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Western University Faculty of Engineering

ES 1050 - Foundations of Engineering Practice

013 – Safwat Ramadan

T13Hide

February 11th, 2022

Winter Project Problem Definition Report:  
 Accessible and Unobtrusive Wildlife Hide

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# Need Statements and Insights

## Early Need Statement

Needs Statement:

The Nature Conservancy of Canada (NCC) needs a way to have a scalable design because the NCC might want to build similar hides in other places.

Supporting Insight and Source:

The supporting insight that led to one of our earlier need statements, was that there are no bird hides on Peelee Island. A scalable design that the NCC would be able to use at multiple conservatories would be beneficial, as they could easily replicate our design and use it elsewhere. The source supporting this insight was determined through team research as well as our first client meeting. In this meeting they spoke on how the NCC has not used bird hides before, and therefore they would prefer a design that was scalable.

## Refined Need Statement

Needs Statement:

The Nature Conservancy of Canada (NCC) needs a way to create a nature hide capable of holding 4-8 people and wheelchair accessible because the NCC wants a way for all kinds of people who visit Peelee Island to be able to experience nature without disturbing it as well as improving relations with their donors.

Supporting Insight and Source:

The supporting insights that led to us redefining our early statement into the one above was primarily accessibility. The bird hide needs to be accessible to all visitors of Peelee Island, this means that our design needs to have certain critiques like a ramp built so that the hide is accessible. Another insight was that the hide should fit 4-8 people. Both these insights support came from our first client meeting. Before that meeting, we had questions regarding how many people should be able to be inside the hid at once. The clients said that 4 to 8 people fitting comfortably is ideal for them, as they do not imagine more than 8 visitors bird watching at a time. The clients also stressed the importance of accessibility in both client meetings and therefore we felt that this need for a ramp was of very high importance.

## Current/Final Statement

Needs Statement:

The Nature Conservancy of Canada (NCC) needs a way to create a nature hide that blends in seamlessly with the surroundings which is capable of holding 4-8 people and is wheelchair accessible because the NCC wants a way for all the visitors of Peelee Island to be able to experience nature without disturbing it or detracting from the natural beauty along with improving relations with their donors.

Supporting Insight and Source:

The supporting insight leading to this Need Statement was that we needed to design a hide that blended in with the environment it was being used for. It also should have dimensions fitting 4 to 8 people in it at a time, and it needed to be accessible to all people. These insights came from the clients in our second client meeting. We had asked the clients about the hides dimensions, and they imagined that it would be able to fit 4 to 8 people in it at once. They also stressed the importance of the hide being environmentally friendly, specifically for the animals that live in the Conservatory. This would mean that the hide needs to blend in with its surroundings as the NCC would like to make sure that it does not disturb any wildlife. This was a very important insight that they provided for us. The accessibility aspect of the hide was sourced from the first client meeting, when they had asked to make sure that all people were able to use the hide, including individuals using wheelchairs. The majority of our sources came from the clients through client meetings, as they were able to paint a very clear picture of what they want the hide to look like, function, and core traits and specifications it should have.

# Design Criteria

## Design Objectives

Table 1: Project Objectives

|  |  |  |  |
| --- | --- | --- | --- |
| **Obj #** | **Objective Description** | **How to Measure** | **Normalized Weighting\*** |
| 1 | Aesthetically Pleasing/Interesting Interior/Exterior | More interesting than just a plain rectangle | 0.019 |
| 2 | Keep the costs low | Utilize materials that have high efficacy at low price. | 0.074 |
| 3 | Blend into the surrounding environment | Natural colours and materials relative to surroundings | 0.234 |
| 4 | To be comfortable for long periods of time | Access to seating and leaning areas | 0.042 |
| 5 | To be environmentally friendly in material and construction | Reference building materials and practices against environmental studies | 0.205 |
| 6 | To be low maintenance | Easy access to waste bins and reminders posted | 0.131 |
| 7 | To have a scalable design | Low complexity and simple shapes | 0.080 |
| 8 | To be long lasting | Relative lifespans of materials used | 0.215 |

## Design Constraints

Table 2: Project Constraints

|  |  |  |
| --- | --- | --- |
| **Cstr #** | **Constraint Description** | **How to Verify** |
| 1 | Accessible to people with disabilities | Accessible elements such as ramps used in design |
| 2 | Must not disturb the wildlife | Limit unnatural elements of the design |
| 3 | On and suitable for Peelee Island | Consider the weather and ground on the island. |
| 4 | Must not be too big (single story, 4-8 people occupancy) | Research and follow appropriate sizing for a hide. |
| 5 | Needs to be feasible to construct on the island. | Materials are easy to transport by ferry and will not need heavy machinery to build. |
| 6 | Must not detract from the natural beauty | No bright colours (such as white paint), generally use discrete materials. |
| 7 | Usable throughout all seasons | Roof requires sloping and the strength to deal with snow and rain. |
| 8 | Accessible viewing heights | Need viewing slits which are at heights appropriate for children and those in wheelchairs. |

# Concept Selection Summary

Table 3: Concept Selection Summary

|  |  |  |  |
| --- | --- | --- | --- |
| **Concept  #** | **Concept Labels**  **(make this precise but descriptive)** | **Filtered by Selection Tool (Gut, TRA …)** | **Reason Eliminated** |
| 1 | Camouflage Net |  | Not eliminated |
| 2 | “Stackable” and symmetrical design | Matrix | This concept scored lower than others, which essentially showed us that having a design which focusses heavily on ‘scalability’ may conflict, or be less important than, meeting our other objectives. |
| 3 | A ramp for accessibility | Matrix | This concept was seen as inferior to the very similar concept 13. Both of these provide accessibility, but 13 is arguably more effective in doing so. |
| 4 | Enclosed door area | Matrix | This had a relatively high score, and thus is considered a main area for prioritization, but was not in the top two. |
| 5 | Slit windows | Matrix | This had a relatively high score, and thus is considered a main area for prioritization, but was not in the top two. |
| 6 | Raised foundation | Matrix | This concept had a mediocre score in our decision matrix. However, our gut still tells us there is value in this concept, as it deals with the specific issue of flooding in the area. This is a ‘secondary’ one which we will give significant thought to. |
| 7 | A fireplace in the hide | Gut/NoGo chart | The smoke from this might disturb the local wildlife. Furthermore, it would have to be maintained (we want to keep required maintenance low). |
| 8 | Paint the outside | Matrix | This had a relatively high score, and thus is considered a main area for prioritization, but was not in the top two. Our primary concern with this option is the environmental impact of paint flecks. |
| 9 | Room for resting elbows or putting camera/binocular tripods | Matrix | This concept had a relatively low score in our decision matrix. However, our gut still tells us there is value in this concept, mainly because our clients have expressed interest in this idea. This is a ‘secondary’ one which we will give significant thought to. |
| 10 | Benches inside | Matrix | This concept had a relatively low score in our decision matrix. However, our gut still tells us there is value in this concept, mainly because our clients have expressed interest in this idea. This is a ‘secondary’ one which we will give significant thought to. |
| 11 | signs/QR codes about the wildlife and resources |  | Not eliminated |
| 12 | Build the hide in the earth mound | Gut/Matrix | The area is prone to flooding, which would likely cause *more* problems for a buried hide than an above-ground one. Furthermore, construction in the mound would be more difficult. |
| 13 | Stairs and ramp | Matrix | This concept had a relatively low score in our decision matrix. However, is still valuable, as it addresses the specific issue of providing accessibility to the hide. This is a ‘secondary’ one which we will give significant thought to. |
| 14 | safety feature on windows to protect birds | Matrix | This had a low score compared to other concepts. This means we will focus on actualizing it *less,* even though we might still do it if we have the time, and it fits. |
| 15 | Quiet entrance, dirt path to not create disturbance | Matrix | This concept had a mediocre score in our decision matrix. However, our gut still tells us there is value in this concept, mainly because our clients have expressed interest in this idea. This is a ‘secondary’ one which we will give significant thought to. |
| 16 | nests for birds -> nest cups for barn swallows | Gut/Matrix | This had a low score compared to other concepts. This means we will focus on actualizing it *less,* even though we might still do it if we have the time, and it fits. |
| 17 | Shutters on windows so no glass needed | Gut/No Go chart | If the windows can only be looked out of when entirely open, this would result in them being open most of the time. This is problematic as it would allow a lot of sound to escape from the hide. |
| 18 | Rough walls in roof for nest building | Matrix | This concept had a mediocre score in our decision matrix. However, our gut still tells us there is value in this concept, mainly because our clients have expressed interest in this idea. This is a ‘secondary’ one which we will give significant thought to. |
| 19 | Nesting materials box | Gut/Matrix | This had a low score compared to other concepts. This means we will focus on actualizing it *less,* even though we might still do it if we have the time, and it fits. This is also the more inferior option out of the concepts which help birds to nest. |

Comparison of Final Two Concepts:

Our final, or *most important*, two concepts were concepts 1 and 11, with concept 1 being considered the superior of the two. These two are the ones which we will focus most on effectively implementing, before all others.  
  
 Both concepts share the fact that they effectively assist in one or more of the objectives, but *without* impeding the progress of any of the others. In concept one’s case, it very effectively meets our objective of making the hide blend in; concept eleven instead assists primarily with increasing the hide’s ‘comfort’ and the aesthetics of its interior. This difference in which objective each concept deals with is what allows them to be ranked; since we consider having the hide blend in to be one of the most important objectives, any concept which meets that objective is therefore also more important. This is the main reason why concept 1 is rated as our best concept. We will have to do some work to ensure the concept is viable as many materials which camouflage nets are made of may be harmful to the environment, but the potential upside is great. Furthermore, both concepts would be relatively easy to implement; though concept 1 seems to be slightly easier, as it would not require the creation of any online infrastructure.

In terms of weaknesses, concept 11 is flawed in the sense that QR codes would require the aforementioned online infrastructure. Even regular signs would require some extra work in the form of writing up the information which would appear on them. This may not be *that* difficult, but it is an issue which concept 1 lacks. Concept 1’s main weakness is that a camouflage net would be comparatively *easy* to remove/damaged by vandals or animals. The net could even get damaged by local weather conditions, such as flooding. Signs installed in the hide however, presumably made of metal or wood, would be far harder to flat-out remove, or damage, due to their sturdier materials.