REDEVELOPMENT OF THE UBC BOTANICAL GARDEN NOVEMBER 2013

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CIVL 445 FINAL REPORT

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Executive Summary

Botanical Garden are a necessary component of today's society to maintain and conserve diverse and exotic collections of plant species. The 40 hectares of winding trails and Garden of the UBC Botanical Garden boast a collection of over 7,000 rare temperate species, providing researchers with a unique opportunity to observe these plants.

The current concern for the Garden is finding ways to attract a broader range of visitors in both an economical and sustainable manner. Increasing the number of visitors will give the Garden additional revenue, which will allow for continued operation and improvement. This report identifies the predominate issues associated with the current conditions of the UBC Botanical Garden to be the restricted accessibility, lack of proper signage, and lack of marketing. All of these factors result in a less than desired quantity of visitors.

This report discusses the conceptual designs that are recommended to address the issues stated above. The areas of improvement include revamping the front area and adding a café, building a pedestrian overpass spanning across SW Marine Drive, introducing better directional signage, building a viewing platform at the southern tip of the Garden, as well as organizing special events. A preliminary cost estimate of these conceptual ideas is also included for review.

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1.0 - Introduction

The Botanical Garden has long been a staple of UBC's effort to promote plant life conservation. As an educational institution, UBC has an obligation to indulge in the scientific and educational purposes that the Botanical Garden offers. In order for the Garden to fulfill its purposes, it requires a reliable source of revenue. One of the main issues that the Garden is facing is the limited amount of visitors it receives each day. The main goal of this report is to provide practical, conceptual plans to improve the accessibility, awareness, and overall appeal of the Garden, paying consideration to sustainable practices for the Garden's future operations. These recommendations would ideally increase the annual revenue of the Garden, permitting more opportunities for continuation and improvement of its operations. The plans should also fit within a reasonable economic scope. This report will outline the details of our conceptual plans for the Garden.

2.0 - UBC Goals/Values

Over the past decade, the University of British Columbia (UBC) has made considerable strides in building a sustainable university, becoming a global leader in the field. Sustainable practice has become the forefront of their plan for the future of the university. They address concerns in ecological, economic, and social arenas on both local and global scales. UBC has incorporated sustainable practices into their academics, research, and operations, turning campus into a living laboratory. For this reason, our team has incorporated sustainable thinking and practice into our recommendation to ensure our solutions reflected UBC's values.

3.0 - UBC Botanical Garden Overview and History

The Botanical Garden main role is to acquire and maintain a large collection of native, temperate, and endangered plants in order to conduct research and create awareness about the benefits of conservation. It provides a service to both the general public and UBC's staff and student body. Throughout the year, the public is welcome to come view the beauty of the Garden and partake in volunteer activities, while staff and students at UBC have the opportunity to conduct research on the plant life contained within the Garden.

The history of the Botanical Garden dates back to 1916 and a man named John Davidson. Originally, Davidson was responsible for completing a province-wide survey of all flora in British Columbia. Over the next few years he would collect thousands of plants for botanical purposes. The start of World War I caused the disbandment of the agency behind this endeavor and thus Davidson and all his plants were relocated to UBC. Under Davidson's command, 34 hectares of land was cleared and a Botanical Garden was constructed at UBC. Over the next few decades, the Garden slowly increased its plant collection, regardless of the strains imposed by the two world wars and the great depression. In the late 1960’s the original goals outlined by Davidson were re-established by director Roy Taylor. This set the tone for the latter half of the 20th century where the Garden slowly grew its plant collection and services. As of today, the Botanical Garden maintains a collection of roughly 7,000 different plants species.

4.0 - Our Goals and Methodologies

The Botanical Garden presents a great value, yet it has quite a few areas that could be improved. Our team was brought together to help solve or mitigate the existing problems associated with the UBC Botanical Garden. Based on discussion with the client, guest speakers, and several site visits, our team identified a number of goals that the Garden wished to achieve. These goals are presented below:

1. For the conceptual designs to honour the UBC Botanical Garden's mandate to properly curate the diverse collection of species within the Garden.
2. To incorporate sustainable practices into the design, that consider ecological, economical, and social impacts, reflecting UBC's and Vancouver's commitment to sustainability.
3. To provide a design that improves public access and awareness, and encourages more visitors all year long, while working within a reasonable budget.
4. For our design to best reflect the wishes of the stakeholders involved, including UBC Botanical Garden staff, visitors, and the surrounding community.
5. To provide a loop within the park to enhance visitor experience and increase attractiveness to the general public.
6. To ensure all concepts are safe and comply with National and Provincial Building Codes.
7. To generate extra revenue for further development of the UBC Botanical Garden.

In order to achieve the identified goals, our team proposes the following strategies:

1. Revamping the front area of the Garden and adding a café
2. Building a pedestrian bridge spanning across the SW Marine Drive
3. Introducing better directional signage
4. Building a viewing platform at the south end of the Garden
5. Introducing internal signage
6. Revamping the existing tunnel
7. Organizing more social events to generate year round visitation

We suggest that the methods identified above will help to achieve the goals of the project.

5.0 - Recommendations

One of the main goals of our conceptual design is to develop strategies to attract more people to the UBC Botanical Garden. It was determined that very few people, including UBC students and staff, are aware of the Garden's exact location and significance. Thus, we are planning to raise awareness and attract attention through marketing means as well as making some general improvements to the Garden itself to appeal to a larger demographic. This section outlines the recommendations our team has proposed to reach the stated goals for the redevelopment project. The locations of redevelopment activities are shown on **Figure 1**.

Figure 1: Site Map

5.1 - Front Area Revamping

Structural, Geotechnical, Hydrological Engineering

The existing front area lacks a welcoming feeling, and could therefore use a makeover. In order to make the Garden more appealing to the general public, we have proposed to make the entrance and front area more welcoming, brighter, and open. To achieve this, we propose to:

- Reorganize and re-shape the existing plants and trees
- Introduce more flower beds
- Revamp the existing pond
- Build a simple wooden bridge spanning from the new entrance down to the redeveloped front area

We also suggest introducing Koi fish into the pond and placing a vending machine with fish food next to the pond. This will make the Garden more interactive for kids and adults, and will generate revenue for Garden.

Figure *2* depicts the revamped front entrance. One will enter the Garden through the green gates, cross the wooden bridge, walk around the front area of the Garden, feed the fish, and enjoy the flowers. The individual can then either go to the café and exit the Garden, take the pedestrian bridge to the North Garden, or continue walking south towards the tunnel, or the viewing platform.

Figure 2: Revamping the Front Entrance

5.2 - Restaurant/Café

Soil, Structural, Hydrology Engineering

To provide an additional attraction for visitors, our team decided to incorporate a restaurant/café into the front area of the Garden, as it would work to attract more visitors and provide another source of revenue. To promote the Botanical Garden's support of sustainable agriculture, the restaurant would incorporate an organic and locally sourced menu. Furthermore, the conceptual design incorporates sustainable innovations such as green roof and wall technologies and a grey water bio-filtration system to minimize its impact on the environment. These considerations align with UBC's vision of a sustainable future and provide another experiment for the campus' living laboratory to explore the feasibility of such projects. The unique characteristics of the restaurant are outlined below.

5.2.1 - The Facility

The restaurant will be located near the front entrance of the Garden and will boast large windows and a deck overlooking the revamped lake area as shown in Figure 3 below. The restaurant has large windows and high ceilings to provide a more open concept design, with better views of the surrounding Garden. The restaurant provides a comfortable place for the visitors of the Garden to enjoy a nice meal or cup of tea at the end of their visit. The facility can hold up to 50 people

inside and 30 guests outside and can also be used to hold receptions and special events. The restaurant is built around the current gift shop building. By constructing around an already existing building, less infrastructure and resources are required, lowering the footprint of the building.

Figure 3*:* Conceptual Design of the Restaurant

5.2.2 - Green Roof and Living Wall Technology

Storm water management has become the forefront of sustainable development practice. In urban environments where there are larger areas of impervious surfaces, storm water has become an issue for municipal wastewater treatment plants. Traditionally, storm water was managed by directing excess runoff through drainage systems directly into the nearest waterway (*Green Roof,* 2012). However, storm water runoff carries a variety of contaminants such as oil, grease, pesticides, fertilizers, sediment and other heavy metals, which compromise the health of the receiving bodies.

Storm water management is a major concern for the UBC campus. It has been estimated that UBC receives approximately 5 billion liters of rainwater annually (Chieng, 2013). The campus has 4 catchment areas that drain storm water into aquifers or outfalls feeding directly into the Georgia Strait (Grant et al, 2002, pg. 2). Furthermore, UBC campus is composed of glacial sediment, creating a dense soil matrix, difficult for storm water to infiltrate and percolate. Therefore, mitigation measures are needed to control and contain storm water and reduce its impact on local ecology.

Figure 4: Green Wall and Roof on Restaurant

For the reasons mentioned above, green roof technology is a measure that can be taken to help manage storm water runoff. Figure 4 above shows the green roof and wall incorporated into the restaurant building. Studies show that green roofs with a depth of approximately 75mm can reduce annual runoff by more than 50% (*Green Roof*, 2012). Below Figure 5 depicts, a typical soil profile of a green roof. This multilayered system has a separate drainage course, filter, growing medium, and vegetation. In regions of heavy rainfall, like Metro Vancouver, it is important to have a growing medium that can allow water to infiltrate quickly, such as sandy

soils (Almarghalani et al., 2010). The additional load from the weight of a green roof must be incorporated into the structural requirements of the restaurant.

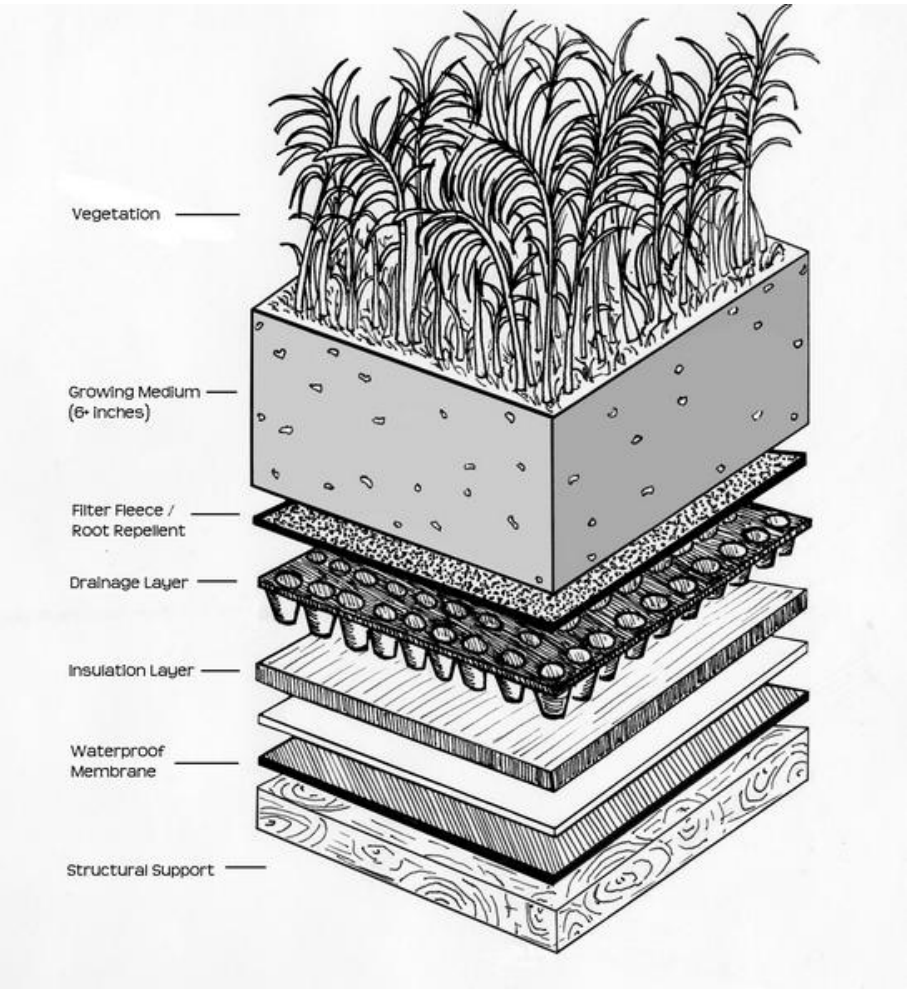

Figure 5: Green Roof Soil Profile *(Green Roof Plan, n.d.)*

Living walls incorporates a latter system in which plants without soil grow in layers of fibrous material that are suspended from the wall (Living Wall, 2013). Living walls are also a solution to retaining storm water runoff not captured by green roof system.

Green roofs and living walls also provide additional benefits for construction. They act as insulation for the building, providing natural heating and cooling, which in turn minimizes the thermal fluctuation between inner and outer surfaces of the roof (Almarghalani et al., 2010). This

provides heating during the winter and cooling during the summer to the inside of the building, thus reducing the restaurant's energy consumption. Green roofs and walls have been tested to demonstrate that they provide sound insulation to a structure (*Green Roof,* 2012). Green roofs also provide an aesthetic addition to the building. Many possible designs are available, based on different types of vegetation, so the restaurant can mesh well with the overall aesthetic of the Garden. It should be noted that regular upkeep is required to maintain the green roof and wall systems.

5.2.3 - Organic and Free Trade Menu

To promote the Garden's value of sustainable and organic agriculture, the restaurant would have an entirely organic and locally sourced menu. This would give an opportunity to provide awareness of the importance of sustainable agriculture to visitors and also reduce the impact of the restaurant on the environment. Organic farming relies on natural compost and manure to fertilize food crops. The use of synthetic fertilizers and pesticides has harmful implications on the environment as various greenhouse gases are emitted upon their production. Furthermore, through farming runoff, the nutrients from these pesticides and fertilizers can enter waterways, negatively impacting local ecosystems. Using a locally sourced menu decreases transportation related emissions and supports local farmers.

5.2.4 - Vermicomposting

The restaurant would implement vermicomposting stations to break down food waste. Vermicomposting utilizes worm species to actively decompose food waste and organic material into nutrient-rich fertilizer on site. The fertilizer can then be used to help feed the Garden's species collection.

5.2.5 - Bio-Filtration System

Incorporated into the restaurant kitchen, our team suggests the construction of a bio-filtration system to filter the grey water runoff and intern replenish the water levels of the pond below. A Google SketchUp model of the proposed bio-filtration system is shown in Figure 6 on the next

page. Grey water is runoff water from kitchen and bathroom sinks and dishwashers, which has not come into contact with feces. Grey water contains contaminates such as oil and grease, cleaning detergents, and food particles. The purpose of a bio filtration system is to recycle this water and use it to fill the pond below. The pond in the front area is manmade pond, built to demonstrate unique aquatic plant species. Currently, the water feeding the pond is potable water from the City of Vancouver, which is by no means a sustainable source. The bio filtration system will aid in alleviating the reliance on potable water and providing a sustainable substitute for the Garden to continue maintaining the pond. Furthermore, the bio-filtration will provide onsite treatment for grey water treatment. This reduces the length water must travel to get treated, reducing energy and new infrastructure requirements for the restaurant.

Figure 6: Restaurant Grey Water Bio-Filtration System

The preliminary design for the bio-filtration system would incorporate a wood chip filter at the start to capture food and grease particulates. Worms and other microorganisms would decompose food and other solid organic matter trapped by the wood chips. From this tank the water will be fed into an artificial replica of a natural wetland, similar to the wetland

incorporated in the CIRS building on campus. The wetland contains a variety of aquatic vegetation, which helps to breakdown harmful bacteria and pollutants in the water. The wetlands then feed the treated wastewater directly into the pond. Proper maintenance and water testing is required to ensure the functionality of the system. Further research and design is needed to ensure the proper hydrology of the system.

5.2.6 - Economic Feasibility

The restaurant would provide an extra source of income for the Garden to continue and improve their operations. With the increased development of the Wesbrook Village, south of West 16th avenue, as well as further residence development on campus, there are large populations of students and residents in the vicinity of the restaurant. For this reason we believe that there is a high potential for this restaurant to be successful.

5.3 - Pedestrian Overpass

A major concern with the UBC Botanical Garden is the route visitors take to travel through the Garden. As it is laid out currently, there is only one direction visitors can travel to get to and from the North Garden. This is through the tunnel that runs under Marine Drive. In order to optimize the route, our group is suggesting that an overpass over Marine Drive at Stadium Road be constructed as is shown in Figure 7. It is necessary to have an overpass instead of a crosswalk to avoid safety and security concerns.

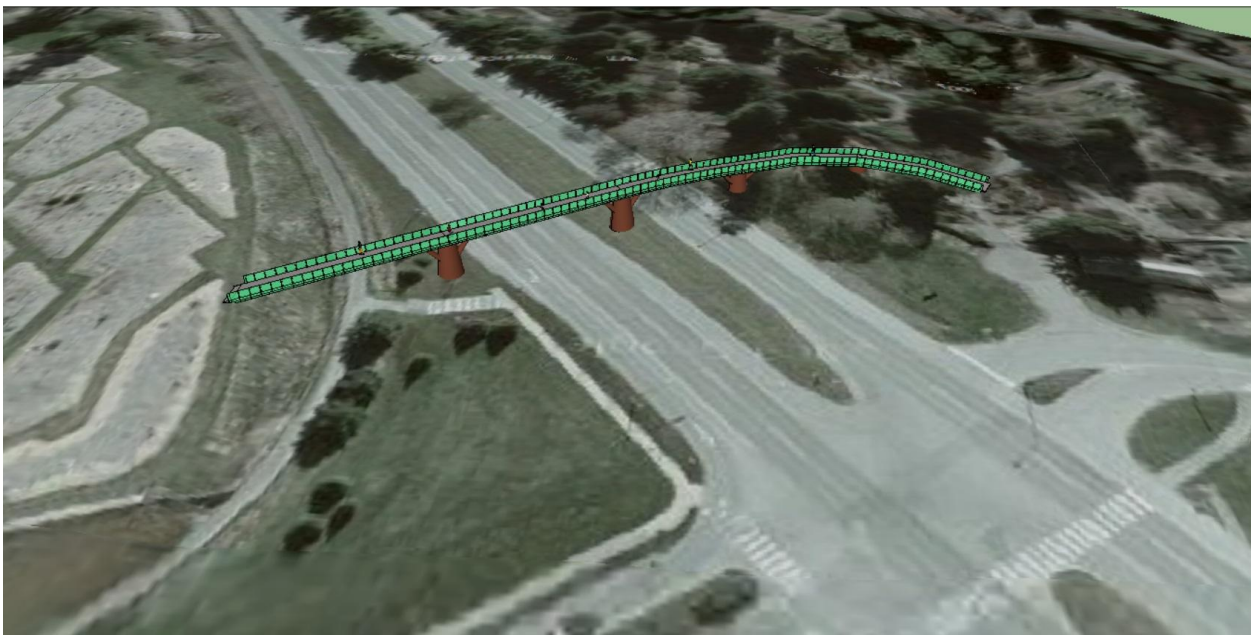

Figure 7: Plan view of Pedestrian Overpass

Constructing the overpass will create a loop in the pathways through the Garden, which will increase the efficiency of pedestrian flow throughout the Garden dramatically. Moreover, the overpass will provide a quick pathway to visit the North Garden without having to walk a large distance through the South Garden and then the tunnel.

5.3.1 - Signage on Overpass

Another possible usage of the overpass is it to install signage. This would provide an excellent advertising opportunity for the Garden to spread more awareness as well as notify commuters of upcoming special events. Since South West Marine Drive is a busy traffic corridor, the banner location would reach a wider audience. An example banner can be seen below in Figure 8.

Figure 8: Use Overpass to Display Banners

5.3.2 - Architectural Design

The actual design of the overpass itself will provide marketing for the Botanical Garden on its own. Our group has planned to utilize concrete in the shape of a tree for the support of the overpass, shown in Figure 9. This along with the signage on the overpass will make it apparent that it is part of the UBC Botanical Garden.

Figure 9: Design to Imitate Trees

5.4 –Directional Signage

Traffic Engineering

Directional and marketing signs will be used to increase the public's awareness. First of all, we are planning to install two large directional signs that will clearly state "UBC Botanical Garden" and show exact directions to the entrance of the Garden. One sign is to be installed before the intersection of W16th Avenue and SW Marine Drive, shown in Figure 10. The second sign will be placed further south at the Kullahun Drive and SW Marine Drive intersection. These signs will work to catch the attention of people travelling towards campus and raise awareness of the Garden presence. The Ministry of Transportation will need to be contacted to grant approval. Another suggestion would be to add a large floral advertising sign on the grassy hillside along SW marine drive.

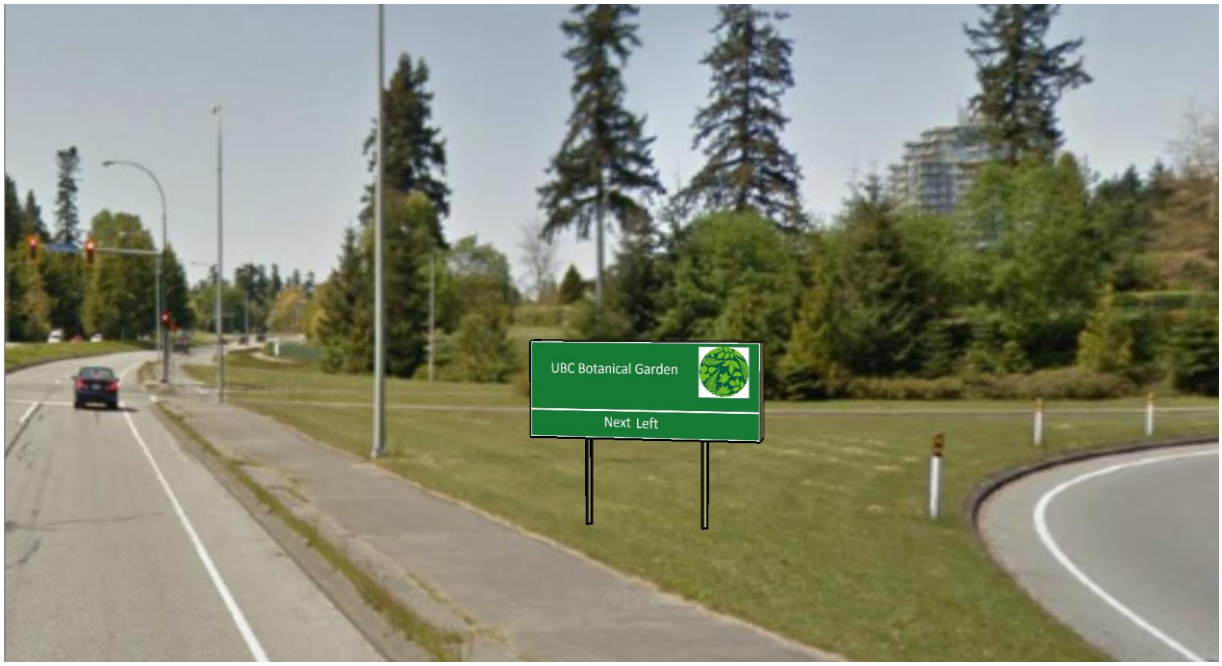

Figure 10: Directional Signage

5.5 - Acquisition of Additional Land

Geotechnical, Structural Engineering

One of the current issues with the Garden that was stressed by Doug Justice was that the Garden currently doesn't have enough land to accommodate the many activities and plant life that the Garden would like to support. To address this issue, we have proposed that the Garden absorb a number of nearby underutilized plots of land.

5.5.1 – Old SW Marine Drive

The first plot of land we recommend be absorbed is the area of land that the Old South West Marine Drive currently runs along. At the present time the roadway is being utilized mostly for free parking, and a beach access. This plot of land is approx. 14,000 m^2 and could expand the Botanical Garden current footprint by approximately 4.0% (UBCGB, 2011)

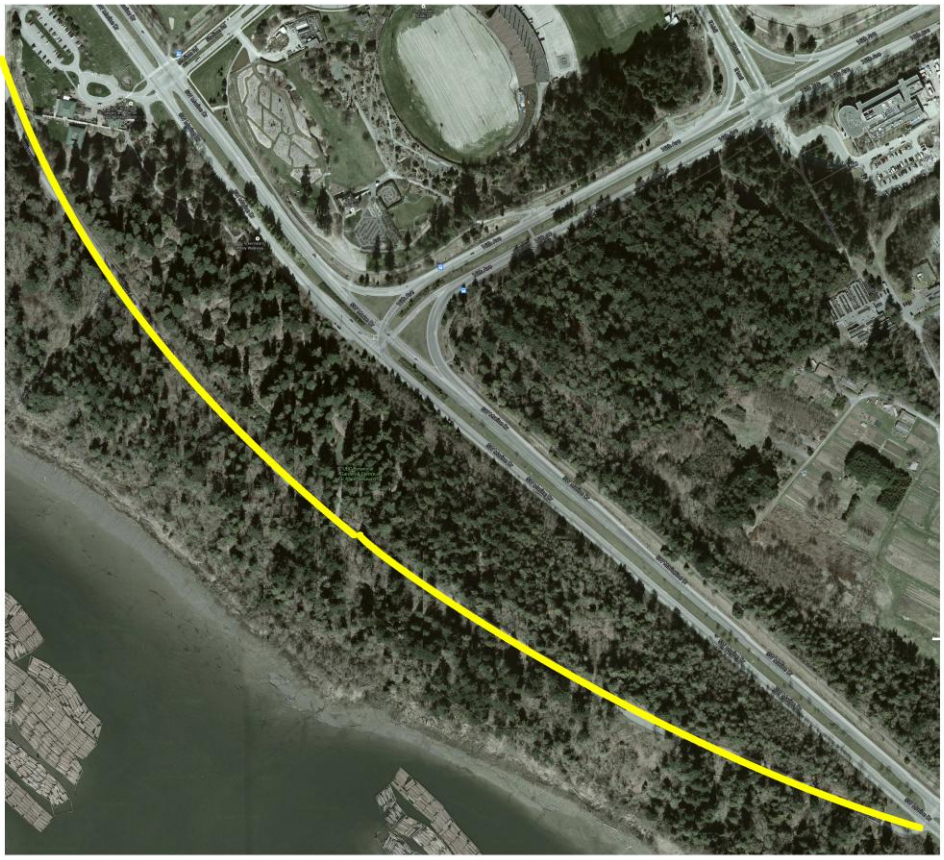

Figure 11: *Old SW Marine Drive*

The land added by absorbing the road would be used for multiple purposes. These include:

- Installation of a boardwalk and viewing platform overlooking the Georgia Strait
- Expansion of the Greenheart Canopy Walkway
- Provide an area for relocating the plants from the entrance area
- Increase land for research and additional plant species

5.5.2 - Decommissioning of the Roadway

The plot of land that the roads run along is currently owned and maintained by the Ministry of Transportation (MoT). Some discussion would be required with the University of British Columbia (UBC), and MoT in order to have the land released to UBC. This could be done by showing MoT that the additional land was going to be put to good use and would help the UBC Botanical Garden grow. In addition, this idea would involve a traffic management plan during the decommission process.

The roadway runs right along the crest of the Point Grey Cliffs, which have been steadily eroding due to natural weather events and water runoff for the past 10,000 years. In recent years human activity has caused increased surface flow in the Point Grey area, which in turn has increased the flow of water over the cliffs surrounding the area and has amplified the erosion problems (SFU, 2013).

Removing Old SW Marine Drive would eliminate a large area of impermeable material from the area, which in turn would allow more rainwater to penetrate into the ground and therefore decrease the amount of surface runoff eroding the cliff face.

5.5.3 - Expansion of the Greenheart Canopy Walkway

The current layout of the Greenheart Canopy Walkway (GCW) is constrained due to the limited space in the Garden. As was discussed by Doug Justice, the company that runs the GCW is currently looking for methods to expand their system, without interfering with the day-to-day

operations of the Garden. If UBC could receive approval from MoT to absorb the land occupied by the roadway, it would give both the Garden and the walkway ample room to expand and increase their appeal.

5.5.4 - Relocation and Addition of Plant Life

One of the objectives of redesigning the front entrance of the Garden is to increase its visual appeal by relocating some of the plants which have no visual appeal to the land freed up by decommissioning and removing the road and replacing them with more attractive flowers or budding plants. Obviously, it would not be economical or practical to relocate the larger trees from the front entrance area, but the majority of the smaller vegetation could be relocated. Freeing up this plot of land would give the Botanical Garden sufficient room to increase their catalogue of species for the foreseeable future. This would help to guarantee that the Garden is able to continue harbouring endangered species as well as ensure that its researchers can continue to perform world-class research.

5.5.5 - Viewing Platform

We propose the addition of a wooden platform to the south corner of the Botanical Garden. The main purpose of this platform is to create a view point overlooking the Strait of Georgia and Wreck Beach. This addition to the Garden would be a part of the effort to decommission the old SW Marine Drive. The location of the platform would be along the existing route of the old SW Marine Drive near the southern tip of the Garden.

The three biggest benefits of a platform would be:

- Creation of a viewpoint
- Addition of an anchor to attract visitors to remote areas of the Garden
- Serve as a resting area

One of the current issues mentioned by Garden staff is that there needs to be anchors located in all parts of the Garden. It could be valuable to add attractions that encourage visitors to walk to

remote areas of the park in order to improve their experience and further showcase the beauty of the Garden. The view that would be generated by the wooden platform would be sufficient in attracting more visitors to the Garden which would bring increased revenue and awareness of the Garden. Shown in Figure 12, is a picture of the potential platform view, taken from Google Street View.

Figure 12: View of Georgia Strait and Wreck Beach

One consideration regarding the location of the platform is the soil stability of the cliff face that borders the west end of old SW Marine Drive. The ground conditions would need to be suitable for construction and placement of a wooden platform which could carry up to a maximum of a couple dozen people. Theoretically the soil conditions directly beneath old SW Marine Drive should be better than the natural soil conditions present throughout the area. For this reason the platform would be placed over the west gravel shoulder of the road, and would not extend beyond the cliff edge.

The main components of this idea would be:

- A flat, wooden platform, roughly 10' wide x 30' long,

- A wooden fence roughly 4' high around the perimeter of the platform with 1/2" metal rods spaced at 4" apart to protect users of the platform and to provide a view for children who cannot see over the top of the fence,
- Two wooden benches along the north and south faces of the platform,
- An information board regarding local soil conditions and plant vegetation visible from the view point,
- A map of the overall botanical Garden layout which shows the reader's location within the Garden.

Figure *13* demonstrates the configuration of the fence with the potential view overlain in the background.

Figure 13: Platform View of Georgia Strait and Wreck Beach

Once the decommissioning of old SW Marine Drive is complete, the remaining gravel from beneath the asphalt could be left as foundation for the platform. Therefore there would be no earthworks needed other than leveling the ground.

5.6 - Minor Improvements within the Garden

The following are potential new features that can be added to the Garden, making it more interactive. These improvements would increase its popularity among the public, especially kids, which could lead to more elementary and secondary school and family tours.

5.6.1 - Additional Areas

In addition to the decommissioning of old SW Marine Drive, we would like to target other plots of land that are currently not included in the UBC Botanical Garden, but are adjacent to the Garden and not currently being used for anything. The areas of interest, shown in Figure 14, include:

- Southeast corner of the intersection between SW Marine Drive and Stadium Road
- Strip of land directly north of the Garden maintenance yard

Figure 14: Additional Land Areas to add to UBC Botanical Garden

Together the two pieces of land will bring a total area increase of roughly 3,300m^2. The additional land could be used for anything that the Garden staff feel is appropriate.

As this land is within the University Endowment Lands, the university would need to be contacted and their approval finalized in order to incorporate the land into the Garden. It is assumed that the land will need to be used in a way that is visually appealing to pedestrians and drivers using Stadium Road. This will be done by leaving a strip to act as a boulevard for Stadium Road and by planting extra trees. The trees will act as a barrier between the boulevard and the Garden. Then south of the boulevard will be a fence that is placed by the UBC Botanical Garden to ensure no trespassers gain access to the Garden.

5.6.2 - Tunnel Improvement

To connect the North and South Garden, there is a subsurface tunnel below SW Marine Drive. The current tunnel has no source of lighting and can be intimidating for young children to walk through. As a result, our team decided that a cost effective solution to improve the Garden's visitor experience is to paint a mural on the walls off the tunnel. This would not only support and promote local artwork but also create a friendlier environment for children. Another addition would be to install lighting along the pathway. This would brighten the tunnel and also be a more economic solution than building a skylight to the median on SW Marine Drive.

Figure 15: Current Tunnel Connecting the North and South Garden

5.6.3 - Sheltered Bike Rack

Figure *16* shows a sheltered bike rack at the front entrance of the Botanical Garden. With the heavy rainfall at UBC, this addition will encourage a more sustainable method of transport, making the Garden more accessible to commuters and campus residents. Since there is a shortage of parking for the Garden, we recommend this addition to encourage less driving and alleviate the restricted parking access.

Figure 16: Bicycle Rack

5.6.4 – Festivals and Special Occasions

A concern mentioned by the UBC Botanical Garden director was improving the flux of visitors during the winter months. To address this concern, our team recommends holding various festivals during the off-season to improve visitation numbers. Our first suggestion would be a Christmas Light Festival; similar to the seasonal Bright Nights Christmas Train that takes place in Stanley Park. For this festival the Botanical Garden would be transformed by decorating the trees and walkways with bright twinkling Christmas lights during the December holiday season. Another suggestion would be a Lantern Festival in late January or early February. A lantern festival is a traditional Chinese practice to celebrate the end of the lunar year. For this festival, hundreds of handmade lanterns would decorate the Botanical Garden' great lawn, providing a beautiful spectacle for visitors. These festivals would highlight the Garden's features and also draw visitors in during slower months.

5.6.5 - Marketing

One issue the UBC Botanical Garden is facing is that it does not draw in enough visitors to make it economically viable to staff the Garden with the required personnel year round. Currently, the Garden is fully staffed from mid March to mid November and the rest of the year its front-end staff (people who work in the store and at the admission desk) do not work.

To help increase the public's awareness of the Garden, and in turn increase the amount of people visiting and expand the demographic of those visitors, we propose that the Garden introduce a marketing campaign.

The marketing campaign would consist of a number of small, economical, and effective projects. These projects include:

- *Small advertisement signs:*
  We propose that the UBCBG install small signs at various locations around UBC and to a lesser degree Vancouver. These signs would not need to do much more then advertise the location of the Garden and a few of its features and events. The most suitable locations for these signs would be areas of the city/school that have large numbers of people passing through each day (i.e. YVR Airport, BC Ferry Terminals, UBC Bus loops, and the Students Union Building).
- *Newspaper advertisements:*
  A second marketing effective marketing method that we propose the Garden implements is to take out advertisements in the local lower mainland newspapers. Like the signs discussed above, these advertisements would just need to showcase the events and attractions of the Garden.

6.0 - Cost Estimation

The following is a preliminary estimate of the cost to implement the recommended improvements to the UBC Botanical Garden. Table 1 shows the specific improvement with the corresponding capital cost, and the yearly operating cost.

Item	**Capital Cost**
Main Sign on SW Marine	$2,000.00
Additional Direction Signs	Contact Ministry of Highways
Pond (10m x 10m)	$150,000.00
Relocation of Vegetation	$50,000.00
Storm Water Treatment	$100,000.00
Vending Machine	$3,000.00
More events	Will depend on Size and Number of Events
Restaurant	$450,000.00
Pedestrian Overpass	$2’000’000.00
Viewing Platform	$5,000.00
TOTAL	**$2,760,000.00**

Table 1: Preliminary Cost Estimate

7.0 - Conclusion

In conclusion, the biggest problems that face the UBC Botanical Garden relate to the overall public appeal, awareness and accessibility to the Garden. We hope to encourage more visitors to come to the Garden year round in order to increase annual revenue and promote the positive aspects of the Garden to the public.

The main changes we are proposing include:

- Revamping the front area of the Garden and adding a café
- Building a pedestrian bridge spanning across the SW Marine Drive
- Introducing better directional signage
- Building a viewing platform at the south end of the Garden
- Introducing internal signage
- Revamping the existing tunnel
- Organizing more social events similar to the Apple Festival

We believe these options form a simple, and effective way to meet the needs outlined by the botanical Garden's staff and all other stakeholders involved as well as improve the overall interest in the Garden.

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Appendix A - Site Visits

Members of our group conducted site visits on three separate occasions. The first two site visits occurred on September 30th, where half the group travelled to UBC Botanical Garden in the morning and the other half in the afternoon.

While at the Garden, we took photos and notes of what we observed in an attempt to better understand the current state of the Garden. This understanding is important in determining the improvements necessary to increase visitation and revenue. Below is a list of our general observations from the site visits on September 30th:

- There are no signs along 16th Avenue that would indicate where the Garden entrance is
- The size of the Garden is quite large and therefore the need for anchors is very true
- The plants growing in the Garden are plentiful and all in great condition

During these two visits, we spoke with a member of the Garden staff who seemed very interested in the idea of improvements to the Garden. He stressed the importance of having more events in the Garden.

The next site visit occurred on October 17th and was leaded by Doug Justice. During this tour Justice stressed the following ideas to the students:

- The value and importance of space within the Garden - there is always a shortage of space which prevents the Garden from being able to conduct all desired activities
- The need to have anchors located in remote areas of the Garden
- The potential increase in convenience to visitors by creating a loop within the Garden - this would be in the form of a pedestrian overpass which would connect the north and south sides of the Garden.

- The educational value of adding a walkway into the marsh located on the north side of the Garden.
- The potential value of adding posters and additional lighting into the tunnel in order to make it more kid-friendly

Some of these ideas, such as the increase in space within the Garden, the addition of anchors, the construction of an overpass over SW Marine Drive and making the tunnel more kid-friendly, where then incorporated into our report.