Abstract

The purpose of the proposal is to offer a solution to the vacant lot by building a server room in its place. The proposed vacant lot is 250m by 250m in size however, the actual server room building will only take up 175m by 150m in space. This server room will provide the means to help the Société de Transport de Montréal fulfill one of their upcoming projects by providing a means to running the occupancy detection program and to processing the incoming data. For this to occur, the server room must contain a server, a server rack, patch cables and a power supply. Furthermore, this plan can be devised into 4 phases: planning and designing, preparation and construction, assembly and implementation and finally, the cleanup stage. The project will commence on March 2nd, 2021 and run until May 6th, 2021, which is roughly 11 weeks. Of the $250,000 budget, only $236,049 will be needed in expenditures including the salaries, equipment, materials and machinery. The project will be led by myself: Chris Pereira, along with my assistant manager Chris DiGiacomo. As for the construction work and responsibility of planting trees, this will be handled by M. Melatti Construction and Team Trees, respectively.

Implementing A Server Room

Vacant Lot Proposal

By

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TABLE OF CONTENTS

List of Figures III
List of Tables IV
1.0 INTRODUCTION 1
1.1 Purpose 1
1.2 Background 1
1.2.1 Major Problem 1
1.2.2 Secondary Problem 2
1.3 Scope 2
2.0 SOLUTION 4
2.1 Approach 4
2.1.1 Overall Description 4
2.1.2 Functions of Major Components 5
2.2 Result 8
3.0 PLAN OF ACTION 9
3.1 Planning & Designing 9
3.2 Preparation & Construction 9
3.3 Assembly & Implementation 10
3.4 Clean Up 10
4.0 SCHEDULE 11
5.0 Budget 13
3.1 Management 13
3.2 Contractors & Equipment 13
3.3 Materials 14
6.0 QUALIFICATIONS 16
6.1 Head Manager – Chris Pereira 16
6.2 Assistant Manager – Chris DiGiacomo 16
6.2 Subcontracting Companies – M.Melatti Construction & Team Trees 16
7.0 CONCLUSION 18
7.1 Contact Information 18
REFERENCES 19

LIST OF FIGURES

Figure 1: A View of Trees in the Vacant Lot ……..……..……2

Figure 2: An Aerial View of The Location of The Server Room……...……3

Figure 3: A View of The Main Components Within a Server Room …….……...5

Figure 4: A View of The Server …….6

Figure 5: A View of a Server Rack Containing Servers Inside ……..……6

Figure 6: A View of Properly Managed Patch Cables…….7

Figure 7: A View of The Power Supply …….……8

Figure 8: Gantt Chart Implementation Schedule…….……..12

LIST OF TABLES

Table 1 Project Budget……..15

1.0 INTRODUCTION

This report is a proposal which will highlight different aspects of a server room in an attempt to provide a solution to a vacant lot with the intent to be read by an executive.

1.1 Purpose

The purpose of this proposal is to implement a solution that would improve and occupy a vacant lot. The proposed solution is to build a server room that would allow for data to be processed and sent to aid in recent projects developed by the Société de transport de Montréal, also known as the STM. Consequently, not only will this be profitable for them, it will also allow for the improvement of the public transportation experience for their customers.

1.2 Background

The vacant lot is located at 1400 Ottawa St. in Montreal just 15 minutes south of Downtown making it the perfect location to set up a server room. This is primarily due to its close proximity to the STM headquarters, which is located in the heart of Downtown.

1.2.1 Major Problem

The location of the vacant lot is the perfect distance away from the headquarters of the STM, however, this also comes with its caveats. The location of the vacant lot is in an area where condos and other housing are being built. This increases the opportunity for loitering and decreases the security of the location. Simply put, the more residential the location of the vacant lot, the greater the chance for break-ins or other forms of vandalism to occur.

1.2.2 Secondary Problem

The second underlying issue lies within the state of the vacant lot. Currently the lot is overrun with trees and bushes. Although good for the environment, they must be removed and cleaned up as a building must take that space. It is important to note that not all trees must be removed, in fact keeping enough trees can help lower the ambient temperature of the building through providing shade to it. In the figure below, we get a more comprehensive view of the space.

Figure 1: A View of Trees in the Vacant Lot [1]

1.3 Scope

The building will be located in the center of the vacant lot, taking up approximately 150m by 175m. The building will contain a patch of grass around it as well as a concrete walkway leading up to and surrounding it. This patch of grass will span the perimeter of the building extending 15 meters outward to allow ample amount of room for trees to be planted. As the

vacant lot holds a size of 250m by 250m, this means we have more than enough free space which is ideal as it allows the building to be as far away from public housing as possible. In figure 2 below, we get an aerial view of the vacant lot and its surroundings.

Figure 2: An Aerial View of The Location of The Server Room [1]

2.0 SOLUTION

The following describes the solution of implementation for the server room in detail.

2.1 Approach

The approach of the solution can be subdivided into two sections: the overall definition of a server room and the summary of functions of its main components.

2.1.1 Overall Description

Within the world of technology, a server room is a room used to store, power and operate computer servers and their associated components [2]. The purpose of the implementation of a server room is because one is required for the implementation of an occupancy level counter in public transportation. This is the STMs latest project. For this to be possible, a server room is required to not only run the occupancy detection program but also to process the data coming in. An example of this would be the program detecting the number of people entering and exiting a specific bus, it sending that data to the server where it is processed and sent to your smart phone so you can plan your trips accordingly. In general, server rooms are usually black in color and are rectangular and modular in shape. The size of the room is generally 175m by 150m consisting of a lot of metal, plastic, and glass. The clear and smooth glass allows for the visibility of the hardware inside whereas the black metal casings hold the actual computer components. Figure 3 below illustrate a few of the major components found in a server room, however it is important to note that there are many more components that may be out of sight. The 4 major components are the server, the server rack, patch cables and the power supply.

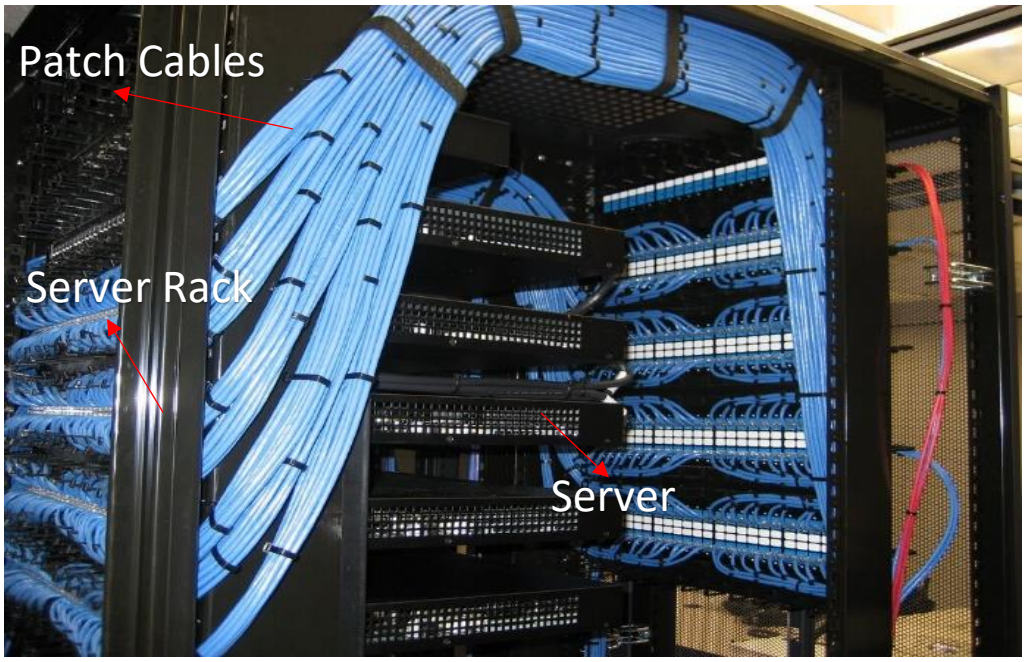

Figure 3: A View of The Main Components in a Server Room [3]

2.1.2 Functions of Major Components

The first major component and arguably the most important component of a server room is the server itself. A server is an enterprise-grade physical server used to host the applications and services of a single hosting client [4]. In laymen terms, it is almost like a giant computer that's able to store and process a large amount of data much faster than your regular computer. This is useful because for the occupancy counter to be effective, it must be able to receive loads of data captured by the sensors across the many transportation vehicles and convert that data into readable figures in the form of illustrations in the user app. As seen in figure 4, the server is usually quite compact and is held in place within a server rack.

Figure 4: A View of The Server [5]

The next major component is the server rack. A server rack is a structure that is designed specifically to house technical equipment including routers, switches, hubs, and of course, servers [6]. As the name suggests, it is there to hold server in place and provides a way to organize the servers in a vertical fashion for optimal space utilization which can be seen in the figure below. These server racks also are responsible for housing the patch cables.

Figure 5: A View of a Server Rack Containing Servers [7]

The next major component are the patch cables. These cables are “electronic cables used to connect electronic devices to enable the transmission of data between them” [8]. They can be quite short, ranging from 3 inches in length to more than 100 feet. These cables allow for the servers to communicate with each other and also can be used to provide the servers with internet connection. The patch cables are shown in the figure below.

Figure 6: A View of Properly Managed Patch Cables [9]

The final component is the power supply. The power supply is a hardware component of a computer that supplies all other components with power [10]. Furthermore, it has the crucial role of converting wall/line AC power to DC power which is important as AC power contains spikes and drops whereas DC power is constant [11]. This is important because if the hardware components within the server experience fluctuating voltages, the machine can fail as a whole and suffer permanent damage.

Figure 7: A View of The Power Supply [12]

2.2 Result

The implementation of the server room provides several advantages not only for the utilization of space in the vacant lot but also offers a solution for the STM and its projects. By constructing a building on the lot, removing any unwanted shrubbery must take place resulting in a cleaner space. Our plan to plant trees in a logical and coherent manner around the building will not only add a nice visual touch to the area but is also environmentally friendly. This implementation will also help improve the public transportation experience because as a result of this server room, an increased amount of transportation vehicles can have this occupancy counter implemented which in turn elevates the public transportation experience and customer satisfaction.

3.0 PLAN OF ACTION

The implementation of the server room can be done in the following 4 steps: planning and design, preparation and construction, assembly and implementation and clean up. The project will take place during the first week of March due to the difficulties of building during the wintertime. The project will end up taking roughly 76 days to complete.

3.1 Planning & Design

The planning and design phase constitutes the first phase of the project. This phase is comprised of the following 2 steps, the design and approval of the building layout and the purchasing of equipment. As the head manager, I will design the layout and consult with my assistant on areas of potential improvement and send the design out to be approved. During this time, I will also purchase all the necessary electrical components needed to build the server room. This will take a few days because all the components need to shipped out which is illustrated in the Gantt chart figure below.

3.2 Preparation & Construction

The second phase of the project and also the longest phase is the preparation and construction phase. This phase is comprised of the transportation of the construction supplies and equipment, mapping out the area, clearing out the work zone, constructing the building and setting up the fencing. Furthermore, all of the work during this phase is done by M. Melatti construction. We estimate that it will take approximately 15 days to get all the necessary equipment and machinery including trucks, cranes, cement, metal rods and other things required for the construction of the building. We will then map out the area in preparation for building and remove any trees that are in the way. During this time, they will dig out the area to create the

foundation of the building and then spend the next 27 days building the actual structing of the building including the interior and exterior. This phase will end with them setting around the perimeter of the vacant lot a fence to prevent intruders.

3.3 Assembly & Implementation

The third phase comes after the building has been fully constructed. This phase focuses on the assembly and implementation of the server room which includes setting up the internal wiring in the building, assembling the server racks, wiring all the servers appropriately and setting up the internet followed by installing the security cameras. This stage, although one of the shortest, is arguably the most important as it is in this step that the purpose of the building is realized. It is important that the wires are routed properly for not only the sake of the technician working there but also to increase airflow to the components and consequently decrease the temperature caused by any heat build-up.

3.4 Clean Up

The final step is the clean-up phase which will take 4 days to complete. This phase includes the planting of the trees and sod which will be done by the managing team as well as Team Trees, as well as the actual cleanup which everyone will take part in. This will include transporting all the machinery back and clearing up any waste left.

4.0 SCHEDULE

This section of the proposal outlines the Gantt chart as seen in figure 8 below. Whenever a block is colored in, that would signify that work is being done on that day and the different colors demonstrate the different stages of the plan. Whenever a colour appears horizontally on multiple blocks, it represents the task taking multiple days. The third phase, preparation and construction was the longest phase. This is because the Melatti Construction group had to build an entire building from the ground up which includes creating a foundation for the building and building the exterior and interior walls. Furthermore, they also had to remove and dig up any trees or bushes that were in the way of the building plan. On another note, the purchasing of the equipment only took a few days, however, the actual delivery of it took longer. In total, the project will take 76 days to complete which is a little less than 11 weeks or 2 and a half months. The project begins on the 2nd of March 2021 and runs until May 16th, 2021. This delay is to the hurdle of planning construction during the winter as the ground is frozen and the constant snow flow creates issues during the construction. Also included in the diagram under the 'assigned to' column are initials of the assigned worker. That is, 'CP' for Chris Pereira, 'TT' for Team Trees, 'MM' for M. Melatti Construction and 'ALL' for everyone.

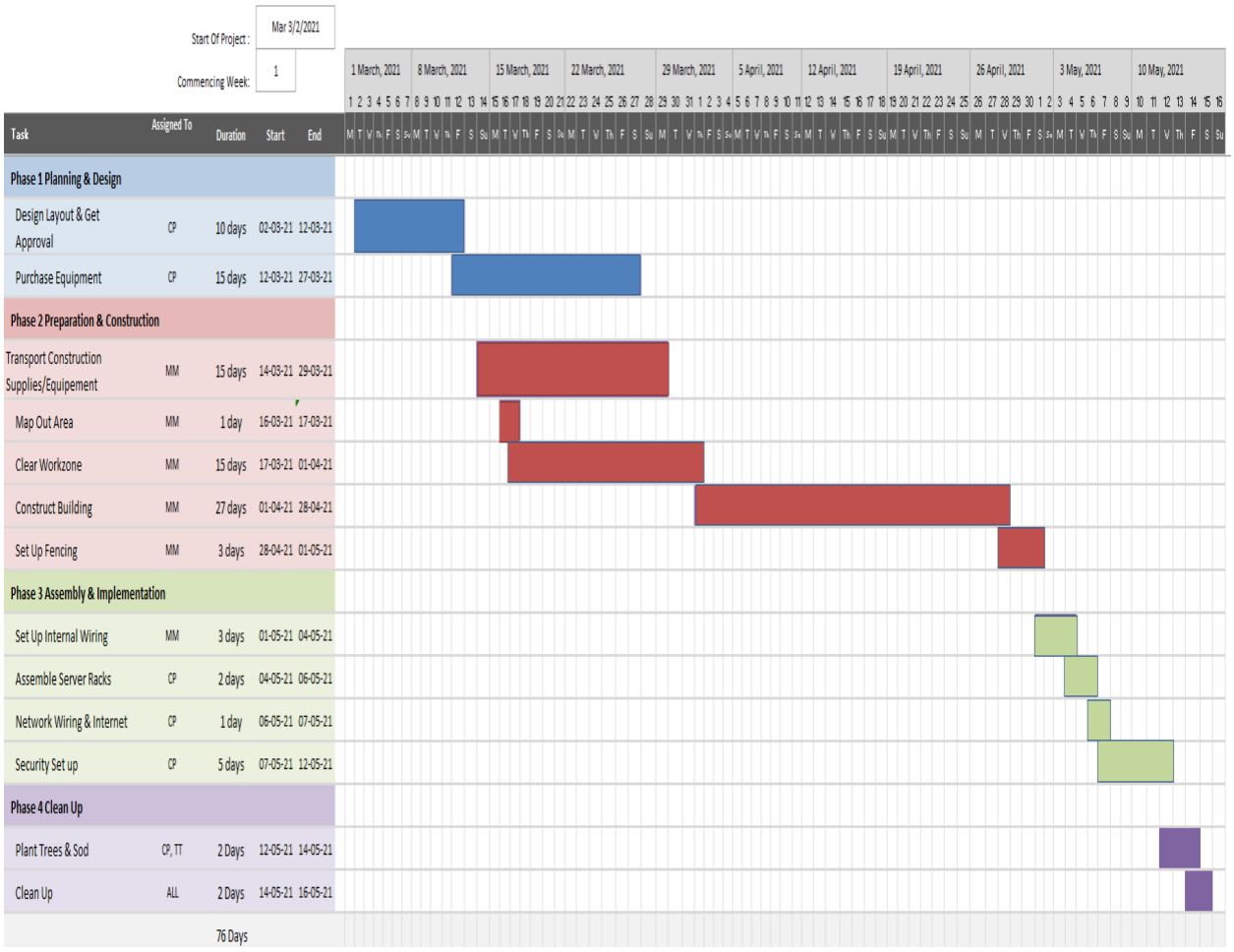

Figure 8: Gantt Chart Implementation Schedule

5.0 BUDGET

This section discusses the budget plan for the implementation of the server room. The allocated budget for this project was $250,000. The total expenditure covering salary costs, time and materials and equipment costs is $236,049, leaving $13,951 in reserve which can be donated to team trees to help fund their mission of saving the environment through the planting of trees. The budget was split into 3 main components: management, contractors and equipment and materials. In the figure below, we see specifically where the money was allocated along with the hourly charges. Note the "# of units" within the table can be considered the amount of time spent working or the amount of that specific item depending on the context. The "unit cost" refers to the cost of that item per unit. This can be viewed in more detail in the table 1 below.

5.1 Management

The management section consists of the hourly charge of the manager being myself as well as that of the assistant manager, Chris DiGiacomo. It also consists of the number of hours worked as well as the total cost. As the head manager, my hourly charge is $50/hour and the assistant makes $35/hour. As head manager, I plan on working upwards of 280 hours or a bit more than 11 days which will span the entire duration of the project. That totals to $14,000. As for my assistant, they will be working for 200 hours totalling to $7,000. This makes a net total of $21,000.

5.2 Contractors & Equipment

As for the contracting and equipment section, the task of construction will be sourced to M. Melatti construction. They will also be bringing the necessary machinery as well as importing

the construction materials. The hourly charge for hiring the M. Melatti construction group is $75/hour in which they will be working for a total of 500 hours. These 500 hours include removal of the trees, digging up the ground to construct the foundations of the building, putting up the walls, setting up the internal wiring and also setting up the exterior fence. This will cost $37,500 as well as an additional $75,000 for the machinery and $80,000 for the building materials. Our other contracting company is in charge of planting the trees and sod is Team Trees. Because they are a non-profit organization whose mission is to plant trees, this will not cost anything, making our total in this section $192,500. This also happens to be the most expensive section but also the most time put in.

5.3 Materials

Finally, the last part of the budget allocation was in the materials, that being the server racks, cabling, routers, power supply, air conditioning units and security cameras. The allocations of money towards the security cameras is due to the potential risks of not only intruders but also potential hazards that can occur inside the building. This adds $1,200 to the budget. The most expensive of the materials is the server rack amounting to $15,522 because of our need for 6 server racks. This makes the total cost of materials $36,549.

Title	# of Units	Unit Cost ($)	Total ($)
Management			
Head Manager Salary	280	50	$14,000
Assistant Manager Salary	200	35	$7,000
			$21,000
Contractors & Equipement			
M.Melatti Construction Salary	500	75	$37,500
Team Trees	30	N/A	$0
Machinery	1	75,000	$75,000
Construction materials	1	80,000	$80,000
			$192,500
Materials			
server w/racks	6	2587	$15,522
Cabling	1	3800	$3,800
routers	2	154	$308
Power Supply	6	2119.8	$12,719
Air conditioning	1	3000	$3,000
Security Camera	12	100	$1,200
			$36,549
		Total:	$236,049

Table 1: Project Budget

6.0 QUALIFICATIONS

This section of the proposal summarizes the key aspects and qualifications of the main players in the project, namely, the management team and the subcontracting company.

6.1 Head Manager – Chris Pereira

As the head manager, I have a combination of knowledge and experience to get the job done. I am a 1st year software engineering student currently enrolled in my 3rd semester. I have previously worked on building personal computers for individuals which I believe created transferable skills to this project. Furthermore, I have been nominated as team captain a handful of times on my hockey team demonstrating the leadership qualities I possess.

6.2 Assistant Manager – Chris DiGiacomo

As the assistant manager, Chris is a 2nd year computer science student at Concordia University. He has worked many customer service-related jobs including being a sales associate and even worked a city-official job. This gives him the right tools in being able to help in the designing and planning stages of the plan as well as use his computer knowledge to set up the severs.

6.3 Subcontracting Companies – M. Melatti Construction & Team Trees

For the subcontracting company, we decided to go with M. Melatti Construction group as well as Team Trees. The M. Melatti construction group has been in the construction industry for over 50+ years in commercial, industrial, office building construction and more. Them being a Montreal based company means a better understanding of the climate. The other contracting company is Team Trees. This non-profit organization is responsible for raising more than 22

million dollars in efforts to combat climate change. Their mission is to plant 1 tree for every dollar donated and we believe planting trees in the exterior of the building provides both a unique look as well as helping them reach their goal.

7.0 CONCLUSION

To conclude, the purpose of this proposal is to propose a solution to improve a vacant lot. The 175m by 150m server room is the perfect solution as it not only cleans up the vacant lot, but it also provides a solution for an upcoming STM project which, in turn, improves the satisfaction of many commuters. The main components of the server room are the server, the server rack, patch cables and the power supply. The project will operate between the 2nd of March, 2021 till the 16th of May, 2021, lasting a little less than 11 weeks and will include phases for planning and designing, preparation and construction, assembly and implementation and finally the cleanup. Furthermore, the target expenditure will remain under the proposed budget at $236,049. In conjunction, the operation will be led by myself and my assistant; Chris DiGiacomo in cooperation with M. Melatti Construction and Team Trees.

7.1 Contact Information

Thank you, Mr. Grenier for taking the time to read the proposal. We hope to hear from you soon within the coming weeks on your decision to follow through with the plan. If you have any additional questions or concerns regarding the proposal, feel free to contact us by phone at 514-979-4308 or by email at c_reira@live.concordia.ca.

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8.0 REFERENCES

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