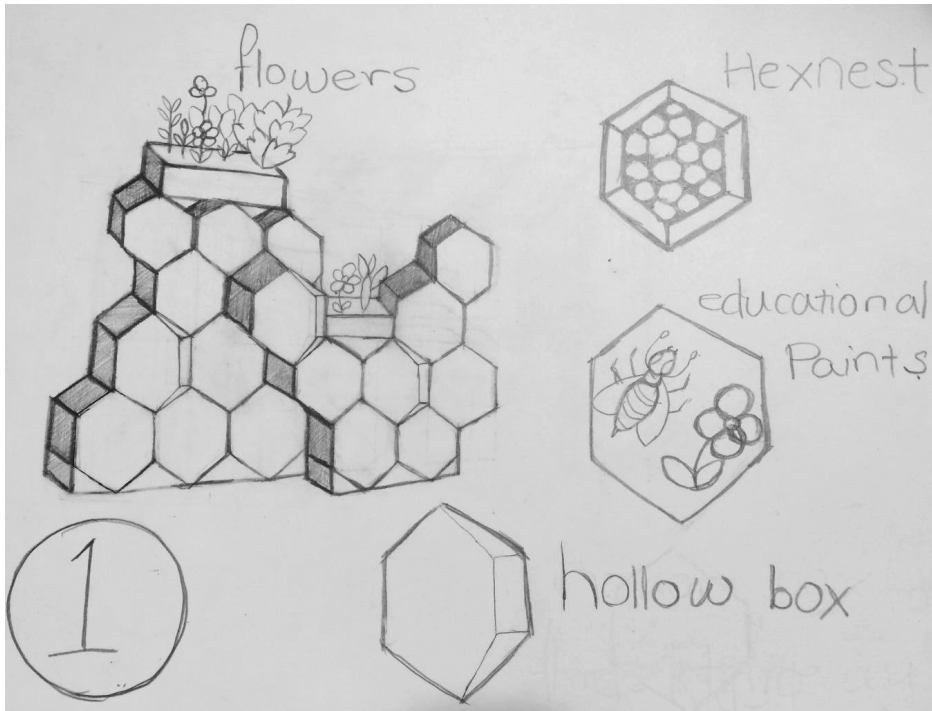
What do you Dislike?

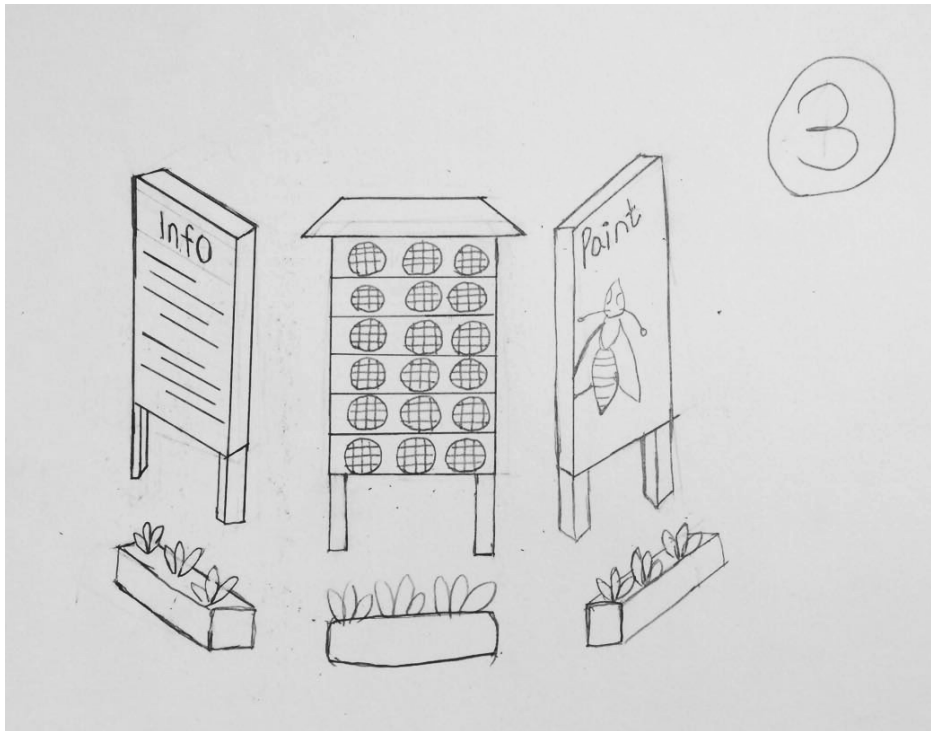
What can be Improved?

What types of plants would be beneficial in the design? (Edible / Non-edible)

Concept Images 1-3







Focus Group discussion questions

1. How many years have you been at the community garden?
2. Where do you go to find out information on how to grow food?
3. Where do you get your plants from?
4. Where do the gardeners get their soil from?
5. How do the gardens look in the summer, are they flourishing or in need of some help growing?
6. What plant species in installation?
7. Mason bee workshop coming up. Are you planning to go?
8. What should we name the installation as?
9. What plants should be planted for the installation?

Mason Bee Interview Questions for Experts in Field

1. Have you done any projects which focus on promoting bees? If so, what has been successful in promoting bee populations and educating about bees?
2. What techniques have your projects used which have effectively engaged the public/community?
3. Have you used any methods to increase biodiversity? and if so, which have shown to be most effective?
4. In creating installation for a community garden is there common mistakes we should try to avoid?
5. Is there any other recommendation you have for a inexperienced group such as ourselves?

| Codes for Interviews | |
|----------------------|----------------------------|
| Code # | Code Words |
| 1 | Criteria |
| 2 | Concept |
| 3 | Focus Group Observation |
| 4 | Interview Script |
| 6 | Plant |
| 7 | Bee |
| 8 | Build |
| 9 | Miscellaneous |
| 10 | Plant Preference |
| 11 | Time |
| 12 | Source |
| 13 | Regulations |
| 14 | Community Engagement/ Kids |
| 15 | Workshop |
| 16 | Success |
| 17 | Preferences |
| 18 | Care |
| 19 | Habitat |
| 20 | Life Cycle |
| 21 | Advice |
| 22 | Specificatoins |
| 23 | Material |
| 24 | Safety |
| 25 | Food Insecurity |
| 26 | Other |
| 27 | Problems |
| 28 | Confusion |





March 28, 2019

Christine Bowden
Faculty of Land and Food Systems
3974 West 32nd Avenue
Vancouver, BC
V6S 1Z3

**TEMPORARY DEVELOPMENT PERMIT
DP 19009T
Expires March 31, 2021**

**Re: DP 19009T: Temporary Mason Bee Habitat Student Project (LFS450 001)
Hawthorn Community Garden, Main Mall Greenway South of Eagles Drive**

Dear Ms. Bowden,

Temporary Development Permit DP 19009T is hereby issued for the temporary installation of a mason bee habitat student project (LFS450 001) northwest of the Hawthorn Community Garden, Main Mall Greenway south of Eagles Drive. The installation will be monitored and maintained by the University Neighborhoods Association (UNA) Gardens Program. This permit is issued subject to the conditions listed below:

1. Approval is based upon general conformance to the following documentation in Attachment A, received on March 21, 2019 and prepared by the applicant, in consultation with the University Neighbourhood Association's Sustainability Coordinator and the Campus and Community SEEDS program:
 - Project Description and Rationale (2 pages)
 - Site Plan Orthophoto Markup
 - Mason Bee Habitat 3D Design (2 pages)
 - Mason Bee Habitat 3D Design with Dimensions
 - Mason Bee Habitat Elevation Options
 - Mason Bee Habitat Project Budget
 - University Neighbourhood Association Letter of Support
2. Details related to landscaping elements are to be finalized to the satisfaction of the University Landscape Architect.
3. The location and design of interpretive signage for the installation is to be provided and be acceptable to the University Landscape Architect.
4. The UNA and/or their delegates are responsible for the maintenance of the garden and for its removal and subsequent restoration of the lawn should the garden become neglected or abandoned.
5. All hard and soft landscaping disturbed by this work is to be remediated to the satisfaction of the Associate Director, Municipal Engineering.
6. This Permit will expire on March 31, 2021.


If an extension is required, a new Development Permit application to renew **DP 19009T** must be submitted to Campus and Community Planning and received prior to December 31, 2020. This



Development Permit will expire if development is not substantially commenced within 12 months from the date of permit issuance.

If you have any questions please call 604-822-6991.

Sincerely,

(for) 

Grant Miller

Director of Planning, Development Services

cc: K. Russell, Manager, Development Services
D. Gregory, Landscape Architect
D. Gill, SEEDS Sustainability Program
E. Lomax, UNA Sustainability Coordinator

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March 14th, 2019

To Whom It May Concern:

This letter is to express my support of the Biodiversity Design and Build Project, through the LFS 450-001 course (Land, Food, and Community III: Leadership in Campus Food System Sustainability). The installation, as outlined in the permit application will be located within Hawthorn Place, adjacent to the Hawthorn Community Garden which is managed by the University Neighbourhoods Association.

The structure will provide a biodiversity service within the community and will aid in the engagement and education of gardeners and other community members.

The installation will be monitored and maintained by the UNA Community Gardens program. This includes any repairs to the structure, as well as the care and maintenance of any vegetation within the scope of the project.

With the expiry date of the permit, the UNA will be responsible for the removal of the structure. Likewise, the UNA will be responsible for the restoration of the site to its original condition, as documented by the student group. Funds will be put aside for this purpose.

Regards,

Emily Lomax
Sustainability Coordinator

APPROVED
Campus & Community Planning
University of British Columbia
By: *ELA*
Date: 28 March/19

UNIVERSITY NEIGHBOURHOODS ASSOCIATION

202-5923 Berton Ave., Vancouver, British Columbia V6S 0B3 T: 604.827.5158 F: 604.827.5375 reception@myuna.ca www.myuna.ca

Purpose statement and Rational

Our group project, as a component of the LFS 450 001 Land, Food, and Community III: Leadership in Campus Food System Sustainability course, is to build an installation based on biodiversity and connecting people with the Hawthorn Community Garden. The desired location of the installation is the northwest of the Hawthorn Community garden along Main Mall Greenway. Our main objective is to provide a conversational topic for the community members and engage the residents in identifying, maintaining and enhancing biodiversity in relation to food, and provide an opportunity to educate the children and fellow community members.

With the collaboration of our community partner, Emily Lomax, sustainability coordinator with the UNA, we chose a mason bee habitat as a preferred focus for our installation. Currently, some members of the garden are already engaged in promoting mason bees and their benefits to gardens and biodiversity. This March 16th, there will be a workshop presented by Richard and Jilian Scarth, members of the UNA community, on how to make mason bee nests, this workshop is open to everyone, and all UNA community garden members have been invited.

Proposed Site Description

As a component of this project is to connect members of the broader UBC community with Hawthorn Community Garden, we conducted a survey of the garden area with Emily, and our desired location for the installation is along the path of Main Mall Greenway. This is desirable as it will grab the immediate attention of passers-by and then begin the engagement that we have planned out. Currently, there are two conveniently located benches along the path just outside the garden, and within close proximity to the desired location of the installation, which provides people an opportunity to sit and relax while enjoying the newly acquired awareness of the local biodiversity, or have conversation with one of the gardeners or another community member. In communication with David Gill, program and policy planner with SEEDS Sustainability Program, we have acquired an underground utilities map, provided by Associate Director of Municipal Engineering, and we have noted that there is a storm water drain running alongside the path approximately three feet east of the path. We are proposing to have our installation no closer than six feet east of the path, and up to 10 feet east of the path. Aerial photos are provided.

Material to be used and Dimensions

The mason bee habitat will be constructed out of cedar for the posts and roof, similar to the material used for fencing, and will have two planks installed in the ground with cement footings of 51cm x 10.5cm for 25.4cm x 5.08cm planks. The proposed height is 185cm above ground and 60cm below ground; width is 160cm, and depth 45cm for the structure. There will be a slanted roof that protrudes 15cm on only one side of the build (the side facing the garden) and will have a ribbon or something similar hanging from the roof as an added safety precaution. The materials within the cedar frame will also consist of cedar, this design will include two panels for information and interaction with the community, and two hexagon shapes that will hold 8 mason bee nests each. Detailed design drawings are provided. The nests will be constructed in the workshop presented by Richard and Jilian. Beside the structure there will be 2-4 blueberry bushes (depending on limitations of permit) with 2 bushes planted an additional 155cm will be added to the dimensions, and with 4 berry bushes an additional 310cm

APPROVED
Campus & Community Planning
University of British Columbia

By: Jh
Date: 28 March/19



will be added to the dimensions. Therefore, the largest area required will be 470cm x 76cm (with 4 bushes), and the smallest area required will be 315cm x 76cm (with 2 bushes)

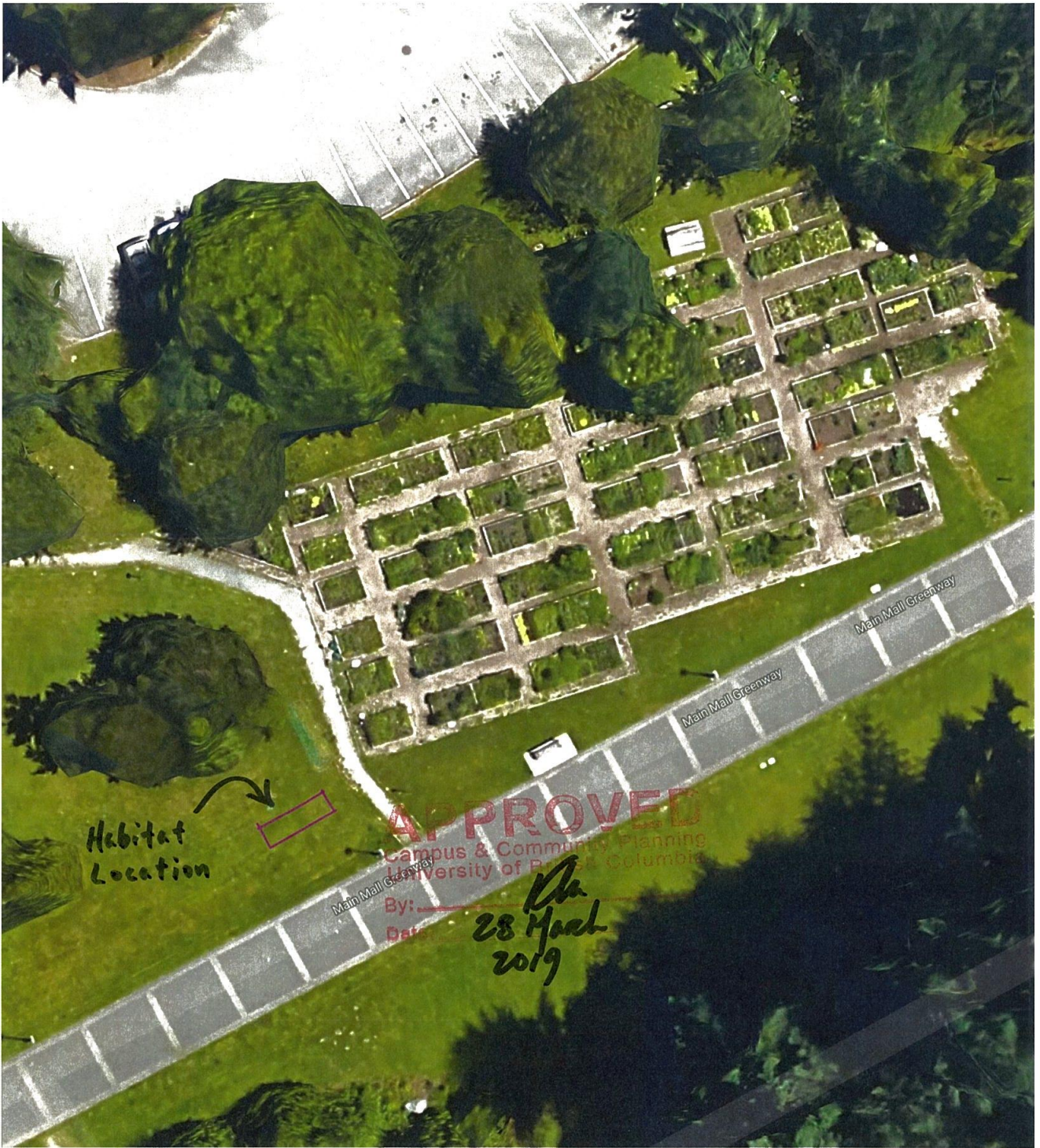
Budget, and Maintenance and Management Plan

There is a budget for this project of \$2000, and some of these funds will be set aside for remediation of the property when the installation is removed. The ongoing maintenance will include annual removal in the fall of the mason bee nests, with replacement of nests in the spring; this will be the responsibility of the UNA and Hawthorn Community gardeners. In addition to the structure that we, the LFS group member, will be building, there will also be 2-4 blueberry bushes planted for an immediate food source for the bees, as well for passers-by to enjoy the berries. Once planted the blueberry bushes do not need to be pruned for the first 2-3 years, and only require regular watering and weeding. Watering and weeding will once again be the responsibility of the UNA and Hawthorn Community gardeners. We do not anticipate management being a concern, since our conducted surveys revealed that the gardeners have expressed interest in having edible plants as part of the installation.

Utility Plan

See Attached files for utilities in the proposed area

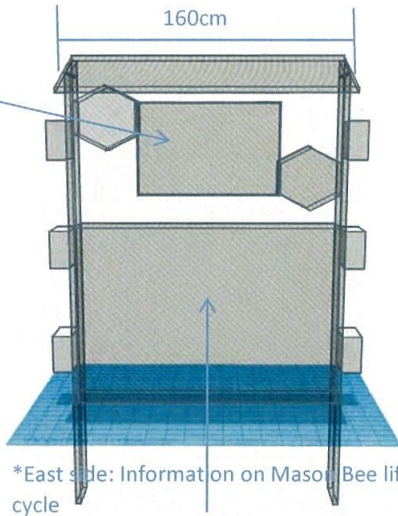
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University of British Columbia
By: *RL*
Date: 28 March 19



*East side:
Information
on
Biodiversity
and how
mason bees
enhance it

*West side:
Plants that
Mason bees
thrive with

Dimensions:
78cm x
60cm x 1.25



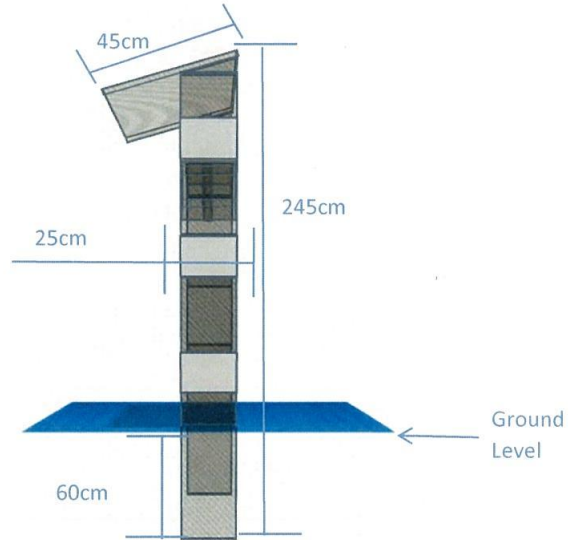
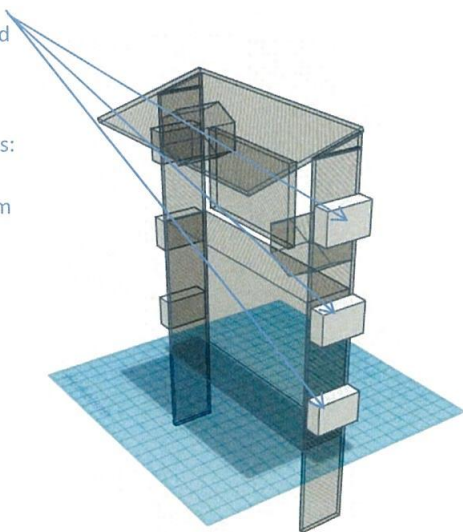
*East side: Information on Mason Bee life cycle

*West side: Steps on how to build mason bee hex nests (as per workshop)

Dimensions: 150cm x 85cm x 1.25

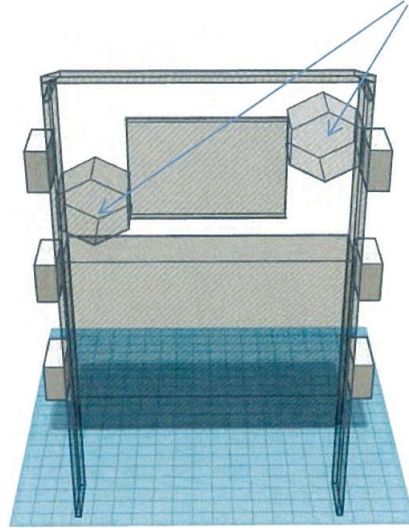
Small side
boxes for
clay and
water, used
by mason
bees

Dimensions:
25cm x
10cm x 6cm



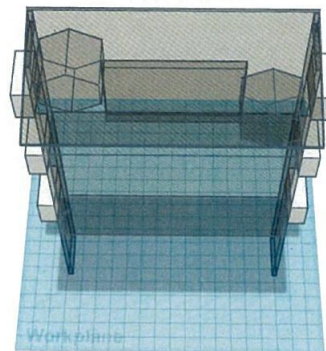
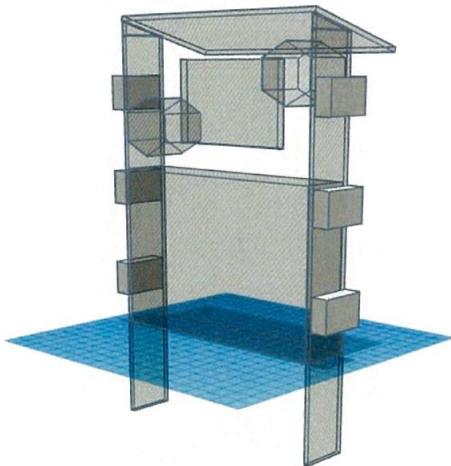
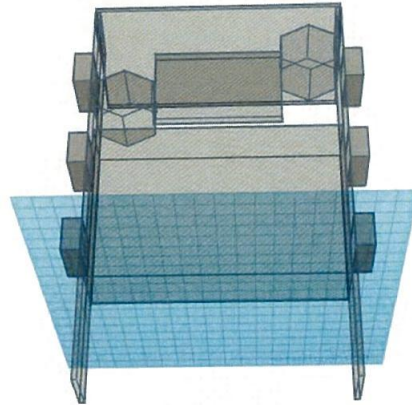
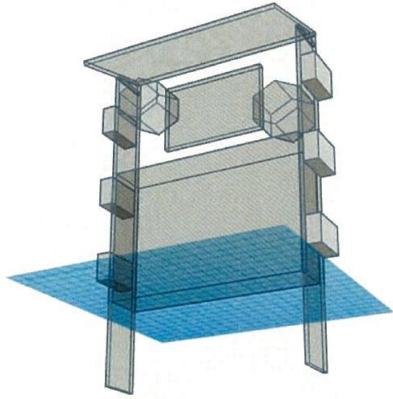
Hexagonal
boxes for
placement
of mason
bee nests
constructed
in workshop

Eastside of
box will
have a
closed off
and
Westside
will be open

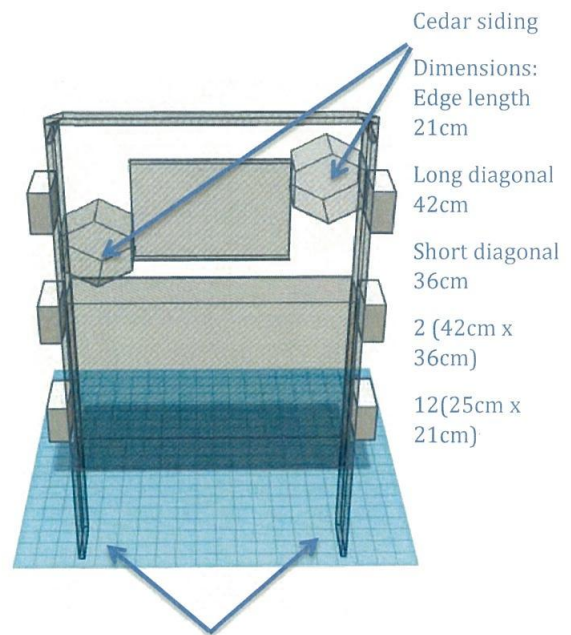
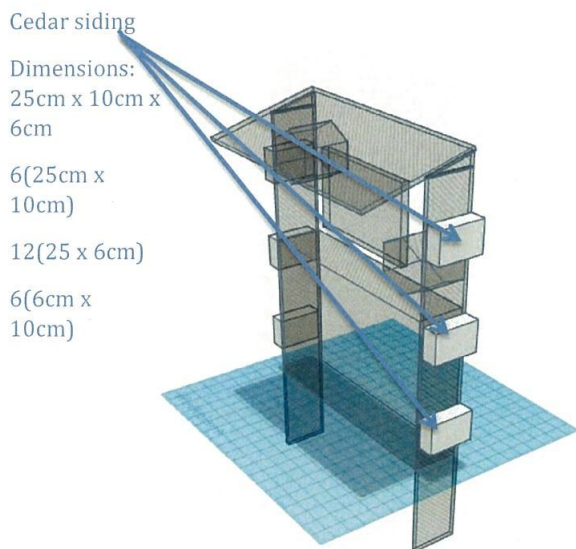
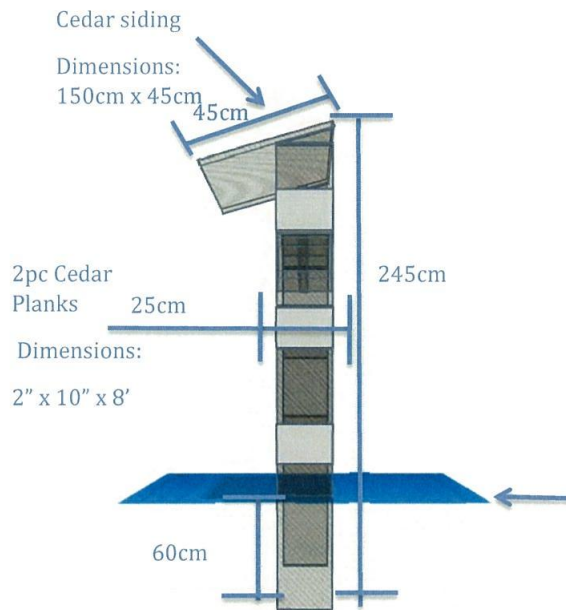
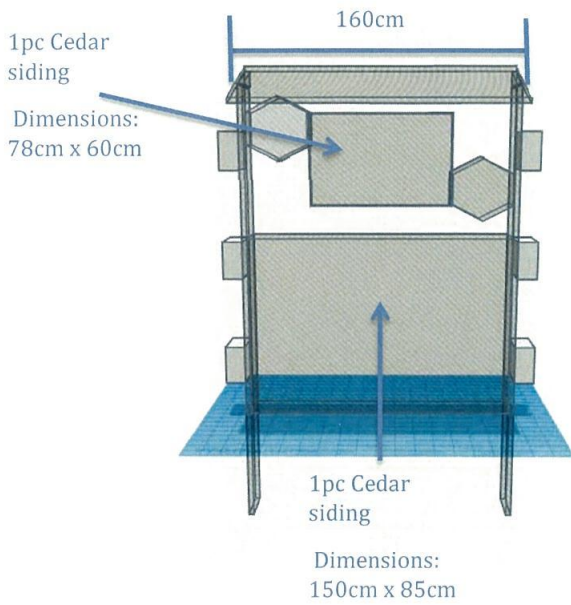


*Message on signage will be developed in consultation with both UNA and Campus Community Planning; the above details of signage content are current suggestions to be approved/modified.

APPROVED
Campus & Community Planning
University of British Columbia
By: [Signature]
Date: 28 March 19



APPROVED
Campus & Community Planning
University of British Columbia
By: *Rla*
Date: 28 March 19



Footing size will be 4" x 20", with 2" of gravel below footing. Planks will be set in concrete mix

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University of British Columbia

By: [Signature]
Date: 28 March 19



Option 1 – Four Berry Bushes



Option 2 – Two Berry Bushes

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 Campus & Community Planning
 University of British Columbia
 By: *[Signature]*
 Date: 28 March 19

Applying Design to Panels

Minwax Finishes & Sealer Polycrylic 946ml Water-Based Protective Finish will be used for transferring laser ink design to panels.

Minwax Finish & Sealer 632 Helmsman Spar Urethane (waterbased) external use will be used for sealing panels with designs.

Hexagon boxes will be constructed out of 1" x 8" cedar board

Laser printing at UBC printing services (84.1cm x 119cm) sheet for 2 x two panels and backside of hexagon boxes (seeking a better price for this) \$110 + tax

Quote for cedar planks is 2pcs (2" x 10" x 8') \$230.85 + tax

Price for wood siding cedar panel 2pcs 4' x 8' 27.99 + tax

Fast Setting Concrete Mix – Rapidpost 25kg for two posts \$8.20 + tax

Minwax Finishes & Sealer Polycrylic 946ml \$21.99 + tax

UBC printing services \$55.00 + tax

Minwax Finishes & Sealer 632 Helmsman 946ml Clear Spar Urethane \$24.99 + tax

1 Porcupine 1-inch x 8-inch (Nominal) x 8 ft. #2 Cedar Board \$14.12 + tax

Gravel to be donated by Christine

Plants

Blue berry bushes (\$14.99each) x 4 \$59.96 + tax

Premier 56L Natural Cedar Mulch (\$5.99each) x 2 \$11.98 + tax

Original Sea Soil 32L (\$9.99each) x 2 \$19.98 + tax

Remediation of area

Pro Mix 28.3L Organic Lawn Soil x 3 bags (\$5.99each) \$17.97 + tax

Sta-Green Complete Lawn Rebuilder \$31.99 + tax

Time for worker to disassemble Installation, recycle materials and refill/seed area affected by the installation \$150.00

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University of British Columbia
By: KCh
Date: 28 March 19

Total to date **\$861.22**

Budget \$2000 – Calculated expenses \$861.22 = **\$1138.78**

Other cost considerations \$1138.78

Labour for assistance in building project

Tool rental for digging hole

Unknowns

Other expenses that arise will be reviewed and approved by Emily Lomax (UNA) and David Gill (SEEDS)

APPROVED
Campus & Community Planning
University of British Columbia
By: _____
Date: 28 March 19

