UNIVERSITY FOR INTERNATIONAL COOPERATION
(UCI)

PROJECT MANAGEMENT PLAN FOR THE RESIDENCE # 5 OF ABEDULES CONDOMINIUM CONSTRUCTION

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DEDICATION

This FGP project is dedicated to my parents, Ana Cecilia Loría Loría and Jose Joaquín Brenes Alvarado, for giving me all their faith in God, unconditional trust, love, and full support throughout my life, and for providing me with the most valuable guidelines to be a good person, safe and successful.

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ABBREVIATIONS AND ACRONYMS (GLOSSARY)

- Acueductos y Alcantarillados (AyA)
- CNFL (National Energy Company)
- CSCR 2010 (Electricity Costarricain Institute)
- Chief Executive Officer (CEO)
- Colegio de Ingenieros y Arquitectos de Costa Rica (CFIA)
- EDIFICON (Construction Company)
- Final Graduation Project (FGP)
- ICE (InstitutoCostarricense de Electricidad)
- INVU (Instituto Nacional de Vivienda y urbanismo).
- Ministerio de Ambiente y Energía (MINAE)
- OPA Organisation Process Assests
- Project Management Institute (PMI)
- Project Mnagement Office (PMO)
- RFQ Request for Quote
- Universidad para la Cooperación Internacional (UCI)
- Work Breakdown Structure (WBS)

EXECUTIVE SUMMARY

The general objective of this FGP is to develop a Project Management Plan, framed within the standards of the Project Management Institute (PMI), to manage the building of Condominium Abedules. The specific objectives were: 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 in order to produce the Project Management Plan; to create a scope management plan that included all the work required to successfully complete the Project; to create a schedule management plan which supported the development and management of a project schedule and ensured the Project was completed within the time constraints; to create a cost management plan that defined the processes for developing and managing the project budget and ensured the Project was completed within the budget constraints; to develop a quality management plan that identified the quality requirements for the Project which ensured that results meet expectations for approval within the time, cost and scope constraints; to create a Resource management plan that ensured that all human resources were identified and managed effectively to complete the Project within time, cost and scope constraints; to develop a communication management plan which ensured the timely and effective communication of the project status and other essential information; to create a risk management plan that identified and examined risks for the successful completion of the Project and developed plans to minimize the likelihood of the harmful risks; to develop a procurement management plan that was used to obtain products, services or results required by the Project, and to develop a stakeholder management plan that identified and supported all the project stakeholders and ensured effective stakeholder engagement.

The methodology used for the research was analytical or explanatory. The primary sources used to gather information included A Guide to the Project Management Body of Knowledge (*PMBOK® Guide*) 6th Edition and interviews with the client and performing organization members. The information was analyzed to create each subcomponent of the subsidiary plans to develop the Project Management Plan for Condominium Abedules.

The Project Management Plan, developed using the *PMBOK® Guide* 6thEdition, provided a new methodology for the project team to build a more thorough project management plan for a project as necessary as the Condominium Abedules to improve the company's way of managing the Project. It is recommended that the

project team at Edificon S.A. consider using the planning process and documents developed during the development of the Project Management Plan for the Building of the Condominium Abedules as a basis for implementing a methodology for similar projects in the future. Furthermore, the team at Edificon S.A. should also seek to utilize document management and storage systems to organize, store and create a central location for Project planning documents and future Organizational Process Assets.

One of the main conclusions for this FGP is that at the end of this Project, we can be able to confirm that we achieved to elaborate a Scope Management Plan that was created using the analytical research method and the fifth edition of the *PMBOK® Guide,* to be used as a developmental tool for the Condominium Abedules Project Management team. Moreover, The Project Charter, the first subsidiary element of the Project Management Plan, was created as the deliverable for specific objective number one. Also, to define and specify the Project's scope, the Scope Management Plan captured the information gathered during meetings with project stakeholders and document reviews. The Schedule Management Plan is essential; the output from specific objective number three was created along with the Activity List, Schedule Network Diagram, Resource Assignments table and Project Gantt chart.To create the Cost Management Plan, the output from specific objective number four, a template in Microsoft Excel, was used to develop the project budget adequately. For the Quality Management Plan, the output from specific objective number five, a template was used to identify the Project’s quality management approach, quality requirements/standards, quality assurance and quality control. To fulfill specific objective number seven (Project Communications Plan), a template was used along with a list of all stakeholders and their roles and responsibilities.On the other side, the Risk Management Plan was created using a template. Additionally, a Risk Register was developed along with a qualitative risk analysis to capture and classify project risks to plan effective risk responses. Also, the Procurement Management Plan deliverable was developed using a template to identify the Project’s procurement management approach, types of contracts used and contract approval process. Finally, the Stakeholder Management Plan, developed for specific objective ten, was also developed using a template.

1. INTRODUCTION

This chapter will describe the general scope of the project Abedules Condominium is located in Guayabos, Curridabat. This property with a mountain view is situated near several universities, a few supermarkets, retail stores, cinemas, and many other amenities. This Condominium was built in 2015, is a familiar condominium, and comprises eight subsidiary farms. Currently, four of the potential eight three-level Condominiums have been built, and this Final Graduation Project consists of the implementation of a Project Management plan to improve the fifth condominium construction turnkey project, this is the most critical stakeholder from Condominium Abedules, and we need to achieve the construction best practices, for this Project in general.

1.1. Background

Senior civil engineer Adrián Brenes is in charge of this Project, and it is essential to conclude it in 6 months, which is the established time to build condominium number 5. Currently, he is involved in producing the Project Management Plan that will guide the execution, monitoring, controlling, and closing of the Project.

This Project is the most complex of Condominium Abedules due to accomplishing this construction Project with a high standard of luxury finishings and a time constraint of six months. We strongly believe that following the Project Management Plan created as a result of this research project will significantly improve the Project's success. If completed successfully, it can considerably improve the Condominium standing in the

design-build sector of the residential zone and hopefully increase business opportunities.

There are approximately five (5) residential construction projects in Guayabos. This residential area has specialized in residential design-build construction. By combining professional project management with the construction guidelines, Condominium Abedules Project will improve in all different construction aspects.

1.2. Statement of the problem

Concerning this Condominium project there are construction best practices and several project management elements, specifically management tools, in use to deliver this Project on time:

> In managing the residential property, the role portrayed by a management body is essential to ensure every problem faced solved with the excellent outcome. Therefore, this paper will identify the problems faced by management based on housing performance indicators in managing high rise residential building (Abd-Wahab*et al*., 2015, n.p.).

Due to the time constraint and the high standard finishings of the Project, it is crucial to produce a comprehensive management tool. "Each element of the Project Management Plan will be created, along with all of the tools, techniques, and concepts used to justify each management decision selected for application"

1.3. Purpose

As in every area, including construction, projects fail for several reasons. One of the

main reasons is the failure of the Project Management team to plan the work adequately. In order to increase the successful building of Residence # 5 in Abedules Condominium, the Project Manager will seek to develop the Project Management Plan by detailing the management of all critical aspects of the Project. Each step is to be coordinated strategically to develop all subsidiary documents, which will be used as a guide during project execution. The research proposal will explore the Project Management Institute's (PMI) Guide to effectively create a Project Management Plan, justifying the decisions made while developing the Project regarding integration, scope, time, cost, quality, human resources, communication, risk, procurement, and stakeholder management plans.

1.4. General objective

To develop a Project Management Plan framed within the standards of the Project Management Institute to manage the building of residence # 5 in Abedules Condominium.

1.5. Specific objectives

- To elaborate a project charter that formally authorizes the Project and provides the project manager with authority to apply organizational resources to the Project to produce the project management plan.

- To organize a scope management plan to ensure that all works required are included to complete the Project successfully.

- To set up schedule management, elaborating a project schedule that ensures the Project is completed within the time constraints.

- 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.

- To implement a quality management plan to identify the quality requirements for the Project to ensure the results meet expectations for approval within the time, cost, and scope constraints.

- To establish a Resource management plan to ensure that all human resources are identified and managed effectively to complete the Project within time, cost, and scope constraints, including equipment , rentals and materials resources as well.

- To develop a communication management plan to ensure the timely and effective communication of the project status and other essential information.

- 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.

- To develop a procurement management plan to be used to obtain products, services or results required by the Project.

- To define a stakeholder management plan to identify and support all the project stakeholders to ensure effective stakeholder engagement.

2. THEORETICAL FRAMEWORK

This chapter will provide information regarding the mission and vision of this project, and also will describe the respective project processes and the differents knowledge areas. Condominium Abedules has an engaged Project team committed to teamwork and open project leadership. Construction of Condominium # 5 is the most complex Project from Condominium Abedules, due primarily to accomplish this construction Project with a high standard of luxury finishings and a time constraint of six months. We strongly believe that following the Project Management Plan created as a result of this research project, it is expected that project success will improve significantly. If completed successfully, it can considerably improve the Condominium standing in the design-build sector of the residential zone and hopefully increase business opportunities. Therefore, a more comprehensive strategy for project execution is required to complete this project. With this in mind, the Managing Director has agreed that a more comprehensive project management plan must be produced.

2.1 Company / Enterprise framework

2.1.1 Company / Enterprise background

This Project team from Condominium Abedules was contracted to work on this Project because it has the technical expertise and experience to complete the Project, and it is the most cost-effective.

2.1.2 Mission. . (Own authorship)

The Condominium Abedules Project Team have as his main objective to provide the best customer experience regarding the overall construction process , managing in the most effective way , every process, in order to achieve the best possible result at the end of the construction process.

Our main goal is to accomplish customer expectations regarding time, quality and cost , that was agreed with every customer in the respective contract, by managing every project with the required work structure , and every related construction process controls , in order to provide the entire customer satisfaction and trust.

2.1.3 Vision . (Own authorship)

Our vision is to establish an organized and structured workforce , where every project member , including architects, engineers , foremans, and every employee in general is able to grow and develop his profesional background on the must efficient , respectfull and high performance environement.

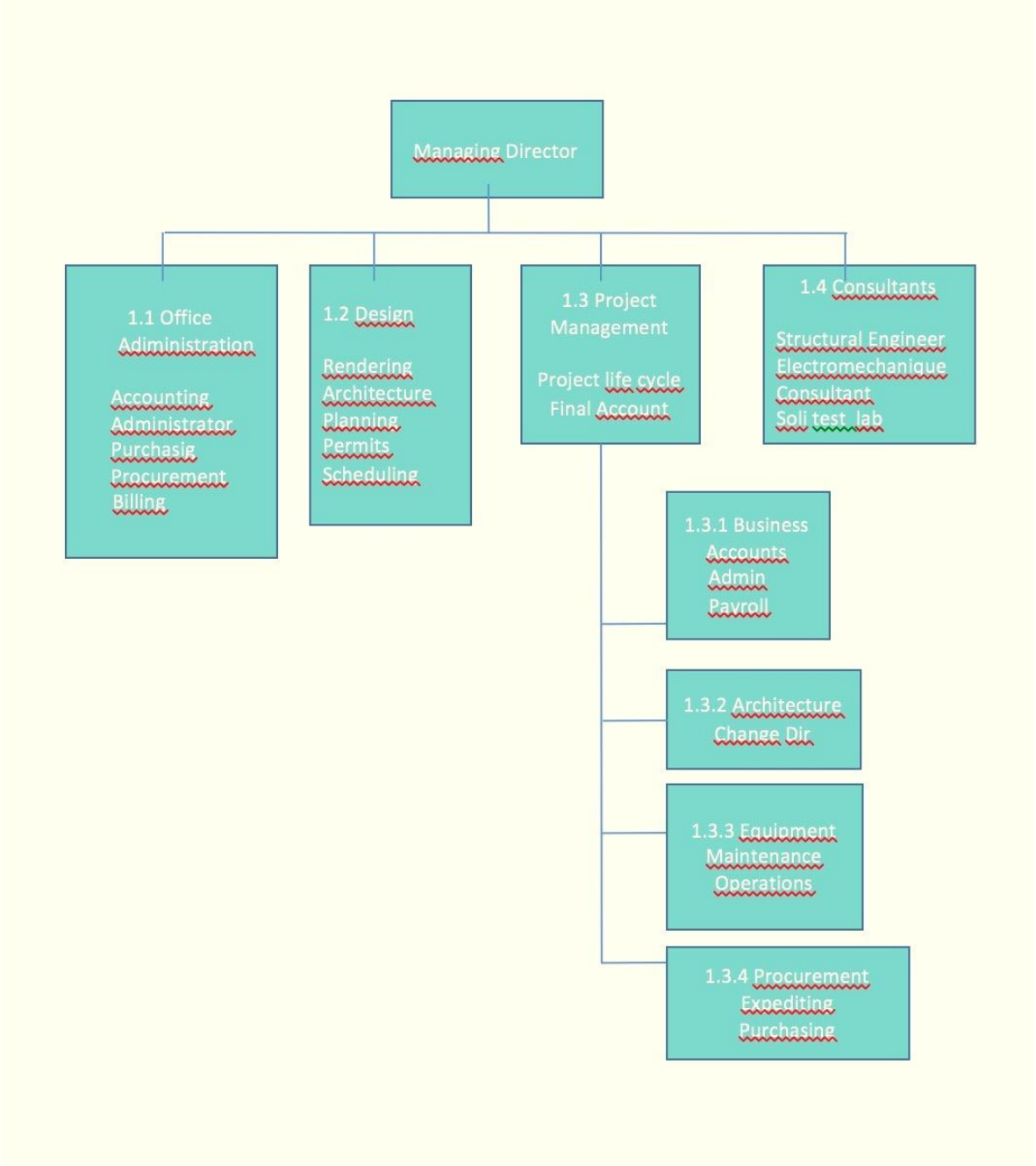
2.1.3 Organizational structure

Currently, Condominium Abedules is a relatively small project team that was organized, retooled, and restructured to execute Condominium # 5 construction. This Project team is currently staffed with eleven (16) full-time employees, which can increase to twenty (18) operational and project management team members while executing the Condominium Abedules construction. The numbers identified do not include subcontracted on site.

Below, in **Figure 1,** the Project team organizational structure is depicted. This project team is headed by Engineer Adrián Brenes, Project Director, lead architectal and administrative functions as well. There are four central departments: Office Administration which consists of three (3) persons; Architecture consisting of three (3) persons; Project Management which consists of four (4) persons; and a list of consultants that are contracted on a need's basis.

Figure 1

Organizational Chart PMBOOK GUIDE 7th version



2.1.4 Products offered

Condominium Abedules construction team offers the following services: design-build, general construction, architecture and engineering services, project management, 3D illustrations and presentations, land development services, furniture and interior designs, project feasibility studies and analysis, architectural surveying, and as-built drawings.

2.2 Project Management concepts

2.2.1 Project

A project can be defined as: "A temporary endeavour undertaken to create a unique product, service, or result" (Project Management Institute, 2017, as cited in Ouellette Carrillo, 2019, p.17). The temporary nature of projects indicates a definite beginning and end . Temporary does not necessarily mean a project has a short duration . A project´s end is reached when the objectives have been achieved or when the project is terminated because its objectives will not or cannot be met, or when the need of the project no longer exists.The decision to terminate a project requires approval and authorization by an appropriate authority.In construction: "Many projects are completed using either 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 the building of a tangible structure" .

Project management is the application of knowledge ,skills , tools and techniques to project activities to meet project requirements . Project management is accomplished trough the appropriate application and integration of the project management processes identified for the project.

Managing a project typically includes but is not limited to :

- Identifying project requirements
- Addresing the various needs, concerns and expectation of stakeholders.
- Establishing and maintaining active communication with stakeholders.
- Managing resources.
- Balancing the competing project constraints , wich include , but not limited to:

    - Scope
    - Schedule
    - Cost
    - Quality
    - Resources
    - Risk

Project circumstances will influence how each project management process is implemented and how the project constraints are prioritized.

At the same time, it is known that project management applies to a specific product and can also result in improved services and tangible or intangible results. In addition, unlike construction management, project management also applies to other fields such as information technology, education, health care and construction (Odain Walker, 2020).

> The Project Management Institute has developed the *Construction Extension to the PMBOK® Guide*. This version provides generalized project management guidance applicable to most projects most of the time. In order to apply this generalized guidance to construction projects. This *Construction Extension* provides construction-specific guidance for the project management practitioner for each of the *PMBOK® Guide Knowledge* Areas, as well as guidance in these additional areas not found in the *PMBOK® Guide*:
>
> All project resources, rather than just human resources.
>
> Project health, safety, security, and environmental management.
>
> Project financial management, in addition to the cost.
>
> Management of claims in construction.

This edition of the *Construction Extension* also follows a new structure, discussing the principles in each Knowledge Areas rather than the individual processes. This approach broadens the applicability of the *Construction Extension* by increasing the focus on what and why of construction project management. This *Construction Extension* also includes discussion of emerging trends and developments in the construction industry that affect the application of project management to construction projects (Project Management Institute, 2017, n.p.).

Project Condominium Abedules has two definitions regarding the Project owner. One is based on an architectural viewpoint, and the other is based on a contractor's viewpoint. As the company specializes in the design-build process, the owner explains both definitions of a project as follows:

A. As an architect, the owner defines a project as planned work that is finished to the desired result with cost, time, quality, and aesthetic controls.

B. As a contractor, the owner defines a project as an endeavor that involves planning, executing, and closing with the delivery of a product that adheres to the cost, time, quality, and aesthetic controls agreed upon in the contract.

2.2.2 Project management

According to PMBook Guide (2017). A project is a temporary endeavor "Project management has evolved into a business process" (Kerzner, 2013, p.xxiii), being used by companies worldwide to increase corporate value in many ways. For example, it can efficiently deliver services, enhance customer satisfaction, and as a tool to embrace opportunities to expand services (Picariello, 2014). The approach has been used for: "Thousands of years dating back to the Egyptian epoch" (Appopardi, n.d.). However, the discipline was not formally recognized until the 1950s (Project Management, 2016). Within every sector, specifically construction, the discipline of project management is integral to success. According to PMI: "Ninety percent of global senior executives ranked project management methods as either critical or somewhat important to their ability to deliver successful projects and remain competitive" (Project Management Institute, 2016, p.2).

According to Vargas Soto (2020):

In the field of project management, different methodologies, like SCRUM, Agile, Waterfall, etc., contain guiding processes for those who are doing project management (Successful Projects, 2016, n.p.). Although, each methodology has its advantages, they all agree that every project management life cycle contains five steps: initiating, planning, execution, monitoring, and controlling & closure (Picariello, 2015, n.p.). After initiating the Project, planning is seen as the all-important second step of any successful project management life cycle (Picariello, 2015, s. p.). A project's plan, depending on the

Project, can be simple or complex. However, in all cases, once completed, it results in a document that contains a fully developed project solution detailing the steps necessary to meet the Project's objectives (Watt, 2014, n.p.) (p.7).

PMI's *PMBOK® Guide (2017)* is a globally recognized standard that details how to initiate, plan, execute, monitor, control and close a project. It can be used as a tool to ensure that all project management professionals speak the same language and understand the stages and roles of the Project. For this reason, the *PMBOK® Guide* will be used as the primary source of reference to manage the development of the Project Management Plan and, subsequently, the building of a three-level condominium.

According to PMI: "Project management is the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements" (Project Management Institute, 2016, p.8). The Final Graduation Project (FGP) development will create the Project Management Plan for building a three-level Condominium # 5 and will be managed as a project. After which, the construction of the Abedules Condominium # 5 project will be managed as another project with six (6) phases. Each phase is identified below:

1. PHASE 1: Initiation Phase 2. PHASE 2: Design Phase 3. PHASE 3: Planning Phase 4. PHASE 4: Construction 5. PHASE 5: Post Construction Phase 6. PHASE 6: Project Closure.

A project phaseis a collection of logically related project activities that culminates in the completion of one or more deliverables. The phases in a life cycle can be described by a variety of attributes . Attributes may be measurable and unique to a specific phase.

Attributes may include but are not limited to:

- Name
- Number
- Duration
- Resource requirements
- Enhance criteria for a project to move into that phase
- Exit criteria for a project to complete a phase.

Projects may be separated into distinct phases or subcomponents are generally given names that indicate the type of work done in that phase . Examples of phase names include but not limited to:

- Concept development
- Feasibility study
- Customer requirements
- Solution development
- Design
- Prototype
- Build
- Test
- Transition
- Commissioning
- Milestone review
- Lessons learned.

The project phases may be established based on various factors incuding , but not limited to:

- Management needs
- Nature of the project
- Unique characteristiques of the organization, industry or technology
- Projects elements including , but not limited to , technology, engineering, business , process or legal.
- Decision points

Using multiple phases may provide better insight to managing the project . It also provides an opportunity to asses the project performance and take necessary corrective or preventive actions in subsequent phases.

2.2.3 Project Management Processes

The project life cycle is managed by executing a series of project management activities known as project management processes . Every project management process produces one or more outputs form one or more inputs by using appropriate project management tools and techniques . the output can be a deliverable or an outcome. Outcomes are an end result of a process. Project management processes apply globally across industries.

The number of process iterations and interactions between processes varies based on the needs of the project . Processes generally fall into one of three categories:

- **Processes used once or at predefined points in the project** . These processes Develop project charter and close project or phase are examples.
- **Processes that are performed periodically as needed** . The process Acquire Resources is performed as resources are needed. The process Conduct Procurements is performed prior to needing the procured item.
- **Processes that are performed continuously throughout the project** The process Define Activities may occur throughout the project life cycle,especially if the project uses rolling wave planning or an adaptive development approach.Many of the monitoring and control processes are ongoing from the start of the project, until it is closed out.

Project management is accomplished through the appropriate application of logically grouped management processes. While there are different ways of grouping processes, the PMBOK guide 2017 groups processes into five categories called Process Group.

- **Initiating Process group .** Those processes performed to define a new project or new phase of an existing project by obtaining authorization to start the project or phase.
- **Planning Process Group .** Those processes required to establish the scope of the project , refine the objectives , and define the course of action required to attain the objectives that the project was undertaken to achieve
- **Executing Process Group .** Those processes performed to complete the work defined in the project management plan to satisfy the project requirements.
- **Monitoring and Controlling Process group .** Those processes required to track , review, and regulate the progress and performance of the project ; identify any areas in wich changes to the plan are required ; and initiate the corresponding changes.
- **Closing Process group .** Those processes perfomed to formally complete or close the project , phase or contract.

2.2.3.1 Project Management Knowledge areas

- In addition to Processes Groups , processes are also categorized by knowledge areas. A knowledge area is an identified area of project management defined by its knowledge requirements and described in terms of its component processes, practices ,inputs , outputs, tools and techniques.

  The ten Knowledge areas identified in this guide are used in most projects most of the time. The ten Knowledge areas described in this guide are:

  According to , https://projectmanagementsheets.com/the-10-knowledge-areas-of-the-pmbok-guide/ , we have the following 10 knowledge areas:

1. Integration Management

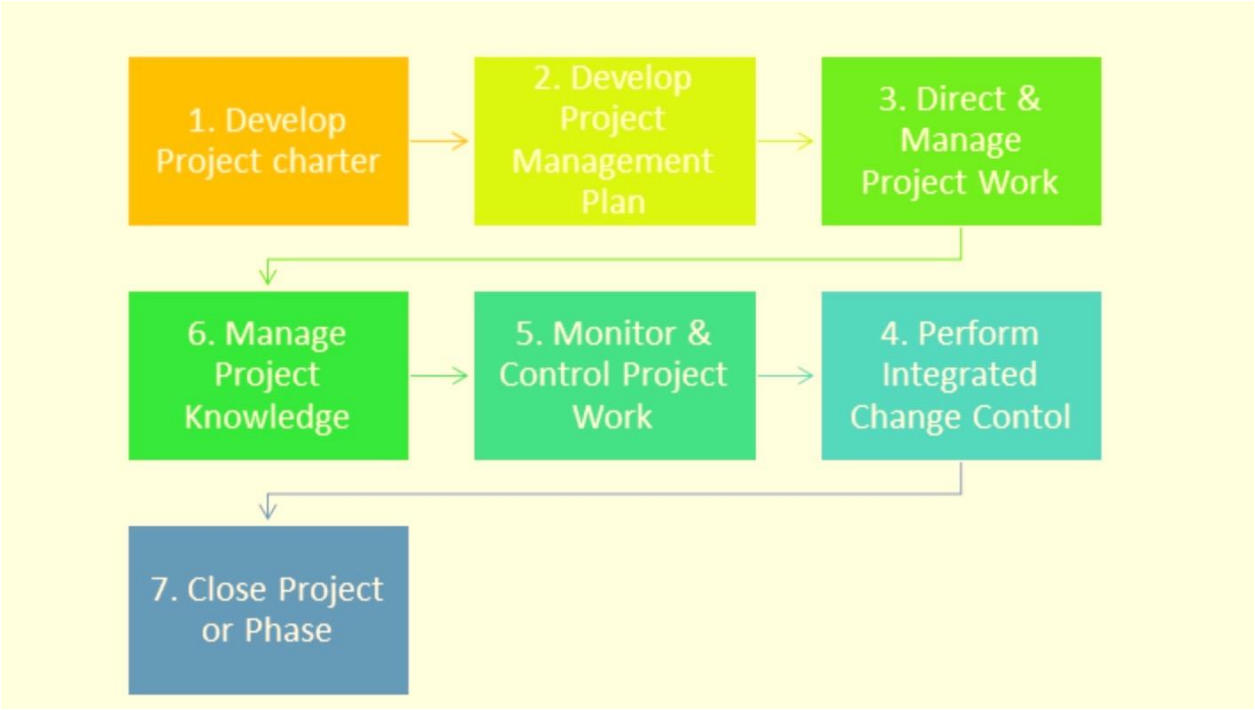
According to the Cambridge dictionary, the definition of integrate is “to combine two or more things in order to become more effective”.

Project Integration Management is the only knowledge area that has at least one process in the five project management process groups. The project manager is specifically responsible for integration management, and this knowledge area cannot be delegated or transferred (PMBOK Guide, pg 72).

All the knowledge areas are connected. If you make a change in one area, then generally, you need to revisit other knowledge areas. Without effectively integrating all the other project areas, the project plan is guaranteed to fail. A critical skill is to balance competing demands effectively.

Figure. 2

Project Integration Management Processes (PMBOK Guide, 2017)



3. **Scope Management**

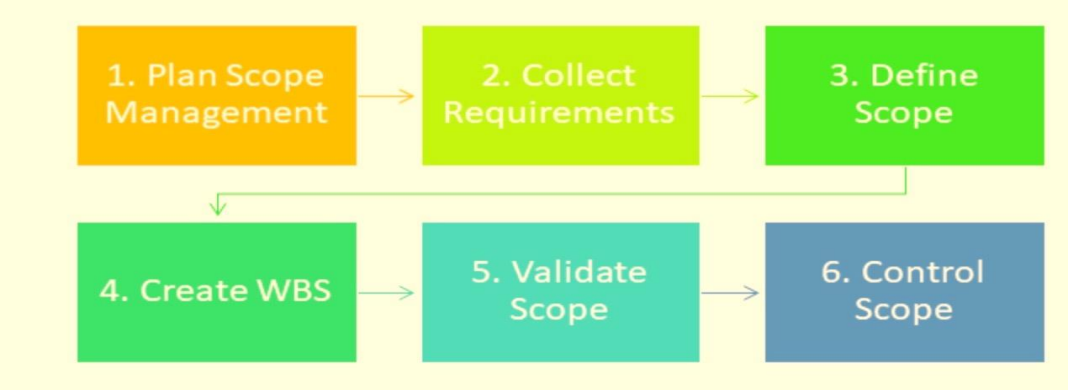
According to Lidl Ireland (2013):

The planning of project scope management was conducted after the Stakeholder Management Plan was completed. It was the first of the planning process group processes to occur, following the development of the Project Charter, Stakeholder Register, and Procurement Management Plan, respectively (n.p.).The scope management plan is critical to ensure the project clearly spells out what work is included and what is not included. It is important to ensure that only the required work to achieve the project objectives is done. Equally, it is important that the project manager and the business analyst/sponsor collaborate to clearly define the requirements of the project. This will increase the likelihood of the project succeeding and meeting expectations. In Scope management, there can be two components:

1. **Product Scope** – refers to the features functions of the end deliverable.
- **Project Scope** – This includes the product scope and includes all the work required to achieve the deliverable

Figure. 3

Project Scope Management Processes (PMBOK Guide, 2017)

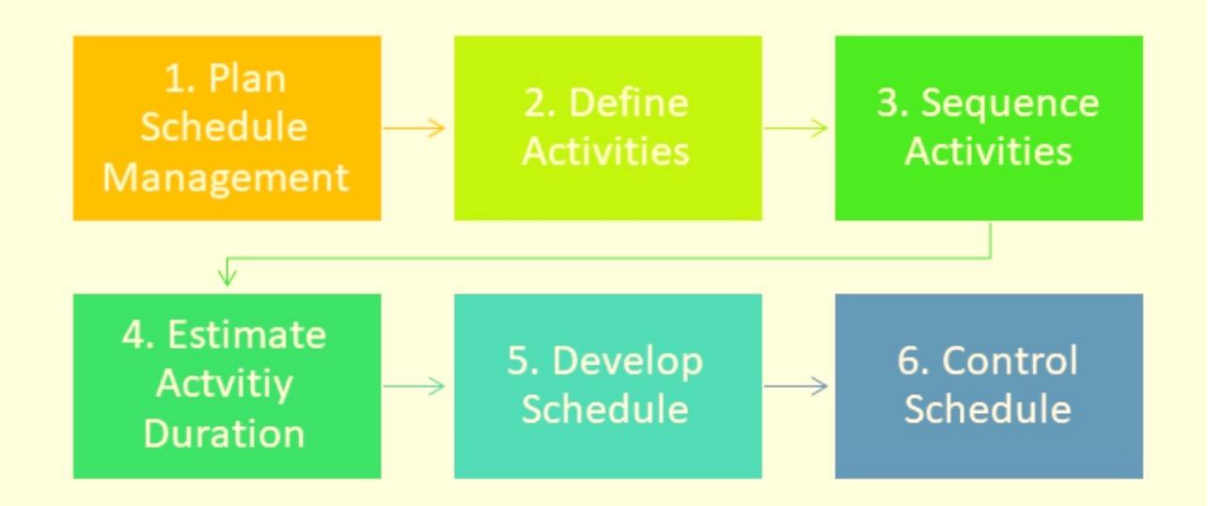


3. Schedule Management

Scheduling is the process of managing the time to complete the project. It is a detailed plan that can be used to communicate how and when project deliverables will be achieved. Furthermore, the project schedule is a communication tool that is used to report on the project's performance both to the project team and the stakeholders.Managing the critical path of a project can ensure that schedule delays are quickly identified, and corrective actions are implemented. Always know what is on your critical path and be aware of delayed tasks that can end up being on the critical path, as you can have more than one critical path depending on the type of project. (Kanban).An interesting or scary fact: Only 34% of organizations complete projects on time.

Figure .4

Schedule Management Processes (PMBOK Guide, 2017)



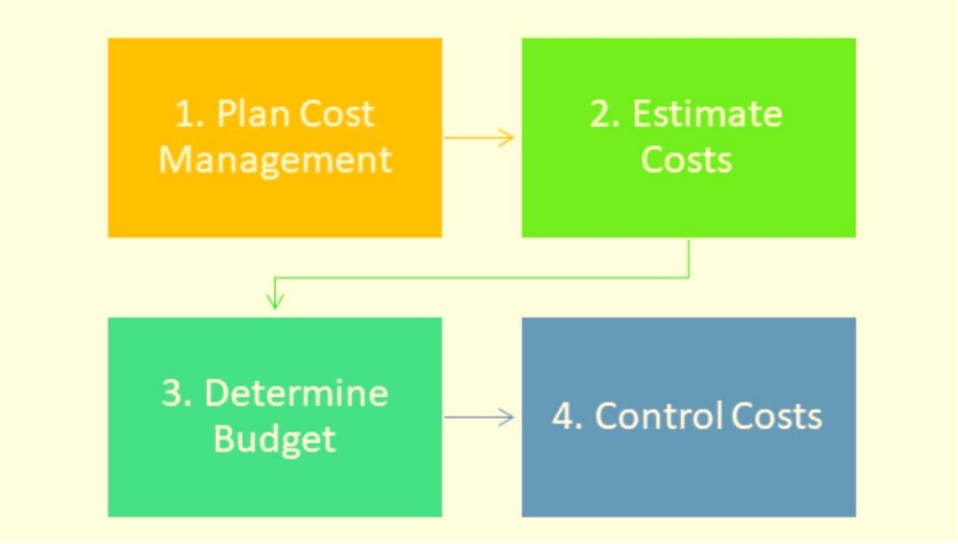
4. Cost Management

Project Cost management planning how costs will be estimated, managed and controlled throughout the project. Many projects go over budget, with only 34% of organizations meeting their budgets.

An important aspect is to manage and control the costs by frequently reviewing and projecting the project costs. Earned Value Analysis is a standard approach used in the PMBOK Guide. Additionally, the planning and monitoring might include calculations such as payback periods, cash flow analysis and internal rate of return, etc.

Figure 5

Project Cost Management Processes (PMBOK Guide, 2017)



5. Quality Management

Project's fail when quality is not achieved. The Quality Management Plan defines how the organizations quality management plan will be incorporated into the project. It is also critical that the plan address the quality control, verification and validation of the project's deliverables in order to meet stakeholder's expectations.

1) Overworking the team to meet customer requirements leads to errors, rework, employee attrition and decreased profits

2) Rushing quality inspections to meet the project schedule leads to undetected faults, errors, post-implementation risks, rework, decreased profits and unsatisfied clients

Figure 6

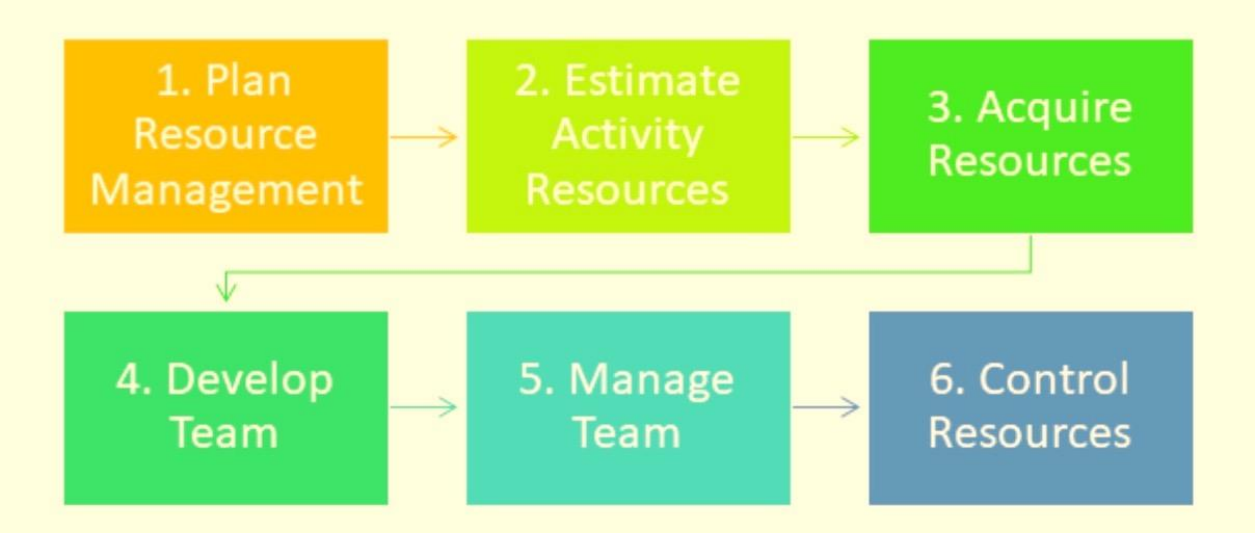
Project Quality Management Processes (PMBOK Guide, 2017)

6. Resource Management

Resource management includes physical resources such as equipment, material and facilities and human (personnel) resources. As a project manager, you are expected to manage and lead the project team. Servant leadership is a developing trend where leaders focus on removing obstacles for their team, provide them with the tools and resources they require and ensure that they develop their skills and knowledge. This is in line with the collaborative management approach that empowers teams to make decisions.

Figure 7

Project Resource Management Processes (PMBOK Guide, 2017)



7. Communications Management

Communication separates the best project managers from the average. The communication plan defines the strategy on how to ensure effective communication with all stakeholders (PMBOK Guide, 2017).

Project managers spend most of their time communicating. Communication can take different forms, and it is important to analyze all stakeholders' communication requirements. It is also important to ensure that the correct and required information is shared with the relevant stakeholders.

Figure 8

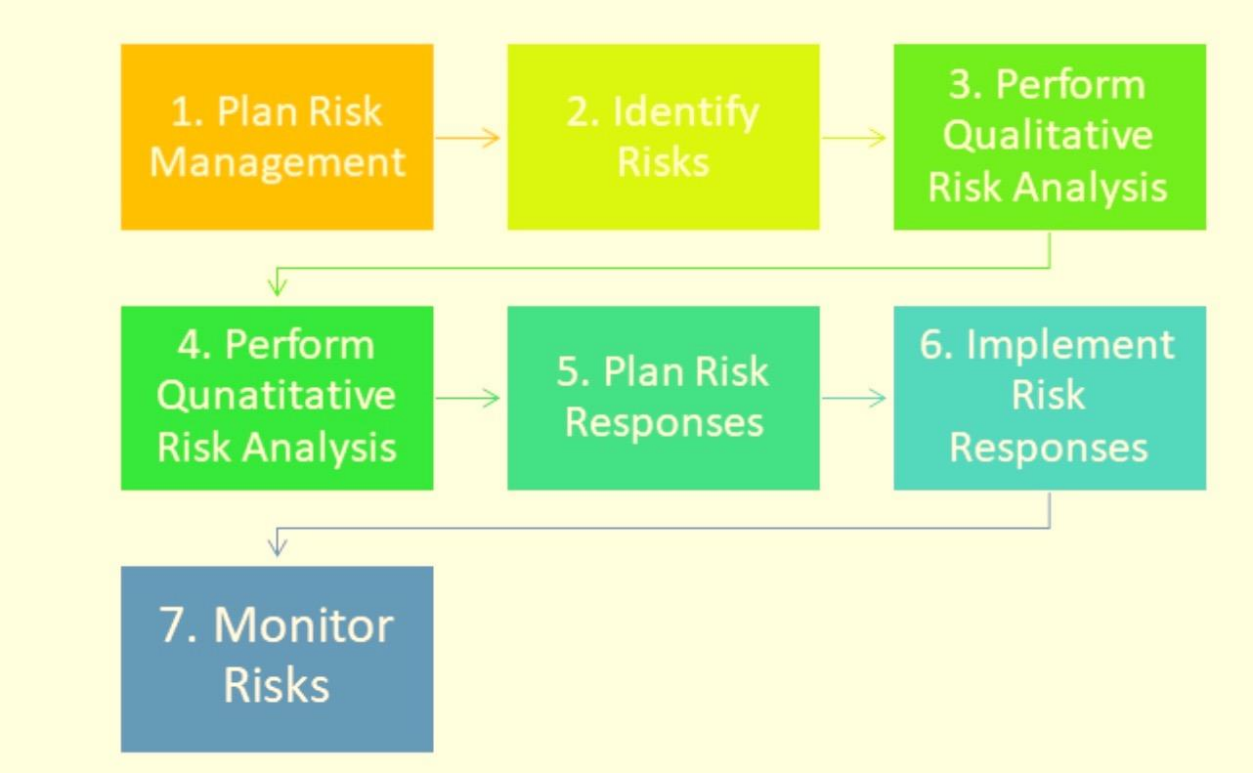
Communication Management Processes (PMBOK Guide, 2017)

8. Risk Management

The objectives of the risk management processes are to identify and analyze risks. These risks are either positive or negative. An important part of the risk management process is developing risk mitigation strategies to remove or reduce the probability or impact of the risk. There are two types of risks in a project: 1) Individual risk – This risk can be a positive or negative event that affects certain project deliverables. 2) Overall project risk – This relates to the whole project and includes individual risks defined above.

Figure 9

Risk Management Processes *(PMBOK Guide, 2017)*



9. Procurement Management

Procurement plays a critical role in all projects and has a direct effect on costs, schedules and resources. The procurement management process involves buying and sourcing products, materials, services and even human resources external to the project.

The process also covers important procurement aspects such as contracts, purchase orders, service level agreements, etc.

Figure 10

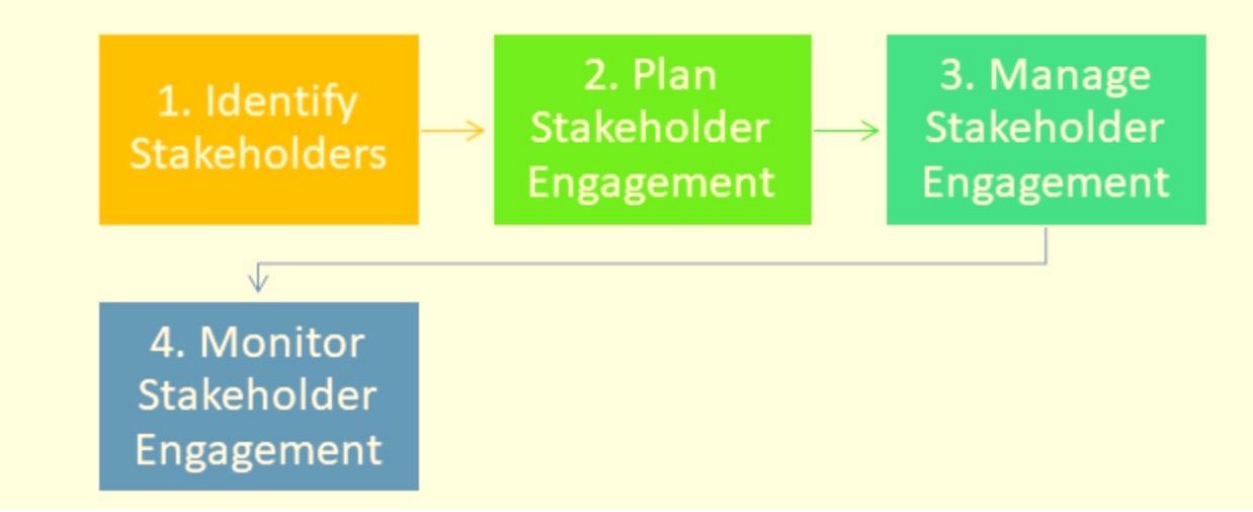
Procurement Management Processes (PMBOK Guide, 2017)

10. Stakeholder Management

The project stakeholder management processes focus on identifying everyone in the project who could impact the project and everyone who will be impacted by the project. It involves understanding their expectations and developing a stakeholder engagement plan to manage their expectations. The value of stakeholder collaboration should be captured, which can be negative or positive.

Figure 11

Stakeholder Management Processes (PMBOK Guide, 2017)



2.2.3.2. Project Management Process Groups

This standard describes the project management processes employed to meet project objectives. Project management processes are grouped in five Project management Process Groups.

- **Initiating Process Group.** The processes performed to define a new project or a new phase of existing project by obtaining authorization to start the project or phase .
- **Planning Process Group.** The processes required to establish the scope of the project , refine the objectives , and define the course of action required to attain the objectives that the project was undertaken to achieve.
- **Executing Process Group .** The processes performed to complete the work defined in the project managementplan to satisfy the project requirements .
- **Monitoring and Controlling Process Group .** The processes required to track , review , and regulate the progress and performance of the project , identify any areas in wich changes to the plan are required , and initiate the corresponding changes .
- **Closing process group .** The processes performed to formally complete or close a project , phase , or contract . Like for example a Punch List for final phase of the project to achieve the project completion and termination.

These five Process groups are independent of the application areas, (such as marketing , information services, or accounting) or industry focus (such as construction , aerospace, telecommunications) . Individual processes in the Process Groups are often iterated prior to completing a phase or a project . The number of process iterations and interactions between processes varies based on the needs of the project . Processes generally fall into one of three categories:

- **Processes used once or at predefined points in the project** . Developing the project charter and closing the project or phase are examples.
- **Processes that are performed periodically as needed.** Acquiring resources is performed when resources are needed. Conducting procurements will be performed prior to needing the procured item.
- **Processes that are performed continuously throughout the project.** Defining activities may occur throughout the project life cycle, especially when the project uses rolling wave planning or an adaptive development approach . May of the monitoring and control processes are ongoing from the start of the project , until is closed out.

The output of one process generally becomes an input to another process or is a deliverable of the project or project phase . For example , the project management plan and project docuements, produced in the Planning Process Group are provided to the Executive Process Group where updates are made . Figure 12. , illustrates an example of how Process Group can overlap during a project or phase.Process Groups are not project phases . If the project is divided into phases , the processes in the Process Groups interact within each phase. It is possible that all Process Groups could be represented within a phase , as illustrated in Figure 12 , As projects are separated into distinct phases , such as concept development , feasibility study, design , prototype , build , or test , etc, processes in each of the Processes Groups are repeated as necessary in each phase until the completion criteria for that phase have been satisfied.

Figure 12

Example of Process Group Interactions within a Project or Phase

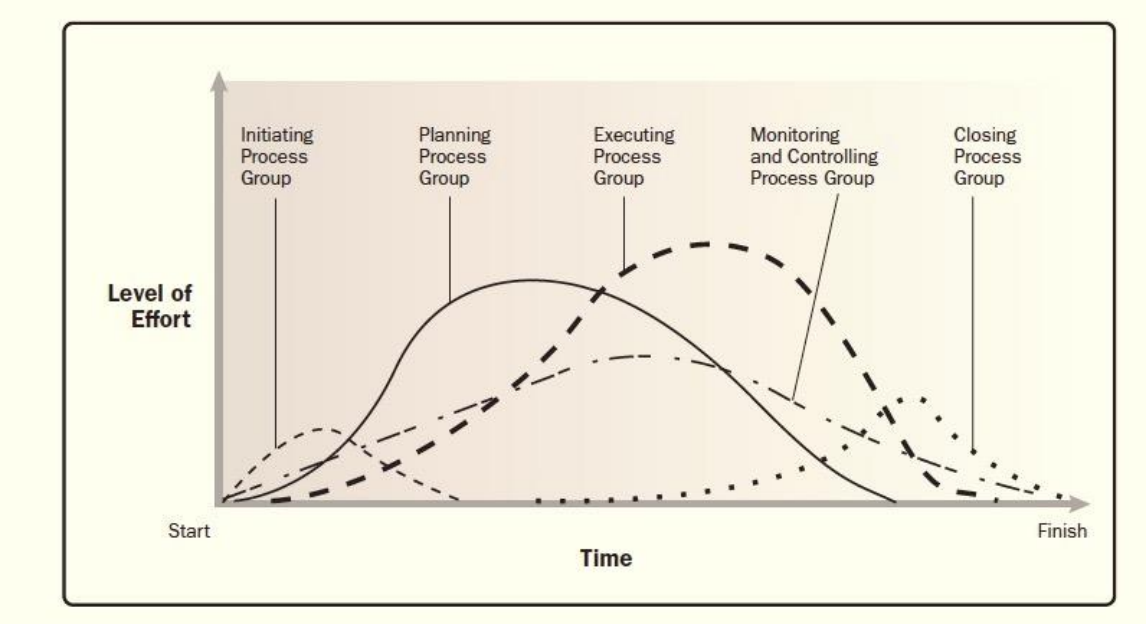


Chart 1

Project Management Processes Group and Knowledge area mapping

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	

During the project's initiation phase to develop the Project Management Plan for the three-level Condominium # 5, the Project: "Will commence with the creation of the project charter. Once the charter is reviewed, accepted, and formally authorized by the sponsor, the formal identity of the Project Manager will be revealed, authorizing her to apply organization resources to project activities" (Project Management Institute, 2016, p.71).

The initiation, planning, execution, monitoring and controlling & and closing phases (stages) for creating the Project Management Plan will occur during the development of the FGP, following the sequential progression of each subsidiary seen in **Figure 2** shown in the following subsection.

2.2.3 Project life-cycle

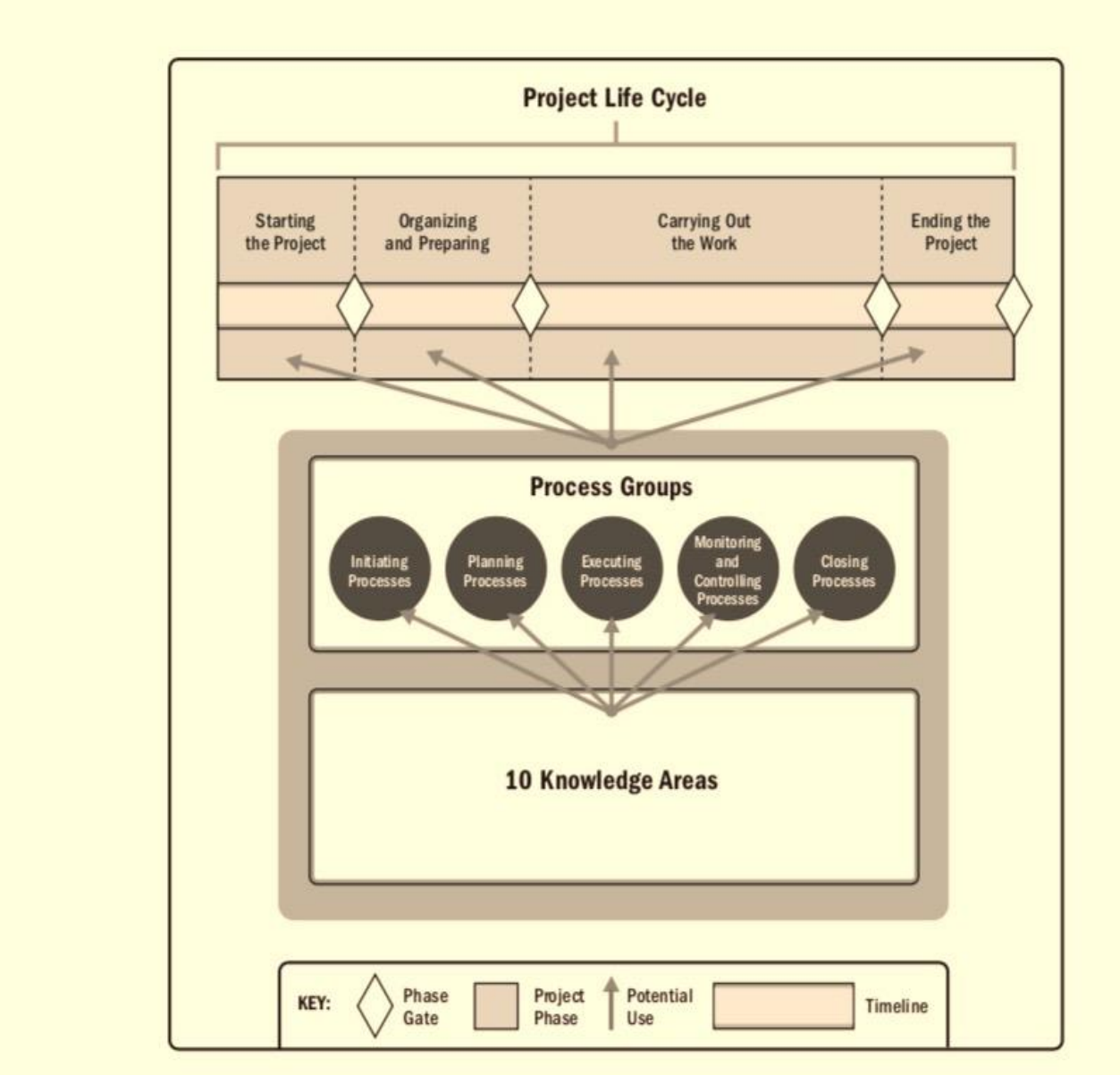
A project life-cycle is a: "Series of phases that a project passes through from its initiation to its closure" (Project Management Institute, 2016, p.9). According to Wilson

The project life-cycle is a "natural progression" and the four main stages(phases) in a project life-cycle are concept and approval, planning and preparation, executing work activities, and closing all project activities (Wilson, 2014). However, the *PMBOK® Guide* states that five process groups interact with one another within each phase of a project life-cycle and: "Could be conducted within a phase" (Project Management Institute, 2017, p.419).

As shown in **Figure 2** below, at Condominium Abedules, the project life-cycle takes on a "natural progression" in that there are clearly defined phases, where one progresses into another. Moreover, at Condominium Abedules Project, each clearly defined progressive phase has a sequence of activities similar to the process groups seen in **Figure 3** below.

Figure 13

Project life cycle stages of progression



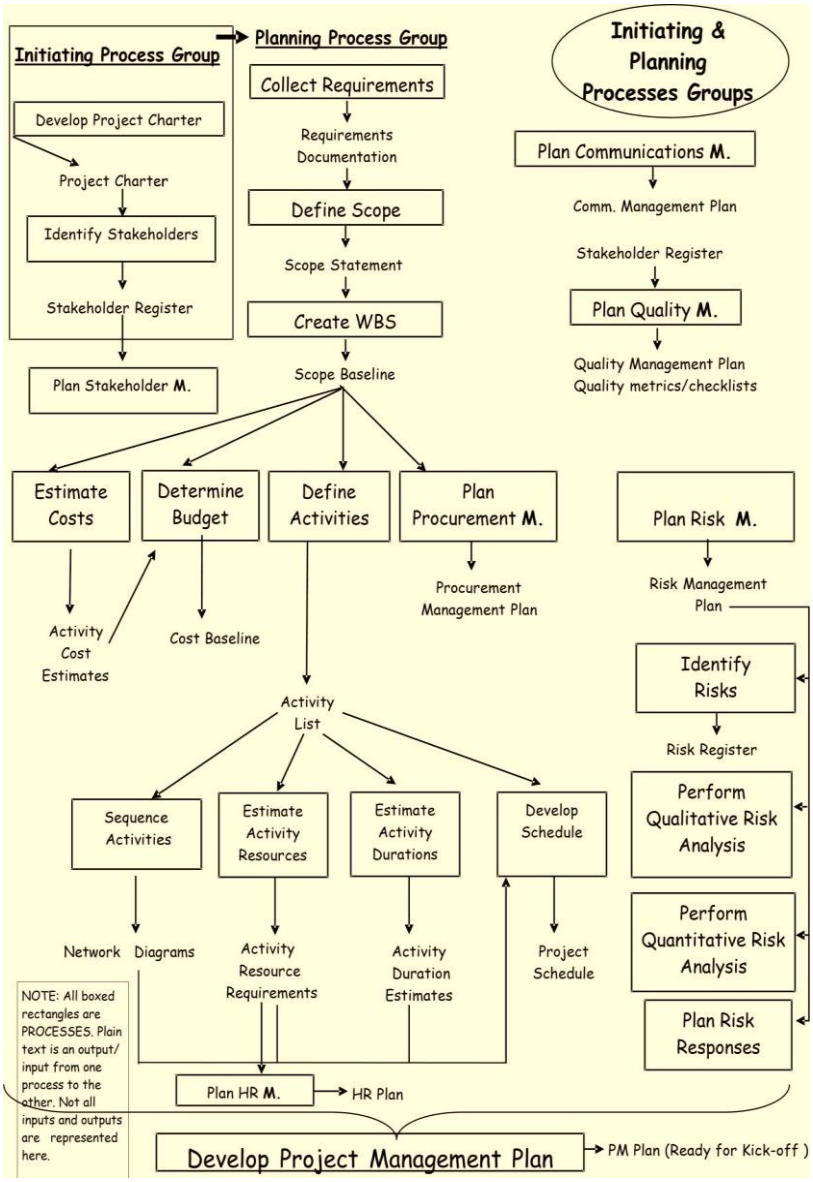
Note. *Mastering Project Management Strategy and Processes* **(p.12), by R. Wilson, 2015, F.T. Press. Copyright 2015 by Randal Wilson**.

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 building Condominium Abedules. The Project Management Plan will be a compilation of subsidiary documents created due to each initiating and planning process activity. A subsidiary document is a document created to support the main document (Project Management Institute, 2017). See**Figure 4** below, detailing a total of 49 processes to be applied during this Project.

Figure 14

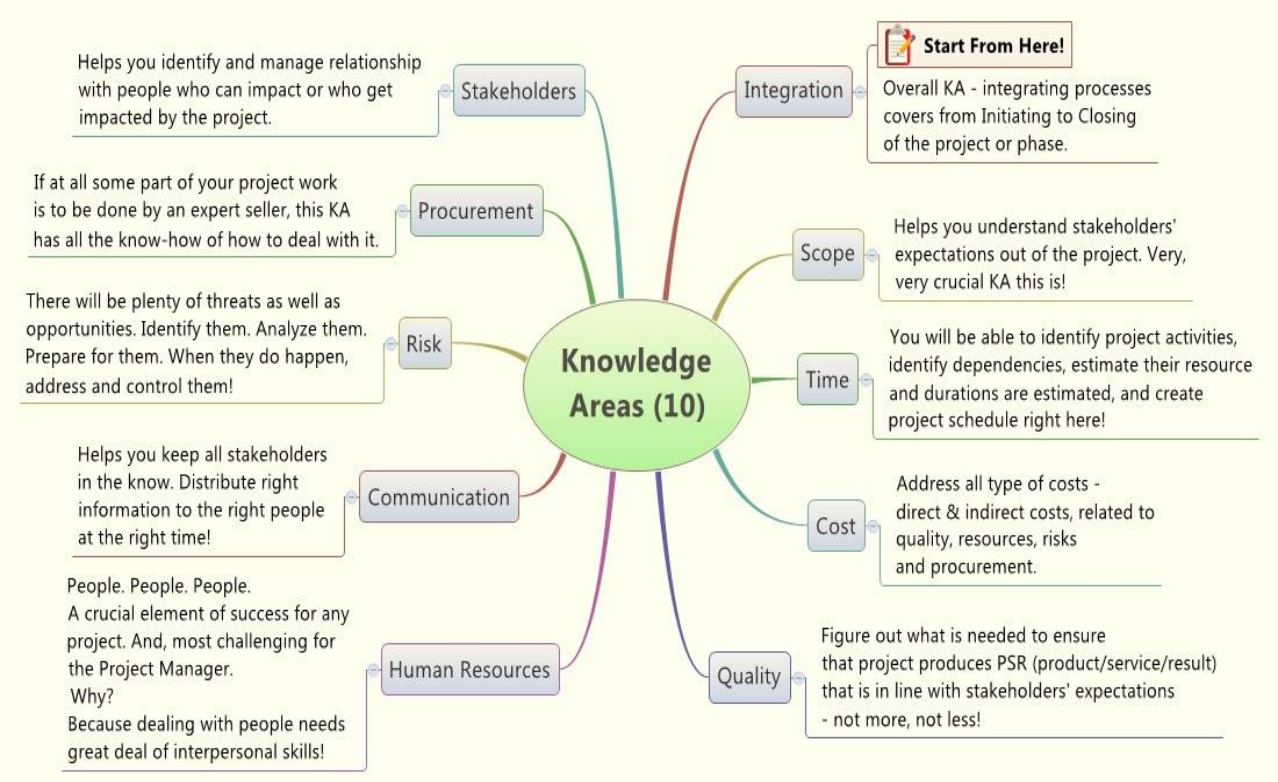
Initiating and Planning Processes. Institute, Inc.



Note. *A Guide to the Project Management Body of Knowledge* **(p.51), Project Management Institute, 2017.**

Figure 15

PMI's PMBOK® Guide 10 Knowledge Areas. Note. PM Exam Smartnotes



By S. Shenoy, s. f., 2016 , Knowledge Areas- Process groups,

http: //www.pmexamsmartnotes.com/project-management-body-of-knowledge/.

2.2.5 Project management knowledge areas

We can identify: "49 project management processes included in the PMBOK® Guide, grouped into ten separate knowledge areas" (Project Management Institute, 2017, p.422). All of which will be used during the life cycle of the FGP. The ten knowledge areas of project management are listed above:

1. Integration management
2. Scope management
3. Time management
4. Cost management
5. Quality management
6. Resources management Plan
7. Communication management
8. Risk management
9. Procurement management
10. Stakeholder management

3 METHODOLOGICAL FRAMEWORK

This chapter will provide the information sources and respective objectives. To clarify, information is: "The knowledge obtained from investigation, study, or instruction, is the knowledge that you get about someone or something: facts or details about a subject**"** (Oxford English Dictionary, 2011, n.p.) and a source consist ofsomeone or something that provides what is wanted or needed. Therefore, it can be concluded that an information source is a place, person or thing from which facts or knowledge are provided or learned.

There are many places for information to be obtained. One can use library sources, internet sources, organizational sources, government agencies as sources, pictorial sources, sources from bibliographies, a colleague or sometimes even one's account as a source. Information sources can be printed or presented in an electronic format. It can be taken from almost anywhere.

No matter where the information originates, there are onlythree typesof information sources – primary, secondary, and tertiary (Schmidt, 2013). To develop the Final Graduation Project, primary and secondary sources will be used.

3.1 Information sources

3.1.1 Primary sources

"A primary source is information is taken directly from a person, event, location, or material at the point of the occurrence" (Schmidt, 2013, p.62). For the development of the Final Graduation Project, the primary information sources that will be used are meeting minutes, personal interviews with members of the Condominium Abedules Project Team, interviews with other stakeholders, such as sellers, and research. Refer to **Chart 1** for the specific primary information sources used.

3.1.2 Secondary sources

"A secondary source is information that a person provides after he or she has gotten the information from a primary source" (Schmidt, 2013, p.62). In this case, the person providing the information did not participate in or is not furnishing first-hand knowledge about the incident.

For the development of the Final Graduation Project, secondary sources such as the *PMBOK® Guide*, library databases, and the PMI database will be used. Refer to **Chart 1** for the list of secondary sources used for each specific objective.

Chart 2

Information sources

Objectives	Information sources	
	Primary	**Secondary**
1. To create a project charter that formally authorizes the Project and provides the project manager with respective authority to apply organizational resources to the project to produce the project management plan.	Meeting minutes, personal interview with the lead project manager (expert)	*PMBOK® Guide and PMI database*
2. To create a scope management plan that ensures that all the work required is included to complete the Project successfully.	Meeting interview with the lead manager and generating the respective minutes.	*PMBOK® Guide*, PMI database, and the Internet
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.		

Objectives	Information sources Primary	Secondary
5. To develop a quality management plan to identify the project's quality requirements to ensure the results meet expectations for approval within the time, cost, and scope constraints.	Personal interview with the lead project manager (expert)	*PMBOK*® *Guide*
6. To create a Resource management plan to ensure that all human resources are identified and managed effectively to complete the Project within time, cost, and scope constraints.	Personal interview with the lead project manager (expert) Personal interview with the lead project manager (expert)	*PMBOK*® *Guide* and the internet *PMBOK*® *Guide* and PMI database
7. To develop a communication management plan to ensure the timely and effective communication of the project status and other essential information.	Personal interview with the lead project manager (expert)	*PMBOK*® *Guide* and PMI database
8. To create a risk management plan to	Personal interview with the lead project manager	*PMBOK*® *Guide* and

Objectives	Information sources	
	Primary	**Secondary**
identify and examine risks to complete the project and develop plans to minimize the likelihood of the risks.	(expert)	PMI database
9. To develop a procurement management plan to be used to obtain products, services or results required by the Project.	Purchasing institutions, personal interviews with the lead project manager (expert)	*PMBOK*® *Guide*
10. To develop a stakeholder management plan to identify and support all the project stakeholders to ensure effective stakeholder engagement.	Interviews with the lead project manager (expert)	*PMBOK*® *Guide* and textbook

3.2 Research methods

According to the Oxford English Dictionary (2011), research is defined as: "The systematic investigation into and study of materials and sources in order to establish facts and reach new conclusions" (p.1222). The same source defines the word method as: "A particular procedure for accomplishing or approaching something" (Oxford English Dictionary, 2011, p.899). Therefore, it is concluded that a research method is a particular procedure to establish facts and reach new conclusions.

3.2.1 Analytical method

The Analytical method is defined as the range of numeric results a method can produce without any special pre-treatment, such as dilution, that is not part of the usual analytic process. The Analytical method must be revalidated at least every six months.
To verify the analytical method, at least three matrix-appropriate materials are assayed, with analyte concentrations near the low, midpoint, and high values of the Analytical method. Specimen target values can be established by comparison with reference materials, assignment of reference method values, or dilution ratios of specimens with known values. In many cases, the method manufacturer will recommend suitable materials. Similar to calibration verification, verification of the Analytical method passes if the appropriate target values are recovered, and proximity limits are satisfied. Again, recommended proximity limits are 10% and 50% for the upper and lower limits. The analytical performance goal is set to the allowable bias for the analyte (https://www.sciencedirect.com/). This research method will examine and use information from multiple sources to develop the deliverables found in **Chart 5 –**

Deliverables

The research method for each specific objective is indicated in Chart 2 below.

Chart 3

Research methods (Source: C. Walker, The Author, August 2016)

Objectives	Analytical Research Method
1. To create a project charter that formally authorizes the Project and provides the project manager with respective authority to apply organizational resources to the project to produce the project management plan.	The analytical method will use facts or information from the sources identified in Chart 1, objective 1 above, to drive decision-making when creating the project charter.
2. To create a scope management plan that ensures that all the work required is included to complete the Project successfully.	The analytical method will use facts or information from the sources identified in Chart 1, objective 2 above, to drive decision-making when creating the scope management plan documents.
3. To create a schedule management plan to support the development and management of a project schedule that ensures the Project is completed within the time constraints.	The analytical method will be employed using information from the sources identified in Chart 1, objective 3 above, to drive decision-making when creating the documents that will comprise the time management plan. **Chart 2**

Objectives	Analytical Research Method
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.	The analytical method will use information from the sources identified in Chart 1, objective 4 above, to drive decision-making when creating the documents that will comprise the cost management plan.
5. To develop a quality management plan to identify the project's quality requirements to ensure the results meet expectations for approval within the time, cost, and scope constraints.	The analytical method will use information from the sources identified in Chart 1, objective 5 above, to drive decision-making when creating the documents that will comprise the quality management plan.
6. To create a Resource management plan to ensure that all human resources are identified and managed effectively to complete the Project	The analytical method will be employed using information from the sources identified in Chart 1, objective 6 above, to drive decision-making when creating

Objectives	Analytical Research Method
within time, cost, and scope constrain	the Resource management plan docu
7. To develop a communication management plan to ensure the timely and effective communication of the project status and other essential information.	The analytical method will be employed using information from the sources identified in Chart 1, objective 7 above, to drive decision-making when creating the communications management plan documents.
8. To create a risk management plan to identify and examine risks to complete the project and develop plans to minimize the likelihood of the risks.	The analytical method will be employed using information from the sources identified in Chart 1, objective 8 above, to drive decision-making when creating the documents that will comprise the risk management plan
9. To develop a procurement management plan to be used to obtain products, services or results required by the Project.	The analytical method will be employed using information from the sources identified in Chart 1, objective 9 above, to drive decision-making when creating the documents that will comprise the procurement management plan.
10. To develop a stakeholder management plan to identify and support all the project stakeholders to ensure effective stakeholder engagement.	The analytical method will be employed using information from the sources identified in Chart 1, objective 10 above, to drive decision-making when creating the documents that will comprise the stakeholder manant. Plan

3.3 Tools

According to the *PMBOK® Guide,* 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.565). Each tool used in the Final Graduation Project is identified and explained below. In addition, the information is summarized in **Chart 4**

Tools description

Project Management Plan and Project charter

Is the second process in the Project Integration Management Knowledge area comprised of the subsidiary plans developed during the Final Graduation Project. A template was used to guide the compilation of the plan.

The Project Charter consisted of the Project's purpose, objectives, description, high level risks, stakeholder list, high-level requirements, assumptions and constraints, identification of deliverables, a summary milestone schedule, overall project budget, criteria necessary for project approval, the identification of the project manager, Project team and the sponsor's authorization (Project Management Institute, 2017).

Work break down structure

This document was created using a modified template taken from an online source. The Scope Management Plan included the scope definition, project scope statement, the Work Breakdown Structure (WBS), the WBS dictionary, scope verification, and the scope control measures to improve the overall project progress. The Scope Management Plan included the Scope Definition outputs and created the WBS processes and would later be approved as the Scope Baseline. Although these processes were identified as occurring after the second process group in scope management, they were conducted concurrently with the development of the Scope Management Plan as the inputs required were developed (Lidl Ireland, 2013).

Requirements traceability Matrix

Provides documentation of each requirement, including how they will be implemented and tested (Project Management Institute, 2017).

Schedule Management Plan template

The project time management planning processes were conducted after Project Scope and Cost Management. The first process in project time management involved developing the Schedule Management Plan that would be used to guide the life-cycle of the Project's schedule. The Project Charter and the Scope Management Plan were used as inputs to this process to gather information regarding the Scope Baseline and the summary milestone schedule.

Cost Management Plan template

The tools and techniques used to develop the Cost Management Plan were expert judgment, analytical techniques, and meetings. Following this process, documents such as the Project Charter, Scope Management Plan, and Schedule Management Plan were updated following the *PMBOK® Guide* (Stamp-Romero, 2020).

Quality Management Plan template

After the Procurement Management Plan, the Quality Management Plan was created to adequately plan and ensure that quality was built into the project's processes and the product. Plan Quality Management is the only Quality Management process used during project planning.

Resource Management template

After the Quality Management plan, the Resource management Plan was created to adequately plan and ensure and control all the project Resources in general, workforce and materials ,it is the plan where all the workforce structure is organized and also the materials resources as well.

Communications Management Plan

For every project organizational structure is essential to develop a communication management plan which ensured the timely and effective communication of the project status and other essential information.

Risk Management Plan template

The Risk Management plan establishes an orderly method by which the goals of requirements management will be achieved. The plan also communicates essential information to project participants and helps newcomers get up to speed. Consequently, the plan is a living document, which needs to be updated and supplemented throughout its life.

Procurement Management Plan

To develop a Procurement Management Plan, a template was used. As documented in the *PMBOK® Guide,* the Requirements Documentation, Risk Register, Stakeholder Register and Project Charter were the inputs used in the process. The tools and techniques were expert judgement and meetings in the form of a personal interview with the lead Project Manager.

Stakeholder Management Plan template

The planning of project scope management was conducted after the Stakeholder Management Plan was completed. It was the first of the planning process group processes to occur, following the development of the Project Charter, Stakeholder Register, and Procurement Management Plan, respectively

Chart 4

Summarized information

Objectives	Tools
1. To create a project charter that formally authorizes the Project and provides the project manager with authority to apply organizational resources to the project to produce the project management plan.	Project Charter template and Project Management Plan template
2. To create a scope management plan that ensures that all the work required is included to complete the Project successfully.	Requirements traceability matrix template, Microsoft Visio Professional 2016, Requirements Documentation template, Requirements Management Plan template, Work Breakdown Structure generator, and Scope Management Plan template
3. To create a schedule management plan to support the development and management of a project schedule that ensures the Project is completed within the time constraints.	Schedule Management Plan template, Microsoft Project 2016, Microsoft Visio Professional 2016, and Activity List template
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.	Cost Management Plan template, Microsoft Excel 2016 Project Budgeting template, and Cost Baseline template
5. To develop a quality management plan to identify the quality requirements	Quality Management Plan template and Quality Management tools

Objectives	Tools
for the Project in order to ensure the results meet expectations for approval.	(Checksheets)
6. To create a Resource management plan to ensure that all human resources are identified and managed effectively to complete the Project within time, cost, and scope constraints, including materials resources as well.	Resource Management template and Responsibility Assignment Matrix
7. To develop a communication management plan to ensure the timely and effective communication of the project status and other essential information.	Communications Management Plan template and Communications Matrix
8. To create a risk management plan to identify and examine risks to complete the project and develop plans to minimize the likelihood of risks.	Risk Management Plan template and Risk Register template
9. To develop a procurement management plan to be used to obtain products, services or results required by the Project.	Procurement Management Plan template
10. To develop a stakeholder management plan to identify and support all the project stakeholders and ensure effective stakeholder engagement.	Stakeholder Management Plan template, Stakeholder Analysis Chart, Microsoft Excel2016, Stakeholder Register Stakeholder Engagement Matrix, Mindtools Online Power/Interest Grid Creator

3.4 Assumptions and constraints

PMI defines an assumption as: "A factor in the planning process considered to be true, real, or uncertain, without proof or demonstration" (Project Management Institute, 2017, p.1). It also defines a constraint as: "A limiting factor that affects the execution of a project, program, portfolio, or process" (Project Management Institute, 2017, p.2). The assumptions and constraints considered in the Final Graduation Project for each specific objective are set out in **Chart 5** below.

Chart 5

Assumptions and constraints (Source: C. Walker, The Author, August 2016)

Objectives	Assumptions	Constraints
1. To create a project charter that formally authorizes the Project and provides the project manager with authority to apply organizational resources to the project to produce the project management plan.	The charter will be created before all other subsidiary documents.	There are only three (3) days allocated to create the Project Charter. Stakeholder identification is scheduled to co-occur with the development of the project charter.
2. To create a scope management plan that ensures that all the work required is included to complete the Project successfully.	The Clients have disclosed all of the information required to develop the scope. The scope management	The Clients are considering the reduction of the project scope.
3. To create a schedule management plan to support the development and management of a project schedule that ensures the Project is completed within the time constraints.	The time allocated for developing the Project Management Plan and the building of the Abedules Condominium will be sufficient to accomplish all project activities.	The time allocated for the building of the Abedules Condominium must not exceed 24 months.

Objectives	Assumptions	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.	The budget created during planning will accurately depict the financial resources required to build the Condominium Abedules.	The budget for the building of the Abedules Condominium must not exceed $300,000.
5. To develop a quality management plan to identify the quality requirements for the Project in order to ensure the results meetexpectations for approval	The quality management plan will identify all of the Project's technical and managerial quality requirements.	The quality constraints require that the concrete structure is designed according to the CódigoSísmico de Costa Rica 2010.
6. To create a Resource management plan to ensure that all human resources are identified and managed effectively to complete the Project within time, cost, and scope constraints.	The organization has sufficient human resources	Resources according to the Project Budget.

Objectives	Assumptions	Constraints
7. To develop a communication management plan to ensure the timely and effective communication of the project status and other essential information.	The organization has the technology required to suffice the communication needs of all stakeholders.	This project requires electricity and Internet services.
8. To create a risk management plan to identify and examine risks to complete the project and develop plans to minimize the likelihood of risks.	There is sufficient information required to identify most project risks adequately.	All project risks must 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 personnel have identified an initial list of suppliers.	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 and ensure effective stakeholder engagement.	The stakeholder of a project schedule ensures that the Project is completed within the time constraints.	The information, durations, and Schedule are in the Gantt chart.

3.5 Deliverables

A deliverable is defined as: "Any unique and verifiable product, result, or capability to perform a service that is required to be produced to complete a process, phase, or project" (Project Management Institute, 2017, p.537).

Chart 6

Deliverables (Source: C. Walker, The Author, August 2016)

Objectives	Deliverables
1. To create a project charter that formally authorizes the Project and provides the project manager with authority to apply organizational resources to the project to produce the project management plan.	Project charter
2. To create a scope management plan that ensures that all the work required is included to complete the Project successfully.	Scope Management Requirements Management Requirements Document Requirements Traceability Matrix
3. To create a schedule management plan to support the development and management of a project schedule that ensures the Project is completed within the time constraints.	Schedule Management Plan, Activity List, Schedule Network Diagram, Resource assignments and activity durations, and Schedule in Gantt chart
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.	Cost Management Plan, Cost Baseline and Project Funding Requirements

Objectives	Deliverables
5. To develop a quality management plan to identify the quality requirements for the Project in order to ensure the results meetexpectations for approval	Quality Management Plan
6. To create a Resource management plan to ensure that all human resources are identified and managed effectively to complete the Project within time, cost, and scope constraints.	Resource Management Plan
7. To develop a communication management plan to ensure the timely and effective communication of the project status and other essential information.	Communication Management Plan and Communications Matrix
8. To create a risk management plan to identify and examine risks to complete the project and develop plans to minimize the likelihood of 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 all the project stakeholders and ensure effective stakeholder engagement.	The Stakeholder Management Plan, Stakeholder Analysis Chart, and Stakeholder Register.

4 RESULTS

This chapter will describe the most important elements to take into account regarding the project management plan. Developing the Project Management Plan for building a three-level house, a **Project Charter**, specific objective one (1), was the first process in the Project Integration Management knowledge area. This was accomplished using interviews, meeting minutes and the *PMBOK*® *Guide* as sources. These were then used as the decision-making drivers and the analytical research methodology application. A template from the PMI database was used to develop the Project Charter that formally authorized the Project and provided the Project Manager with authority to apply organizational resources to the Project to produce the Project Management Plan.The development of the **Project Management Plan:** Is the second process in the Project Integration Management Knowledge area comprised of the subsidiary plans developed during the Final Graduation Project. A template was used to guide the compilation of the plan.

4.1 Project Integration Management

The Project Charter consisted of the Project's purpose, objectives, description, high level risks, stakeholder list, high-level requirements, assumptions and constraints, identification of deliverables, a summary milestone schedule, overall project budget, criteria necessary for project approval, the identification of the project manager, Project team and the sponsor's authorization (Project Management Institute, 2017, p.72) According to *PMBOK® Guide,* the following inputs, tools, and techniques were required to develop the Project Charter. See **Figure 16** below (Project Management Institute, 2017)

Figure 16

Develop Project Charter: Inputs, Tools & Techniques, and Outputs

Note. A Guide to the Project Management Body of Knowledge (p.66), Project Management Institute, 2013. Copyright 2013 by Project Management Institute, Inc.

Since Edificon S.A. did not have a developed project management approach to deliver the three house level construction, Abedules Condominium, the Assistant Project Manager knew that although the Project's statement of work, business case, agreements, enterprise environmental factors and organizational process assets were the recognized inputs for developing the Project Charter, none of these documents would be made available for use by any of the representatives from the company. There were no organizational process assets (OPA). Due to the lack of a formal project management team or project management office (PMO), the enterprise environmental factors (EEF) were limited to understanding that the Project was of the utmost importance to the company and that she, the Assistant Project Manager, would be the only person responsible for developing the Project Management Plan.

PROJECT CHARTER BUILDING CONDOMINIUM ABEDULES

TABLE OF CONTENTS

Project Purpose/Justification

Business Need/Case

The building of Abedules Condominium arises from market demand to design and build a luxury condominium with the best finishings. In addition, Condominium Abedules is also being pursued to expand Edificon S.A. Construction business.

Business Objectives

Currently, most construction companies do not have an organizational strategic plan. However, the following business objectives have been established concerning the three-level - Condominium Abedules Construction:

To build a multi-faceted luxury house that will house a multiplicity of materials and finishings to create economic benefit for the business establishment.

To create an economically feasible structure to construct and maintain during the years.

To create an aesthetically attractive Condominium that can improve the construction activities of Edificon S.A.

To ensure that the Project is self-sustainable and has growth potential for now and the future.

To build and shape an efficient Construction Project Team to improve the Condominium construction process and final finishings.

Project Description

Stakeholders

Epic Enterprises (Client Organization and Sponsor)

- Owner
- Board of Directors
- Accountant

EDIFICON S.A.

- Designer/Architect
- Contractor
- Project Manager
- Assistant Project Manager
- Office Assistant
- Superintendent
- Foreman
- Gofer
- Draftsman

Subcontractors

- Electrical
- Plumbing
- Fire/Safety
- Roofing
- Tiling
- Pool
- Sound Engineering
- Acoustics
- Building Lighting
- Stage Lighting
- Windows and doors
- Interior finishings

Suppliers

- Eurobau
- EPA
- Lagar
- Construplaza
- El Eléctrico
- IESA
- Alumimundo
- Superbloque
- GrupoOrosí
- Novex

Consultants

- Electrical Engineer
- Structural Engineer
- Geotechnical Engineer
- Community Members

Measurable Project Objectives and Success Criteria

Requirements

Abedules Condominium must be constructed out of materials that are structurally sound and can withstand earthquake-resistant parameters, according to Código Sísmico de Costa Rica 2010. In addition, the building should be outfitted with materials and finishings with the highest standards.

Constraints

The Project should not exceed $200,000 (USD). The project duration should not exceed eight (8) months, with six (6) months to substantial completion and an additional two (2) for the project finishing.

Assumptions

Weather

- It is assumed that it will rain; therefore, the building has to be weatherproof
- It is assumed that there will be seismic movements; therefore, concessions have been made to reinforce the building to withstand up to a Código Sísmico de Costa Rica 2010.
- It is assumed that we will have high temperatures; therefore, this will determine the type of paint and cement finishes used.
- It is assumed that there will be moisture, so a product called DensGlass® Gold will be used to mitigate moisture.

Finances

- It is assumed that the client is funded sufficiently.
- It is assumed that every payment will be made in time.

Workforce

- It is assumed that we have sufficient quantities of skilled workers that
- Are competent.
- It is assumed that Covid constraints are going to be almost done.

Schedule

- It is assumed that the project will be substantially completed in six (6) months, with an additional two (2) allocated for the remaining work.

Budget

- It is assumed that the Project can be accomplished for $200,000 US.

Planning

- It is assumed that the building regulators will approve all building components as indicated on the drawings and schedule

Preliminary Scope

- The project includes building a 220 m^2 luxury condominium of three floors, luxury finishings, stairs and one elevator. The following items included and items excluded:

Floors &Storey Details

- A. **Perimetral Walls** – see Scope Management Plan for specifications
- B. **Electric gate** – see Scope Management Plan for specifications
- C. **Glace balcony** - see Scope Management Plan for specifications
- D. **Walls with rock finishings**– see Scope Management Plan for specifications

Items Excluded

- A. Protection bars
- B. Stair Wheel shairequipement
- C. Elevator
- D. Pergolas

Risks

a. Financial

a. Price increases on materials over time

b. Damage to materials on site

c. Accidents on-site

d. Underestimation of the project

b. Planning regulatory demands

a. Demands are not consistent with approved drawings

c. Stakeholders

a. Client unauthorized/misplaced involvement in the project

d. Scheduling delays

a. Severe climate changes causing delays

b. Shipping delays

c. Production and fabrication delays

d. Design delays

Project Deliverables

-

Customer deliverables

a. Project charter

b. Architectural and Engineering Drawings

c. Design documents

d. Site investigation report

e. Tender document

f. Condominium structure

g. Commencement of vertical construction

h. Super structure erected

i. Progress report to client

j. Cladding and in walls complete

k. Windows and doors installed

l. Electrical and plumbing installation

Ministry of Works deliverables

a. Structure drawings

b. Mechanical drawings

c. Plumbing and electrical drawings

d. Safety plan

e. Site plan

f. Parking layout

g. Stress calculations

h. Building permit

i. Inspection report

Fabricators deliverables

a. 3D structural design

b. Architecture

c. Project requirement

d. Excerpts from Bahamas Building Control

CHART 7

Project Budget , this is the budget breakdown.

This detailed Budget is presented in order to describe the Procurement process, and how is been managed on this Condominium Abedules Constrcution Process, in order to have control for the labor, materials , equipment and subcontractors for this project.

PROJECT : ABEDULES CONDOMINIUM

Condominium # 5 : Ana Cecilia Loria Loria y Jose Joaquin Brenes Alvarado

Location : Cipreses **Construction area :** 220 m2

Construction timeline : 8 months

Date : 21- March-22 **D. T. :** Ing. Adrian Brenes Loria

Dolar $: 660

	BUDGET : Direct Cost	QTY:	UND:	UNIT. M.O.	UNIT. MAT.	UNIT. SUB.	LABOUR	MATERIAL	SUBCONTRACT	TOTAL
1	Preliminary Installation	1	gb	¢25287,57	¢200220,79		¢25287,57	¢200220,79		¢225508,36
2	Earth movement	48	m3	¢1085,22	¢12978,78		¢52090,50	¢622981,33		¢675071,83
3	Ballast	13	m3	¢3085,93	¢29924,17		¢39067,88	¢378840,00		¢417907,88
4	Traced	190	m2	¢508,71	¢507,04		¢96604,20	¢96286,63		¢192890,83
5	Excavation	1	gb	¢419588,98	¢416724,00		¢419588,98	¢416724,00		¢836312,98
6	Foundations	1	gb	¢1046096,00	¢2600000,00		¢1046096,00	¢2600000,00		¢3646096,00
7	First floor walls and columns	1	gb	¢800000,00	¢2094959,00		¢800000,00	¢2094959,00		¢2894959,00
8	Slab	1	gb	¢446950,00	¢1950000,00		¢446950,00	¢1950000,00		¢2396950,00
9	2nd floor walls and columns	1	gb	¢2144745,00	¢1870000,00		¢2144745,00	¢1670000,00		¢3814745,00
10	Stairs	1	gb	¢256900,00	¢1145000,00		¢446950,00	¢1145000,00		¢1591950,00
11	Electromechanical piping	1	gb	¢414119,48	¢872669,57		¢414119,48	¢872669,57		¢1286789,05
12	Concrete finishings	1	gb	¢904320,00	¢1356480,00		¢904320,00	¢1356480,00		¢2260800,00
13	Subfloor	98	m2	¢3400,00	¢18235,64		¢145853,40	¢1787092,57		¢1932945,97
14	First level tiles	197	m2	¢7000,00	¢10000,00		¢1379000,00	¢1970000,00		¢3349000,00
15	Bathroom tiles	38	m2	¢1233,72	¢8198,65		¢46881,45	¢311548,71		¢358430,16
16	Roof strcuture and roof	117	m2	¢7481,00	¢24800,00		¢875277,00	¢2901600,00		¢3776877,00
17	Eaves	19	m2	¢4112,41	¢12223,68		¢78135,75	¢232250,01		¢310385,76
18	Cieiling	94	m2	¢5541,54	¢7903,11		¢520905,00	¢742891,88		¢1263796,88
19	Doors and locks	1	gb	¢225030,96	¢820000,00		¢225030,96	¢820000,00		¢1045030,96
20	Electric installation	1	gb	¢984984,00	¢1762000,00		¢984984,00	¢1762000,00		¢2746984,00
21	Bathrooms and laundry furniture			¢1260098,00						¢1260098,00
22	Sanitaryware	1	gb	¢1100000,00			¢1100000,00			¢1100000,00
23	Final finishings	1	gb	¢342218,80	¢1430990,24		¢342218,80	¢1430990,24		¢1773209,04
24	Fascia	12	m2	¢3038,61	¢14742,88		¢36463,35	¢176914,59		¢213377,94

	BUDGET : Direct Cost	QTY:	UND:	UNIT. M.O.	UNIT. MAT.	UNIT. SUB.	LABOUR	MATERIAL	SUBCONTRACT	TOTAL
25	Baseboard	194	ml	¢537,02	¢1242,23		¢104181,00	¢240992,25		¢345173,25
26	Closets	1	gb	¢628000,00	¢1182450,00		¢628000,00	¢1182450,00		¢1810450,00
27	Concrete registry boxes	1	gb	¢52090,50	¢214665,29		¢52090,50	¢214665,29		¢266755,79
28	2nd level floor	1	gb	¢1400000,00	¢0,00		¢1400000,00			¢1400000,00
29	Canoas and tinsmith	1	gb	¢0,00	¢0,00	¢552000,00			682000,00	¢682000,00
30	Windows	1	gb	¢0,00	¢0,00	¢2996000,00			2996000,00	¢2996000,00
31	Kitchen furniture	1	gb	¢0,00	¢0,00	¢3062845,00			3062845,00	¢3062845,00
32	Moldings	1	gb	¢0,00	¢0,00	¢709062,20			709062,20	¢709062,20
33	Balconies	1	gb	¢0,00	¢0,00	¢435666,00			435666,00	¢435666,00
34	Gas tubing	1	gb	¢110000,00	¢270000,00					¢380000,00
	BUDGET : INDIRECT COSTS						LABOUR	MATERIAL	SUBCONTRACT	TOTAL
									¢7885573,00	¢7885573,00
33	Water and Electricity conexions									¢102950,38
34	Carries	2	%					¢0,00		¢543570,00
35	Tools and equipment	2	%					¢0,00		¢620000,00
36	Social charges	38	%				¢0,00			¢5534621,00

SUBTOTAL COLONES:	57.993.677
SUBTOTAL DÓLARES:	
TOTAL COMMON AREAS	25.758.534
Peace of land cost	47.247.789
Total (Colones)	131.000.000
Total (USD)	200.000

Project Approval

In order to gain project approval, a 220 m^2Abedules Condominium must be delivered by August 15 2023, with all of the details agreed upon in the Scope Statement.

Project Manager

The Project Manager is Mr. Adrián Brenes Loría. The Assistant Project Manager, Ricardo Brenes Loría, will act on his behalf in his absence.

Responsibilities include:

Production

Coordination

Quality Control

Procurement

Regulation Compliance

Architectural Engineering

Reporting

Project finances

4.2 Scope Management

To define the scope of the Project, a scope management plan was produced. This document was created using a modified template taken from an online source. The Scope Management Plan included the scope definition, project scope statement, the Work Breakdown Structure (WBS), the WBS dictionary, scope verification, and the scope control measures to improve the overall project progress. The Scope Management Plan included the Scope Definition outputs and created the WBS processes and would later be approved as the Scope Baseline. Although these processes were identified as occurring after the second process group in scope management, they were conducted concurrently with the development of the Scope Management Plan as the inputs required were developed (Lidl Ireland, 2013).To create the plan, as detailed in the *PMBOK® Guide* 6thedition, the Project Charter was used as an input, along with an interview was conducted with the lead: "Project Manager and a review of his meeting minutes, which documented discussions between him and the project sponsor, collected during the clients' requirements meetings" (Project Management Institute, 2017, p.107).

Introduction

According to Lidl Ireland (2013):

> The Scope Management Plan provides the scope framework for this Project documents the scope management approach; roles and responsibilities pertaining to project scope; scope definition; verification and control measures; scope change

> control; and the Project's work breakdown structure. Any project communication which pertains to the Project's scope should adhere to the Scope Management Plan (n.p.).

This Project is for the building of the Abedules Condominium. Condos Building Business demand necessitated the construction and design of such a multi-faceted luxury condominium.

Scope Management Approach

According to Stamp-Romero (2020):

> For this Project, scope management will be the sole responsibility of the Project Manager. The scope for this Project is defined by the Scope Statement, Work Breakdown Structure (WBS) and WBS Dictionary. The Project Manager, Sponsor and Stakeholders will establish and approve documentation for measuring project scope which includes deliverable quality checklists and work performance measurements.
>
> Proposed scope changes may be initiated by the Project Manager, Stakeholders or any member of the project team. All change requests will be submitted as **change orders** to the Project Manager who will then evaluate the requested scope change. Upon acceptance of the scope change request, the Project Manager will submit the scope change request to the Sponsor, Stakeholder, Sub Consultants and/or Subcontractors. The Project Manager is responsible for the approval of

> scope changes that are strictly technical in nature. Whereas, the Project Sponsor is responsible for the approval of scope changes affecting time and costs parameters. Upon approval of scope changes, the Project Manager will update all project documents and communicate the scope change to all stakeholders through a **change directive**. Based on feedback and input from the Project Manager and Stakeholders, the Project Sponsor is responsible for the acceptance of the final project deliverables and project scope (p. 62).

Roles and Responsibilities

The Project Manager, Sponsor, and Team will all play critical roles in managing this Project's scope. As such, the project sponsor, manager, and team members must accomplish their responsibilities to ensure adequate progress on the Project during the different stages of the Project. Chart 7 below defines the roles and responsibilities for the scope management of this Project (Stamp-Romero, 2020).

Chart 8

Scope Management Risks and responsibilities

Name	Role	Responsibilities
Epic Designs	Project Sponsor	a. Approve or deny scope change requests as appropriate b. Evaluate need for scope change requests c. Accept project deliverables
E. B. Rolle	Project Manager	a. Measure and verify project scope b. Facilitate scope change requests c. Facilitate impact assessments of scope change requests d. Organize and facilitate scheduled change control meetings e. Communicate outcomes of scope change requests f. Update project documents upon approval of all scope changes
Assistant Project And Project Team	Team Members	a. Participate in defining change resolutions b. Evaluate the need for scope changes and communicate them to the project manager as necessary
Stakeholders	Subcontractors/Sub Consultants/Site Workers	c. Can propose scope changes d. Will execute change directives issued by Project Manager

Table 1.1, *Scope Management Roles and Responsibilities*

Scope Definition

The scope for this Project was defined through a comprehensive requirements collection process. First, a thorough analysis of all revised project contracts and meeting minutes, building codes, owners' requirements and documentation relative to industry standards were completed. The project manager and assistant project manager developed the requirements management plan, requirements documentation and the requirements traceability matrix for the building specifications (Stamp-Romero, 2020).

The project deliverables were generated based on the requirements collection process and input from subject matter experts such as the Architect, Contractor, Sub consultants, Subcontractors, Environmental Agencies, Governmental Regulatory Agencies, and the Fabricators. This expert judgment process provided feedback on the most effective, safe and cost-efficient ways to meet the original requirements of building of Abedules Condominium, that is structurally according to Código Sísmico de Costa Rica 2010.

Project Scope Statement

According to Lidl Ireland (2013):

> The project scope statement provides a detailed description of the Project, deliverables, constraints, exclusions, assumptions, and acceptance criteria. Additionally, the scope statement includes what work should not be performed in order to eliminate any implied but unnecessary work which falls outside the Project's scope (n.p.).

Figure 17

Condominium Abedules WBS

CONDOMINIUM ABEDULES WBS

WBS

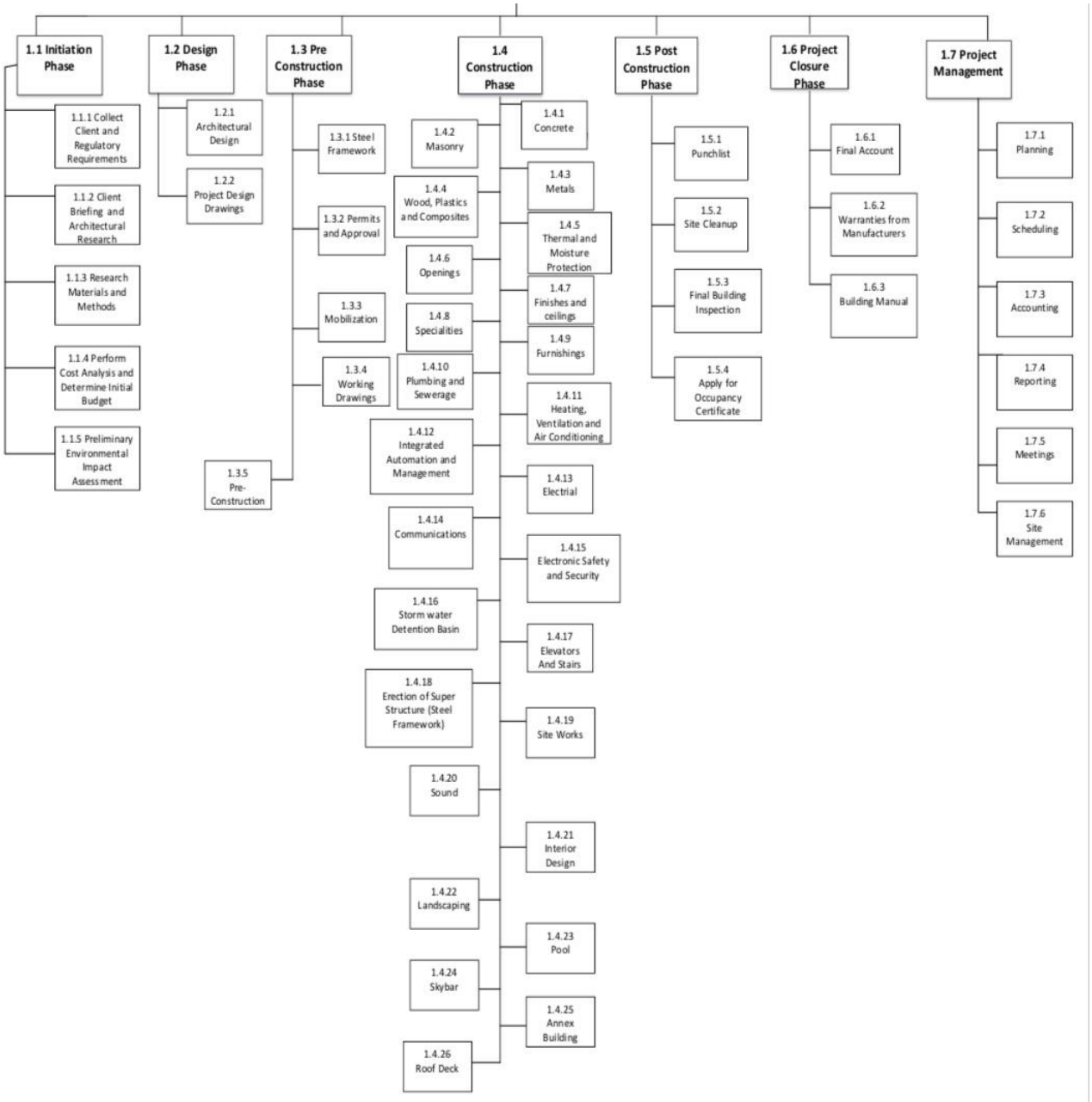


Figure 1.1, ***Work Breakdown Structure (WBS)***

According to Alcide (2018):

> In order to more clearly define the work necessary for project completion, the WBS Dictionary is used. The WBS Dictionary includes an entry for each WBS element. The WBS Dictionary includes a detailed description of work for each element and the deliverables, budget, and resource needs for that element. The project team will use the WBS Dictionary as a statement of work for each WBS element […]. As this Project progresses, the Project Manager will verify interim project deliverables against the original scope as defined in the scope statement, WBS and WBS Dictionary. Once the Project Manager verifies that the scope meets the requirements defined in the project plan, the Project Manager and Sponsor will meet for formal acceptance of the deliverable. During this meeting, the Project Manager will present the deliverable to the Project Sponsor for formal acceptance. The Project Sponsor will accept the deliverable by signing a project deliverable acceptance document. This will ensure that project work remains within the scope of the Project on a consistent basis throughout the life of the Project (n.p.).

Chart 9

WBS Dictionnary

Level	WBS Code	Element Name	Description of Work	Deliverables	Budget	Resources
1	**1.1**	**Initiation Phase**	**Commencement of Conceptualization**		***$ 2.200***	
2	1.1.1	Collect Client and Regulatory Requirements	Meetings held to ascertain client and regulatory needs for the project	Initial Requirements Documentation	***$ 1.200***	Laptop Computer Internet Relevant Literature
2	1.1.2	Client briefing and Architectural Research	Architectural briefing describing the understanding of the project with the Architect, Hydrologist, and Sub consultants	Client Directive	***$ 1.700***	Laptop Computer Internet Relevant Literature
2	1.1.3	Research Materials and Methods	Research materials, methodologies and architectural standards that can be used for the project	Project Documentation	***$ 1.200***	Laptop Internet Standards Books
2	1.1.4	Determine Initial Budget and Perform Cost Analysis	Calculating the type of financial commitment needed based on the requirements from the client to complete the project	Cost Evaluation	***$ 800***	Project Scope
2	1.1.5	Preliminary Environmental Impact Assessment	Environmental Engineer will perform assessment of the project	Environmental Assessment Study	***$ 1.200***	Architectural Drawings/Sketches and Project Scope
1	**1.2**	**Design Phase**	**Collaborative Effort of Consultations**		***$ 11.200***	
2	1.2.1	Architectural Design	Graphical visualization of project	Architectural drawings	***$ 1.500***	CAD Software

Level	WBS Code	Element Name	Description of Work	Deliverables	Budget	Resources
2	1.2.2	Project Design Drawings	Sub consultant's drawings such as; *Geotechnical engineer *Structural engineer/Structural Steel Fabricators	Engineering Drawings	***$18.500***	
1	**1.3**	**Pre-Construction Phase**	**Contract Phase where design development, consultant identification and agreements with necessary stakeholder(s) are established**		***$175.000***	
2	1.3.1	Steel Framework (Steel Superstructure Fabrication)	Allied Steel is identified and contracted to produce Steel Superstructure based on requirements	Steel Superstructure and Client-Supplier Agreement	***$144.000***	Requirements, Architectural and Structural Drawings
2	1.3.2	Permits and Approval	The process of making an application for the following permits; *Town planning permit	Permits to Proceed	***$17.000***	Requirements, Architectural and Structural Drawings

Level	WBS Code	Element Name	Description of Work	Deliverables	Budget	Resources
2	1.3.3	Mobilization	Process of preparing the project site for works to begin	Site preparation complete including; *site surveying *site layout *hoardings *fencing *site office *toilets *temporary electricity *water *signs	***$3000***	Backhoe, dump truck, cement mixer, light weight crane, wheel barrows, jackhammers
2	1.3.4	Working Drawings	A set of graphical documents that instructs the contractors how to build the building		***$6000***	
2	1.3.5	Pre-Construction	Drilling, piling, forming & shoring, capping & levelling stilts		***$5500***	
1	**1.4**	**Construction Phase**	**Phase where project execution occurs**		***$38.500***	
2	1.4.1	Concrete	Entails all structural cementers work	Stills, pilings and floors	***$16.200***	Masons, concrete workers, crane, concrete truck, and formwork
2	1.4.2	Masonry	Cementers material used to clad cement block units or other materials	Used as substrate for DensGlass Gold and to plaster other concrete components	***$8.500***	Suppliers Quotes and In house labour
2	1.4.3	Metals	ClarkDietrich structural in wall system	Used for all exterior walls	***$2.200***	Suppliers Quotes and Subcontractors installation quote
2	1.4.4	Wood, Plastics and Composites	Wood is used as a blocking for doors and windows.	Wood used in interior in walls (not exposed).	***$8.500***	Suppliers Quotes and Subcontractors installation quote

Level	WBS Code	Element Name	Description of Work	Deliverables	Budget	Resources
			Plastics will be used for eaves drips. Composites such as DensGlass gold and faux will be used.	Plastics will be used on the exterior. DensGlass gold used on exterior and interior. Faux used in interior.		
2	1.4.5	Thermal and Moisture Protection	Underlayment for the roofing system and any other bitchum	Underlayment for roofing system	***$1500***	Suppliers Quotes and Subcontractors installation quote
2	1.4.6	Openings	Void spaces for windows and doors	Window and door spaces	***$8500***	Suppliers Quotes
2	1.4.7	Finishes and ceilings	Cement based stucco (exterior), Gypsum board with veneer plaster (interior), and ceilings will comprise of type X Gypsum board	Cement finished on walls (interior and exterior) and ceilings	***$15.500***	Suppliers Quotes and Subcontractors installation quote
2	1.4.8	Specialties	Includes balcony and stair railings, and other architectural components	Specialty items	***$11.500***	Suppliers Quotes and Subcontractors installation quote
2	1.4.9	Furnishings	Includes chairs, tables, desks, lights, lamps, daybeds and other items indicated in the scope	Used throughout the building per design drawings	***$18.500***	Suppliers Quotes and Subcontractors installation quote
2	1.4.10	Plumbing and Sewerage	Installation of all waste and supply lines, water closets and lavatory	Throughout the building per building specifications	***$15.700***	Suppliers Quotes and Subcontractors installation quote
2	1.4.11	Heat, Ventilation, and Air Conditioning	Forced air air-conditioning system	Air conditioning and ventilation system	***$18.500***	Suppliers Quotes and Subcontractors installation quote
2	1.4.12	Integrated Automation and	System that controls the building from a remote location,	Integrated Automation and	***$3500***	Suppliers Quotes and Subcontractors

Level	WBS Code	Element Name	Description of Work	Deliverables	Budget	Resources
		Management	includes the control of: *telephones *alarms *lighting *sound *air-conditioning *security camera *irrigation *pool system	Management System		installation quote
2	1.4.13	Electrical	Electrical power to building and equipment (including generator)	Electricity	$7.500	Suppliers Quotes and Subcontractors installation quote
2	1.4.14	Communications	Installation of conduits and telecommunications system	Communications Systems	$4.500	Suppliers Quotes and Subcontractors installation quote
2	1.4.15	Electronic Safety and Security	Installation of door buzzers, security cameras and systems, emergency lighting, and elevator alarms and phone	Electronic safety and security systems	$2.500	Suppliers Quotes and Subcontractors installation quote
2	1.4.16	Storm Water Detention Basin	Man-made pond developed on site to retain the runoff	Man-made pond	$1.500	Subcontractor
2	1.4.17	Elevators and Stairs	Installation of mechanical airlift for transporting people, materials and goods from floor to floor	Elevators (2)	$17.500	Suppliers Quotes and Subcontractors installation quote
2	1.4.18	Erection of Super Structure	Install Super Structure	Steel Super Structure Framework for building	$13.500	Subcontractor installation quote
2	1.4.19	Site Works	Works pertaining to exterior elements of the project such as parking layout, lighting and landscape	Parking lot, exterior lighting and landscaping	$7.500	
2	1.4.20	Sound	Works pertaining to the reduction and control of sound transmission throughout the	Sound reduction and control	$1.500	

Level	WBS Code	Element Name	Description of Work	Deliverables	Budget	Resources
			building			
2	1.4.2 1	Interior Design	The placement of furnishings, and finishings (walls, floors and ceilings) and other interior components required for maximum use of the building	Interior Design	***$1200***	
2.	1.4.2 2	Landscaping	The physical placement of shrubs, trees, grass and other organic items	Landscaping	***$4.700***	
2	1.4.2 3	Pool	Bean-shaped pool located on the roof deck	Pool	***$5000***	
2	1.4.2 4	Sky bar	Circular bar with translucent top designed with an Art Architecture style	Sky bar	***$1400***	
2	1.4.2 5	Annex building	A support building that houses the restrooms and kitchen holding area	Annex building	***$1300***	
2	1.4.2 6	Roof deck	Simulative deck that mimics a ship	Roof deck	***$7.500***	
1	**1.5**	**Post-Construction Phase**	**Phase that occurs after substantial completion**		***$11.500***	
2	1.5.1	Punch list (Budgeted as Contingency)	To fix defective works	Checklist	***$14.200***	Project Manager/Architect
2	1.5.2	Site Clean-up	To clean up the site	Cleaned site	NA	
2	1.5.3	Final Building Inspection	Building inspection performed by the Ministry of Works, Project Manager and Architect	Quality checklist Requirements document	NA	
2	1.5.4	Apply for Occupancy Certificate	Submit application to the regulatory agencies	Occupancy certificate	NA	
1	**1.6**	**Project Closure Phase**	**Phase that signifies completion of project and handover of convention center**		**NA**	
2	1.6.1	Final Account	The accumulation of		NA	

Scope Control

According to Vargas Soto (2020):

> The Project Manager and the project team will work together to control the scope of the Project. The project team will leverage the WBS Dictionary by using it as a statement of work for each WBS element. The project team will ensure that they perform only the work described in the WBS dictionary and generate the defined deliverables for each WBS element. The Project Manager will oversee the project team and the progression of the Project to ensure that the scope control process is followed.
>
> If a change to the project scope is needed, the process for recommending changes to the project's scope must be carried out. Any project team member or sponsor can request changes to the project scope. All change requests must be submitted to the Project Manager in the form of a project **change order**. The Project Manager will then review the suggested change to the scope of the Project. The Project Manager will then either deny the change request if it does not apply to the intent of the Project or convene a change control meeting between the project team and Sponsor to review the change request further and perform an impact assessment of the change. If the change request receives approval by the Project Manager and Sponsor, the Project Manager will then formally submit the change request to the Project Sponsor who will then formally accept the change by signing the **change order**. Upon acceptance of the scope change by the Project Manager and Project Sponsor, the Project Manager will update all project documents and communicate the **scope directive** to all project team members and stakeholders (p.36).

OVERVIEW

The Project to build Abedules Condominium by Edificon S.A. as a means of expanding their business portfolio. The building will be composed of the main concrete structure with three floors, luxury finishings inside, and stucco finishings on exterior walls. Perimetral walls are going to be built using stone tiles. The roof will be built using a Decrashake system from Amanco.

Purpose

According to Vargas Soto (2020):

> The purpose of requirement management is to establish a common understanding of the technical and non-technical requirements that will be addressed by the Project or organization between the customer and Project or organization, within the Project or organization, and throughout the life-cycle. The goals of requirements management are to ensure that requirements are controlled to establish a baseline for development, acquisition, or management; and to ensure plans, work products, and activities are consistent with the requirements.
>
> The Risk Management plan establishes an orderly method by which the goals of requirements management will be achieved. The plan also communicates essential information to project participants and helps newcomers get up to speed. Consequently, the plan is a living document, which needs to be updated and supplemented throughout its life (p.38).

I. Roles and Organization

Role A

The project manager is responsible for collecting, reviewing, and developing project requirements. He is also responsible for approving technical, building and Project requirements (Project Management Institute, 2017).

Role B

The project sponsor is responsible for providing client requirements, reviewing technical and building requirements and approving requirements (Project Management Institute, 2017).

Role C

The fabricators are responsible for providing any variations in the technical requirements related to the steel framework that they will be producing for the Project (Project Management Institute, 2017).

Role D

The project team members are responsible for reviewing requirements to ensure specific and accurate details (Project Management Institute, 2017).

Role E

The sub-consultants are responsible for providing technical requirements and specialty consultations for the Project (Project Management Institute, 2017).

REQUIREMENTS PROCESSES

Overview

To identify, develop, maintain, and manage the requirements, the *PMBOK® Guide's* Project Scope Management processes will be used. Therefore, the following processes will guide requirements management:

Process A

Collect requirements: determining, documenting, and managing the stakeholder needs, regulatory requirements, and industry standards as it applies to the project objectives (Project Management Institute, 2017).

Process B

Define scope: this is the process that will involve the development of a detailed description of the product of the project that is driven by the stakeholder needs, regulatory requirements, and industry standards (Project Management Institute, 2017).

Process C

Create WBS: this process involves subdividing project deliverables and work into smaller, more manageable components (Project Management Institute, 2017).

Process D

Validate scope: this process involves formally accepting the completed project deliverables developed from the stakeholder requirements (Project Management Institute, 2017).

Process E

Control scope: this is the process of monitoring the project and product scope status and managing changes to the scope baseline (Project Management Institute, 2017).

Chart 10

TOOLS

Tool	Version	Use
WBS tool	2022	Tasks control
Stakeholder Management Plan template	2022	Used to create requirements documentation
Requirements Documentation template	2022	Used to create requirements documentation
Microsoft Project	2022	Used to manage WBS elements
Requirements Traceability Matrix	2022	Used to identify and manage the requirements

REQUIREMENTS DOCUMENTATION AND ORGANIZATION Requirements Documentation

WORK BREAKDOWN STRUCTURES

Provides a graphical hierarchical decomposition of the total scope of work to be completed for the Project (Project Management Institute, 2017).

REQUIREMENTS TRACEABILITY MATRIX

Provides documentation of each requirement, including how they will be implemented and tested (Project Management Institute, 2017).

REQUIREMENTS DOCUMENT

Details the design, structural and functional requirements for the Condominium Abedules (Project Management Institute, 2017).

SCOPE MANAGEMENT PLAN

Lays out details on how the scope will be developed, managed and maintained throughout the project life-cycle (Project Management Institute, 2017).

MEASURES

Measures will be used for managing requirements, details of which will be included in the appendix (Project Management Institute, 2017).

To measure requirements, the site manager will be given Work Orders (Directives) every week, preferably Monday mornings before site work begins, to carry out the work based on the schedule.

Daily, the site manager will collect data and compile a report that will be sent to the Project Management Office (PMO) for the Project Manager or Assistant Project Manager to compile a report that will result in the Work Orders (Directives) to be issued the following Monday as per the project requirements.

Chart 11

Requirements Traceability Matrix

Requirements Traceability Matrix								
Project Name:			Building of Condominium Abedules					
Project Manager Name:			AdriánBrenesLoría					
Project Description:			Construction of a 3 level Luxury Condominium					
ID	WBSID	Customer Needs	Functional Requirements	Technical Assumptions	Verification	Design	Priority	Comments
001	1.2.1	Use existing property	Surveyor's Drawings	The building must be in a residential area		Location plan	High	
002	1.2.4	Obtain maximum the maximum property use	Use the surveyor's plan to produce an architectural site plan.	The site plan indicates the location of the building on the proposed construct		Site plan and site analysis	High	

Requirements Traceability Matrix								
				ion site.				
003	1.2.4	The building is built with structural integrity.	Enlist the services of an electrical engineer.	The structural engineer must be certified by CFIA.		Complete structural drawings	High	
004	1.2.4	Must have electricity	Enlist the services of an electrical engineer	The electrical engineer must be certified by CFIA		Electrical layouts and schedules	High	
005	1.2.4	Must have plumbing water system	Enlist the service of a mechanic engineer	The mechanic engineer must be certified by CFIA		Plumbing drawings and schedules	High	
007	1.2.1	Ergonomically planned spaces,	Enlist the services of an	The architect must be certified		Architectural Elevations	High	

Requirements Traceability Matrix								
		modern colonial design.	architect	by CFIA				
008	1.2.1	Windows and doors selection	Enlist the services of an architect	The architect must be certified by CFIA		Windows and doors schedule	High	
009	1.2.1	Quality detailed finishes	Enlist the services of an architect	The architect must be certified by CFIA		Architectural details	High	
010	1.2.1	Modern ceilings and luxury finishes	Enlist the services of an architect	The architect must be certified by CFIA		Reflected ceiling plan	High	

Quality Standards

Describe the characteristics of requirements of good quality.

Customer or user needs of good quality are:

Safety: adequate security personnel on location and alarm systems and cameras.

Aesthetics: top of the line integrated cement and color finishes

Concrete strength test.

Soil test for soil compaction process

- Proper cooling and ventilation systems: a high seer (energy efficient) level water chill air-conditioning system.
- Barrier-free design (handicap access): all floor levels and the living room must be unobstructed to allow wheelchair access, according to law 7600.
- Proper site drainage: project site must have catch basins and drainage systems
- Proper site lighting: The project site must be well lit around the perimeter to ensure pedestrians' safety and vehicular traffic.

4.3 Project Time Management

According to Project Management Institute (2017):

> The project time management planning processes were conducted after Project Scope and Cost Management. The first process in project time management involved developing the Schedule Management Plan that would be used to guide the life-cycle of the Project's schedule. The Project Charter and the Scope Management Plan were used as inputs to this process to gather information regarding the Scope Baseline and the summary milestone schedule.
> Since there were no OPA's, a Schedule Management Plan template was derived from another source and modified for this purpose (p.143).

SCHEDULE MANAGEMENT PLAN BUILDING OF THE CONDOMINIUM ABEDULES

Project schedules will be made using Microsoft Project 2020. According to Project Management Institute (2017):

> Activity definition will identify the specific work packages which must be performed to complete each deliverable. Activity sequencing will be used to determine the order of work packages and assign relationships between project activities. Activity duration estimating will be used to calculate the number of work periods required to complete work packages. Resource estimating will be used to assign resources to work packages in order to complete schedule development.
> Once an initial schedule has been developed, the project manager and assistant project manager will assess it cautiously to review assigned project tasks. The project team and resources must agree to the proposed work package

assignments, durations, and schedule. Once this is achieved the project sponsor will review and approve the schedule and it will then be baselined (p.146).

The following are designated as milestones for the project schedule:

Project Initiation/Kick-off

Design Drawings

Project Defined

Site Investigation Report and soil tests

Feasibility Study Complete

Approval of Project Charter

Baseline Project Schedule

Design documents approved by the client

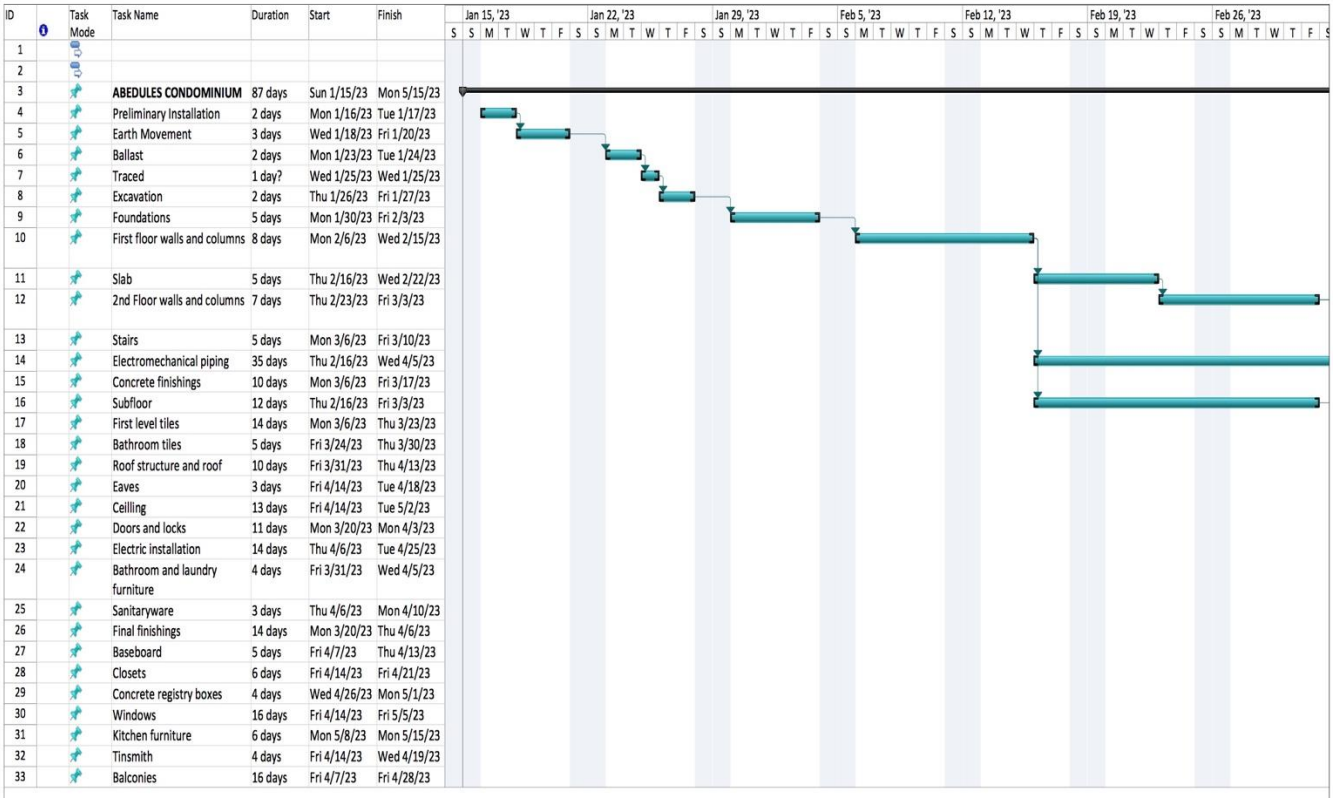
- Complete Design Documents
- CFIA construction permits
- Project Management Plan Complete
- Procurement and Sourcing Commence
- Materials Ordered
- Sub-Contractor Tendering Commence
- Sub- Contractor Tendering Complete

- Award Contracts
- Begin Work Drawings
- Approval of Roles and Responsibilities
- Working Drawing Complete
- Mobilization Commencement
- Mobilization Complete
- Site works begin
- Commencement of Vertical Construction
- Soil movement
- 1st Floor concrete Superstructure components delivered
- Commencement of 1st Floor Steel Superstructure erection
- Concrete Superstructure (2nd floor and 3rd floor) components delivered
- Commencement of (2nd floor and 3rd floor) Superstructure erection
- Erection of roof Steel structure
- Annex building and roof deck complete
- Concrete flooring, decking and steel work complete
- Cladding and in-walls complete
- Electrical and plumbing roughing complete

- Internal and external finishings
- Windows and doors installed
- Stairs construction and finishings
- Alarms and protection bars.
- Substantial Completion
- Miscellaneous works complete
- Apply for occupancy
- Punch list complete
- Final Building Inspection
- Final account
- End of Project

Figure 18

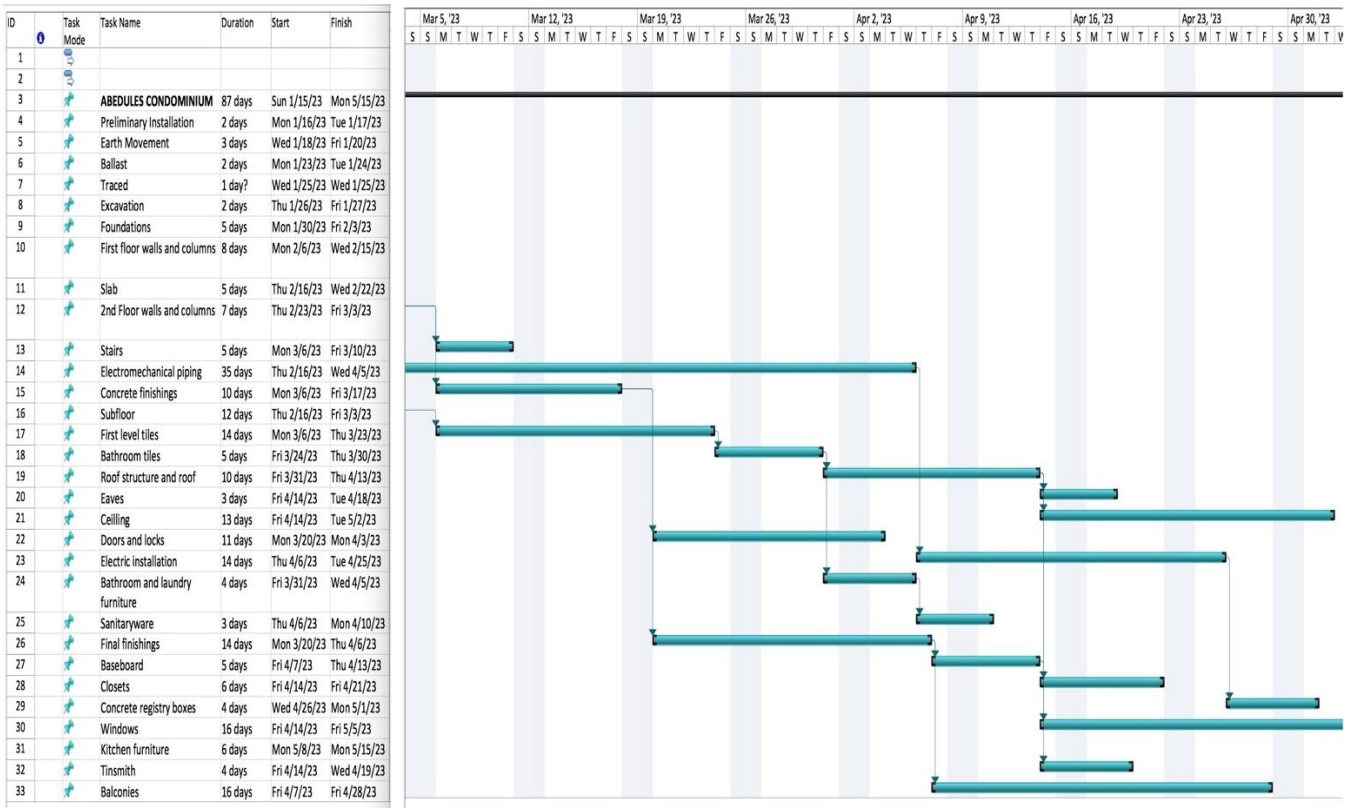
Graphical Schedule



ID	Task Mode	Task Name	Duration	Start	Finish
1					
2					
3		**ABEDULES CONDOMINIUM**	87 days	Sun 1/15/23	Mon 5/15/23
4		Preliminary Installation	2 days	Mon 1/16/23	Tue 1/17/23
5		Earth Movement	3 days	Wed 1/18/23	Fri 1/20/23
6		Ballast	2 days	Mon 1/23/23	Tue 1/24/23
7		Traced	1 day?	Wed 1/25/23	Wed 1/25/23
8		Excavation	2 days	Thu 1/26/23	Fri 1/27/23
9		Foundations	5 days	Mon 1/30/23	Fri 2/3/23
10		First floor walls and columns	8 days	Mon 2/6/23	Wed 2/15/23
11		Slab	5 days	Thu 2/16/23	Wed 2/22/23
12		2nd Floor walls and columns	7 days	Thu 2/23/23	Fri 3/3/23
13		Stairs	5 days	Mon 3/6/23	Fri 3/10/23
14		Electromechanical piping	35 days	Thu 2/16/23	Wed 4/5/23
15		Concrete finishings	10 days	Mon 3/6/23	Fri 3/17/23
16		Subfloor	12 days	Thu 2/16/23	Fri 3/3/23
17		First level tiles	14 days	Mon 3/6/23	Thu 3/23/23
18		Bathroom tiles	5 days	Fri 3/24/23	Thu 3/30/23
19		Roof structure and roof	10 days	Fri 3/31/23	Thu 4/13/23
20		Eaves	3 days	Fri 4/14/23	Tue 4/18/23
21		Ceilling	13 days	Fri 4/14/23	Tue 5/2/23
22		Doors and locks	11 days	Mon 3/20/23	Mon 4/3/23
23		Electric installation	14 days	Thu 4/6/23	Tue 4/25/23
24		Bathroom and laundry furniture	4 days	Fri 3/31/23	Wed 4/5/23
25		Sanitaryware	3 days	Thu 4/6/23	Mon 4/10/23
26		Final finishings	14 days	Mon 3/20/23	Thu 4/6/23
27		Baseboard	5 days	Fri 4/7/23	Thu 4/13/23
28		Closets	6 days	Fri 4/14/23	Fri 4/21/23
29		Concrete registry boxes	4 days	Wed 4/26/23	Mon 5/1/23
30		Windows	16 days	Fri 4/14/23	Fri 5/5/23
31		Kitchen furniture	6 days	Mon 5/8/23	Mon 5/15/23
32		Tinsmith	4 days	Fri 4/14/23	Wed 4/19/23
33		Balconies	16 days	Fri 4/7/23	Fri 4/28/23

Figure 18

Graphical Schedule



ID	Task Mode	Task Name	Duration	Start	Finish
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31		Kitchen furniture	6 days	Mon 5/8/23	Mon 5/15/23
32		Tinsmith	4 days	Fri 4/14/23	Wed 4/19/23
33		Balconies	16 days	Fri 4/7/23	Fri 4/28/23

Roles and responsibilities for schedule development are as follows:

The project manager will be responsible for facilitating the breakdown of work packages into activities that provide a basis for sequencing and estimating duration and resources with the project team. The project manager will also create the project schedule using MS Project 2018 and validate the schedule with the project team and stakeholders. The project manager will obtain schedule approval from the stakeholders and baseline the schedule (Alcide, 2018).

According to Alcide (2018): “The project team is responsible for participating in work, and duration and resource estimating. The project team will also review and validate the proposed schedule and perform assigned activities once the schedule is approved” (p.66).

The project stakeholders will participate in reviews of the proposed schedule, assist in its validation, and approve the final schedule before it is baselined (Alcide, 2018).

Schedule Control

The project schedule will be reviewed and updated as necessary when new or old information is added or deleted. It will include the actual start, finish, and completion percentages (Stamp-Romero, 2020).

The project manager is responsible for holding schedule updates or review meetings and determining schedule modifications. Submitting schedule change requests and reporting schedule status following the project's communications plan will be left to the project manager (Stamp-Romero, 2020).

The project team is responsible for participating in schedule updates or review meeting sessions. The team must communicate any changes to the project manager's actual start/finish dates. Finally, the team will participate in schedule variance resolution activities as needed (Stamp-Romero, 2020).

The project stakeholder(s) will maintain awareness of the project schedule status and review/approve any schedule change requests submitted by the project manager (Stamp-Romero, 2020).

Schedule Changes and Thresholds

According to Stamp-Romero (2020):

> If any member of the project team determines that a modification to the schedule is essential, the project manager and team will meet to assess and evaluate the change. The project manager and project team must conclude which tasks will be impacted, any variance resulting from the potential change, and any alternatives or variance resolution activities they may employ to see how they would affect the scope, schedule, and resources. If, after this evaluation is complete, the project manager determines that any change will surpass the established schedule constraints, then a schedule change request must be submitted.Submittal of a schedule change request to the project stakeholder(s) for approval is required if either of the two following conditions is true:
>
> • The proposed change is estimated to reduce the duration of an individual work package by 2% or more or increase the duration of an individual work package by 10% or more.
>
> • The change is estimated to reduce the duration of the overall baseline schedule by 10% or more or increase the duration of the overall baseline schedule by 2% or more.Any change requests that would result in changes that are within or less than the percentages indicated in the above thresholds must be submitted to the project manager for approval.Once the change request has been reviewed and approved the project manager is responsible for adjusting the schedule and communicating all changes and impacts to the project team and stakeholders.

> The project manager must also ensure that all change requests are stored for safety (pp.96-97).

Scope Change

According to Stamp-Romero (2020):

> Any changes in the project scope, which have been approved by the project stakeholder, will require the project team to evaluate the outcome of the scope changes on the current schedule. If the project manager determines that the scope change will significantly affect the current project schedule, they may demand that the schedule be re-baselined in concern of any changes, which need to be made as part of the new project scope. The project stakeholder must review and approve this request before the schedule can be re-baselined (p.98).

Figure 19

Condominium Abedules Schedule Management Plan.

SPONSOR ACCEPTANCE

Approved by:

_____ Date: _____

Representative of Epic Enterprises Client

Adapted from *Piazza.* **Retrieved November 10, 2016.**

The second process in planning project schedule management, following the development of the Schedule Management Plan, was Activity Definition. The Schedule and Scope Management Plans containing the Scope Baseline comprised of the WBS, project deliverables, constraints and assumptions were inputs used specifically for activity definition. Of the techniques identified in the *PMBOK® Guide*, decomposition and expert judgment were the ones used during this process. The tool used to capture this information and the remaining processes required to develop the schedule was Microsoft Office Project 2018, identified as a scheduling software in the *PMBOK® Guide* (Alcide, 2018).

According to PMI: “An activity list is a comprehensive list with an activity identifier and scope of work description of the schedule activities required to complete each work package” (Project Management Institute, 2017, p.152). Also, while defining activities, milestones were added and modified. Subsequently, the milestone list found in the Project Charter and Schedule Management Plan was updated after defining the activities.

An Activity Attributes list was not developed as an output to this process, as indicated in the *PMBOK® Guide*, because the information detailed in the Activity Attributes, such as the activity ID, activity description, WBS number, activity responsibility, predecessor scheduling and dependency, activity predecessors and dependencies, and successor scheduling and dependencies were already

> captured in other plans or matrices included in the FGP (Project Management Institute, 2017, p.149).

The fifth planning process conducted for Project Schedule Management involved estimating Activity Durations as detailed in the *PMBOK® Guide*. The Schedule Management Plan, Activity List, Activity Resource Requirements, Resource Calendar, and the Project Scope Statement were used. The tools and techniques used were the Project Manager's expertise, Mr. AdriánBrenes, and the scheduling tool (Alcide, 2018).

Finally, the sixth planning process conducted for Project Time Management, also detailed in the *PMBOK® Guide*, was the development of the Schedule. The schedule was created concurrently with the initial time management processes. The inputs to this process were the Schedule Management Plan, Activity List, Project Schedule Network Diagram, Activity Resource Requirements, Resource calendar, Activity Durations, Project Scope Statement, Risk Register, and Resource Requirements (Alcide, 2018).

4.4 Project Cost Management

“The first process of Project Cost Management, Plan Cost Management, was completed after the first process of Schedule Management, because the scope baseline, along with the Schedule Management Plan was used to develop the Cost Management Plan” (Project Management Institute, 2017, p.84).The tools and techniques used to develop the Cost Management Plan were expert judgment, analytical techniques, and meetings. Following this process, documents such as the Project Charter, Scope Management Plan, and Schedule Management Plan were updated following the *PMBOK® Guide* (Stamp-Romero, 2020).

COST MANAGEMENT PLAN BUILDING OF THE CONDOMINIUM ABEDULES

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Introduction

The Project Manager will be responsible for managing and reporting on the project's cost throughout the project. The Project Manager will send out a weekly financial report by E-mail to the Project Sponsor. During the bi-monthly project progress meeting, the Project Manager and Assistant Project Manager will meet with Project Sponsors to present and review the project's cost performance for the preceding month. The performance will be measured using earned value management or metrics. The Assistant Project Manager prepares the Cost Management Plan and the Cost Baseline. The Project Manager is responsible for accounting for cost deviations and presenting the Project Sponsor with options for getting the project back on budget. The Project Sponsor has the authority to change the project to bring it back within budget.

Project Costs

The total Estimated Budget for this project is a total amount for 200.000 USD , for a turn key contract.

The main costs are as following:

Preliminary works : 225.508 colones

Earth movements: 675.071 colones

Ballast : 417.907 colones

Foundations : 3.646.096 colones

First floor walls and columns : 2.894.959 colones

2nd Floor Slab : 2.396.950 colones

2nd Floor Walls and columns : 3.814.745 colones

Electromechanical scope : 1.286.789 colones

Subfloor	:	1.932.945 colones
First level tiles	:	3.349.000 colones
Roof Structure and roof	:	3.776.877 colones
Ceiling	:	1.263.797 colones
Doors and locks	:	1.045.030 colones
Final finishings	:	1.773.409 colones
Windows	:	2.996.000 colones
Social charges	:	5.534.621 colones
Contigencies (2%)	:	620.000 colones
Total Cost	:	136.400.000 colones

And is really important to highlight that the amount that was destinated for contingencies for this project is 620.000 colones, and every time that the project present a contingencies , the customer is going to be informed and this line of contingencies will cover the respective expenses.

Cost Management Approach

Costs for this project will be managed at the second level of the Work Breakdown Structure (WBS). Control Accounts (CA) will be created at this level to track costs. Earned Value calculations for the CAs will measure and manage the project's financial performance. Credit for work will be assigned at the work package level. The percentage (%) of credit granted to each work package will be calculated based on the amount of work completed at a point in time compared to the total costs required to complete the work package. Costs may be rounded to the nearest dollar and work hours rounded to the nearest whole hour.

Cost variances of +/- 0.1 in the cost and schedule performance indexes will change the cost status to cautionary; as such, those values will be changed to yellow in the project status reports. Cost variances of +/- 0.2 in the cost and schedule performance indexes will change the cost status to an alert stage; those values will be highlighted in red in the project status reports. This will require corrective action from the Project Manager to bring the cost or schedule performance indexes below the alert level. Corrective actions will require a project change order and must be approved by the Project Sponsor before they can be included within the project’s scope.

Measuring Project Costs

Performance of the project will be measured using Earned Value Management. The following four Earned Value metrics will be used to measure the project's cost performance:

Schedule Variance (SV)

Cost Variance (CV)

Schedule Performance Index (SPI)

Cost Performance Index (CPI)

If the Schedule Performance Index or Cost Performance Index has a variance of between 0.1 and 0.2, the Project Manager must report the reason for the exception. If the SPI or CPI has a variance of greater than 0.2, the Project Manager must report the reason for the exception and provide management with a detailed corrective plan to bring the project's performance back to acceptable levels.

Chart 12

Performance measure table

Performance Measure	Yellow	Red
Schedule Performance Index (SPI)	Between 0.9 and 0.8 or Between 1.1 and 1.2	Less than 0.8 or greater than 1.2
Cost Performance Index (CPI)	Between 0.9 and 0.8 or Between 1.1 and 1.2	Less Than 0.8 or greater than 1.2

Reporting Format

Project progress reports for cost management will be included every two months. The Monthly Project Progress Report will include a “Cost Management” section. This section will contain the Earned Value Metrics identified in the previous section. All cost variances outside the thresholds identified in this Cost Management Plan will be reported, including any planned corrective actions. This report will identify and track change orders triggered based upon project cost overruns.

Cost Variance Response Process

The Control Threshold for this project is a CPI or SPI of less than 0.8 or greater than 1.2. If the project reaches one of these Control Thresholds, a Cost Variance Corrective Action Plan is required. The Project Manager will present the Project Sponsor with options for corrective actions within five business days from when the cost variance is first reported. Within three business days from when the Project Sponsor selects a corrective action option, the Project Manager will present the Project Sponsor with a formal Cost Variance Corrective Action Plan. The Cost Variance Corrective Action Plan will detail the actions necessary to bring the project back within budget and how the effectiveness of the actions in the plan will be measured. Upon acceptance of the Cost Variance Corrective Action Plan, it will become a part of the project plan, and the project will be updated to reflect the corrective actions.

Cost Change Control Process

The cost change control process will follow the established project change order process. Approvals for project budget/cost changes must come from the project sponsor.

4.5 Project Quality Management

After the Procurement Management Plan, the Quality Management Plan was created to adequately plan and ensure that quality was built into the project's processes and the product. Plan Quality Management is the only Quality Management process used during project planning.

The inputs for this process identified in the *PMBOK® Guide* were used to develop the Quality Management Plan. These inputs included the Stakeholder register, Risk register, and the Requirements documentation previously developed by the Assistant Project Manager. In addition, the Requirements Management Plan was used as an input, because it identified the requirements of good quality previously outlined by the project team. The tools and techniques that will be used are checksheets and meetings (Project Management Institute, 2017, p.232).

As this project was unique, in that Edificon S.A. was responsible for designing and building the Condominium Abedules, the company: "Increased [its] responsibility for the project beyond simply building to a predetermined set of contract documents" (Barlow, 2009, p.7). Consequently, the Quality Management Plan was used as a guide to ensure that the design, processes used, materials and construction of the Condominium Abedules met or, in most cases, exceeded industry standards in elevating the quality of the product.

QUALITY MANAGEMENT PLAN BUILDING OF CONDOMINIUM ABEDULES

EDIFICON S.A. SAN JOSE, COSTA RICA

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22 MARCH, 2022

Introduction

The Quality Management Plan for the Building of the Abedules Condominium project will establish the activities, processes, and procedures for ensuring a quality product upon the project's conclusion. The purpose of this plan is to:

Ensure quality is planned

Define how quality will be managed

Define quality assurance activities

Define quality control activities

Define acceptable quality standards

Quality Management Approach

The quality management approach for the Building of the Condominium Abedules project will ensure quality is planned for both the product and process. In order to be successful, this project will meet its quality objectives by utilizing an integrated quality approach to define quality standards, measure quality, and continuously improve quality. Product quality for the Building of the Condominium Abedules project will be defined by the company's current standards and criteria based on industry standards. The focus is on the project's deliverable, and the standards and criteria being used will ensure the product meets established quality standards and client satisfaction. Process quality for the Building of the Condominium Abedules project will focus on how the project deliverable will be designed and constructed. Establishing process quality standards will ensure that all activities conform to organizational and regulatory standards, resulting in the product's successful delivery. The Project Manager/Architect will define and document all organizational and project-specific quality standards for products and processes. All quality documentation will become part of the Condominium Abedules Project Management Plan and will be transitioned into a building operational

management document upon the successful completion of the project. Metrics will be established and used to measure quality throughout the project life-cycle for the product and processes. The Project Manager/Architect will be responsible for working with the project team to define these metrics, conduct measurements, and analyze results. These product and process measurements will be used as one criterion in determining the project's success and must be reviewed by the project sponsor/client. Metrics will include:

- Building Design
- Schedule
- Resources
- Cost
- Process performance o Fabrication
- Product performance

Any member of the project team will identify quality improvements. Each recommendation will be reviewed to determine the cost versus benefit of implementing the improvement and how the improvement will affect the product or processes. If an improvement is implemented, the Assistant Project Manager will update all project documentation to include the improvement.

Quality Requirements / Standards

Product Quality:

The Project Manager/Architect will determine the product quality standards and requirements. These standards will primarily be based on the company's documented standards. Product-specific quality standards may be identified that are not currently part of the documented organizational standards. In this case, the project Manager/Architect will review these newly identified standards, and the Assistant Project Manager will incorporate them into organizational documentation if approved. The project team will also document any newly identified quality standards in the Abedules Condominium Project Management plan building and ensure communication with all stakeholders.

Process Quality:

The Project Manager/Architect will determine the process quality standards and requirements. Many of these standards will be based on existing company process standards. The Building of the Condominium Abedules project team will work with the Project Manager/Architect to establish acceptable standards and document these standards for incorporation into both organizational process documents and the building of the Condominium Abedules Project Management plan. These standards will be communicated to all project stakeholders.

Quality Assurance

The quality assurance of the building of Condominium Abedules focuses on the processes used in the construction of the building according to design drawings. In order to ensure quality, an iterative quality process will be used throughout the project life-cycle. This iterative process includes measuring process metrics, analyzing process data, and continuously improving the processes.

The Project Manager/Architect and the project team will perform assessments at planned intervals throughout the project to ensure all processes are being correctly implemented and executed.

The Project Manager and the project team will provide day-to-day quality management and conduct process audits every week, monitor process performance metrics, and assure all processes comply with project standards. If discrepancies are found, the Project Manager or Assistant Project Manager will meet with the Field Superintendent and review the identified discrepancies.

The Assistant Project Manager will schedule regularly occurring project management and document reviews. In these reviews, an agenda item will include a review of project processes, any discrepancies or audit findings, and a discussion on process improvement initiatives.

Process improvement is another aspect of quality assurance. Quality assurance reviews, findings, and assessments should always result in some form of process

improvement and, as a result, product improvement. All process improvement efforts must be documented, implemented, and communicated to all stakeholders as changes are made.

Quality Control

The quality control of the Building of the Condominium Abedules project focuses primarily on the design and construction of the building. The quality performance standards for the Building of the Condominium Abedules Project follow the organizational standards. Additionally, all physical measurements will be conducted to ensure compliance with established quality standards.

The project team will perform all physical measurements on-site and ensure all physical and performance standards are met.

The Project Manager will schedule regularly occurring project management and document reviews. In these reviews, an agenda item will include a review of products, any discrepancies or audit findings from the Assistant Project Manager, and a discussion on product improvement initiatives.

It is imperative to the project's success that all of the established physical and time, quality and cost performance standards are met.

Building this project with the best quality control regarding soil Lab tests, concrete lab tests, using the best quality materials for all finishings, buying the best brands for all the construction materials, and according to the Código Eléctrico and Código Sísmico specifications. All the activities must be organized with appropriate construction

schedules and continue this schedule control during the complete construction process. Also, the construction has to be guided by a project team organized according to the PMI statements and providing the best possible results regarding time, quality, and cost.

Quality Control Measurements

All Building of the Condominium Abedules Project deliverables and processes must be measured and aligned with the established standards and tolerances. The below logs will be used by the project team in conducting these measurements and will be maintained as supporting documentation for the project's acceptance.

4.6 Project Resource Management

Project Resource Management includes the processes to identify , define , manage and acquire the ressources to achieve the successful Project results.Resource Management plan also includes materials resources , also equipment , machinery or others type of resources required to provide the best possible project completion. The following processes will help to ensure that the right resources will be available to the project manager and the project team :

4.6.1 Plan the Resource management

Plan the Resource management process consist in how to estimate , acquire , manage and use physical and team resources, including also materias , machinery , tools or equipment.The key benefit of this process is that establishes the approach required to manage project ressources based on the type and complexity of the project.This process is performed once or at predefined points in the project.

In order to proceed with project Plan Resource, we need to consider differents Inputs essential to perform this process:

4.6.1.1 PROJECT CHARTER : the project charter provides the high level of project description and requirements . It also has the key stakeholder list, summary milestones , and preapproved financial resources that may influence the resource management of the project.

4.6.1.2 QUALITY MANAGEMENT PLAN: this quality management plan helps define the level of resources that wll be required to achieve and maintain the defined level of

quality and achieve the metrics expected for the successful project completion.

4.6.1.3 PROJECT SCHEDULE : The project schedule shows the time line and milestones required to accomplish the project successful completion.

4.6.1.4 RQUIREMENTS DOCUMENTATION: Requirements will dictate the type and amount of resources needed for the project and may influence how they are managed.

4.6.1.5 RISK REGISTER : contains information on threats and opportunities that may impact ressource planning.

4.6.1.6 STAKEHOLDER REGISTER aids in identifying those stakeholders who have a particular interest in or an impact on resources needed for the project. It also helps to identify stakeholders who can influence the use of one kind of resource over another.

Figure 20

Organizational structure of the project team

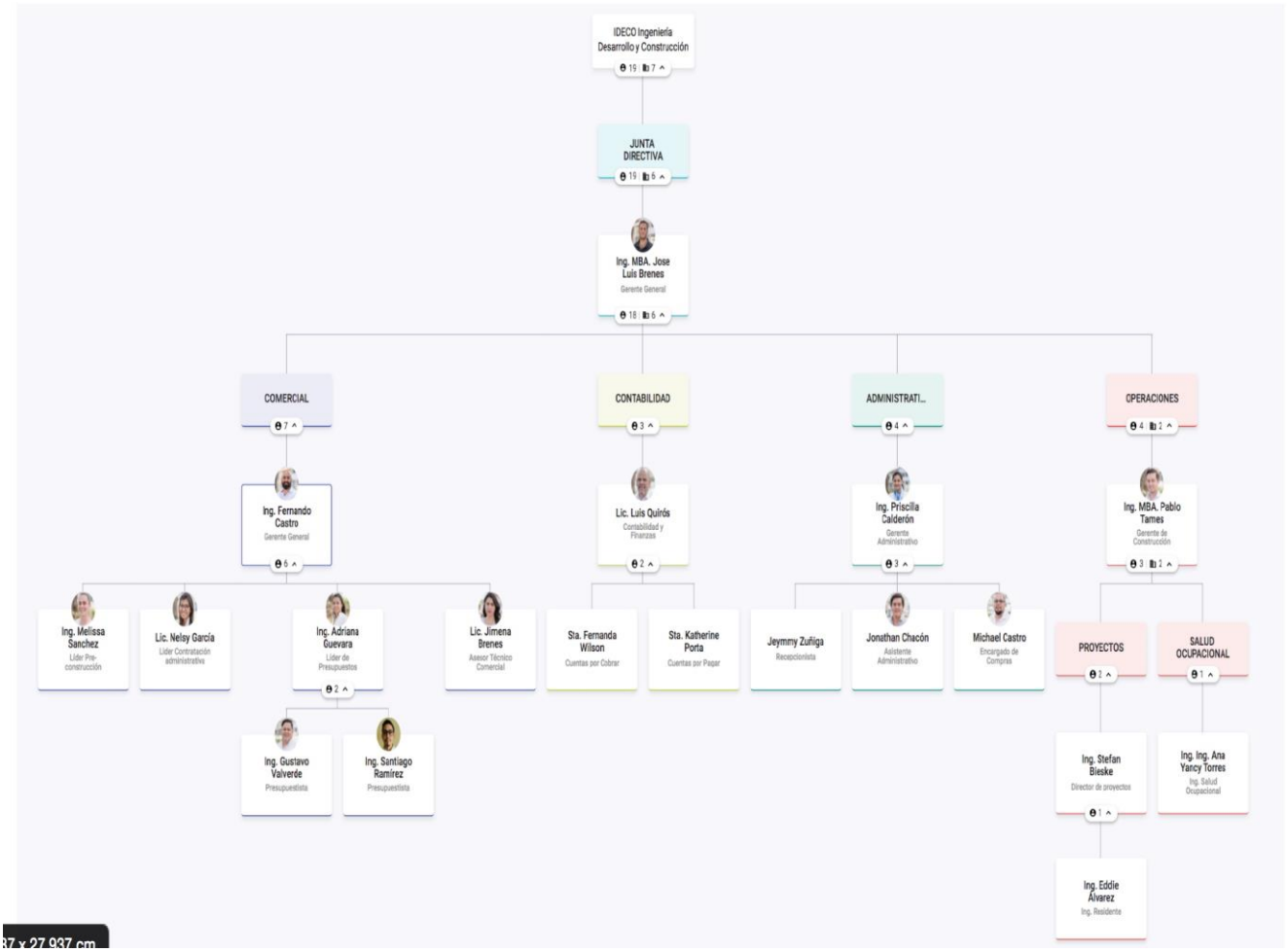


Chart 13

RACI CHART

RACI Chart	Person					
Activity	Melissa Sanchez	Jose Luis Brenes	Fernando Castro	Adrian Brenes	Pablo Tames	Priscilla Calderon
Preconstrcution process	R	I	I	I	A	A
Create a Budget	A	R	A	A	I	I
Construction drawings	A	A	R	A	I	I
Contract signature	I	A	R	A	I	I
Cost control	I	R	A	A	I	I
Construction Execution	A	I	C	R	A	A
Submit change request	I	I	A	R	I	I
Payments	I	A	I	I	I	R
Project Closure	I	A	A	R	I	A
R= Responsible A = Accountable C= consult I = inform						

4.6.1.7 TECHNIQUES AND TOOLS FOR PLAN RESOURCE MANAGEMENT

4.6.2.7.1 Expert Judgement : Expertise should be considered from individuals or groups with specialized knowledge or training in the following topics:

- Negotiating for the best resources within the organization
- Talent management and personnel development
- Determining the preliminary effort level needed to meet project objectives
- Determining the preliminary effort level needed for project completion
- Determining reporting requirements based on the organizational culture
- Estimating lead times required for acquisition , retention and release plans
- Complying with applicable government and union regulations
- Managing sellers and the logistics effort to ensure materials and supplies are available when needed.

4.6.2.7.2 Data Representation

Data representation techniques that can be used for this process include but are not limited to charts , most fall into hierarchical, matrix, or text oriented formats.A hierarchical format may be used to represent high level roles , while a text –based format may be better suited to document the detailed responsabilities.

- **Hierarchical charts** : is the traditional organizational chart structure can be used to show positions and relationships in a graphical , top –down format.
- **Work breakdown** : The WBS is designed to show how the project deliverables are broken down into work packages and provide areas of responsabilities.
- **Organizational breakdown structure** : an OBS is arranged according to an organization existing departements, units or teams with the project activities listed under each department.
- **Resource breakdown**: The resource breakdown structure is a hierarchical list of team and physical resources related by category and resource type that is used for planning , managing and controlling project work completion.

- **Responsibility Assignement Matrix**: A RAM shows the project resources assigned to each work package. It is used to illustrate the connections between work packages , or activities , and project team members . On larger projects , RAMs can be developed at various levels. For exemple , a high – level RAM can define the responsabilities of a project team.
- **Text oriented formats**. Team member responsabilities that require detailed descriptions can be specified in text –oriented formats. Usually in outline form, these documents provide information such as responsabilities , authority , competencies , and qualifications.The documents are known by various name including position descriptions and role –responsibility –authority forms.These documents can be used as templates for future projects , especially when the information is updated throughout the current project by applying lessons learned.

4.6.2 Estimate Activity Resources

Estimate activity resources is the process of estimating team resources and the type and quantities of materials , equipment , and supplies necessary to perform project work . The key benefit of this process is that it identifies the type , quantity , and characteristics of resources required to complete the project . This process is performed periodically throughout the project as needed .

4.6.2.1 Project Management Plan

Resource management plan The resource management plan defines the approach to identify the different resources needed for the project . It also defines the methods to quantify the resources needed for each activity and aggregates this information.

Scope baseline Described in section 5.4.3.1 The scope baseline identifies the project and product scope necessary to meet the project objectives . The scope drives the needs for both team and physical resources.

4.6.2.2 Project Documents

Activity attributes. These documents provide the primary data source for use in estimating team and physical resources required for each activity on the activity list . Examples of attributes include the resource requirements , imposed dates , activity location, assumptions, and constraints.

Activity list. The activity list identifies the ativities that will need resources.

Assumption log. The assumption log may have information on productivity factors, availability , cost estimates, and approaches to work that will influence the nature and number of team and physical resources.

Cost estimates. The cost of resources may impact resource selection from the quantity and skill level perspectives.

Resource calendars. A resource calendar identifies the working days , shifts, start and end of normal business hours, weekends , and public holidays when each specific resource is available, information on wich resources (such as team resource , equipment and material) are potentially available during a planned activity period.

Risk register. The risk register describes the individual risks that can impact resource selection and availability.

4.6.3 ACQUIRE RESOURCES

Acquire resources is the process of obtaining team members , facilities , equipment , materials , supplies , and other resources necessary to complete project work completion. The key benefit of this process is that it outlines and guides the selection of resources and assigns them to their respective activities. This process is performed periodically throughout the project as needed.

The resources needed for the project can be internal or external to the project – performing organization. Internal resources are acquired (assigned) form functional or resource managers . External resources are acquired trough the procurement processes, and can be equipment, tools, materials, for example.

The project team may or may not have direct control over resource selection because of collective bargaining agreements, use of subcontractors personnel , a matrix project environement , internal or external reporting relationships, or others reasons. It is important that the following factors are considered during the process of acquiring the project resources:

- The project manager or project team should effectively negotiate and influence others who are in a position to provide the required team and physical resources for the project.
- Failure to acquire the necessary resources for the project may affect project schedules,budgets, customer , satisfaction , quality and risks . Insufficient resources or capabilities decrease the probability of success , and in a worse case scenario , could result in project cancellation.

- If the team ressources are not available due to constraints such as economic factors or assignement, to other projects, the project manager or project team may be required to assign alternative ressources.

4.6.4 DEVELOP TEAM

Develop team is the process of improving competencies , team member interaction, and the overall team environement to enhance project performance. The key benefit of this process is that it results in improved teamwork , enhanced interpersonal skills and competencies , motivated employees , reduced attrition, and improved overall project performance . This process is performed throughout the project.

Project managers require the skills to identify , build , maintain , motivate . lead , and inspire project teams to achieve high team performance and to meet the porject's objectives. Teamwork is a critical factor for project success, and developing effective project teams is one of the primary responsabilities of the project manager. Project managers should create an environement that facilitates teamwork and continually motivates the team by providing challenges and opportunities , providing timely feedback and support as needed , and recognizing an rewarding good performance.High team performance can be achieved by employing these behaviors:

- Using open and effective communication
- Creating team-buiding opportunities
- Developing trust among team members

- Managing conflicts in a constructive manner
- Encouraging collaborative problem solving
- Encouraging collaborative decision making

Projects managers operate in a global environement and work on projects characterized by cultural diversity. Team members often have diverse industry experience , communicate in multiple languages , and sometimes work with a team language or cultural norm that may be different from their native one. Developping the project team improves the people skills , technical competencies ,project performance and overall team environement .

4.6.5 MANAGE TEAM

Manage Team is the process of tracking team member performance , providing feedback , resolving issues , and managing team changes to optimize project performance. The key benefit of this process is that it influences team behavior , manages conflict, and resolves issues. This process is performed throughout the project.

Managing the project team requires a variety of management and leadership skills for fostering teamwork and integrating the efforts of team members to create high performance teams . Team management involves a combination of skills with special emphasis on communication, conflict management , negotiation , and leadership. Project managers shoul provide challenging assignements to team members and provide recognition for high performance.

4.6.6 CONTROL RESOURCES

Control Resources in the process of ensuring that the physical resources assigned and allocated to the project are available as planned , as well as monitoring the planned versus actual utilization of resources and taking corrective action as necessary . The key benefit of this process is ensuring that the assigned resources are available to the project at the right time and in the right place and are released when no longer needed. This process is performed throughout the project.

The Control Resources process should be performed continuously in all project life cycle. The resources needed for the project should be assigned and released at the right time , right place , and right amount for the project to continue without delays. The Control Resources process is concerned with physical resources such as equipment, materials , facilities , and infrastructure. Team members are addresses in the Manage Team process.Updating resource allocation requires knowing what actual resources have been used to date and what is still needed. This is done mainly by reviewing the performance usage to date. Control Resources is concerned with:

- Monitoring resource expenditures
- Identifying and dealing with resource shortage / surplus in a timely manner.
- Ensuring that resources are used and released according to the plan and project needs.
- Informing appropriate stakeholders if any issues arise with relevant resources.
- Influencing the factors that can create resources utilization change
- Managing the actual changes as they occur.

How changes on the project will be managed ?

Every change on the project in relation of the agreement stated on the original contract, will be informed to the owner , preparing differents change orders files, including differents options and with respectives quotations, in order to provide support to stakeholder to decide the best possible result regarding the mentioned change on our project.Only the respective stakeholders can request changes in the project, of course has to be approved by the main stakeholder. Project team can provide all kind of suggestion or recommendation for a change in the project , that has to be approved by the main project stakeholder or the owner.

The list of changes will be managed on a global change list control file, in order to review every change order when is needed, this change order control will provide the option to indicate the change order status , if the order is approved , in review, in budget or rejected.Every change order will have a breakdown indicating the related costs for each activity to achieve the differents change orders.

Every approved change order will be printed and presented to the stakeholder in order to gather his approval with his signature. And this activities will take place as soon as the change order is canceled.The change order document will include every related technical sheet, schematic drawing or plans to indicate differents details related to the change order.

Finally the original budget will be updated with the total amount approved for differents change orders , also the projet team will be in charge to provide a project projection expenses to achieve the final deliverables of the project.

How will the supply of materials will be managed during the overall project ?

First a ball , the project team is in charge to prepare and share with the client the list of submittals, documents where all the physical resources will be described and the respective technical sheets are shared also with the owner and respective stakeholders, to gather respective approval, and during the pre-construction project , the procurement department needs to prepare the official project budget.

Project Engineer prepare the complete list of materials supply, respective materials deliveries need to be scheduled during the course of the project. The project team need to generate a cash flow document to share with the client, in order to schedule and coordinate the complete list of materials and equipment required for this project. This document will be bases on the updated version of the official budget .

It is a best practice to prepare a document called the Budget variance, where the project team is going to keep in track , all the most importants costs variance regarding the original budget versus the real project expenses. During thos process there is a cost document that need to be generated, wich is the real cost expenses vs the original budge costst of the project.

Edificon company has to keep the record for all the project expenses regarding all the `labor costs, services , subcontractors payments, equipement , rentals, and materials, all this resources has to be controlled by a established procurement process, in order to achieve the most important project objectives regarding time , quality and costs.

PROJECT ORGANIZATIONAL CHARTS STAFFING MANAGEMENT

Introduction

Resource management plan is an essential part of the Building of the Condominium Abedules. The resources management plan is a tool that will aid in the management of this project's human resource activities and materials resources throughout the project until closure. The Resources management plan includes:

Roles and responsibilities of team members throughout the project

Project organization charts

Staffing management plan to include:

- How resources will be acquired
- Timeline for resources/skill sets
- Training required to develop skills
- How performance reviews will be conducted
- Recognition and rewards system

The Resources management plan aims to achieve project success by ensuring that the appropriate human resources are acquired with the necessary skills, resources are trained if any gaps in skills are identified, team building strategies are clearly defined, and team activities are effectively managed. **Roles and Responsibilities** The roles and responsibilities of the project team of the Building of the Condominium Abedules are essential to project success. And also the definition of all the materials , contractors and services required for this project.

All team members must clearly understand their roles and responsibilities to successfully perform their project portion. For the Building of the Condominium Abedules, the following project team roles and responsibilities have been established:

Architect (A), (1 position): responsible for ensuring the building aesthetics, function, and use of space. The Architect is also responsible for all of the various disciplines, excluding the project manager and the production of the project's documents.

Project Manager (PM), (1 position): responsible for the Project's overall success. The PM must authorize and approve all project expenditures. The PM is also responsible for ensuring that work activities meet established acceptability criteria and fall within acceptable variances. The PM will be responsible for reporting project status following the communications management plan. The PM will evaluate the performance of all project team members. The PM is also responsible for acquiring human resources for the project by skillset. The PM

must possess the following skills: leadership/management, budgeting, scheduling, and effective communication.

Assistant Project Manager (APM), (1 position): responsible for creating project planning documents (i.e., Project Management Plan), taking meeting minutes, reporting to the PM on changes and updates made to the project for approval, managing the procurement process, and collecting daily reports from the site management team. The Assistant Project Manager is also responsible for broadcasting daily site reports to relevant stakeholders as directed by the Project Manager.

Sound & Acoustics Engineer (SE), (1 position): responsible for determining the conductivity of the building's sound and suggesting ways to create proper sound acoustics within an acceptable range. The SE is also responsible for documenting recommendations in a written document outlining various rooms and spaces issued to the Architect.

Accountant: responsible for all financial transactions and reporting about the project.

Electrical Engineer (EE), (1 position): responsible for ensuring that the building operates at an optimum and efficient electrical capacity. The EE is responsible for producing an electrical floorplan, lighting layout, switches, rises, etc., for being submitted to the Architect.

Structural Engineer (SE), (1 position): responsible for the structural integrity of the building and produces structural calculations and drawings to be issued to the Architect.

Mechanical Engineer (ME), (1 position): responsible for the air-conditioning systems, ensuring that they provide the necessary cooling capacity to maintain the CFMs and airflow in the building. The ME also produces an air-conditioning, ducting, and supply line layout to be submitted to the Architect.

Plumbing Engineer (PE), (1 position): responsible for producing floor layouts showing the lavatories, water closets, urinals, supply lines, wastewater lines and connections to the sewer system. The PE will also submit drawings to the Architect.

Geotechnical Engineer (GE), (1 position): responsible for determining the soil and site conditions, ensuring that the building is duly anchored in the allocated spaces. The GE produces a pile drawing locating the piles on a grid system and indicating each pile's size, reinforcement, and strength.

Hydrologist (H), (1 position): responsible for measuring water tables, water flow, and drainage. The Hydrologist is responsible for indicating the type of drainage system applicable for the building’s functioning.

Quantity Surveyor (QS), (1 position): responsible for collecting data based on the construction specifications and drafting documents to conduct a cost analysis for the proposed project.

Land Surveyor (LS), (1 position): responsible for topography and contour mapping.

Interior Designer (ID), (1 position): responsible for ensuring the design theme for interior spaces, furniture, ceiling-wall colors, fabric, materials, etc. The ID is also responsible for the proper placement of all building furniture to maximize space.

Gofer (G), (1 position): person available to run errands for the project **Field Superintendent (FS), (1 position):** responsible for all production and business about the site works.

Foreman (F), (1 position): responsible for the technical requirements as per the specifications and drawings. The Foreman ensures that each skilled worker performs the work per the specifications.

Draftsman (D), (1 position): responsible for all revisions, 2D and 3D drafting, designs and details based on change orders and addendums.

Electrical Subcontractor (ES), (1 position): responsible for reading and calculating electrical drawings and ensuring their correct placement in the building. In addition, the ES is responsible for installing all building and site lighting as per electrical and site layouts and schedules.

Plumbing Subcontractor (PS), (1 position): responsible for reading and calculating plumbing drawings and ensuring their correct placement in the building within schedule constraints.

Fire and Safety Subcontractor (FSS), (1 position): responsible for determining the necessary apparatus required to ensure fire safety. The FSS is also responsible for installing the necessary apparatus to ensure fire safety within schedule constraints.

Roofing Subcontractor (RS), (1 position): responsible for reading Architectural drawings about the roof layout and constructing the roof following the specifications and schedule constraints.

Tiling Subcontractor (TS), (1 position): responsible for reading the floor plan drawings and installing tiles per layouts and following accepted industry standards and within schedule constraints.

Pool Subcontractor (PS), (1 position): responsible for Architectural drawings and uses geometric calculations to lay out the pool on the deck and build according to standards and within schedule constraints.

Faux Installation Subcontractor (FDIS), (1 position): responsible for installing all faux components within schedule constraints.

Windows and Doors Subcontractor (WDS), (1 position): responsible for ensuring that the window and door schedules and specifications are adhered to in the manufacturing of the windows and installation, following the drawings and within schedule constraints.

Benefits of the turnkey contract

With the turnkey contract, the construction company and stakeholders will have a clear scope to define the respective project. This scope should include all the different stages of the related project.

4.7 Project Communications Management

According to Project Management Institute (2017):

> To ensure that information communicated about the project during the project lifecycle will be disseminated to the appropriate parties at the correct time, the Communications Management Plan**,** was developed using the *PMBOK*® *Guide*. The plan details how each stakeholder would receive information from members of the project team, the frequency of communication, the information that would be communicated to them and the person responsible for ensuring that the correct information was received by the communication sent (p.289).

An interview was conducted with Mr. AdriánBrenes, the Project Manager, to ascertain the company's communication types and delivery methods. The information gathered, and a communications requirements analysis completed by the Assistant Project Manager are included in the Communication Matrix (Project Management Institute, 2017).

Chart 14 **–**

Communication Matrix

Project Team Communication Matrix

Communication Type	Deliverable	Description	Delivery Method	Frequency	Owner	Audience
Personal Communication	Project updates	Regular communication	Telephone Calls	Needs basis	Project Manager/Assistant Project Manager	CEO Board of Directors
	Project updates	Regular communication	Telephone Calls E-mail	Needs basis	Project Manager/Assistant Project Manager	Sub consultants Subcontractors
	Project updates	Regular communication	Telephone Calls E-mail Meetings	As needed	Project Manager	Assistant Project Manager
	Project updates	Regular communication	Telephone Calls E-mail	Daily	Assistant Project Manager	Field Superintendent
	Project updates	Regular communication	E-mail Conversation	Daily	Field Superintendent	Foreman
	Project updates	Regular communication	E-mail	Needs basis	Project Manager/Assistant Project Manager	Financial Advisor
	Procurement update	Update on status of products and shipping	E-mail Conversation Web conference	Weekly	Project Manager/Assistant Project Manager	Suppliers
	Project updates	Regular communication	Face to Face Communication	Daily	Foreman	Subcontractors
	Instructions and Issues	Regular communication	Face to Face Communication	Daily	Subcontractors	Site workers
Reports	Project status report (Project Process)	Regular update on critical project issues	E-mail	Weekly	Project Manager	Project Manager CEO Board of Directors Project Team
	Quality audit report	Regular updates on project quality performance	E-mail	Bi-monthly	Assistant Project Manager	Project Manager CEO Board of Directors Project Team

Communication Type	Deliverable	Description	Delivery Method	Frequency	Owner	Audience
	Financial report	Regular updates on project finances	E-mail	Weekly - Friday	Project Manager	Quality Manager Project Manager CEO Board of Directors
	Compliance report	Regular updates on pending permits, extensions, deviations, request for information (RFI), etc.	E-mail	Weekly - Friday	Project Manager	Project Manager CEO Board of Directors
	Task report	Regular updates on critical project issues pertaining to the external team (sub consultants and subcontractors)	E-mail	Weekly - Every Monday morning after Team meeting	Assistant Project Manager	Project Manager Project Team Quality Team
Presentations	Project review	Project status updates	Meeting	Monthly	Project Manager	Project Manager Project Sponsor Project Team
	Final account	A complete audit of project finances from the project, done at the end of the project. In addition to operational costs' projections.	Meeting	Once	Project Manager and Assistant Project Manager	Project Manager Assistant Project Manager CEO Board of Directors
Project Announcements	Task reminders	Task owner schedule reminders	E-mail	Daily	Assistant Project Manager	Project Manager Project Team

Communication Type	Deliverable	Description	Delivery Method	Frequency	Owner	Audience
	Change Request/Orders	Request to add or remove scope from the project.	Written (Standard Form)	Needs basis	Project Manager	Project Manager Project Team CEO Board of Directors Sub consultants Subcontractors
	Project updates	Project updates for Community Members	Written	Needs basis	Project Manager	Community Members
Reviews and Meetings	Team meeting	Meeting to review project status	Planning Meeting	Weekly First thing Monday Morning	Assistant Project Manager	Project Manager Project Team Assistant Project Manager
	Financial report	Regular updates on project finances	Progress Meeting	Bi-monthly	Project Manager	CEO Board of Directors Project Manager
	Project status meetings (Project Process)	Regular updates on critical project issues	Progress Meeting	Bi-monthly	Project Manager	Project Manager CEO Board of Directors Project Team
	Planning	Regular updates and project planning	Progress and Planning Meeting	Daily	Project Manager	Assistant Project Manager
	Consultant Meeting	Technical planning session to collaborate on work schedules, installations, delays, issues, etc.	Planning Meeting	By request	Project Manager	Assistant Project Manager Sub consultants
	Site Meeting	Regular updates and project planning	Progress/Planning Meeting	Monthly	Project Manager	Foreman Subcontractors Site Superintendent Assistant Project Manager
	External Regulatory Meeting	Meeting at the request of Governmental	Meeting	By request	Project Manager	Project Manager Assistant Project Manager Regulatory Governmental

4.8 Project Risk Management

Although Project Risks were identified during the development of the Project Charter and considered while planning Project Time and Cost Management, Project Risk Management was the final knowledge area addressed during the planning for the building of the Condominium Abedules (Stamp-Romero, 2020).

As indicated in the section above, risk management was planned to adequately identify and plan for the project risks. The project risks were identified qualitatively analyzed and, finally, responses were planned for each identified risk. Risks were not quantitatively analyzed due to a lack of tools, for example, simulation software, that would be required during the process (Stamp-Romero, 2020).

> Although, risk management was completed as the final planning activity in the development of the Project Management Plan, during the development of the plan, the Assistant Project Manager and Project Manager were actively managing the risks that were identified and arose during project management planning (Stamp-Romero, 2020, p.142).

To plan risk management, according to Project Risk Management described in the *PMBOK® Guide*, the previously developed subsidiary plans, including the:

> Project Charter and Stakeholder register were used as inputs to the process. The tools and techniques used were analytical techniques, expert judgement, and meetings. The output developed was the Risk Management Plan**.** The plan speaks to how risks will be identified, analysed, planned for, and monitored and controlled throughout the project lifecycle (Project Management Institute, 2017, p.313).

INSTRUCTIONS: The Risk Management Plan briefly describes the purpose, terminology, and risk management process for this project. Use this document in conjunction with the Risk Log template.

BACKGROUND

This document is intended for the Project Manager and Assistant Project Manager (Stamp-Romero, 2020).

Risks are positive or negative events or conditions that may or may not occur during the project lifecycle and can impact project objectives (Stamp-Romero, 2020).

The impact is defined as the ability to increase or decrease the probability of an event or condition (Stamp-Romero, 2020).

The trigger is defined as an event that marks the occurrence of a risk (Stamp-Romero, 2020).

A contingency plan is designed to account for a possible future event or circumstance (Stamp-Romero, 2020).

Risks are controlled by watching for triggering events of risks and executing the corresponding response plan (Stamp-Romero, 2020).

IDENTIFYING RISKS

According to Stamp-Romero (2020):

Initially, risks will be identified while developing the project charter. However, during creation of the subsidiary plans, a comprehensive risk register will be compiled. Finally, during risk identification, the risk register will be reviewed to include or remove any risks that may or may no longer be applicable to the project. The risk register will be created and maintained by the Assistant Project Manager, under the responsibility of the Project Manager. The categories of risks relevant to this project are financial, planning, stakeholder, and scheduling (pp.143-144).

ANALYZING RISKS

According to Stamp-Romero (2020): “The impact and probability of risks will be evaluated using a probability impact matrix during qualitative risk analysis. There will be a response plan developed for all risks identified as having any impact on the project, positive or negative” (p.144).

PLANNING RISK RESPONSES

According to Stamp-Romero (2020):

The project management team, including consultants, vendors and contractors, will identify and assist with planning risk responses. However, the Project Manager will be in charge of planning risk responses with the Assistant Project Manager managing data collection and storage (p.144).

MONITORING AND CONTROLLING RISKS

The Assistant Project Manager will monitor the status of risks by comparing the data collected during project execution with the risk register and risk analysis summary. The risk register will be updated weekly and communicated to the Sponsors and project management team during project status meetings. The Project Manager is responsible for deciding when to execute a risk response. To identify the project risks, the Risk Management Plan, Cost Management Plan, Schedule Management Plan, Quality Management Plan, Resource Management Plan, Scope baseline, Activity Cost and Duration Estimates, Stakeholder Register and Procurement documents were used as inputs to the process. The tools and techniques employed were documentation reviews and expert judgment. The risk register below is the output from this process. However, a few elements have been added to the chart below as they will be used during project execution to control risks. The risk register was compiled in Microsoft Excel 2016 (Stamp-Romero, 2020).

Chart 15

Risk Register

Risk ID	Risk Description	Category	Date	Status	Responsible Individual	Probable Cause of Risk	Prevention Strategy	Trigger Event	Contingency Plan	Contingency Plan Activation Date	Planned Resolution Date	Risk Close Date	Comments
1	Price increase on materials over time	Financial	21-Oct-16	Open	Assistant Project Manager								
2	Damage to materials on site	Financial	21-Oct-16	Open	Site Foreman								
3	Accidents on site	Financial	21-Oct-16	Open	Site Foreman								
4	Underestimating of Project Cost	Financial	21-Oct-16	Open	Project Manager								
5	Regulatory demands not consistent with approved drawings	Planning	21-Oct-16	Open	Architect/ Project Manager								
6	Client unauthorized or misplaced involvement in the project	Stakeholder	21-Oct-16	Open	Project Manager								
7	Sever climate changes	Scheduling	21-Oct-16	Open	Assistant Project Manager								

In addition, to detailing a list of identified risks and risk responses, the risk register will be used to capture information regarding how each risk is prioritized by combing its probability of occurrence and impact, which are both aspects of Qualitative Risk Analysis. The Risk Management Plan, Risk Register, and Scope Baseline were used to perform Qualitative Risk Analysis. Microsoft Excel 2016 was used to capture the information detailed in the chart above and used to produce **Chart 12** below. The tools and techniques used during this process were risk probability and impact assessment, risk urgency assessment and expert judgment. In addition, a 3x3 probability and impact matrix was employed to prioritize each risk for planning risk responses (Stamp-Romero, 2020).

Based on the probability of each risk occurring and its possible impact on the project, a black circle is placed in the expected risk position. The red zone represents high risks, the yellow zone moderate risks and the green zone low risks. To determine which risks can be categorized as having a high, medium, or low probability of occurrence and having a high, medium, or low impact on the project, a meeting was conducted with Mr. AdriánBrenes, the expert in the field (Stamp-Romero, 2020).

Chart 16

Probability and Impact Matrix

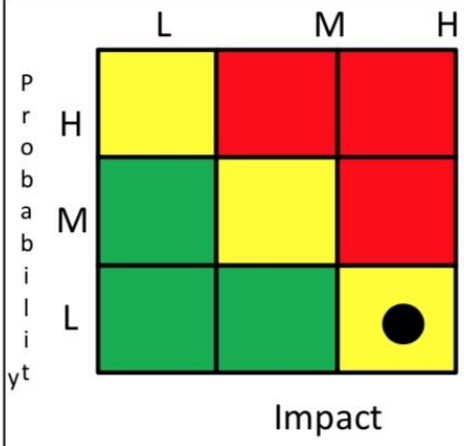
Project Name: Building of the Convention Center ID # 1. Price increase on materials over time	
Description of Risk Event:	Prevention Strategies:
Price increases of materials being purchased as the project progresses.	Procurement contracts must be Firm Fixed Price (FFP)
Probable Causes:	Risk Response/Contingency Plans:
Inflation	Risk Response: Avoid/Mitigate Contingency Plan: Contact sellers and meet regarding contract terms and agreements
Risk Matrix:	Triggers Events:
	Increase in purchase price of items being procured

Chart 16

Probability and Impact Matrix

<table>
<tr><td colspan="2">Risk ID # 2. Damage to Materials</td></tr>
<tr><td>Description of Risk Event:</td><td>Prevention Strategies:</td></tr>
<tr><td>Materials damaged once in care of project team members</td><td>Ensure proper storage trailers, adequate site management and on-site supervision. Also, ensure that site supervisors train and enforce proper handling and care for project materials.</td></tr>
<tr><td>Probable Causes:</td><td>Risk Response/Contingency Plans:</td></tr>
<tr><td>Improper storage, handling, weather conditions or human error</td><td>Risk Response: Avoid/Transfer

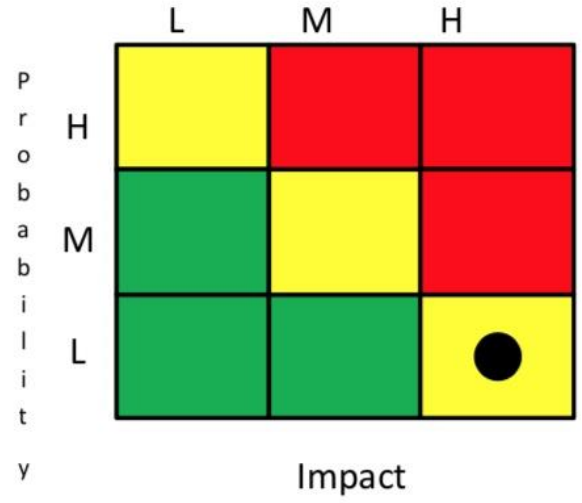
Contingency Plan: All risk builder's insurance</td></tr>
<tr><td>Risk Matrix:</td><td>Triggers Events:</td></tr>
<tr><td> 
</td><td>The occurrence of physical injuries, material waste or repurchasing materials</td></tr>
</table>

Chart 16

Probability and Impact Matrix

<table>
<tr><td colspan="2">Risk ID # 3. Accidents on Site</td></tr>
<tr><td>Description of Risk Event:</td><td>Prevention Strategies:</td></tr>
<tr><td>Incidents that can occur resulting in bodily injury or damaged project materials</td><td>Ensure proper site management and supervision. Plan for adequate site help and contract only experienced subcontractors or workers who are covered under all risk builder's insurance</td></tr>
<tr><td>Probable Causes:</td><td>Risk Response/Contingency Plans:</td></tr>
<tr><td>Weather conditions or human error</td><td>Risk Response: Avoid/Transfer

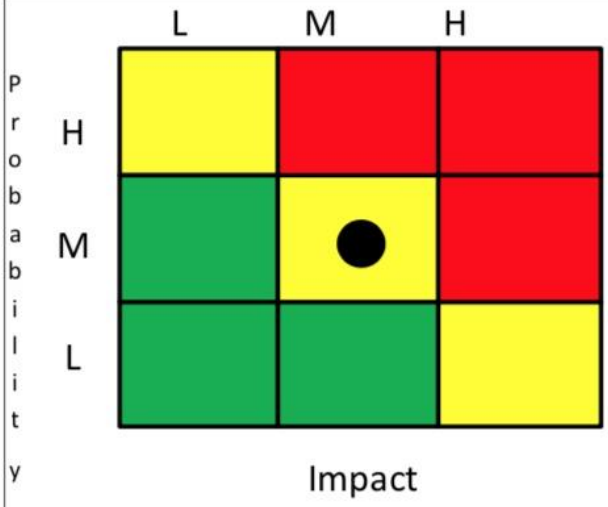
Contingency Plan: Injury or waste to be at the expense of the subcontractors or contractors all risk builder's insurance.</td></tr>
<tr><td>Risk Matrix:</td><td>Triggers Events:</td></tr>
<tr><td> 
</td><td>Human injury and material damage</td></tr>
</table>

Chart 16

Probability and Impact Matrix

<table>
<tr><td colspan="2">Risk ID # 4. Underestimation of Project Costs</td></tr>
<tr><td>Description of Risk Event:</td><td>Prevention Strategies:</td></tr>
<tr><td>Project budget not accurately calculated, resulting in insufficient funds to complete project</td><td>Project Manager and Assistant Project
Manager will both check budget more than
3 times to ensure accuracy</td></tr>
<tr><td>Probable Causes:</td><td>Risk Response/Contingency Plans:</td></tr>
<tr><td>Human error</td><td>Risk Response: Avoid

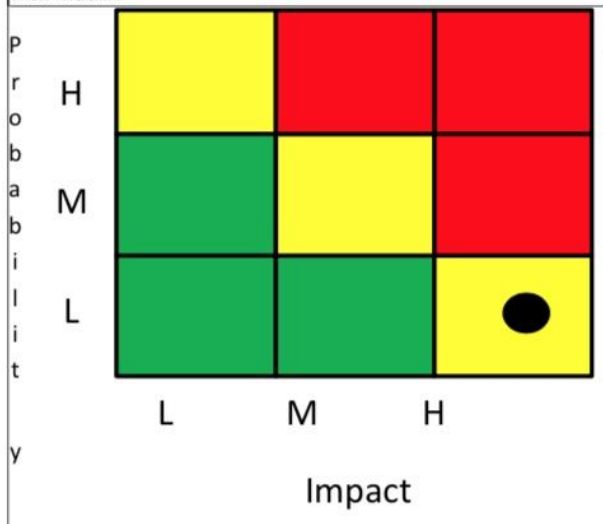
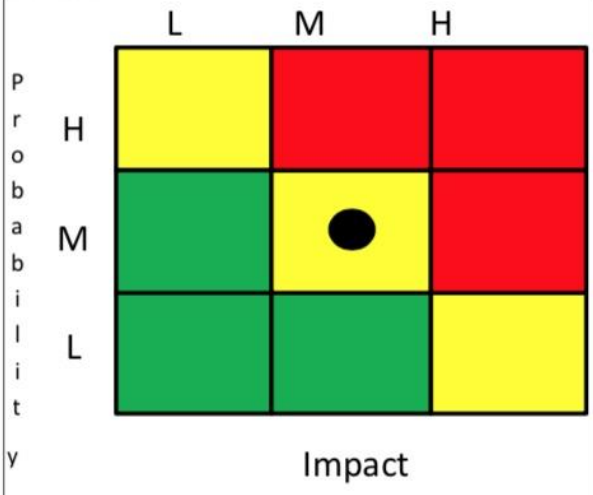
Contingency Plan: Contingency added to budget</td></tr>
<tr><td>Risk Matrix:</td><td>Triggers Events:</td></tr>
<tr><td> 
</td><td>Data shows that there are cost deviations (increase)</td></tr>
</table>

Chart 16

Probability and Impact Matrix

<table>
<tr><td colspan="2">Risk ID # 5. Regulatory demands not consistent with approved drawings</td></tr>
<tr><td>Description of Risk Event:</td><td>Prevention Strategies:</td></tr>
<tr><td>Regulatory bodies do not provide deliverable approvals even though the details in the drawings have been approved by their counterparts</td><td>Meet with representatives from the regulatory bodies more than once to review
requirements and compare with deliverables before formal inspection</td></tr>
<tr><td>Probable Causes:</td><td>Risk Response/Contingency Plans:</td></tr>
<tr><td>Human error</td><td>Risk Response: Accept

Contingency Plan: Contingency added to budget for rework or to complete works</td></tr>
<tr><td>Risk Matrix:</td><td>Triggers Events:</td></tr>
<tr><td> 
</td><td>Denied permits and/or inspections even though specifications were adhered to</td></tr>
</table>

Finally, Risk Responses were planned for each risk to reduce the threat to project objectives. The Risk Management Plan and Risk Register were used as inputs to this process. The tools and techniques used were strategies for harmful risks or threats, contingent response strategies and expert judgment.

4.9 Project Procurement Management

According to Project Management Institute (2017):

> Project Procurement Management was conducted after Project Cost, Time and Resource Management. To develop a Procurement Management Plan, a template was used. As documented in the *PMBOK® Guide,* the Requirements Documentation, Risk Register, Stakeholder Register and Project Charter were the inputs used in the process. The tools and techniques were expert judgement and meetings in the form of a personal interview with the lead Project Manager (p.358).

The Procurement Management Plan detailing how the project team would address procurement throughout the project's lifecycle. It detailed the procurement management approach, types of contracts, identified procurement risks and procurement risk management, cost determination, procurement constraints, contract approval process, decision criteria, vendor management approach, and performance metrics (Project Management Institute, 2017).

As Procurement Management is integral to the project’s success and subject to financial and scheduling constraints, it was imperative that all items being purchased by the project team were done efficiently and effectively, thus providing enough time for delivery within budget and of an acceptable standard of quality. Since most of the

materials for the project, including the fabrication of the Steel Superstructure, were to be purchased from international suppliers, it was necessary (Project Management Institute, 2017).

The Procurement Management Plan identified the items that would be outsourced and the required date, as seen in the procurement definition, as a subset of the plan (Project Management Institute, 2017).

For this project, a procurement statement of work was not developed, and the Source Selection Criteria were included in the Procurement Management Plan labeled as the Decision criteria. In addition, the Procurement Management Plan identified elements that the Procurement Documents and a sample Checksheet used to measure vendor performance (Project Management Institute, 2017).

PROCUREMENT MANAGEMENT PLAN BUILDING OF THE CONDOMINIUM ABEDULES

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EDIFICON S.A. SAN JOSE , COSTA RICA

PERFORMANCE METRICS FOR PROCUREMENT ACTIVITIES

SPONSOR ACCEPTANCE

Introduction

This Procurement Management Plan sets the procurement framework for this project. It will serve as a guide for managing procurement throughout the project's life and will be updated as acquisition needs change. A make or buy analysis will not be used for this project as some of this information already exists in the architectural specifications and requirements defined during project initiation, found in the project charter. In addition, due to the project management team's vast experience and technical expertise, the items to be purchased, made, or constructed on-site are already known. This plan identifies and defines the items to be procured, the types of contracts to be used in support of this project, the contract approval process, and decision criteria. The importance of coordinating procurement activities, establishing firm contract deliverables, and utilizing metrics in measuring procurement activities is included. Other items included in the procurement management plan are procurement risks and procurement risk management considerations; how costs will be determined; how standard procurement documentation will be used; and procurement constraints (Project Management Institute, 2017).

Procurement Management Approach

The project manager will oversee and manage all procurement activities under this project. The assistant project manager will work with the project manager to identify all

items to be procured for the successful completion of the project. The project manager will then review the procurement list before purchasing, which the assistant project manager will make. The project manager will review the procurement items, determine whether it is advantageous to make or buy them, and begin the vendor selection, purchasing and contracting process (Project Management Institute, 2017).

Type of Contract to be Used

Services required for work such as the fabrication of the Steel Superstructure, electrical, roofing, masonry, etc., to be procured for this project will be solicited under a labour-only contract. The project team will work with the assistant project manager to define the item types, quantities, services and required delivery dates. The assistant project manager will then solicit bids from various vendors. Once the vendor is selected, procurement of the items within the required time frame and at a reasonable cost will commence based on contract conditions (Project Management Institute, 2017).

All additional items to be procured for this project will be solicited under a materials-only contract.

Procurement Risks

All procurement activities carry some potential for risk, which must be managed to ensure project success. While all risks will be managed following the project's risk management plan, there are specific risks that pertain specifically to procurement that must be considered:

Unrealistic schedule and cost expectations for vendors

Manufacturing capacity capabilities of vendors

Conflicts with current contracts and vendor relationships

Configuration management for upgrades and improvements of purchased technology

Potential delays in shipping and impacts on cost and schedule

Questionable past performance of vendors

Procurement Risk Management

As previously stated, project risks will be managed following the project's risk management plan. However, additional consideration and involvement for risks explicitly related to procurement must be considered. Project procurement efforts involve external organizations and potentially affect current and future business relationships and internal supply chain and vendor management operations. Because of the sensitivity of these relationships and operations, the project team will include the project sponsor/client and the project team in all project meetings and status reviews. Additionally, any decisions regarding procurement actions must be approved by the project sponsor/client and

project manager before implementation. Any issues concerning procurement actions or any newly identified risks will immediately be communicated to the project management team and the project sponsor (Project Management Institute, 2017).

Cost Determination

For this project, we will issue a Request for Quote (RFQ) to solicit proposals from various vendors that describe how they will meet our requirements and the cost of doing so. All proposals will include vendor support for all items from the procurement definition paragraph and the base and out-year costs. The vendors will outline how the work will be accomplished, who will perform the work, vendors' experience in providing these goods, customer testimonials, backgrounds and resumes of employees performing the work, and a line-item breakdown of all costs involved. Additionally, the vendors will be required to submit work breakdown structures (WBSs) and work schedules to show their understanding of the work performed and their ability to meet the project schedule (Project Management Institute, 2017).

All information must be included in each proposal, as the proposals will be used as the foundation of our selection criteria. Proposals that omit solicited information or contain incomplete information will be discarded from consideration (Project Management Institute, 2017).

Standardized Procurement Documentation

The procurement management process consists of many steps and ongoing management of all procurement activities and contracts. In this dynamic and sensitive environment, our goal must be to simplify procurement management by all necessary means to facilitate the successful completion of our contracts and project. To aid in simplifying these tasks, we will use standard documentation for all steps of the procurement management process. These standard documents will be developed and revised over time to improve procurement efforts in the future continually. They should provide adequate levels of detail, which allow for easier comparison of proposals, more accurate pricing, more detailed responses, and more effective management of contracts and vendors (Project Management Institute, 2017).

The Assistant Project Manager will develop and maintain a repository on the company's shared drive which will contain standard project management and procurement documentation that will be used for this project. The following standard documents will be used for project procurement activities (Project Management Institute, 2017):

Standard Request for Proposal Template to include

- Background
- Proposal process and timelines
- Proposal guidelines
- Proposal formats and media
- Source selection criteria
- Statement of work
- Terms and Conditions

- - Internal source selection evaluation forms
- - Non-disclosure agreement
- - Letter of intent
- - Contract types
- - Procurement audit form
- - Procurement performance evaluation form
- - Lessons learned form

Procurement Constraints

There are several constraints that must be considered as part of the project's procurement management plan. These constraints will be included in the RFQ and communicated to all vendors to determine their ability to operate within these constraints. These constraints apply to several areas, which include schedule, cost, scope, resources, and technology:

Schedule:

The project schedule is inflexible, and the procurement activities, contract administration, and contract fulfillment must be completed within the established project schedule. Cost:

The project budget has a contingency reserve built-in; however, the reserve may not be applied to procurement activities. Reserves are only to be used in the event of an approved change in project scope.

Scope:

- All procurement activities and contract awards must support the approved project scope statement. Any procurement activities or contract awards that specify work that does not directly support the project's scope statement will be considered out of scope and disapproved.

Resources:

- All procurement activities must be performed and managed with current personnel. No additional personnel will be hired or re-allocated to support the procurement activities on this project.

Technology:

- Parts specifications have already been determined and included in the work statement as part of the RFQ. While proposals may include suggested alternative materials or manufacturing processes, parts specifications must match those provided in the statement of work strictly.

Contract Approval Process

The first step in the contract approval process is determining what items or services will require procurement from outside vendors. This will be determined by conducting a cost analysis on products or services provided internally and compared with purchase prices from vendors. Once cost analyses are complete and the list of items and services to be procured externally is finalized, the Assistant Project Manager will send out solicitations to outside vendors. Once solicitations are complete and all vendors have received proposals, the approval process begins. The first step of this process is to review all vendor proposals to determine which meet the criteria established by the project team. Purchases less than $10,000 only require the approval of the Assistant Project Manager, whereas purchases greater than $10,000 must be approved by the Project Manager and the Sponsor (Project Management Institute, 2017).

Decision Criteria

The criteria for the selection and award of procurement contracts under this project will be based on the following decision criteria:

The ability of the vendor to provide all items by the required delivery date

Quality

Cost

Expected delivery date

Comparison of outsourced cost versus in-sourcing

Past performance

These criteria will be measured by the Project Manager and Assistant Project Manager. The ultimate decision will be made based on these criteria and available resources. Considering good performance, all vendor evaluations are above 85%. Considering punctuality, delivery accuracy, security, respect, and excellent relationships.

Vendor Management

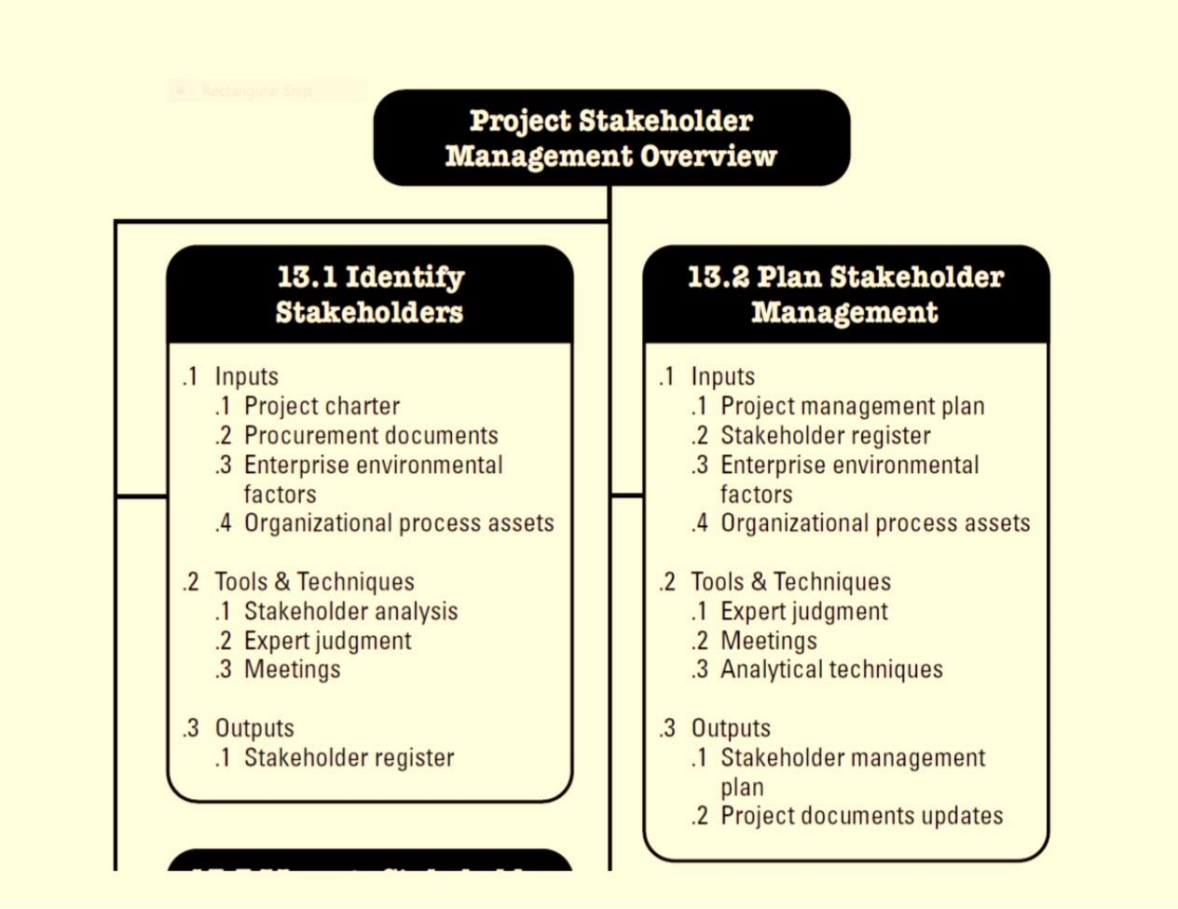
The Project Manager is ultimately responsible for managing vendors. In order to ensure the timely delivery and high quality of products from vendors, the Project Manager or the Assistant Project Manager will meet weekly with each vendor to discuss the progress for each procured item. The meetings can be in person or by teleconference. The purpose of these meetings will be to review all documented specifications for each product. This forum will allow a review of each item's development or the service provided to ensure it complies with the requirements established in the project specifications. It also serves as an opportunity to ask questions or modify contracts or requirements ahead of time to prevent delays in delivery and schedule. The Assistant Project Manager will be responsible for scheduling this meeting every week until all items are delivered and are determined to be acceptable (Project Management Institute, 2017).

4.10 Project Stakeholder Management

Project Stakeholder Management was the last process conducted by the initiation process group. To conduct Project Stakeholder Management, the stakeholders involved in constructing the Condominium Abedules were identified using the inputs, tools and techniques in **Figure 10** taken from the *PMBOK*® *Guide*. As such, the agreement between Edificon S.A. and the owner, the agreement with the fabricators and the initial list of stakeholders outlined in the project charter were reviewed by the Assistant Project Manager and the expert, Mr. AdriánBrenes, to develop a complete stakeholder register seen in **Chart 8** below entitled Condominium Abedules Stakeholder Register (Project Management Institute, 2017).

Figure 21

PMBOK® Guide: Stakeholder Management Planning Processes Overview.



Note. *A Guide to the Project Management Body of Knowledge* **(p.392), Project Management Institute, 2017. Copyright 2013 by Project Management Institute, Inc.**

In the article *Importance of Stakeholder Analysis in Management Plans,* Kokemuller, an experienced college marketing professor and author, stated that: “Stakeholder analysis is the review and consideration of the impact stakeholders have on your business” (Stamp-Romero, 2020, n.p.).

Being proactive was critical for time and financial constraints and the project’s success. Therefore, the Stakeholder Management Plan was developed as an output of the second process of Stakeholder Management. Each stakeholder was identified along with detailed information that explained how each would be engaged throughout the building of the Condominium Abedules.

PURPOSE

Stakeholder Management includes the processes required to identify the people, groups and organizations that could affect or be affected by the project, to analyze stakeholder expectations and their impact on the project, and to develop appropriate strategies and tactics for effectively engaging stakeholders in a manner appropriate to the stakeholders' interest and involvement in the project. The Stakeholder Management Plan helps ensure that stakeholders are effectively involved in project decisions and execution (PMBOK 6thEdition) throughout the project's lifecycle to gain support for the project and anticipate resistance, conflict, or competing objectives among the project's stakeholders. The Stakeholder Management Plan includes several sections (Project Management Institute, 2017):

Identify Stakeholders – identify by name and title the people, groups, and organizations that significantly influence project direction and its success or who are significantly impacted by the project.

Plan Stakeholder Management – identify the strategies and mechanisms that will be used to achieve the most significant support from stakeholders and minimize resistance.

Manage Stakeholder Engagement – outlines the processes and steps undertaken to carry out the planned strategies.

Control Stakeholder Engagement – describes the methods used to monitor stakeholder engagement and alert the project team if problems are surfacing.

Identify Stakeholders

In order to develop an effective plan for managing stakeholders, they first must be identified and assessed. Stakeholders will be identified by performing a stakeholder analysis in which potential stakeholders and relevant information (interests, involvement, interdependencies, influence, and potential impact on project success) are gathered, documented, and analyzed (PMBOK 6thEdition). To assist with stakeholder identification and analysis, the team has created and is completing a Stakeholder Analysis Register categorized by Stakeholder Group. The Stakeholder Analysis Register captures the following information.

- Group name
- Number of stakeholders in the group
- Description of the group
- Level of impact on the project
- The level the group is impacted by the project
- Current change readiness state
- Desired change readiness state
- Issues, opportunities, and risks associated with each group
- Strategies and actions to address issues, risks, and opportunities
- A snapshot from the Stakeholder Analysis Register is provided below.

Please note: Impact is measured by High (H), Medium (M) or Low (L). State of change readiness is assessed using the measures from PMBOK as follows:

U – Unaware – this group has no information about the project

R – Resistant – aware of the project and resistant to the changes and impacts the project may bring

N – Neutral – aware of the project and neither supportive nor resistant

S – Supportive – aware of the project and the potential changes and impacts and is supportive

L – Leading – aware of the project and actively engaged to ensure the project's success

Chart 17

Stakeholders Analysis Register

Group Name	Group	Description	Impact	Impacted	Current	Desired State	Issues, Opportunities and Risks	Mitigation Strategies and actions
CEO Board of Directors	5	.Key decision-makers CEO and Sponsor	H	H	L	L	Issue: The CEO takes Project advice from a financial advisor who is not an expert in the field.	Mitigate through signed contracts of roles and responsibilities
Edificon S.A.	9+	. Consists of an architect contractor, Project manager,	H	H	L	L	Risk : Varying levels of incompetence or low	Incentivize (Resource management plan)

Group Name	Group	Description	Impact	Impacted	Current	Desired State	Issues, Opportunities and Risks	Mitigation Strategies and actions
		assistant Project manager					level of productivity.	
Sub-contractors	13	. Contracted professional	H	H	S	S	Risk: Inaccurate or inefficient designs, lack of concern and tardiness	Checkpoints and independent check person (PM)
Suppliers	5+	.Provide materialson a contract basis	H	M	S	S	Opportunity International products are cheaper than	Risk: Insurance

Group Name	Group	Description	Impact	Impacted	Current	Desired State	Issues, Opportunities and Risks	Mitigation Strategies and actions
							local	
Sub Consultants	9	. Technical Expertise	H	M	S	S	Risk: Varying levels of incompetence or low level of productivity	Checkpoints and independent check person (PM)
Regulatory Bodies	8	. Regulate and enforce building codes and standards	H	L	N	N	Risk : Additional non-constitutional items to the agenda.	Compliance Or Negotiation
Community	1	. Opinions	L	L	U	N	Risk : Nuisance	Ignore, meeting and /or legal cause of action

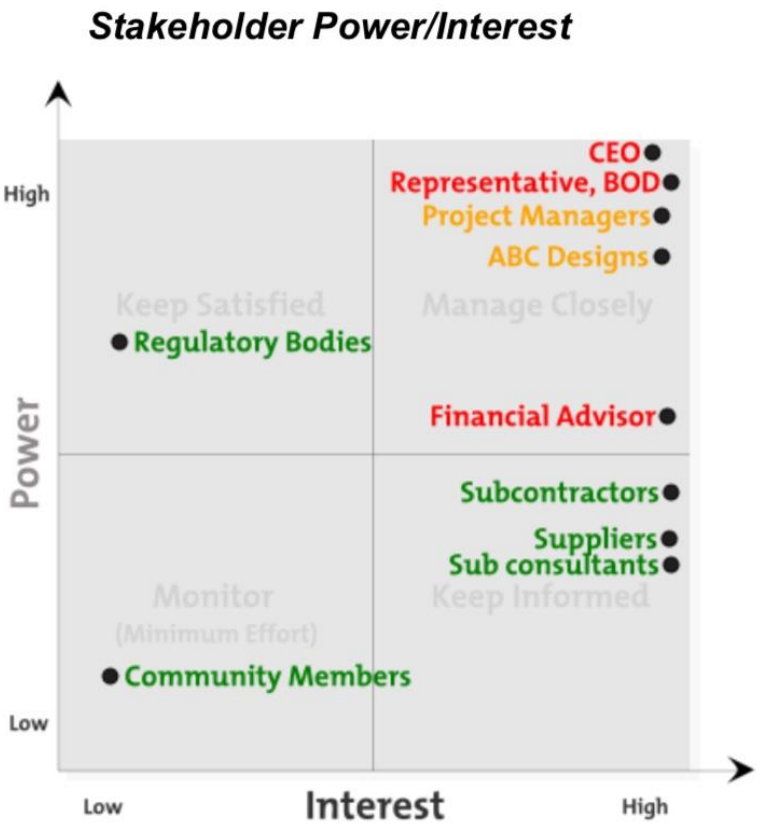
Power/Interest Classification

As mentioned above, the Building of a Condominium Abedules Project assesses each group's position and their impact on the project or how the project impacts them. This activity aims to help identify and categorize groups so that appropriate attention can be given to each group according to the level of engagement needed. To help in this process, the project will use the PMBOK Power/Interest Grid to categorize each stakeholder group. The Power/Interest Grid analyses stakeholder groups visually to further establish stakeholders' level of interest or concern and their ability to influence the project outcomes (Project Management Institute, 2017).

An essential outcome of the stakeholder identification and analysis work, including the Power/Interest Grid, is to identify the most influential and most impacted stakeholder groups to develop and execute a focused stakeholder management strategy and plan. Provided below is the Power/Interest Grid with the project's primary stakeholders and stakeholder groups (Project Management Institute, 2017).

Chart 18

Stakeholder Power / Interest



Stakeholder Interviews

To confirm that the Stakeholder Identification and Analysis process is accurate and complete, the Assistant Project Manager will conduct reviews with the CEO and others. In addition, optional qualitative interviews may be performed for the Stakeholder Groups identified as most influential or most impacted by the project to validate that their issues and concerns have been captured accurately.

Plan Stakeholder Management

Plan Stakeholder Management is the process of developing appropriate management strategies to effectively engage stakeholders throughout the project's lifecycle, based on the analysis of their needs, interests and potential impact on project success. The key benefit of this process is that it provides a clear, actionable plan to interact with project stakeholders to support the project's interests (PMBOK 6thEdition).Based on the information gathered in the Stakeholder Analysis Register and Communication Plan, the Project Manager will be responsible for engaging stakeholders throughout the project's lifecycle. The level of engagement required for each stakeholder may vary throughout the project. For example, during the beginning stages of the project, it might be necessary for the Project Manager to engage more highly with critical stakeholders. In the early stages of the project, highly engaged key stakeholders are pivotal for project kick-off, achieving staff buy-in and clearing obstacles. As the project progresses, engagement will shift from key stakeholders to the broader project team and end-users (Project Management Institute, 2017).

Monitor Stakeholder Engagement

Monitor Stakeholder Engagement is monitoring overall project stakeholder relationships and adjusting strategies and plans for engaging stakeholders. Monitor Stakeholder Engagement involves collecting data, assessing the level of engagement, and using insights from the data collection to adjust strategies and tactics for engaging effectively with stakeholders (Project Management Institute, 2017).

As mentioned in the Communications Plan and the Risk Management Plan, the Building of Condominium Abedules Project will have mechanisms to receive ongoing direct feedback from key stakeholders, including email, personal communication, site meetings, status meetings and community meetings. Individual stakeholders will be encouraged to participate and voice questions and concerns, with the most serious issues and concerns raised addressed in a formal, rigorous process through the Issues and Risk logs (Project Management Institute, 2017).

As described in the Scope Management Plan, the project will solicit broad participation in the collection and validation of requirements, which will uncover issues and concerns early on to be addressed (Project Management Institute, 2017).

5. CONCLUSIONS

1. The Project Management Plan was created using the analytical research method and the fifth edition of the *PMBOK® Guide* as a developmental tool for the Condominium Abedules Project Management team.

2. The Project Charter was the first subsidiary element of the Project Management Plan, created as the deliverable for specific objective number one. Using a template as a guide to capture and organize the business needs and objectives, project description, preliminary scope statement, initial project risks, project deliverables, summary milestones, and project budget, the Project Charter also included identification of the project manager and the sponsor's authorization for the project to commence.

3. The Scope Management Plan,created to define and specify the project scope, the deliverable created for specific objective number two, along with the WBS, WBS dictionary, Requirements Management Plan, Requirements Document, and Requirements Traceability Matrix, were developed from a table or template, capturing the information gathered during meetings with project stakeholders and from project document reviews.And also to ensure that all works required are included to complete the project successfully.

4. The Schedule Management Plan, the output from specific objective number three, was created along with the Activity List, Schedule Network Diagram, Resource Assignments table and Project Gantt chart to adequately identify and orchestrate each project activity to ensure the project's completion within the time constraints.

5. To create the Cost Management Plan, the output from specific objective number four, a template in Microsoft Excel was used to develop the project budget adequately. A template was used to capture the Cost Management Plan, which will guide the development of cost management performance measures and documents such as the Cost Baseline and the Project Funding Requirements.

6. To develop the Quality Management Plan, the output from specific objective number five, a template was used to identify the project's quality management approach, quality requirements/standards, quality assurance, quality control, and the quality control measures that will be used throughout the project to ensure that quality was built into the project's processes and product.

7. To address specific objective number six, the Resource Management Plan, all human resources required to complete the project were identified and classified in a comprehensive list based on their roles and responsibilities. In addition, the project organization chart, the staffing management approach, and details identifying how the human resources will be managed throughout the project are detailed in the plan.

8. To fulfill specific objective number seven, the Project Communications Plan, a template was used along with a list of all stakeholders and their roles and responsibilities. In addition, a Communications Matrix was developed, detailing all project stakeholders (names/titles, information, format) throughout the project lifecycle, and ensuring that the information disseminated during the project is done so at the right time, in the proper format, to the right people and by the right person.

9. The deliverable for specific objective number eight, the Risk Management Plan, was created using a template. Additionally, a Risk Register was developed along with a qualitative risk analysis to capture and classify project risks so that effective risk responses could be planned. Quantitative Risk Analysis was not performed during this process as the tools were unavailable.

10. The Procurement Management Plan deliverable, created for specific objective nine, was developed using a template to identify the project's procurement management approach, types of contracts used and contract approval process. The plan is comprehensive in that it also details procurement risks and constraints and how these issues, along with vendors, will be managed effectively.

11. The Stakeholder Management Plan, developed for specific objective ten, was also developed using a template. In addition to the plan, which details how stakeholders will be identified, classified, managed, and engaged throughout the project, the Stakeholder Register and Stakeholder Analysis and Level of Engagement were also developed to provide more information for effective stakeholder engagement.

12. As the project management team was limited in its human resource capacity, the writer, in her role as Assistant Project Manager, developed all subsidiary plans using templates, spreadsheets, tables and charts, conducting meetings with the key contact person - the Lead Project Manager, and reviewing meeting minutes and other project documents.

13. For years, the *PMBOK*® *Guide* 6th Edition and previous versions have provided a set of good project management practices used by differents proactive project teams to develop a project management plan and in this case to improve the way that Edificon company will manage a project as Condominium Abedules, to achieve the best possible result.

6. RECOMMENDATIONS

1. Edificon S.A. should employ formal Project Management methods or formal construction management to increase the likelihood of project success in the completion of building projects.

2. Edificon S.A. should develop standard project management initiation and planning documents prior to the execution of building projects.

3. All projects managed by Edificon S.A. should be headed by a project management team, using developed standard project planning documents tailored for the project.

4. Edificon S.A. should invest in the tools required to complete quantitative risk analyses for all projects.

5. Edificon S.A. should use a Project Management Guide or Framework to direct the development of all project management tools.

6. Edificon S.A.'s project management team should exercise care and caution during the development of each subsidiary plan of the Project Management Plan to ensure that all planning subsets for each knowledge area or respective application area are thorough and accurate.

7. Edificon S.A.'s project management team should utilize a document management and storage system to organize and store all documents created for future use and review.

8. The Senior manager of Edificon S.A. should ensure that the project management team is hired and in place prior to the execution of any project and ensure that this team conducts all project planning-related activities to enhance the proper management of the project during its lifecycle.

9. The project management team of Edificon S.A. should consider the use of the planning process and templates created during the development of the Project Management Plan for the Building of the Condominium Abedules as a basis for implementing a methodology to be used by the company for future projects of similar relevance.

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Annexes

Annex 1: Project Charter

UCI GSPM

PROJECT CHARTER

Date:	Project Name:
11/9/21	Project management plan of a three-level house construction , in concrete, implementing the optimal construction methods regarding cost , time and quality.
Knowledge Areas / PM Processes:	**Application Area (Sector / Activity):**
Knowledge Areas : Project integration management, project scope management, project schedule management, project cost management, project quality management, project resource management, project communication management, project risk management, project procurement management, project stakeholder management. **Process groups :** Initiating, Planning, Monitoring and controlling.	Planning/Construction/ Residencial
Project Start Date:	**Project Finish date:**
11/9/21	31/03/2021

Project Objectives (General and Specific):

General Objective:

To create a project management plan , framed with the standars of the Project Management Institute, to manage the building of a three-level house construction , in concrete , implementing the optimal construction methods regarding cost , time and quality.

Specific Objectives:

1. To Elaborate a project charter that formally authorizes the project and provide the project manager with the authority to apply organizational resoures to the project in order to produce the project management plan.
2. To organize a scope management plan to ensures taht all works required are included to sccessfully complete the project.
3. To set up a schedule management plan ,elaborating a project schedule that ensures the project is completed within the budget constraints.
4. To create a cost management plan to define the processes for developping and managing the project budget to ensure the project is completed within the respectives constraints.
5. To implement a quality management plan to identify the quality requirements for the project in order to ensure that results meet the expectations for approval within the time, cost and scope constraints.
6. To establish a Resource Management Plan to ensure that all human resources are identified and managed effectively to complete the project within time , cost and scope constriants.
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 define 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):

The main purpose of this project is to achieve this construction project implementing the more effectives, more innovatives and the optimal practices in construction, in order to achieve the best possible results , with the best quality standars regarding the concrete houses building. The overall organization of this project has to provide an optimal construction process in order to achieve the best results, and of course is required to be a sustainable project regarding the environemental impacts.The project manager and project manager team undersatnd the importance of the planning process and the project management plan , to the succesful completion of the project . During this project , the project manager will plan to develop the subsidiaries of the project management plan for this house construction project.

Description of Product or Service to be generated by the Project -Project final deliverables.

The project management plan for this house construction project will be generated by this project. This plan will consist of all the subsidiary documents of a Project management plan.

Assumptions:

Resources : The project can be completed in three months. Resources : The project can be completed 16 persons

Constraints:

Time: Three (3) months. Resources : One (16) person

Preliminary Risks:

1. If the schedule for milestone completion is not adhered to, the project management plan may not be completed in three months. 2. If support by the supervisor is not prompt, the project management plan may not be completes as expected.

Budget:

Budget will constitute of financial resources required to print , bind and deliver the Final Graduation Project.

Milestones and dates:

Milestone	Start date	End date
Project start	11/8/21	31/03/22
Project charter	11/8/21	14/11/21
WBS	11/8/21	14/11/21
Chapter 1: Introduction charter	15/11/21	21/11/21
FGP schedule	15/11/21	21/11/21
Chapter 2: Theoretical Framework	22/11/21	28/11/21
Chapter 3: Methodological Framework	29/11/21	12/5/21
Executive Summary	29/11/21	12/5/21
Annexes - Bibliography , indexes	29/11/21	12/5/21
Signed charter -Approval	12/6/21	12/12/21
Tutoring	13/12/21	13/12/21
Previous Chapters Adjusments	16/12/21	22/12/21
Chapter 4: Development (results)	23/12/21	25/02/22
Chapter 5 : Conclusions	28/02/21	3/4/22
Chapter 6 : Recommendations	3/7/21	3/11/21
Tutor Approval	3/11/22	3/11/22
FGP Submission to Reviewers	18/03/22	18/03/22
Review	21/03/22	4/1/22
Adjustements	4/4/22	20/04/22

Relevant historical information:

Not applicable

Stakeholders:

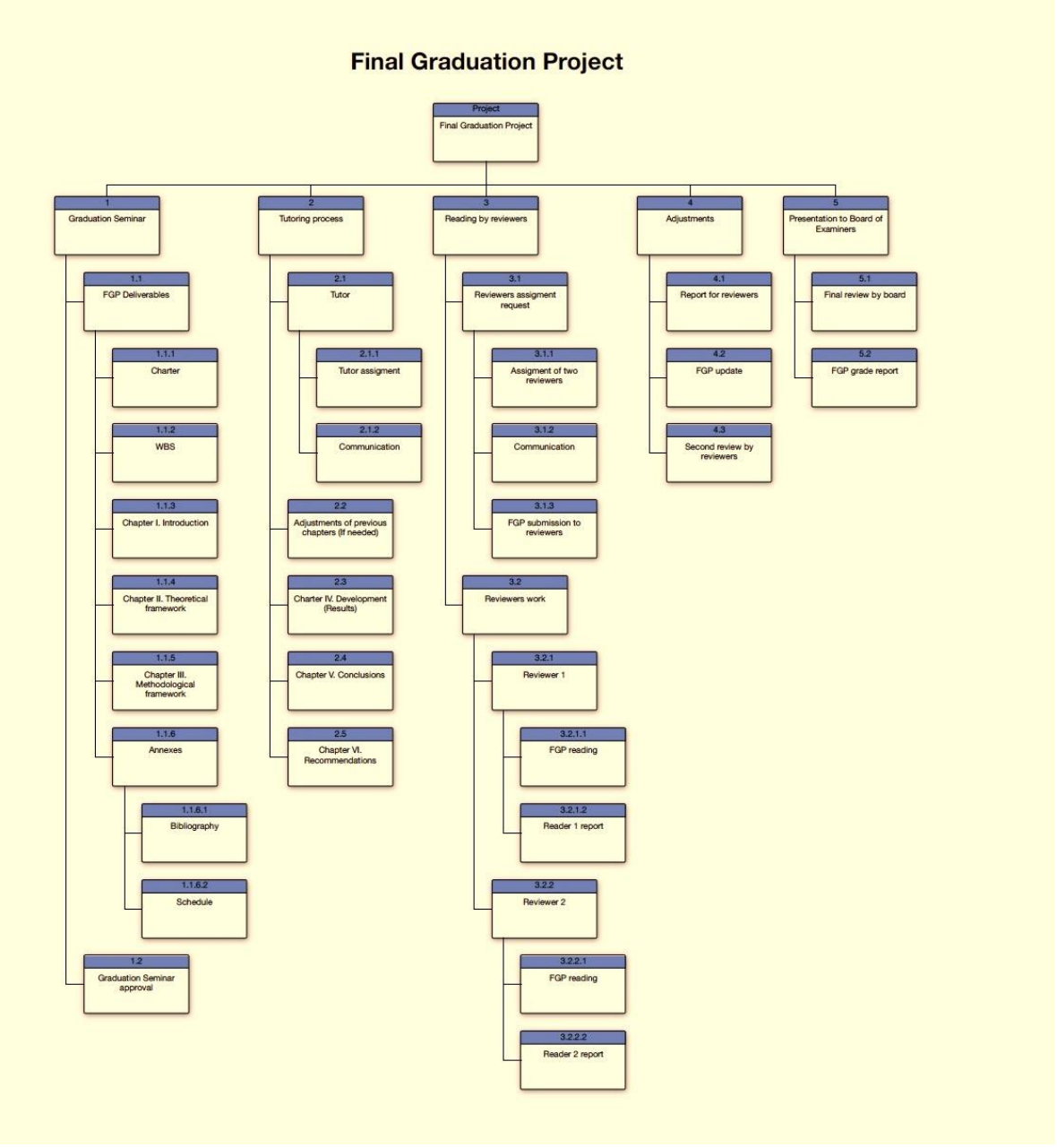
Direct stakeholders : FGP (Seminar profesor) : Mr. Brenes - Tutor : Eduardo Lima Reviewers : Fabio Muñoz - Cristian Solano

Approval:

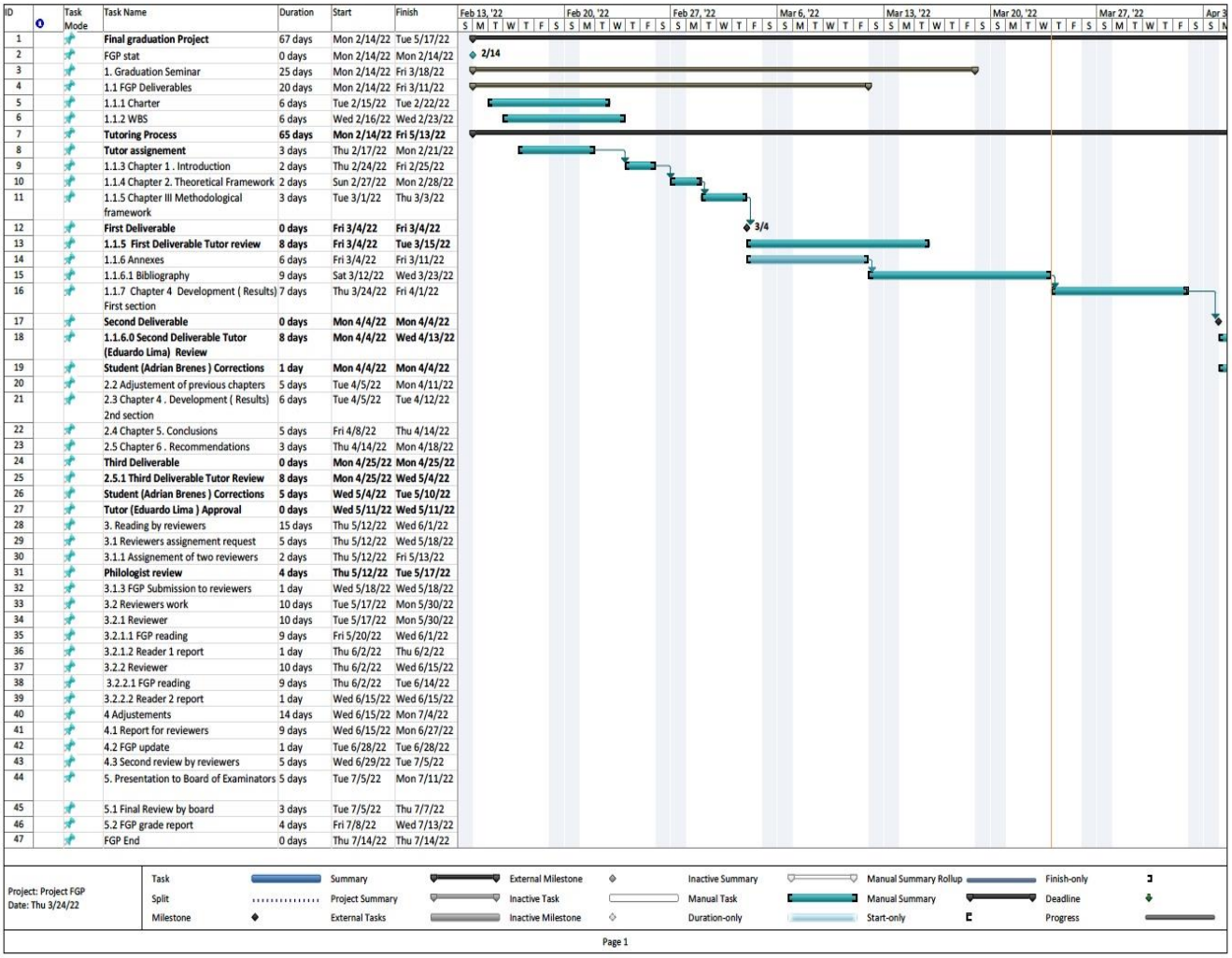
Project Manager: Adrian Brenes	Signature: Adrian Brenes Loria Firmado digitalmente por Adrian Brenes Loria Fecha: 2021.12.12 10:54:09 -06'00'
Authorized by:	Signature:

Version July 2019

Annex 2: FGP WBS



Annex # 3: Schedule



ID	Task Mode	Task Name	Duration	Start	Finish
1		**Final graduation Project**	67 days	Mon 2/14/22	Tue 5/17/22
2		FGP stat	0 days	Mon 2/14/22	Mon 2/14/22
3		1. Graduation Seminar	25 days	Mon 2/14/22	Fri 3/18/22
4		1.1 FGP Deliverables	20 days	Mon 2/14/22	Fri 3/11/22
5		1.1.1 Charter	6 days	Tue 2/15/22	Tue 2/22/22
6		1.1.2 WBS	6 days	Wed 2/16/22	Wed 2/23/22
7		**Tutoring Process**	**65 days**	**Mon 2/14/22**	**Fri 5/13/22**
8		**Tutor assignement**	3 days	Thu 2/17/22	Mon 2/21/22
9		1.1.3 Chapter 1 . Introduction	2 days	Thu 2/24/22	Fri 2/25/22
10		1.1.4 Chapter 2. Theoretical Framework	2 days	Sun 2/27/22	Mon 2/28/22
11		1.1.5 Chapter III Methodological framework	3 days	Tue 3/1/22	Thu 3/3/22
12		**First Deliverable**	**0 days**	**Fri 3/4/22**	**Fri 3/4/22**
13		**1.1.5 First Deliverable Tutor review**	**8 days**	**Fri 3/4/22**	**Tue 3/15/22**
14		1.1.6 Annexes	6 days	Fri 3/4/22	Fri 3/11/22
15		1.1.6.1 Bibliography	9 days	Sat 3/12/22	Wed 3/23/22
16		1.1.7 Chapter 4 Development (Results) First section	7 days	Thu 3/24/22	Fri 4/1/22
17		**Second Deliverable**	**0 days**	**Mon 4/4/22**	**Mon 4/4/22**
18		**1.1.6.0 Second Deliverable Tutor (Eduardo Lima) Review**	**8 days**	**Mon 4/4/22**	**Wed 4/13/22**
19		**Student (Adrian Brenes) Corrections**	**1 day**	**Mon 4/4/22**	**Mon 4/4/22**
20		2.2 Adjustement of previous chapters	5 days	Tue 4/5/22	Mon 4/11/22
21		2.3 Chapter 4 . Development (Results) 2nd section	6 days	Tue 4/5/22	Tue 4/12/22
22		2.4 Chapter 5. Conclusions	5 days	Fri 4/8/22	Thu 4/14/22
23		2.5 Chapter 6 . Recommendations	3 days	Thu 4/14/22	Mon 4/18/22
24		**Third Deliverable**	**0 days**	**Mon 4/25/22**	**Mon 4/25/22**
25		**2.5.1 Third Deliverable Tutor Review**	**8 days**	**Mon 4/25/22**	**Wed 5/4/22**
26		**Student (Adrian Brenes) Corrections**	**5 days**	**Wed 5/4/22**	**Tue 5/10/22**
27		**Tutor (Eduardo Lima) Approval**	**0 days**	**Wed 5/11/22**	**Wed 5/11/22**
28		3. Reading by reviewers	15 days	Thu 5/12/22	Wed 6/1/22
29		3.1 Reviewers assignement request	5 days	Thu 5/12/22	Wed 5/18/22
30		3.1.1 Assignement of two reviewers	2 days	Thu 5/12/22	Fri 5/13/22
31		**Philologist review**	**4 days**	**Thu 5/12/22**	**Tue 5/17/22**
32		3.1.3 FGP Submission to reviewers	1 day	Wed 5/18/22	Wed 5/18/22
33		3.2 Reviewers work	10 days	Tue 5/17/22	Mon 5/30/22
34		3.2.1 Reviewer	10 days	Tue 5/17/22	Mon 5/30/22
35		3.2.1.1 FGP reading	9 days	Fri 5/20/22	Wed 6/1/22
36		3.2.1.2 Reader 1 report	1 day	Thu 6/2/22	Thu 6/2/22
37		3.2.2 Reviewer	10 days	Thu 6/2/22	Wed 6/15/22
38		3.2.2.1 FGP reading	9 days	Thu 6/2/22	Tue 6/14/22
39		3.2.2.2 Reader 2 report	1 day	Wed 6/15/22	Wed 6/15/22
40		4 Adjustements	14 days	Wed 6/15/22	Mon 7/4/22
41		4.1 Report for reviewers	9 days	Wed 6/15/22	Mon 6/27/22
42		4.2 FGP update	1 day	Tue 6/28/22	Tue 6/28/22
43		4.3 Second review by reviewers	5 days	Wed 6/29/22	Tue 7/5/22
44		5. Presentation to Board of Examinators	5 days	Tue 7/5/22	Mon 7/11/22
45		5.1 Final Review by board	3 days	Tue 7/5/22	Thu 7/7/22
46		5.2 FGP grade report	4 days	Fri 7/8/22	Wed 7/13/22
47		FGP End	0 days	Thu 7/14/22	Thu 7/14/22

Annex # 4 : Philologist Approval Letter

Filólogos Bórea

Filólogos Bórea
Revisión de tesis | Corrección de estilo

Philologist Approval Letter

Cartago, 08 de june de 2022

The undersigned, Elena Redondo Camacho, mayor, married, philologist, incorporated into the Costa Rican Association of Philologists with card number 0247, bearer of identity card number 3-0447-0799, and Daniel González Monge, mayor, married, philologist , incorporated into the Costa Rican Association of Philologists with card number 0245, bearer of identity card number 1-1345-0416, both residents of Quebradilla de Cartago, we reviewed the final graduation work entitled: PROJECT MANAGEMENT PLAN FOR THE RESIDENCE # 5 OF THE ABEDULES CONDOMINIUM CONSTRUCTION, supported by Adrián Brenes Loría.

We state that aspects of spelling, writing, style and other language flaws that can be transferred to the text were corrected. Despite this, the originality and validity of the content are the direct responsibility of the author.

We hope that our participation will satisfy the requirements of the University for International Cooperation.

X

Elena Redondo Camacho
Filóloga - Carné ACFIL n.º 0247

X

Daniel González Monge
Filólogo - Carné ACFIL n.º 0245