UBC Social, Ecological Economic Development Studies (SEEDS) Student Reports

UBC Farm Mobile Market Trailer Project

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CIVIL 201

Dr. Susan Nesbit

Community Service Learning Project

December 4th, 2009


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UBC Farm Mobile Market Trailer Project
Design and Construction of Mobile Market Trailer

Community Service Learning Project – UBC Farm Mobile Market Trailer

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I. OVERVIEW

This document introduces some background information about UBC Farm and the community involved and presents a detailed schedule and design for a mobile market trailer that would meet the needs of UBC Farm.

II. COMMUNITY ORGANIZATION BACKGROUND

The UBC Farm is a 24-hectare learning and research farm located on the University of British Columbia's campus in Vancouver. The farm is integrated with the wider community and served as the only working farm in the city of Vancouver.

The farm is a student-driven initiative where students, faculty, staff and the local community have been working together to create a place where learning and sustainability values are promoted in order to connect the land and food system with the community. The ultimate goal of the farm is to retain existing farm and forest lands at UBC into an internationally significant centre for sustainable agriculture, forestry and food system.

A. Vision and Mission

The UBC Farm will function as means for change through demonstration of alternative methods that will improve the ecological, economic and social health of our urban communities. The UBC Farm provides educational, research and practical leadership in the area of agro-ecological design and planning in a manner that ultimately benefits present and future community farmers, developers, and other citizens. The Farm provides academic and practical leadership in the areas of agro-ecological design, community planning and development in a manner that benefits past, present and future community members in a healthy, sustainable manner.

B. Goals and Objectives

- Design and employ a management system that will ensure the development of a student-driven, sustainable farm system across all disciplines that is integrated with the community.
- Design UBC Farm in order to establish it as an important and vital facility for UBC and the surrounding community.
- Support the farm system and the University's mission by appropriately developing and integrating academic activities that promote a healthy learning environment.
- Develop and implement programs and activities that demonstrate the University's commitment to sustainability and community health.
- Engage and involve students by creating and maintaining relevant programs, activities and events that encourage meaningful participation of students.
- Promote and support the growth and development of sustainable communities by establishing strong connections with them and implementing important services at various levels.

Reference

UBC Farm Visioning Document (Wednesday, April 18, 2001)

III. PROJECT DEFINITION

- The need that the CSL project addresses
  - The obstacle that the UBC Farm has requested us to address is a lack of convenient and user-friendly transportation options for bringing a greater volume of produce to campus, in addition to other public events. The UBC Farm owns a 1984 Toyota Corolla hatchback, which is currently their only means of transporting tables, signs, totes of produce and other equipment needed to set up a market stall. This is often a cumbersome and labour intensive affair, an issue that this project will address

- Stakeholders
  - Susan Nesbit (Professor of UBC Civil Engineering Department)
    - Instructor of CIVL 201/202 classes
  - Amy Frye, Andrew Rushmere, Tim Carter (UBC Farm staff)
    - Main contact people for trailer design and building considerations
  - Brenda Sawada (Sustainability Office SEEDS staff)
    - Coordinator of the project (in charge of organizing stakeholders meetings, report publishing, resource sourcing, and making sure everyone stays on task)
  - Lee Ferrari (Fleet Manager, Plant Operation Staff)
    - Brings expertise, and possibly resources in dealing with trailer sourcing, maintenance, cleaning, and repair
  - Tracey Mason (UBC Community Learning Initiative Staff)
    - Helps facilitate links between UBC classes and community partners such as the UBC Farm

- Final output of the project
  - The main objective of this project is to design and build a Mobile Market Trailer that can be towed behind the UBC Farm car and used to bring produce to campus for sale. This market trailer will be the final output of this project

- Project constraints
  - Budget in a range of $500 to $1000
  - Timeline
  - The dimension of the trailer
  - Limited free materials from UBC Farm
  - Possible limited expertise in certain tools
  - Working environment
  - The weather might not be suitable since the construction time will be in February (rain, cold temperatures, possibly snow)
  - The need to consider sustainable materials
  - Maintenance and repair

- Project assumptions
  - Initial project budget is $500
  - Budget is adequate for the project
  - Enough help, tools and materials are available from UBC Farm
  - We can get help from experts, friends and other people
  - Materials we have to buy do not exceed the budget

- Days and hours to access to the project site are adequate (UBC Farm)
- Ability to obtain a free trailer before February 2010 from Lee Ferrari
- In the event we do not get a free trailer from Lee, that we can get a free trailer from somewhere else instead, i.e. *craiglist.com* and *freecycle.org*
- The base of the trailer size is 8 by 5 feet

IV. SCOPE OF THE PROJECT

- **Project Justification**

UBC Farm is currently in need of a market trailer in which they can store fruit and vegetables when taking produce to the market and other places to be sold. They have requested that we build a trailer that can be towed by a UBC Farm vehicle. The purpose of this project is to build a mobile market trailer to suit their organizational needs.

- **Project Outcome**

The expected outcome of this project is that we as a group will coordinate our efforts and build a trailer with the resources (money and materials) and time available to us. We also expect to learn how to work with tools and equipment and materials that we will be using in the construction of a mobile market trailer. Eventually we will turn this trailer over to UBC Farm for use when they transport their produce to the market. We expect to come away from this project with experience on how an engineering project is managed and completed.

- **Project Deliverables**

The project deliverables will include a finished market trailer that is fully capable of storing fruit and other produce from UBC Farm. The trailer should be sturdy enough to withstand the rigour of travel on the road back and forth between the market and UBC Farm, since there may be a considerable distance between the two locations. Also, the trailer must be built strong enough to endure the elements as well as shocks caused from bumps in the road. This trailer will be handed over to UBC Farm by the end of the project timeline. Other deliverables include a Community Service Learning Design and Planning Report on our design ideas on how the trailer should be built, as well as detailing what tasks are allocated to which members. This report will also list materials and other equipment that we will need in order to complete this project, and will be submitted to the instructor of Civil 201 for approval by 4pm, December 4th.

- **Project Objective**

The objectives of this project from the group members' perspective are to learn how to work together in a team, get an idea of what it is like to build a market trailer, learn how to successfully communicate with an organization in a professional manner, as well as properly demonstrate the process of proper engineering design and planning – which will be shown in this report. From UBC Farm's perspective, the objectives of this project are to increase UBC Farm market revenues by increasing the amount of produce that the client can take to off-campus sales, in addition to decreasing the time needed for UBC Farm staff to pack, set up and take down market stands. Another objective is also to reduce the number of staff needed to take produce to a market sale, since the market trailer will only require one person to detach from the vehicle, unpack, and set up the produce for sale. The reverse process – which will involve putting away remaining produce, packing, and attaching the trailer to the vehicle – will also require only one person.

V. ACTIVITY DEFINITION AND SCHEDULE

A. Planning Phase: First Term

Week 1 (Oct. 19 – Oct. 25, 2009)

- Meet the other group members
- Research information about UBC Farm
- Distribute contact information, put up on a common thread on Vista
- Decide on time of regular group meetings
- Create a list of questions to ask the organization
- Meet with our reflection mentor (Justine Clift) and discuss questions we should ask the organization, UBC Farm

Week 2 (Oct. 26 – Nov. 1, 2009)

- Submit a revised list of questions to the reflection mentor
- Designate three people in charge of contacting the organization, our instructor (Dr. Susan Nesbit) and Justine Clift, as well as backup people in case the contact people cannot be reached
- Establish contact with the organization via e-mail
- Obtain contact information of UBC Farm from reflection mentor
- Decide a time to go and meet with UBC Farm Staff (Amy Frye and Andrew Rushmere)

Week 3 (Nov. 2 – Nov. 8, 2009)

- Inquire about the budget for this project
- Meet with Amy and Andrew at UBC Farm and discuss our project objectives and design ideas for a trailer
- Discuss how to obtain a trailer and how we could modify it
- See if there are any materials UBC Farm can give us to use. (e.g. wood, metal)

Week 4 (Nov. 9 – Nov. 15, 2009)

- Continue brainstorming ideas for our project
- Contact Lee Ferrari and Brenda Sawada and arrange a meeting with them
- Meet with Lee and Brenda at the University Sustainability Office
- Discuss with Lee how we could obtain a trailer for our project, as well as and a truck that UBC Farm could use
- Talk with Brenda about SEEDS and project sustainability, possible funding from AMS

Week 5 (Nov. 16 – Nov. 22, 2009)

- Meet Tim Carter at UBC Farm and talk about the project budget, whether it is subject to change, size of the totes, as well as tools available
- Go over the trailer design with Tim, obtain dimensions of totes
- Verify that the tools we need are supplied by and available at UBC Farm
- Contact Susan and confirm what the budget is
- Delegate tasks among the group members and start working on the project report
- Contact Justine and arrange a meeting
- Finalize the trailer design and drawings

Week 6 (Nov. 23 – Nov. 29, 2009)

- Meet with Justine and reflect on our experience with UBC Farm and the overall project so far
- Arrange for 3 people to go to UBC Farm and take photographs of the materials, tools and equipments available. The other 4 people will plan to meet with Lee and ask him about the trailer
- Continue to work on our sections of the report over the next few days
- Figure out a way to draw the trailer design in 3D

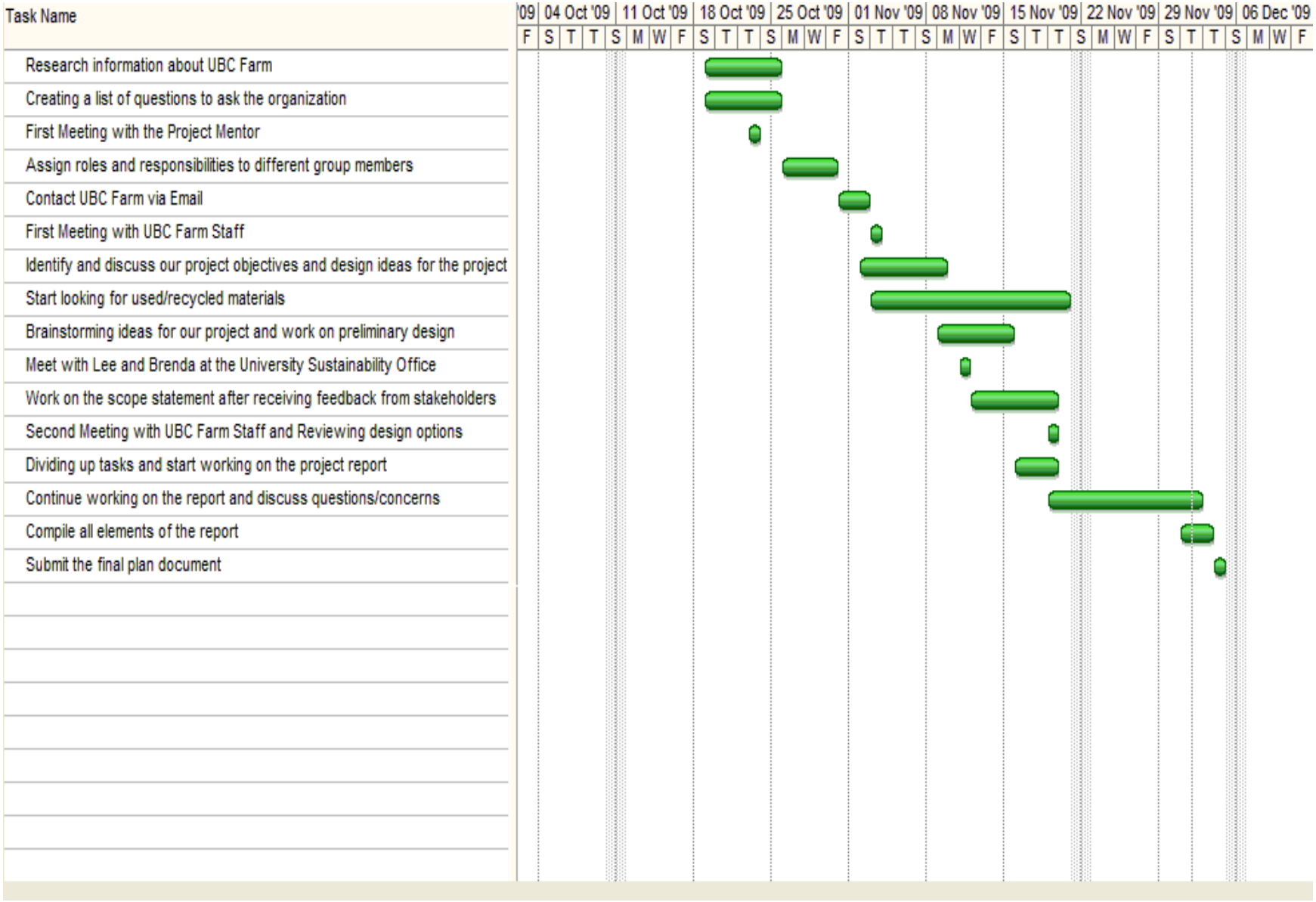


Figure 1: Gantt Chart of the Planning Phase

Schedule and Description of Meetings

Date of the Meeting	Summary of the Meeting
Oct 19, 09	• Chose the contact people for communicating with the project mentor and UBC Farm • Came up with some questions to ask from UBC Farm Staff on our first meeting
Oct 23, 09 **(First meeting with our mentor)**	• Discussed the questions with our mentor • Added a new question/concept to our list: sustainability – e.g. Using recycled/used materials – which have been used before and are good enough to be reused
Oct 29, 09	• Came up with the final list of questions and concerns to ask during our first meeting with UBC Farm Staff • Discussed about the possible dates for the meeting, and what to bring
Nov 3, 09 **(Meeting with UBC Farm Staff)**	• Met Amy and Andrew of UBC Farm • Discussed the following: i. The mobile market trailer project (design features, etc) ii. Need to acquire trailer iii. Lee Ferrari of UBC Plant Ops may be helpful in getting trailer iv. UBC Farm has some tools which can be used v. Some materials available at UBC Farm vi. May be able to get funding from Brenda Sawada of Seeds vii. Need to meet with Tim Carter at some point as he is sick this week

Nov 5, 09	• Reviewed what happened at the meeting with UBC Farm Staff • Discussed how we could obtain a trailer for our Mobile Market Trailer project • Brainstormed on how we could possibly get a trailer, and came up with some ideas about modifying it
Nov 9, 09 **(Meeting with Brenda & Lee)**	• Met Lee Ferrari and Brenda Sawada • Were informed by Lee about a high possibility of obtaining a free trailer and a truck for our project • Were informed by Brenda about requesting funding from AMS • Discussed sustainability ideas, such as using recycled/used materials
Nov 19, 09 **(Meeting with UBC Farm Staff)**	• Met Tim • Discussed about our possible design • Tim mentioned that we might get an extra $500 from UBC Farm if we come up with a good design • Checked the tools available there • Figured out the sizes of the totes
Nov 20, 09	• Discussed about some concerns • Decided to look into AMS Funding • Divided up the tasks for writing our report
Nov 23, 09	• Discussed some questions related to different parts of the report at the beginning • Decided to meet Lee to talk about the trailer • Worked on some sketches of the trailer

Nov 24, 09	• Decided to go to UBC Farm to take some photos of the tools/materials available there • Worked on different parts of the report • Discussed about the design
Nov 26, 09 **(Second meeting with our mentor)**	• Took photos of tools/materials • Worked on our parts • Worked on the schedule • Had our 2nd meeting with the mentor • Had a discussion about the project with her
Nov 28 – Dec 04, 09	• Met every day to work on our parts • Discussed questions and concerns • Finished our report

Table 1: Summaries of the Meetings

B. Implementation Phase: Second Term

By the End of January:

- Divide up all of the tasks
- Finalize the schedule
- Make sure the experts are available during the time we are building the trailer
- Review the goals and objectives
- Determine what materials/tools we need to buy/rent
- Determine what materials/tools we can get from UBC Farm
- Make sure that we have enough tools for everyone
- Present our design to UBC Farm (in details)
- Get final feedbacks from UBC Farm

February:

Day 1 – February 12, 2010:

Goals:

- Get all the tools and materials we need for both days
- Build all the separate parts and make them ready to be installed on the trailer on Day 2

9:00 am – 9:45 am

- Make sure we have all the tools ready
- Make sure we get materials we need
- Make sure team members know their roles

9:45 am – 12:00 pm

- Prepare all of the components
- Cut woods
- Determine the exact size of the roof and cut and prepare the materials we need for it
- Decide on where the signs need to be put

Lunchtime (12:00 – 1:00): Brief Discussion

- How is the day progressing?
- Are we working on schedule?
- What else we need to do for the rest of the day?

1:00 pm – 5:00 pm

- Get feedbacks from UBC Farm
- Build the supports for the roof
- Build all of the separate parts (Trays, doors, etc)
- Get different parts ready to be put together during the next day
- Discuss the remaining parts for the next day
- Review accomplishments on Day 1

Day 2 – February 13, 2010:

Goals:

- Put all the separate parts together
- Install all of the components
- End the implementation phase of the trailer

9:00 am – 9:45 am

- Make sure everyone is prepared and knows their tasks for the day
- Prepare all of the tools
- Discuss what needs to be done by the end of the day
- Discuss the concerns/questions for today's tasks

9:45 am – 12:00 pm

- Put together all of the separate parts we made on the first day
- Get final feedbacks from UBC Farm

Lunchtime (12:00 pm – 1:00 pm): Brief Discussion

- How is the day progressing?
- Any concerns/questions related to the individual work?
- Are we working on schedule?
- What else we need to do for the rest of the day?

1:00 pm – 5:00 pm

- Do final work on putting together all the parts of the trailer
- Install the lights
- Paint the trailer
- Install all of the smaller components (Signs, door handles, etc)
- Test the trailer
- Share final thoughts

VI. ROLES AND RESPONSIBILITIES

CSL Team members:	Roles and Responsibilities
Tyler Sheasby ➢ tsheasby@gmail.com	• Communicate with the organization (UBC Farm) • Communicate with other stakeholders (Brenda and Lee) • Arrange meetings with them • Work on 2D/3D sketches • Work on the written part of the design (descriptions) • Write meeting minutes
Saghar Soleimani-D ➢ saghar_s11@hotmail.com	• Communicate with the project mentor (Justine) • Give her updates on the meetings • Arrange meetings with her • Keep track of who will be responsible for what activities throughout the project • Work on the activity schedule for both terms • Help with Gantt Charts(scheduling) • Write meeting minutes
Houman Hoseini ➢ houman.hoseini@gmail.com	• Communicate with Dr. Nesbit • Organize the regular group meetings • Make sure everyone attends the meetings • Work on procurement planning • Work on Gantt Charts (scheduling) • Help with 2D/3D sketches • Write meeting minutes

Ho Pong Ching ➢ mochaching@hotmail.com	• The backup contact person for communicating with the mentor • Supervise the discussion board, and regulate the discussions • Determine the information and communication needs of stakeholders • Provide a background of the organization and its goals and objectives • Write meeting minutes
Dakai(Alex) Luo ➢ alexluo121@hotmail.com	• The backup contact person for communicating with the organization • Describe the needs that the project addresses, stakeholders, constraints, and assumptions • Work on the project definition • Help with 3D sketches • Help with scheduling and activities definition • Write meeting minutes
Wilson Lee ➢ draft21@interchange.ubc.ca	• Make sure that the group stays focused on the goals and objectives • Describe the project justification, outcome, deliverable, and objectives • Work on the activities definition • Help with project definition • Write meeting minutes
Thomas Hsueh ➢ th77126@hotmail.com	• Keep track of the meeting minutes • Research and find information about where to get used materials from • Contact experts to find out if they can help us with building the trailer • Work on risk planning • Write meeting minutes

Table 2: Roles & Responsibilities: CSL Members

Project Contacts	Roles and Responsibilities
Tim Carter ➢ *Production Coordinator* timothyecarter@gmail.com	• Help the group with technical parts of the project • Give rough ideas about how the trailer should be built • Provide some of the needed tools/materials
Andrew Rushmere ➢ *Academic Coordinator* *ubcfarm.learning@gmail.com*	• Main contact person for UBC farm • Give information about how the trailer will be used • Give information about the budget
Amy Frye ➢ *Marketing Coordinator* ubcfarm.market@gmail.com	• The person in charge of all of the sales at UBC farm • Give information about how the trailer will be used • Give information about how the trailer should be to be more practical and easy to use
Lee Ferrari ➢ *Supervisor, Resources Services* lee.ferrari@ubc.ca	• Bring expertise and resources in dealing with trailer sourcing, maintenance, cleaning, and repair • Suggest places from where we can get used/recycled materials
Brenda Sawada ➢ *Manager UBC SEEDS Program Sustainability* brenda.sawada@ubc.ca	• Give recommendations on sustainability issues and concerns
Justine Clift ➢ *4th year Civil Engineering Student* jeclift@gmail.com	• The project mentor • Communicate with the group through the contact person • Help the group throughout the project by giving suggestions and supervising the activities

Table 3: Roles and Responsibilities: Contacts

VII. COMMUNICATIONS PLANNING

Stakeholders	Information Needs	Communication Needs	When They Would Need it	Methods of communication
Susan Nesbit	• Progress updates on the project	• To observe the team member's progress throughout the project	• After each meeting throughout the whole semester	• Post meeting summaries on Vista discussion board • Emails
Brenda Sawada	• Final report	• To be updated continuously on the report	• By December 4th	• Submit a hard copy of the report
Lee Ferrari	• The conceptual and detailed design of the trailer • Materials needed to build the trailer	• To set up a meeting with him twice through the semester	• By the end of January	• Meetings with him in person • Emails
UBC Farm Staff (Amy Frye, Andrew Rushmere, Tim Carter)	• Final design and budget of the trailer • Materials needed to build the trailer	• To be updated continuously on the report • To approve the conceptual and final design	• By the end of January	• Meetings • Emails

Table 4: Information and Communication Needs of Stakeholders

VIII. CONCEPTUAL DESIGN

A. Design Objectives

- Storage space for at least 10 totes
- Should include a functional display space for market produce
- Should include built in market signage
- Should include a functional space for a customer check out area
- Hitching, packing, and market set up tasks can be completed easily by one person working alone

B. Decision-Making Process

Type of Roof	Pro's	Con's
Fixed	• Easy to build • Lower cost • No set-up required	• Less coverage area • More difficult for transportation purposes • Aesthetics
Adjustable	• More coverage area • Easier for transportation purposes • Ideal for different weather conditions	• Difficult to build (limited expertise) • Higher cost (more material, i.e. hinges) • Requires setting up

Table 5a: Comparison of Design Options

Storage Area	Pro's	Con's
8-10 Totes	• Less totes to store • Easier to build the storage area (keeps the height of the trailer lower)	• Lower amount of produce is taken to the market • Does not meet the project requirement
16 Totes	• Higher amount of produce is taken to the market • Higher revenue • Ideal case for UBC Farm	• Higher cost (more materials, i.e. frames) • Difficult to build two-level storage area • Requires more storage area

Table 5b: Comparison of Design Options

Check-out Area	Pro's	Con's
Built-in Folding Table	• Convenient • Does not require unpacking and setting up • Not required to carry extra tent and table • Less time needed to set up the entire trailer	• Higher cost • Difficult to build • Time consuming • Requires more materials to build
Separate Tent and Table	• Lower cost • Only requires a door and storage space in the trailer • Easier to implement	• Not as convenient as the folding table • Requires more storage space • Takes away space for storing totes • Requires many times of loading and unloading

Table 5c: Comparison of Design Options

C. Recommended Design:

- We decided to choose a fixed roof because it is easier for the team to implement and build due to our limited skill. Moreover, the cost for the fixed roof is lower than the adjustable roof and it does not require any form of setting up

- Although UBC Farm suggests that the trailer be able to carry 16 totes for the sale purpose, we have decided to design the trailer to carry 8-10 totes instead. This is because that the design option for 16 totes requires a two-level storage area given the dimensions of our trailer, making this design an unsuitable option. Also, the height of the trailer would increase as a result, leading to possible instability. As a result, we decided to implement the 8-10 totes design since the storage area is easier to build and cost less according to our budget.

- Having a separate tent and table for the check-out area allows the staff working with the trailer to have more space during sale. It would also require less money to implement and build this design option. In addition, the folding table would be more difficult to build, thus making it less desirable.

IX. DETAILED DESIGN

A. Design Description

⇨ Our trailer design is based on a sketch provided by UBC farm. The design is to be built on an existing trailer that will be provided in January 2010* (See Figure 2&3). Due to current monetary and construction constraints, our trailer is a wood based design. It features a wooden inner frame with plywood cover. Recycled materials will be used where applicable. While our design is wood based, our conceptual design could be adapted to a metal design if additional resources become available next semester.

⇨ One of the design requirements was for the trailer to have a functional display space for market produce. Our design features two display areas, one on either side of the trailer. This dual sided design provides more display space and allows for more display options.

⇨ Our design also features multi-level display trays. The lower tray provides ample space for larger produce, while the upper tray can be used for smaller sized produce. Both trays are angled to allow for easier viewing of the produce and provide a more attractive display area.

⇨ Another design requirement was that the trailer include built in market signage. Our design feature large 1.1'x 6.4' whiteboard signs on either side. The whiteboard material was chosen to allow for more signage options. In addition, the large doors covering the tote storage can be painted with additional signage or UBC logos if desired.

- Due to the fact that our design does not include a cashier area, we have included a storage space to store the following items: 2'x6' folding table, 10'x10' folding tent, cash register, scale, and stool. The items can be used to set up a cashier area which can be placed wherever is most convenient. This separate cashier area design allows for more flexibility during set-up. The storage space is accessible from the rear side of the trailer and covered by a door. The storage space is large enough to store additional materials, such as additional tables or extra totes, if needed.

- To protect the produce from the elements, our design features a roof which extends to the edges of the display trays. The roof is to be constructed of either corrugated metal or corrugated plastic depending on the availability of used materials. The pros and cons of the two types of roof are discussed in the following section.

- One of the design goals was the ability to hold 16 large (1.3'x1.3'x1.8') Rubbermaid totes and have them easily accessible. Due to space constraints, our trailer is designed to store 8-10 totes, depending on the size of the trailer provided by UBC Plant Ops. Additional totes can be transported in truck which will be used to pull the trailer. Storage of the totes in the market trailer is accomplished by placing the totes beneath the display racks. The totes are accessible from the outside of the trailer by lowering the cover doors. The cover doors hinge from the bottom to allow for easier removal of the totes as the doors. The use of one large door for each side allows for faster and easier removal of the totes during set-up. Also, if UBC Farm chooses to have locks on the doors, only two locks will need to be removed during set-up.

*Note - Due to the fact that the trailer has not yet been provided, the dimensions listed in the following section are estimates only and based on the trailer that we have requested from UBC Plant Ops.

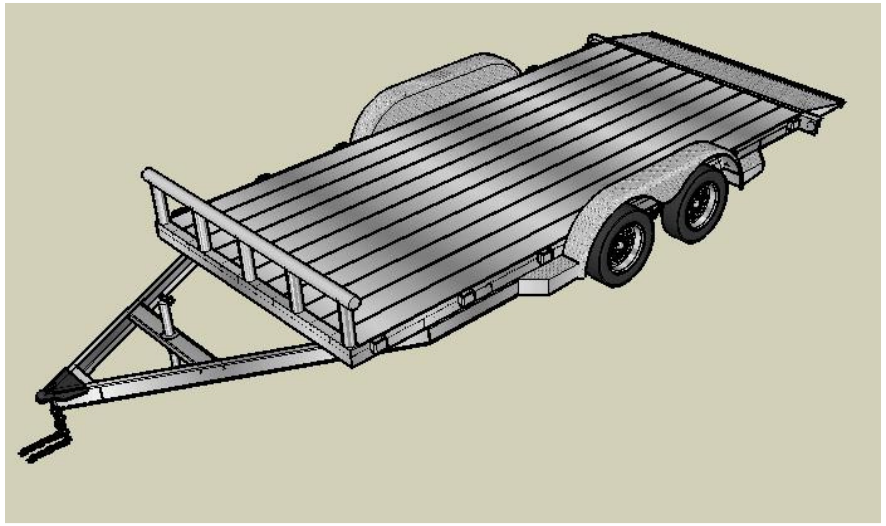


Figure 2: Trailer Bed Template

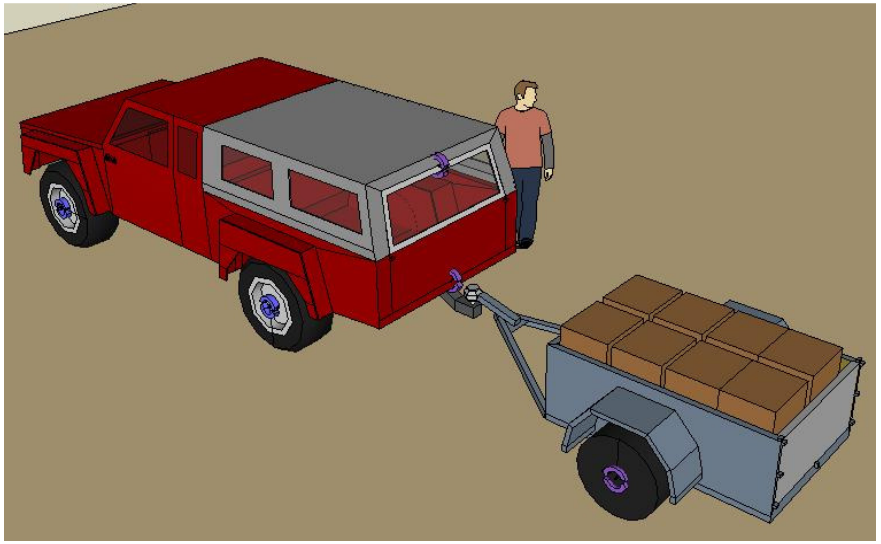


Figure 3: An Overview of Truck and Trailer Combination

B. Design Drawings

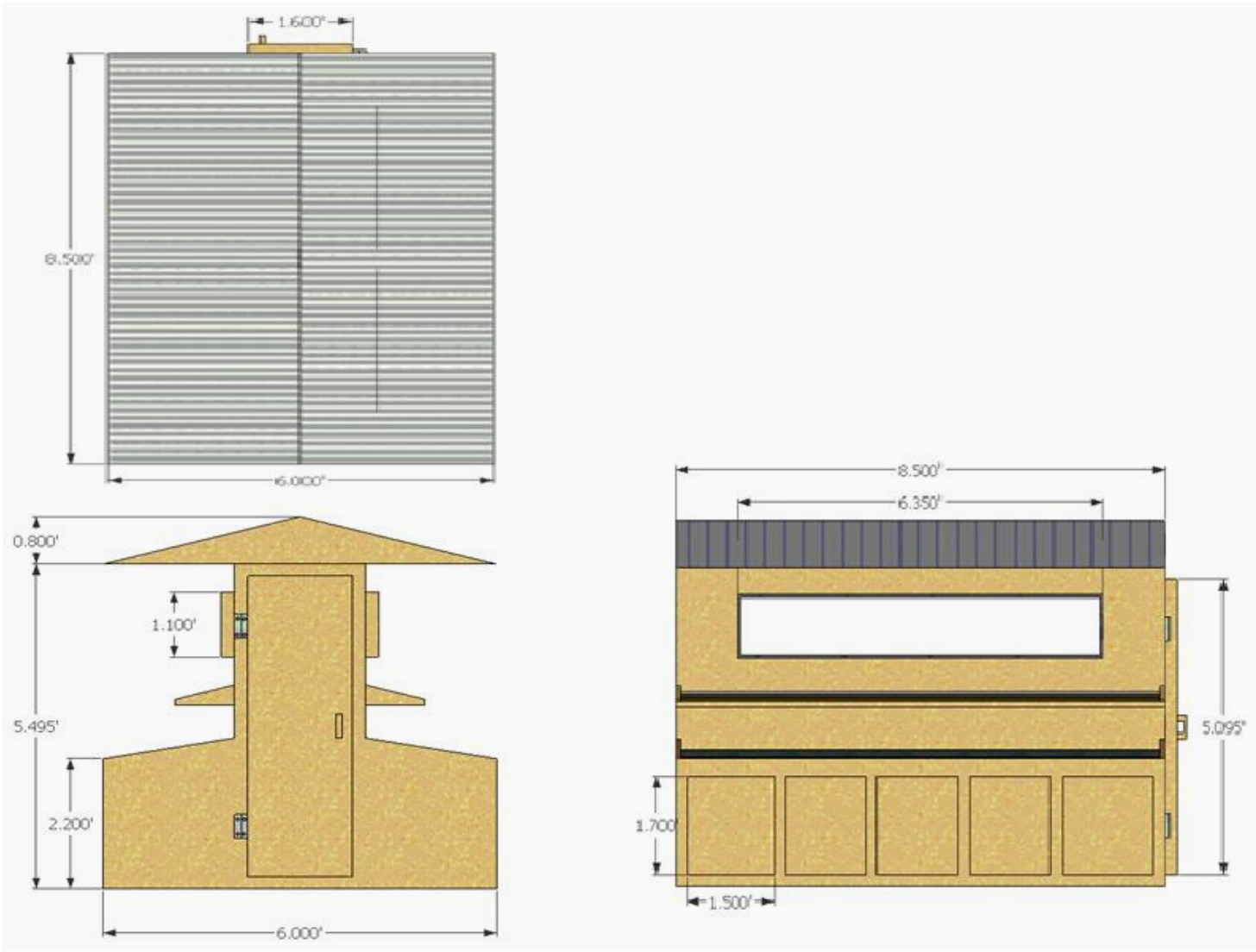


Figure 4: Detailed Design: Section Views of the Trailer

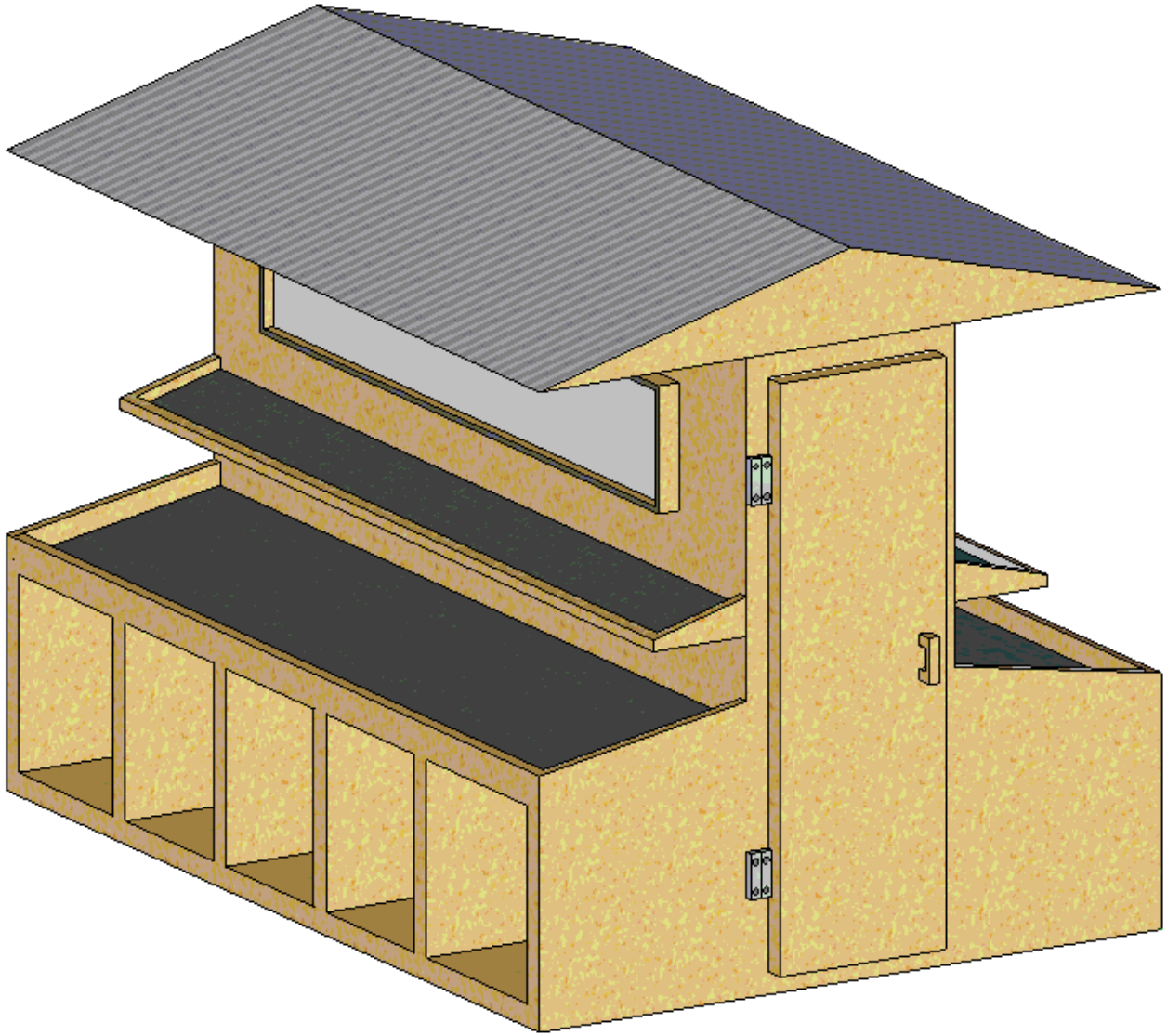


Figure 5: Detailed Designs: 3D View without Doors

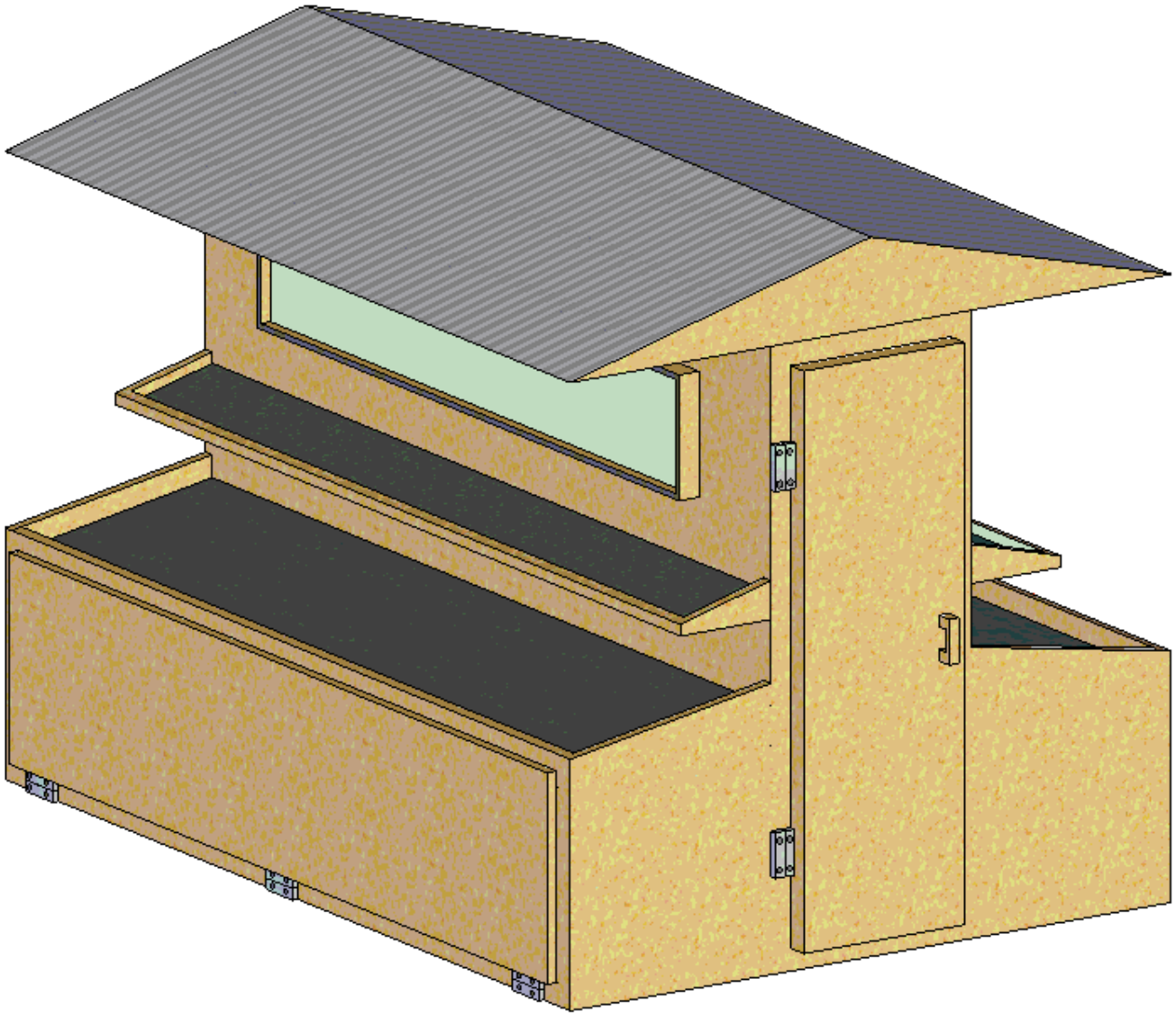


Figure 6: Detailed Design: 3D View with Doors

X. PROCUREMNT PLANNING: MATERIALS, TOOLS, COST ESTIMATION (PURCHASE AND RENTAL)

All cost for materials and tools are based on the assumption that the team is not provided with pre-used tools and materials, thus making the total cost calculation only an estimating cost. The information on the product name and cost estimation is obtained from the following sources:

- Canadian Tire, http://www.canadiantire.ca/home.jsp
- Rona – Canadian Branch, http://www.rona.ca/content/home
- United Rentals- Canadian Branch, http://www.ur.com/

There are also sources such as Vancouver Craigslist and Yahoo Free-Cycle where recycled materials and tools are available. However, their quantity is limited and not guaranteed to be available during our schedule days of construction. Therefore, this cost is not included in the following cost calculation. During Term 2, we will research these organizations before the implementation phase for recycled materials in order to make this project a more sustainable and on budget.

Quantity of Wood Required			
Type	**Length**	**Quantity**	**Total Cost**
Lumber	2” x 4” x 8’	35	$114.45
	2” x 6” x 8’	30	$123.60
	2” x 8” x 8’	25	$122.50
Plywood	4’ x 8’	6	$132.00
	6’ x 6’	5	$145.00

Table 6: Estimated Wood Requirement of Different Dimensions

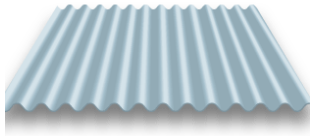
Required Tool	Product Name	Cost Estimation (CDN)			Procurement	
		Purchase	Rental	Quantity	Options	Price Quote
Hammer 	Steel 8-oz Claw Hammer	$3.99	Might be provided by Team Members / Organization	3	Retail Purchase	Free
Measuring Tape 	Stanley Tape Measure	$19.99	Might be provided by Team Members / Organization	1	Retail Purchase	Free
Chisel 	Mastercraft Maximum 3-Piece Chisel Set	$12.49	Might be provided by Team Members / Organization	3	Retail Purchase	Free
Screwdrivers 	Mastercraft 10-piece Magnetic Screwdriver	$9.99	Might be provided by Team Members / Organization	5	Retail Purchase	Free
Vice Grip Plier 	Vice-Grip 5-in. Curved-Jaw Pliers	$14.99	Might be provided by Team Members / Organization	2	Retail Purchase	Free

Required Tool	Product Name	Cost Estimation (CDN)			Procurement	
		Purchase	Rental	Quantity	Options	Price Quote
Table Saw 	**Mastercraft 10-in. Table Saw with Stand**	**$119.99**	• **Might be provided by Team Members / Organization** • **Rental cost : $51 per day or $166 per day**	**1**	• **Delivering with truck provided by the organization** • **One of the team members bring a vehicle voluntarily for transportation** • **Rent a truck from car rental companies for a day** • **Might be provided in the construction area in UBC Farm**	• **Free** • **Budget Car Rental: Truck Rentals are estimated to be $50 per day**
Cordless Drill 	**Hitachi Drill/Driver, 18 Volts**	**$128.88**	• **Might be provided by Team Members / Organization**	**1**	• **Retail Purchase** • **Retail Rental and be returned by one of the team members**	**Free**

Required Tool	Product Name	Cost Estimation (CDN)			Procurement	
		Purchase	Rental	Quantity	Options	Price Quote
Drill Press 	**Jobmate 8-in. Bench Drill Press**	**$89.99**	• **Might be provided by Team Members / Organization** • **Rental Cost: $96 per day**	**1**	• **Retail Purchase** • **Retail Rental and be returned by one of the team members** • **Might be provided in the construction area in UBC Farm**	**Free**
Combination Square 	**Mastercraft 16-in. Combination Square**	**$16.99**	• **Might be provided by Team Members / Organization**	**3**	• **Retail Purchase**	**Free**

Table 7: Tools Requirement

Required Materials	Product Name	Cost Estimation (CDN)			Procurement	
		Purchase	Rental	Quantity	Options	Price Quote
Trailer Lights 	**LED Submersible Trailer Lighting Kit**	**$69.99**	**_____**	**1**	• **Delivering with truck provided by the organization** • **One of the team members bring a vehicle voluntarily for transportation** • **Rent a truck from car rental companies for a day** • **Might be provided in the construction area in UBC Farm**	**Free**
Lumber 	**Approximate Lumber Dimensions of 2” x 4” x 8’**	**$3.27 (Per Square Feet) x 35 = $114.45**	**_____**	**35**	• **Rent a truck from car rental companies for a day** • **Delivering with truck provided by the organization** • **One of the team members bring a vehicle voluntarily for transportation**	• **Free** • **Budget Car Rental: Truck Rentals are estimated to be $50 per day**

Required Materials	Product Name	Cost Estimation (CDN)			Procurement	
		Purchase	Rental	Quantity	Options	Price Quote
Corrugated Metal/Plastic Roofing 	**Corrugated Galvanized Steel Metal Roofing**	**$60.00**	**_____**	**1**	**Retail Purchase**	**Free**
Hinges 	**Ideal Garage Door Hinge**	**$7.49**	**_____**	**4**	**Retail Purchase**	**Free**
Locks 	**Regular Padlock**	**$2.99**	**_____**	**1**	**Retail Purchase**	**Free**

Required Materials	Product Name	Cost Estimation (CDN)			Procurement	
		Purchase	Rental	Quantity	Options	Price Quote
Nails 	Mastercraft Brad Nails (Each package contains 2000 nails)	$12.29	_____	1 Package	Retail Purchase	Free
Screws 	Buildex Multi-mate 180-piece All-purpose Screws	$10.99	_____	1 Package	Retail Purchase	Free
Plywood 	Approximate Plywood Dimensions of 4’ x 8’	$22	_____	6	Retail Purchase	Free

Table 8: Materials Requirement

Estimated Cost of Tools and Materials	Estimated Purchase Cost:	$971.86	Grand Total:	$1071.86
	Estimated Delivery Cost :	$100.00		

Weight Calculation of Mobile Market Trailer:

It is vital to be aware of the weight of the trailer since this factor affects the transportation and setting up of the trailer during Term 2. As a result, an approximate estimate of the trailer's weight is demonstrated in the following table:

Components of the Trailer	Weight
Wood (Yellow Pine)	Density = 28 Pound/ Cubic Feet Volume = (35)(1/6 ft. x 1/3 ft. x 8 ft.) = 16 Cubic Feet Weight = 436 Pound
Corrugated Metal/Plastic Roof	Approximate Weight = 15 Pound
Materials (Totes + Fruits & Vegetable)	Approximate Weight = 60 Pound
Foundation of the Trailer (Wheels and Trailer Bed)	Approximate Weight = 200 Pound
Total Weight Approximation: **711 Pound**	

Table 9: Weight Calculations

XI. RISK PLANNING

Risks	Responses
Injuries caused by working with power tools to students and UBC farm members	● Consult experts and receive basic knowledge of the tools before operating the tools ● Have first aid kid on site ● Have one person with first-aid certificate on side ● Have access to phone on site ● Have a car on site while working
Miscommunication formed between students and community members	● Have one person responsible to contact the organization or client ● Forward all e-mails and important decisions to other team members as quickly as possible
Failure to meet the desired time lines	● Always have back up dates ● Plan alternative plans ● Plan a few days before schedule
Poor weathers (Snow, Storm, or Rain)	● Have tarps to cover expensive power tools and other water sensitive materials
Lack of communication and coordination between team participants during construction days	● Appoint a leader to give team members a guide line ● Set goals before starting the project each day ● Arrange group meetings during break if problems arise during construction ● Complete progress evaluation at the end of each day

Trailer has the potential to collapse when carrying excessive loads of goods	• Measure the amount of load that the trailer is capable of carrying, and clearly inform the maximum load to the clients
Rusting of metals materials on the trailer may injure workers, as well as weakening the structure of the trailer	• Provide protective coating for the metal materials on the trailer that are exposed to the atmosphere
Add-ons built on trailers will raise the center of gravity, making tipping of the trailer more likely	• Slowing the car speed down while towing the trailer
Lack of materials	• Consult experts to seek for alternative materials if possible • Consider the overrun cost that might be due to wrong calculations and estimates
Not all students present on the construction days	• Get confirmation from most of the team members before arranging a meeting • Try to contact those who are not present

Table 10: Risk Planning