

UNIVERSIDAD PARA LA COOPERACIÓN INTERNACIONAL
(UCI)

PROJECT MANAGEMENT PLAN FOR THE NEW VISITOR CENTER BUILDING
OF THE ORGANIZATION FOR TROPICAL STUDIES (OTS) IN COSTA RICA

GLORIANA OUELLETTE CARRILLO

FINAL GRADUATION PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR THE
MASTER IN PROJECT MANAGEMENT (MPM) DEGREE

SAN JOSE, COSTA RICA

SEPTEMBER 2020

UNIVERSIDAD PARA LA COOPERACIÓN INTERNACIONAL
(UCI)

This Final Graduation Project was approved by the University as
Partial fulfillment of the requirements to opt for the
Master in Project Management (MPM) Degree

Eduardo Lima
TUTOR

Carlos Brenes Mena
Full name must be written
REVIEWER No.1

Xavier Salas Ceciliano
Full name must be written
REVIEWER No.2

Gloriana Ouellette Carrillo
STUDENT

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ABBREVIATIONS AND ACRONYMS

GLOSSARY

- APC: Administración de Proyectos de Construcción for its initials in Spanish; it means Construction Project Management Software.
- CFIA: Colegio Federado de Ingenieros y de Arquitectos for its initials in Spanish; it means Federated College of Engineers and Architects.
- INVU: Instituto Nacional de Vivienda y Urbanismo for its initials in Spanish; it means National Institute of Housing and Urban Development.
- NGO: a nonprofit organization that operates independently of any government, typically one whose purpose is to address a social or political issue.
- OTS: Organization for Tropical Studies
- PM: Project manager
- WBS: Work Breakdown Structure

EXECUTIVE SUMMARY (ABSTRACT)

The construction of tourist centers in Costa Rica is very common, since a large percentage of the country's income is due to tourism. In this case, the visitor center of the Organization for Tropical Studies will have several functions once it is built as planned, located in Flaminia neighbourhood, Horquetas de Sarapiquí, in OTS's La Selva Property, 100 meters on the ballast road from the main entrance. It is important for there to be an area where you can hold different types of meetings and have an exhibition of the different plants that are studied in the area.

The need to improve the facilities was made more than four years ago when a public tender was held to allow several national companies to participate in the planning, design, and construction of the new facilities of the Organization for Tropical Studies (OTS). The resources to finance the project come from other organizations around the world that are interested in a place in Central America where tropical plants can be studied and which infrastructure is adequate to be able to use them.

The public tender consisted of finding companies that have experience in the processing of construction permits and the design of architectural, structural, electrical, and mechanical plans. In addition, they request construction experience, where a work schedule is carried out due to detailed budgets and documentation to be able to control the construction, that there are no delays and, above all, that they remain within the amounts established by the OTS.

The final graduation project general objective is the creation of a project management plan for the construction of the new reception building of the Organization for Tropical Studies (OTS) in Costa Rica. The specific objectives are the following. Objective 1 is to create a project charter to formally authorize the project and provide the project manager with the authority to apply organizational resources to the project and to produce the project management plan. Objective 2 is to develop a scope management plan to ensure that it includes all the work required to successfully complete the project. Objective 3 is to create a time management plan to ensure that it includes all the work required to successfully complete the project within the time constraints. Objective 4 is to create a cost management plan to define the processes for developing and managing the project budget to ensure the project is completed within the budget constraints. Objective 5 is to develop a quality management plan to identify the quality requirements for the project in order to ensure results meet the expectations for approval within the time, cost, and scope constraints. Objective 6 was to create a human resource management plan to ensure that the human resources are identified and managed effectively to complete the project within time, cost, and scope constraints. Objective 7 is to develop a communication management plan to ensure the timely and effective communication of the project status and other key information.

Objective 8 is to create a risk management plan to identify and examine risks to the successful completion of the project and develop plans to minimize the likelihood of the risks. Objective 9 is to develop a procurement management plan to be used to obtain products, services, or results required by the project. Objective 10 is to develop a stakeholder management plan to identify and support all the project stakeholders to ensure effective stakeholder engagement.

The methodology used for the research was analytical or explanatory. The main sources used to select the information were the Sixth Edition of the Project Management Body of Knowledge (PMBOK® Guide), visits to the project site, and interviews with the professionals in charge of carrying out the project as well as with members of the Organization for Tropical Studies. The information was analyzed to create each subcomponent of the subsidiary plans used to develop the project management plan for a visitor center.

The project management plan, developed using the 6th Edition of the PMBOK® Guide, provided a new methodology for the project team to develop a project management plan for a development as important as the visitor center to progress the way the company would manage the project. It is recommended that the project team considers the use of the planning process and the documents developed during the creation of the project management plan for the construction of the visitor center, as the basis for implementing a methodology for similar projects in the future.

INTRODUCTION

1.1 Background

The main problem of the reception are the termites, the loss of heat from the rooms, and the humidity of the area inside and outside the building.

As specific conditions to carry out the design, the windows must have approximately 70° of inclination, since the birds of the area can die when hitting with their reflection. The light walls must maintain the temperature of the air conditioning inside the building, and on the outside, it must insulate the humidity so the walls that are recommended to be placed, by the civil engineer in charge of the project, are lightweight walls of Securock with Typar (breathable non-woven polypropylene waterproof membrane) and a thermal insulator inside the sheets.

The managers of the organization advised to make a design that cannot be placed downpipes, canoes, or anything of the rain system but to take into account that the rain system should not erode the land once it rains (90% of the time in the area) with the fall of water from the roof, so it is recommended to build a ground gutter so the rainwater travels to a log box and to take the water to the new rain system of rainwater. Moreover, it is not possible to place a metal structure because the relative humidity of the area is 95% - 100%, so the water can drop into the surface due to the condensation that is constantly generated.

1.2 Statement of the Problem

In the organization, there are no construction guidelines and minor elements of project management, specifically management tools, so a project management approach will be generated to be able to deliver a product. Each element of the project management plan will be created, along with all the tools, techniques, and concepts used to justify each management decision selected for the application.

The problem that the OTS has is that the construction areas have more than 30 years of existence. With this, for example, in the reception area, there are several problems, such as the large number of termites inside the building because they generate rotten wood and health problems for the workers of the building. Also, as it is mentioned in the background, one of the main problems is the loss of heat from the building, which indicates that the existing structure is not designed to maintain the air conditioner that they placed at the lobby because the humidity that remains at 95% -100% in the area and temperatures can reach up to 35°C depending on the time of year, so it is necessary to cool the area; the air conditioning spends a lot of energy since. The design does not allow the cold to remain inside of the building, and the moisture penetrates the walls causing them to damage because water drops into the surface.

Being the building an NGO and an organization that takes care and protects the environment, all the more reason for its buildings to be sustainable and be a green construction. The existent building does not meet any parameter for green construction condition.

1.3 Purpose

The main motivation that led to the work of the project management plan for the building of the new visitor center of the Organization of Tropical Studies (OTS) in Costa Rica is the need to change the construction for a new one, which can host more tourists during each visit, where there is also not much energy consumption and is an environmentally friendly area. The project is a real project that is being carried out due to the needs of the place, also in order to build something that is more in harmony with the environment and to be able to add technology in order to carry out better management.

It should be noted that the current situation of the area is not the optimal condition to receive the number of tourists who pass through it daily, although there is the entry of tourists to the area; this organization is dedicated to the research of plants and animals of the tropics.

Following the project management plan created as a result of this research project, the improved level of project success is expected.

1.4 General Objective

The creation of a project management plan for the new visitor center building of the Organization for Tropical Studies (OTS) in Costa Rica.

1.5 Specific Objectives

1. To create a project charter to formally authorize the project and provide the project manager with the authority to apply organizational resources to the project and to produce the project management plan
2. To develop a scope management plan to ensure that it includes all the work required to successfully complete the project
3. To create a time management plan to ensure that it includes all the work required to successfully complete the project within the time constraints
4. To create a cost management plan to define the processes for developing and managing the project budget that ensures the project is completed within the budget constraints
5. To develop a quality management plan to identify the quality requirements for the project in order to ensure results meet the expectations for approval within the time, cost, and scope constraints
6. To create a human resource management plan to ensure that the human resources are identified and managed effectively to complete the project within time, cost, and scope constraints

7. To develop a communication management plan to ensure the timely and effective communication of the project status and other key information
8. To create a risk management plan to identify and examine risks to the successful completion of the project and develop plans to minimize the likelihood of the risks
9. To develop a procurement management plan to be used to obtain products, services, or results required by the project
10. To develop a stakeholder management plan to identify and support all the project stakeholders to ensure effective stakeholder engagement

THEORETICAL FRAMEWORK

2.1 Company/Enterprise Framework

2.1.1 Company/Enterprise Background

The organization is dedicated to maintaining tropical ecosystems by promoting discovery and scientific knowledge, enriching the human perception of nature, and improving global policy actions in the tropics.

Each year, this organization receives specialists from around the world, dedicated to tropical ecology and specialized in advanced topics, such as plant systematic, tropical medicine and global health, conservation genetics, protected area management, agro ecology, global change, and methods.

The research stations give unique support to the latest generation research and facilities, such as herbariums, biological inventories, and meteorological records, as well as technology, such as high-speed internet, molecular and chemical laboratories, integrated sensor network, towers of canopy, and global information system (GIS) laboratories.

Laitano Engineering and Electromechanical Construction is a company in the construction sector with 12 years of experience, focused on providing electrical and mechanical engineering solutions tailored to our clients throughout the country through a reliable and professional service that integrates the design of electromechanical plans, maintenance, construction, and consulting.

The company aims to create reliable solutions to respond to the diversity of market needs. For this reason, we design projects at competitive prices and following all national and international quality and safety standards.

The company is guided by innovation, commitment, loyalty, and trust. Thanks to this, we guarantee the quality of our work, carried out by authorized professionals and highly trained personnel, with excellent response times.

For the project to be developed with the OTS, the company had to expand its working areas to a civil engineering and architecture department to achieve the requested objective.

2.1.2 Mission and Vision Statements

2.1.2.1 Mission Statement

The mission of Organization of Tropical Studies is to provide leadership in education, research, and responsible use of natural resources in the tropics.

2.1.2.2 Vision Statement

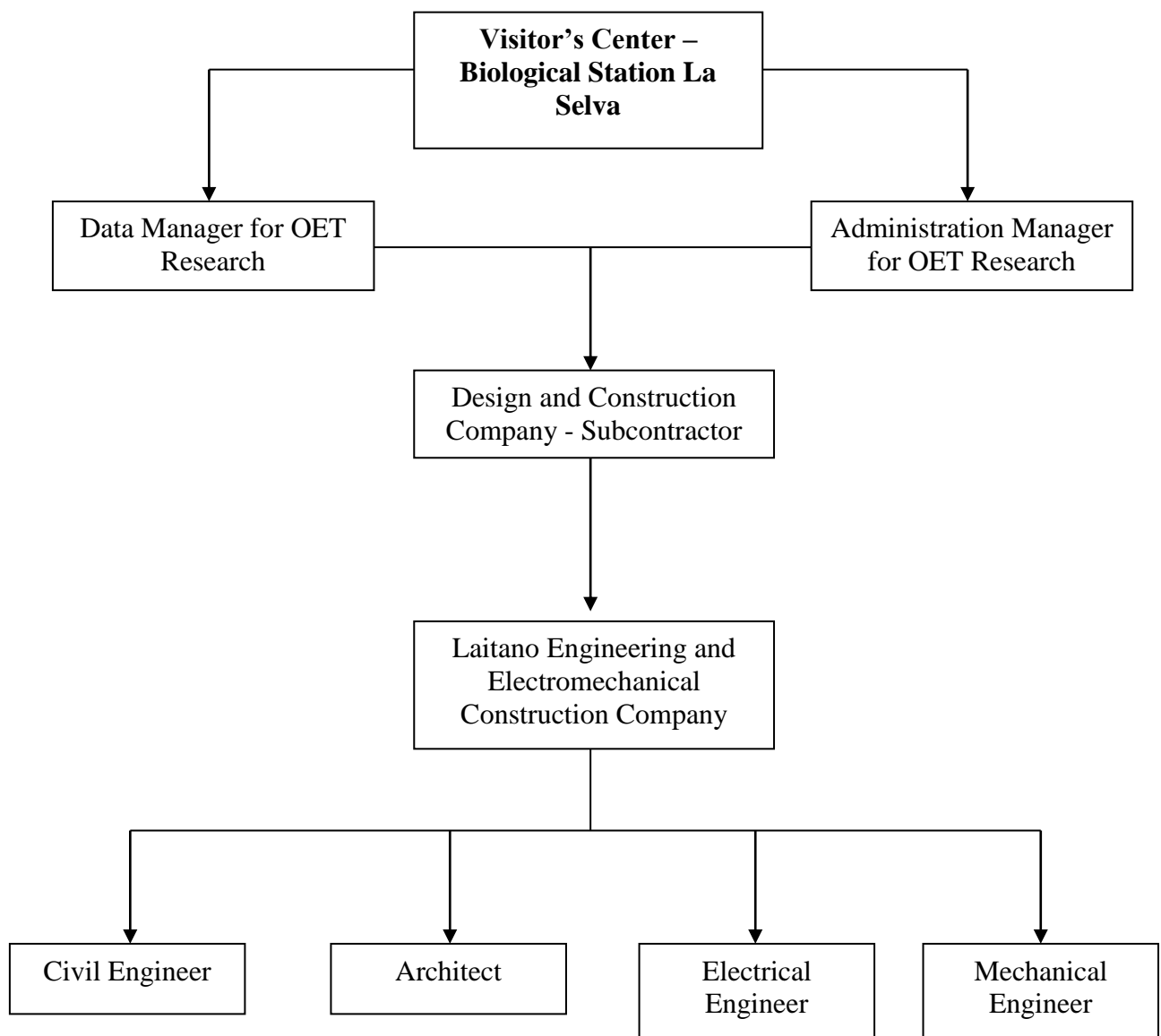
The purpose of OTS is to sustain our tropical ecosystems by driving scientific discovery and knowledge, enriching human perception of nature, and enhancing worldwide policy actions in the tropics.

2.1.3 Organizational Structure

In order to carry out the construction of the visitor center, the following organizational chart will be required to carry out the construction of the building. The following chart presents the form of organization and communication that is maintained with the OTS personnel and the construction company.

The visitor center requires the following organizational chart for its construction:

Chart 1 Organization Chart (Own Elaboration)



2.1.4 Products Offered

Some of the services offered by the Organization are tropical ecosystem education programs.

OTS field-based education programs inspire and prepare the next generation of change agents, critical thinkers, scientists, and practitioners on their paths to discovery and global leadership. As an OTS student, you will be immersed in tropical ecosystem education, explore biodiversity firsthand, connect with diverse communities and cultures, and experience the wonder of the tropics. OTS will equip you to work effectively in today's interconnected world and become a solution-maker for the future.

2.2 Project Management Concepts

2.2.1 Project

A project can be defined as "a temporary effort made to create a unique product, service or result" (Project Management Institute, 2016, p. 8). This is further emphasized because no two buildings are exactly alike, even if they were made with the same design elements, products, and people.

In order to build, projects are used, and many projects are completed using project management, construction management, or a combination of both. Project management and construction management are similar; however, unlike project management, construction management is more specific to building a tangible structure.

2.2.2 Project Management

Project management, then, is the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements. Project managers

must not only strive to meet specific scope, time, cost, and quality requirements of projects; they must also facilitate the entire process to meet the needs and expectations of the people involved in or affected by project activities.

It has always been practiced informally, but it began to emerge as a distinct profession in the mid-20th century. PMI's *A Guide to the Project Management According to Body of Knowledge (PMBOK® Guide) – Sixth Edition (2017)* identified its recurring elements:

Project management processes fall into five groups:

- Initiating Process Group:

This process is where all projects begin. The value of the project is determined as well as its feasibility to define a new project or a new phase of an existing project by obtaining authorization to start the project or phase.

- Planning Process Group:

This process is where the project is approved; then, the next step is to assemble a project team and to start planning how to manage the project so it can achieve its goals within budget and on time. The project plan will include what resources are needed, financing, and materials.

- Executing Process Group:

After the planning process is over, it is time to start the project. Follow the plan you created, assign the tasks to team members, and manage and monitor their progress with project management tools. Complete the work defined in the project management plan to satisfy the project requirements.

- Monitoring and Controlling Process Group:

This process is to ensure that the project plan is being updated; all aspects of the project must be monitored and adjusted as needed.

- Closing Process Group:

This last process of the project isn't over until the project goals and objectives have been met. To close the project, it must be certain that the project deliverables have been completed as planned, all outstanding contracts and administrative matters must be closed out, and the paperwork must be archived and disseminated to proper parties.

2.2.3 Project Life Cycle

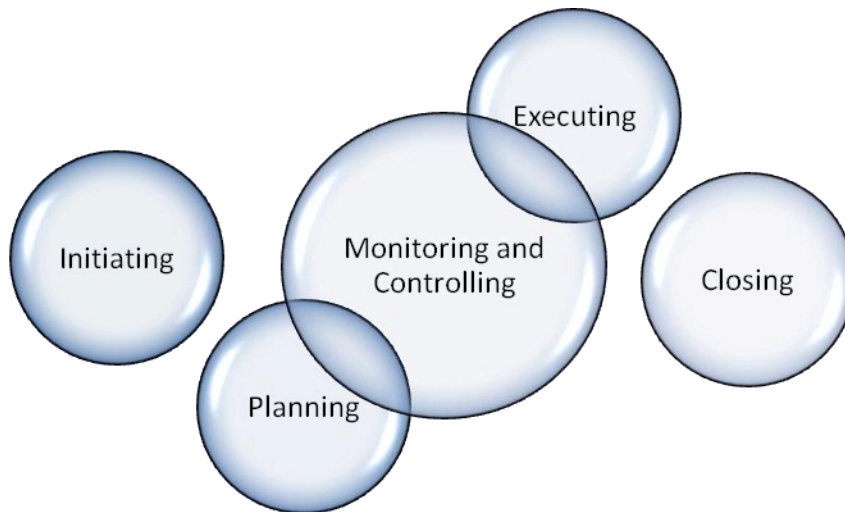
Life cycle project management is an approach to the management of projects in which the following objective functions are employed as criteria for decision-making throughout the project's life:

- Financial objectives, such as equity, internal rate of return, and cost/worth ratio
- Customer satisfaction objectives, such as functionality, operability, aesthetics, quality, and user satisfaction
- Due diligence objectives, which concern reducing exposure to risks and liabilities, including compliance with statutory requirements and so on

These criteria are referred to as life-cycle objective functions. Provided an appropriate system and managerial infrastructure can be established for the project, the life cycle project management model can respond to the requirements stated earlier. The life cycle project management approach is opportunistic and driven by risk/rewards throughout the project's life.

In the following chart, the project life cycle function is shown, where it is indicated that the project cannot be closed until all the deliverables in the planning and executing phase are done.

Figure 1 Project Life Cycle (Own Elaboration)



2.2.4 Project Management Processes

Only the processes involved in initiating and planning a project will be used to develop the project management plan for the building of a convention center. The project management plan will be a compilation of subsidiary documents created as a result of each initiating and planning process activity.

2.2.5 Project Management Knowledge Areas

In the *Body of Knowledge (PMBOK® Guide) – Sixth Edition (2017)* the process groups are the chronological phases that the project goes through, and the knowledge areas occur throughout any time during the process groups. The process groups are horizontal, and the knowledge areas are vertical. They are the core technical subject matter of the project management profession, and they bring the project to life.

These are the 10 project management knowledge areas, according to The 10 project management knowledge areas - (PMBOK). (2019, November 27):

2.2.5.1 Integration Management

The project integration management holds the project together, which includes such fundamental plans as developing a project charter that is created during the initiation phase. This is the document that sets up the project and assigns the project manager. The project integration area also includes the directing and managing of the project work, which is the production of its deliverables. This process is monitored, analyzed, and reported on to identify and control any changes or problems that might occur.

2.2.5.2 Scope Management

Scope relates to the work of the project. So that includes plan scope management, which is part of the project management plan. It is also when a detailed requirement for the final product or service is collected. Validate scope during the project, which means making sure that the deliverables are being approved regularly by the sponsor or stakeholder. This occurs during the monitoring and controlling process groups, and is about accepting the deliverables, not the specs laid out during planning.

2.2.5.3 Time Management

Project time management is the time consuming in a project. The project is divided into tasks, which are scheduled with start dates and deadlines as well as budgets for each task. Things are constantly changing over the phases of any project, which means revising these things often. This involves plan schedule management, which involves creating a schedule for the project and determining who is responsible for what. That means defining activities, which is not the same as making a WBS but similar, so you create a task list that touches on every aspect of the project.

2.2.5.4 Cost Management

This area involves the project budget, which means having good estimating tools to make sure that the funds cover the extent of the project and are being monitored regularly to keep stakeholders or sponsors informed. Plan cost management will determine the method to establish the budget, which includes how and if it will

change and what procedures will be used to control it. Each task will have to be estimated for cost, which means including all resources such as labor, materials, equipment, and anything else needed to complete the task.

2.2.5.5 Quality Management

A project can come in on time and within budget, but if the quality is not up to the standard set, then the project is a failure. Plan quality management is part of the overall project management plan, though it can be a standalone document if it contains the quality specs for the product or service. The process needs to include quality assurance, which is just a way to make sure that quality standards are being met. Therefore, to control quality, the deliverables must be inspected to make sure that those standards outlined in the quality management plan are being met.

2.2.5.6 Human Resources Management

The project team is your most important resource, so it is crucial to assemble the best team and make sure they are happy. But you also need to track their performance to ensure that the project is progressing as planned. A human resource management plan will identify their roles and their requirements for those positions as well as how they fit in the overall project structure. After you've determined the job descriptions, it's time to fill those positions and acquire a project team. This can be done in-house by drawing from other departments in the organization, by getting new hires, or by a combination of both. The team needs development, possibly training and other things that will make them viable for the project.

2.2.5.7 Communication Management

Communications inform the team and stakeholders; therefore, the need to plan communication management is a critical step in any project. It is at this point that the dissemination of communication is determined, including how it's done and with what frequency. Target who needs what and when. Also, note how communication will occur when issues arise in the project, such as changes. Manage the communications when the project is executed to make sure it runs as planned.

This will also involve controlling communications by reviewing their effectiveness regularly and adjusting as needed.

2.2.5.8 Risk Management

Risk management plans will identify how the risks will be itemized, categorized, and prioritized. This involves identifying risks that might occur during the execution of the project by making a risk register. Perform qualitative risk analysis after the biggest risks have been identified and classified by likelihood and impact. Then, prioritize them. Then, perform a quantitative analysis according to their impact on the project, such as its budget, schedule, etc. Now, you'll need to plan risk responses. If those risks, in fact, become issues, then a response needs to have been written in advance, with an owner who can make sure the risk is properly identified and handled.

2.2.5.9 Procurement Management

Planning procurement management starts by identifying the outside needs of the project and how those contractors will be involved. Now, conduct those procurements by hiring the contractors, which includes a statement of work, terms of reference, request for proposals, and choosing a vendor. You will want to control the procurement process by managing and monitoring and then closing the contracts once the work has been done to everyone's satisfaction.

2.2.5.10 Stakeholder Management

To start, one must identify the stakeholders. It's not always easy, but it is a crucial part of starting any project, so find out who they are and what concerns they have. Now, plan stakeholder management, which means listing each stakeholder and prioritizing what their concerns are and how they might impact the project. This will lead to managing stakeholders' expectations to make sure their needs are met and that you're in communication with them.

In the chart below, the project management process group and knowledge area mapping are shown.

Chart 2 Project Management Process Groups and Knowledge Area Mapping

Table 1-4 (P. 25) Project Management Institute. (2017).

Knowledge Areas	Project Management Process Groups				
	Initiating Process Group	Planning Process Group	Executing Process Group	Monitoring and Controlling Process Group	Closing Process Group
4. Project Integration Management	4.1 Develop Project Charter	4.2 Develop Project Management Plan	4.3 Direct and Manage Project Work 4.4 Manage Project Knowledge	4.5 Monitor and Control Project Work 4.6 Perform Integrated Change Control	4.7 Close Project or Phase
5. Project Scope Management		5.1 Plan Scope Management 5.2 Collect Requirements 5.3 Define Scope 5.4 Create WBS		5.5 Validate Scope 5.6 Control Scope	
6. Project Schedule Management		6.1 Plan Schedule Management 6.2 Define Activities 6.3 Sequence Activities 6.4 Estimate Activity Durations 6.5 Develop Schedule		6.6 Control Schedule	
7. Project Cost Management		7.1 Plan Cost Management 7.2 Estimate Costs 7.3 Determine Budget		7.4 Control Costs	
8. Project Quality Management		8.1 Plan Quality Management	8.2 Manage Quality	8.3 Control Quality	
9. Project Resource Management		9.1 Plan Resource Management 9.2 Estimate Activity Resources	9.3 Acquire Resources 9.4 Develop Team 9.5 Manage Team	9.6 Control Resources	
10. Project Communications Management		10.1 Plan Communications Management	10.2 Manage Communications	10.3 Monitor Communications	
11. Project Risk Management		11.1 Plan Risk Management 11.2 Identify Risks 11.3 Perform Qualitative Risk Analysis 11.4 Perform Quantitative Risk Analysis 11.5 Plan Risk Responses	11.6 Implement Risk Responses	11.7 Monitor Risks	
12. Project Procurement Management		12.1 Plan Procurement Management	12.2 Conduct Procurements	12.3 Control Procurements	
13. Project Stakeholder Management	13.1 Identify Stakeholders	13.2 Plan Stakeholder Engagement	13.3 Manage Stakeholder Engagement	13.4 Monitor Stakeholder Engagement	

METHODOLOGICAL FRAMEWORK

3.1 Information Sources

There are several types of information sources; for example, in bookstores, we can find three types of information sources: primary, secondary, and tertiary.

3.1.1 Primary Sources

According to *Primary vs. secondary sources | Explained with easy examples.* (2019, September 23), primary sources of information are original materials and first handed evidence. They present original thinking, report a discovery, or share new information. The definition of a primary source may vary by discipline or context.

For this project, interviews will be conducted with several people involved in the project, such as the professionals like engineers, architects, and the administration of the organization. In addition, photographs and Internet communications on email will be part of the information this document will have.

3.1.2 Secondary Sources

According to *Primary vs. secondary sources | Explained with easy examples.* (2019, September 23), secondary sources of information provide second-hand information and commentary from other researchers; in general, they are accounts written after the fact with the benefit of hindsight. They are interpretations and evaluations of primary sources.

For this project, all documentation found in this document will be analyzed, with emphasis on information related to the areas of green construction. The use of the information found on the website will also be part of the document.

Chart 3 Information Sources (Own Elaboration)

Objectives		Information sources	
		Primary	Secondary
General objective	Creation of a project management plan for the construction of the new Reception Building of the Organization for Tropical Studies (OTS) in Costa Rica.	Meeting minutes and a personal interview with the lead project manager (expert)	The PMBOK® Guide, the PMI database, and the Internet
1	To create a project charter to formally authorize the project and provide the project manager with the authority to apply organizational resources to the project and to produce the project management plan.	A personal interview with the lead project manager (expert)	The PMBOK® Guide, the PMI database, and the Internet
2	To develop a scope management plan to ensure that it includes all the work requires to successfully completing to the project.	A personal interview with the lead project manager (expert)	The PMBOK® Guide, the PMI database, and the Internet
3	To create a time management plan to ensure that it includes all the work requires to successfully completing the project is completed within the time constraints.	A personal interview with the lead project manager (expert)	The PMBOK® Guide, the PMI database, and the Internet
4	To create a cost management plan to define the processes for developing and managing the project budget to ensure the project is completed within the budget constraints.	A personal interview with the lead project manager (expert)	The PMBOK® Guide, the PMI database, and the Internet
5	To develop a quality management plan to identify the quality requirements for the project in order to ensure results meet expectations for approval within the time, cost and scope constraints.	A personal interview with the lead project manager (expert)	The PMBOK® Guide, the PMI database, and the Internet
6	To create a human resource management plan to ensure that the human resources are identified and managed effectively to complete the project within time, cost and scope constraints.	A personal interview with the lead project manager (expert)	The PMBOK® Guide, the PMI database, and the Internet
7	To develop a communication management plan to ensure the timely and effective communication of the project status and other key information.	A personal interview with the lead project manager (expert)	The PMBOK® Guide, the PMI database, and the Internet

8	To create a risk management plan to identify and examine risks to the successful completion of the project and develops plans to minimize the likelihood of the risks.	A personal interview with the lead project manager (expert)	The PMBOK® Guide, the PMI database, and the internet
9	To develop a procurement management plan to be used to obtain products, services or results required by the project.	A personal interview with the lead project manager (expert)	The PMBOK® Guide, the PMI database, and the Internet
10	To develop a stakeholder management plan to identify and support all the project stakeholders to ensure effective stakeholder engagement.	A personal interview with the lead project manager (expert)	The PMBOK® Guide, the PMI database, and the Internet

3.2 Research Methods

According to *Cambridge international dictionary of English. (1995)*, research is defined as the detailed study of a subject, especially in order to discover (new) information or reach a (new) understanding. The same source defines method as a particular way of doing something. As a result, it is accomplished that a research method is a particular process to establish facts and reach new conclusions.

The Internet is a very powerful worldwide instrument, which serves as a good source for research work and learning. It generates current information, fact-finding, and is the most outstanding invention in the area of communication in the history of human race.

A visit to the existing visitor center at the OTS has also been one of the main research methods to carry out the project. Each of these visits has been used to understand the purpose of the new building change.

3.2.1 Analytic-Synthetic Method

According to *Types of research - Research methodology. (n.d.)*, the analytical research method, sometimes referred to as the explanatory method, “uses facts or information already available and analyzes it to make a critical evaluation”. With this research method, information from multiple sources will be examined and used to develop the deliverables.

In relation to Analytical method - Tool/Concept/Definition. (n.d.), analytical research attempts to establish why it is that way or how it came to be. The use of the analytical method is critical to solve the sustainability problem because it appears that current processes are inadequate. They are intuitive, simple, and based on how activists’ approach everyday problems.

Chart 4 Research Methods (Own Elaboration)

Objectives		Research methods	
General objective	Creation of a project management plan for the construction of the new Reception Building of the Organization for Tropical Studies (OTS) in Costa Rica.	Analytic-Synthetic	The analytical method will be employed by using facts or information from the sources identified in Chart 1, objective 1 above, to drive decision making when creating the project charter.
1	To create a project charter to formally authorize the project and provide the project manager with the authority to apply organizational resources to the project and to produce the project management plan.	Analytic-Synthetic	The analytical method will be employed by using facts or information from the sources identified in Chart 1, objective 1 above, to drive the decision making when creating the project charter.
2	To develop a scope management plan to ensure that it includes all the work requires to successfully completing to the project.	Analytic-Synthetic	The analytical method will be employed by using facts or information from the sources identified in Chart 1, objective 1 above, to drive the decision making when creating the project charter.

3	To create a time management plan to ensure that it includes all the work requires to successfully completing the project is completed within the time constraints.	Experimental	The experimental method will be employed by using facts from other similar projects to create a time management plan or information from the sources identified in Chart 1, objective 1 above, to drive the decision making when creating the project charter.
4	To create a cost management plan to define the processes for developing and managing the project budget to ensure the project is completed within the budget constraints.	Experimental	The experimental method will be employed by using facts from other similar projects to create a cost management plan or information from the sources identified in Chart 1, objective 1 above, to drive the decision making when creating the project charter.
5	To develop a quality management plan to identify the quality requirements for the project in order to ensure results meet expectations for approval within the time, cost and scope constraints.	Analytic-Synthetic	The analytical method will be employed by using facts or information from the sources identified in Chart 1, objective 1 above, to drive the decision making when creating the project charter.
6	To create a human resource management plan to ensure that the human resources are identified and managed effectively to complete the project within time, cost and scope constraints.	Analytic-Synthetic	The analytical method will be employed by using facts or information from the sources identified in Chart 1, objective 1 above, to drive the decision making when creating the project charter.
7	To develop a communication management plan to ensure the timely and effective communication of the project status and other key information.	Analytic-Synthetic	The analytical method will be employed by using facts or information from the sources identified in Chart 1, objective 1 above, to drive the decision making when creating the project charter.
8	To create a risk management plan to identify and examine risks to the successful completion of the project and develops plans to minimize the likelihood of the risks.	Analytic-Synthetic	The analytical method will be employed by using facts or information from the sources identified in Chart 1, objective 1 above, to drive the decision making when creating the project charter.

9	To develop a procurement management plan to be used to obtain products, services or results required by the project.	Analytic-Synthetic	The analytical method will be employed by using facts or information from the sources identified in Chart 1, objective 1 above, to drive the decision making when creating the project charter.
10	To develop a stakeholder management plan to identify and support all the project stakeholders to ensure effective stakeholder engagement.	Analytic-Synthetic	The analytical method will be employed by using facts or information from the sources identified in Chart 1, objective 1 above, to drive the decision making when creating the project charter.

3.3 Tools

According to the *Body of Knowledge (PMBOK® Guide) – Sixth Edition (2017)*, a tool is defined as “something tangible, such as a template or software program, used in performing an activity to produce a product or result” (Project Management Institute, 2017, p. 7255).

The tools that will be used in the final graduation project are identified and explained below.

- Acquisition - Obtaining human and material resources necessary to perform project activities. Acquisition implies a cost of resources, and it is not necessarily financial.
- Alternative analysis - A technique used to evaluate identified options in order to select which options or approaches to use to execute and perform the work of the project

- Analogous estimating - A technique for estimating the duration or cost of an activity or a project using historical data from a similar activity or project
- Analytical techniques - Various techniques used to evaluate, analyze, or forecast potential outcomes based on possible variations of project or environmental variables and their relationships with other variables
- Approved change requests review - A review of the change requests to verify that these were implemented as approved
- Bottom-Up estimating - A method of estimating project duration or cost by aggregating the estimates of the lower-level components of the work breakdown structure (WBS)
- Checklist analysis - A technique for systematically reviewing materials using a list for accuracy and completeness
- Claims administration - The process of processing, adjudicating, and communicating contract claims
- Communication models - A description, analogy, or schematic used to represent how the communication process will be performed for the project
- Conflict management - Handling, controlling, and guiding a conflictual situation to achieve a resolution
- Cost benefit analysis - A financial analysis tool used to determine the benefits provided by a project against its costs

- Cost of quality. (COO) - A method of determining the costs incurred to ensure quality
- Critical path method (CPM) - A method used to estimate the minimum project duration and determine the amount of scheduling flexibility on the logical network paths within the schedule model
- Decomposition - A technique used for dividing and subdividing the project scope and project deliverables into smaller, more manageable parts
- Earned value management - A methodology that combines scope, schedule, and resource measurements to assess project performance and progress
- Expert judgment - Judgment provided based upon expertise in an application area, knowledge area, discipline, industry, etc., as appropriate for the activity being performed
- Focus groups - An elicitation technique that brings together prequalified stakeholders and subject matter experts to learn about their expectations and attitudes about a proposed product, service, or result
- Ground rules - Expectations regarding acceptable behaviour by project team members
- Information management systems - Facilities, processes, and procedures used to collect, store, and distribute information between producers and consumers of information in physical or electronic format
- Inspection - Examining or measuring to verify whether an activity, component, product, result, or service conforms to specified requirements

- Parametric estimating - An estimating technique in which an algorithm is used to calculate cost or duration based on historical data and project parameters
- Payment systems - The system used to provide and track a supplier's invoices and payments for services and products
- Quality audits - A quality audit is a structured, independent process to determine if project activities comply with organizational and project policies, processes, and procedures.
- Requirement documentation - A description of how individual requirements meet the business need for the project
- Risk categorization - Organization by sources of risk (e.g., using the RBS), the area of the project affected (e.g., using the WBS), or other useful category (e.g., project phase) to determine the areas of the project most exposed to the effects of uncertainty
- Schedule compression - Techniques used to shorten the schedule duration without reducing the project scope
- SWOT analysis - Analysis of strengths, weaknesses, opportunities, and threats of an organization, project, or option

Chart 5 Tools (Own Elaboration)

Objectives		Tools
General objective	Creation of a project management plan for the construction of the new Reception Building of the Organization for Tropical Studies (OTS) in Costa Rica.	Critical path method
		Analogous estimating
		Cost benefit analysis
		Information management systems
1	To create a project charter to formally authorize the project and provide the project manager with the authority to apply organizational resources to the project and to produce the project management plan.	Critical path method
		Expert judgment
		Cost benefit analysis
		Information management systems
2	To develop a scope management plan to ensure that it includes all the work requires to successfully completing to the project.	Critical path method
		Expert judgment
		Cost benefit analysis
		Information management systems
3	To create a time management plan to ensure that it includes all the work requires to successfully completing the project is completed within the time constraints.	Critical path method
		Expert judgment
		Cost benefit analysis
		Information management systems
4	To create a cost management plan to define the processes for developing and managing the project budget to ensure the project is completed within the budget constraints.	Critical path method
		Analogous estimating
		Cost benefit analysis
		Information management systems
5	To develop a quality management plan to identify the quality requirements for the project in order to ensure results meet expectations for approval within the time, cost and scope constraints.	Critical path method
		Quality audits
		Inspection
		Information management systems
6	To create a human resource management plan to ensure that the human resources are identified and managed effectively to complete the project within time, cost and scope constraints.	Critical path method
		Alternative analysis
		Cost benefit analysis
		Information management systems
7	To develop a communication management plan to ensure the timely and effective communication of the project status and other key information.	Critical path method
		Analogous estimating
		Communication models
		Information management systems

8	To create a risk management plan to identify and examine risks to the successful completion of the project and develops plans to minimize the likelihood of the risks.	Critical path method
		Risk categorization
		Cost benefit analysis
		Information management systems
9	To develop a procurement management plan to be used to obtain products, services or results required by the project.	Critical path method
		Expert judgment
		SWOT analysis
		Information management systems
10	To develop a stakeholder management plan to identify and support all the project stakeholders to ensure effective stakeholder engagement.	Critical path method
		Expert judgment
		SWOT analysis
		Information management systems

3.4 Assumptions and Constraints

According to *Body of Knowledge (PMBOK® Guide) – Sixth Edition (2017)*, a project assumption is “a factor in planning process that is considered to be true, real or certain often without any proof or demonstration”. Another definition could be “Project assumptions are events or circumstances that are expected to occur during the project life-cycle”.

Similarly, the PMBOK Guide defines a constraint as “a limiting factor that affects the execution of a project, program, portfolio or a process”. ... Some of these limitations are imposed by the project stakeholders, but many others are intrinsically present in the environment.

Chart 6 Assumptions and constraints (Own Elaboration)

	Objectives	Assumptions	Constraints
1	To create a project charter to formally authorize the project and provide the project manager with the authority to apply organizational resources to the project and to produce the project management plan.	The charter will be created before all other subsidiary documents.	Short time of period to create the project charter
2	To develop a scope management plan to ensure that it includes all the work requires to successfully completing to the project.	The scope management plan will identify the work required for the project. The PM already has all the information he needs to develop the project.	Customers want to limit the time to obtain the scope management plan. Similarly, not all plans are needed to complete the project.
3	To create a time management plan to ensure that it includes all the work requires to successfully completing the project is completed within the time constraints.	The time management plan assigned to construction is sufficient; no more time is needed.	Six months of construction is the time in which the visitor center can be built.
4	To create a cost management plan to define the processes for developing and managing the project budget to ensure the project is completed within the budget constraints.	The budget created during planning will accurately represent the financial resources necessary to build the visitor center.	The budget for the construction of the visitor center cannot exceed \$ 60,000.00 (USD).
5	To develop a quality management plan to identify the quality requirements for the project in order to ensure results meet expectations for approval within the time, cost and scope constraints.	The quality management plan will identify all the technical and managerial quality requirements of the project.	Quality restrictions require that the structure be able to withstand 95% to 100% humidity due to the area where it is located.

6	To create a human resource management plan to ensure that the human resources are identified and managed effectively to complete the project within time, cost and scope constraints.	The organization has sufficient human resources to complete the project. Team development plans for the project team and subcontractors will be sufficient to begin construction of the visitor center on time.	Only the human resources identified and planned for will be included in the budget. The man hours and overtime hours are predetermined.
7	To develop a communication management plan to ensure the timely and effective communication of the project status and other key information.	The organization has the necessary technology to satisfy the communication needs of all those interested, such as the Internet for constant communication and telephone service.	The availability of electricity and consistency of internet access must be dependable.
8	To create a risk management plan to identify and examine risks to the successful completion of the project and develops plans to minimize the likelihood of the risks.	Sufficient information is required to identify project risks.	All of the project risks need to be identified within the planning phase (stage) or as early as possible.
9	To develop a procurement management plan to be used to obtain products, services or results required by the project.	The company already has the entire list of suppliers in the area.	The list of suppliers needs to be exhaustive. The use of international suppliers should not cause schedule delays.
10	To develop a stakeholder management plan to identify and support all the project stakeholders to ensure effective stakeholder engagement.	The stakeholder management plan will include a complete list of all stakeholders involved and a plan as to how to properly manage each.	The information required to plan and manage stakeholders must be accurate.

3.5 Deliverables

A deliverable is an input/output term that refers specifically to the unique and individual products, elements, results, or items that are produced for delivery at the conclusion of a specific project component or at the conclusion of the project as a whole.

Chart 7 Deliverables (Own Elaboration)

Objectives		Deliverables
1	To create a project charter to formally authorize the project and provide the project manager with the authority to apply organizational resources to the project and to produce the project management plan.	Project charter
2	To develop a scope management plan to ensure that it includes all the work requires to successfully completing to the project.	Scope management plan and requirement management plan
3	To create a time management plan to ensure that it includes all the work requires to successfully completing the project is completed within the time constraints.	Schedule management plan, activity list, and schedule network diagram
4	To create a cost management plan to define the processes for developing and managing the project budget to ensure the project is completed within the budget constraints.	Cost management plan, cost baseline, and project
5	To develop a quality management plan to identify the quality requirements for the project in order to ensure results meet expectations for approval within the time, cost and scope constraints.	Quality management plan
6	To create a human resource management plan to ensure that the human resources are identified and managed effectively to complete the project within time, cost and scope constraints.	Human resource management plan

7	To develop a communication management plan to ensure the timely and effective communication of the project status and other key information.	Communication management plan and communications matrix
8	To create a risk management plan to identify and examine risks to the successful completion of the project and develops plans to minimize the likelihood of the risks.	Risk management plan and risk register
9	To develop a procurement management plan to be used to obtain products, services or results required by the project.	Procurement management plan
10	To develop a stakeholder management plan to identify and support all the project stakeholders to ensure effective stakeholder engagement.	Stakeholder management plan, stakeholder analysis chart, and stakeholder register

RESULTS

4.1. Project Integration Management

According to the Body of Knowledge (PMBOK® Guide) – Sixth Edition (2017) (Page 69), project integration management includes the processes and activities to identify, define, combine, unify, and coordinate the various processes and project management activities within the project management process groups. Creating the project plan is part of the project initiation process, and it doesn't start until the project is authorized. The project charter will provide a preliminary delineation of the roles and responsibilities of the project. A project charter should include project details, statement of scope, objectives, project purpose, risk, time, assumptions, constraints, and deliverables.

4.1.1 Project Purpose / Justification

As mentioned in section 1.3 of the purpose, the main motivation that led to the creation of the project management plan for the new visitor center building of the Organization for Tropical Studies (OTS) in Costa Rica is the need to change the construction for a new one, which can house more tourists during their visit, with not much energy expenditure, and which is more friendly with the environment. The project is a real project that is being carried out due to the needs of the areas and to be able to build something that is consistent with the environmental harmony of the place and to add technology for better management.

4.1.2 Business Case

Currently, the OTS visitor center is a small place in which, as the years have passed, offices and other types of infrastructure that have impoverished the most important building in the area have been added. As for the visitors, sometimes, very large groups of students and professionals arrive, and there is no place where an initiation activity can be carried out to explain their stay in the place. The lack of space for this type of activities makes the need for an adequate visitor center noticeable.

The new construction of the visitor center will include several administrative offices, in which each of its collaborators will have one. Compared to today, the company's employees have to share offices and common spaces in order to carry out their activities. Also, in order to access bathrooms, since the construction has been carried out gradually, people have to go through offices inside the building, which indicates that large groups of visitors have to go outside of the visitor center and into another building to enter public restrooms.

Also, the visitor center will have more technology, indicating that there may be more cell phones, computers, and more electronic devices connected at the same time, along with independent air conditioning in each room and an early fire detection system, as it does not currently have this type of technology.

The new construction of the visitor center will have construction permits provided by the Municipality of Puerto Viejo of Sarapiquí, along with the correct approval of the Federated College of Engineers and Architects (CFIA).

When carrying out this construction, the new design involves the area where it is going to be done, a tropical forest, so its external colors are similar to the area where it is located; its materials are resistant to the high humidity of the area, and recycled materials will also be used.

4.1.3 Requirements

In order to carry out the construction of the visitor center, the OTS requested several types of requirements that must be met at the design level, such as:

- Windows should be built at 45° to avoid accidents with the birds in the area.
- The external walls must be of reinforced masonry to avoid heat loss and be more resistant.
- The ceiling heights must be 3.50m.
- Recycled materials must be used for certain areas.
- The showroom has to host at least 80 people at the same time.
- An early fire detection system must be installed.
- A 1.20m sidewalk should be placed on the perimeter of the construction.
- No roof drains or downspouts should be placed.

4.1.4 Constraints

According to the Body of Knowledge (PMBOK® Guide) – Sixth Edition (2017) (Page 701), a constraint is a limiting factor that affects the execution of a project, program, portfolio, or process.

- The following constraints pertain to the visitor center project:
- The time of the project management plan will be done in three (3) months.
- The project duration, design, permits, and construction should not exceed December 2020.
- The project should not have roof drains and downspouts, since due to the area, the leaves get into the system and block it.

- The project will depend on the time of the Municipality of Puerto Viejo of Sarapiquí along with the Federated College of Engineers and Architects (CFIA) in order to obtain the construction permits.

4.1.5 Assumptions

According to the Body of Knowledge (PMBOK® Guide) – Sixth Edition (2017) (Page 898), an assumption is a factor in the planning process that is considered to be true, real, or certain, without proof or demonstration.

The following are a list of assumptions:

It is assumed that all the required information to execute this FGP will be readily available.

It is assumed that the Organization of Tropical Studies will provide all the project-specific information in a timely manner and without any significant restriction to create the project management plan.

- It is assumed that during the construction of the reception, the weather will be in good condition.
- It is assumed that the client is funded sufficiently
- It is assumed that the project will be built in five months, plus two more months for the construction permits.
- It is assumed that the project will be built with \$60,000.00 USD.

4.1.6 Preliminary Scope Statement

The project of the visitor center will include architectural design, structural design, electromechanical design, technical drawing, topography, soil studies, and all the procedure documentation for the required public entities, which will be officially delivered to the OTS for its due construction. The OTS will prepare an official document to carry out the project execution, where at least three companies can participate in a private tender. For this administrative contracting, companies must meet a series of requirements imposed by the PM and OTS administrative office.

4.1.7 Risks

According to the Body of Knowledge (PMBOK® Guide) – Sixth Edition (2017) (Page 720), a risk is an uncertain event or condition that, if it occurs, has a positive or negative effect on one or more project objectives.

In order to achieve the construction in this specific area of the country, the project manager will determine and employ the necessary risk mitigation/avoidance strategies as appropriate to minimize the likelihood of these risks:

- Weather conditions, rain can last throughout the year.
- Transportation of materials, some materials can be transported in the area, but some of them must be transported from the capital (1.5 hours away from the project).
- Municipality of Puerto Viejo of Sarapiquí along with the Federated College of Engineers and Architects (CFIA) permit delay.

4.1.8 Project Deliverables

The following deliverable list must be met upon the successful completion of the visitor center project. Any changes to these deliverables must be approved by the project sponsor.

- Technical documentation (submittals) to create the private tender and hire a subcontractor
- Construction permit from the Municipality of Puerto Viejo of Sarapiquí
- Recommendation list for future security considerations
- Engineering, calculation memories, and drawings
- Visitor center construction

4.1.9 Summary Milestone Schedule

The milestone schedule is a summary level schedule that allows the project team leader to review and identify all of the significant and major project related milestones that may exist in the course of a project and can be proven helpful in making sure that nothing falls behind schedule or off the radar entirely.

("Milestone schedule," 2008)

Chart 8 Summary Milestone Schedule

Summary Milestone Schedule			
CODE	ACTIVITY NAME	START DATE	END DATE
1	CONSTRUCTION PERMIT	Wednesday, June 17, 2020	Friday, July 17, 2020
2	PRELIMINARY WORKS	Monday, August 03, 2020	Wednesday, August 26, 2020
3	EARTHWORKS	Tuesday, August 25, 2020	Monday, September 07, 2020
4	EXCAVATION AND FOUNDATIONS	Monday, August 31, 2020	Friday, September 25, 2020
5	CONCRETE COLUMNS, BEAMS, WALLS	Friday, September 25, 2020	Tuesday, November 10, 2020
6	SUBFLOORS	Wednesday, November 04, 2020	Friday, November 13, 2020
7	ROOF METAL STRUCTURE	Friday, November 13, 2020	Thursday, November 26, 2020
8	ROOFING	Thursday, November 26, 2020	Thursday, December 17, 2020
10	CEILINGS	Saturday, December 05, 2020	Saturday, January 16, 2021
11	WALL FINISHES	Monday, December 21, 2020	Saturday, January 09, 2021
12	FLOORS	Thursday, November 05, 2020	Friday, November 27, 2020
13	DOORS AND LOCKS	Friday, November 27, 2020	Tuesday, December 08, 2020
14	WINDOWS AND GLASS DOORS	Tuesday, December 08, 2020	Tuesday, December 22, 2020
15	SANITARY	Monday, December 28, 2020	Sunday, January 05, 2020
17	ELECTRICAL SYSTEM	Wednesday, September 09, 2020	Thursday, January 14, 2021
18	MECHANICAL SYSTEM	Wednesday, September 09, 2020	Thursday, January 07, 2021
19	ELECTROMECHANICAL CIVIL WORK	Wednesday, December 09, 2020	Tuesday, October 13, 2020
16	PASTA AND PAINT	Saturday, December 19, 2020	Tuesday, January 26, 2021

4.1.10 Project Approval Requirements

For the correct approval, before the construction of the project, public entities of Costa Rica will require the following documents; each requirement depends on the type of project to be executed:

- Proof of being up to date with municipal taxes
- Cadastral plan of both properties
- Literal certification of the property
- Photocopy of the identity card. If you are a company: a photocopy of the identity card of the legal representative and certification of legal status (one month from issue)
- Water availability letter
- INVU withdrawal if the property is affected by a river or stream
- Land use of both properties
- Declaration of Public Utility
- Existing site map
- Soil studies

4.2. Project Scope Management

4.2.1 Scope Management Introduction

According to the Body of Knowledge (PMBOK® Guide) – Sixth Edition (2017) (Page 129), project scope management includes the processes required to ensure that the project includes all the work required, and only the work required, to complete the project successfully. Managing the project scope is primarily concerned with defining and controlling what is and what is not included in the project.

Project scope management follows a five-step process: collect requirements, define scope, create WBS, verify scope, and control scope.

4.2.2 Scope Management Approach

For the construction of the visitor center project, the project manager will be responsible for managing the scope of the project. The scope of this project is defined by the scope statement, the work breakdown structure (WBS), and the WBS dictionary. The approval and establishment of project scope documentation will be the responsibility of the project manager, sponsor, and stakeholders.

These documents include deliverable quality checklists and work performance measurements. Change requests that occur throughout the project can be requested by any team member, although change control is carried out by the project manager, who will be in charge of evaluating the requested change of scope. For the acceptance of the final deliverables and the scope of the project, the project manager, together with the stakeholders, should send the contributions and comments to the project sponsor for approval.

Chart 9 WBS Dictionary

WBS dictionary			
WBS level	WBS code	WBS name	WBS description
1	1	Construction permit	Official document to build
2	1.1	CFIA approval	Federated College of Engineers and Architects approval
2	1.2	Municipality of Sarapiquí	Local government that provides the construction permit
1	2	Construction	Method to build a structure
2	2.1	Preliminary works	Site clearance
3	2.1.1	Centerlines marks	Marks to define where the construction goes
3	2.1.2	Project enclosure	Construction area to be enclosed
3	2.1.3	Provisional warehouse	Small construction for tools
2	2.2	Earthworks	Process of excavation
3	2.2.1	Removal of organic material	Remove 25cm of organic material
3	2.2.2	Structural excavation	Removal of compact material for foundations
2	2.3	Concrete elements	Concrete elements
3	2.3.1	Reinforced concrete foundation	Concrete with rebar reinforcement elements
3	2.3.2	Reinforced concrete columns and beams	Concrete with rebar reinforcement elements
3	2.3.3	Masonry walls	Walls of blocks
2	2.4	Floors	Floors
3	2.4.1	Reinforced concrete subfloors	Concrete with rebar reinforcement elements
3	2.4.2	Porcelain floors	Porcelain tiles
2	2.5	Roof	Upper covering of the structure
3	2.5.1	Roof metal structure	Roof metal structure
3	2.5.2	Roofing	Roof covering
3	2.5.3	Roof painting	Roof covering paint
2	2.6	Finishes	Last details of construction

3	2.6.1	Gypsum ceiling	False ceilings that hang from the structure
3	2.6.2	Wall finishes	Painting and décor
3	2.6.3	Doors and locks	Doors and locks
2	2.7	Electromechanical works	Electromechanical works
3	2.7.1	Electrical system	Electrical system
3	2.7.2	Mechanical system	Mechanical system

4.2.3 Roles and Responsibilities

The project manager, sponsor, and team will all play key roles in managing the scope of this project. The following table defines the roles and responsibilities for the scope management of this project.

Chart 10 Roles and Responsibilities

Roles and responsibilities				
Item	Name	Organization	Job title	Responsibilities
1	Gloriana Ouellette Carrillo	Laitano Consultores	Project manager / civil engineer	<p>Responsible for managing the execution, direction, and coordination of the project</p> <p>To ensure that there is synergy between design and construction</p> <p>To ensure that all materials and practices are keeping with approved best practice codes and regulations to provide logistical and construction/engineering advice</p>
2	Alexander Laitano Benavides	Laitano Consultores	Electromechanical engineer	<p>To ensure that there is synergy between design and construction</p> <p>To ensure that all materials and practices are keeping with approved best practice codes and regulations to provide logistical and construction/engineering advice</p>
3	Charles Acuna	OTS	Administration	To direct and manage the operation of the visitor center.
4	Subcontractors	Construction company	Engineers, laborers, plumbers, electricians, painters, and tillers	Responsible for completing the construction of the visitor center project on time and within a budget
5	Suppliers	Suppliers	Suppliers	Material and services providers

4.2.4 Scope Definition

The scope of this project was defined through meetings to obtain the construction requirements that the client requested and then initiate a process to collect essential documents to start its execution. First, several trips were made to the site to understand the climate of the area and an exhaustive analysis of the materials required to carry out its construction; the architectural decisions were reviewed with the client in order to better accommodate the desired final design.

From this information, the project team developed the project requirement documentation, the requirement management plan, and the requirement traceability matrix for what the final design of the visitor center should achieve. The project description and deliverables were developed based on the requirement compilation process requested by the Sarapiquí municipality and the CFIA.

Chart 11 Requirement Traceability Matrix

Requirement traceability matrix					
Project name		Visitor center of the Organization of Tropical Studies (OTS)			
Project manager		Gloriana Ouellette			
Project description		Construction of a 385m2 visitor center in Sarapiquí			
ID	WBS ID	Requirement description	Business need, opportunities, goals, and objectives	Architectural/Design document	Priority
1	2	Construction built within 5 months	To take advantage of the low season	Project schedule	High
2	2.3	Masonry exterior walls	No humidity inside of the building	Structural drawing	High

3	1.1	Topography studies	To review the slopes of the property	Topographic report	High
4	1.1	Soil testing	To review the soil for structural purposes	Soil testing Report	High
5	1.1	No roof drains or downspouts	Great amount of leaves on the roof	Architectural drawing	High
6	1.1	45° external windows	For birds not to crash on the windows	Architectural drawing	High
7	1.1	Recycled materials	Ecological construction	Architectural drawing	High
8	1.1	1.20m sidewalk on the perimeter	Walking inside and outside of the building easily	Architectural drawing	High
9	1.1	Municipality of Sarapiquí	Construction permit	Construction permit	High
10	1.1	INVU documentation	For the construction not to be affected by a river or stream	INVU seal	High

4.2.5 Project Scope Statement

The project scope statement is the description of the project scope, major deliverables, assumptions, and constraints. It describes the project's deliverables in detail.

In addition, the scope statement includes in detail what work should and should not be done, even if implicit but unnecessary that it is not within the scope.

This project includes the following elements:

- Architectural design

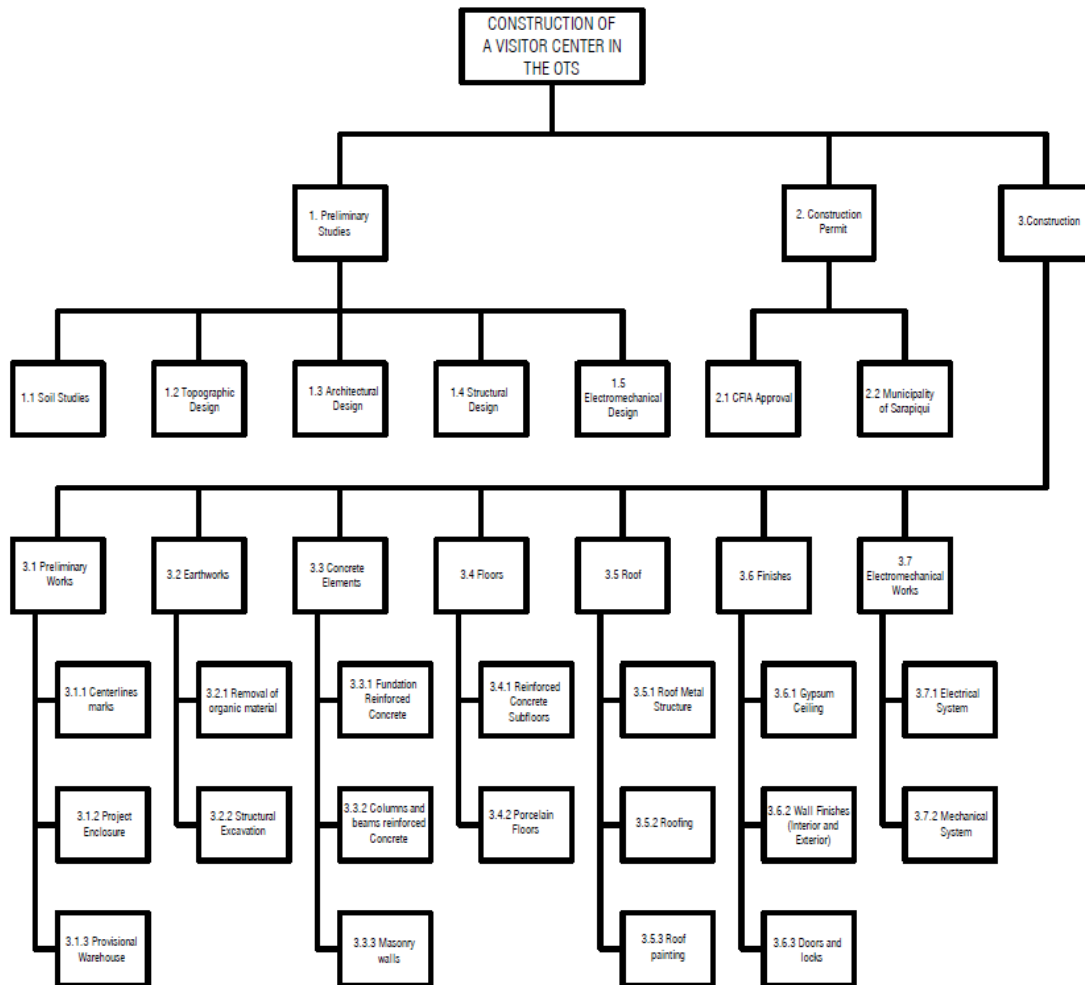
- Structural design
- Electromechanical design
- Topographic design
- Soil studies
- Planning
- Schedule
- Cost plan
- Construction

This project has already been accepted by clients (OTS), and it has shown that it complies with what the NGO was requesting to be able to host its visitors. This project includes construction; in order to start it, the OTS must carry out a private bid and see which subcontractor complied with the requirements being suggested, such as best price, experience in similar projects, and experience incorporated to the CFIA.

4.2.6 Work Breakdown Structure

According to the Body of Knowledge (PMBOK® Guide) – Sixth Edition (2017) (Page 156), creating a WBS is the process of subdividing project deliverables and project work into smaller, more manageable components. In this project, the WBS will help the PM to manage the project scope more effectively.

Chart 12 WBS (Own Elaboration)



4.2.7 Scope Verification

As the project progresses, the project manager will be able to verify the deliverables regarding the scope of the project as defined in the scope statement and WBS.

Once it has been verified that the scope of the project meets the requirements defined in the project plan, the sponsor and the PM can proceed to formally accept the subcontractor to initiate the construction.

For the verification of the scope of the project, an official document is made where all the technical specifications of the materials to be used are found. Each product has its technical sheet where the way of use is described. This document is delivered to the construction subcontractor. During construction, the material on site is verified to be the same as described in the submittals and technical specifications. The progress of the work is verified with the work schedule. The PM and the PS review the progress to disburse the corresponding payments.

4.2.8 Scope Control

Control scope is the process of monitoring the status of the project and product scope and managing changes to the scope baseline. The key benefit of this process is that the scope baseline is maintained throughout the project. The project manager and the project team will work together to control the scope of the project.

During construction, when a constructive change is requested, the subcontractor must fill out a document issued by the PM requesting the change, being approved by the project sponsor and the PM. Changes must be within the scope of the project, both in price and delivery time.

Chart 13 Change of Order (Own Elaboration)

**CHANGE OF ORDER
FORM FOR APPROVAL OF CHANGE OF ORDER
"Visitor Center - OTS"**

For:

From:

Change of order N'::

Date:

1. DESCRIPTION OF CHANGE					
2. PRICE					
Item	Activity Name	Quantity	Unit	Unit Cost	Total project cost
TOTAL					

Review by: _____

Review Date: _____

Project Manager

4.3 Project Time Management

4.3.1 Project Schedule Introduction

Project scheduling provides a detailed plan that represents how and when the project will deliver the products, services, and results defined in the project scope and serves as a tool for communication, managing stakeholders' expectations, and a basis for performance reporting, conferring Body of Knowledge (PMBOK® Guide) – Sixth Edition (2017) (Page 175).

4.3.2 Schedule Management Approach

The project time management plan or the project schedule management plan captures the processes required to manage the timely completion of the project. The intention of the plan is to establish the criteria and the activities for developing, monitoring, and controlling the project schedule. It helps keep the project on track. The project manager has direct responsibility of managing the project schedule to ensure the project is successfully completed on time. At the task level, the respective personnel are responsible to adhere to established activity durations and achievement timelines for milestones.

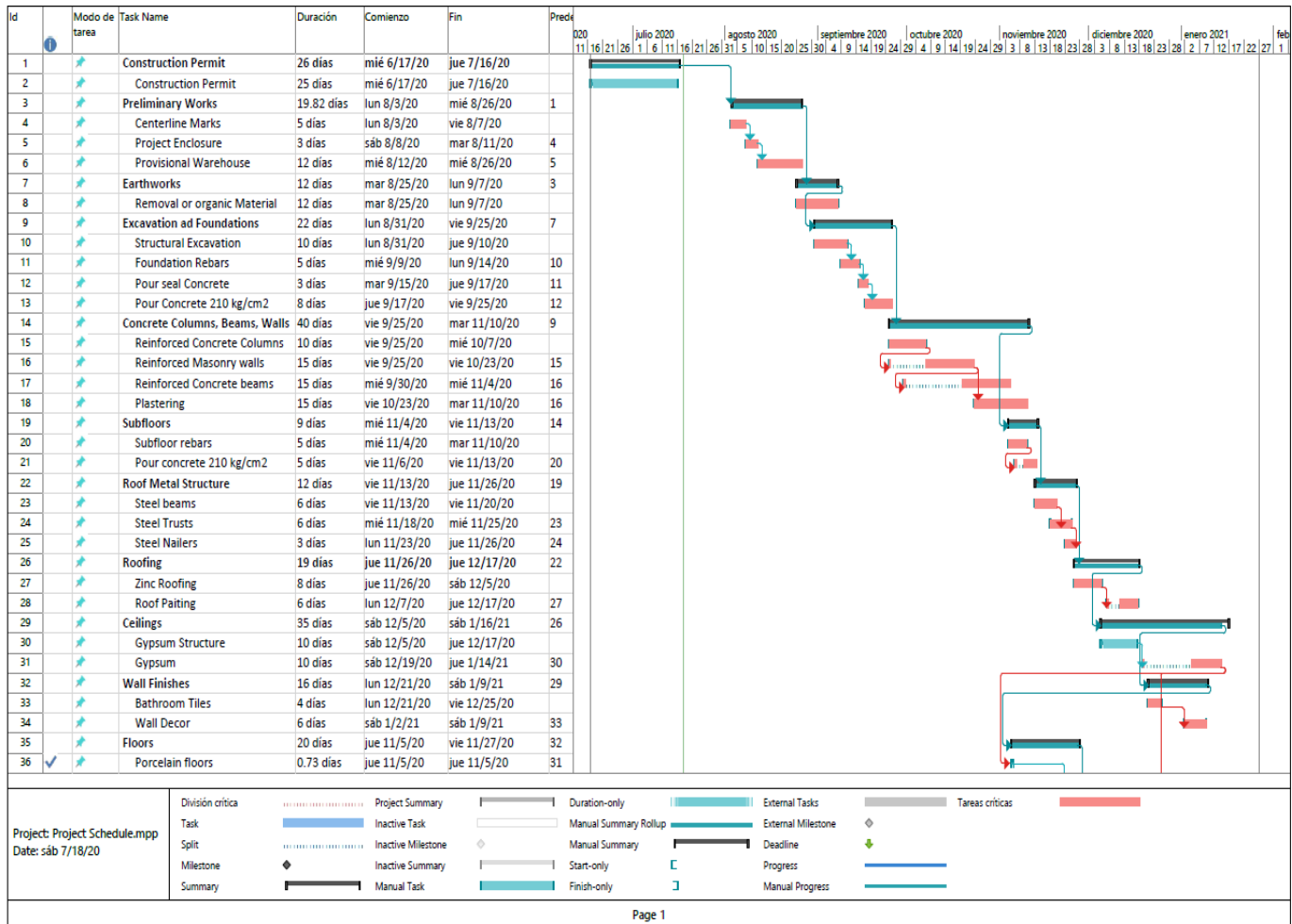
4.3.3 Develop Schedule

In the time management process, the project activities were defined. The relationships of the activities were described; the activities were ordered, and the resources and the duration of each of the activities were estimated.

The final project schedule must be updated during the development of the project in order for it to be achieved; the PM will be in charge of carrying out each of the updates. If the project does not meet the dates, a review should be made, and it

should be noted where part of the project is failing and why. Schedule reviews should be biweekly with the PS.

Chart 14 Project Schedule (Own Elaboration)





4.4 Project Cost Management

4.4.1 Cost Management Introduction

The purpose of this cost management plan is to define the procedure by which the costs associated with the construction of the visitor center project will be managed throughout the life cycle of the project.

To ensure the successful completion of the project within the allocated budget, this plan establishes the format and standards by which project costs are measured, reported, and controlled. The plan cost management is the process of defining how the project costs will be estimated, budgeted, managed, monitored, and controlled.

It is a process that provides critical guidance and direction on how the project costs will be managed throughout the project.

Various cost components are associated with this project. Metrics such as cost variance considerations and reporting activities will be described in this plan. To complete this project successfully, all key project members and stakeholders must adhere to and work within this cost management plan and the overall project plan it supports.

4.4.2 Measuring Project Cost

In the initial phase of the project, the PM is in charge of sending the total cost of the project to the project sponsor so that he/she can decide how to finance it. The PM will be responsible for managing and reporting the cost of the project throughout its execution, using the progress made on the schedule.

During the monthly meeting held with the project sponsor, the PM will review and present the performance of the project costs of the last month, and the performance will be measured using the value earned up to the current advance of the schedule. The PM will be responsible for accounting for cost deviations and presenting the best options for the project to return to its original budget. In the same way, the project sponsor can also make changes so that the project can be within the budget.

4.4.3 Process Description

The activity cost estimating is the process of developing an approximation of the cost of resources needed to complete project work. The process main aim is determining the monetary resources required for the project. The activity cost estimating is executed using an activity list where all pertinent activities relating to the project are listed. The monetary quantification of these activities can employ

various techniques; however, this project will utilize expert judgment to ascertain activity cost estimates. For this project, cost estimates will be expressed in United States Dollar (USD) currency, while other units of measurement will be used to aid with the calculation of activity estimates. These quantities of measures may include staff hours or staff days, area (m2), volume (m3), etc.

To ensure that activity cost estimates are appropriate and accurate, the project manager, along with the project team, will finalize the resources and staffing requirements necessary for the successful completion of the project.

In order to carry out a good cost control throughout the project, the payment method with the client will be an advance of 40% of the project, while the next 60% will be divided into biweekly payments, where the work progress must go hand in hand with the project schedule. Each of the activities has a specific amount so that according to the percentage of the progress of the work, this will be the payment by the client.

Chart 15 Cost Schedule (Own Elaboration)

COST SCHEDULE																
CODE	COST	40% ADVANCED	PAYMENTS													
			01/07/2020	15/07/2020	31/07/2020	14/08/2020	31/08/2020	14/09/2020	30/09/2020	15/10/2020	31/10/2020	15/11/2020	30/11/2020	15/12/2020	30/12/2020	15/01/2021
1	7,122.50	2,849.00	1,994.30	1,994.30	284.90	-	-	-	-	-	-	-	-	-	-	-
2	6,456.45	2,582.58	-	-	-	1,852.72	1,403.58	617.57	-	-	-	-	-	-	-	-
3	10,241.00	4,096.40	-	-	-	-	2,835.97	3,308.87	-	-	-	-	-	-	-	-
4	4,619.00	1,847.60	-	-	-	-	-	1,551.98	1,219.42	-	-	-	-	-	-	-
5	5,594.40	2,237.76	-	-	-	-	-	-	364.85	2,991.79	-	-	-	-	-	-
6	8,901.20	3,560.48	-	-	-	-	-	-	-	-	-	5,340.72	-	-	-	-
7	8,470.00	3,388.00	-	-	-	-	-	-	-	-	-	781.85	4,300.15	-	-	-
8	2,117.50	847.00	-	-	-	-	-	-	-	-	-	242.00	907.50	121.00	-	-
9	8,988.00	3,695.20	-	-	-	-	-	-	-	-	-	-	1,284.00	1,926.00	2,054.40	128.80
10	9,213.75	3,685.50	-	-	-	-	-	-	-	-	-	-	-	-	2,618.64	2,909.61
11	5,082.00	2,032.80	-	-	-	-	-	-	-	-	-	1,386.00	1,663.20	-	-	-
12	637.00	254.80	-	-	-	-	-	-	-	-	-	-	104.24	277.96	-	-
13	6,700.00	2,680.00	-	-	-	-	-	-	-	-	-	-	-	2,010.00	2,010.00	-
14	850.00	343.60	-	-	-	-	-	-	-	-	-	-	-	-	128.85	386.55
15	60,445.00	24,178.00	-	-	-	-	-	1,427.83	4,569.07	4,283.50	4,569.07	4,283.50	4,283.50	4,283.50	4,283.50	4,283.53
16	49,665.00	19,866.00	-	-	-	-	-	1,241.63	3,973.20	3,724.88	3,973.20	3,724.88	3,724.88	3,724.88	3,724.88	1,986.60
17	2,409.90	963.96	-	-	-	-	-	-	-	-	-	-	-	247.88	619.69	578.38
18	16,443.00	6,577.20	-	-	-	-	-	-	-	-	-	-	-	-	2,855.89	4,154.02
18	16,443.00	6,577.20	-	-	-	-	-	-	-	-	-	-	-	-	2,855.89	4,154.02
SUBTOTAL	213,964.70	85,585.88	1,994.30	1,994.30	284.90	1,852.72	4,239.55	8,147.08	10,126.54	11,000.17	8,542.27	15,516.95	14,317.97	12,735.72	18,286.45	16,353.09
19	6,419.94	2,567.58	241.79	241.79	276.33	241.79	233.60	241.79	276.33	259.06	276.33	259.06	259.06	259.06	259.06	276.33
20	38,513.65	15,405.46	1,450.74	1,450.74	1,657.99	1,450.74	1,781.61	1,450.74	1,657.99	1,554.36	1,657.99	1,554.36	1,554.36	1,554.36	1,554.36	1,130.87
TOTAL	258,897.29	103,558.91	3,686.83	3,686.83	2,219.22	3,545.25	6,294.76	9,840.41	12,060.86	12,813.59	10,476.59	17,330.37	16,131.39	14,549.14	20,101.87	18,287.41

4.4.4 Cost Change Control Process

In order to monitor the status of the project, the cost control process is used, thus updating costs and managing changes in the cost baseline. The cost baseline is maintained throughout the project, this being the main benefit of this process. The PM must constantly review the initial budget so that the current approved cost, anticipated and real cost, and committed costs can be controlled.

Cost metrics will also be monitored to ensure they do not exceed established thresholds. If the thresholds are exceeded, the necessary corrective actions will be considered and implemented to ensure that the project returns to an acceptable performance range. A detailed analysis of cost control measures will be submitted to the project sponsor for approval. The project manager will lead the implementation of all approved control measures and complete any necessary change requests in accordance with the project change control process, as shown in Chart 13.

Monitoring and controlling the project budget ensures that only appropriate project changes are included in the budget baseline. That information about authorized changes is communicated, and those responsible take corrective action.

4.4.5 Project Budget

To budget for the project, estimated costs must be assigned to individual activities or work packages to establish an authorized cost baseline. Once the cost baseline is established, the activity can be monitored and controlled for project performance.

The importance of making the project budget before starting the work is that a real data of the total cost of each activity is shown. A poorly made budget can negatively affect the result of the project; even the qualities of the project can change to be able to adjust to the amount estimated by the client.

To mitigate the consequences of misestimating the project budget, the project manager will collaborate with those responsible for managing work efforts as well as estimating project costs. The team will calculate the estimated costs for individual activities or work packages. A monthly review will be carried out comparing the actual amount spent together with the estimated budget at the beginning of the project. If it indicates losses, the project sponsor and the PM must make decisions to adjust the changes to the estimated budget.

In Costa Rica, in order to calculate the contingency reserve, 3% is used when it is a new construction; when it is a remodeling, 5% to 10% can be used according to the CFIA.

According to the Association of Engineers and Architects, professionals must charge 12% for the management reserve for a new construction and 18% when it comes to remodelling.

Chart 16 Project Cost (Own Elaboration)

PROJECT COST - VISITOR CENTER					
Item	Activity Name	Quantity	Unit	Unit Cost	Total project cost
1	CONSTRUCTION PERMIT	385	m2	\$ 18.50	\$ 7,122.50
2	PRELIMINARY WORKS	385	m3	\$ 16.77	\$ 6,456.45
3	EARTHWORKS	385	m3	\$ 26.60	\$ 10,241.00
4	EXCAVATION AND FOUNDATIONS	149	m3	\$ 31.00	\$ 4,619.00
5	CONCRETE COLUMNS, BEAMS, WALLS	189	m2	\$ 29.60	\$ 5,594.40
6	SUBFLOORS	385	m2	\$ 23.12	\$ 8,901.20
7	ROOF METAL STRUCTURE	385	m2	\$ 22.00	\$ 8,470.00
8	ROOFING	385	m2	\$ 5.50	\$ 2,117.50
10	CEILINGS	321	m2	\$ 28.00	\$ 8,988.00
11	WALL FINISHES	567	m2	\$ 16.25	\$ 9,213.75
12	FLOORS	385	m2	\$ 13.20	\$ 5,082.00
13	DOORS AND LOCKS	7	Unit	\$ 91.00	\$ 637.00
14	WINDOWS AND GLASS DOORS	1	global	\$ 6,700.00	\$ 6,700.00
15	SANITARY	1	global	\$ 859.00	\$ 859.00
17	ELECTRICAL SYSTEM	385	m2	\$ 157.00	\$ 60,445.00
18	MECHANICAL SYSTEM	385	m2	\$ 129.00	\$ 49,665.00
19	ELECTROMECHANICAL CIVIL WORK	87	m2	\$ 27.70	\$ 2,409.90
16	PASTA AND PAINT	567	m2	\$ 29.00	\$ 16,443.00
SUBTOTAL					\$ 213,964.70
Contingency Reserve		3%			\$ 6,418.94
Management Reserve		18%			\$ 38,513.65
TOTAL					\$ 258,897.29

4.5 Project Quality Management

4.5.1 Quality Management Introduction

According to *Body of Knowledge (PMBOK® Guide) – Sixth Edition (2017)* (page 271), project quality management includes the processes for incorporating the organization's quality policy regarding planning, managing, and controlling project and product quality requirements in order to meet stakeholders' objectives.

In order to guarantee a quality project, a quality management plan will be drawn up for the visitor center, establishing its due activities, processes, and work procedures.

4.5.2 Quality Management Approach

The quality management approach for the visitor center project ensures that both the product and the process maintain the quality that was established and that it will meet quality objectives using an integrated quality approach to define the standards to be used. The quality standards will be included in the technical specifications of the project as well as in architectural, structural, and electromechanical plans.

During its construction, the PM and the sponsor will establish the quality of the processes and products used in the project, through technical specifications indicated in the architectural, structural, and electromechanical plans. All documentation used for quality control will become part of the visitor center project plan and will be part of the operations once the project is completed.

The quality standards will be made from metrics, which will be used to measure quality throughout the life of the project and will be applied to products and

processes. The construction subcontractor will be responsible for using the quality measures, while the PM will ensure that they are used correctly, carrying out biweekly inspections, taking measurements, and reviewing the results as the project progresses.

Metrics of the project include:

- Building design
- Schedule
- Resources
- Cost
- Process performance
- Product performance
- Customer satisfaction

4.5.3 Quality Requirement / Standards

Before starting the construction of the visitor center, the PM and the project sponsor must choose a construction company that will be in charge of carrying out the new building.

The submittal document includes the technical data sheet of each of the products to be used, most of which indicate the manuals on how each of its facilities is carried out. In order to maintain quality standards, the construction company, if they place another type of product or established process, must deliver an official document indicating the reason for the change, and the technical sheet will be compared with the original material. The comparison must be of a material equal to it or greater, since if a lower quality material than that indicated in the drawings is placed, making the technical drawings of each of the necessary elements and with the expert judgment of those involved, the guarantee of the project would not be the same.

Chart 17 Submittal (Own Elaboration)

**SUBMITTAL
FORM FOR APPROVAL OF EQUIPMENT AND MATERIALS PROJECT
"Visitor Center - OTS"**

For:
From:
Submittal N°:
Date:

Reference of specifications or construction plans	Description of the material or equipment (Indicate, brand, model, Catalog No., etc.)	Decision				
		Use	Approved	Approved with comments	Not approved / Redress	Rejected
Comments on the request (Include additional documentation if necessary)						
Annexed:						
The product data sheet is attached						
Comments						

Review by: _____ **Review Date:** _____

Project Manager

4.5.4 Quality Assurance

The processes to be used for construction are the focal point for the quality assurance of the visitor center. An iterative process will be used for the entire project, which consists of measuring, analyzing, and improving the processes.

In order to determine the quality of a product, several factors must be taken into account, for example, concrete, one of the most important products in this construction.

Chart 18 Quality Assurance (Own Elaboration)

**QUALITY ASSURANCE
FORM FOR APPROVAL OF QUALITY ASSURANCE
"Visitor Center - OTS"**

For:
From:
Material / Activity:
Date:

Quality Assurance Material				
Deliverable	Requirement	Manage and Control activities	Frequency	Responsible
		Manage:		
		Control:		
		Manage:		
		Control:		
		Manage:		
		Control:		
		Manage:		
		Control:		

Review by: _____ **Review Date:** _____

Project Manager

The qualities of the materials also depend on the suppliers, where the specifications that they must have are indicated. For example, concrete needs to be close to the project to prevent rapid drying and must meet the required strength. The quality of the final finish of the concrete that is tuned is also verified. The concrete blocks are tested for resistance in the contracted laboratory, and the rebar must be those requested by the engineers along with their technical data sheet. Each of the requested materials must go through a quality control before being placed.

4.5.5 Control Quality

According to *Body of Knowledge (PMBOK® Guide) – Sixth Edition (2017)* (page 298), control quality is the process of monitoring and recording the results of executing the quality management activities in order to assess performance and ensure the project outputs are complete, correct, and meet customer expectations. The key benefit of this process is verifying that project deliverables and work meet the requirements specified by key stakeholders for final acceptance.

In Chart 17, Concrete Quality Assurance, in order to verify the quality of the concrete and the requested resistance, concrete cylinder testing must be carried out. This type of test checks the concrete resistance on 7, 14, and 28 days, so the concrete reaches a resistance of 210kg / cm³.

4.6 Project Human Resource Management

4.6.1 Human Resource Management Introduction

Regardless of the project to be carried out, human resource management is important to be able to develop the visitor center, since it is a tool that will be

maintained from the initial phase of the project until its closure. One of the objectives of this plan is to be able to get the right team with the necessary skills to carry out the different activities of the new building.

In order to form a team, there must be a guide on human resources, influencing the capacities, roles, and responsibilities of each member, complying with the requirements of the project as well as the execution times of activities and administrative requirements assigned.

4.6.2 Roles and Responsibilities

Chart 10 shows the roles and responsibilities of the visitor center project team are very important for the development of the project. Each member must understand what their participation in the project is.

4.6.3 Project Organizational Charts

A graphic visualization of the project tasks and team members is shown in the human resource plan, illustrating the responsibilities of each member of the work team, using the following tools, such as responsible, accountable, consult, and inform (RACI).

Chart 19 Project Organizational Chart (Own Elaboration Chart)

Item	Activity Name	Project Sponsor	Project Manager	Civil Engineer	Electromechanical engineer	Architect	Structural Engineer	Geotechnical Engineer	Topographical Engineer	Interior Designer	Technical Drafter	Foreman	Civil Subcontractor	Electrical Subcontractor	Mechanical Subcontractor	Roofing Subcontractor	Tiling Subcontractor	Windows and Door Subcontractor	Steel Structure Subcontractor	Administration	Tropical Biologists	Suppliers	
1	CONSTRUCTION PERMIT	C	A	R	A	A	A	A	A		A												
2	PRELIMINARY WORKS	C	A	C	C	C	C	C	C		R	R	R	R	R	R							I
3	EARTHWORKS	C	A	C							R	R	R										I
4	EXCAVATION AND FOUNDATIONS	C	A	C							R	R	R										I
5	CONCRETE COLUMNS, BEAMS, WALLS	C	A	C	C	C	C				R	R	R	C	C								I
6	SUBFLOORS	C	A	C	C	C	C				R	R	R										I
7	ROOF METAL STRUCTURE	C	A	C	C	C	C				R	R	R						R				I
8	ROOFING	C	A	C	C	C	C				R	R	R			R	I	I	I	I			I
10	CEILINGS	C	A	C	C	C	C				R	R	R										I
11	WALL FINISHES	C	A	C	C	C	C				R	R	R										I
12	FLOORS	C	A	C	C	C	C				R	R	R				R						I
13	DOORS AND LOCKS	C	A	C	C	C	C				R	R	R										I
14	WINDOWS AND GLASS DOORS	C	A	C	C	C	C				R	R						R					I
15	SANITARY	C	A	C	C	C	C				R	R		R									I
17	ELECTRICAL SYSTEM	C	A	C	C	C	C				R	R											I
18	MECHANICAL SYSTEM	C	A	C	C	C	C				R	R		R									I
19	ELECTROMECHANICAL CIVIL WORK	C	A	C	C	C	C				R	R											I
16	PASTA AND PAINT	C	A	C	C	C	C			I	R	R	R										I

Key:

R – Responsible for completing the work

A – Accountable for ensuring task completion/sign off

C – Consulted before any decisions are made

I – Informed of when an action/decision has been made

4.7 Project Communication Management

4.7.1 Communication Management Introduction

The communication management plan indicates how communication will be throughout the project, and updates will be made as needed.

The plan identifies and defines the roles of the team members. It also includes a matrix that announces the communication requirements of the project, as the meetings will be held so that they can have the most benefit, and the plan also consists of providing a directory where all forms of contact with the members are found.

4.7.2 Communication Management Constraints

The PM will be in charge of ensuring that all the communication activities of the project are within the schedule and budget. As it was mentioned above, inspection team meetings will be held every two weeks, so the team must be prepared. All communication activities will be done in accordance with the detailed communication matrix.

4.7.3 Communication Management Matrix

The function of the communication matrix is to keep the project stakeholders informed; it is possible to detail the communication line between the work team. It also announces the maximum deadlines of communication, project status, and general changes to be made.

One of the advantages over the communication matrix is the improved communication between each department of the work team, which is a more effective and fluid communication; it is possible to take benefit of the resources of the project, since all are consenting to what is happening. All this convenience indicates that there is more time to solve other types of problems and prepare for each meeting; decision-making becomes easier, and the team leaders keep all the information in their hands.

Chart 20 Communication Matrix

Communication Matrix						
Communication	Purpose	Medium	Frequency	Audience	Owner	Approval
Meetings	Review project objectives	Face to face	2 weeks	Project Sponsor	Project Manager	Project Sponsor
				Project Manager		Project Manager
				Subcontractors		Project Manager
Status reports	Report status of the project to management	Regular Communication and email	2 weeks	Project Sponsor	Project Manager	Project Sponsor
				Project Manager		Project Manager
				Subcontractors		Project Manager
Project Newsletter	Promote high performing content of the project	Email	1 week	Project Sponsor	Project Manager	Project Sponsor
				Project Manager		Project Manager
				Subcontractors		Project Manager
Material Approval	Present submittals to management	Email	1 week	Project Manager Subcontractors	Project Manager	Project Manager
Presentations	Project status updates	Face to face	2 weeks	Project Manager Subcontractors	Project Manager	Project Manager
Technical Design Meetings	Discuss technical design solutions	Regular Communication, emails and face	2 weeks	Project Sponsor	Project Manager	Project Sponsor
				Project Manager		Project Manager
				Subcontractors		Project Manager

4.7.4 Guidelines for Meetings

For effective communication, there are different types of methods by which project stakeholders can communicate. The following will be those used for the visitor center, according to communication planning – Project management. (2014, August 14):

- Live meeting: A gathering of team members at the same location
- Conference call: A telephone call in which several people participate

- Audio conference: Similar to a conference call but conducted online using software like Skype
- Computer-assisted conference: An audio conference with a connection between computers that can display a document or spreadsheet that can be edited by both parties
- Video conference: Similar to an audio conference but with live video of the participants. Some laptop computers have built-in cameras to facilitate video conferencing.
- IM (instant messaging): The exchange of text or voice messages using pop-up windows on the participants' computer screens
- Texting: The exchange of text messages between mobile phones, pagers, or personal digital assistants (PDAs)—devices that hold a calendar, a contact list, a task list, and other support programs
- Email: The exchange of short informational messages between at least two people over a computer network

4.8 Project Risk Management

4.8.1 Risk Management Introduction

The risk management plan determines the framework of how the work team will identify risks and carry out strategies to avoid them.

To carry out the plan, it is necessary to provide the project information, such as cost plans and budgets, the WBS, cronograms, resources, schedules, roles and responsibilities of each team member, among others. Thus, with this information, each project risk can be obtained more closely.

4.8.1.1 Top Three Risks

The top three risks of the project are the following:

- Rain: Due to the location of the project, which is adjacent to the Braulio Carrillo National Park, the area is a humid tropical forest, and its annual rainfall is high. It could affect work performance due to the large amount of rain during the construction time.
- Material transportation: The project is located 1.5 hours from the capital, San Jose, so some materials are only found in this area. Even though most materials are located near the project, access is not easy, so your delivery schedule should be very well coordinated.
- Labour: The qualities of the labour are that it has to be highly qualified and live close to the project so as not to exceed construction costs. Some architectural details can only be done by specialized people, so those subcontracts will be made separately, carefully reviewing the budget.

4.8.2 Risk Identification

For the visitor center, risk identification was carried out by contributing with the following list of tools.

The identification of risks was carried out regarding the expert judgment of the work team in similar constructions, analysis of assumptions, and the brainstorming that were discussed at the risk meeting before the project started. By mapping the WBS, all the risks can be reviewed by each project activity.

Expert judgment: judgment based on the area of expertise, area of knowledge, discipline, or industry (PMBOK® Guide) – Sixth Edition (2017) (Page 79). In this case, the expert was based on similar constructions.

Analysis of assumptions: A number of project decisions are based on assumptions (conscious or unconscious). Since each assumption could be wrong, each is a

potential risk. A challenge in assumption analysis is trying to make unconscious assumptions visible. Risk identification. (2003, May 25).

Brainstorming: It is about promoting a line of thought among all the meeting participants, proposing ideas of possible project risks.

Risk meeting: A meeting that takes place before starting the project with all the project stakeholders to avoid any type of delay or budget problems during the construction of the project.

Mapping the WBS: By mapping the WBS carried out in the project scope management, a review is made of each activity in order to name all possible risks.

4.8.3 Risk Qualification and Prioritization

Project risks are classified according to the probability and the impact factor that each one will have in the project. In this way, the PM can be in charge of prioritizing each of the risks, creating an integrated risk matrix. A mitigation plan is carried out, which consists of reducing the probability and severity of each risk.

Chart 21 Integrated Risk Matrix

RISKS BREAKDOWN STRUCTURE						
RBS LEVEL 0	RBS LEVEL 1		RBS LEVEL 2		RBS LEVEL 3	
PROJECT RISKS	1	Technical risk	1.1	Scope definition	1.1.1	Project accepted by the OTS
					1.1.2	Private bid for construction companies
					1.1.3	Adapting the construction to the budget
			1.2	Requirement definition	1.2.1	Construction companies' experience in similar projects
					1.2.2	More than 5 years of being incorporated in the CFIA

					(engineers)	
				1.2.3	At least one project of more than 300m2 outside of San Jose.	
		1.3	Estimates, assumptions, and constraints	1.3.1	Construction time: 5 months	
				1.3.2	Material delivery	
				1.3.3	Dry season during the construction time	
		1.4	Construction technical performances	1.4.1	Building structural systems as indicated in the plans	
				1.4.2	Building finishes according to the architect	
		1.5	Quality performances	1.5.1	Concrete pouring	
				1.5.2	Concrete resistance for foundations (210kg/cm2)	
				1.5.3	Roof welding system	
				1.5.4	Roofing quality material	
				1.5.5	Electromechanical system	
		1.6	Installation quality	1.6.1	Concrete	
				1.6.2	Roofing installation	
				1.6.3	Wall system	
				1.6.4	Subfloor installation	
PROJECT RISKS	2	Management risk	2.1	Estimating	2.1.1	Delivering the estimate in 3 weeks
					2.1.2	Detailed plans information
			2.2	Planning	2.2.1	Formulation of detailed plans one by one
					2.2.2	Achieving optimum schedule balance
			2.3	Controlling	2.3.1	Controlling installation quality
					2.3.2	Invoice control
					2.3.3	Delivery time
			2.4	Communication between stakeholders	2.4.1	Email
					2.4.2	Phone
					2.4.3	Meetings
			2.5	Project management	2.5.1	Processes
					2.5.2	Technology
					2.5.3	Project resources
			2.6	Operations management	2.6.1	Time-Critical - Balancing resources
2.6.2	Identifying hazards					
PROJECT RISKS	3	Commercial risk	3.1	Delay in payment from the client	3.1.1	The NGO does not deliver the payment on time.

					3.1.2	The client does not pay on time.			
					3.1.3	No materials can be bought.			
			3.2	Inadequate claim administration	3.2.1	The supportive documentation is not prepared for claims.			
					3.2.2	Claims are not made on time.			
			3.3	Poor contract terms	3.3.1	Inappropriate contract			
					3.3.2	Time and cost definitions			
			3.4	Third party liability	3.4.1	Contractors may deliver and finish on time.			
					3.4.2	On time material delivery			
			3.5	Conflict in the contract	3.5.1	Inappropriate contract			
					3.5.2	Time and cost definitions			
			3.6	Delivery of products on time	3.6.1	On time material delivery			
			PROJECT RISKS	4	External risk	4.1	Subcontractors and suppliers	4.1.1	Contractors may deliver and finish on time
						4.2	Market availability	4.2.1	Louvers
								4.2.2	Roofing
4.2.3	Windows								
4.2.4	Floors								
4.3	Customer satisfaction	4.3.1				Choose wall colors			
		4.3.2				Quality installation			
		4.3.3				Functionality			
4.4	Bad weather	4.4.1	Rainy season						
PROJECT RISKS	5	Organizational	5.1	Project dependency from client	5.1.1	The NGO does not deliver payment on time.			
					5.1.2	The client pays the construction company.			
			5.2	Funding	5.2.1	NGO			
					5.2.2	OTS is in charge of payments.			
			5.3	Prioritization	5.3.1	Funding for starting the construction			
					5.3.2	Construction permits			

Chart 22 Probability and Impact Scales

Probability and impact scales.						
Scale	Probability	Probability Score	Impact on Project			
			Schedule	Cost	Scope	Impact Score
Low	< 30%	0.3	< 5 month	1% to < 2%	Product performance shortfall in area of tertiary (minor) importance	0.2
Medium	30% to < 60%	0.6	5 month to < 7 months	2% to < 4%	Product performance shortfall in area of secondary importance	0.4
Very High	> 70%	0.9	> 7 months	> 8%	Significant failure of product to meet one of its primary (critical) purposes	0.8

Chart 23 Probability and Impact Matrix (Own Elaboration)

Probability and impact matrix							
Probability		Threats			Opportunities		
	0.9	0.18	0.36	0.72	0.72	0.36	0.18
	0.6	0.12	0.24	0.48	0.48	0.24	0.12
	0.3	0.06	0.12	0.24	0.24	0.12	0.06
		0.2	0.4	0.8	0.8	0.4	0.2
		Impact					

Low

Medium

High

4.8.4 Risk Mitigation and Avoidance

The PM manages the list of risks identified in the project; each of these will be rated, and a strategy of avoidance and mitigation will be carried out for each of them. In the risk register and the project plan, each risk will be supervised to avoid any type of consequence, which will be controlled by time, scope, and cost limitations.

Through the meetings, the work team, together with the PM, will carry out the best way to respond to each risk to guarantee a success in the project.

4.8.5 Risk Register

The risk register is a document where all the identified project risks are found, defining their probability and impact on the project, what category they are in, and how they will be evaluated and mitigated so that they do not affect the project under construction. Risk register begins at the first meeting where stakeholders identify all possible risks.

Once all the risks of the project have been identified, the costs of each risk are described, this is defined as a contingency reserve. For construction projects, the contingency reserve should be managed between 3% to 5% of the total project.

Chart 24 Risk Register (Own Elaboration)

Risk Register											
RBS Code	Cause	Risk	Consequence	Probability	Impact	Pxl	Trigger	Owner	Strategy	Cost	Mitigation
1	The client, OTS may want some project changes	Changes to scope.	Increase to the project budget and schedule as more activities will be needed to successfully complete the project.	0.3	0.2	0.1	Change in the customer's needs.	PM	During the project planning phase, make sure that each part of the plan and accepted.	No extra cost.	Give space in the design part to make all the changes
2	Increased cost to produce material.	Increase in price of material during project duration.	Increase of project of project budget.	0.6	0.4	0.2	National tax increase.	PM	Monitor the cost of material before and during the project, and consider the extra cost before the project starts	No extra cost.	Investigate the increase in materials before sending a budget to the client
3	Discount from supplier due to high volume of materials being purchased.	Discount not made to materials	Materials overpriced	0.3	0.2	0.1	Communication with the supplier	PM	Build relationship with suppliers and influence them as much as possible to offer discount with high volume purchases.	Cost of lunch meetings.	Make a deal with the supplier
4	Approval process is delayed.	Permits are delayed.	Delay in project schedule as permits are needed to begin the work.	0.9	0.8	0.7	Missed documents for construction permits	Project Sponsor	Apply for permits as soon as the project as the project plan has been approved.	No extra cost.	Call the institutions to know the exact execution times

5	Poor attention to best practices while working.	Staff injury while at work.	Delay in project schedule and increase in budget due to having to replace worker.	0.3	0.2	0.1	Lack of punishment for not employing company policies.	Sub contractor	Safety talk and safety supervision during construction	No extra cost.	Hire experienced labor
6	Stakeholders not located in a central area.	Communication between stakeholders	No signal on project	0.3	0.2	0.1	Lack of communication medium/ liaison personnel within the company.	PM	Introduce communication methods that allow stakeholders to communicate regardless of location.	New communication system	Prepare communications between stakeholders
7	Improper treatment of project staff.	Labour strike	Delay in project schedule because staff refuses to work.	0.3	0.2	0.1	No benefits or union to protect employees.	PM	Have a staff benefit program put in place before the start of the project and shared with the project staff on agreeing to work on the project.	Cost of health insurance	All worker should have a health insurance
8	Change in requirements /scope.	Delay in payment from the client	Project development will begin at a later date result in an increase in cost.	0.3	0.2	0.1	Change requested for requirements.	PM	Have all funding processes agreed upon and deadlines set to avoid delay in project schedule.	No extra cost.	Accomplish with the delivery of progress
10	Delay in shipment from suppliers.	Late arrival of material.	Late start to construction phase of project and delaying project schedule.	0.3	0.2	0.1	Covid - 19	PM	Have material ordered early enough to account for any delays in the shipping process.	No extra cost.	Prepared orders with time or change the material with a submittal
11	Mother nature.	Bad weather	Delay in project schedule, as well as, destruction of materials and project progress.	0.9	0.4	0.4	Rainy Season	PM	Add extra days to the project schedule to allow for bad weather delays. Prepare to work on rain.	No extra cost.	Prepare the construction with 100% of rain, so it will no delays

4.9 Project Procurement Management

4.9.1 Procurement Management Introduction

The procurement management plan establishes how project purchases will be made. It will also be updated depending on whether the purchasing needs change and the way it is carried out. The plan identifies and defines what should be purchased, how contracts are made to different companies, and how purchases and contracts are approved. In the same way, it includes the importance of including each of the activities when purchasing materials or subcontracts.

4.9.2 Types of Contract to Be Used

For all the services and materials that will be acquired during the construction of the visitor center, a fixed price contract will be made without changes during the stipulated time. The procurement department must make comparative tables of three types of bidders and thus obtain the best products at the best prices within the requested period.

4.9.3 Material Contract

To be able to select who will be responsible for supplying the project materials, a list of materials is made for each activity to be carried out in the project. Each material will be linked to the schedule, which will indicate when they will be delivered.

Also, it is necessary that the material supplier is close to the Sarapiquí area in order to save money on transportation. A contract is made with each company that is close to the project. The companies that will participate in the sale of materials would be the closest deposits to the area, and the construction company must have credit with one of the material companies so that they can facilitate the delivery and disposal of materials.

Once the company has the offers from the three providers, the PM, together with the procurement department, must review which of the three has the best price and what advantages can be obtained with the use of the services. For the visitor center, it is of great importance that the material supplier includes the transportation service, since it is one of the most expensive services for making constant deliveries to the project and can raise the price of the work.

4.9.4 Subcontractor Contract

Like the material contract, three suppliers will be chosen to review their offers and be able to make a decision that fits the budget made for the project.

In order to choose labour suppliers, the price, quality of work, experience in similar jobs, projects outside the Greater Metropolitan Area of Costa Rica, experience in professionals with at least 5 years of incorporation into the CFIA, and a minimum of 3 years of incorporation into the CFIA by the company are analyzed.

The selected company must also comply with a guarantee of the work to be performed. Just as the OTS will comply with the payment dates, the construction company must comply with the times estimated by the PM.

4.9.5 Plan Procurement Management

The scope of the project with the stakeholders is defined, with the exact execution time to avoid economic losses and costs that are not defined. Before starting construction, you must define what type of documentation will be used to avoid delays and risks that may arise.

Once all contracts have been made by the procurement department, with the assistance of the PM in the technical aspects, timing, and others, a payment schedule will be sent to each contracted party so that both parties fulfill the provisions of the contract, since the OTS must comply with the payment as the subcontract must meet the delivery date.

4.9.6 Conduct Procurement Management

Before starting the project, the PM must prepare the necessary documentation for the execution of the project, such as the change requests, cost estimates, lessons learned, and the printed project schedule to be able to review the critical path of the project. Each of these documents is very important to carry out the work.

As in the initial phase, the documentation is prepared before starting the project. The project experts, such as engineers on how each of the activities will be carried out, should also be consulted so that the different activities, such as electromechanical and civil, can work simultaneously without affecting delivery times.

The PM is in charge of making weekly reports on what was done in the project, in case there was a risk that could be avoided in the future.

4.10 Project Stakeholder Management

4.10.1 Identifying Stakeholders

The stakeholder management plan establishes who the stakeholders are in the project, be it the sponsors, managers, and team members, who are all those within the project and who supervise, finance, and execute the project until its completion. It also includes the client and subcontractors.

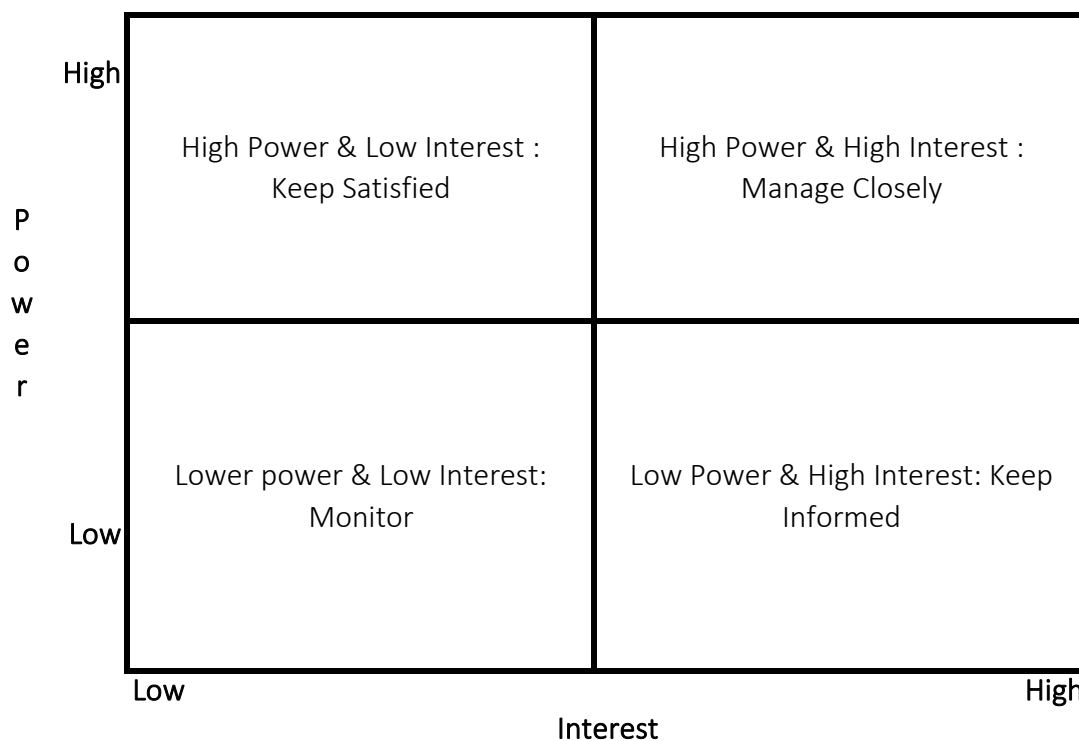
Not only those who participate directly in the project are part of it, but those who are indirectly affected, either positively or negatively, are also stakeholders.

4.10.2 Categorized Stakeholders

The power of interest grid is a simple tool that helps you categorize project stakeholders with increasing power and interest in the project. This tool helps you focus on the key stakeholders who can make or break your project, according to “An overview of the power interest grid for stakeholder prioritization”. (2010, July 31).

Chart 25 Power Interest Grid

Adapted from Mendelow, A.L. (1981). 'Environmental Scanning - The Impact of the Stakeholder Concept,' ICIS 1981 Proceedings, 20.



P o w e r	High	Geotechnical Engineer	Project Sponsor
		Topographical Engineer	Project Manager
		Interior Designer	Civil Engineer
			Electromechanical engineer
			Architect
			Structural Engineer
			Administration
		Tropical Biologists	Technical Drafter
		Suppliers	Foreman
			Civil Subcontractor
			Electrical Subcontractor
			Mechanical Subcontractor
	Low		Roofing Subcontractor
			Tiling Subcontractor
			Windows and Door Subcontractor
		Steel Structure Subcontractor	
	Low		High Interest

- **High power — high interest** (Manage closely): These are key stakeholders like the project sponsor and project manager. They will be managing and controlling the project. They can help you get the much-needed budget or recruit the right team members. Because of this, *manage them closely* and involve them early on in the decision-making process.
- **High power — low interest** (Keep satisfied): They might have a low interest at the moment, but this can change if the project deviates from its course. Keep the professionals satisfied with communication so they can be aware of what is going on with the project.
- **Low power — high interest** (Keep informed): Subcontractors have high interest because they need to know which type of work each one of them will

be doing, so keep them informed about all major updates and invite them to help with the project details.

- **Low power — low interest** (Monitor): It is not necessary to spend too much time with them. Tropical biologists will only use the visitor center once it is finished, and suppliers will be there only when the team requires to buy materials or services.

CONCLUSIONS

1. A project charter was created to formally authorize the project and provide the project manager with the authority to apply organizational resources to the project and to produce the project management plan.
2. A scope management plan was created to ensure that the project includes all the work required. It describes the project deliverables in detail.
3. A time management plan was created to present a detailed plan that represents how and when the project will deliver the products, services, and results.
4. A cost management plan was created to define the procedure by which the costs associated with the construction of the visitor center project will be managed throughout the life cycle of the project.
5. A quality management plan was created to present the processes for incorporating the organization's quality policy regarding planning, managing, and controlling project and product quality requirements in order to meet stakeholders' objectives.
6. A human resource management plan was created to get the right team with the necessary skills to carry out the different activities of the new building.
7. A communication management plan was created to indicate how communication will be managed throughout the project.
8. A risk management plan was created to determine the framework of how the work team will identify risks and carry out strategies to avoid, mitigate, or transfer them.
9. A procurement management plan was created to establish how the project will manage the acquisition of services and products.
10. A stakeholder management plan was created to establish who the stakeholders are in the project.
11. The project management plan of the visitor center for the OTS was created to construct a new building from the ground, organizing and managing the

project with all the resources required, applying all the processes, methods, and skills of project management from PMBOK Sixth Guide.

RECOMMENDATIONS

1. The project manager should develop standard project management initiation and planning documents before the project starts.
2. The OTS should invest in the tools required to complete the quantitative risk.
3. The OTS and the project manager should utilize a documentation management system to organize the project advance, such as MS Project and MS Excel.
4. When the construction starts, the team should follow this project management plan.

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APPENDICES

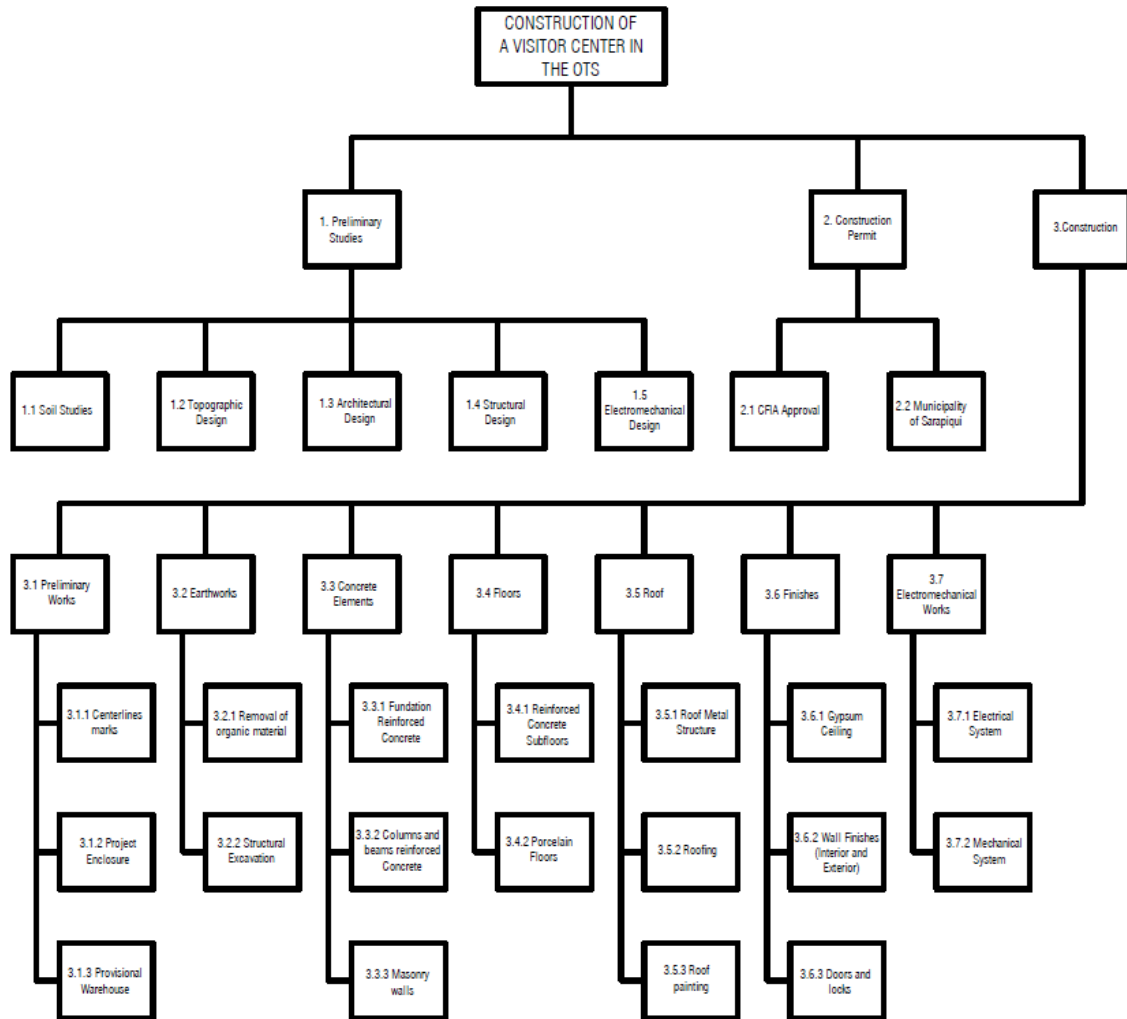
APPENDIX1: FGP Charter

		
PROJECT CHARTER (Formalizes the project start and confers the project manager with the authority to assign company resources to the project activities. Benefits: it provides a clear start and well defined project boundaries)		
Date:	Project Name:	
March 1st, 2020	Project Management Plan for the New Visitor's Center Building of the Organization for Tropical Studies (OTS) in Costa Rica.	
Knowledge Areas / PM Processes:	Application Area (Sector / Activity):	
Project Integration Management Project Scope Management Project Time Management Project Cost Management Project Quality Management Project Human Resource Management Project Risk Management Project Procurement Management Project Communications Management Project Stakeholder Management Processes Groups: Initiatin, Planning, Monitoring and Controlling	Planning Construction Commercial Tourism	
Project Start Date:	Project Finish date:	
March 1st, 2020	September 9th, 2020	
Project Objectives (General and Specific):		
General Objective: Project Management Plan for the New Visitor's Center Building of the Organization for Tropical Studies (OTS) in Costa Rica.		
Specific Objectives:		
<ol style="list-style-type: none"> 1 To create a project charter to formally authorize the project and provide the project manager with the authority to apply organizational resources to the project and to produce the project management plan. 2 To develop a scope management plan to ensure that it includes all the work requires to successfully completing to the project. 3 To create a time management plan to ensure that it includes all the work requires to successfully complete the project is completed within the time constraints. 4 To create a cost management plan to define the processes for developing and managing the project budget that ensures the project is completed within the budget constraints. 5 To develop a quality management plan to identify the quality requirements for the project in order to ensure results meet expectations for approval within the time, cost and scope constraints 6 To create a human resource management plan to ensure that the human resources are identified and managed effectively to complete the project within time, cost and scope constraints 7 To develop a communication management plan to ensure the timely and effective communication of the project status and other key information 8 To create a risk management plan to identify and examine risks to the successful completion of the project and develops plans to minimize the likelihood of the risks. 9 To develop a procurement management plan to be used to obtain products, services or results required by the project 10 To develop a stakeholder management plan to identify and support all the project stakeholders to ensure effective stakeholder engagement. 		

Project purpose or justification (merit and expected results):	
<p>The aim of this Final Graduation Project (FGP) is to create a Project Management Plan for the New Visitor's Center Building of the Organization for Tropical Studies (OTS) in Costa Rica. The project is located in Puerto Viejo of Sarapiquí, Heredia, Costa Rica, and the OTS requires a change of the Visitor's Center Building because they constantly receive professionals and specialists in tropical studies around the world and the existing reception does not present the infrastructure desire to receive all the people that visit the place. So a new Visitor's Center will be built, it may include a coffee shop, a reception, an exhibition room for plants and animals, administration offices, bathrooms and guides offices. It is of great importance that the construction of this reception meets the requirements of the area, and the design is 100% environmentally friendly.</p>	
<p>The project manager will plan the development of the Project Management Plan for the Visitor Center, to meet the cost, time, schedule, and proposed qualities. The project manager together with the project management team understands the importance of planning the process and the project management plan, in order to achieve successful completion of the project.</p>	
Description of Product or Service to be generated by the Project – Project final deliverables:	
<p>The Final graduation Project (FGP) will provide a comprehensive project management plan with all its subsidiary management plans. The Project Management Plan will address all good practices recommended in appropriate bibliographical sources such as the Project Management Body of Knowledge (PMBOK® 6th Edition).</p>	
Scope Management Plan	
Time Management Plan	
Cost Management Plan	
Quality management Plan	
Human Resource Management Plan	
Risk Management Plan	
Procurement Management Plan	
Communications Management Plan	
Stakeholder Management Plan	
Project Charter	
Assumptions:	
1	It is assumed that all the required information to execute this FGP will be readily available.
2	It is assumed that the Organization of Tropical Studies will provide all the project specific information on a timely manner and without any significant restriction to create the Project Management Plan
3	It is assumed that during the construction of the reception the weather will be in good conditions
4	It is assumed that the client is funded sufficiently
5	It is assumed that the project will be designed in one month, and another month for the construction permits.
6	It is assumed that the project will be build with \$80,000.00 USD.
Constraints:	
1	The time of the Project Management Plan is three (3) months.
2	The project duration should not exceed December 2020, the design, permits and construction phase.
3	The project should not have roof drains and downspouts, because of the area the leaves get into the system and block it.
Preliminary Risks:	
1	Weather conditions
2	Township delays
3	Transportation to site
Budget:	
<p>Budget will constitute of financial resources required to print, bind and send to UCI (Universidad para la Cooperacion Internacional)</p>	

Milestones and dates:				
	Milestone	Start date	End date	
1	Introduction	18-May		31-May
2	FGP Charter		18-May	24-May
3	WBS		25-May	31-May
4	Chapter I	18-May		31-May
5	Introduction Chapter		18-May	24-May
6	FGP Schedule		25-May	31-May
7	Chapter II	18-May		24-May
8	Theoretical Framework		18-May	24-May
9	Chapter III	18-May		24-May
10	Methodological Framework		18-May	24-May
11	Signed Charter	18-May		24-May
12	Signed Charter		18-May	24-May
13	Chapter IV	25-May		15-Jun
14	Tutor Assignment		25-May	08-Jun
15	Tutor Assignment		25-May	30-May
16	Review #1	01-Jun		08-Jun
17	FGP Review		01-Jun	08-Jun
18	Review #2	08-Jun		15-Jun
19	Scope Management Plan		08-Jun	22-Jun
20	Schedule Management Plan		08-Jun	22-Jun
21	Cost Management Plan		08-Jun	22-Jun
22	Review #3	22-Jun		06-Jul
23	Quality Management Plan		22-Jun	06-Jul
24	Human Resource Management		22-Jun	06-Jul
25	Communications Management I		22-Jun	06-Jul
26	Stakeholder Management Plan		22-Jun	06-Jul
27	Review #4	06-Jul		13-Jul
28	Procurement Management Plan		06-Jul	13-Jul
29	Risk Management Plan		06-Jul	13-Jul
30	Project Integration		06-Jul	13-Jul
31	Closure - Review #5	13-Jul		29-Jun
32	Conclusions		13-Jul	27-Jul
33	Recommendations		13-Jul	27-Jul
34	Final Evaluation		13-Jul	27-Jul
35	Executive Summary		13-Jul	27-Jul
36	Bibliography		13-Jul	27-Jul
37	Phylogologist Review	27-Jul		03-Aug
38	Phylogologist Review		27-Jul	03-Aug
39	Defense of the FGP - Body Readers	09-Aug		09-Sep
40	Defense of the FGP - Body Readers		09-Aug	09-Sep
Relevant historical information:				
The Organization for Tropical Studies (OTS) exists a little more than 50 years ago; it is a nonprofit consortium between approximately 50 research institutions in seven countries on four continents. In Costa Rica it is located in Puerto Viejo de Sarapiquí, in a tropical forest where it borders the Braulio Carrillo National Park; also, the OTS is a non-profit organization.				
Stakeholders:				
1	Gloriana Ouellette Carrillo			Civil Engineer
2	Alexander Laitano Benavides			Electromechanical engineer
3	Charles Acuna			OET Representant
4	Tropical Biologists			
Approval:				
Project Manager: Gloriana Ouellette Carrillo		Signature:		
Authorized by:		Signature:		

APPENDIX 2: WBS



APPENDIX 3: FGP Schedule

Mod de	Task Name	Duración	Comienzo	Fin	Predecesoras	Nor recu	17 feb '19		19 may '19		18 ago '19		17 nov '19		16 feb '20		17 may '20		16 ago '20		15 nov '20	
							31	15	27	09	22	03	16	28	10	22	05	18	30	12	24	06
1	Final Graduation Project	34 días	lun 24/02/20	vie 03/04/20																		
2	FGP Start	1 día	lun 24/02/20	lun 24/02/20																		
3	1, Graduation Seminar	1 día	lun 24/02/20	lun 24/02/20	2																	
4	1.1, FGP Deliverables	6 días	lun 24/02/20	dom 01/03/20																		
5	1.1.1, Charter	6 días	lun 24/02/20	dom 01/03/20																		
6	1.1.2, WBS	6 días	lun 24/02/20	dom 01/03/20																		
7	1.1.3, Chapter I. Introduction	6 días	lun 02/03/20	dom 08/03/20	5,6																	
8	1.1.4, Chapter II. Theoretical framework	5 días	mar 17/03/20	dom 22/03/20	7,12																	
9	1.1.5, Chapter III. Methodological framework	5 días	lun 23/03/20	dom 29/03/20																		
10	1.1.6, Annexes	22 días	mar 03/03/20	vie 27/03/20																		
11	1.1.6.1, Bibliography	5 días	lun 23/03/20	vie 27/03/20	8																	
12	1.1.6.2, Schedule	5 días	mar 03/03/20	dom 08/03/20	6,5																	
13	1.2, Graduation Seminar approval,	5 días	lun 30/03/20	dom 05/04/20	9,11																	
14	2, Tutoring process	65 días	lun 06/04/20	vie 03/07/20																		
15	2.1, Tutor	3 días	lun 06/04/20	mié 08/04/20																		
16	2.1.1, Tutor assignment	1 día	lun 06/04/20	lun 06/04/20	13																	
17	2.1.2, Communication	2 días	mar 07/04/20	mié 08/04/20	16																	
18	2.2, Adjustments of previous chapters (if needed)	5 días	jue 09/04/20	mié 15/04/20	16,17																	
19	2.3, Charter IV. Development (Results)	47 días	jue 16/04/20	vie 19/06/20	18																	
20	2.4, Chapter V. Conclusions	5 días	lun 22/06/20	vie 26/06/20	19																	

21	2.5, Chapter VI. Recommendations	5 días	lun 29/06/20	vie 03/07/20	20																	
22	Tutor approval	0 días	vie 03/07/20	vie 03/07/20	21																	
23	3, Reading by reviewers	15 días	lun 06/07/20	vie 24/07/20																		
24	3.1, Reviewers assignment request	5 días	lun 06/07/20	vie 10/07/20																		
25	3.1.1, Assignment of two reviewers	2 días	lun 06/07/20	mar 07/07/20	22																	
26	3.1.2, Communication	2 días	mié 08/07/20	jue 09/07/20	25																	
27	3.1.3, FGP submission to reviewers	1 día	vie 10/07/20	vie 10/07/20	26																	
28	3.2, Reviewers work	10 días	lun 13/07/20	vie 24/07/20																		
29	3.2.1, Reviewer	10 días	lun 13/07/20	vie 24/07/20																		
30	3.2.1.1, FGP reading	9 días	lun 13/07/20	jue 23/07/20	27																	
31	3.2.1.2, Reader 1 report	1 día	vie 24/07/20	vie 24/07/20	30																	
32	3.2.2, Reviewer	10 días	lun 13/07/20	vie 24/07/20																		
33	3.2.2.1, FGP reading	9 días	lun 13/07/20	jue 23/07/20	27																	
34	3.2.2.2, Reader 2 report	1 día	vie 24/07/20	vie 24/07/20	33																	
35	4, Adjustments	20 días	lun 27/07/20	vie 21/08/20																		
36	4.1, Report for reviewers	9 días	lun 27/07/20	jue 06/08/20	34																	
37	4.2, FGP update	1 día	vie 07/08/20	vie 07/08/20	36																	
38	4.3, Second review by reviewers	10 días	lun 10/08/20	vie 21/08/20	36,37																	
39	5, Presentation to Board of Examiners	5 días	lun 24/08/20	vie 28/08/20																		
40	5.1, Final review by board	2 días	lun 24/08/20	mar 25/08/20	38																	
41	5.2, FGP grade report	3 días	mié 26/08/20	vie 28/08/20	40																	
42	FGP End	0 días	vie 28/08/20	vie 28/08/20	41																	

APPENDIX 4: Project Renders





APPENDIX 5: Philologist Review Document

San José, August 4, 2020

Universidad para la Cooperación Internacional (UCI)

To Whom It May Concern:

Natalia Alvarado Mata, identification number 305030705, Bachelor in English with a focus on translation, hereby states that the project titled: **PROJECT MANAGEMENT PLAN FOR THE NEW VISITOR CENTER BUILDING OF THE ORGANIZATION FOR TROPICAL STUDIES (OTS) IN COSTA RICA**, carried out by Gloriana Ouellette Carrillo, has been revised.

The project was carried out to obtain the Master in Project Management (MPM) Degree. Aspects such as paragraph form, language quirks in written language, orthography, punctuation, and other aspects related to syntax and grammar were inspected and proofread. Therefore, taking into account the changes that were made, the project is ready to be presented.

Sincerely,

Natalia Alvarado

Natalia Alvarado Mata

English Translator and Proofreader

natalia.alvarado@filologos.cr



**NATALIA
ALVARADO
MATA
(FIRMA)**

Digitally signed by NATALIA ALVARADO MATA (FIRMA)
DN: SERIALNUMBER=CPF-03-0503-0705,
SN=ALVARADO MATA, G=NATALIA,
C=CR, O=PERSONA FISICA,
OU=CIUDADANO, CN=NATALIA
ALVARADO MATA (FIRMA)
Reason: Filólogos CR
Location: Costa Rica
Date: 2020-08-04 15:41:41
Foxit Reader Version: 9.7.1

APPENDIX 6: Contract OTS – Gloriana Ouellette



Organización para Estudios Tropicales

CONTRATO DE PRÁCTICA SUPERVISADA LS N°03-2020

La ORGANIZACION PARA ESTUDIOS TROPICALES (OET), cédula jurídica número 3-013-045269-35, representada por MIGUEL MÉNDEZ GONZÁLEZ, casado, Contador Público, cédula de identidad número 106060307, costarricense, vecino de Santa Ana, San José, Representante Legal, en adelante la ORGANIZACIÓN y Gloriana Ouellette Carrillo, estudiante de Maestría de Project Management, costarricense, vecina de Curridabat, del Archivo Nacional 100 al norte y 25 al este, cédula de identidad número 1-1361-0358; quien en adelante se denominará EL ESTUDIANTE, convienen en celebrar el siguiente contrato de practicante, que se registrá por las siguientes condiciones específicas:

I NATURALEZA DEL CONTRATO

Este contrato busca cumplir los objetivos de LA ORGANIZACION como ente formador de personal profesional en el Área de Ingeniería Civil; al poner a disposición del ESTUDIANTE, instalaciones y equipos con el fin único de apoyar su desarrollo académico y profesional.

II OBJETIVOS Y DURACION DEL PROYECTO ACADEMICO

El presente contrato tiene como objetivo brindar al ESTUDIANTE la oportunidad de realizar el proyecto final de graduación en las instalaciones de la Estación Biológica la Selva.

El objetivo general del Proyecto es la Creación de un plan de gestión del proyecto para la construcción del nuevo Centro de Visitantes de la Organización de Estudios Tropicales (OET) en Costa Rica.

Los objetivos específicos son:

1. Crear una carta del proyecto para autorizar formalmente el proyecto y proporcionar al gerente del proyecto la autoridad para aplicar recursos organizativos al proyecto y producir el plan de gestión del proyecto.
2. Desarrollar un plan de gestión del alcance para garantizar que incluye todo el trabajo requerido para completar con éxito el proyecto.
3. Crear un plan de gestión del tiempo para garantizar que incluye todo el trabajo requerido para completar con éxito el proyecto dentro de las limitaciones de tiempo.
4. Crear un plan de gestión de costos para definir los procesos para desarrollar y administrar el presupuesto del proyecto para garantizar que el proyecto se complete dentro de las restricciones presupuestarias.
5. Desarrollar un plan de gestión de calidad para identificar los requisitos de calidad para el proyecto a fin de garantizar que los resultados cumplan con las expectativas de aprobación dentro de las limitaciones de tiempo, costo y alcance.
6. Crear un plan de gestión de recursos humanos para garantizar que los recursos humanos se identifiquen y gestionen de manera efectiva para completar el proyecto dentro de las limitaciones de tiempo, costo y alcance.



Tel: (506) 2524-0607 | Fax: (506) 2524-0608
Apartado: 676-2050 San Pedro, Costa Rica, Ciudad de la Investigación U.C.R.
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Hecho por: Adriana Molina



Organización para Estudios Tropicales

CONTRATO DE PRÁCTICA SUPERVISADA LS N° 03-2020

7. Desarrollar un plan de gestión de la comunicación para garantizar la comunicación oportuna y efectiva del estado del proyecto y otra información clave.
8. Crear un plan de gestión de riesgos para identificar y examinar los riesgos para la finalización exitosa del proyecto y desarrollar planes para minimizar la probabilidad de los riesgos.
9. Desarrollar un plan de gestión de adquisiciones para ser utilizado para obtener productos, servicios o resultados requeridos por el proyecto.
10. Desarrollar un plan de gestión de partes interesadas para identificar y apoyar a todas las partes interesadas del proyecto para garantizar una participación efectiva de las partes interesadas.

III DURACION

La actividad se desarrollará del 24 de Febrero al 28 de Agosto del 2020, en horario a convenir entre las partes.

IV APOYO FINANCIERO. No se brindará apoyo financiero, la estudiante cubrirá los gastos de diversa índole que se generen objeto de esta práctica. Si se brindará apoyo logístico interno y acceso a la Estación para recopilar la información que requiera para el logro de los objetivos citados.

V LUGAR

EL ESTUDIANTE realizará las actividades relacionadas con este contrato en la Estación Biológica La Selva y oficina personal.

VI INDEPENDENCIA

EL ESTUDIANTE realizará sus actividades formativas, bajo su cuenta y riesgo y con absoluta independencia y autonomía, en consecuencia, LA ORGANIZACION no tiene facultades de dirección y mucho menos de disciplina; aunque sí conserva la facultad de coordinar el objeto de la práctica profesional por medio de Charles Acuña, Administrador financiero y comercial de la estación Biológica la Selva. Al tratarse de una práctica supervisada, el ESTUDIANTE reconoce que no existe ninguna relación laboral con la ORGANIZACION y, por ende, exime a LA ORGANIZACION de cualquier responsabilidad derivada de las disposiciones legales y demás ordenamientos en materia de trabajo y de seguridad social.

EL ESTUDIANTE reconoce que no tiene acceso a *ninguna de los derechos y beneficios laborales otorgados a los funcionarios de LA ORGANIZACION*. *El ESTUDIANTE cuenta con su póliza de riesgos en caso de accidentes, de la cual brindará fotocopia.*

VII RESCISION

Si en la ejecución de este contrato se presentaran atrasos, detención del proyecto, trabajos incompletos e insatisfactorios, o cualquier otro incumplimiento de los objetivos, imputables al ESTUDIANTE, LA ORGANIZACION, podrá dar por resuelto unilateralmente y de pleno derecho el contrato con responsabilidad por daños y perjuicios a cargo del ESTUDIANTE. LA ORGANIZACIÓN notificará por escrito su decisión de rescisión.



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VIII NORMAS DE CONDUCTA

El ESTUDIANTE se conducirá en todo momento en forma compatible con los propósitos y principios de la ORGANIZACION en virtud de este contrato. El ESTUDIANTE no ejercerá ninguna actividad en perjuicio de los mismos.

IX PROTOCOLIZACION Y DOMICILIO DEL CONTRATO

Cualquiera de las partes podrá protocolizar este contrato sin la comparecencia de la otra, corriendo por su cuenta los gastos que tal acto demande. Para efectos judiciales, las partes señalan como domicilio la ciudad de San José, y se someten a la jurisdicción de los tribunales en esa ciudad.

X COORDINACIÓN

El ESTUDIANTE estará bajo la coordinación de su profesor de curso y su contacto en la OET es Charles Acuña.

XI ESTIMACION

Para efectos legales se estima el valor de este contrato en la suma de €0,00 leído por ambas partes, lo aceptan, ratifican y firman, en la ciudad de San José, el 05 de agosto del 2020.

GLORIANA OUELLETTE
CARRILLO
(FIRMA)

Digitally signed by
GLORIANA
OUELLETTE
CARRILLO (FIRMA)
Date: 2020.08.06
16:19:56 -06'00'

Gloriana Ouellette Carrillo
ESTUDIANTE

Miguel Méndez
REPRESENTANTE LEGAL

Charles Acuña Salazar
ADMINISTRADOR



Tel: (506) 2524-0607 | Fax: (506) 2524-0608
Apartado: 676-2050 San Pedro, Costa Rica, Ciudad de la Investigación U.C.R.
www.ots.ac.cr

Hecho por: Adriana Molina