UNIVERSIDAD PARA LA COOPERACION INTERNACIONAL
(UCI)

PROJECT MANAGEMENT PLAN
FOR NEW RGD HEALTH CENTER LIMESGRACHT

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DEDICATION

"The most important thing in the world is to love and to be loved"

To Ruwisha, my amazing wife, whose sacrificial care for me and our son, made it possible for me to complete this research project.

For Ayaan, “You’re my inspiration and motivation, my son!”

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Signed;

Ramadhin P.S.

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ABBREVIATIONS AND ACRONYMS

FGP	- Final Graduation Project
PMBOK	- Project Management Body of Knowledge, 5th Edition
RGD	- Regional Health Service
WBS	- Work Breakdown Structure
RBS	- Risk Breakdown Structure
PMI	- Project Management Institute
UCI	- Universidad para la Cooperación Internacional
VAT	- Value Added Tax
GPM	- Green Project Management
COQ	- Cost of Quality
PDCA	- Plan, DO, Check, Act
ISDB	- Islamic Development Bank
RACI	- Responsibility, Accountability, Consulted and Informed Matrix
RFC	- Request for Change

EXECUTIVE SUMMARY (ABSTRACT)

The Regional Health Service (RGD) is a semi-governmental organization responsible for primary healthcare in the coastal area of Suriname. With more than 45 healthcare facilities and 30 employees houses, it is the largest organization in its category. In the past 5 years the RGD, has managed a few construction projects. All these projects were completed over the final delivery date, resulting in a loss of resources, budget and opportunities. The main reason for this is, that except from the architectural plans, no other plans were developed on how to manage the project and there is little to no experience and knowledge in project management methodologies.

The organization is planning the construction of seven healthcare centers in the coastal area, starting with the construction of the healthcare center Limesgracht. In order to make this project a success, the organization has to adhere to project management guidelines and develop a project management plan to guide the execution, monitoring/ controlling and closing of the project. The PMBOK Guide 5th Edition was used as reference to develop the Project Management Plan and all the subsidiary plans for the development of the project.

The general objective of this FGP was to develop a Project Management Plan for the construction of the new RGD Health center Limesgracht. The project management plan defined the approach used to manage, control and deliver the intended project management scope. The specific objectives were: to develop a project charter that authorizes the project, to create a scope management plan to manage the scope and required works, to create a time management plan to manage the project schedule, to ensure the project is completed within the allotted time frame, to develop a cost management plan to manage the project budget, to create a quality management plan to identify the quality requirements and expectations for the project, to develop a human resource management plan to identify and manage all required human resources, to create a communication

management plan to ensure effective communication and sharing of information, to create a risk management plan to identify and examine risks and how to minimize these, to create a procurement management plan to serve as a guideline on how to obtain products and services and to create a stakeholder management plan to identify all the project stakeholders and how to manage them.

The methodology used for the research was analytical or explanatory. The main sources used to gather information included The Project Management Body of Knowledge (PMBOK Guide) Fifth Edition, the Green Project Management P5 Standard for Sustainability in Project Management (GPM P5 Standard) and interviews. The information obtained was analyzed to create the subcomponents of each of the subsidiary plans.

The Project Management Plan, developed using the PMBOK® Guide 5th Edition, will provide the RGD, a set of best practices for project management that can be used as knowledge to develop a new methodology to manage future construction projects. The RGD should consider the use of the documents and templates, developed during the development of the Project Management Plan for the New RGD Health center Limesgracht as a basis for future projects.

1. INTRODUCTION

1.1. Background

The Regional Health Service (RGD) is a semi-government organization responsible for primary healthcare in the coastal area of Suriname. With more than 45 healthcare facilities and 30 employees' houses in the coastal area, it is the largest organization in its category. It employs 700+ persons and has the following slogan "Bring Healthcare closer to home"

Five (5) years ago, the company started with the construction of three more healthcare centers. In order to keep the costs down, the organization decided to manage to projects itself. The Facility Department was in charge of the management of the three projects. With little to no project management experience the projects were completed almost 3 years behind schedule and 2 times the allocated budget.

For the coming years, the organization has in planning the construction of seven healthcare centers in the coastal area, starting with the construction of the healthcare center Limesgracht. In order to make this project a success the organization has to adhere to project management guidelines and develop a project management plan to guide the execution, monitoring/ controlling and closing of the project.

1.2. Statement of the problem

In the past 5 years, the RGD, through his Facility Department, has managed a few construction projects. All these projects were delivered at least 3 years over the final delivery date, resulting in loss of resources, budget and opportunities. By the time the projects were completed, many of the new building technics implemented where already old, competitors had gained more market shares resulting in losses for the project.

The core business of the RGD is to provide primary healthcare and most of the funds is used in training of healthcare professionals, staff and other employees. The Facility Department is not trained in project management methodologies and techniques, so all the projects managed by them is on an ad hoc basis. Except from the architectural plans developed by the architect, no other plans are developed on how to manage the project, resulting in:

- Employees not knowing their roles and responsibilities.
- No consistency in delivery and terminology.
- No evaluations on qualified staffing and resources.
- No clear goals and objectives for team members.
- No adequate monitoring and controlling.

1.3. Purpose

To complete the construction of the New RGD Health center Limesgracht on time and budget, the RGD has to develop a project management plan, based on the guidelines of the PMBOK Guide.

This research will seek to develop that project management plan that will help the RGD to complete the construction process within time, budget and available resources. All the documents in the project management plan will be used by

the Project Management team during the project management processes, to effectively manage the project. In order to increase the opportunity of success of the project, the project management plan must include all areas of the project. The project management plan will be created according the guidelines of the PMBOK Guide and will contain all the subsidiary plans for the developing the project.

Some of the expected benefits will be:

- Project will be completed within the available timeframe
- Resources availabilty will be managed efficiently
- Better control of quality of products and resources
- Project will be completed within budget
- Better management of risks

1.4. General objective

To develop a project management plan for the construction of the new RGD Healthcenter Limesgracht. This document will define the approach used to manage, control and deliver the intended project management scope.

1.5. Specific objectives

- To develop a project charter that authorizes the project.
- To create a scope management plan to manage the scope and required works.
- To create a time management plan to manage the project schedule, to ensure the project is completed within the allowed time frame
- To develop a cost management plan to manage the project budget.

- To create a quality management plan to identify the quality requirements and expectations for the project.
- To develop a human resource management plan to identify and manage all required human resources.
- To create a communication management plan to ensure effective communication and sharing of information.
- To create a risk management plan to identify and examine risks and minimize negative risk impact.
- To create a procurement management plan to serve as guideline on how to obtain products and services.
- To create a stakeholder management plan to identify all the project stakeholders and how to manage them.

2. THEORETICAL FRAMEWORK

2.1 Company/ Enterprise framework

2.1.1 Company/ Enterprise background

The Regional Health Service (RGD) is one of the most important health institutions in Suriname. The RGD Foundation was officially established on May 24, 1991 and approximately one-third (1/3) of the Surinamese population is dependent on the health services that are being provided daily at the various RGD health facilities.
The RGD is now in the process of expanding the various health services that is offered and has planned to build or renovate seven facilities, starting with the RGD Health center Limesgracht.

2.1.2 Mission and vision statements

The RGD Foundation is responsible for providing primary health care in the coastal area of Suriname. By setting up facilities in the different regions, the RGD is able to provide primary healthcare adapted to the specific issues within the different regions. This in line with the national goals and programs aimed at further development of the primary healthcare.

The RGD has the following mission and vision statements:

- **Mission:**

The Regional Health Service is an innovative and dynamic healthcare provider that offers high quality primary healthcare with dedicated and competent staff and, in collaboration with others, creates conditions that enable people to live healthy in their communities. (RGD, Articles of Association, 1991)

- **Vision:**

Healthy people in healthy communities in Suriname (RGD, Articles of Association, 1991)

2.1.3 Organizational structure

The RGD has a hierarchical organizational structure. In a hierarchical structure employees are ranked at various levels within the organization, each level is one above the other. At each stage in the chain, one person has a number of employees directly under them, within their span of control. The organizational structure is displayed on the following page.

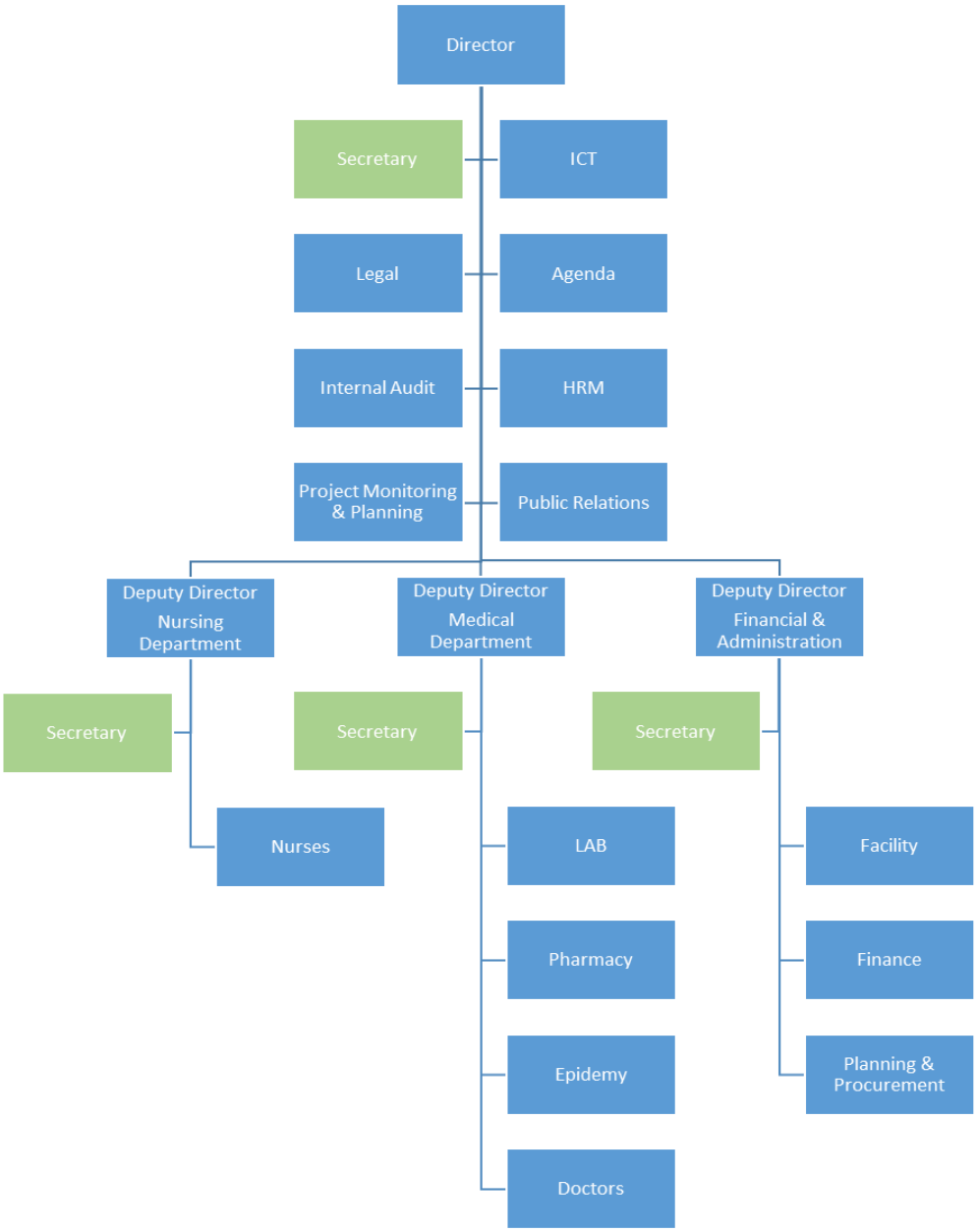

Figure 1 Organizational structure (Source: created by author)

The management team of the RGD consist of the Acting Director, Mr. Edwin Noordzee and three Deputy Directors. Twelve managers, each of them in charge of a specific department, assist them in managing the daily operations. In March of 2017, a new department was implemented with the specific goal of monitoring and planning of projects. This department falls under the Acting Director, whereas the Facility Department operates under the Deputy Director.

2.1.4 Products offered

The RGD is a service-oriented organization whose primary role is providing primary healthcare services. Some of the services offered in the RGD health centers are:

- Curative and preventive services.
- General medical assistance.
- Prenatal care.
- Infant and toddler care.
- Health education and nutrition.
- Mother and childcare.
- School healthcare.
- Home visits.
- Ambulance services.

2.2 Project management concepts

2.2.1 Project

A project as defined by the PMBOK Guide “is a temporary endeavor undertaken to create a unique product, service, or result. The temporary nature of projects indicates that a project has a definite beginning and end. The end is reached when the project’s objectives have been achieved or when the project is terminated because its objectives will not or cannot be met, or when the need for the project no longer exists” (Project Management Institute, 2013, p.3).

2.2.2 Project management

It is well established that the management techniques we call “modern project management” had their beginnings in the late 1950’s with the first real papers being published in 1958. Now, we are at the point where the professional project manager is a major part of the management team in not only the construction industry, but also a wide variety of other businesses (Snyder, J. R. (1987). There are many different methodologies when it comes to project management, like PRINCE2, AGILE, SCRUM, PMBOK etc. All these methodologies give us guidelines in applying project management in a project. In this paper, the development of the project management plan for the construction of the new RGD Health center Limesgracht will be based on the PMBOK Guide.

According to the PMBOK Guide, project management is the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements. Project management is accomplished through the appropriate application and integration of the 47 logically grouped project management processes, which are categorized into five process groups, namely initiating,

planning, executing, monitoring and Controlling and closing (Project Management Institute, 2013, p.5).

Managing a project also includes, but is not limited to the identification of requirements, addressing of needs, concerns and expectations of stakeholders and managing them, creating project deliverables and balancing the project constraints. These constraints can be scope, schedule, resources, quality, budget and risks.

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.38). These phases are generally time bounded, with a start and end. The project life cycle can be determined or shaped by the unique aspects of the organization and provide the basic framework for managing the project. Figure two shows a generic project life cycle structure.

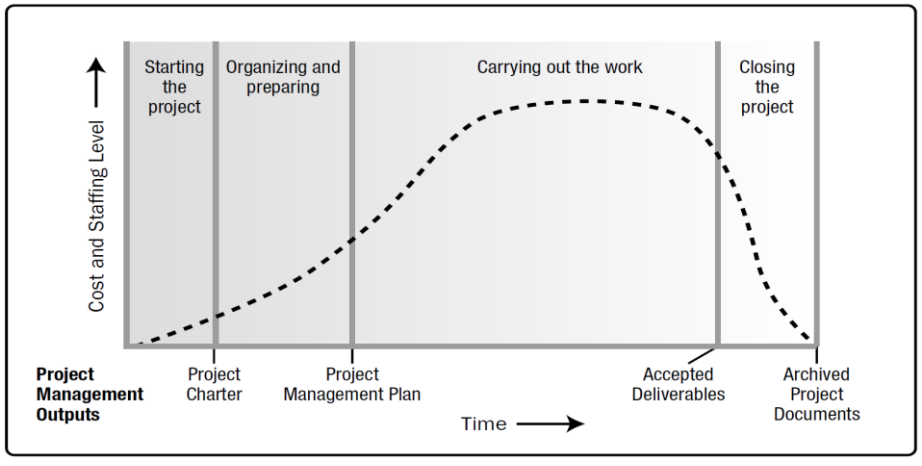

Figure 2 Typical Cost and Staffing Levels Across a Generic Project Life Cycle Structure. Reprinted from *A Guide to the Project Management Body of Knowledge* (p. 39), Project Management Institute, 2013.

Within each phase of a project life cycle, the five process groups interact with each other. The level of interaction is shown in figure three of the next page. Although there is a Project Monitoring and Planning Department at the RGD, there are no formal project management guidelines and adapted methodologies. The persons involved in the project team of the construction of the New RGD Health center Limesgracht has to be trained in project management methodologies, mainly the PMBOK Guide 5th edition, because the project management plan will be based on the methodologies from this guide.

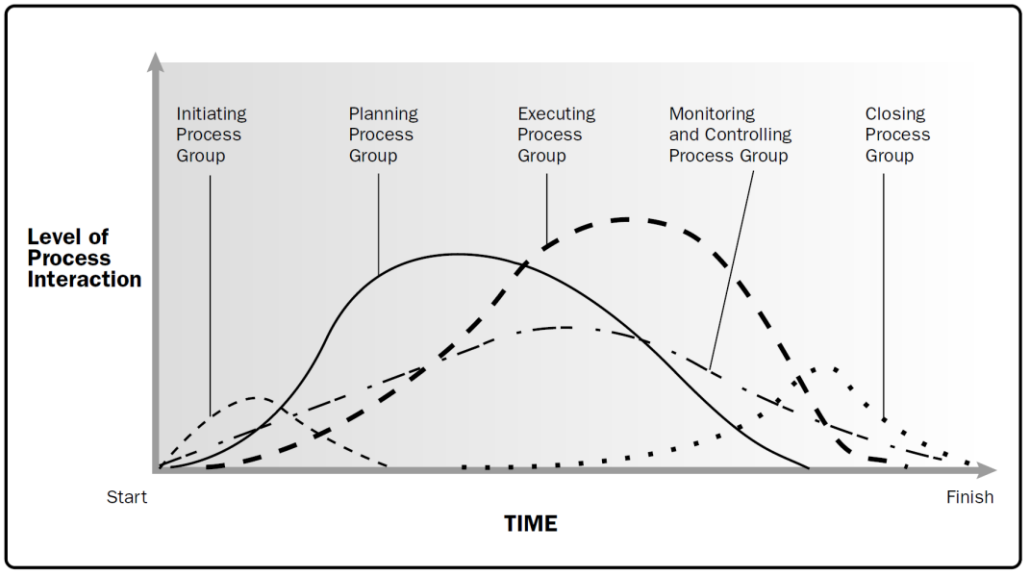

Figure 3 Process groups interact in a Phase or Project. Reprinted from *A Guide to the Project Management Body of Knowledge* (p. 51), Project Management Institute, 2013.

2.2.4 Project management processes

Project management processes ensures the effective flow of the project throughout its life cycle. These processes encompass the tools and techniques involved in applying the skills and capabilities of the 10 knowledge areas. A process is a set of interrelated actions and activities performed to create a pre-specified product,

service, or result. Each process is characterized by its inputs, the tools and techniques that can be applied, and the resulting outputs. (Project Management Institute, 2016, p.47).

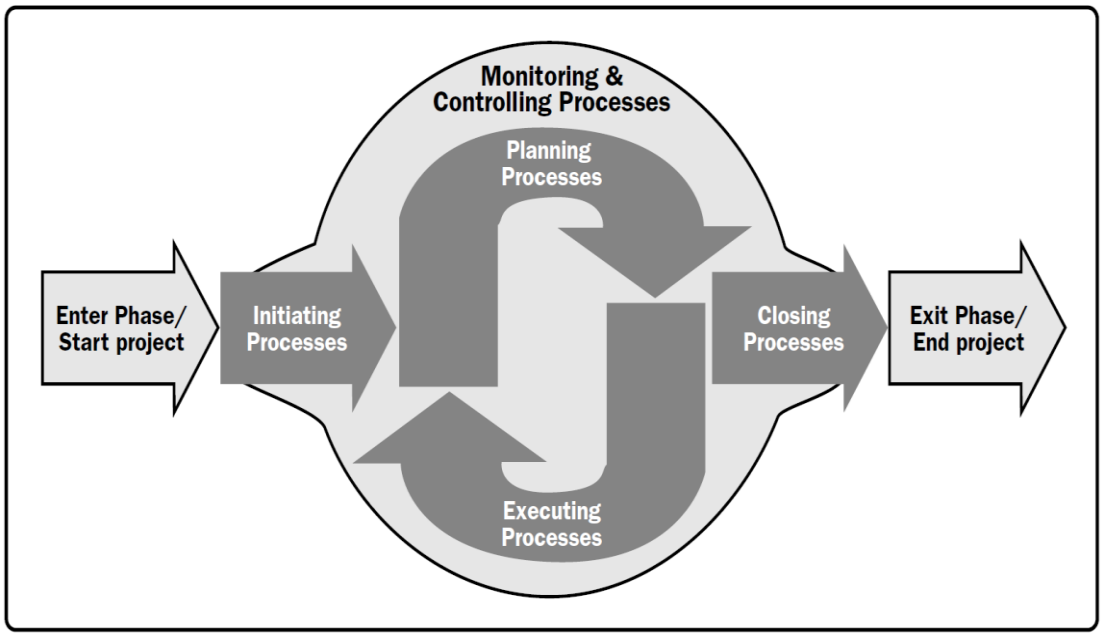

Figure 4 Project Management Process Groups. Reprinted from A Guide to the Project Management Body of Knowledge (p. 50), Project Management Institute, 2013.

The 10 knowledge areas and their place in the process groups is shown in figure five on the next page. All the 10 knowledge areas will be used to develop the Project management plan and all the subsidiary documents.

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 Monitor and Control Project Work 4.5 Perform Integrated Change Control	4.6 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 Time Management		6.1 Plan Schedule Management 6.2 Define Activities 6.3 Sequence Activities 6.4 Estimate Activity Resources 6.5 Estimate Activity Durations 6.6 Develop Schedule		6.7 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 Perform Quality Assurance	8.3 Control Quality	
9. Project Human Resource Management		9.1 Plan Human Resource Management	9.2 Acquire Project Team 9.3 Develop Project Team 9.4 Manage Project Team		
10. Project Communications Management		10.1 Plan Communications Management	10.2 Manage Communications	10.3 Control 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 Control Risks	
12. Project Procurement Management		12.1 Plan Procurement Management	12.2 Conduct Procurements	12.3 Control Procurements	12.4 Close Procurements
13. Project Stakeholder Management	13.1 Identify Stakeholders	13.2 Plan Stakeholder Management	13.3 Manage Stakeholder Engagement	13.4 Control Stakeholder Engagement	

Figure 5 Project Management Process Group and Knowledge Area Mapping. Reprinted from A Guide to the Project Management Body of Knowledge (p. 423), Project Management Institute, 2013.

2.2.5 Project management knowledge areas

A knowledge area represents a complete set of concepts, terms, and activities that make up a professional field, project management field, or area of specialization (Project Management Institute, 2013, p.60). There are 47 project management processes identified in the PMBOK Guide 5th Edition, these are grouped into ten separate knowledge areas. Processes under each knowledge areas are iterative and may or may not overlap or interact with each other. All the ten knowledge areas will be used in the Project management plan for the construction of the New RGD Health Center Limesgracht.

The ten knowledge areas as defined in the PMBOK Guide 5th Edition are:

- Integration management
- Scope management
- Time management
- Cost management
- Quality management
- Human Resources management
- Communication management
- Risk management
- Procurement management
- Stakeholder management

3. METHODOLOGICAL FRAMEWORK

3.1 Information sources

An information source is where you got your information from. Information sources are the various means by which information is recorded for use by an individual or an organization. It is the means by which a person is informed about something or knowledge is availed to someone, a group of people or an organization. Information sources can be observations, people, speeches, documents, pictures, organizations. Information sources can be in print, non-print and electronic media or format (Karibou connections)

Information can be gathered from everywhere. The obviously one is the internet, but there are other sources that can be accessed, such as libraries, articles, compilations, a colleague etc. Primary and secondary sources will be used to create the Final Graduation Project.

3.1.1 Primary sources

According to the Santiago Canyon College (2017), a primary source is a source that provides direct or firsthand evidence about an event, object, person, or work of art. Primary sources provide the original materials on which other research is based and enable other researchers to get as close as possible to what actually happened during a particular event or time period. Here the information is taken directly from the source.

Examples of primary sources are Correspondence, Interviews, Surveys, Email, Books, Government documents etc.

The primary information sources that will be used to create the FGP are;

- Interviews
- E-mail
- Meetings

3.1.2 Secondary sources

According to the Santiago Canyon College (2017), a secondary source describes, discuss, interpret, comment upon, analyze, evaluate, summarize, and process primary sources. A secondary source is generally one or more steps removed from the event or time period and are written or produced after the fact with the benefit of hindsight. The information that is provided here, originates from a primary source.

Examples of secondary sources are Bibliographies, Books, Articles, Literature reviews etc.

The secondary information sources that will be used to create the FGP are:

- Internet
- PMBOK Guide, 5th Edition
- PMI Website
- The *GPM P5 S*tandard for Sustainability in Project Management

Chart 1 Information sources (Source: compiled by the author)

Objectives	Information sources	
	Primary	Secondary
To develop a project charter that authorizes the project.	Interviews, E-mail	PMBOK Guide, 5th Edition, PMI Website
To create a scope management plan to manage the scope and required works.	Interviews, E-mail	Internet, PMBOK Guide, 5th Edition, PMI Website, GPM P5
To create a time management plan to manage the project schedule, to ensure the project is completed within the allowed time frame	Interviews, E-mail, Meetings	Internet, PMBOK Guide, 5th Edition, PMI Website
To develop a cost management plan to manage the project budget.	Interviews, E-mail, Meetings	Internet, PMBOK Guide, 5th Edition, PMI Website, GPM P5
To create a quality management plan to identify the quality requirements and expectations for the project.	Interviews, E-mail, Meetings	Internet, PMBOK Guide, 5th Edition, PMI Website, GPM P5
To develop a human resource management plan to identify and manage all required human resources.	Interviews, E-mail, Meetings	Internet, PMBOK Guide, 5th Edition, PMI Website
To create a communication management plan to ensure effective communication and sharing of information.	Interviews, E-mail, Meetings	Internet, PMBOK Guide, 5th Edition, PMI Website
To create a risk management plan to identify and examine risks and how to minimize it.	Interviews, E-mail, Meetings	PMBOK Guide, 5th Edition, PMI Website
To create a procurement management plan to serve as guideline on how to obtain products and services.	Interviews, E-mail, Meetings	PMBOK Guide, 5th Edition, PMI Website, GPM P5
To create a stakeholder management plan to identify all the project stakeholders and how to manage them.	Interviews, E-mail, Meetings	PMBOK Guide, 5th Edition, PMI Website

3.2 Research methods

Research is defined by Neuman (Mahmood, 2010, slide 15) as a collection of methods and methodologies that researchers apply systematically to produce scientifically based knowledge about the social world. Whereas methods is defined as a set of specific techniques for selecting cases, measuring and observing aspects of social life, gathering and refining data, analyzing data and reporting results (Mahmood, 2010, slide 17) Therefore, a research method must be systematic and follow a series of steps and a rigid standard protocol.

Some research methods are:

1. Comparative research
2. Explorative research
3. Causal research
4. Action research
5. Explanatory research
6. Theory testing research

For the development of this FGP, the explanatory or analytical research method will be used.

3.2.1 Analytical method

The Analytical or explanatory research method aims at explaining the social relations and events and also to build, test or revise a theory (Mahmood, 2010, slide 38)

In Analytical Research, the researcher has to use facts or information already available, and analyze them to make a critical evaluation of the material. It involves the in-depth study and evaluation of available information in an attempt to explain

complex phenomenon. Analytical Research is primarily concerned with testing hypothesis and specifying and interpreting relationships, by analyzing the facts or information already available (Scribd)

Chart 2 Research methods (Source: compiled by the author)

Objectives	ANALYTICAL METHOD
To develop a project charter that authorizes the project.	to use facts or information already available, and analyze them to make a critical evaluation and based upon that a decision
To create a scope management plan to manage the scope and required works.	to use facts or information already available, and analyze them to make a critical evaluation and based upon that a decision
To create a time management plan to manage the project schedule, to ensure the project is completed within the allowed time frame	to use facts or information already available, and analyze them to make a critical evaluation and based upon that a decision
To develop a cost management plan to manage the project budget.	to use facts or information already available, and analyze them to make a critical evaluation and based upon that a decision
To create a quality management plan to identify the quality requirements and expectations for the project.	to use facts or information already available, and analyze them to make a critical evaluation and based upon that a decision
To develop a human resource management plan to identify and manage all required human resources.	to use facts or information already available, and analyze them to make a critical evaluation and based upon that a decision
To create a communication management plan to ensure effective communication and sharing of information.	to use facts or information already available, and analyze them to make a critical evaluation and based upon that a decision
To create a risk management plan to identify and examine risks and how to minimize it.	to use facts or information already available, and analyze them to make a critical evaluation and based upon that a decision
To create a procurement management plan to serve as guideline on how to obtain products and services.	to use facts or information already available, and analyze them to make a critical evaluation and based upon that a decision
To create a stakeholder management plan to identify all the project stakeholders and how to manage them.	to use facts or information already available, and analyze them to make a critical evaluation and based upon that a decision

3.3 Tools

The PMBOK Guide 5th Edition, defines “tool” as something tangible, such as a template or software program, used in performing an activity to produce a product or result (Project Management Institute, 2013, p. 565).

All the tools that are used in the Final Graduation Project are:

1. Expert Judgement - *is applied to all technical and management details during this process. Such expertise is provided by any group or individual with specialized knowledge or training and is available from many sources (Project Management Institute, 2013, p. 71).*
2. Facilitation Techniques - *Brainstorming, conflict resolution, problem solving, and meeting management are examples of key techniques used by facilitators to help teams and individuals accomplish project activities (Project Management Institute, 2013, p. 71).*
3. Meetings
4. Interviews - *is a formal or informal approach to elicit information from stakeholders by talking to them directly (Project Management Institute, 2013, p. 114).*
5. Group Creativity Techniques – *Brainstorming, idea/ mind mapping.*
6. Document Analysis - *is used to elicit requirements by analyzing existing documentation and identifying information relevant to the requirements (Project Management Institute, 2013, p. 117).*
7. Decomposition - *is a technique used for dividing and subdividing the project scope and project deliverables into smaller, more manageable parts (Project Management Institute, 2013, p. 128).*
8. Precedence Diagramming Method - *PDM is a technique used for constructing a schedule model in which activities are represented by nodes and are graphically linked by one or more logical relationships to show the*

sequence in which the activities are to be performed (Project Management Institute, 2013, p. 156).

9. Project management software – MS Project 2016
10. Analogous Estimating - *is a technique for estimating the duration or cost of an activity or a project using historical data from a similar activity or project (Project Management Institute, 2013, p. 169).*
11. Critical Path Method - *Is a method used to estimate the minimum project duration and determine the amount of scheduling flexibility on the logical network paths within the schedule model (Project Management Institute, 2013, p. 176).*
12. Bottom-Up Estimating - *is a method of estimating a component of work (Project Management Institute, 2013, p. 205).*
13. Reserve Analysis - *Contingency reserves are the budget within the cost baseline that is allocated for identified risks, which are accepted and for which contingent or mitigating responses are developed (Project Management Institute, 2013, p. 206).*
14. Cost Aggregation - *Cost estimates are aggregated by work packages in accordance with the WBS. The work package cost estimates are then aggregated for the higher component levels of the WBS (such as control accounts) and ultimately for the entire project (Project Management Institute, 2013, p. 211).*
15. Cost of Quality (COQ) - *includes all costs incurred over the life of the product by investment in preventing nonconformance to requirements, appraising the product or service for conformance to requirements, and failing to meet requirements (rework) (Project Management Institute, 2013, p. 235).*
16. Seven Basic Quality Tools – *Flow charts, check sheets, Control Charts, Histogram etc.*
17. PDCA Cycle – *Plan Do Check Act Cycle*

18. Organization Charts and Position Descriptions – *Hierarchy, RACI Matrix etc.*
19. Pre-assignment - *When project team members are selected in advance, they are considered pre-assigned (Project Management Institute, 2013, p. 270).*
20. Acquisition - *When the performing organization is unable to provide the staff needed to complete a project, the required services may be acquired from outside sources (Project Management Institute, 2013, p. 270).*
21. Virtual Teams - *can be defined as groups of people with a shared goal who fulfill their roles with little or no time spent meeting face to face (Project Management Institute, 2013, p. 271).*
22. Communication Requirements Analysis - *determines the information needs of the project stakeholders. These requirements are defined by combining the type and format of information needed with an analysis of the value of that information (Project Management Institute, 2013, p. 291).*
23. Communication Technology – *What type of technologies are available*
24. Communication Methods – *What methods to use; push, pull, interactive*
25. Documentation Reviews – *Is a structured review of the project documentation*
26. Checklist Analysis - *Risk identification checklists are developed based on historical information and knowledge that has been accumulated from previous similar projects and from other sources of information (Project Management Institute, 2013, p. 325).*
27. Assumptions Analysis - *explores the validity of assumptions as they apply to the project. It identifies risks to the project from inaccuracy, instability, inconsistency, or incompleteness of assumptions (Project Management Institute, 2013, p. 325).*

28. Make-or-Buy Analysis – *Is a general management technique used to determine whether particular work can best be accomplished by the project team or should be purchased from outside sources (Project Management Institute, 2013, p. 365).*
29. Market Research - *includes examination of industry and specific vendor capabilities (Project Management Institute, 2013, p. 365).*
30. Stakeholder Analysis - *is a technique of systematically gathering and analyzing quantitative and qualitative information to determine whose interests should be taken into account throughout the project (Project Management Institute, 2013, p. 395).*
31. Analytical Techniques - *The current engagement level of all stakeholders needs to be compared to the planned engagement levels required for successful project completion. Stakeholder engagement throughout the life cycle of the project is critical to project success (Project Management Institute, 2013, p. 402).*

Chart 3 Tools (Source: compiled by the author)

Objectives	Tools
To develop a project charter that authorizes the project.	1. Expert Judgement 2. Facilitation Techniques
To create a scope management plan to manage the scope and required works.	1. Expert Judgement 2. Meetings 3. Interviews 4. Group Creativity Techniques 5. Group Decision-Making Techniques 6. Document Analysis 7. Decomposition
To create a time management plan to manage the project schedule, to ensure the project is completed within the allowed time frame	1. Expert Judgement 2. Meetings 3. Precedence Diagramming Method 4. MS Project 2016 / Visio 2016 5. Analogous Estimating 6. Critical Path Method 7. Critical Chain Method
To develop a cost management plan to manage the project budget.	1. Meetings 2. Expert Judgement 3. Analogous Estimatin 4. Reserve Analysis 5. Cost Aggregation
To create a quality management plan to identify the quality requirements and expectations for the project.	1. Meetings 2. Cost of Quality (COQ) 3. Seven Basic Quality Tools 4. PDCA Cycle
To develop a human resource management plan to identify and manage all required human resources.	1. Meetings 2. Expert Judgement 3. Organization Charts and Position Descriptions 4. Pre-assignment 5. Acquisition 6. Virtual Teams

Objectives	Tools
To create a communication management plan to ensure effective communication and sharing of information.	1. Communication Requirements Analysis 2. Communication Technology 3. Meetings 4. Communication Methods
To create a risk management plan to identify and examine risks and how to minimize it.	1. Expert judgement 2. Meetings 3. Documentation Reviews 4. Checklist Analysis 5. Assumptions Analysis
To create a procurement management plan to serve as guideline on how to obtain products and services.	1. Make-or-Buy Analysis 2. Expert judgement 3. Meetings 4. Market Research
To create a stakeholder management plan to identify all the project stakeholders and how to manage them.	1. Stakeholder Analysis 2. Expert judgement 3. Meetings 4. Analytical Techniques

3.4 Assumptions and constraints

An assumption is a factor in the planning process that is considered to be true, real, or certain, without proof or demonstration (Project Management Institute, 2013, p. 529). Whereas a constraint a limiting factor is, that affects the execution of a project, program, portfolio, or process (Project Management Institute, 2013, p. 533). The PMBOK Guide, 5th edition identifies six project constraints: scope, quality, schedule, budget, resource and risk. Three of these constraints are known as the triple constraints. These are:

- Scope
- Schedule
- Budget

The assumptions and constraints considered on the Final Graduation Project for each specific objective is compiled in Chart 4 below.

Chart 4 Assumptions and constraints (Source: compiled by author)

Objectives	Assumptions	Constraints
To develop a project charter that authorizes the project.	The project charter will be created	Time allocated for creating the project charter is not sufficient
To create a scope management plan to manage the scope and required works.	The project scope will be defined.	Scope may change during the project
To create a time management plan to manage the project schedule, to ensure the project is completed within the allowed time frame	The time management plan will be developed and sufficient time is available	Time allocated for the project is 8 months
To develop a cost management plan to manage the project budget.	The cost management plan will be developed.	Budget is set at $1.000.000,00
To create a quality management plan to identify the quality requirements and expectations for the project.	The quality management plan will be created and all technical and materials specifications are identified	Quality requirements may change during project progress
To develop a human resource management plan to identify and manage all required human resources.	The human resource plan will be developed, roles and responsibilities are identified and there are sufficient human resources available	Not all identified resources are available.
To create a communication management plan to ensure effective communication and sharing of information.	The communication plan will be developed, formal authorities and structures will be identified	Not everyone has access to internet.
To create a risk management plan to identify and examine risks and how to minimize it.	The risk management plan will be created and all risks are identified and budgeted for.	Not enough time to identify all risks
To create a procurement management plan to serve as guideline on how to obtain products and services.	The procurement management plan will be created and suppliers and procedures are identified and created.	Not all goods available locally. Import of goods can cause delays
To create a stakeholder management plan to identify all the project stakeholders and how to manage them.	The stakeholder management plan will be created with all stakeholders involved identified	Stakeholder requirements and level of interest may change

3.5 Deliverables

The (Project Management Institute, 2013, P.537) defines a deliverable as a "unique and verifiable product, result, or capability to perform a service that is required to be produced to complete a process, phase, or project". Chart 4 below shows the deliverables of the Final Graduation Project.

Chart 5 Deliverables (Source: compiled by the author)

Objectives	Deliverables
To develop a project charter that authorizes the project.	Project Charter
To create a scope management plan to manage the scope and required works.	Scope Management Plan
To create a time management plan to manage the project schedule, to ensure the project is completed within the allowed time frame	Time Management Plan
To develop a cost management plan to manage the project budget.	Cost Management Plan
To create a quality management plan to identify the quality requirements and expectations for the project.	Quality Management Plan
To develop a human resource management plan to identify and manage all required human resources.	Human Resource Management Plan
To create a communication management plan to ensure effective communication and sharing of information.	Communication Management Plan
To create a risk management plan to identify and examine risks and how to minimize it.	Risk Management Plan
To create a procurement management plan to serve as guideline on how to obtain products and services.	Procurement Management Plan
To create a stakeholder management plan to identify all the project stakeholders and how to manage them.	Stakeholder Management Plan

4. RESULTS

4.1. Project Integration Management

The development of a project charter for the New RGD health center Limesgracht, is the first process related to project integration management. The second process in this knowledge area is the development of the project management plan. The project charter is developed using facilitations techniques, analytical research methodology, GPM Guide and the PMBOK Guide as references.

The Project Charter consists of the following components; project's purpose, objectives, high-level requirements, assumptions and constraints, high level risks, milestones, overall project budget, stakeholder list, assigned project manager (Project Management Institute, 2013, p. 72).

Project charter for the New RGD health center Limesgracht

Project purpose

To build a new RGD health center at Limesgracht, in code with new building standards and green constructions practices. The new facility must accommodate more clients and more healthcare services.

Objectives

The project has the following objectives:

1. To build a one-storey building in order to accommodate more clients
2. The building must be constructed out of sustainable materials
3. The structure must apply with health industry codes

High-level requirements

1. The structure must withstand the elements of nature
2. Lower the cost of energy and water by implementing renewable sources
3. Use of materials that complies with the green building technologies as identified by GPM

Assumptions

1. Weather:
   - It is assumed that it will rain, because the duration of the project overlaps two rain seasons, therefore the lost time is covered in the schedule.
2. Schedule
   - It is assumed that the project will be completed in twenty-four (24) months.
3. Finance
   - It is assumed that the project will be approved by the financial entity, the ISDB.
4. HRM
   - It is assumed that enough resources will be available and that the required skills and knowledge is present.
5. Budget
   - It is assumed that the project will be accomplished for US$ 1,000,000.00

Constraints

The project cost should not exceed US$ 1,000,000.00 and the duration should not exceed twenty-four (24) months.

Risks

1. Delays in schedule/ planning due to climate changes, delivery of materials and or production.
2. Financial
    - Materials increases in price
    - Demand of more salary by workers due to the economic situation in Suriname.
    - Accidents on site or damage of materials
3. Stakeholders keeps changing the scope of the project.

Chart 6 Milestones (Source: compiled by the author)

MILESTONE	***DATE***
Groundwork	14th January 2019
Foundation	14th February 2019
Ground floor: Floors and Beams	28th February 2019
Ground floor: Columns and Walls	29th March 2019
First floor: floors, beams, columns, stairs and walls	28th June 2019
Ring beams and concrete cutter box	22nd July 2019
Roof construction and roofing	30th September 2019
Floor, wall and façade finishes	20th December 2019
Drainage systems	15th January 2020
Windows and doors	10th February 2020
Ceilings	16th March 2020
Painting	13th April 2020
Electro technical installations	27th April 2020
Water installations	4th May 2020
Data and Telephony installations	11th May 2020
Climate control installations	18th May 2020
Installation of cctv, alarm and acs systems	1st June 2020
Final Building inspection	8th June 2020
End of Project	14th June 2020

Budget

The total project budget is set at US$ 1,000,000.00, this includes all the costs associated with the construction of the building, overhead cost, insurance and contingency reserves.

Stakeholders

The following stakeholders are identified:

- Ministry of Health of the Republic of Suriname – Government Entity
- Regional Health Service – Project Sponsor
- Islamic Development Bank – Financial Entity
- AAC Design & Consultancy - Architect
- Contractor
- Subcontractor Climate control installations
- Subcontractor Electro technical installations
- Subcontractor Data and Telephony installations
- Subcontractor Water installations
- Subcontractor windows and doors installations
- Subcontractor cctv, alarm and acs systems
- Suppliers
- Healthcare professionals
- Project manager

Project Sponsor

The project sponsor of the new RGD Health center Limesgracht is the Regional Health Service

Project Manager

The project manager assigned for this project is Mr. Ramadhin Prewien. The project manager will choose his project team before starting all other works.

4.2. Project Scope Management

Introduction

Scope Management is the collection of processes which ensure that the project includes all the work required to complete it. It also details all the work that is excluded from the project. The Scope Management Plan details how the project scope will be defined, developed, and verified. It defines who is responsible for managing the projects' scope and acts as a guide for managing and controlling the scope. The Scope Management Plan provides the scope framework for this project. This plan documents the scope management approach; roles and responsibilities; scope definition; verification and control measures; scope change control and the project's work breakdown structure.

This scope management plan is for the construction project of the new RGD health center Limesgracht.

Scope Management Approach

For this project, scope management will be the responsibility of the Project Manager. The scope for this construction project is defined by the Scope Statement, Work Breakdown Structure (WBS) and WBS Dictionary. The Project Manager, Project Sponsor and Stakeholders will establish and approve documentation for measuring project scope which includes deliverable quality checklists and work performance measurements. Changes to the scope may be proposed by the Project Manager, Stakeholders or any member of the project team. All change requests will be submitted to the Project Manager who will then evaluate the request. Upon acceptance of the scope change request, the Project Manager will submit the scope change request to the Stakeholders, Architect and (sub) contractor(s). 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. 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.

Roles and Responsibilities

The Project Manager, Sponsor and Team will all play key roles in managing the scope of this project. As such, the project sponsor, manager, and team members must be aware of their responsibilities in order to ensure that work performed on the project is within the established scope throughout the duration of the project. The table on the next page defines the roles and responsibilities for the scope management of this project.

Chart 7 Roles & Responsibilities (Source: compiled by the author)

Name	Role	Responsibilities
Management of RGD	Project Sponsor	▪ Approve or deny scope change requests ▪ Evaluate need for scope change requests ▪ Accept deliverables
Ramadhin Prewien	Project Manager	▪ Measure and verify project scope ▪ Facilitate scope change requests ▪ Facilitate impact assessments of scope change requests ▪ Organize and facilitate change control meetings ▪ Communicate outcomes of scope change requests ▪ Update project documents upon approval
Project Team	Team Members	▪ Participate in defining change resolutions ▪ Evaluate the need for scope changes and communicate them to the project manager as necessary
Stakeholders	Contractor Subcontractors	▪ Can propose scope changes ▪ Will execute change directives issued by Project Manager

Scope Definition

Usually the scope of a project is defined through a comprehensive requirements collection process, were a thorough analysis is done of all revised project contracts, building codes, owners' requirements and industry standards. The project manager uses all this information to develop the requirements management plan and the requirements documentation. For this project these steps where skipped, because the design and requirements of the RGD Health center Limesgracht, is the same as the RGD Health center Lelydorp, Meerzorg and Latour. The construction of the RGD Health center Limesgracht is part of 7 more health centers to be built by the RGD in the coastal part of Suriname. The lessons learned from the previous projects, feedback from subject matter experts such as

the architect, contractor, subcontractors and environmental agencies are taken into consideration to generate the project deliverables of the 1 storey RGD Health center Limesgracht, in an effective, cost efficient and environmental friendly way.

Project Scope Statement

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.

Scope Description, Acceptance Criteria and Deliverables

The project mainly involves the carrying out of all the necessary work for delivering a one- storey, ready-to-use environmental friendly health center, in code with new building standards and green construction practices, housing the following details:

a. Execution of earthworks
b. Performing concrete work
c. Carrying out drainage works
d. Performing masonry work
e. Performing carpentry
f. Carrying out construction work
g. The provision of floor and wall workmanship
h. Conducting preservation and painting
i. The supply and installation of aluminum and plaster ceilings
j. The supply and installation of aluminum windows and doors
k. The supply and installation of fixed inventory
l. The supply and installation of cladding
m. Performing electrical work, including installation of fixtures

n. The provision of water supply works, including installation of fixtures

o. The supply and installation of climate control systems, alarm, cctv and acs

p. Conducting field work

q. The provision of associated and ancillary works

Further details can be found in the architectural drawings that are part of the project.

Figure 6 3D Render of RGD Health Center Limesgracht, AAC, 2017.

Figure 7 Ground floor lay-out and measurements, AAC, 2017.

Figure 8 First floor lay out and measurements, AAC, 2017.

Exclusions

1. Furnishing the building
2. Medical equipment's
3. Fence
4. Landscaping

Constraints

The project cost should not exceed US$ 1,000,000.00 and the duration should not exceed twenty-four (24) months.

Assumptions

1. Weather:
   - It is assumed that it will rain, because the duration of the project overlaps two rain seasons, therefore the lost time is covered in the schedule.
2. Schedule
   - It is assumed that the project will be completed in twenty-four (24) months.
3. Finance
   - It is assumed that the project will be approved by the financial entity, the ISDB.
4. HRM
   - It is assumed that enough resources will be available and that the required skills and knowledge is present.
5. Budget
   - It is assumed that the project will be accomplished for US$ 1,000,000.00

Work Breakdown Structure

In order to effectively manage the work required to complete this project, it will be subdivided into individual work packages which will not exceed 40 hours of work. This will allow the Project Manager to more effectively manage the project's scope as the project team works on the tasks necessary for project completion. The project is broken down into five phases: the initiation phase, pre-construction phase, construction phase, post construction phase and the project management phase. Each of these phases is then subdivided further down to work packages (see WBS below).

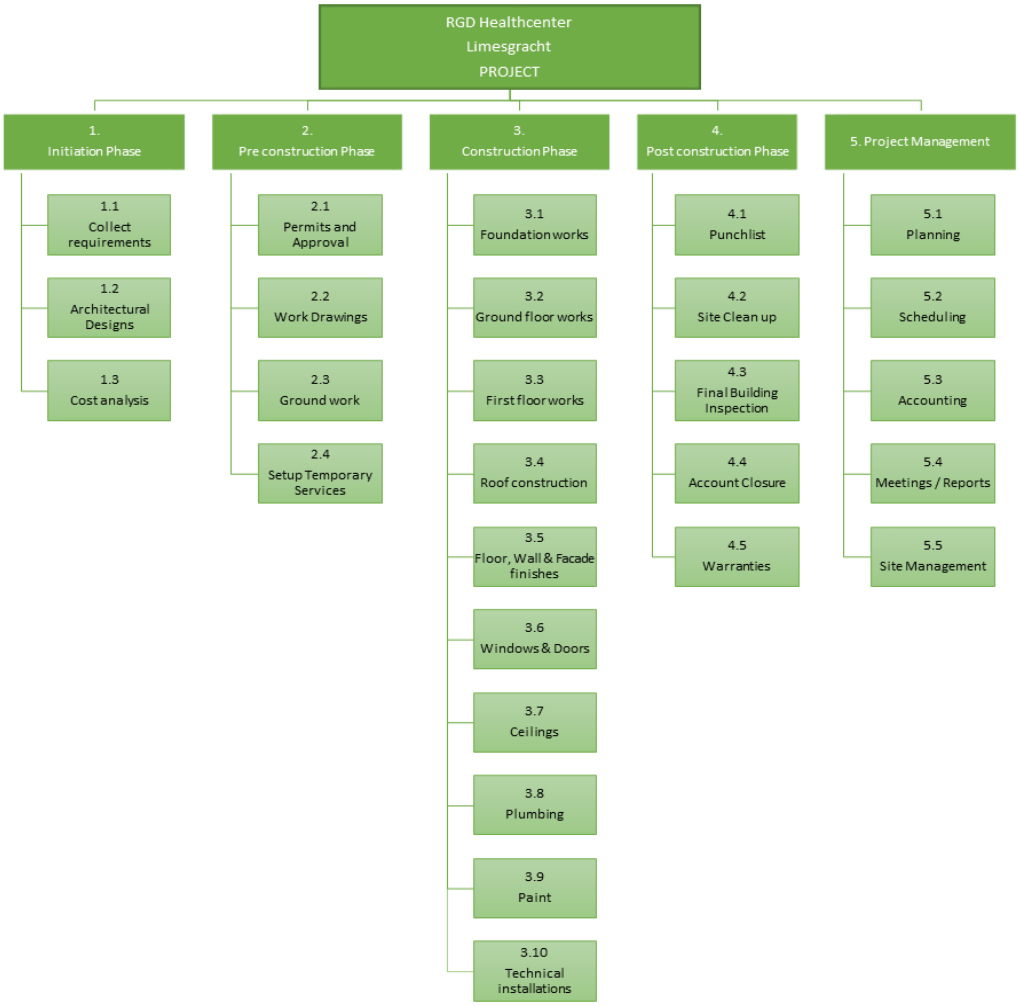

Figure 9 Work Breakdown Structure, Compiled by author, 2018.

After the WBS, the WBS Dictionary is created in order to more clearly define the work necessary for project completion. The WBS Dictionary includes an entry for each WBS element. The work breakdown structure dictionary is a document that provides detailed information about a work package (work at the lowest level in a work breakdown structure). Such information includes a unique number or WBS code, detailed description of the work, cost, resources needed for carrying out the work.

Chart 8 WBS Dictionary (Source: compiled by the author)

WBS level	WBS Code	Element	Work Description	Cost $	Resources
1	1	Initiation Phase		**50,000.00**	
2	1.1	Collect requirements	To find out certain client as regulatory needs for the project	5,000.00	Computer, Printer
2	1.2	Architectural designs	Design firm will make all the architectural drawings of the building and all technical drawings.	40,000.00	Computer, Printer, CAD Software
2	1.3	Cost analysis	Calculating of financial needs and project budget and how to finance the project	5,000.00	Computer, Printer
1	2	Pre-Construction Phase		**40,000.00**	
2	2.1	Permits and approval	Process of applying for all the permits necessary to start the project	2,500.00	Computer, Printer, architectural drawings
2	2.2	Work drawings	Technical documents and drawings as instruction for contractors and subcontractors, how to cope with the project	2,500.00	Computer, Printer, CAD Software
2	2.3	Ground work	All the works necessary to make the ground ready for starting the project and building the health center	30,000.00	Backhoe, dump truck, light weight crane, wheel barrows, jackhammers
2	2.4	Setup temporary Services	Cabins for site management, meetings, sanitary stops	5,000.00	Truck, light weight crane, Pre-camp
1	3	Construction Phase		**780,000.00**	
2	3.1	Foundation works	All the works necessary the pour concrete cement and pouring of cement to finish foundation works	80,000.00	Suppliers and (sub) contractors quote
2	3.2	Ground floor works	All the works necessary to pour the concrete floor and concrete walls of 6inch thickness	30,000.00	Suppliers and (sub) contractors quote
2	3.3	First floor works	All the works necessary to pour the concrete floor and concrete walls of 4inch thickness	35,000.00	Suppliers and (sub) contractors quote
2	3.4	Roof construction	Roof construction of aluminum pipes, roof materials & thermal mats	45,000.00	Suppliers and (sub) contractors quote

WBS level	WBS Code	Element	Work Description	Cost $	Resources
2	3.5	Floor, wall & façade finishes	All the works necessary to finish and clad the floor, walls and façade	160,000.00	Suppliers and (sub) contractors quote
2	3.6	Windows & doors	Delivery and installation of aluminum doors and windows with all necessary locks and hardware	75,000.00	Suppliers and (sub) contractors quote
2	3.7	Ceilings	All the works necessary to complete and finish the ceilings of the building with gypsum board	85,000.00	Suppliers and (sub) contractors quote
2	3.8	Plumbing	All plumbing installations, drainage systems, faucets, toilets	38.000,00	Suppliers and (sub) contractors quote
2	3.9	Paint	Painting of the building with environmental friendly paint inside and outside	26,500.00	Suppliers and (sub) contractors quote
2	3.10	Technical installations	Complete installation and testing of electricity, generator, climate control, water installation, cctv, acs and burglary systems	205,500.00	Suppliers and (sub) contractors quote
1	4	Post construction phase		**30,000.00**	
2	4.1	Punchlist	To fix defective works	20,000.00	Contractors quote
2	4.2	Site clean up	All works necessary to clean the construction site	4,000.00	Backhoe, dump truck,
2	4.3	Final building inspection	Walkthrough of the building for inspection	1,000.00	-
2	4.4	Account closure	Closing of all accounts and payments	5,000.00	-
2	4.5	Warranties	Manufacturers warranties for fixing problems within warranty period	N/A	-
1	5	Project management		**100,000.00**	
2	5.1	Planning	Planning of project activities throughout project lifecycle	20,000.00	Computer, Printer, Ms Project
2	5.2	Scheduling	Planning of project timeline, assigning milestones and dates to control project duration	20,000.00	Computer, Printer, Ms Project
2	5.3	Accounting	Monitoring of financial expenditures throughout the project lifecycle	20,000.00	Computer, Printer, Account view
2	5.4	Meetings/ Reports	Status of project, management of project	10,000.00	Computer, Printer
2	5.5	Site management	Day to day management of project site	30,000.00	Computer, Printer, Safety gear

The template on the following page will be used for assigning work packages to resources and will be used by the project team as a statement of work for each WBS element.

Chart 9 Work Package Form (Source: compiled by the author)

Work Package:			Code:						
Work description:									
Assumptions:									
Constraints:									
Scheduled Milestones: 1. 2. 3.			Due Dates:						
Responsible:									
ID	Activity	Resource	**Labour**			**Material**			Total Cost
			Hours	Rate	Total	Units	Cost	Total	
Quality Requirements:									
Acceptance Criteria:									
Technical References:									
Notes:									

Scope Verification

As the project progresses, the Project Manager will verify interim project deliverables against the original scope as defined in the scope statement and the WBS. After the verification meets the requirements defined in the project plan, the Project Manager will meet the Project Sponsor for formal acceptance of the deliverable. 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.

Scope Control

The Project Manager and the project team will work together to control the scope of the project. He 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 scope is needed, the change scope process must be carried out as depicted in figure 10.

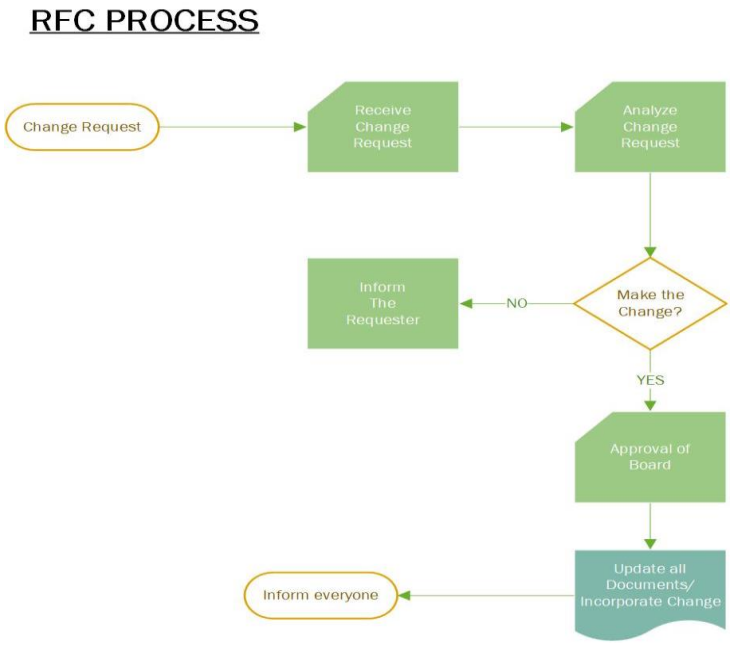

Figure 10 Request for Change process, Compiled by author, 2018.

Any project team member or owner can request changes to the project scope. All change requests must be submitted conform chart 10, to the Project Manager. He will then review the suggested change to the scope of the project. The Project Manager will then either deny or accept the change request. If the change request requires more work an impact assessment has to be performed. All changes have to be formally submitted and accepted. Upon acceptance of the scope change by the Project Manager and Project Sponsor, the Project Manager will update all project documents and communicate the change with all project team members and stakeholders.

Chart 10 Change Request Form (Source: compiled by the author)

CHANGE REQUEST FORM			
Project:			Date:
Request by:			Change no.:
Signature:			Position:
Change type: *(check all that apply)* ☐ Scope ☐ Schedule ☐ Cost ☐ Other		Change affect: *(check all that apply)* ☐ Corrective Action ☐ Preventive Action ☐ Repair ☐ Other	
Change description:			
Change reason:			
Alternatives considered:			
Risks to be considered:			
Resource and Cost estimation:			
Decision:	☐ Approve	☐ Reject	☐ Defer
Justification:			
Change Board Approval:			
Name	**Position**	**Signature**	**Date**

4.3. Project Time Management

4.3.1. Schedule Management Plan

Introduction

According to the Project Management Institute, project time management includes “the processes required to manage the timely completion of the project”, (Project Management Institute, 2013, p.141). Developing the Schedule Management Plan is the first process in project time management. The Schedule Management Plan will be used to guide the lifecycle of the project’s schedule, whereas the Project Charter and the Scope Management Plan were used as inputs. The tools and techniques used are meetings, expert judgement and analytical techniques. The Schedule Management Plan also provides guidelines for the project team on analyzing, prioritizing, approving or rejecting all schedule- related changes to the approved schedule and how to manage them. The project schedule is the guide for how the project will be carried out from start to end and is a critical part of the project, because it provides the project team and other stakeholders with a clear visual of the project’s status.

Schedule Management Approach

To create the schedules of the RGD Health center project, Microsoft Project 2016 and Visio 2016 will be used as a software tool, whereas the following techniques will be used to provide the data for creating the schedules;

1. Activity definition – for identifying the specific work packages which must be performed to complete each deliverable.
2. Activity sequencing – for determining the order of work packages and relationships.
3. Activity duration estimating – for calculating the number of work periods required to complete work packages.

4. Resource estimating - for assigning resources to work packages.

After the development of the initial schedule, the project manager and project team will assess it. The project team and resources must agree to the proposed assignments, durations and schedule. Only after this the schedule will be sent to the project sponsor to review and approve the schedule. If reviewed and approved by the project sponsor, the schedule will then be baselined.

The following table provides the milestones of the RGD Health center project:

Chart 11 Project Milestones (Source: compiled by the author)

MILESTONE	***DATE***
Start of groundwork	14th January 2019
Finish of foundation	14th February 2019
Ground floor: Floors and Beams finished	28th February 2019
Ground floor: Columns and Walls finished	29th March 2019
First floor: floors, beams, columns, stairs and walls finished	28th June 2019
Ring beams and concrete cutter box finished	22nd July 2019
Roof construction and roofing finished	30th September 2019
Floor, wall and façade finishes done	20th December 2019
Drainage systems done	15th January 2020
Windows and doors installed	10th February 2020
Ceilings finished	16th March 2020
Painting done	13th April 2020
Electro technical installations finished	27th April 2020
Water installations finished	4th May 2020
Data and Telephony installations finished	11th May 2020
Climate control installations finished	18th May 2020
Installation of cctv, alarm and acs systems finished	1st June 2020
Final Building inspection done	8th June 2020
End of Project delivery signed	14th June 2020

Roles and responsibilities for schedule development are as follows:

Chart 12 Schedule roles & responsibilities (Source: compiled by the author)

ROLE	RESPONSIBILITY
Project Manager	▪ Creating of project schedule with MS Project ▪ Leading the project team in creating the project schedule ▪ Obtaining approval from stakeholders for the project schedule
Project Team	▪ Review and validation of project schedule ▪ Participate in discussions for estimating work duration, sequencing and resource estimating
Project Stakeholders	▪ Validation and approval of the final project schedule

Schedule Control

The project schedule will include the start, finish and percentages of the completion and will be reviewed and updated when information regarding project schedule becomes available. The project manager is responsible for keeping track of the schedule and changes to it. He will hold meeting for schedule updates, reviews and changes. He is also responsible for submitting schedule change requests and reporting of schedule status to the Project Sponsor.

The project team is responsible for participating in schedule updates and schedule variance resolution sessions and must communicate any changes to schedule dates with the project manager. The Project Sponsor will review/ approve any schedule change requests submitted by the project manager. All schedule changes must comply with the change process flow as depicted in figure 10 and must be requested using chart 10.

Schedule Changes and Thresholds

The following procedure is applicable if a modification to the project schedule is required:

1. Any member of the project team can make a request for modification
2. Project team will meet to assess and evaluate the request.
3. Project team will check which work packages will be impacted.
4. Project team will check any variance resulting from the potential change
5. Project team will check for any alternatives
6. Project team will check for any variance resolution activities they may employ to see how they would affect the scope, schedule, and resources.
7. Project manager determines that a schedule change request must be submitted for any change that will exceed the established boundary conditions.
8. Submittal of a schedule change request to the project sponsor for approval is required if either of the following conditions is true:
   - The proposed change is estimated to reduce the duration of an individual work package by 5% or more, or increase the duration of an individual work package by 5% or more and the change is estimated to reduce the duration of the overall baseline schedule by 5% or more, or increase the duration of the overall baseline schedule by 5% or more.
9. Any change requests that results in changes that are within or less than the percentages indicated in the above thresholds must be submitted to the project manager for approval.
10. If the change request has been reviewed and approved, the project manager must adjust the schedule and communicate all changes and impacts to the project team, project sponsor, and stakeholders.

Scope Change

The project team must evaluate any changes in the project scope, which have been approved by the Project Sponsor and the impact it will have on the current

project schedule. If the project manager determines that the scope change will significantly affect the current project schedule, he may demand that the schedule is re-baselined in concern of any changes, which need to be made as part of the new project scope. The Project Sponsor must review and approve this request before the schedule can be re-baselined.

4.3.2. Define Activities

The second process in planning project schedule management is Define Activities. PMBOK describes Define Activities as the process of “identifying and documenting the specific actions to be performed to produce the project deliverables”, (Project Management Institute, 2013, p.141). The following inputs were used for activity definition; Scope Baseline comprised of the WBS, project deliverables, constraints and assumptions. Of the techniques identified in the PMBOK Guide, decomposition and expert judgement were used during this process, whereas the tool used to capture the information for this and the remaining processes required to develop the schedule was Microsoft Office Project 2016 and Visio 2016. The output to this process is the Activity List, as seen in chart 12. 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 (PMI, 2013, p. 152). Also, while defining activities, milestones were added and modified. Subsequently, after defining the activities, the milestone list found in the Project Charter and Schedule Management Plan were updated.

Chart 13 Activity List (Source: compiled by the author)

ID Nr.	Activity Name	Description of Work	Responsibility
1	Initiation Phase	Request for Proposal	AAC, Project Manager, ISDB
1.1	Collect requirements	To find out certain client as regulatory needs for the project	AAC, Project Manager
1.2	Architectural designs	Design firm will make all the architectural drawings of the building and all technical drawings.	AAC
1.3	Cost analysis	Calculating of financial needs and project budget and how to finance the project	Project Manager
2	Pre-Construction Phase	Contract Phase	AAC, Project Manager
2.1	Permits and approval	Process of applying for all the permits necessary to start the project	Project Manager
2.2	Work drawings	Technical documents and drawings as instruction for contractors and subcontractors, how to cope with the project	AAC, Project Manager
2.3	Ground work	All the works necessary to make the ground ready for starting the project and building the health center	Contractor
2.4	Setup temporary Services	Cabins for site management, meetings, sanitary stops	Contractor
3	Construction Phase	Phase where project execution occurs	Project Manager Project team
3.1	Foundation works	All the works necessary the pour concrete cement and pouring of cement to finish foundation works	Contractor
3.2	Ground floor works	All the works necessary to pour the concrete floor and concrete walls of 6inch thickness	Contractor
3.3	First floor works	All the works necessary to pour the concrete floor and concrete walls of 4inch thickness	Contractor
3.4	Roof construction	Construction of the roof made of aluminum pipes and roof materials, including thermal mats	Contractor
3.5	Floor, wall & façade finishes	All the works necessary to finish and clad the floor, walls and façade	Contractor
3.6	Windows & doors	Delivery and installation of aluminum doors and windows with all necessary locks and hardware	Sub-Contractor
3.7	Ceilings	All the works necessary to complete and finish the ceilings of the building with gypsum board	Contractor
3.8	Plumbing	All plumbing installations, drainage systems, faucets, toilets	Sub-Contractor
3.9	Paint	Painting of the building with environmental friendly paint inside and outside	Contractor

ID Nr.	Activity Name	Description of Work	Responsibility
3.10	Technical installations	Complete installation and testing of electricity, generator, climate control, water installation, cctv, acs and burglary systems	Sub-Contractors
4	Post construction phase	Phase after substantial completion	Project Manager Project team
4.1	Punchlist	To fix defective works	Project Manager Field Supervisor
4.2	Site clean up	All works necessary to clean the construction site	Contractor
4.3	Final building inspection	Walkthrough of the building for inspection	Project Manager, Owner, Contractor
4.4	Account closure	Closing of all accounts and payments	Accountant
4.5	Warranties	Manufacturers warranties for fixing problems within warranty period	Contractor, AAC, Project Manager
5	Project management	The management of the project	Project Manager
5.1	Planning	Planning of project activities throughout project lifecycle	Project Manager, AAC, Project team
5.2	Scheduling	Planning of project timeline, assigning milestones and dates to control project duration	Project Manager, AAC, Project team
5.3	Accounting	Monitoring of financial expenditures throughout the project lifecycle	Accountant
5.4	Meetings/ Reports	Status of project, management of project	Project Manager, Project team
5.5	Site management	Day to day management of project site	Field Supervisor

4.3.3. Sequence Activities

The third planning process of Project Schedule Management, after the activities were identified and defined, is the Sequence Activities process. PMI defines this process as “identifying and documenting relationships between project activities” (Project Management Institute, 2013, p. 153). The input to this process are; The Schedule Management Plan, the Activity list, the Milestone list and the Project Scope Statement. Microsoft Visio was used as tool to develop the output from this process. The Network Diagram developed can be seen on the next page.

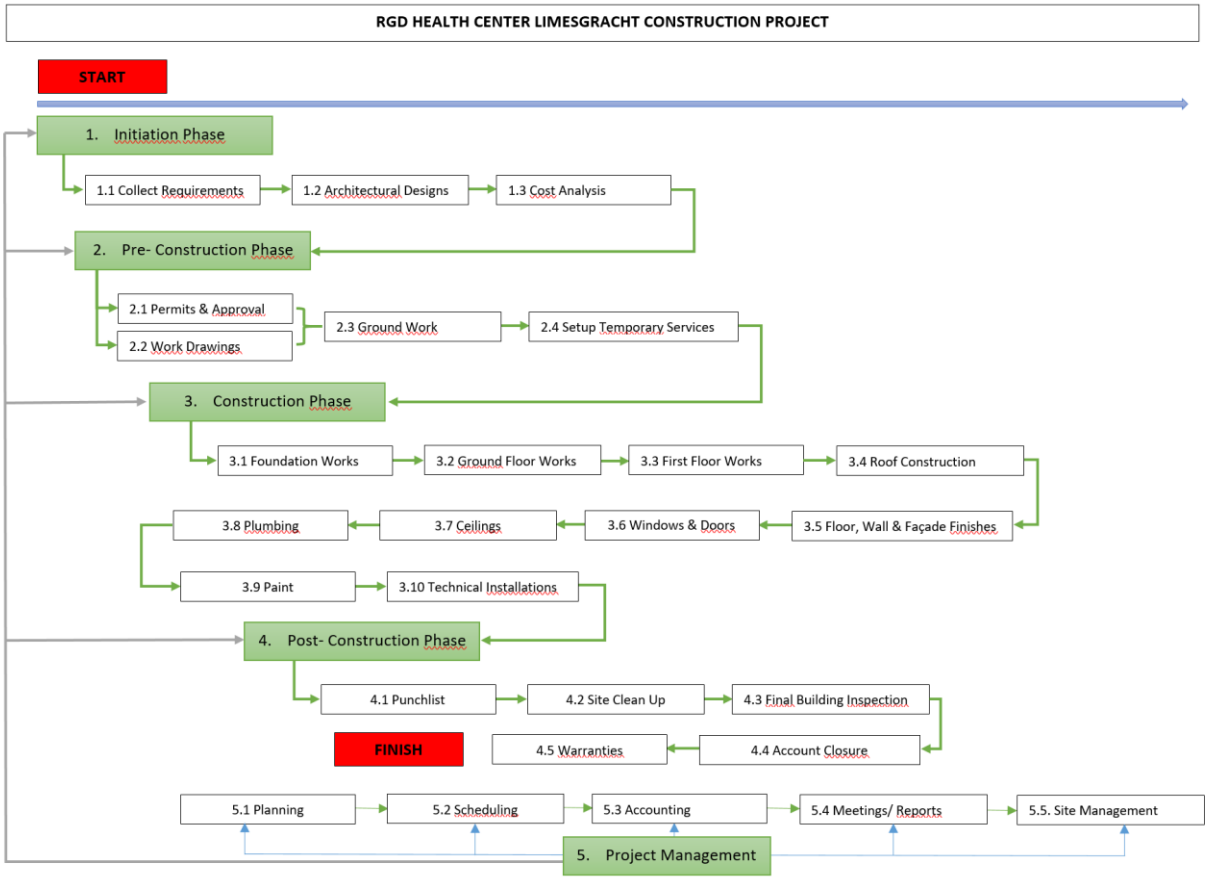

Figure 11 Network diagram, Compiled by author, 2018.

4.3.4. Estimate Activity Resources

The fourth planning process of Project Schedule Management is the Estimate Activity Resources process. PMBOK defines this process as “estimating the type and quantities of material, human resources, equipment, or supplies required to perform each activity”, (Project Management Institute, 2013, p.141). Since, the majority of work is being (sub) contracted, only the human resources were assigned to each activity. As more information becomes available, all resources

detailed in the PMBOK Guide will be identified for each activity and compiled in a Resource Breakdown Structure.

The inputs to this process were the Schedule Management Plan, the Activity List, the Resource Calendar, the Risk Register and the Activity Cost Estimates detailed in the WBS Dictionary. The tools and techniques used were expert judgement and Microsoft Project 2016. The human resources assigned to each activity is outlined in the table below.

Chart 14 Resource Assignment and Activity Duration List (Source: compiled by the author)

ID Nr.	Task Name	Duration	Resource Name
1	Initiation Phase	**2 months**	AAC, Project Manager, ISDB
1.1	Collect requirements	3 weeks	AAC, Project Manager, Project Sponsor
1.2	Architectural designs	4 weeks	AAC, Project Manager, Stakeholders
1.3	Cost analysis	1 week	Project Manager, Project Team
2	Pre-Construction Phase	**1.5 months**	AAC, Project Manager
2.1	Permits and approval	1 week	Project Manager, Project Team
2.2	Work drawings	1 week	AAC, Project Manager, Project Team
2.3	Ground work	2 weeks	Contractor, Site Supervisor
2.4	Setup temporary Services	2 weeks	Contractor, Site Supervisor
3	Construction Phase	**15 months**	Project Manager, Site Supervisor, Project team
3.1	Foundation works	4 weeks	Contractor, Site Supervisor
3.2	Ground floor works	5 weeks	Contractor, Site Supervisor
3.3	First floor works	8 weeks	Contractor, Site Supervisor
3.4	Roof construction	4 weeks	Contractor, Site Supervisor
3.5	Floor, wall & façade finishes	10 weeks	Contractor, Site Supervisor
3.6	Windows & doors	3 weeks	Sub-Contractor, Site Supervisor
3.7	Ceilings	5 weeks	Contractor, Site Supervisor
3.8	Plumbing	2 weeks	Sub-Contractor, Site Supervisor
3.9	Paint	6 weeks	Contractor, Site Supervisor
3.10	Technical installations	13 weeks	Sub-Contractors, Site Supervisor
4	Post construction phase	**2 months**	Project Manager, Project team
4.1	Punchlist	4 weeks	Project Manager, Site Supervisor
4.2	Site clean up	2 week	Contractor, Site Supervisor
4.3	Final building inspection	1 day	Project Manager, Owner, Contractor
4.4	Account closure	1 week	Accountant
4.5	Warranties	4 days	Contractor, AAC, Project Manager

ID Nr.	Task Name	Duration	Resource Name
5	Project management	N/A	Project Manager
5.1	Planning		Project Manager, AAC, Project team
5.2	Scheduling		Project Manager, AAC, Project team
5.3	Accounting		Accountant
5.4	Meetings/ Reports		Project Manager, Project team
5.5	Site management		Site Supervisor

4.3.5. Estimate Activity Durations

The fifth planning process is the Estimate Activity Durations process. The PMBOK Guide defines this process as “estimating the number of work periods needed to complete individual activities with estimated resources”, (Project Management Institute, 2013, p.141). The Schedule Management Plan, Activity List, Activity Resource Requirements, Resource Calendar and the Project Scope Statement were used as inputs. The tools and techniques used were Expert Judgement and Microsoft Project 2016. The output from this process is detailed in chart 13 of the above paragraph.

4.3.6. Develop Schedule

Develop Schedule is the sixth planning process for Project Time Management. The PMBOK Guide defines this process as the “process of analyzing activity sequence, durations, resource requirements and schedule constraints to create the project schedule model” (Project Management Institute, 2013, p.172). The inputs to this process were the Schedule Management Plan, the Activity List, the Project Schedule Network Diagram, the Activity Resource Requirements, the Resource calendar, the Activity Durations, the Project Scope Statement, the Risk Register and the Resource Requirements. The tools and techniques used to develop the

project schedule, were Schedule Network Analysis, Leads and Lags, and Microsoft Project 2016. Figure 12 shows the project schedule

	Task Name	Duration	Start	Finish	Predec
1	**New RGD Health Center Construction Project**	**20.5 mons**	**Mon 12/3/18**	**Fri 6/26/20**	
2	**1. Initiation Phase**	**2 mons**	**Mon 12/3/18**	**Fri 1/25/19**	
3	1.1 Collect Requirements	3 wks	Mon 12/3/18	Fri 12/21/18	
4	1.2 Architectural Designs	4 wks	Mon 12/24/18	Fri 1/18/19	3
5	1.3 Cost Analysis	1 wk	Mon 1/21/19	Fri 1/25/19	4
6	**2. Pre-Construction Phase**	**1.5 mons**	**Mon 1/28/19**	**Fri 3/8/19**	
7	2.1 Permits and Approvals	1 wk	Mon 1/28/19	Fri 2/1/19	
8	2.2 Work Drawings	1 wk	Mon 2/4/19	Fri 2/8/19	7
9	2.3 Ground Works	2 wks	Mon 2/11/19	Fri 2/22/19	7,8
10	2.4 Setup Temporary Services	2 wks	Mon 2/25/19	Fri 3/8/19	9
11	**3. Construction Phase**	**15 mons**	**Mon 2/11/19**	**Fri 4/3/20**	
12	3.1 Foundation Works	4 wks	Mon 3/11/19	Fri 4/5/19	10
13	3.2 Ground Floor Works	5 wks	Mon 4/8/19	Fri 5/10/19	12
14	3.3 First Floor Works	8 wks	Mon 5/13/19	Fri 7/5/19	13
15	3.4 Roof Construction	4 wks	Mon 7/8/19	Fri 8/2/19	14
16	3.5 Floor, Wall & Façade Finishes	10 wks	Mon 8/5/19	Fri 10/11/19	15
17	3.6 Windows & Doors Installations	3 wks	Mon 10/14/19	Fri 11/1/19	16
18	3.7 Ceilings Installations	5 wks	Mon 11/4/19	Fri 12/6/19	17,15,
19	3.8 Plumbing	2 wks	Mon 12/9/19	Fri 12/20/19	18,13,
20	3.9 Paint	6 wks	Mon 12/23/19	Fri 1/31/20	19
21	3.10 Technical Installations	13 wks	Mon 2/3/20	Fri 5/1/20	20
22	**4. Post Construction Phase**	**2 mons**	**Mon 4/6/20**	**Fri 5/29/20**	
23	4.1 Punchlist	4 wks	Mon 4/6/20	Fri 5/1/20	20
24	4.2 Site Clean up	2 wks	Mon 5/4/20	Fri 5/15/20	23
25	4.3 Final Building Inspection	1 day	Mon 5/18/20	Mon 5/18/20	24
26	4.4 Account Closure	1 wk	Tue 5/19/20	Mon 5/25/20	25
27	4.5 Warranties	4 days	Tue 5/26/20	Fri 5/29/20	25,26
28	**5. Project Management**	**20.5 mons**	**Mon 12/3/18**	**Fri 6/26/20**	
29	5.1 Planning	20.5 mons	Mon 12/3/18	Fri 6/26/20	
30	5.2 Scheduling	20.5 mons	Mon 12/3/18	Fri 6/26/20	
31	5.3 Accounting	20.5 mons	Mon 12/3/18	Fri 6/26/20	
32	5.4 Meetings/ Reports	20.5 mons	Mon 12/3/18	Fri 6/26/20	
33	5.5 Site Management	20.5 mons	Mon 12/3/18	Fri 6/26/20	

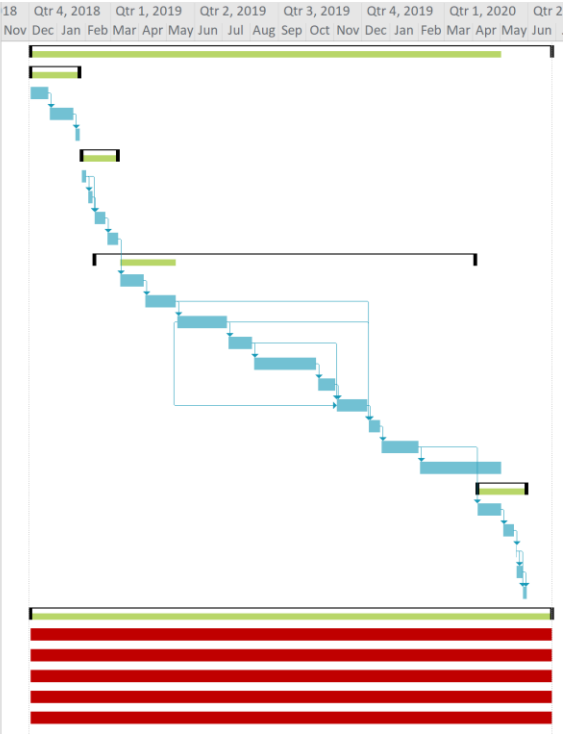

Figure 12 Project Schedule New RGD Health center Limesgracht , Compiled by author, 2018.

4.4. Project Cost Management

PMBOK defines project cost management as “the processes involved in planning, estimating, budgeting, financing, funding, managing and controlling costs so that the project can be completed within the approved budget”, (Project Management Institute, 2013, p.193). The first process of Project Cost Management is Plan Cost Management, further described in paragraph 4.4.1

4.4.1. Plan Cost Management

Introduction

Plan Cost Management is the “process that establishes the policies, procedures, and documentation for planning, managing, expending, and controlling project costs”, (Project Management Institute, 2013, p.193). The input used to develop the cost management plan for the new RGD Health center Limesgracht is the project charter and the tools and techniques used were expert judgement, analytical techniques and meetings.

The Project Manager is the person responsible for managing and reporting on the cost of the project, from start to end. Reporting can either be done, by sending financial reports updates weekly to the Project Sponsor and meeting the Project Sponsor on a monthly basis for presenting the project’s cost performance reports, which will be measured using earned value management. The Project Manager is further responsible for cost deviations in the project budget and for options to get the project back on budget. These options have to be authorized by the Project Sponsor, who also has the authority to make changes to the project to bring it within budget.

Cost Management Approach

Costs for this project will be managed through control accounts, that will be created to track project costs. The financial performance of the project will be measured by Earned Value Management calculations for the control accounts. 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 and compared to the total costs required to complete the work package. Costs will be rounded to the nearest dollar and work hours to the nearest whole hour.

The following rules are to be followed for cost variances;

- Cost variances of +/- 0.2 - Status of cost is cautionary.
- Cost variances of more than 0.2 – Status of cost is in alert stage.

Project Cost

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

1. Cost Variance (CV)
2. Schedule Variance (SV)
3. Schedule Performance Index (SPI)
4. Cost Performance Index (CPI)

The following rules are to be followed;

- If SPI or CPI has a variance of +/- 0.2 - The Project Manager must report the reason for the exception to the Project Sponsor.
- If SPI or CPI has a variance of more than 0.2 - The Project Manager must report the reason for the exception and provide the Project Sponsor corrective measurements to bring the project back on track.

Reporting

As is true for all other reports during the construction of the New RGD Health center Limesgracht, the Cost Management Report will be done on a weekly basis. The report must contain all cost variances outside of the identified thresholds and the corresponding corrective actions. The report must be signed by the Project Manager and approved by the Project Sponsor.

Cost Variance Response

A CPI or SPI of less than 0.9 or greater than 1.2 is set as the Control Threshold for this project. The Project Manager must present the Project Sponsor a report with options for corrective actions, if the project reaches one of these aforementioned Control Thresholds. Every option presented in the report must contain a corrective action plan, the resources associated with it and the cost in percentage gained, to get the project back on track. The report must reach the Project Sponsor within three business days and after approval, it will become part of the project plan.

Cost Change Control

All changes to the project budget or extra cost associated with control changes must be presented to and approved by the Project Sponsor.

All cost changes must comply with the change process flow as depicted in figure 10 and must be requested using chart 10.

Project Budget

The budget for this project is set at: USD 1,000,000.00

Chart 15 Project Budget Overview (Source: compiled by the author)

DESCRIPTION	COST (USD)
Labour & Materials	950,000.00
Contingency 5%	50,000.00
PROJECT TOTAL	1,000,000.00

Note: There is no tax calculated for the total project budget, because the project is a government driven project and funded by the IsDB and such requires the government to provide tax exception for the project.

4.4.2. Estimate Cost

After developing the schedule, the costs for the project were estimated. Estimate Cost is the second process of project cost management. This process is described in PMBOK as “developing an approximation of the monetary resources needed to complete project activities”, (Project Management Institute, 2013, p.200). The input to this process is the Cost Management Plan. The tools and techniques used were expert judgement, analogous estimating and three points estimating. Meetings were conducted with some experts, related to other projects of same scale to determine an estimate budget for the project. Expert judgment indicated that the cost may reach $ 400.00 per square foot at the most.

Using Analogous Technique, three similar but not identical projects were identified and each cost per square foot was extrapolated. Each cost per square foot was then multiplied by the square feet of the new building to get a range of estimates. Three-Point Estimate was then used to determine an average estimate of the cost per square foot.

Assumptions:

The Pessimistic cost per square foot = the lowest cost per sq. foot from the three

The Most likely cost per square foot = the average of all three costs.

The cost estimate includes a contingency reserve calculated at 5%.

Chart on the next page provides the information of the activity cost estimates.

Chart 16 Activity Cost Estimates (Source: compiled by the author)

WBS code	Element	Duration	Labour Cost	Material Cost	Total Cost $	Resources
1	Initiation Phase	**2 months**			**50,000.00**	
1.1	Collect requirements	3 weeks	4,900.00	100.00	5,000.00	Computer, Printer
1.2	Architectural designs	4 weeks	39,500.00	500.00	40,000.00	Computer, Printer, CAD Software
1.3	Cost analysis	1 week	4,950.00	50.00	5,000.00	Computer, Printer
2	Pre-Construction Phase	**1.5 months**			**40,000.00**	
2.1	Permits and approval	1 week	1,000.00	1,500.00	2,500.00	Computer, Printer, architectural drawings
2.2	Work drawings	1 week	2,450.00	50.00	2,500.00	Computer, Printer, CAD Software
2.3	Ground work	2 weeks	12,000.00	18,000.00	30,000.00	Backhoe, dump truck, light weight crane, wheel barrows, jackhammers
2.4	Setup temporary Services	2 weeks	2,000.00	3,000.00	5,000.00	Truck, light weight crane, Pre-camp
3	Construction Phase	**15 months**			**780,000.00**	
3.1	Foundation works	4 weeks	32,000.00	48,000.00	80,000.00	Suppliers and (sub) contractors quote
3.2	Ground floor works	5 weeks	12,000.00	18,000.00	30,000.00	Suppliers and (sub) contractors quote
3.3	First floor works	8 weeks	14,000.00	21,000.00	35,000.00	Suppliers and (sub) contractors quote
3.4	Roof construction	4 weeks	18,000.00	27,000.00	45,000.00	Suppliers and (sub) contractors quote
3.5	Floor, wall & façade finishes	10 weeks	64,000.00	96,000.00	160,000.00	Suppliers and (sub) contractors quote
3.6	Windows & doors	3 weeks	30,000.00	45,000.00	75,000.00	Suppliers and (sub) contractors quote

WBS code	Element	Duration	Labour Cost	Material Cost	Total Cost $	Resources
3.7	Ceilings	5 weeks	34,000.00	51,000.00	85,000.00	Suppliers and (sub) contractors quote
3.8	Plumbing	2 weeks	15,200.00	22,800.00	38.000,00	Suppliers and (sub) contractors quote
3.9	Paint	6 weeks	10,600.00	15,900.00	26,500.00	Suppliers and (sub) contractors quote
3.10	Technical installations	13 weeks	82,200.00	123,300.00	205,500.00	Suppliers and (sub) contractors quote
4	Post construction phase	**2 months**			**30,000.00**	
4.1	Punchlist	4 weeks	8,000.00	12,000.00	20,000.00	Contractors quote
4.2	Site clean up	2 week	1,600.00	2,400.00	4,000.00	Backhoe, dump truck,
4.3	Final building inspection	1 day	800.00	200.00	1,000.00	-
4.4	Account closure	1 week	4,900.00	50.00	5,000.00	-
4.5	Warranties	4 days			N/A	-
5	Project management	N/A			**100,000.00**	
5.1	Planning	-	19,000.00	1,000.00	20,000.00	Computer, Printer, Ms Project
5.2	Scheduling	-	19,000.00	1,000.00	20,000.00	Computer, Printer, Ms Project, Visio
5.3	Accounting	-	19,000.00	1,000.00	20,000.00	Computer, Printer, Account view
5.4	Meetings/ Reports	-	9,000.00	1,000.00	10,000.00	Computer, Printer
5.5	Site management	-	25,000.00	5,000.00	30,000.00	Computer, Printer, Safety gear

4.4.3. Determine Budget

Determine Budget is the third process of project cost management. Using the information from the Activity Costs Estimates, Scope Baseline, Cost Management Plan, Project Schedule, Risk Register and Agreements, the budget was determined by aggregating the costs of each work package. During this process, expert judgement was used as technique. The output of this process is the Cost Baseline, that was developed using a template.

Chart 17 Cost Baseline (Source: pugetsoundpmi.org)

Project Name	New RGD Health center Limesgracht
Project Manager	P. Ramadhin
Project Sponsor	IsDB
Date Prepared	April, 17th 2018
Submitted to	IsDB (project sponsor)
Total Cost Authorization	

COST BASELINE

EXPENSE	Qty	UNIT COST	TOTAL COST	PURPOSE
Consultants	2	6,650.00	13,300.00	Labour only
Consultants and architect office materials		2,200.00	2,200.00	Materials
Architect	1	29,500.00	29,500.00	Labour only
Assistant Architect	1	10,000.00	10,000.00	Labour only
Contractor	1	164,400.00	164,400.00	Labour only
Construction materials		245,600.00	245,600.00	Materials
Subcontractor Windows & Doors	1	30,000.00	30,000.00	Labour only
Subcontractor Windows & Doors	1	45,000.00	45,000.00	Materials
Subcontractor Ceilings	1	34,000.00	34,000.00	Labour only
Subcontractor Ceilings	1	51,000.00	51,000.00	Materials
Subcontractor Plumbing	1	15,200.00	15,200.00	Labour only
Subcontractor Plumbing	1	22,800.00	22,800.00	Materials
Subcontractor Paint	1	10,600.00	10,600.00	Labour only
Subcontractor Paint	1	15,900.00	15,900.00	Materials
Subcontractor Electro technical installations	1	21,500.00	21,500.00	Labour only
Subcontractor Electro technical installations	1	31,400.00	31,400.00	Materials
Subcontractor Water installations	1	9,000.00	9,000.00	Labour only
Subcontractor Water installations	1	13,300.00	13,300.00	Materials
Subcontractor Data and Telephony installations	1	11,300.00	11,300.00	Labour only
Subcontractor Data and Telephony installations	1	17,080.00	17,080.00	Materials
Subcontractor Climate control installations	1	23,900.00	23,900.00	Labour only
Subcontractor Climate control installations	1	35,240.00	35,240.00	Materials
Subcontractor cctv, alarm and acs systems	1	16,500.00	16,500.00	Labour only
Subcontractor cctv, alarm and acs systems	1	26,280.00	26,280.00	Materials
Project Manager	1	21,000.00	25,000.00	Labour only
Accountant	1	19,000.00	19,000.00	Labour only
Project team members	4	10,500.00	42,000.00	Labour only
Office Assistant	2	6,950.00	13,900.00	Labour only
Project management office materials		9,050.00	9,050.00	Materials
Total cost Material & Labour			**$1,000,000.00**	

The monthly cash flow of the project is depicted by the S-Curve, as shown in figure …The data for the cash flow was extracted from the project schedule and the activity cost estimates table. Microsoft Excel was used to combine the data and calculate the cash flow.

Figure 13 S-Curve, Compiled by author, 2018.

4.5. Project Quality Management

Project Quality Management includes the processes and activities of the performing organization that determine quality policies, objectives, and responsibilities so that the project will satisfy the needs for which it was undertaken. Project Quality Management works to ensure that the project requirements, including product requirements, are met and validated (Project Management Institute, 2013, p. 227).

Plan Quality Management is the only Quality Management process used during project planning. The tools that will be used to ensure that quality standards are met or exceeded are meetings, cost-benefit analysis, cost of quality (COQ), seven basic quality tools and the PDCA Cycle.

Introduction

The Quality Management Plan for the construction of the New RGD Health center Limesgracht project will establish the activities, processes, and procedures for ensuring a quality building constructed of quality materials. The quality management plan must also ensure that all products used are environmental friendly.

Quality Management Approach

The quality management approach will ensure quality is planned for all products and materials by utilizing an integrated quality approach to define quality standards, measure quality and continuously improve quality. The quality standards will be defined by the company’s current standards and criteria’s based on country and or health industry standards. All project specific quality standards for all materials and products will be documented and part of the total project duration. The Project Manager will be responsible for working with the project team

to conduct analyses on materials and products used. Any member of the project team can identify quality improvements which must be reviewed based on a cost-benefit analysis. If an improvement is implemented, all project documentation must be updated.

Quality Management Roles and Responsibilities

The following are general roles and responsibilities of main persons involved in ensuring quality management:

- *Project manager:*
  - Ensuring that quality management plan and its components are implemented.
  - Ensuring that quality audits are performed.
  - Ensuring that everyone knows the importance of quality management.
  - Have regular meetings with the project team to review the project quality approach.
- *Site manager:*
  - Reports to the project manager.
  - Checks all materials that are delivered.
  - Monitors inventory to ensure that everything is available.
  - Ensures site safety.
  - Documents everything.
- *Quality Assurance Manager:*
  - Reports to the project manager.
  - Inspects materials on quality standards and sustainability.
  - Ensure materials are stored properly.
  - Documents all audits and changes.

Quality Standards

In Suriname the Ministry of Public Works issues guidelines and codes for the construction work. The architect, in this case AAC Engineering will have to submit all drawings and specifications to the Ministry of Public Works for approval. Only after approval by the ministry and issuing of permits, the construction process can start. Some product quality standards and requirements will be determined by the architect; these standards will be primarily based on the health industries documented standards. All approved quality standards have to be documented and available to everyone working in the project.

Quality Assurance

Perform Quality Assurance is the process of auditing the quality requirements and the results from quality control measurements to ensure that appropriate quality standards and operational definitions are used. The key benefit of this process is that it facilitates the improvement of quality processes (Project Management Institute, 2013, p. 242).

The following codes and standards must be met pertaining to the construction of the New RGD Health center Limesgracht:

- Concrete Regulations as defined in “De Voorschriften Beton VB 1990” established by the Royal Institute of Engineers (Koninklijk Instituut voor Ingenieurs) with accompanying notes and appendices. All regulations herein that differ from the existing situational climate and other conditions in Suriname, will be revoked or will be amended.
- The standards for construction, NEN BUNDEL, most recent edition, with all additions and amendments issued by the Dutch Standardization Institute.
- All safety regulations as stipulated in the Land Safety Regulations.
- The requirements of Energy Company Suriname (E.B.S.).
- The requirements of the Water Company Suriname (S.W.M.).
- The Surinamese Building Decree no. 1.

- The regulations for the execution and the building materials associated with the specifications document for architectural work in Suriname (VBS 1976).
- The Inspectorate Service of the Ministry of Labor.
- The recommendations of the Fire Department Suriname.
- The product manufacturer(s) instructions.

Other instructions:

- The height measures on the contract drawings are indicated with respect to P=0. P=0 is the top of the finished ground floor. This is equivalent to 30 cm above the crown of the axis of the adjacent road.
- Treat the ground under the building and up to one meter around the building before pouring the foundations against wood lice and termites. The treatment method as well as the performing company must be approved by management. The exporting company will adhere to the applicable instructions and rules for the use of Aldrin, Dieldrin, Chlordane and Heptachlor.
- The concrete for reinforced concrete must meet minimum quality B25 according to VB 1990, concrete class 1, cement content min. 350 kg/m3, for consistency area 3. Flooring work must meet at least quality B15.
- Applying FeB-400 for rebar, unless otherwise indicated on drawing. For stirrups in beams etc. steel quality FeB-220 is allowed unless otherwise stated.
- The required steel grade of a steel roof structure is Fe 360.

Quality Control

Quality control is important for the success of the project, because according to PMI it has the following benefits:

1. Identifying the causes of poor process or product quality and recommending and/or taking action to eliminate them
2. Validating that project deliverables and work meet the requirements specified by key stakeholders necessary for final acceptance.

The Project team will conduct all quality control, have regular project meetings and reviews of all quality control checklist, sheets and reports. The following are applicable sheets to use for quality control purposes.

Chart 18 Material Inspection Report (Source: MSDGC, 2014)

Receiving Material Inspection Report			
Project Name:			**Project Number:**
DFOW:			
Date Received:	**Order Number:**	**Date Inspected:**	**Inspected By:**

Ref No.	**Item Description**	**Quantity**	**Partial or Full?**	**Okay or Damaged?**	**Special Storage?**

Chart 19 Inspection Checklist (Source: MSDGC, 2014)

Initial Inspection Checklist			
Project Name:			**Project Number:**
DFOW:			
Date:	**Sheet:**	**Spec. Section:**	**Page: ___ of ___**

No.	**Item**	**Yes**	**No**	**N/A**
1	Was the production foreman present?			
2	Material			
a)	Were materials inspected for compliance?			
b)	Were corrective actions taken for defective material?			
c)	Were corrective actions appropriate?			
d)	Were any deviations accepted?			
3	Installation Requirements			
a)	Did work comply with specifications or plans?			
b)	Was workmanship satisfactory?			
c)	Were corrective actions appropriate?			
d)	Were any deviations accepted?			
4	Tests			
a)	Were tests being performed?			
b)	Was testing frequency satisfactory?			
c)	Were test samples or locations appropriate?			
d)	Was testing quality coordinated with Mechanical/Electrical technicians?			
5	Inspections			
a)	Was inspection done by the QC Inspector in the Prep. meeting?			
b)	Was the inspection frequency as established in the Prep. Meeting?			
c)	Were critical inspections satisfactory?			
d)	Was the inspection satisfactory?			
6	Safety			
a)	Was the safety officer present?			
b)	Were the safety requirements followed?			
c)	Were the safety requirements modified?			
Remarks (explanations required for “No” responses and if deviations were accepted):				

Reported By:	Reviewed By:	Reviewed By:
(Quality Control Inspector)	(Quality Control Manager)	(Quality Assurance Representative)

Chart 20 Construction punch list (Source: MSDGC, 2014)

Construction Punch List			
Project Name:			**Project Number:**
Structural ☐	**Mechanical ☐**	**Electrical ☐**	**Civil ☐**
Inspected By:		**Date:**	**Page: ___ of ___**

Item No.	**Description**	**Completed by Construction (Sign/Date)**	**Accepted by Quality Control (Sign/Date)**

4.6. Project Human Resource Management

Introduction

Project Human Resource Management includes the processes that organize, manage, and lead the project team. The project team is comprised of the people with assigned roles and responsibilities for completing the project. (Project Management Institute, 2013, p. 255).

In creating the project human resource management plan, expert judgement, interviews and meetings, were used as the tools and techniques to identify the resources required. These tools were also used to define the roles and responsibilities of each resource and how they will be managed throughout the project lifecycle.

Plan Human Resource Management is the only process from the Human Resource Management knowledge area that will be used during the planning process. The PMBOK Guide defines this process as; “Plan Human Resource Management is the process of identifying and documenting project roles, responsibilities, required skills, reporting relationships, and creating a staffing management plan. The key benefit of this process is that it establishes project roles and responsibilities, project organization charts, and the staffing management plan including the timetable for staff acquisition and release”.

The other 3 processes as seen in the figure on the next page are conducted during the execution phase of the project.

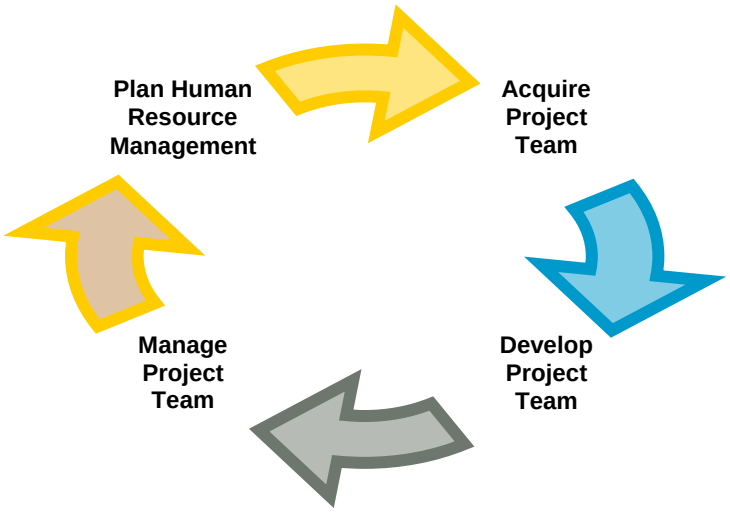

Figure 14 Project Human Resource Management Processes. Source: created by author and derived from the Project Management Body of Knowledge (p. 257), Project Management Institute, 2013.

Roles and Responsibilities

The following roles and responsibilities are identified:

Chart 21 Roles and Responsibilities matrix (Source: created by author, 2018)

ROLE	RESPONSIBILITY	AUTHORITY	COMPETENCES
Project manager	Responsible for: ▪ overall project success. ▪ authorization and approval of all project expenditures. ▪ evaluation of team members.	Moderate to high	▪ Coach/ Mentor ▪ Effective decision making ▪ Team building ▪ Communication ▪ Project management
Site manager	Responsible for: ▪ on time delivery of materials. ▪ monitoring of inventory. ▪ site safety.	Low to moderate	▪ Effective decision making ▪ Communication ▪ Motivate
Quality Assurance manager	Responsible for: ▪ deliverables meet established acceptability criteria. ▪ assuring green resources are used ▪ proper storing of goods	Moderate	▪ Technical Capacity ▪ Communication ▪ Performance management

ROLE	RESPONSIBILITY	AUTHORITY	COMPETENCES
Accountant	Responsible for: ▪ budget control ▪ all financial transactions ▪ proper documenting of financial records	Low to moderate	▪ Accuracy ▪ Integrity ▪ Time management ▪ Informing
Office Assistant	Responsible for: ▪ planning, convocation of meetings ▪ meeting minutes, logs, correspondence, agenda ▪ archiving of all documents	Low	▪ Organized and detail oriented ▪ Excellent communicator ▪ Time Mgnt
Architect AAC	Responsible for: ▪ designs, drawings ▪ permits ▪ use of sustainable and innovative materials in design	Moderate	▪ Technology in breadth and depth ▪ Communication ▪ Strategy
Head Contractor	Responsible for: ▪ construction of the building ▪ all requirements as per architect drawings ▪ managing subcontractors	Moderate	▪ Professional ▪ Communication ▪ Time Management
Subcontractor Climate control	Responsible for the installation of the climate control systems as per technical specifications and drawings	Low	▪ Professional ▪ Communication ▪ Time Management
Subcontractor Electro technical	Responsible for the installation of the electrical systems as per technical specifications and drawings	Low	▪ Professional ▪ Communication ▪ Time Management
Subcontractor Data and Telephony	Responsible for the installation of the data and telephone infrastructure as per technical specifications and drawings	Low	▪ Professional ▪ Communication ▪ Time Management
Subcontractor Water installations	Responsible for the installation of the water supply systems as per technical specifications and drawings	Low	▪ Professional ▪ Communication ▪ Time Management
Subcontractor windows and doors	Responsible for the installation of all windows and doors per technical specifications and drawings	Low	▪ Professional ▪ Time Management
Subcontractor cctv, alarm and acs	Responsible for the installation of the buildings security systems as per technical specifications and drawings	Low	▪ Professional ▪ Communication ▪ Time Management

Staffing Acquisitions and Release

For the building of the New RGD Health center Limesgracht staff will be acquired on a schedule driven basis, whereby the project staff will consist of internal and external resources. However, much of the operational work will be done by an external head contractor. The head contractor will be responsible for identifying and assigning of the resources for the project, this in close collaboration with the project manager.

RACI

The RACI model is a tool used for identifying roles and responsibilities and avoiding confusion over those roles and responsibilities during a project. The acronym RACI stands for:

- **Responsible:** The person who does the work to achieve the task. They have responsibility for getting the work done or decision made. As a rule, this is one person; examples might be a business analyst, application developer or technical architect.
- **Accountable:** The person who is accountable for the correct and thorough completion of the task. This must be one person and is often the project executive or project sponsor. This is the role that responsible is accountable to and approves their work.
- **Consulted:** The people who provide information for the project and with whom there is two-way communication. This is usually several people, often subject matter experts.
- **Informed:** The people kept informed of progress and with whom there is one-way communication. These are people that are affected by the outcome of the tasks, so need to be kept up-to-date.

Without clearly defined roles and responsibilities, it is easy for projects to run into trouble. When people know what management expect of them, it is easier for them to complete their work on time, within budget and to the right level of quality.
The following RACI chart shows the relationship between project tasks and team members.

Chart 22 RACI matrix (Source: created by author, 2018)

R – *Responsible* **A -** *Accountable* **C -** *Consulted* **I –** *Informed*	**Project Manager**	**Site Manager**	**Q- Assur. Manager**	**Accountant**	**Office Assistant**	**Architect AAC**	**Head Contractor**	**Sub-contractors**	**Site workers**
Design of the building	A					R			
Administration	A	R	R	R	R	R	R	R	C
Operational work	A	R	R	I	I	C	R	R	R
Quality Assurance	A	R	R		I	C	R	R	I
Accounting	A			R					
Stakeholder Management	A				R				
Procurements	A			R	I				
Technical Installations	A	C	C		I	C		R	R
Reports	A	R	R	R	R	R	R	R	C

Safety & Training

To ensure safe on the construction site all workers must wear protective gear (safety shoes, clothing, helmet, eye and ear protection (if applicable) etc.). All personal shall receive a mandatory safety training. Instruction signs must be placed by the entrance of the construction site and where necessary. The signs must be clearly visible.

All (sub)contractors are required to train their crew in the handling of equipment's and machinery. For everyone personal assigned to this project a CV and relevant certificates or document must be submitted to the project manager for approval.

Regulations and Policy

The acquisition and release of all human resources shall be handled in respect to the local and international laws and regulations for the acquisition and release of human resources. Also the rules governing employment by the International Labour organization (ILO) and the UN Charter on Human Rights must be respected. The working hours for the construction sector as issued by the Ministry of Labour must be followed. If more working hours are necessary, the workers must be compensated accordingly.

4.7. Project Communication Management

Introduction

Project communications management deals with the way project information is communicated between project stakeholders. To ensure that this information is communicated in a correct manner, at the correct time and with the right persons a communication management plan will be created for the New RGD Health center project Limesgracht. The plan will be developed using the PMBOK Guide. According to the PMBOK Guide 5th Edition; Plan Communications Management is the process of developing an appropriate approach and plan for project communications based on stakeholder's information needs and requirements, and available organizational assets. The key benefit of this process is that it identifies and documents the approach to communicate most effectively and efficiently with stakeholders.

The communication management plan will be created based on information gathered during meetings with the project team and other stakeholders. The plan will describe how each stakeholder will receive information from other members of the project team, how the information will be communicated, the person responsible for it and the frequency of the communication process.

Communication methods and technologies

The communication methods and technologies used for this project are:

- Face to face communication
- Meetings
- Presentations
- Reports
- Phone and video calls (Whatsapp, Skype)
- Text messages (Whatsapp)
- E-mails

Communication standards

The RGD has the following communication standards:

- E-mail: Employees can only use the organizations e-mail server, for sending and receiving emails related to work. For the project communication through e-mail this platform should be used only.
- Phone calls: The preferred method here is to use the organizations VOIP network in combination with the mobile closed user group provided to employees.

Communication audience

The stakeholders involved in communications with great impact to the project are:

- Management of the Regional Health Service
- AAC Design & Consultancy
- Contractor
- Subcontractors
- Project manager
- Project team
- Site Manager
- Quality Assurance Manager
- Accountant
- Office Assistant
- Site workers

Communication matrix

Chart 233 Communication matrix (Source: created by author, 2018)

ID	Communication Type	Objective of communication	Distribution Vehicle	Frequency	Target Audience	Owner
1	Kickoff meeting	Introduction of project and project team	Face to face	Once	▪ Sponsors ▪ Stakeholders	Project Manager
2	Project team meetings	Review project status and schedule	▪ Face to face ▪ Conference	Weekly	Project team	Project Manager
3	Project status meeting	Report status of project	Face to face	Monthly	▪ Contractors ▪ Architect ▪ Management	Project Manager
4	Project status reports	Reporting of project activities, progress, costs etc.	E-mail	Monthly	▪ Sponsors ▪ Project team ▪ Stakeholders	Project Manager
5	Project updates	Updates on project progress	▪ Face to face ▪ Phone calls ▪ E-mail ▪ Text messages	As needed	▪ Contractors ▪ Project team	Site Manager
6	Project updates	Updates on project progress	▪ Face to face ▪ Phone calls ▪ E-mail	As needed	▪ Contractors ▪ Project team	Quality Assurance Manager
7	Documents, correspondence	To inform	▪ E-mail ▪ Papers ▪ Text messages	As needed	▪ Everyone involved in project ▪ Community	Office Assistant

The charts on the next page must be used for respectively project update by e-mail and project status report.

Chart 24 Project update template (Source: created by author, 2018)

PROJECT UPDATE E-MAIL TEMPLATE
To : Contractors Project team Subject : Project update no… KEY HIGHLIGHTS: *(Mention all achieved projects high points, like milestones, approved budget, change, project % status etc.)* TASKS UPDATE: *(Provide updates on all planned tasks, % complete, issues, etc.)* OTHER UPDATES: *(Information regarding holidays, who's on leave etc.)*

Chart 25 Project Status Report template (Source: created by author, 2018)

Project Status Report				
Project Name:				
To: From: Date: Subject:				
Executive Summary:				
Period Accomplishments				
Major Issues				
Major Risks				
Next period plans				
Budget:				
Include a summary for budgeted and actual values by tasks. *Explain reasons for significant cost variances.*				
Schedule:				
Include a summary schedule for planned and actual dates by tasks. *Explain reasons for significant delays or early finishes.*				
Lessons Learned:				
List the lessons learned.				
Open Issues				
Issue Description	Status	Owner	Date Open	Target Date
List major issues.				

4.8. Project Risk Management

Introduction

Project Risk Management is defined as “the processes of conducting risk management planning, identification, analysis, response planning and controlling risk on a project”, (Project Management Institute, 2013, p.309).

4.8.1. Plan Risk Management

The risk management plan for the new RGD Health center Limesgracht, defines the risk management approach that will be taken to address the various risks that are likely to affect the project. The PMBOK Guide defines a project risk as an uncertain event or condition that, if it occurs, has a positive or negative effect on one or more project objectives such as scope, schedule, cost, and quality.

To increase the chance of project success, the risk management plan will capture and analyze as many risks as possible by using information gathering techniques as brainstorming, interviews and root cause analysis as well as analytical techniques. The project charter and stakeholder register was used as inputs for this process. After all the known risks are identified to a reasonable extent a risk register will be created. The risks are then quantified to determine their likelihood of occurrence and the impact they might have on project objectives. A risk response strategy is then developed to eliminate or reduce the impact of risk.

Risks Identification

Risks are identified during the development of the project charter and are exhausted during the creation of the subsidiary plans. After all the risks are identified they are grouped in categories and a risk breakdown structure is created.

The risk breakdown structure (RBS) will show the major risks, for more detailed information a risk register will be compiled. The risk register will be created and maintained by the Project Manager.

Risk Categories

The categories of risks identified for the new RGD Health center Limesgracht are:

1. Technical
2. External
3. Organizational
4. Project Management

The Risk Breakdown Structure

A risk breakdown structure (RBS) is a hierarchical representation of risks according to their risk categories and it helps the project team to look at many sources from which project risk may arise in a risk identification exercise. The following figure gives the RBS for the New RGD Health center Limesgracht project.

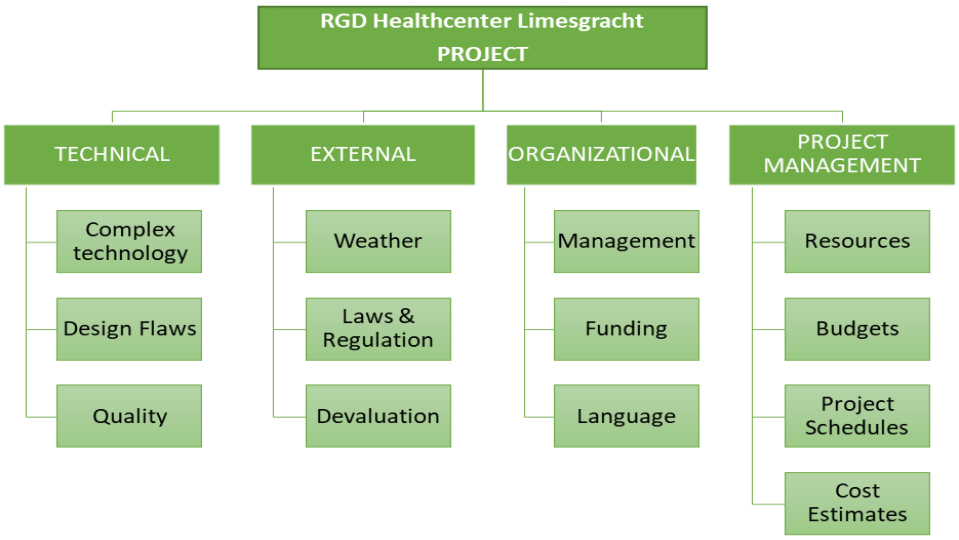

Figure 15 Risk Breakdown Structure. Source: created by author

The Risk Register

The risk register is a document in which the results of risk analysis and risk response planning are recorded. It contains the outcomes of the other risk management processes as they are conducted, resulting in an increase in the level and type of information contained in the risk register over time. The following table is the risk register of this project.

Chart 26 Risk Register (Source: created by author, 2018)

ID	Risk	Category	Date	Status	Responsible Person	Probable Cause	Prevention Strategy	Event Trigger	Contingency	Risk Close Date
1	Complex Technology	Technical	26-4-2018	Open	Architect					
2	Design Flaws	Technical	26-4-2018	Open	Architect					
3	Quality	Technical	26-4-2018	Open	Quality Assurance Manager					
4	Weather	External	26-4-2018	Open	Project Manager					
5	Laws & Regulations	External	26-4-2018	Open	Project Manager					
6	Devaluation	External	26-4-2018	Open	Accountant					
7	Management	Organizational	26-4-2018	Open	Project Manager					
8	Funding	Organizational	26-4-2018	Open	Project Sponsor					
9	Language	Organizational	26-4-2018	Open	Project Manager					
10	Resources	Project Management	26-4-2018	Open	Project Manager					
11	Budgets	Project Management	26-4-2018	Open	Accountant					
12	Project Schedules	Project Management	26-4-2018	Open	Project Manager					
13	Cost Estimates	Project Management	26-4-2018	Open	Accountant					

Qualitative Risk Analysis

After the risks are identified, the following 3 steps will be performed:

- Assessing the probability of it occurring and its impact if it did
- Managing the risk identified
- Allocating responsibility and action

These steps are performed with the formula: Risk = Probability x Impact

Chart 27 Risk Formula (Source: created by author, 2018)

PROBABILITY (P)		IMPACTS TIME or COST dependent		IMPACT (I)		RISK R=PxI	DEGREE Of RISK	SUGGESTED ACTION
Very likely >75%	5	>8 weeks added to completion date	>$100.000	Very high	5	17 - 25	Unacceptable	Project should not proceed if risk cannot be reduced
Likely 50 – 75%	4	>4 weeks added to completion date	$50.000 to $100.000	High	4	13 - 16	Unacceptable	Work must not start until risk has been reduced
Probable 25 – 50%	3	>3 weeks added to completion date	$10.000 to $ 50.000	Medium	3	9 - 12	Significant	Reduce risk. Mitigate or transfer
Unlikely 10 – 25%	2	1 to 3 weeks on activity: no change to completion date	$1.000 to $10.000	Low	2	5 - 8	Tolerable	Consider risk reduction measures
Negligible <10%	1	<1 week to activity: no change to completion date	< $1.000	Very low	1	1 - 4	Trivial	Monitor work

A risk value of 1- 4 is considered trivial, 5- 8 tolerable, 9- 12 significant and above 12 is unacceptable. Ideally, only trivial risks (1- 4) should be accepted, but in practice this will not always be possible. Risks with a value above 9 should not be accepted. These should be reduced to less than 9 by appropriate risk control measures, i.e. management and/or mitigation.

The table below shows risks that are reduced to less than 9, by applying risk mitigation.

Chart 28 Risk Mitigation (Source: created by author, 2018)

ID	RISK	BEFORE CONTROLS			RESPONSE	AFTER CONTROLS		
		P	I	R= pxi	*Avoid, transfer, mitigate, accept & manage*	P	I	R= pxi
1	Complex Technology	3	5	15	Train personal, double check all work, Use experienced staff	2	3	6
2	Design Flaws	3	3	9	Have the design screened by another architect	1	2	2
3	Quality	5	4	20	Hire experienced Quality Assurance Manager. Have quality measurements in place and ensure everyone is aware of it	4	2	8
4	Weather	3	5	15	Monitor weather, create work schedule based on weather forecast, calculate time in project schedule	3	1	3
5	Laws & Regulations	1	5	5	Ensure contracts has a fixed term, anticipate on draft law proposals that are prepared or submitted	1	2	2
6	Devaluation	2	5	10	Calculate contingency and budget project in USD, due to economic situation of the country	1	2	2
7	Management	3	3	9	Ensure management is aware of project management methodologies, if not train them or keep them informed	2	2	4
8	Funding	2	5	10	ISDB shuts down the project funding – Have alternative funding options explored	2	3	6
9	Language	3	2	6	Look out for language barriers. Group resources based on spoken language	1	3	3
10	Resources	4	3	12	For specialized materials, resources must be supplied by the subcontractor. He must sent proof of certifications to the project manager, 2 months before commenced of scheduled work	4	1	4
11	Budgets	3	4	12	Project contingency is not enough – Keep track of all project expenditures, Report weekly on budget deviations	1	3	3
12	Project Schedules	3	5	15	Double check schedule estimates, ask for expert judgement	2	2	4
13	Cost Estimates	3	5	15	Double check cost estimates, ask for expert judgement	2	2	4

4.8.2. Identify Risks

The second process within the risk management process is the identify risks process and it is “the process of determining which risks may affect the project and documenting their characteristics”, (Project Management Institute, 2013, p.319). The inputs used for this process were; risk management plan, schedule management plan, cost management plan, quality management plan, human resource management plan and procurement management plan. Tools and techniques applied were documentation review and expert judgement.

4.8.3. Perform Qualitative Risk Analysis

Perform Qualitative Risk Analysis is the “process of prioritizing risks for further analysis or action by assessing and combining their probability of occurrence and impact’’, (Project Management Institute, 2013, p.328) and is performed after the risk identification process. The inputs used for this process were scope baseline, risk management plan and the risk register. The tools and techniques used were risk probability and impact assessment, probability and impact matrix, risk categorization, risk register and expert judgement.

4.8.4. Plan Risk Responses

Plan Risk Responses is the process of “developing options and actions to enhance opportunities and threats to project objectives”, (Project Management Institute, 2013, p.342). The inputs for this process were the risk register and the risk management plan, whereas the tools and techniques applied were expert judgement, strategies for negative risks or threats and contingent response strategies.

4.9. Project Procurement Management

Introduction

The New RGD Health center Limesgracht project will be financed by the Islamic Development Bank (IsDB). Therefor the procurement of the project will be conducted conform the guidelines set by the IsDB. All specifications are subject to Surinamese laws and regulations. All disputes arising out of the interpretation and or application of this specifications or any provision hereof shall be subject to the judgement of the adjudicator.

Purpose

The purpose of the procurement management plan is to outline and define the procurement activities necessary for successful completion of the project objectives. This plan outlines the activities that forms part of the procurement process, contract type, selection criteria, contract process, awarding of contracts and method of controls to be employed throughout the life of the project. It also outlines how contracts will be closed.

Project procurement management approach

The construction of the New RGD Health center Limesgracht will be tendered conform the bidding document of the IsDB and awarded as a firm fixed price contract (FFP) to the bidder that meets all required criteria. The bidding document will consist of:

PART 1 Bidding Procedures

- Section I - Instructions to Bidders (ITB)
- Section II - Bid Data Sheet (BDS)
- Section III - Evaluation and Qualification Criteria
- Section IV - Bidding Forms
- Section V - Eligible Countries

PART 2 Requirements

- Section VI - Works Requirements

PART 3 Conditions of Contract and Contract Forms

- Section VII - General Conditions (GC)
- Section VIII - Particular Conditions (PC)
- Section IX - Contract Forms

The bidder has to specify the project price in accordance to the following table;

Chart 29 Price Specification Chart (Source: IsDB, 2017)

Project:	New Healthcare Center Limesgracht
Principal:	Ministry of Public Heath
Project number:	MVG/ HSSP/RDG/1601
Financing:	IsDB/OFID
Applicant:	**Date:**

Summary

Code	Discription	Materials	Labor	Machnies	Transportion	P/R/O	Total
10	Insurance	-				-	-
15	Mobilization	-	-	-	-	-	-
20	Groundwork	-	-	-	-	-	-
25	Foundation	-	-	-	-	-	-
30	Ground floor: floors and beams	-	-	-	-	-	-
35 A	Ground floor: columns and walls	-	-	-	-	-	-
35 B	First floor: floor, beams, columns, stairs and walls	-	-	-	-	-	-
40	Ring beams and concrete gutter box	-	-	-	-	-	-
45	Roof construction, roofing, ee	-	-	-	-	-	-
50	Floor, wall and facade finishes	-	-	-	-	-	-
55	Drainage system	-	-	-	-	-	-
60	Windows and doors	-	-	-	-	-	-
65	Ceilings	-	-	-	-	-	-
70	Fixed inventory	-	-	-	-	-	-
75	Painting	-	-	-	-	-	-
80	Electrotechnical installations	-	-	-	-	-	-
85	Water and sanitary installations	-	-	-	-	-	-
90	Climate control installations	-	-	-	-	-	-
	Subtotal 1	-	-	-	-	-	-

Code	Reservation	Amount
S01	Structural work	
S02	Finishing work	
S03	Emergency stairs	
S04	Electrotechnical installations	
S05	Water and sanitary installations	
S06	Climate control installations	
S07	Ground works and fencing	
S08	Landscaping	
	Subtotal 2	*45.000,00*
	GRAND TOTAL **USD**	**45.000,00**

Procurement guidelines

1. The bidding language to be used is English
2. All prices must be in US$ currency
3. Cost reservations estimates must be included and will need to be added to the financial offer of the tenderer, to an amount of USD 45,000.00 which are reserved for the execution of the following components: Architectural construction; Electrical installations; Sanitary installations; Fixed assets (kitchen unit); Road works.
4. There will be no settlement for price changes of materials, raw materials, rent, freight etc.
5. Changes in currency exchange rates will not result in additional payment or refund.
6. In case of government measures, that result in price adjustments and other results, the contractor will submit a price correction request, which will be granted after assessment of reasonableness and fairness. Any settlements will be paid after the 1st delivery of the project.

The project manager has direct responsibility to ensure that all procurement activities and guidelines are met. He will provide oversight and management for all procurement activities under this project and review the procurement documents prior to approval.

Materials and Manufacturer brands

All materials offered for this project has to be eco-friendly and comply with green manufacturing/ harvesting methodologies or processes. If the designation of manufacturer brands as mentioned in the tender documents cannot be maintained, equivalent materials may be permitted. If equivalent material is offered, the contractor, upon request of the project manager, will present the specifications to

determine that the equivalent standards, in respect to what is stated in the tender documents is met, at the expense of the contractor. Prior to delivery of materials the contractor shall submit documentation describing all materials within the delivery, on which the project manager may designate approval/ disapproval and/ or comment.

Decision criteria

The criteria for the selection and award of the contract will be based on the following decision criteria:

1. Ability of the contractor to meet schedule deadlines
2. Use of eco-friendly materials
3. Use of green project management methodologies
4. Quality of materials
5. Cost
6. Past performance
7. Safety regulations

Payments

The payments will be made by the IsDB after the mandate of the invoice by the project manager. The currency of the construction contract and the claims are made in USD. At the commencement of the work, an invoice format shall be presented by the contractor in collaboration and with approval of the project manager, that entails all the work-related quantities, deliveries and to be executed work. It shall also include the payable prices that should match the original cost plan and day work schedule as best as possible.

4.10. Project Stakeholder management

Purpose

Project Stakeholder Management includes the processes required to identify the people, groups, or organizations that could impact or be impacted by the project, to analyze stakeholder expectations and their impact on the project, and to develop appropriate management strategies for effectively engaging stakeholders in project decisions and execution (Project Management Institute, 2013, p. 391). The Stakeholder Management Plan helps ensure that stakeholders are effectively involved throughout the lifecycle of the Project. Doing so helps to gain support for the project and to anticipate resistance, conflict, or competing objectives among the project's stakeholders.

4.10.1. Identify Stakeholders

Identify Stakeholders is the process of identifying the people, groups, or organizations that could impact or be impacted by a decision, activity, or outcome of the project, analyzing and documenting relevant information regarding their interests, involvement, interdependencies, influence, and potential impact on project success. The key benefit of this process is that it allows the project manager to identify the appropriate focus for each stakeholder or group of stakeholders (Project Management Institute, 2013, p. 393).

To develop an effective stakeholder management plan, the stakeholders need to be clearly identified. This is done by performing a stakeholder analysis in which potential stakeholders and important information are gathered, analyzed and documented. The Stakeholder Analysis Register captures information as; stakeholder or group name, description of the group, level of impact, current change readiness state, desired change readiness state, issues, opportunities, risks and the associated strategies and actions to address them.

Chart 30 Stakeholder Analysis Register (Source: created by author, 2018)

ID	NAME	DESCRIPTION	IMPACT	CURRENT STATE	DESIRED STATE	ISSUES, OPPORTUNITIES, RISKS	STRATEGIES AND ACTIONS
1	Ministry of Health of the Republic of Suriname	Decision maker	H	L	L	Risk: Scope change	Inform about costs and project delay, contracts
2	Regional Health Service Management	Decision maker and sponsor of project	H	L	L	Risk: Scope change	Inform about costs and project delay, contracts
3	Islamic Development Bank	Financial Entity	H	S	S	Issue: budget not available in a timely manner	Inform, keep updated on project progress
4	AAC Design & Consultancy	Architect	H	L	L	Risk: not enough expertise in green building techniques	Hire an expert in green building techniques to assist
5	Head Contractor	Contracted professional	H	S	S	Risk: Lack of concern, inefficient designs, poor workmanship	Checkpoints, external consultant to check work
6	Subcontractor Climate control installations	Contracted professional	H	S	S	Risk: Lack of concern, inefficient designs, poor workmanship	Checkpoints, external consultant to check work
7	Subcontractor Electro technical installations	Contracted professional	H	S	S	Risk: Lack of concern, inefficient designs, poor workmanship	Checkpoints, external consultant to check work
8	Subcontractor Data and Telephony installations	Contracted professional	H	S	S	Risk: Lack of concern, inefficient designs, poor workmanship	Checkpoints, external consultant to check work
9	Subcontractor Water installations	Contracted professional	H	S	S	Risk: Lack of concern, inefficient designs, poor workmanship	Checkpoints, external consultant to check work
10	Subcontractor windows and doors installations	Contracted professional	H	S	S	Risk: Lack of concern, inefficient designs, poor workmanship	Checkpoints, external consultant to check work
11	Subcontractor cctv, alarm and acs systems	Contracted professional	H	S	S	Risk: Lack of concern, inefficient designs, poor workmanship	Checkpoints, external consultant to check work
12	Suppliers	Technical expertise	H	S	S	Opportunity: work with new materials. Risk: delay in delivery	Delay payment clause in contract.
13	Healthcare professionals	Subject specific expertise	M	U	S	Opportunity: involvement in project, own the project where they will work	Presentations, surveys, keep updated
14	Community	People surrounding the project ground	L	U	N	Risk of resistance to activities	Inform, meetings and presentations

U	*= Unaware, has no information of the project*
R	*= Resistant, aware of project and resistant to the changes and impacts of it*
N	*= Neutral, aware of project but is neither supportive or resistant*
S	*= Supportive, aware of the project and supports the impacts and changes*
L	*= Leading, aware of the project and actively engaged to ensure success*

IMPACT	
H	*High*
M	*Medium*
L	*Low*

After the stakeholders are identified, they have to be categorized so that appropriate attention can be given to them according to the level of engagement. This will be done by using the Power/ Interest Grid Matrix. The Power/ Interest Grid Matrix analyses stakeholders in a visual manner to further establish stakeholders level of interest or concern and their ability to influence the project outcomes. An important outcome of this process is the identification of the most influential and most impacted stakeholders. The Power/Interest Grid Matrix is seen below.

POWER		
High	KEEP SATISFIED **Islamic Development Bank**	MANAGE CLOSELY **Ministry of Health of the Republic of Suriname** **Regional Health Service Management** **AAC Design & Consultancy** **Project Manager** **Head Contractor**
Low	MONITOR **Healthcare professionals** **Community**	KEEP INFORMED **Suppliers** **All Subcontractors**
	Low **INTEREST** *High*	

Figure 16 Power/ Interest Grid Matrix. Source: created by author and derived from the Project Management Body of Knowledge (p. 397), Project Management Institute, 2013.

4.10.2. Plan Stakeholder Management

Plan Stakeholder Management is the process of developing appropriate management strategies to effectively engage stakeholders throughout the project life cycle, 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 (Project Management Institute, 2013, p. 399).

The Project Manager of the new RGD Health center Limesgracht will be responsible person for engaging stakeholders throughout the lifecycle of the project. The stakeholder register will give him valuable information about the level of engagement required for each stakeholder, their impacts etc. The level of engagement will vary over the course of the project. In the beginning stages of the project, the level of engagement will be higher with key stakeholders. As the project progresses, the level of engagement will be lower. To ensure the correct level of engagement, the Stakeholders Engagement Matrix, as seen below, will be used.

Chart 31 Stakeholder Engagement Matrix (Source: created by author, 2018)

Stakeholder	Unaware	Resistant	Neutral	Supportive	Leading
Ministry of Health of Suriname					C D
Regional Health Service Management					C D
Islamic Development Bank				C D	
AAC Design & Consultancy					C D
Head Contractor				C D	
Subcontractors (ALL)				C D	
Suppliers				C D	
Healthcare professionals	C			D	
Community	C		D		

***C** indicates the current engagement*

***D** indicates the desired engagement*

Important is to keep track of all stakeholders and actively update the matrix if new information becomes available.

4.10.3. Manage Stakeholder Engagement

Manage Stakeholder Engagement is the process of communicating and working with stakeholders to meet their needs/expectations, address issues as they occur, and foster appropriate stakeholder engagement in project activities throughout the project life cycle. The key benefit of this process is that it allows the project

manager to increase support and minimize resistance from stakeholders, significantly increasing the chances to achieve project success (Project Management Institute, 2013, p. 404).

Managing stakeholder engagement helps to increase the probability of project success by ensuring that stakeholders clearly understand the project goals, objectives, benefits, and risks. This will be achieved by utilizing the identified strategies in the Stakeholders and the Communication Plan. For project success it is important that the relevant project information is passed to key stakeholders in a proactive and timely manner. Doing so, the project manager will have the ability to increase support and minimize stakeholder resistance throughout the life of the project. It is also mandatory for the project team to keep an Issue Log to collect, document and address concerns raised by stakeholders and to identify and provide solutions for stakeholder management risks that have materialized into issues.

4.10.4. Control Stakeholder Engagement

Control Stakeholder Engagement is the process of monitoring overall project stakeholder relationships and adjusting strategies and plans for engaging stakeholders. The key benefit of this process is that it will maintain or increase the efficiency and effectiveness of stakeholder engagement activities as the project evolves and its environment changes (Project Management Institute, 2013, p. 409).

Stakeholders are critical to the success of this project. The project team has to involve, engage and listen to all (key) stakeholders throughout the project lifecycle. This will be done by using information management systems to deliver status updates, project schedule updates and project performance to stakeholders. Also

as mentioned in the Communications Plan, the project team will have mechanisms to receive feedback from stakeholders by means of email, personal communication and meetings. Individual stakeholders will also be encouraged to participate and to voice questions and concerns.

5. CONCLUSIONS

1 This Project Management Plan was created to serve as a guide for the construction of the New RGD Health center Limesgracht project. The plan was created by using the analytical research method and the PMBOK Guide, 5th edition.

2 As part of Project Integration Management, a Project Charter was created to authorize the project and establish project boundaries. The Project Charter includes the objectives, initial scope statement, risks, deliverables, milestones and the costs. An important aspect of the Project Charter is the identification of the project manager and the sponsor's authorization for project to start.

3 The Scope Management Plan was created to define and specify the scope of the project. The Scope Management Plan includes all the work necessary to complete the project. Important aspects of it are the WBS and the WBS dictionary that were compiled by gathering information's during meetings with project stakeholders.

4 The Schedule Management Plan was developed to create the project schedule and to ensure the management of the project schedule throughout the project lifecycle. Aspects of the Schedule Management Plan are; the Activity List, Schedule Network Diagram and Project Gantt chart. It is the Project Managers responsibility to ensure that the project is completed within the identified timeframe.

5 The Cost Management Plan was created to set rules and guidance on managing to project budget. The objective of this plan is to ensure that the project is completed within the project budget, by describing cost management performance measures

6 The Quality Management Plan was developed to identify the project's quality management approach, requirements, assurance, control and the quality control measures that will be used throughout the project. This is important in order to ensure that products/ deliverables meet quality expectations.

7 The Human Resource Management Plan was created to identify all human resources required to complete the project. All identified human resources are classified based on their roles, responsibilities, qualifications and authorities. The plan also details how the human resources will be managed throughout the project lifecycle.

8 The Project Communications Plan was developed to identify and list all stakeholders with their roles and responsibilities and the most efficient and effective ways of communication throughout the project lifecycle, ensuring that information is delivered at the right time, by the right medium, to the right people.

9 The Risk Management Plan was created to identify, describe and classify project risks, so that effective risk responses could be planned and managed. A Risk Register was developed to capture the information, the resources responsible and the needed actions.

10 The Procurement Management Plan was developed to identify the project's procurement management approach, types of contracts used and contract approval process. The plan also details how to manage and deal with procurement issues.

11 The Stakeholder Management Plan was created to identify and classify project stakeholders. The plan describes how to manage and engage them actively throughout the project lifecycle. The Stakeholder Register was developed to provide more information for effective engagement.

6. RECOMMENDATIONS

5. The RGD should adapt the PMBOK methodology as guide for the development of all project management documents/ plans. The development of project management plan should be mandatory for all projects.

6. The RGD should train and certify key persons in PMBOK methodology, to increase the likelihood of project success.

7. The RGD should set up a project management team to plan and manage all construction projects. This team must conduct all project activities during the project lifecycle.

8. The RGD should use and adapt more sustainable materials and or products in future projects.

9. The RGD should develop a database for best practices and lessons learned in project management as a reference for future projects.

10. The RGD should make more effort to integrate sustainable principles and methodologies in future construction projects.

11. The RGD should consider the use of all the documents and templates created during the development of the Project Management Plan for the Construction of the New RGD Health center Limesgracht, as the basis for future construction projects.

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8. APPENDICES

8.1.1. Appendix 1: FGP Charter

PROJECT CHARTER	
Date	**Project Name:**
June 27th, 2017	Project Management Plan for new RGD Healthcenter Limesgracht
Knowledge Areas / Processes	**Applicacion Area (Sector / Activity)**
Knowledge areas: Project Integration Management Project Scope Management Project Time Management Project Cost Management Project Quality Management Project Human Resource Management Project Communication Management Project Risk Management Project Procurement Management Project Stakeholder Management **Process groups:** Initiation Planning Executing Monitoring & Controlling Closing	Healthcare - Construction
Start date	**Finish date**
June 27th, 2017	December 22th, 2017
Project Objectives (general and specific)	
General objective: To develop a Project Management Plan for the construction of the new RGD Healthcenter Limesgracht. This document will define the approach used to manage, control and deliver the intended project management scope. Specific objectives: 1. To develop a project charter that authorizes the project. 2. To create a scope management plan to manage the scope and required works.	

3. To create a time management plan to manage the project schedule, to ensure the project is completed within the allowed time frame
4. To develop a cost management plan to manage the project budget.
5. To create a quality management plan to identify the quality requirements and expectations for the project.
6. To develop a human resource management plan to identify and manage all required human resources.
7. To create a communication management plan to ensure effective communication and sharing of information.
8. To create a risk management plan to identify and examine risks and how to minimize it.
9. To create a procurement management plan to serve as guideline on how to obtain products and services.

Assumptions

1. It is assumed that the project can be completed in 5.5 months
2. It is assumed that the Facilitator will provide expert judgement on time

Constraints

Time: 5.5 months.

Resources: 1 person

Preliminary risks

1. If internet connections fails, the student will miss the assignment submission deadline
2. If submissions are late, the student will not get the required grades
3. If feedback isn't received on time from the facilitators, the student can miss the submission deadline

Budget

The project is estimated to cost US$ 100,00

Milestones and dates

Milestone	Start date	End date
Graduation Seminar	June, 26th 2017	July, 28th 2017
Tutoring Process	July, 31st 2017	October, 27th 2017
Reading by Reviewers	October, 30th 2017	November, 17th 2017
Adjustments	November, 20th 2017	December, 15th 2017
Presentation to Board of Examiners	December, 18th 2017	December, 22nd 2017

10. To create a stakeholder management plan to identify all the project stakeholders and how to manage them.

Project purpose or justification (merit and expected results)

The research will seek to develop a Project Management Plan for the construction of the New RGD Healthcenter Limesgracht. The Project Management Plan will help the RGD to complete the construction process within time, budget and available resources. All the documents in the Project Management Plan can be used by the projectmanagement team during the project management processes, to effectively manage the project.
Some of the expected benefits will be;

1. Project will be completed within the available timeframe
2. Resources availabilty will be managed efficiently
3. Better control of quality of products and resources
4. Project will be completed within budget
5. Better anticipation on risks

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

1. Document with the proposed Scope Management Plan
2. Document with the proposed Time Management Plan
3. Document with the proposed Cost Management Plan
4. Document with the proposed Quality Management Plan
5. Document with the proposed Human Resource Management Plan
6. Document with the proposed Communication Management Plan
7. Document with the proposed Risk Management Plan
8. Document with the proposed Procurement Management Plan
9. Document with the proposed Stakeholder Management Plan

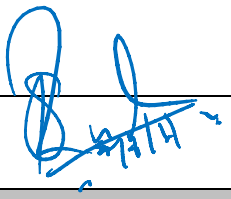
Relevant historical information

The Regional Health Service (RGD) is a semi-government organization responsible for primary healthcare in the coastel area of Suriname. With more than 50 facilities in the coastel area, it's the largest organization in it's category. It employs 700+ persons.
The company has experience in managing construction projects.

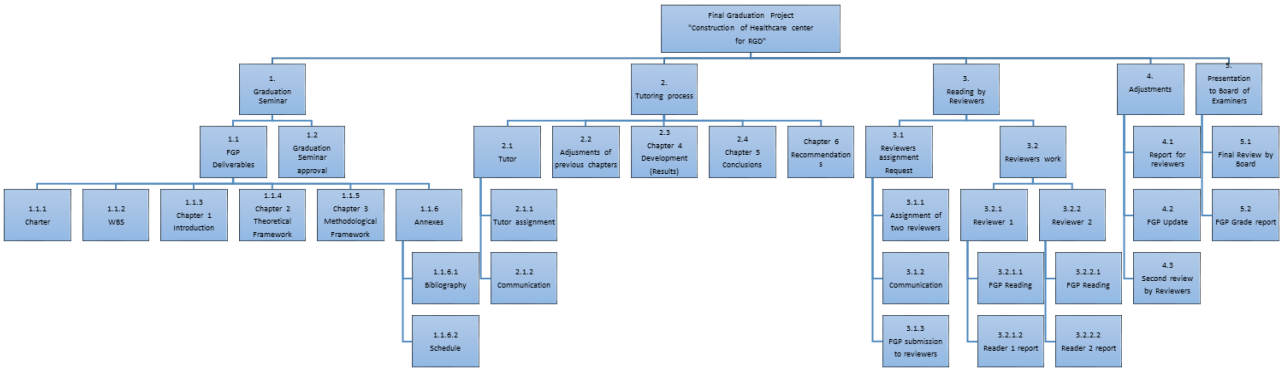
Stakeholders

Direct stakeholders:
Global School Of Project Management
Mr Brenes Carlos - Lecturer
Management of Regional Health Service (RGD)
Project Manager

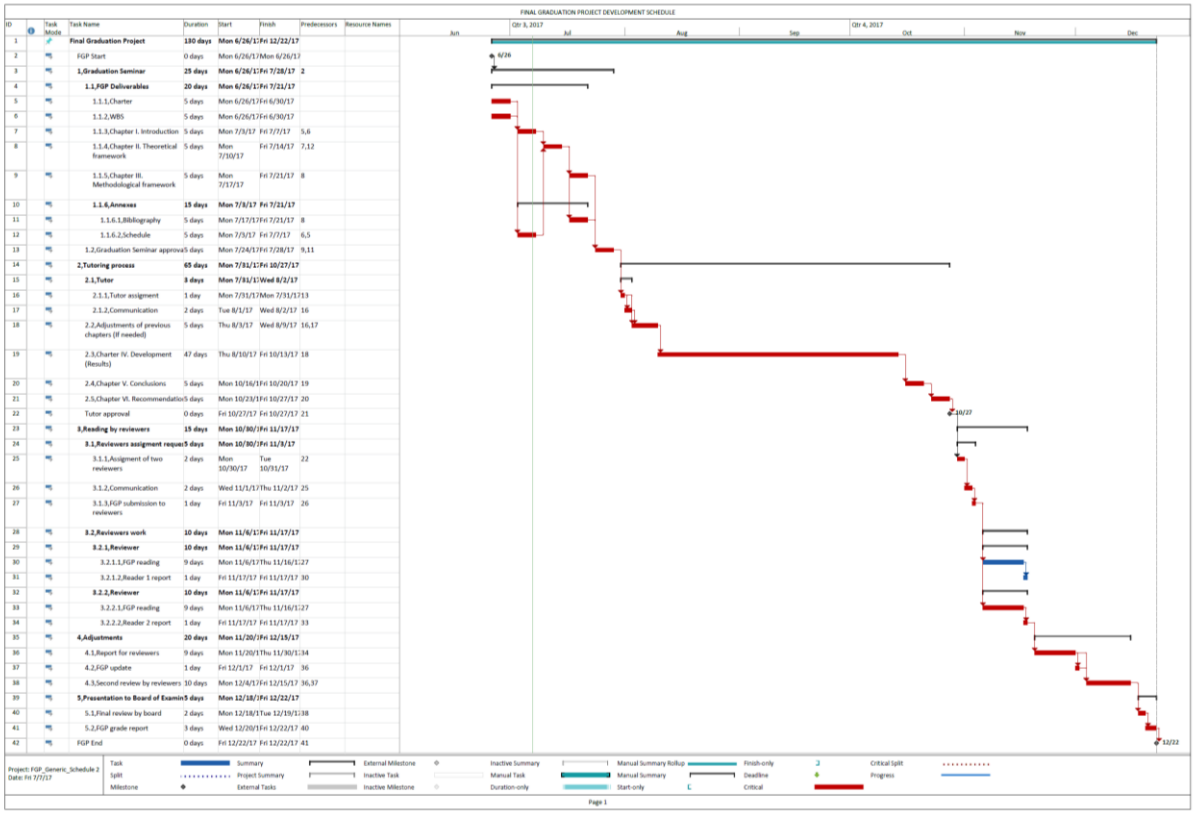
Indirect stakeholders:
Friends and family
Academic assistant

Project Manager: Ramadhin S.	**Signature:** 
Authorized by:	**Signature:**

8.1.2. Appendix 2: FGP WBS



8.1.3. Appendix 3: FGP Schedule



8.1.4. Appendix 4: Philologist Certificate of Review

Ministry of Education and Community Development and Science

INSTITUUT VOOR DE OPLEIDING VAN LERAREN (IOL)

**TEACHERS TRAINING INSTITUTE,
DEPARTMENT OF ENGLISH**

University Campus, Leysweg / Tel.nr.: (597)-530637*437788*437805*/ Fax.nr.: (597)437796 /
Email: secriol@gmail.com

CERTIFICATE OF ENGLISH LANGUAGE REVIEW

To whom it may concern:

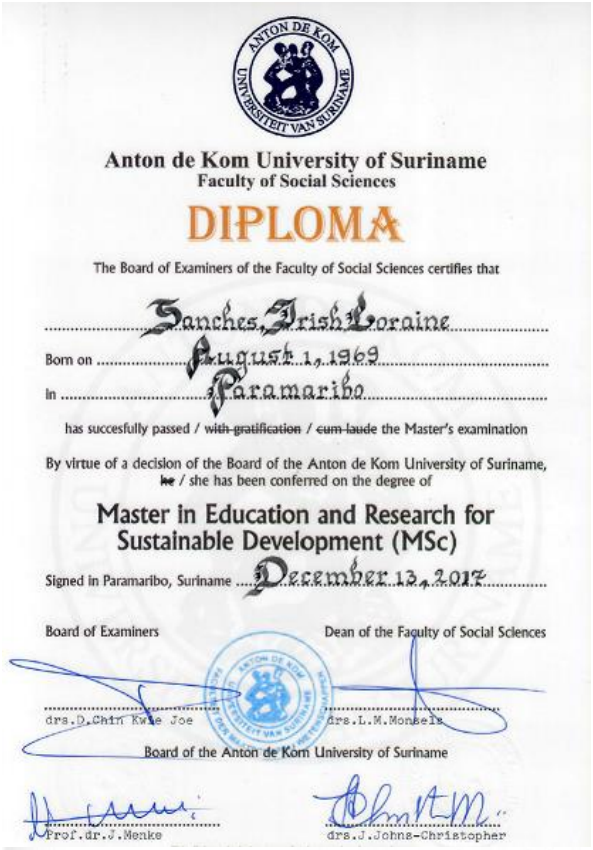
With regard to the linguistic review of the Final Graduation Project (FGP) submitted by RAMADHIN SOERDJDEW PREWIEN in partial fulfillment for the Masters in Project Management (MPM) Degree from the Universidad para la Cooperation Internacional (UCI), I hereby confirm that I have worked closely with Ramadhin Soerdjdew Prewien for the purpose of reviewing and editing the FGP and that he has made all the necessary changes and edits to the document (spelling, grammar, punctuation, and other mechanics of the English Language) as I have advised. In my professional estimation, the document meets the linguistic and stylistic standards expected for a student reading for a degree at Masters level.

I am a lecturer and tutor at the English Department of the Teachers Training Institute, known in Suriname as the INSTITUUT VOOR DE OPLEIDING VAN LERAREN (IOL) in the Dutch language and I have obtained my first and second teaching degree in the English Language at the said Educational Institute; after that I pursued a MSc degree at the A.de Kom University of Suriname in the English course MERSD (Master of Education, Research in Sustainable Development).

Paramaribo, 9 May 2018

Ms. Irish Sanches, MSc.
Lecturer and Tutor at the IOL,
Paramaribo.

8.1.5. Appendix 5: Philologist Qualification



Anton de Kom University of Suriname
Faculty of Social Sciences

DIPLOMA

The Board of Examiners of the Faculty of Social Sciences certifies that

Sanches, Irish Loraine

Born on August 1, 1969

In Paramaribo

has succesfully passed / ~~with gratification~~ / ~~cum laude~~ the Master's examination

By virtue of a decision of the Board of the Anton de Kom University of Suriname, ~~he~~ / she has been conferred on the degree of

Master in Education and Research for Sustainable Development (MSc)

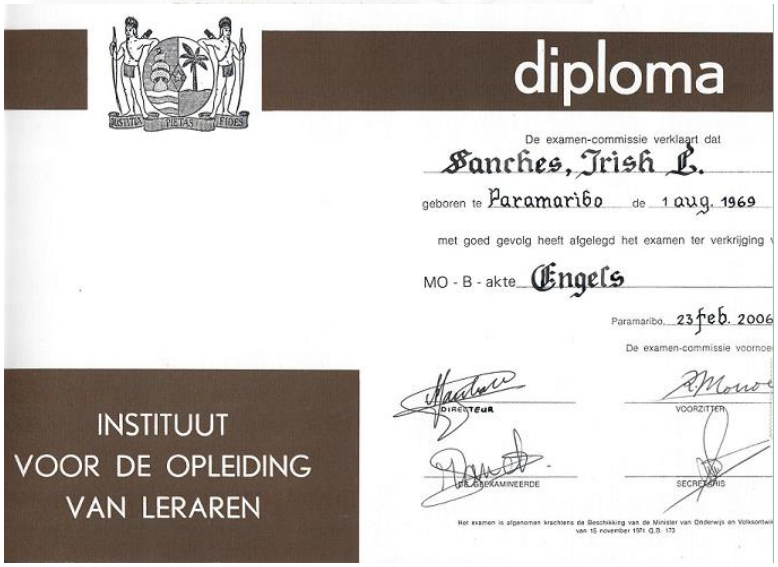
Signed in Paramaribo, Suriname December 13, 2017

Board of Examiners — Dean of the Faculty of Social Sciences

drs.D.Chin Kwie Joe — drs.L.M.Monsels

Board of the Anton de Kom University of Suriname

Prof.dr.J.Menke — drs.J.Johns-Christopher



diploma

De examen-commissie verklaart dat

Sanches, Irish L.

geboren te Paramaribo de 1 aug. 1969

met goed gevolg heeft afgelegd het examen ter verkrijging

MO - B - akte Engels

Paramaribo, 23 feb. 2006

De examen-commissie voornoe

DIRECTEUR — VOORZITTER

DE EXAMINEERDE — SECRETARIS

Het examen is afgenomen krachtens de Beschikking van de Minister van Onderwijs en Volksontwi
van 15 november 1951, G.B. 173

INSTITUUT VOOR DE OPLEIDING VAN LERAREN