UNIVERSIDAD PARA LA COOPERACION INTERNACIONAL
(UCI)

Project Management Plan for the West Coast Road Rehabilitation Project in St. Lucia

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

Castries, Saint Lucia

October 21, 2019

UNIVERSIDAD PARA LA COOPERACION INTERNACIONAL
(UCI)

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

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DEDICATION

This Final Graduation Project for the Masters in Project Management is dedicated to my children Aiden and Arianne who continuously to provide every reason for me to strive for excellence and to my mother, Marie Providence who has always been a pillar of support and encouragement.

ACKNOWLEDGMENTS

Thank you to the following individuals who provided immeasurable assistance to me during the course of this Final Graduation Project. I am indeed thankful to Mr. Amos Hippolyte, Ms. Ulanda Antoine, Mr. Jn Baptiste and the remaining supporting staff of the Ministry of Infrastructure, Ports Energy and Labour. A special thank you to Ms. Perle Alcindor, Economist within the Department of Economic Development who provided useful insight and guidance during this process.

I would also like to thank Mr. Carlos Brenes for his patience and advice during this tutorship process and also Ms. Lydia Joseph and Mrs. Christella Duplessis-Sutherland who assisted in editing and providing recommendations regarding this FGP.

A special thank you to the Almighty for providing me with this opportunity to pursue a Master's degree and giving me the grace and strength to persevere despite the odds. For without him, this would all not be possible.

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ABBREVIATIONS AND ACRONYMS

AASHTO	American Association of State Highway and Transport Officials
CCB	Change Control Board
CDB	Caribbean Development Bank
CTB	Central Tenders Board
DFID	Department for International Development of the Government of the UK
EOI	Expression of Interest
GOSL	Government of St. Lucia
MIPEL	Ministry of Infrastructure, Ports, Energy and Labour
RACI	Responsibility, Accountability, Consult, Informed Matrix
RFP	Request for Proposal
UKCIF	United Kingdom Caribbean Infrastructure Partnership Fund
WCRR	West Coast Road Rehabilitation
WBS	Work breakdown structure

EXECUTIVE SUMMARY (ABSTRACT)

Road Infrastructure maintenance is fundamental for the national development of Saint Lucia and consequently, the Government of Saint Lucia (GOSL) is fully aware of the relevance of the road network and its proper and efficient functionality to underpin economic growth for the benefit of all citizens. Proper road maintenance is crucial as it facilitates access to employment, social, health and education services which also enables the connectivity of essential goods and services, leading to the stimulation of economic and social development. For this reason, road infrastructure is considered to be the most important of all public assets in St. Lucia.

The West Coast Road is located on the West Coast of the Island with the project limits extending from Roseau to the North and Colombette to the South. It is a two-lane highway that serves as a major commercial corridor between Soufriere and Cul de Sac and provides access to key areas along the West Coast. The project will be undertaken by the Government of St. Lucia through the Ministry of Infrastructure, Ports, Energy and Labour (MIPEL). Strategic maintenance is therefore critical to preserve and extend the life of this vital road infrastructure to alleviate negative social and economic implications.

As a small island developing state currently operating a fiscal deficit, the island of St. Lucia needs to maximize and ensure that value for money is derived from grant funding received from the United Kingdom to improve the road infrastructure network in St. Lucia. Where the grant funding facility is inadequate to meet the obligation of the project, a loan will be obtained from the Caribbean Development Bank (CDB). The project will bring the following benefits inter alia, to the people of St. Lucia; improved accessibility within the road network, employment generated during construction, improvement in the quality of life of the residents, improvement in the motorability of the roads, stabilized road slopes and decreased erosion, reduced operating cost to vehicle owners and overall improved infrastructure.

In order to maximize these benefits the general objective of this Final Graduation Project is to develop a Project Management Plan based on the best practices of the Project Management Institute (PMI) used to manage the West Coast Road Project and to improve road infrastructure for the benefit of all citizens. The specific objectives of this plan are to develop a Project Charter which officially marks the commencement of the Project Management Plan for the West Coast Road Rehabilitation project; to integrate all project management activities within the project management process groups through project integration management; to construct a scope management plan which ensures that the project scope is well defined, developed, monitored and controlled; to create a schedule/ time management plan to ensure that the project is completed within the established time frame; to develop a cost management plan to ensure that the project remains within budget; to develop a quality management plan which includes planning, managing and controlling

quality requirements in order to ensure that the project meets quality standards and project objectives; to develop a resource management plan to identify, acquire and manage resources needed for the project; to develop a communications management plan to ensure that timely and appropriate means of communication are adhered to so that project deliverables are met; to develop a risk management plan for the accurate identification, monitoring and analysis of all possible risk factors which may impact the project; to create a stakeholder management plan to ensure that all stakeholders are accurately identified and categorized; To develop a procurement strategy which would be used to plan, conduct and control procurements for the West Coast Road Rehabilitation Project.

The methodology used for the research was analytical. The Project Management Body of Knowledge (PMBOK® Guide) 6th edition served as the primary theoretical source for the development of the FGP. Meetings were held with key personnel from the Ministry of Infrastructure, Ports Energy and Labour which included the Capital Economist, the Project Manager and the Chief Civil Engineer. This resulted in the creation of the subsidiary plans used to develop the Project Management Plan for the West Coast Road Rehabilitation Project. The Project Management Plan, developed using the PMBOK® Guide 6th Edition provided a methodological framework needed for the MIPEL to ensure that a project as vital as the road infrastructural network would be executed in a manner to maximize all efficiencies and govern the overall successful management of the West Coast Road Rehabilitation Project.

It is recommended that MIPEL utilize the processes and tools and templates as developed by the FGP as part of their planning process and ensure that all aspects of the project are planned precisely and adhered to for each component of the project management knowledge areas. There should be greater investments geared towards adopting the best Project Management practices during all projects conducted by MIPEL. This will ensure more efficient management of the projects delivered and will bring value to the projects deliverered and to road users and residents of St. Lucia. There should exist an information system and document management system to ensure that project information are electronically stored and archived and readily available for referrals. The work of the department is heavily centered around the delivery of road projects. Therefore information management systems would lead to greater efficiencies and the ability to retrieve pertinent information in an organized manner.

1. INTRODUCTION

1.1. Background

Saint Lucia is a small island developing state with constricted fiscal space which hinders the responsiveness of Government to the mounting demands for infrastructural development. As part of the overall strategy to support the development goals of the Caribbean region, the Government of the United Kingdom, through the Department for International Development (DFID), has provided a £300 million grant financing to eight Caribbean countries eligible for Overseas Development Assistance to build economic infrastructure in the Caribbean. The fund is designed to "provide critical infrastructure which will lay the foundation for growth and prosperity, poverty reduction and increased resilience to climate change in the Caribbean".

For years now, there has been no major reconstruction and rehabilitation work conducted on the West Coast Road due to lack of available funding by the government. As a result, the roads have deteriorated considerably and restoration works need to be undertaken to preserve and improve commuting, connectivity and the distribution of essential goods and services.

The grant facility provided by the Government of the United Kingdom will be utilized to upgrade the West Coast Road. In an effort to fully maximize the benefits of the grant, a technical assistance facility and loan assistance was secured from the Caribbean Development Bank. The Ministry of Infrastructure, Ports, Energy and Labour has therefore embarked upon a strategic initiative to upgrade the West Coast Road in St. Lucia.

The key mandate of the Ministry of Infrastructure Ports, Energy and labour is "To be a Flagship Ministry crucial to the achievement of infrastructural and National

Development, creating an environment that fosters sustainable, social and economic growth of Saint Lucia through the development of a superior road and transportation network." Given the fiscal deficit which the country is now burdened with and the daunting history of projects which have been unsuccessful due to poor project management practices, it is imperative that a project management plan be developed for the upgrading of the West Coast Road Project to ensure that the project meets all requirements including scope, quality, schedule and budget constraints to fully benefit the people of St. Lucia.

1.2. Statement of the problem

At the Ministry of Infrastructure, there is a dedicated team of civil engineers and a technical team who are competent in successfully delivering an upgrade project such as the West Coast Road Rehabilitation project. However, the Ministry lacks the key competencies needed to develop a project management approach to meet the objectives of the project. As a result of the large investment by the UK Government to upgrade the road and the dire need to do so in the most efficient manner, it is crucial that a Project management plan be developed. This project management plan will provide the framework for the successful upgrade of the West Coast Road.

1.3 Purpose

The Government of St. Lucia through the Ministry of Infrastructure, Ports Energy and Labour is responsible for the construction and upgrading of roads on the island. Projects undertaken by the Government have been synonymous with either exceeding the intended budget, going beyond the intended schedule and not meeting the baseline quality requirements. The purpose of this project is to ensure that the successful upgrading of the road network delivers value to all citizens of St. Lucia. Connectivity and proper road conditions sets the foundation which are necessary to facilitate commuting of residents, distribution of essential goods and

services and infrastructural development which leads to numerous economic benefits across various sectors. The Project Management Plan will detail all critical components of the project by expounding thoroughly all subsidiary plans which will be developed for the project. This Project Management plan for the upgrade of the West Coast Road will explore the Project Management Institute's (PMI) best practices to create a Project Management Plan to ensure that the project is successful based on all the underlying project management knowledge areas.

1.4 General Objective

To develop a Project Management Plan based on best practices of the Project Management Institue (PMI) to manage the upgrading of the West Coast Road Rehabilitation Project to improve road infrastructure for the benefit of all citizens in St. Lucia.

1.5 Specific Objectives

- To develop a project charter which officially marks the commencement of the Project Management Plan for the upgrading of the West Coast Road Rehabilitation project.
- To construct a scope management plan which ensures that the project scope is well defined, developed, monitored and controlled.
- To create a schedule/ time management plan to ensure that planning the upgrading of the road network is done within the established time frame.
- To develop a cost management plan to ensure that the project remains within budget.
- To develop a quality management plan which includes planning, mangaging and controlling quality requirements to ensure that the project meets quality standards and project objectives.
- To develop a resource management plan to identify, acquire and manage the resources needed for the project.

- To develop a communications management plan to ensure that timely and appropriate means of communication are adhered to in order to meet project deliverables.
- To develop a risk management plan for the accurate identification, monitoring and analysis of all possible risk factors which may impact the project.
- To create a stakeholder management plan to ensure that all stakeholders are accurately identified and categorized.
- To develop a procurement strategy which would be used to plan, conduct and control procurements for the upgrading of the West Coast Road Rehabilitation Project.

2. THEORETICAL FRAMEWORK

2.1 Company/Enterprise framework

2.1.1 Company/Enterprise background

The Ministry of Infrastructure, Ports Energy and Labour has the mandate to oversee the development and maintenance of the island's road infrastructure network. This consists of all maintenances of roads classified as national, secondary, collector, and residential roads. The Ministry is also tasked with the responsibility to maintain and construct bridges, culverts, drainage systems and slope stabilization measures aimed at achieving comprehensive road infrastructural maintenance. The execution of the West Coast Road upgrading Project contributes to the realization of the Department's vision to be "a flagship Ministry critical to the achievement of infrastructural and national development." The infrastructural programmes of the Department are guided by the strategic priorities of obtaining motorable roads, enhancing road safety and creating resilient infrastructure.

2.1.2 Mission and Vision statements

Mission: The mission of the Ministry of Infrastructure is to create an environment that fosters sustainable, social and economic growth of Saint Lucia through the development of a superior road and transportation network, advanced global communication services, exceptional public utility services, vigilant and well-equipped meteorological services; and a dynamic regulatory framework that fulfills the diverse needs of our customers and stakeholders with a cadre of professional employees.

Vision: To be a flagship Ministry critical to the achievement of infrastructural and national development.

The vision and mission of the Ministry as defined above fully supports the objectives which the rehabilitation of the West Coast Road intends to achieve for the benefit of the people of St. Lucia. The Ministry serves as the driving force, which directs all road infrastructural developments on island and as such plays a fundamental role in achieving national development objectives through the ability to penetrate various sectors by providing a superior road network.

2.1.3 Organizational structure

The Ministry of Infrastructure, Ports, Energy and Labour is headed by the Honourable Minister Stephenson King and consists of a Permanent Secretary and two deputy Permanent Secretaries. The unit consists of an Administrative Department and a Finance and Budgeting Department with seven subsidiary departments namely:

- The IT Communications Unit
- Public Utilities Department
- Technical Services Department
- Electrical Services Department
- Meteorological Services Department
- Accounts Department
- Energy Unit

The Technical Services Department, Electrical Services Department, Meteorological Services Department and Energy Unit are further divided in sub-units as follows:

Technical Services Department

- Project Planning and Design
- Road Construction and Maintenance
- Public Buildings and Grounds
- Laboratory Services
- Mechanical Workshop
- SPU/GIS/RMMS

Electrical Services Department

- Electrical Designs and Planning
- Electrical Services and Maintenance
- Licensing and Inspection

Metrological Services Department

- Climate Data Management
- Weather Forecast

Energy Unit

- Renewable Energy

The Organizational Structure for the Ministry of Infrastructure, Ports, Energy and Labour is depicted in Figure 1 below:

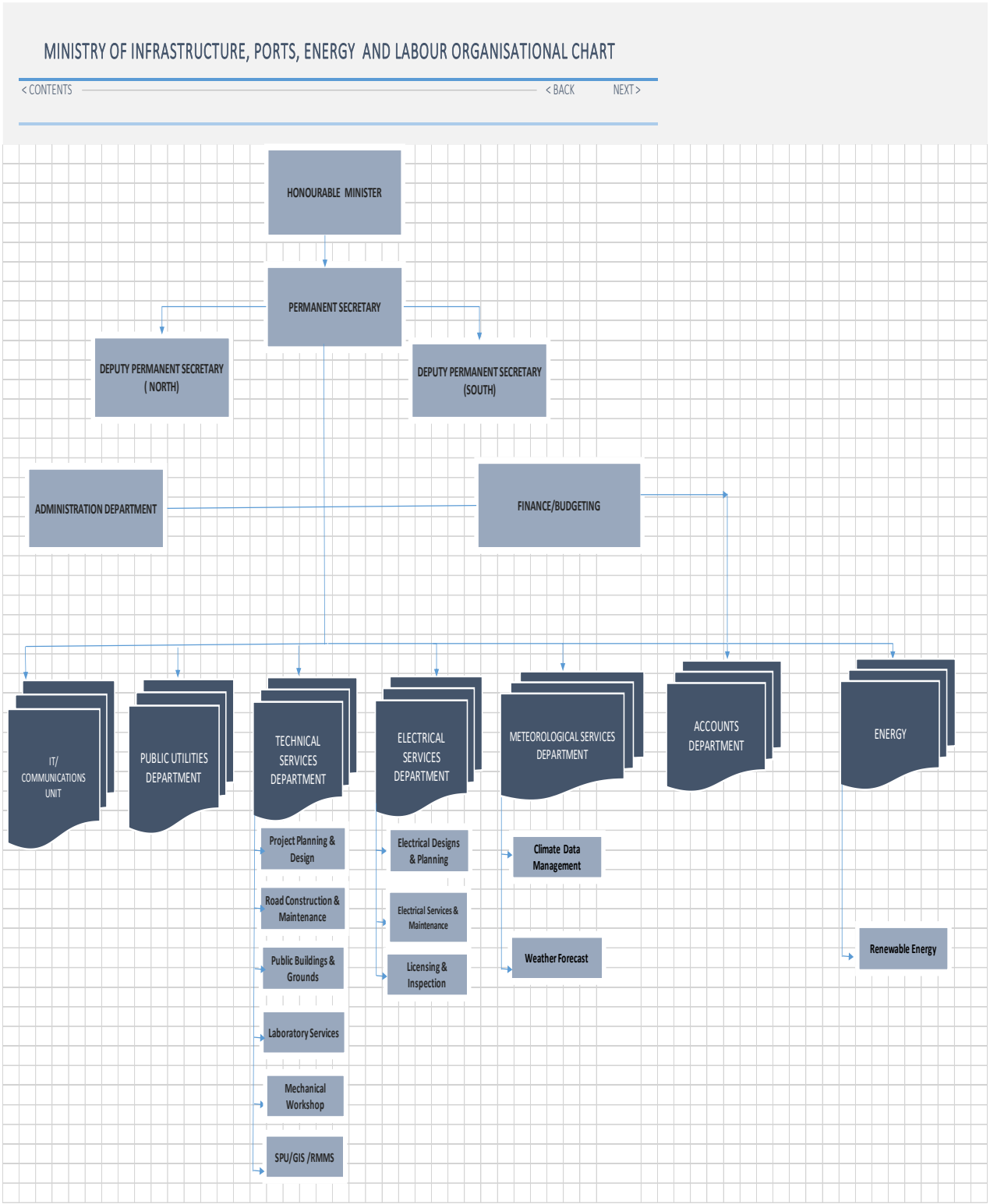


Figure 1: Organizational structure (Source: Department of Infrastructure)

2.1.4 Products offered

The Ministry of Infrastructure, Ports, Energy and Labour is responsible for facilitating the construction and maintenance of roads, construction of bridges, culverts, drainage systems and slope stabilization measures across the island. The West Coast Road Rehabilitation project falls within these portfolio of services, which are offered for the benefit of infrastructural socio-economic benefits to the citizenry. In addition to this, the Ministry also provides laboratory services, engineering surveys, contract management and procurement, feasibility studies and designs services. Electrical certification and inspection are also services which can be sought from the Ministry. Meteorological services are also provided to the public, which encompasses Climate Data Management and weather forecasting services to the people of St. Lucia.

2.2 Project Management concepts

2.2.1 Project

A project is a temporary undertaking to create a definitive product, service or result. It must have a start and end date (PMBOK®Guide, 6th edition). Projects are undertaken to fulfill objectives by producing deliverables. A deliverable is defined as a unique and verifiable product, result or capacity to perform a service that is required to be produced to complete a process, phase or project. (PMBOK®Guide, 6th edition). For the purpose of this research project, a Project Management plan will be developed for the Rehabilitation of the West Coast Road Project in St. Lucia.

2.2.2 Project Management

Project management involves the planning and organization of a company's resources to move a specific task, event, or duty towards completion. It can involve a one-time project or an ongoing activity, and the resources managed include personnel, finances,

technology, and intellectual property. From start to finish, every project needs a plan that outlines how things will get off the ground, how they will be built and how they will finish. Project management is the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements. (PMBOK®Guide, 6th edition).

The Prince 2 methodology is another common Project Management methodology which is predominatly utilized in the United Kingdom. Prince 2 is often considered to be a prescriptive methodology in that it describes what should be accomplished, who should complete the task and the identified time frame in which it must be done to achieve the project outcomes. It is defined as Projects in Controlled Environments and entails a process based methodology. PMI methodology however contains a more comprehensive overview of the best practices which are applicable for projects. This includes a combination of skills, tools and techniques that can enhance the success of projects. This comprehensive analysis that PMI Knowledge areas utilize encapsulates the underlying themes of Prince 2. PMI also entails Procurement Management which is not an aspect found in the Prince 2 methodology. PMBOK® Guide provides a comprehensive range of tools and techniques to be utilized and thus was selected as the preferred methodology to be utilized for the development of this FGP.

2.2.3 Project life cycle

A project life cycle is the series of phases that a project passes through from its initiation to its closure (PMBOK®Guide, 6th edition). Although projects are unique and highly unpredictable, their standard framework consists of the same generic lifecycle structure, consisting of the following phases:

- The Initiation Phase
- The Planning Phase
- The Execution Phase
- Monitoring and Controlling Phase

- The Closing Phase

Figure 2: Project Management Process Groups (Source: Project Cubicle)

The roadmap for Project Delivery typically consists of the following process within the MIPEL.

1. Problem Assessment and Project Financing Technical Assistance- This includes the engagement of suitable funding agencies to secure project funds.

2. Procurement- A series of activities to acquire the resources for the project.

3. Feasibility- The activities which are used to determine the technical and financial viability of the project.

4. Project Appraisal and Financing for Civil Works- An assessment of the viability of the project for funding. Financing will be arranged for the viable projects.

5. Construction-The execution of project activities to achieve the product of the project.

6. Project Closure

2.2.4 Project Management Processes

For the upgrading of the West Coast Road Rehabilitation Project the processes to be used will be the initiating and planning phases of the Project Management process. The result of this will be the Project Management Plan, which will include all subsidiary plans containing individual plans for all project management knowledge areas.

2.2.5 Project management knowledge areas

A project management knowledge area is an identified area of project management defined by its knowledge requirements and described in terms of its component processes, practices, inputs, outputs, tools and techniques. The ten knowledge areas of project management will be used during the FGP for the Project Management Plan for the West Coast Road Project.

The ten knowledge areas of project management (Project Management Institute, 2016), are as follows:

1. Integration management

2. Scope management

3. Time management

4. Cost management

5. Quality management
6. Human Resources management
7. Communication management
8. Risk management
9. Procurement management
10. Stakeholder management

Project Integration Management defines the processes and activities that integrate the various elements of project management. This includes activities which identify, define, combine, unify and coordinates the various processes within the project management process groups. This includes:

- Develop Project Charter
- Develop Project Management Plan
- Direct and Manage Project Execution
- Monitor and Control Project Work
- Perform Integrated Change Control
- Close Project or Phase.

Project Scope Management is the knowledge area during the Project management process, which ensures that the project includes all the work required, and only the work required, to complete the project successfully.

- Collect Requirements
- Define Scope
- Create WBS
- Verify Scope
- Control Scope.

Project Schedule/Time Management focuses on the processes that are used to help ensure the timely completion of the project. This includes:

- Define Activities
- Sequence Activities
- Estimate Activity Resources
- Estimate Activity Durations
- Develop Schedule
- Control Schedule.

Project Cost Management describes the processes involved in planning, estimating, budgeting, and controlling costs so that the project can be completed within the approved budget. This includes:

- Estimate Costs
- Determine Budget
- Control Cost.

Project Quality Management describes the processes involved in planning for, monitoring, controlling, and assuring the quality requirements of the project are achieved in order to meet all stakeholder expectations. This chapter includes:

- Plan Quality
- Perform Quality Assurance
- Perform Quality Control.

Project Human Resource Management describes the processes involved in the planning, acquisition, development, and management of the project team. This includes:

- Develop Human Resource Plan
- Acquire Project Team
- Develop Project Team

- Manage Project Team.

Project Communications Management identifies the processes involved in ensuring timely and appropriate generation, collection, dissemination, storage and ultimate disposition of project information. This includes:

- Identify Stakeholders
- Plan Communications
- Distribute Information
- Manage Stakeholders Expectations
- Report Performance.

Project Risk Management describes the processes involved with identifying, analyzing, and controlling risks for the project. This includes:

- Plan Risk Management
- Identify Risks
- Perform Qualitative Risk Analysis
- Perform Quantitative Risk Analysis
- Plan Risk Responses
- Monitor and Control Risks.

Project Procurement Management describes the processes involved with purchasing or acquiring products, services or results for the projects. This includes:

- Plan Procurements
- Conduct Procurements
- Administer Procurements
- Close Procurements.

Project Stakeholder Management describes the processes used to identify the people, groups or organizations that could impact or be impacted by the project. It requires

analyzing stakeholder expectations and their impact on the project and to develop appropriate management strategies for effectively engaging stakeholders throughout the project management life cycle. The process includes the following:

- Identify Stakeholders
- Plan stakeholder management
- Manage stakeholder engagement
- Control stakeholder engagement

The diagram below provides a summarized overview of the Project Management Knowledge areas and their process groups.

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

Figure 3: Project Management Process Groups (Retrieved from: A Guide to the Project Management Book of Knowledge (PMBOK®Guide 2016)

3. METHODOLOGICAL FRAMEWORK

3.1 Information sources

According to the oxford dictionary, information is described as “Facts provided or learned by something or someone.” A source as described by the oxford dictionary is “ A place, person, or thing from which something originates or can be obtained. This therefore means that an information source is an avenue which is used to obtain details, facts and knowledge for a particular purpose.”

Information can be obtained from numerous sources. There are several methodologies which can be used to obtain information. Particularly in the emerging advent of technology and innovation, the ease of obtaining information has become convenient and much of a less tedious task. Common methods of obtaining information are through literature searches, talking with people through focus groups, personal interviews and conducting surveys. The types of information sources can be grouped into three categories namely Primary, Secondary and Tertiary. For the purpose of this FGP all three of the above named sources will be utilized.

3.1.1 Primary sources

Primary sources of information provide direct or firsthand evidence about an event, object, person, or work of art (Oxford Dictionary). Primary sources include historical and legal documents, eyewitness accounts, and results of experiments, statistical data, pieces of creative writing, audio and video recordings, speeches, and art objects. Interviews, surveys, fieldwork, and internet communications via email, blogs, and newsgroups are also primary sources. In this FGP the primary sources of information used are interviews with members of staff at the Ministry of

Infrastructure, email communications, meetings and reports prepared by the department.

3.1.2 Secondary sources

A secondary source is one that gives information about a primary source. In utilizing secondary sources, the original information is selected, modified and arranged in a suitable format. Secondary sources involve generalization, analysis, interpretation, or evaluation of the original information. A secondary source contrasts with a primary source, which is an original source of the information being discussed; a primary source can be a person with direct knowledge of a situation, or a document created by such a person. (Oxford Dictionary)

For the compilation of the FGP, the secondary sources used in the project are depicted in the following table below:

Chart 1 Information sources (Source: A Providence, Author, June 2019)

Objectives	Information sources	
	Primary	Secondary
To develop a project Charter which officially marks the commencement of the Project Management Plan for the upgrading of the West Coast Road Rehabilitation project.	Personal meeting with Senior Capital Economist for the Ministry of Infrastructure, Ports, Energy and Labour	PMBOK®Guide, the Internet, Government of St. Lucia Website
To construct a scope management plan which ensures that the project	Personal meeting with Senior Capital Economist for the	PMBOK®Guide, Internet, PMI Database

scope is well defined, developed, monitored and controlled.	Ministry of Infrastructure, Ports, Energy and Labour	
To create a schedule/ time management plan to ensure that planning the upgrading of the road network is done within the established time frame.	Personal meeting with Senior Capital Economist and Civil Engineer for the Ministry of Infrastructure, Ports, Energy and Labour.	PMBOK®Guide, Internet
To develop a cost management plan to ensure that the project remains within budget.	Personal meeting with Senior Capital Economist and Civil Engineer for the Ministry of Infrastructure, Ports, Energy and Labour.	PMBOK®Guide, Internet, PMI database
To develop a quality management plan which includes planning, managing and controlling quality requirements to ensure that the project meets quality standards and project objectives.	Personal meeting with Senior Capital Economist and Project Manager for the Ministry of Infrastructure, Ports, Energy and Labour.	PMBOK®Guide, PMI database
To develop a resource management plan to identify, acquire and manage resources needed for the project.	Personal meeting with Senior Capital Economist and Project Manager for the Ministry of Infrastructure, Ports, Energy and Labour.	PMBOK®Guide, Internet
To develop a communications management plan to ensure timely and appropriate means of communication are utilized to meet project deliverables.	Personal meeting with Senior Capital Economist and Project Manager for the Ministry of Infrastructure, Ports, Energy and Labour.	PMBOK®Guide, PMI database Internet

To develop a risk management plan for the accurate identification, monitoring and analysis of all possible risk factors which may impact the project.	Personal meeting with Senior Capital Economist and Project Manager for the Ministry of Infrastructure, Ports, Energy and Labour.	PMBOK®Guide, Internet
To create a stakeholder management plan to ensure that all stakeholders are accurately identified and categorized.	Personal meeting with Senior Capital Economist and Project Manager for the Ministry of Infrastructure, Ports, Energy and Labour.	PMBOK®Guide, Internet. PMI database
To develop a procurement strategy which would be used to plan, conduct and control procurements for the upgrading of the West Coast Road Project.	Personal meeting with Senior Capital Economist and Project Manager for the Ministry of Infrastructure, Ports, Energy and Labour.	PMBOK®Guide, Internet

3.2 Research methods

The Oxford English Dictionary describes research as being “The systematic investigation into and study of materials and sources in order to establish facts and reach new conclusions”. Method as also defined by the Oxford dictionary is “A particular procedure for accomplishing or approaching something, especially a systematic or established one.”

3.2.1 Analytical method

Analytical research is a specific type of research that involves critical thinking skills and the evaluation of facts and information relative to the research being conducted. This method was utilized as the facts and information previously

available were used to make appropriate analysis to make evaluations for the purpose of this FGP.

Chart 2 Research methods (Source: A. Providence, Author, June 2019)

Objectives	Analytical Method
1. To develop a project charter which officially marks the commencement of the Project Management Plan for the upgrading of the West Coast Road project.	The analytical method will be utilized using all the primary and secondary methodologies as listed in chart 1 to develop the project charter.
2. To construct a scope management plan which ensures that the project scope is well defined, developed, monitored and controlled.	The analytical method will be utilized using all the primary and secondary methodologies as listed in Chart 1 to develop the scope management plan to ensure that it meets the desired objectives.
3. To create a schedule/ time management plan to ensure that planning the upgrading of the road network is done within the established time frame.	The analytical method will be utilized using all the primary and secondary methodologies as listed in Chart 1 to develop the schedule plan to ensure that the project is completed within the established time period.
4. To develop a cost management plan to ensure that the project remains within budget.	The analytical method will be utilized using all the primary and secondary methodologies as listed in Chart 1 to develop the cost management plan to ensure that the project meets the cost budget.
5. To develop a quality management plan which includes planning, managing and controlling quality requirements to ensure that the project meets quality standards and project objectives.	The analytical method will be utilized using all the primary and secondary methodologies as listed in Chart 1 to develop the quality management plan to ensure that baseline quality requirements are adhered to.
6. To develop a resource management plan to identify, acquire and manage resources needed for the project.	The analytical method will be utilized using all the primary and secondary methodologies as listed in Chart 1 to develop the project charter.

7. To develop a communications management plan to ensure that timely and appropriate means of communication are utilized to meet project deliverables.	The analytical method will be utilized using all the primary and secondary methodologies as listed in Chart 1 to develop the communications management plan to ensure that all relevant stakeholders are engaged during the project process.
8. To develop a risk management plan for the accurate identification, monitoring and analysis of all possible risk factors which may impact the project.	The analytical method will be utilized using all the primary and secondary methodologies as listed in Chart 1 to develop the risk management plan.
9. To create a stakeholder management plan to ensure that all stakeholders are accurately identified and categorized.	The analytical method will be utilized using all the primary and secondary methodologies as listed in Chart 1 to develop the stakeholder management plan to ensure that all relevant stakeholders are engaged during all stages of the project process.
10. To develop a procurement strategy which would be used to plan, conduct and control procurements for the upgrading of the West Coast Road Project.	The procurement strategy will be utilized using all the primary and secondary methodologies as listed in Chart 1.

3.3 Tools

A tool as described by PMBOK®Guide is “Something tangible such as a template or software program, used in performing an activity to produce a product or result.” The tools to be used in the Final Graduation Project for the West Coast Road Rehabilitation project will be listed below and summarized in Chart 3.

- Project charter template
- Work Breakdown Structure (WBS)
- Scope Management Plan template
- Schedule Management Plan template
- Scheduling tool
- Activity List template

- Cost Management Plan template
- Project Budgeting template
- Quality Management Plan template
- Quality Management tools
- Human Resource Management Plan template
- Communications Management Plan template
- Communication Matrix
- Risk Management Plan and Risk Register template
- Procurement Management Plan template
- Stakeholder Register template

Chart 3 Tools (Source: A Providence, Author, June 2019)

Objectives	Tools
1. To develop a project Charter which officially marks the commencement of the Project Management Plan for the upgrading of the West Coast Road project.	Interviews Expert Judgement Project Charter Template
2. To construct a scope management plan which ensures that the project scope is well defined, developed, monitored and controlled.	Interviews Scope management plan template, Activity list template
3. To create a schedule/ time management plan to ensure that planning the upgrading of the road network is done within the established time frame.	Interviews Expert Judgement, Activity list template, Ghantt chart
4. To develop a cost management plan to ensure that the project remains within budget.	Analogous estimating Parametric estimating Cost Management Plan Template Microsoft Project Office 2016 Budgeting template
5. To develop a quality management plan which includes planning, managing and controlling quality requirements to ensure that the project meets quality standards and project objectives.	Quality Management Plan Template
6. To develop a resource management plan to identify, acquire and manage resources needed for the project.	Human Resource Management template
7. To develop a communications management plan to ensure timely and appropriate means of communication are utilized to meet project deliverables.	Communications management plan Template, Communications matrix
8. To develop a risk management plan for the accurate identification, monitoring and analysis of all possible risk factors which may impact the project.	Qualitative Risk Analysis Quantitative Risk analysis Risk Management Plan template and Risk Register
9. To create a stakeholder management plan to ensure that all stakeholders are accurately identified and categorized.	Stakeholder Management Plan template, Stakeholder Register, Stakeholder power/interest grid
10. To develop a procurement strategy which would be used to plan, conduct and control	Meetings, Procurement Management Plan template, procurement process diagram

procurements for the upgrading of the West Coast Road Project.	

3.4 Assumptions and constraints

Things that are assumed to be true but that may not be true are termed as assumptions. Constraints are factors that limits the team's options, limits on time, schedule, resources, cost, and scope (PMBOK®Guide, 6th edition). Constraints and assumptions are identified and documented at high level during project initiation. They are refined and documented in detail as a part of the define scope process in project planning. They are inputs to many project management processes. Constraints and assumptions need to be identified, tracked and effectively controlled during the project life cycle. (Project Management Professional, Grey Campus.com).

The assumptions for the FGP are as follows:

- The political environment will remain stable.
- There will be minimal changes in prices and exchange rates.
- Resources will be available in a timely manner.
- Approvals will be provided in a timely manner.
- Funding will be available during the lifetime of the project.
- The scope of the project will not be altered.
- There will be minimal alterations to the overall cost of the project.
- Motorability will greatly improve as a result of the project.

Key constraints for the project include:

- Project schedules may be impacted due to unpredictable weather
- The UK National Design Standards and Guidelines (Design Manual for roads and bridges must be adhered to during the project)

Chart 4 Assumptions and constraints (A. Providence, Author, June 2019)

Objectives	Assumptions	Constraints
1. To develop a project Charter which officially marks the commencement of the Project Management Plan for the upgrading of the West Coast Road project.	All information required to develop the project charter will be readily available	The project charter is to be developed and submitted for approval within two working days.
2. To construct a scope management plan which ensures that the project scope is well defined, developed, monitored and controlled.	There is sufficient information available to develop the scope management plan and to ensure that the scope is well defined.	A preconceived scope for the project exists which may llimit the requirements process. Stakeholders will be allowed to provide feedback however, due to the existing budget, factors may be considered during the process but may not necessarily determine the scope of the project.
3. To create a schedule/ time management plan to ensure that planning the upgrading of the road network is done within the established time frame.	It is assumed that the project will be completed within the stipulated time frame.	The project must be completed within the allotted time frame.
4. To develop a cost management plan to ensure that the project remains within budget.	It is assumed that all financial resources will be made available and that the project will be completed within budget.	The budget for the West Coast Road Rehabilitation project must not exceed the baseline budget.
5. To develop a quality management plan which includes planning, managing and controlling quality requirements to ensure	It is assumed that all information will be made available to identify	Quality requirements of UK standards must be met and the roads

Objectives	Assumptions	Constraints
that the project meets quality standards and project objectives.	all the required quality requirements for the project.	must be able to withstand severe weather and remain within class A road classifications for 5 years.
6. To develop a resource management plan to identify, acquire and manage resources needed for the project.	It is assumed that the human resource personnel will be sufficient, meet the required qualifications and will be able to meet the project requirements	Road projects being conducted during the same period may cause human resource constraints. Overtime is limited and will only be approved when deemed absolutely necessary by the Project Manager.
7. To develop a communications management plan to ensure timely and appropriate means of communication are maintained to meet project deliverables.	It is assumed that all communication channels will effectively convey communication needs and be utilized in an appropriate manner to meet the target audiences.	The island's internet service provider is sometimes very unreliable and this may cause delays in communications which require the use of internet and telecommunications.
8. To develop a risk management plan for the accurate identification, monitoring and analysis of all possible risk factors which may impact the project.	It is assumed that all information will be available from all key stakeholders to accurately identify all risks which may pose a threat to the project.	It is important that risks be accurately identified in the initial stages of the project and throughout the project.
9. To create a stakeholder management plan to ensure that all stakeholders are accurately identified and categorized.	It is assumed that information will be made available to ensure that all stakeholders will be	Stakeholder needs may change during the project.

Objectives	Assumptions	Constraints
	engaged and managed appropriately at every stage of the project.	
10. To develop a procurement strategy which would be used to plan, conduct and control procurements for the upgrading of the West Coast Road Project.	The procurement management strategy will be fairly conducted and due diligence done at every stage of the contractual process to ensure that value is received for money.	The procurement strategy will only be restricted to bidders within St. Lucia and not open to bidders regionally or internationally.

3.5 Deliverables

According to PMBOK®Guide," A deliverable is defined as any unique and verifiable product, result or capability to perform a service that is required to be produced to complete a process phase or project. Deliverables may be tangible or intangible". The deliverables developed for this FGP are:

- Project Charter
- Scope Management Plan
- Schedule Management Plan, Activity List, Ghantt Chart.
- Cost Management Plan
- Quality Management Plan
- Human Resource Management Plan
- Communications Management Plan
- Risk Management Plan and Risk Register
- Stakeholder Management Plan and Stakeholder register
- Procurement Management Plan

Chart 5 Deliverables (A. Providence, Author, June 2019)

Objectives	
1. To develop a Project Charter which officially marks the commencement of the Project Management Plan for the upgrading of the West Coast Road project.	Project Charter
2. To construct a scope management plan which ensures that the project scope is well defined, developed, monitored and controlled.	Scope Management Plan,
3. To create a schedule/ time management plan to ensure that planning the upgrading of the road network is done within the established time frame.	Schedule Management Plan
4. To develop a cost management plan to ensure that the project remains within budget.	Cost Management Plan
5. To develop a quality management plan which includes planning, managing and controlling quality requirements to ensure that the project meets quality standards and project objectives.	Quality Management Plan
6. To develop a resource management plan to identify, acquire and manage resources needed for the project.	Human Resource Management Plan
7. To develop a communications management plan to ensure timely and appropriate means of communication are utilized to meet project deliverables.	Communications Management Plan
8. To develop a risk management plan for the accurate identification, monitoring and analysis of all possible risk factors which may impact the project.	Risk Management Plan

9. To create a stakeholder management plan to ensure that all stakeholders are accurately identified and categorized.	Stakeholder Management Plan
10. To develop a procurement strategy which would be used to plan, conduct and control procurements for the upgrading of the West Coast Road Project.	Procurement Management Plan

4. RESULTS

4.1. Project Charter

The Project Charter is used to officially initiate the commencement of the Project and gives the Project Manager the authority to assign resources to the project. The Charter for the West Coast Road Rehabilitation Project was developed through a meeting held with the Project Manager at the Ministry of Infrastructure, Ports, Energy and Labour.

The Project Charter lists the project objectives, project description, risks, assumptions, critical success factors, constraints, stakeholders, the Project Manager assigned to the project as well as the authorization from the Permanent Secretary to proceed with the

Project. It provides the framework which is needed and serves as the preliminary guide which enables the Project Manager to plan and control the project.

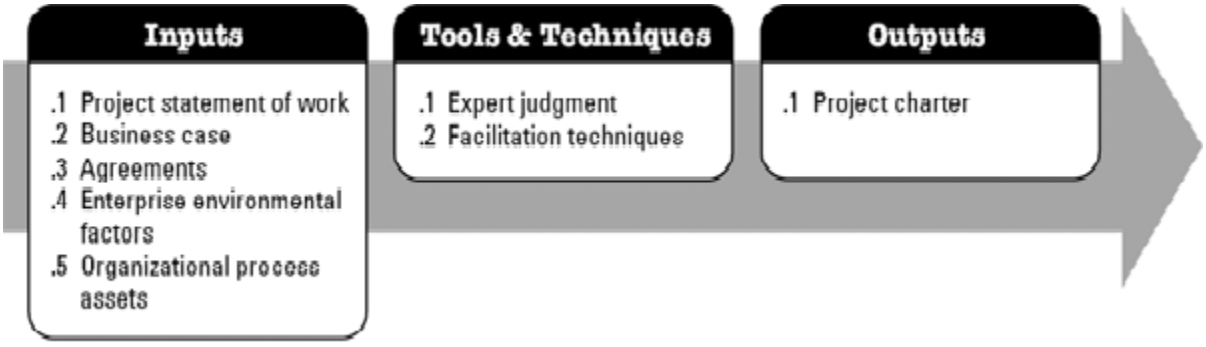


Figure 4: Develop Project Charter Source: (PMBOK®Guide)

PROJECT CHARTER

Project Name:
West Coast Road Rehabilitation Project
Ministry of Infrastructure, Ports, Energy and Labour
Government of St. Lucia

Project Number: 157

Date: 25th October 2018

Project Manager: Mrs. Ira Mc-Kie

1. PROJECT OBJECTIVE

The objective of the West Coast Road Rehabilitation Project is to deliver a climate resilient road infrastructure network along the West Coast corridor and to improve overall connectivity and road safety on the island of St. Lucia.

2. PROJECT DESCRIPTION

The West Coast Highway is classified as a principal rural arterial highway on the National Highway System. It is a two-lane highway that serves as a major commercial corridor between Soufriere and Cul de Sac and provides access to recreational areas along the West Coast. The West Coast Road Rehabilitation (WCRR) project involves the strategic maintenance of the entire West Coast Road of Saint Lucia, in particular phase 3.2 which involves the rehabilitation of 18 km of road between Roseau and Colombette and the construction of proper drainage infrastructure and the implementation of slope stabilization measures.

The project WCRR Phase 3.2, is located on the West Coast of the Island of Saint Lucia and follows the West Coast Highway. The project limits are approximately Roseau to the North and Colombette to the South. This project is located in the Ministry of Infrastructure, Ports, Energy and Labour (MIPEL). The infrastructural programmes of the Department are guided by motorable roads, road safety and resilient infrastructure.

3. CRITICAL SUCCESS FACTORS

- Procurement of a competent contractor and consultant to conduct project deliverables.
- Adherence to project management best practices and standards during the project life cycle.

- Timely resolution of project issues.
- Support and buy-in from motorists, the public and key stakeholders.
- Adequate financial capacity and human resources to complete the project.

4. STAKEHOLDERS

- Motorists and pedestrians
- Business community
- Community groups
- Political directorate
- Caribbean Development Bank
- UKCIF
- Government Agencies

5. ASSUMPTIONS, CONSTRAINTS & DEPENDENCIES

ASSUMPTIONS

- There will be no delays in the availability of construction materials locally or imported during the completion of works for the project.
- The contractor for the project has all the requisite skills to implement the project adhering to all quality, schedule, financial and scope requirements.
- Prices of fuel and raw materials will fluctuate during the project life cycle.
- Natural hazards as a result of climate change may negatively affect the project schedule.

- The results of the completion of the project will lead to a reduction of vehicle operating costs.
- The political environment during the project period will remain stable as elections will not be constitutionally due.
- Funding will be made available throughout the duration of the project.

CONSTRAINTS

Quality- Design Constraints

- The hydraulic design of drainage structures and bridges must be resilient and cater for climate change impacts.
- Slope Stabilization Design must take into consideration the frequency of slides between Bouton and Soufriere during the rainy season.
- Construction shall be in accordance with the UK National Design Standards and Guidelines (Design Manual for roads and bridges) and specifications for highway works developed by the UK Department of Transport.
- Works shall be undertaken in accordance with the Works and Roads Act of Saint Lucia.
- All Contractors must have a Health and Safety Plan which conforms to ILO (International Labor Organization) rules.
- All contractors must have a Quality Assurance Plan.
- All works must conform to existing Environmental and Social Policy.
- Salaries shall be in accordance with the minimum wage laws.
- Execution of the project must be done in conformity with the Environmental Management plan.
- Resilience must be built into all project designs.
- Deconstruction and disposal of waste must to be in accordance with the existing Waste Management Policy.

- Construction must be carried out in such a manner so as to minimize inconvenience to all road users.
- The Geometric Designs of the project must be in accordance with the UK Transport and Road Research Laboratory (TRRL)-Road note 6 and AASHTO (American Association of State, Highway and Transportation Officials) standards.

Third Party Constraints

- Utility companies must be engaged at the design stage to ensure that their concerns are taken into consideration.

Scope Constraints

- Repairs and construction of drainage-over 18km.
- Repairs and construction of retaining structures-over 18 km.
- Implementation of slope stabilization mechanisms-over 1km.
- Road rehabilitation including pavement strengthening -over 18 km.
- Bridge Construction-1 No for a return period of 1 in 100 years.
- Laybys must be established at touristic viewpoints.
- Traffic safety devices must be placed at all accident hotspots.
- Road markings must be done according to the British Traffic Signs Manual.
- Installation of Vertical road signs must be according to the British Traffic Signs Manual.
- Repairs to culverts and construction of new ones must be done to ensure sufficient hydraulic capacity in cross drainage structures to ensure climate change resilience.
- Bus shelters must be installed at all bus stops.

6. RISKS

- Local residents, the motoring public and businesses will be inconvenienced during paved road construction due to the highly urbanized nature of the project area.
- Price fluctuations in foreign currencies to contractors, consultants and suppliers may negatively affect the project budget. In addition, increases in international fuel prices and fluctuations in raw materials may allow the project to exceed its budget.
- Given the size and geographical location of St. Lucia and the impending perils of climate change, the island is extremely vulnerable to natural hazards and this could negatively affect the schedule of the project.

7. MILESTONE LIST

Milestone	Description	Date
1	Commencement of the procurement process for the design and supervision consultant	01/10/18
2	Award of the consultancy contract	25/02/19
3	Completion of design services	29/11/19
4	Commencement of procurement process for Works Contractor	10/01/20
5	Award of works contract	24/04/20
6	Issuance of Taking Over certificate	28/02/20
7	Issuance of Performance Certificate	18/07/23

8	Project Closure	07/09/23

8. BUDGET

The total estimated project implementation cost is approximately EC $59.4million.

9. PROJECT AUTHORIZATION

Approved by:	Project Manager	Date
		01/05/
Mavan Daniel–	***Mrs. Ira -McKie***	18
Permanent Secretary		

Followed by the development of the Project Charter, the Project Management Plan is developed. The Project Management Plan consists of all subsidiary plans which integrates all Project Management knowledge areas. All subsidiary plans are clearly defined according to the requirements for the West Coast Road Rehabilitation Project. The Project Management Plan will also comprehensively through the subsidiary plans

detail the Project Management processes which is how each plan will be developed, executed, monitored and controlled.

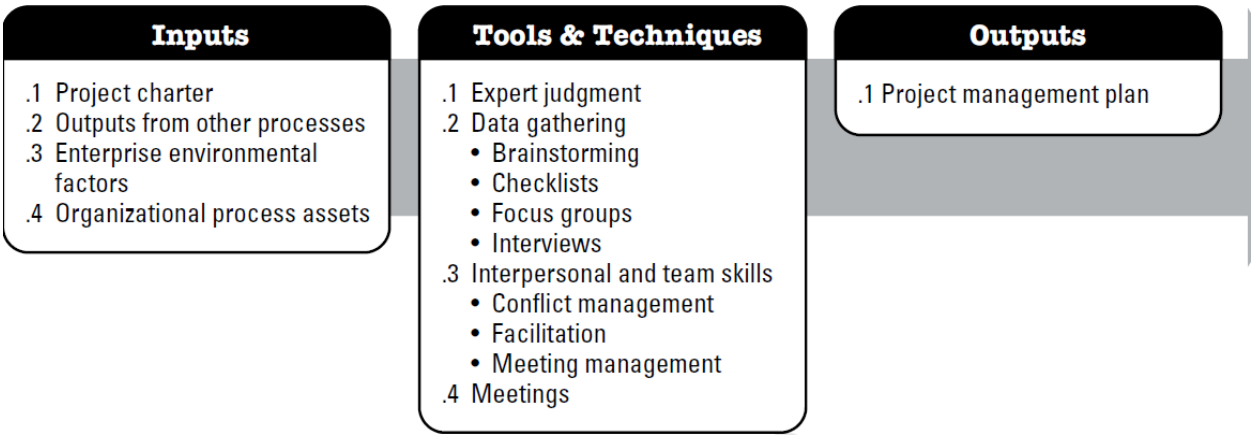


Figure 5: Project Management Plan Inputs, Tools and Techniques, Source (PMBOK®Guide)

4.2 Project Scope Management

Scope Management Plan
West Coast Road Rehabilitation Project
Ministry of Infrastructure, Ports, Energy and Labour
Government of St. Lucia

The Project scope management processes according to PMBOK®Guide are defined by the following processes:

- Plan Scope Management
- Collect Requirements
- Define Scope
- Create WBS
- Validate Scope
- Control Scope

4.2.1 Plan Scope Management

The Plan Scope Management process for the West Coast Road Rehabilitation Project determines how the scope for the project will be defined, developed, monitored, controlled and validated (PMBOK®Guide 2016). The inputs required for this process includes the Project Management Plan, Project Charter, Enterprise Environmental factors and Organizational Process Assets. This process was the preliminary process developed as part of the planning process which commenced following the development of the Project Charter, Stakeholder Register and the development of project objectives for the West Coast Road Rehabilitation Project.

The Project Manager for the West Coast Road Rehabilitation Project will assume ultimate responsibility for the scope management function for the project. The scope management

plan will also include roles and responsibilities as they pertain to project scope, scope definition, verification and control measures, scope change control, and the project's work breakdown structure. Expert judgment, data analysis and meetings amongst several key stakeholders were utilized as the required tools and techniques which resulted in the Scope Management Plan for the Project.

4.2.2 Collect Requirements

The collect requirements process involves determining and documenting all stakeholder requirements for the project. The first step in commencing the collect requirements process for the project is utilizing the stakeholder register which provides a guide as to the key persons who need to be engaged in the process. In addition, relevant project documentation to the process included the Project Charter, assumptions of the project, Lessons Learnt register from previous road projects and other subsidiary project management plan documents. The requirements for the West Coast Road Rehabilitation project was primarily pre-defined by the MIPEL however, stakeholder feedback was utilized to gather feedback and needs particularly on the community level. Data gathering techniques which included brainstorming, interviews, meetings and expert judgement were utilized where stakeholders were engaged by the project team to gain feedback based on the predefined scope for the project. A review of the minutes for the stakeholder meetings held, led to the consideration of requirements needed for the project lead by the Project Manager and the Project Team. These requirements were subsequently prioritized through a final stakeholder analysis which fed into the definition of the scope of the project thereby leading to establishing effective scope control and establishing the scope baseline for the West Coast Road Rehabilitation project. Some of the requirements

which were developed as part of the process which involved the MIPEL are depicted in Figure 6 below:

REQUIREMENTS TRACEABILITY MATRIX - West Coast Road Rehabilitation Project						
ID	**Work Package**	**Requirements Description**	**Goals/Objectives**	**Project Phase**	**Priority**	**Owner**
1	2.4	The Geometric Designs of the project must be in accordance with the UK Transport and Road Research Laboratory (TRRL)-Road note 6 and AASHTO (American Association of State, Highway and Transportation Officials) standards.	To ensure that the highest international standards are maintained	Design	High	Project Manager/Consultant
2	2.4	Construction shall be in accordance with the UK National Design Standards and Guidelines (Design Manual for roads and bridges) and specifications for Highway Works developed by the UK Department of Transport.	To ensure that the highest international standards are maintained	Design	High	Project Manager/Consultant
3	2.4	Works shall be undertaken in accordance with the Works and Roads Act of Saint Lucia.	To ensure that legal obligations are complied with based on the works undertaken	Design	High	Project Manager/Consultant
4	2.4	The Contractor shall supply works test certificates, analyses, mill sheets, etc, as relevant to the particular materials and as required by relevant Standards etc.	To ensure that the highest international standards are maintained	Works		Contractor/ Engineer
5	2.4	Materials, equipment and methods shall comply with the standards, generally the relevant British Standards and Codes of Practice.	To ensure that the highest international standards are maintained	Works	High	Project Manager/Consultant/Contractor
9	2.4	The cement used throughout the Works shall be obtained from manufacturers approved in writing by the Engineer and shall as appropriate comply with the following specification:-Ordinary Portland Cement B. S 12/ Sulphate Resisting Cement B. S 4027	To ensure that quality is maintained in the delivery of the project	Works	High	Contractor
10	2.4	Gravel or ballast shall be free from clay, earth, loam or other organic or similar material and shall be approved by the Engineer.	To ensure that quality is maintained in the delivery of the project	Works	High	Contract/ Engineer
11	2.4	Clean fresh water is to be used for the mixing of all concrete and mortar and is to be from a source approved by the Engineer.	To ensure that quality is maintained in the delivery of the project	Works	High	Chief Engineer/ Contractor
7	2.8	Marking materials shall be in accordance with BS 3262 and shall be suitable for road surface temperatures of up to 23oC.	To ensure longevity in road markings and quality	Works	High	Contractor
8	2.8	The laid thickness of the markings shall be in accordance with BS 3262.	To ensure longevity in road markings and quality	Works	High	COntractor
12	2.9	The Contractor shall obtain traffic signs from an approved manufacturer, who shall design the signs based on information given by the Engineer.	To ensure that traffic signs are durable and provide clear directions adhering to requirements	Works	High	Chief Engineer/ Contractor
13	2.9	The Contractor shall submit for approval details of the paint manufacturer and of the specific paints prior to application.	To ensure that quality is maintained in the delivery of the project	Works	High	Chief Engineer/ Contractor
14	2.9	Before painting all galvanised surfaces shall be thoroughly degreased with an approved cleansing solution, washed	To ensure that quality is maintained in the delivery of the project	Works	High	Contractor
15	2.13	Where the route of the road traverses existing water lines, electricity and telecom lines the construction to accommodate these lines must conform to the details acceptable to the services company.	To ensure that utility services are not affected during the process	Works	High	Contractor

Figure 6: Requirements traceability Matrix

4.2.3 Define Scope

The define scope process was subsequently followed by the collect requirements process for the project. This process lead to the definition of the scope statement for the project. The project scope statement details the project objectives, deliverables, constraints, assumptions, budget and exclusions of the project. The objectives includes measurable success criteria for the project. The Scope Statement serves as a written confirmation of the results that the project will deliver and is a guide to ensure that the project remains within the established defined scope baseline requirements. The scope statement is depicted below.

Scope Statement

Project Name	West Coast Road Rehabilitation Project	Date	**29/09/19**
Project Number	157	Project Manager	Mrs. Ira- Mckie

1.1 Project Objective
To deliver a climate resilient road infrastructure network along the West Coast corridor and to improve overall connectivity and road safety for all road users in St. Lucia.

1.2 Project Benefits
Employment opportunities will be available during the construction and maintenance of the road project for local residents who are skilled in the construction field.
Improved road accessibility between communities
Enhanced quality of life for residents
Reduce traffic accidents by improving the safety of the road through horizontal road marking and replacement of vertical signage.
Improve the property values of the affected communities and increase the possibility of land development.
The implementation of proper road drainage will decrease the possibility of flooding in the road infrastructure.
Reduction in Vehicle Operating Cost for motorists

1.3 Project Deliverables- Design Phase
1. The Department of Infrastructure, Ports and Energy hires a consultant to perform a variety of Engineering and Supervision services for the West Coast Road Rehabilitation Project The project will be accomplished using three phases. Phase I will progress through the design activities including the complete preparation of the construction plans and associated documents. Phase II will correspond to the construction phase and Phase 3 is the Defects Liability Period. The duration of the project is expected to be 59 months and commences with the Notice to Proceed (NTP) following reviews by the project team and stakeholders through the award of contract.
2. The design must consider construction staging, traffic control, temporary transitions and reuse of existing roadway where possible, drainage features and reconnection of local access. The project will also include Department of Infrastructure Ports and Energy (MIPEL) designed major Bridge structures. The design of the project includes highway landscaping, multi-use pathways, co-ordination and design of Touristic amenities/ facilities.
3. Design shall include and incorporate all mitigation measures identified in the final environmental impact Statement (EIS). Work that is of landscape and architectural in nature may require professional expertise for the agronomic, architectural components of the projects as needed.
4. The team for the design effort shall include at a minimum, the Technical Department MIPEL, Other government agencies which includes the Department of Physical Planning, Department of Agriculture, Ministry of Tourism, Design and Supervision Consultant and other agencies or interested stakeholders.
5. The Consultant shall develop a plan for the design and pre-construction activities necessary for delivering the project in a timely manner consistent with the length of service described. The plan shall include a list of activities, estimated duration and resources as well as a Critical Path Method (CPM) schedule and other information as appropriate. The consultant shall provide a schedule of major project milestones.
6. The Consultant shall provide a CPM schedule compatible to the Primavera scheduling system, MS Project or similar. It shall include the milestones/flags requested by MIPEL. An initial schedule shall be submitted within 6 weeks of the Notice to Proceed. The schedule submitted shall be customized to reflect the specific needs of the project. Work elements for which MIPEL has responsibility shall be included in the schedule.
7. The consultant shall include status activities in the schedule in accordance with a schedule furnished by MIPEL. Changes to the schedule logic will be submitted to the Project Manager for approval. If the milestones show negative float, the Consultant shall include a narrative of corrective solutions to put the design schedule back on time for delivery.
8. The Consultant shall schedule and attend a regularly scheduled monthly progress meeting. The Consultant shall document the progress meeting through Meeting notes ("minutes"), which shall be distributed to the team within 10 calendar days of the meeting.
9. Design features of this project shall be in accordance with the approved final Environmental Impact Statement (EIS). All mitigation measures identified in the EIS shall be incorporated into the project

design. The development of the EIS will be undertaken by the Consultant in accordance with the Terms of Reference Issued by the MIPEL.
10. The Design firm shall design and prepare construction plans.
11. The Design firm shall design and prepare technical specifications.
12. The Design firm shall design and prepare cost estimates.
13. The Design firm shall design and prepare quantity computations.
14. The Design firm shall design and prepare construction documents.

1.4 Project Deliverables- Works Phase
1. Repair 2 km and construct 5 km of drainage over 18km. Repair 20 and construct 15 retaining structures over 18 km.
2. Implement slope stabilization mechanisms over 1km.
3. Reconstruct 18 km of road.
4. Reconstruct 1 bridge as per MIPEL's approved designs.
5. Establish 10 Laybys at Touristic Viewpoints
6. Place traffic safety devices at all accident hotspots
7. Establish road markings according to the British Traffic Signs Manual along 18 km of reconstructed road.
8. Install Vertical road signs according to the British Traffic Signs Manual as per the Traffic Signs plan and designs for the project.
9. Repair 10 culverts and reconstruct/build 15 culverts
10. Install 30 Bus Shelters.
11. Undertake works as per British and AASHTO's Standards as directed by the MIPEL

1.5 Project Deliverables- Defects Liability Phase
1. Undertake supervision during defects liability period.
2. Prepare final account for works completed.
3. Prepare project closeout report
4. Issue Performance Certificate
5. Prepare as built drawings
6. Close Project Office
7. Project Closure

1.6 Project Exclusions
1. Works shall not include the demolition of existing structures

1.7 Success / Acceptance Criteria
1. The project must meet all deliverables within the scheduled time, quality and budget tolerances.

1.8 Estimated Cost of Project	1.9
The West Coast Road Rehabilitation Project	59.4million

1.10 Project Constraints
The West Coast road rehabilitation project must not exceed 59.4 million dollars and must be completed within the allotted 54 month time frame.

1.11 Project Assumptions
1. It is assumed that the Project funding will be allocated efficiently.
2. It is assumed that the project will be completed within budget and within the stipulated time frame.
3. It is assumed that there will be minimal weather threats which may prolong the project.
4. It is assumed that the entire Project Team, Consultants and Contractors will be skilled and be employed during the entire project cycle and that there will be continuity and prompt human resource replacements if necessary
5. It is assumed that physical environment conditions will not change the scope and cost of the project.

1.12 Decision	
[X] Approved	[ ] Rejected
[ ] Approved with modifications	[ ] Deferred
Additional Comments	
The Project scope statement is hereby approved.	

_____ _____

Approver's Printed Name Date

_____

Title

_____

Signature

Roles and Responsibilities

The Project Manager, Chief Engineer, Project Team and the Change Control Board (CCB) will assume pivotal roles in managing the scope of the project. It is fundamental that roles and responsibilities are defined to ensure that responsibilities are clearly

understood. The table below defines the roles and responsibilities for the scope management of the West Coast Road Rehabilitation Project.

Chart 6 Roles and Responsibilities Matrix (Source: A. Providence, Author, September, 2019)

Role	Responsibility
Project Manager	• Reviews change requests put forward by the project team • Manages the scope of the project • Updates project documents following scope change requests • Communicates scope changes to all stakeholders of the project • Has overall responsibility for the management of scope for the West Coast Road Rehabilitation Project • Keeps a record of all change requests made during the project life-cycle
Project Team	• Communicates change requests to the project sponsor • Assesses the validity and justifications for the change requests • Assists in the supervision of project deliverables

Chief Engineer	• Oversees the design and prepare construction plans, technical specifications, cost estimates, quantity computations and related construction documents • Responsible for the rejection or approval of change requests • Submits change request to the change control board for review
Stakeholders	• Submits requests for scope changes • Communicates justification of project change requests to the project team
Change Control Board	• Reviews the change request submitted by the Chief Engineer • Performs Impact assessment of change requests. • Approves changes made to the project's scope.

4.2.4 Create Work Breakdown Structure

The effective management of the scope of the project required the need to decompose the scope of the project into a work breakdown structure created for the project which further subdivided the major project deliverables into manageable work packages consisting of activities. The key benefit of this process is that it provides a structured vision of what has to be delivered for the West Coast Road Rehabilitation Project and ensures

that the project remains within its baseline scope requirements. The work breakdown structure for the West Coast Road Rehabilitation Project decomposes the project into manageable and defined tasks thereby allowing the Project Manager to oversee the tasks more effectively and enabling greater overall control of the project components.

The work breakdown structure for the West Coast Road Rehabilitation Project is depicted in the figure below:

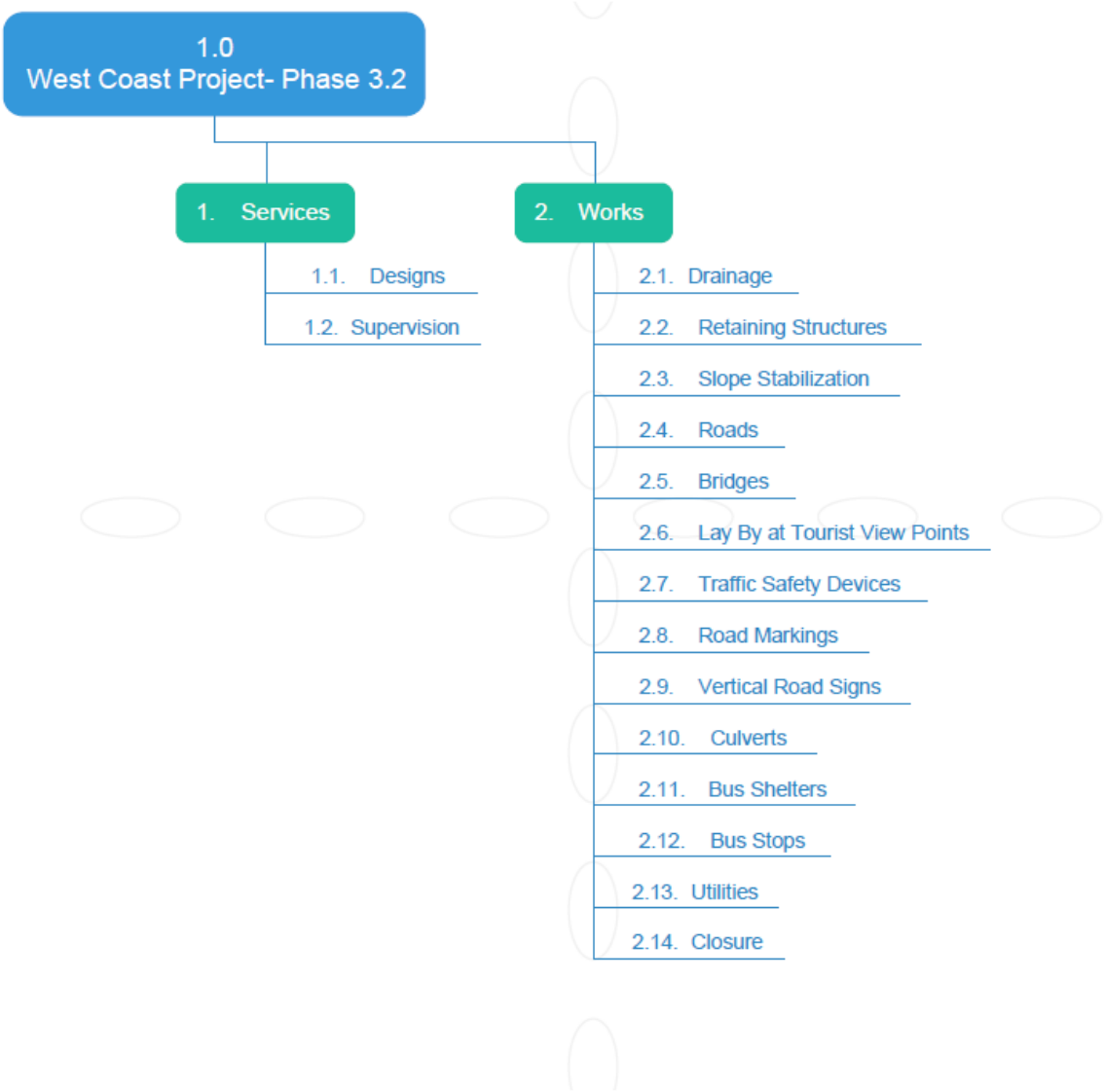


Figure 7: Work Breakdown structure (WBS)-(Source: Compiled by author)

WBS Dictionary

The WBS dictionary explains the work which must be completed to produce each deliverable and clearly defines and explains the requirements of the project. A well defined WBS for the West Coast Road Rehabilitation project sets the framework needed to prevent scope creep and is an output of the create WBS process.

Chart 7 Work Breakdown Structure Dictionary (Source: A. Providence, Author, September 2019)

WORK BREAKDOWN STRUCTURE DICTIONARY

		PROJECT TITLE; West Coast Road Rehabilitation Project	PROJECT ID :157

Level	WBS Code	Elements	Descritpion of works
1	1.1	Designs	Carry out the design for drainage structures, a new bridge, retaining walls, slope stabilization bus stops and laybys and road pavement structure.

1	1.2	Supervision	Undertake the supervision of all works according to the consultancy agreement between the sponsor and the consultant. Undertake the supervision of all works during defects liability period, according to the consultancy agreement between the sponsor and the consultant.
2	2.1	Drainage	Construct a total length of 5 km of concrete drains of various sections as per design.
2	2.2	Retaining Structures	Construct 15 retaining walls as per design at identified locations along the road corridor.
2	2.3	Slope stabilization	Implement slope stabilization mechanisms as per design over discrete sections totaling 1 km of road.
2	2.4	Roads	Construct roads.
2	2.5	Bridges	Undertake the necessary works to build the bridge abutments /bridge bearings and piers according to the design drawings.
2	2.6	Laybys at tourist view points	Construct concrete curbs to 10 laybys at tourist viewpoints as per design.
2	2.7	Traffic safety devices	Undertake the installation of traffic safety devices along 18 km of road.
2	2.8	Road markings	Undertake the painting of road markings as per the road marking schedule.
2	2.9	Vertical road signs	Undertake the placing of vertical road signs as per signs schedule
2	2.1	Culverts	Undertake the repair of 10 culverts as per design.Undertake the reconstruction/construction of 15 new culverts at various locations as per design.
2	2.11	Bus shelters	Undertake construction of 30 bus shelters as per architectural design
2	2.12	Bus stops	Undertake the placing of bus stops and tourist viewpoints signage as per signage schedule.

2	2.13	Ultilities	Carry out a Utility assessment to inform replacement of old water lines, and the relocation of electricity poles and telecommunication infrastructure
2	2.14	Closure	Carry out the closing procedures for the project office

4.2.5 Validate Scope

The Project Manager and the project team shall establish a system to control the scope of the project. The project team will use the Work Breakdown Structure (WBS) as a statement of work. The WBS dictionary will be used as a guide to define the work to be performed for the West Coast Road Rehabilitation Project. The Project Manager will ensure that the project team and the consultants/contractor perform only the work described in the WBS and generate the defined deliverables for each WBS element. The Project Manager will oversee progression of the project to ensure that this scope control process is followed and progress is reported through Project Scope measurements tools.

During the implementation of the project, the Project Manager will verify interim project deliverables against the original scope as defined in the scope statement and the WBS. After the Project Manager verifies that the scope/deliverables satisfies the requirements defined in the project plan, a meeting will be convened with the Chief Engineer for confirmation of the deliverables. The Chief Engineer will accept the deliverables by signing a project deliverable document. This will ensure accountability that the project work remains within the scope of the project on a consistent basis throughout the life of the project. The template below in figure will be utilized to verify the scope of the project.

Project Name	**West Coast Road Rehabilitation Project**	**Date**	**29/9/19**
Deliverable (s)			
Inspection Results			

The above inspection fully met the deliverable(s) specified in this project's Scope Statement.		
Project Manager		
Chief Engineer		

Figure 8: Validate Scope (Source: Compiled by author)

4.2.6 Control Scope

The Control Scope process is where changes to the scope baseline for the project are managed. This process is performed throughout the entire project life cycle and the intent of this process is to ensure that the scope baseline is complied with. The inputs to this process include the project management plan, project documents and organizational process assets.

Proposed scope changes to the project may be initiated by the Permanent Secretary, Chief Engineer, Project Manager, key stakeholders or any member of the project team. All change requests must be submitted on a prescribed change form and will detail the estimate and impact to schedule and costs. The Project Manager is responsible for the review and recommendation process and will evaluate the requested scope change and make a recommendation. Following this, the request is submitted to The Chief Engineer who can either reject the change request if it does not apply to the intent of the project, or convene a Change Control meeting between the Project Manager and the Change Control Board to review the change request further and perform an impact assessment of the change.

The following persons will form the Change Control Board for this project

- Permanent Secretary, Ministry of Infrastructure, Ports ,Energy and Labour
- Chief Engineer, Ministry of Infrastructure, Ports, Energy and Labour
- Financial Analyst at the Ministry of Infrastructure, Ports, Energy and Labour
- Duly appointed representatives from the Department of Economic Development and the Department of Finance.

If the change has been approved the Project Manager formally accepts the change by signing the project change control document. Upon acceptance of the change by the Change Control Board Bank the Project Manager will update all project documents and

communicate the change to all project team members. The Project Manager will keep a record of all change requests. The change request form to be utilized for this process is depicted below:

Project Name:				
Requested By		Change Number		
Presented To		Date of Request		
Change Name				
Description of Change:				
Reason for Change:				
Effect on Project Cost:				
Item Description	Hours		Dollars	
	Reduction	Increase	Reduction	Increase
Analysis		0		$ 0.00
Total Net Change in Cost:			$ 0.00	

Assessment of Impact (effect on schedule, deliverables, project etc)	

	Effect of NOT Approving this Change:
	Reason for Rejection (if applicable):

Change Control Board

☐ Approved Signature:

☐ Rejected Title:

4.3 Project Schedule Management

Schedule Management Plan
West Coast Road Rehabilitation Project
Ministry of Infrastructure, Ports, Energy and Labour
Government of St. Lucia

The schedule management processes according to PMBOK®Guide are defined by the following processes:

- Plan Schedule Management
- Define Activities
- Sequence Activities
- Estimate Activity Durations
- Develop Schedule
- Control Schedule

4.3.1 Plan Schedule Management

Plan Schedule Management is an important input for developing the project schedule for the West Coast Road Rehabilitation Project. It establishes the procedures, policies, as well as the documentation to plan, develop, manage, execute and control the project schedule. The project schedule provides guidance on how the project timelines will be managed by the project manager throughout the project's lifecycle. The schedule is a critical part of this project because it provides the project team and sponsor with the project's scheduled progress at any required time.

To devise the schedule, the Project Manager utilized the project management plan, the scope management plan, the project charter, enterprise environmental factors. and organizational process assets to create the schedule management plan. The tools and techniques utilized during the process were meetings, expert judgment and data analysis.

The project schedule management process allows the project manager to plan the appropriate schedule for its team members to deliver the planned services and works. The project schedule management process must be done in tandem with the established schedule agreed to by the contractors/ consultants as defined by their contractual obligations. The tool used to capture the information for this and the remaining processes required to develop the schedule was Microsoft Office Project 2016, identified as a scheduling software in the PMBOK® Guide.

4.3.2 Define Activities

In order to define the activities for the West Coast Road Rehabilitation process, the Work Breakdown Structure was utilized which was devised from the scope management process. Work packages are broken down further into activities to ensure that work packages are delivered. PMI states that 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. The define activities process will provide the basis for estimating, scheduling, monitoring and controlling project work. It is mandatory that the entire project scope be executed with the activities described in the activity list.

For the purpose of controlling the project, the Project Manager imposed milestones during the Sequence Activities or develop schedule processes. Deviations from the planned activities are detected when the project progress has not met the required milesones.The project milestones are outputs of the define activities process and refers to zero duration “activities” which mark the completion or start of an important phase. Milestones allow

the Project Manager to subdivide the project work to give sense of completion between important project stages. It is also used as reminder of important deadlines and for determining activities slack or schedule flexibility.

The milestone list for the West Coast road rehabilitation project is listed as follows:

Milestone List

1. Commencement of procurement process for Design and Supervision consultant
2. Award of consultancy contract
3. Completion of design services
4. Commencement of procurement process for Works Contractor
5. Award of works contract
6. Issuance of Taking Over certificate
7. Issuance of Performance Certificate
8. Project Closure

4.3.3 Sequence Activities

Following the identification and documentation of activities, the sequencing of activities is developed. This step of defining the relationship between activities is to ensure that the project manager has a logical sequence of work by determining which activities are predecessors and successors of each other. Sequencing is the process of identifying and documenting relationships among the project activities. To perform this process, the constraints and assumptions of the project as well as the WBS were utilized. The key benefit of this process is that it defines the logical sequence of work to obtain the greatest efficiency given all project constraints. This process facilitated the development of a project schedule network diagram and lead to the updating of the activity list and milestone list for the West Coast Road Rehabilitation Project.

4.3.4 Estimate Activity Duration

Activity duration estimates are required in order to quantify the amount of time that is necessary for the completion of each project activity. This was achieved through a series of meetings with stakeholders, where expert judgment was utilized as well as data analysis based on analogous estimating and the PERT three point estimating technique. Through analogous estimating, historical data from past road rehabilitation projects completed by the Ministry of Infrastructure were utilized in addition to referrals from lessons learnt on previous projects.

PERT uses a three point estimation approach based on the assumption that the completion of activities may most likely be defined by uncertainties. PERT provides a range of estimates within which the task can actually be completed.

The 3 points of estimates are for the PERT estimating technique are detailed below:

Optimistic estimate – Estimate when all favorable events will occur.
Pessimistic estimate – Estimate when all unfavorable conditions will occur.
Most Likely estimate – Estimate when both favorable and unfavorable conditions will occur.

The PERT formula utilized to compute activity duration:

$$\frac{\text{Optimistic time} + 4\text{X most likely time} + \text{Pessimistic Time}}{6}$$

The Activity list for the West Coast road rehabilitation project is listed as follows

Chart 8 Activity List including coding, activity name, predecessor/successor list, activities duration (Source: Providence, Author, September 2019)

WBS	Activity Code	Activity Name	Activity Description	Predecessors	Successors	Duration/Work days	Resource
1.1.1	100	Procure consultants	Procurement of consultants according to the Caribbean Development Bank's procurement guidelines and the Finance Act of Saint Lucia	None	150,200,250,300, 350	105	Project Manager
1.1.2	150	Undertake traffic studies	Carry out traffic studies to inform the pavement design for a design life of 20 years.	100	350,400	30	Traffic Engineer, 10 automatic counters,4 technicians.
1.1.3	200	Undertake topographic surveys	Carry out topographic studies to locate the road corridor, to set out the road widening, laybys and locate drains and retaining structures.	100	350,400	45	2 Engineering surveyors,4 survey technicians
1.1.4	250	Undertake geotechnical studies	Carry out geotechnical investigations to compile the materials report which will inform the structural design of the road pavement and retaining structures.	100	350,400	20	Geotechnical engineer,4 technicians, 1 boring

							machine,1 truck.
1.1.8	300	Undertake utility assessment	Carry out a Utility assessment to inform replacement of old water lines, and the relocation of electricity poles and telecommunication infrastructure.	100	350,400	30	1 utilities engineer,2 technicians, 1 pickup truck.
1.1.5	350	Undertake Engineering designs	Carry out the design for drainage structures, a new bridge, retaining walls, slope stabilization bus stops and laybys and road pavement structure.	150,200,250,300,350	450	120	1 team leader,2 design engineers,2 CAD technicians
1.1.7	400	Consult the public	Engage the affected public along the road corridor on the proposed project with a view to addressing all concerns.	150,200,250,300,350	450	14	Project manager, Consultant's team leader.
1.1.6	450	Undertake cost estimate	Carry out the necessary analysis to inform the total cost of the works to facilitate the bidding exercise.	350,400	500	20	Quantity Surveyor,2 quantity surveying technicians.
1.1.10	500	Prepare bid documents	Undertake the necessary to prepare the required documentation to facilitate the submission of full proposals by interested contractors.	450	550	30	Team leader.
1.1.11	550	Procure works contractor	Procurement of contractors for the works according to the Caribbean Development Bank's procurement	500	600	75	Project manager.

			guidelines and the Finance Act of Saint Lucia				
1.1.12	600	Carry out kick off meeting	Organize and hold a meeting with the selected contractor and the sponsor prior to the commencement of works to ensure clarity in respect of protocols.	550	650,700,	1	Project manager, Team leader.
1.2.4	650	Supervise works	Undertake the supervision of all works according to the consultancy agreement between the sponsor and the consultant.	600	1450	(LOE)	Team leader, Chief Resident Engineer,2 Resident Engineers
2.5.1.1	700	Construct bridge foundation	Undertake the necessary to build the bridge foundations according to the design drawings.	600	710,720	14	Excavator ,Operator for Excavator, Tipper Truck, 4 Laborers, 2 Masons , Supervisor, 20 M^3 Concrete (C35/20) , Reinforcement (varies)- 2 tons, 50 M^2 Formwork, 1 Concrete

							Batching Plant
2.5.1.2	710	Construct Bridge Abutment /Pier	Undertake the necessary to build the bridge abutments and piers according to the design drawings.	700	730	30	Formwork 300M ^{2}, Reinforcement (Varies)-4 tons, 50 M ^{3} Concrete(C3 5/20), 4 Laborers, 2 Masons, Supervisor
2.5.3.2	720	Construct bridge bearings	Undertake the necessary to construct the bridge bearings according to the design drawings.	700	730	7	Engineer,Foreman,2 laborers
2.5.2.1	730	Construct composite bridge support beams	Undertake the necessary to construct the bridge support beams according to the design drawings.	710,720	740,750	7	200M ^{2} Formwork, Reinforcement (Varies)-12 tons, Concrete (C35/20)-307M ^{3}, 4 Laborers, 2 Masons, Supervisor,1 pickup truck.

2.5.2.2	740	Place steel reinforcement for deck and barriers	Undertake the necessary to tie the steel reinforcement for the bridge deck and parapets according to the design drawings.	730	760	7	4 Steel Fixers, Supervisor
2.5.3.1	750	Place utility ducts in bridge deck	Undertake the necessary to lay utility ducts in the bridge deck according to the design drawings.	730	760	0.5	2 Laborers, Supervisor
2.5.2.3	760	Construct concrete deck and barriers	Undertake the necessary to pour the bridge deck and parapets according to the design drawings.	740,750	770	1	4 Laborers,1 pickup truck.
2.5.3.3	770	Construct bridge joints	Undertake the necessary to construct the bridge joints according to the design drawings.	760	780	1	Engineer,Technician,Supervisor,2 laborers
2.5.2.4	780	Construct asphalt overlay	Undertake the necessary to overlay the bridge deck with 75 mm asphaltic concrete according to designs.	770	790	3	240 M^2 Asphalt-50mm, Asphalt Paver, Asphalt Paver Operator, Roller, 2 Laborers, Foreman
2.5.3.4	790	Paint bridge	Undertake the painting of the bridge with 3 coats of an approved all weather paint.	780	1450	3	152 liters paint, Painters-2, 1

							Laborer, Supervisor
2.3	800	Build slope stabilization	Implement slope stabilization mechanisms as per design over discrete sections totaling 1 km of road	600	1450	60	Engineer, Foreman, Geotechnical Engineer,50,000 M^2 type A geogrid.1500 plants vertivert grass,10 laborers,Foreman.4 tipper trucks.4 drivers.
2.1.1	850	Dig earthen drains	Dig earthen drains as per designs over 3 km of road.	600	1450	20	Back hoe-2 No, Tipper Trucks-4, Operators-2, Supervisor ,laborers-4.,4 drivers
2.1.2	900	Construct lined drains	Construct a total length of 5 km of concrete drains of various sections as per design.	600	1450	150	250 M^3 Concrete, Formwork, Reinforcement (Varies)-10 tons, 6

							Laborers, Supervisor, Masons-10
2.1.3	950	Repair concrete drains	Repair 2 km of concrete drains of various cross sections as per design.	600	1450	60	50 M^3 Concrete, Reinforcement-1 ton, 4 Laborers, Supervisor , Formwork-20 $M^{2,}$ Masons-4
2.2.1	1000	Construct retaining walls	Construct 15 retaining walls as per design at identified locations along the road corridor.	600	1450	120	100 M^3 Rubble, Concrete-50 M^3, Reinforcement (varies), Tipper Truck, Driver for Vehicle, 4 Laborers, Supervisor
2.2.2	1050	Repair masonry retaining walls	Repair 20 retaining walls as per design at identified locations along the road corridor.	600	1450	60	2 Masons, Concrete - 40 M^3,50 M^3 Rubble, 4 Laborers, Supervisor

2.4.1	1100	Construct road widening including ancillary works	Undertake road widening as informed by the new horizontal road alignment along with ancillary works.	600	1390,1400,1410	120	Excavator, 5 Tipper Trucks, 3000 M^2 Crusher run-200mm,3000 M^2 Asphalt-125mm , Asphalt Paver Operator, Asphalt Paver, 3 Rollers, 6 Laborers, Supervisor
2.4.2	1150	Place road sub base	Undertake construction of road sub base as per new pavement design over 18 km of road.	600	1160,1170,1180	135	130,000 M^2 Crusher Run-200mm, 6 Rollers, Operators , 20 Tipper Trucks, Supervisor , Drivers, 30 Laborers, Engineer

2.6.2	1280	Place subbase/base in laybys at tourist view points	Undertake construction of road sub base/base as per new pavement design in laybys at tourist viewpoints.	600	1160,1170,1180	20	130,000 M^2 Crusher run-200, Supervisor, Roller, Operator, 2 Laborers
2.12.2	1290	Place subbase/base in bus stops	Undertake construction of road sub base as per new pavement design in laybys at bus stops.	600	1160,1170,1180	60	1,200 M^2 Crusher run-200mm, Supervisor , Roller, Operator, 2 Laborers
2.10.1	1300	Repair culverts	Undertake the repair of 10 culverts as per design.	600	1360,1370,1380	60	10 M^3 Concrete, Reinforcement-0.5 tons, Formwork-30 M^2, 2 Laborers, Backhoe, 4 masons, Supervisor,60 concrete culvert pipes
2.10.2	1310	Reconstruct culverts	Undertake the reconstruction/construction of 15 new culverts at various locations as per design.	600	1360,1370,1380	120	Excavator, Operator, Laborers, Formwork,

							20 M^3Concrete, Reinforcement-5 tons, Supervisor, tipper Truck-2, 200 concrete culvert pipes.
2.13.1	1320	Relocate telecommunication infrastructure	Undertake the relocation of telecommunication infrastructure at predetermined locations as per design.	600	1360,1370,1380	30	Telecommunication technician, 1000 m of fiber optic cable, 7 technicians, 4 tipper trucks.
2.13.2	1340	Replace old infrastructure with new	Undertake the replacement of aged water infrastructure at predetermined locations as per design.	600	1360,1370,1380	270	1 Excavator, Roller, operators, 10,000 M^3 of fill.5 water technicians, Water engineer,2000 M of PVC 4 inch pipe.

2.13.3	1350	Relocate power lines	Undertake the relocation of power lines at predetermined locations as per design.	600	1360,1370,1380	30	Electrical engineer,4 lines men,75 utility poles,4 trucks,operator,drivers,4 laborers.
2.4.3	1160	Place road base in road box	Undertake construction of road base as per new pavement design over 18 km.	1150,1280,1290	1360,1370,1380	180	130,000 M^2 Asphaltic base-75mm , 20 Tipper Trucks, 20 Laborers, Supervisor, 1 Paver ,7 Rollers, Operators,3 Foremen, Engineer
2.6.1	1170	Construct concrete curbs to laybys at tourist viewpoints	Construct concrete curbs to 10 laybys at tourist viewpoints as per design.	1150,1280,1290	1360,1370,1380	30	10 M^3 Concrete (varies), Concrete truck, Reinforcement-2 tons, 15 M^2 Formwork, 3 Laborers,

							Supervisor, 2 masons.
2.12.1	1180	Construct concrete curbs to laybys at bus stops	Construct concrete curbs to 30 laybys at bus stops as per design	1150,1280,1290	1360,1370,1380	90	20 M^3 Concrete (varies), Concrete truck, Reinforcement-2 tons, 15 M^2 Formwork, 3 Laborers, Supervisor,2 masons.
2.4.4	1360	Construct asphalt overlay to roads	Construct asphaltic concrete overlay to 18 km of road as per design.	1160,1170,1180	1390,1400,1410	45	130,000 M^2 Asphal-50mmt, Asphalt Pavers-1, 8 Laborers , Supervisor ,Engineer
2.6.3	1370	Place asphalt to laybys at tourist viewpoints	Place 75 mm asphaltic concrete over 10 laybys at tourist viewpoints	1160,1170,1180	1390,1400,1410	1	400 M^2 Asphalt-50mm, Asphalt Paver, Asphalt Paver Operator, 2

							Laborers , Supervisor
2.12.3	1380	Place asphalt to bus laybys	Place 75 mm asphaltic concrete over 30 bus laybys	1160,1170,1180	1390,1400,1400	3	1200 M^2 Asphalt-50mm, Asphalt Paver, 2 Laborers , Supervisor
2.11	1390	Construction of bus shelters	Undertake construction of 30 bus shelters as per architectural design	1360,1370,1380	1420,1430,1440	60	20 prefab structures.2 carpenters,2 masons,2 technicians, 1 small crane,engineer,operator ,1 pickup truck.
2.6.5	1400	Construct Amenities	Undertake construction of amenities to touristic viewpoints as per design.	1360,1370,1380	1420,1430,1440	60	10 prefab structures.2 carpenters,2 masons,2 technicians, 1 small crane,engineer,operator ,1 pickup truck.

2.12.4	1410	Erect signage to bus stops and tourist viewpoints	Undertake the placing of bus stops and tourist viewpoints signage as per signage schedule.	1360,1370,1380	1420,1430,1440	7	10 Traffic Signs, 10 Poles, 0.5 M^3 Concrete , 2 Laborers, Supervisor,1 tipper truck
2.9	1420	Erect vertical road signs	Undertake the placing of vertical road signs as per signs schedule.	1390,1400,1410	1450	30	1000Traffic Signs, 850Poles, 50 M^3 concrete, 5 Laborers, Supervisor,2 tipper trucks.
2.8	1430	Place road markings	Undertake the painting of road markings as per the road marking schedule.	1390,1400,1410	1450	60	10000 liters thermoplastic paint, 2 Road Marking Machines, Machine Operators, Supervisor
2.7	1440	Install traffic safety devices	Undertake the installation of traffic safety devices along 18 km of road.	1390,1400,1410	1450	60	2000 M Guard rails, 20 M^3 Concrete, Labourers-4,

							Supervisor, Engineer
1.2.3	1450	Issue taking over certificate	Prepare and issue the taking over certificate on substantial completion of the works.	1420,1430,1440	1460	1	Chief Resident Engineer
1.2.1	1460	Undertake supervision during defects liability period.	Undertake the supervision of all works during defects liability period, according to the consultancy agreement between the sponsor and the consultant.	1450	1470,1480,1490,1500	360	Resident Engineer
1.2.2.2	1480	Prepare final account for works contract	Undertake preparation of final account for the contracted work.	1460	1510	30	Quantity Surveyor, Chief Resident Engineer
1.2.2.3	1490	Prepare project closeout report	Compile the project closeout report for project sponsor.	1460	1510	30	Chief Engineer
1.2.2.4	1500	Issue performance certificate	Prepare and ssue the performance certificate on the fulfilment by the contractor of his obligations at the end of the defects liability period.	1460	1510	1	Chief Resident Engineer
1.2.2.1	1470	Prepare as built drawings	Compile and submit to the sponsor a complete pictorial representation via design drawings of all the completed works.	1460	1510	20	AutoCAD Technician, Chief Resident Engineer
1.2.2.5	1510	Close project office	Carry out the closing procedures for the project office.	1470,1480,1490,1500	None	7	Contractor ,Chief

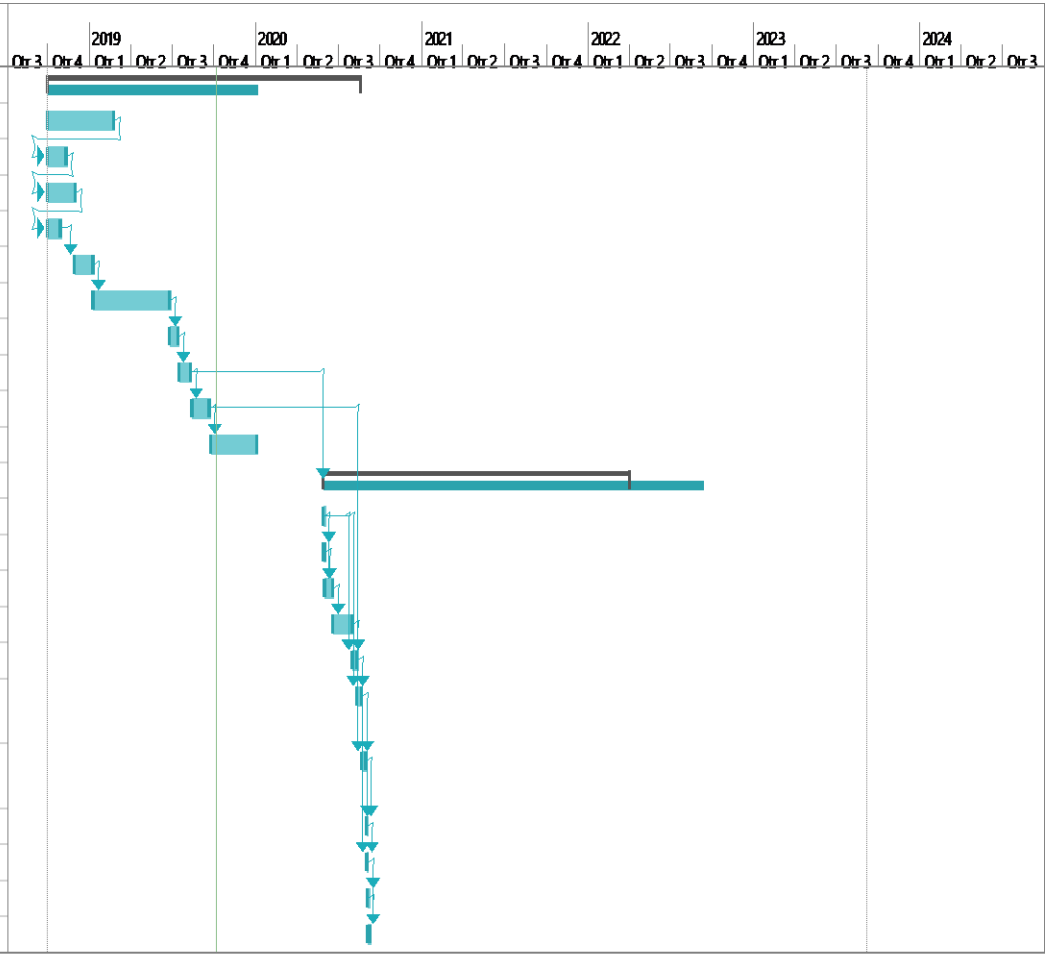
							Resident Engineer

4.3.5 Develop Schedule

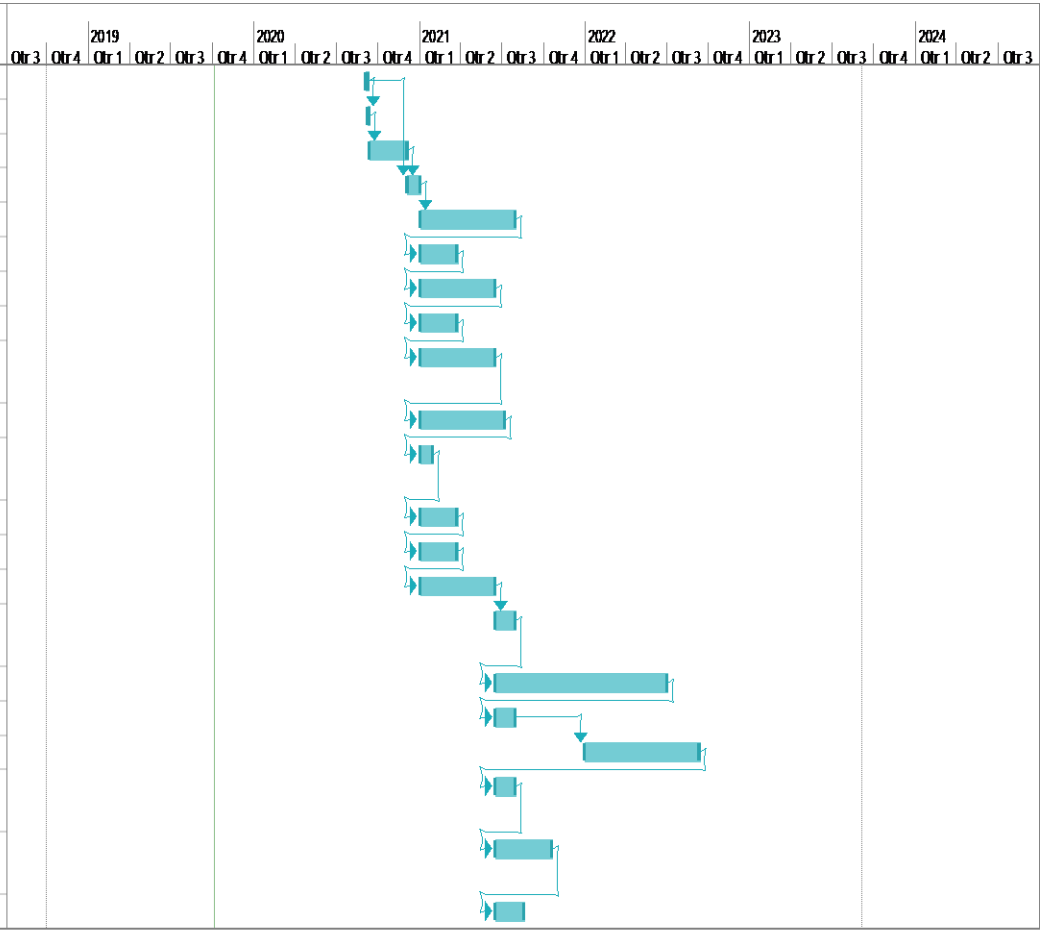
The schedule for the West Coast Road Rehabilitation Project was developed using MS Project 2013. For the develop schedule process activity sequences, durations, resource requirements and schedule constraints were analyzed to create the project schedule. The objective of developing a schedule is to allow the project team to be able to track the progress of the project at any point during its life cycle to ensure that the project adheres to the required time requirements. Start and finish dates were determined for each activity through consultations with all relevant stakeholders. The project team were assigned to the activities defined and this was validated against resource calendars to ensure that no conflicts existed in resource assignments.

The Project schedule for the West Coast Road Rehabilitation Project is depicted below:

ID	Task Mode	Task Name	Duration	Start
1		**Design Phase**	**491 days**	**Mon 10/1/18**
2		Procure consultants	105 days	Mon 10/1/18
3		Undertake traffic studies	30 days	Mon 10/1/18
4		Undertake topographic surveys	45 days	Mon 10/1/18
5		Undertake geotechnical studies	20 days	Mon 10/1/18
6		Undertake utility assessment	30 days	Tue 11/27/18
7		Undertake Engineering designs	120 days	Tue 1/8/19
8		Consult the public	14 days	Tue 6/25/19
9		Undertake cost estimate	20 days	Mon 7/15/19
10		Prepare bid documents	30 days	Mon 8/12/19
11		Procure works contractor	75 days	Mon 9/23/19
12		**Construction Phase**	**481 days**	**Thu 5/28/20**
13		Carry out kick off meeting	1 day	Thu 5/28/20
14		Supervise works	1 day?	Fri 5/29/20
15		Construct bridge foundation	14 days	Mon 6/1/20
16		Construct Bridge Abutment /Pier	30 days	Fri 6/19/20
17		Construct bridge bearings	7 days	Fri 7/31/20
18		Construct composite bridge support beams	7 days	Tue 8/11/20
19		Place steel reinforcement for deck and barriers	7 days	Thu 8/20/20
20		Place utility ducts in bridge deck	0.5 days	Mon 8/31/20
21		Construct concrete deck and barrie	1 day	Mon 8/31/20
22		Construct bridge joints	1 day	Tue 9/1/20
23		Construct asphalt overlay	3 days	Wed 9/2/20



ID	Task Mode	Task Name	Duration	Start
23		Construct asphalt overlay	3 days	Wed 9/2/20
24		Paint bridge	3 days	Mon 9/7/20
25		Build slope stabilization	60 days	Thu 9/10/20
26		Dig earthen drains	20 days	Thu 12/3/20
27		Construct lined drains	150 days	Thu 12/31/20
28		Repair concrete drains	60 days	Thu 12/31/20
29		Construct retaining walls	120 days	Thu 12/31/20
30		Repair masonry retaining walls	60 days	Thu 12/31/20
31		Construct road widening including ancillary works	120 days	Thu 12/31/20
32		Place road sub base	135 days	Thu 12/31/20
33		Place subbase/base in laybys at tourist view points	20 days	Thu 12/31/20
34		Place subbase/base in bus stops	60 days	Thu 12/31/20
35		Repair culverts	60 days	Thu 12/31/20
36		Reconstruct culverts	120 days	Thu 12/31/20
37		Relocate telecommunication infrastructure	30 days	Thu 6/17/21
38		Replace old infrastructure with ne	270 days	Thu 6/17/21
39		Relocate power lines	30 days	Thu 6/17/21
40		Place road base in road box	180 days	Fri 12/31/21
41		Construct concrete curbs to laybys at tourist viewpoints	30 days	Thu 6/17/21
42		Construct concrete curbs to laybys at bus stops	90 days	Thu 6/17/21
43		Construct asphalt overlay to roads	45 days	Thu 6/17/21



ID	Task Mode	Task Name	Duration	Start
41		Construct concrete curbs to laybys at tourist viewpoints	30 days	Thu 6/17/21
42		Construct concrete curbs to laybys at bus stops	90 days	Thu 6/17/21
43		Construct asphalt overlay to roads	45 days	Thu 6/17/21
44		Place asphalt to laybys at tourist viewpoints	1 day	Thu 6/17/21
45		Place asphalt to bus laybys	3 days	Thu 6/17/21
46		Construction of bus shelters	60 days	Sat 6/19/21
47		Construct Amenities	60 days	Sat 6/19/21
48		Erect signage to bus stops and tourist viewpoints	7 days	Sat 10/9/21
49		Erect vertical road signs	30 days	Tue 11/9/21
50		Place road markings	60 days	Tue 11/9/21
51		Install traffic safety devices	60 days	Tue 11/9/21
52		Issue taking over certificate	1 day	Tue 2/1/22
53		**Defects Liability Period**	**397 days**	**Mon 2/28/22**
54		Undertake supervision during defects liability period.	360 days	Mon 2/28/22
55		Prepare final account for works contract	30 days	Mon 7/17/23
56		Prepare project closeout report	30 days	Mon 7/17/23
57		Issue performance certificate	1 day	Fri 7/14/23
58		Prepare as built drawings	20 days	Mon 7/17/23
59		Close project office	7 days	Tue 3/28/23
60				

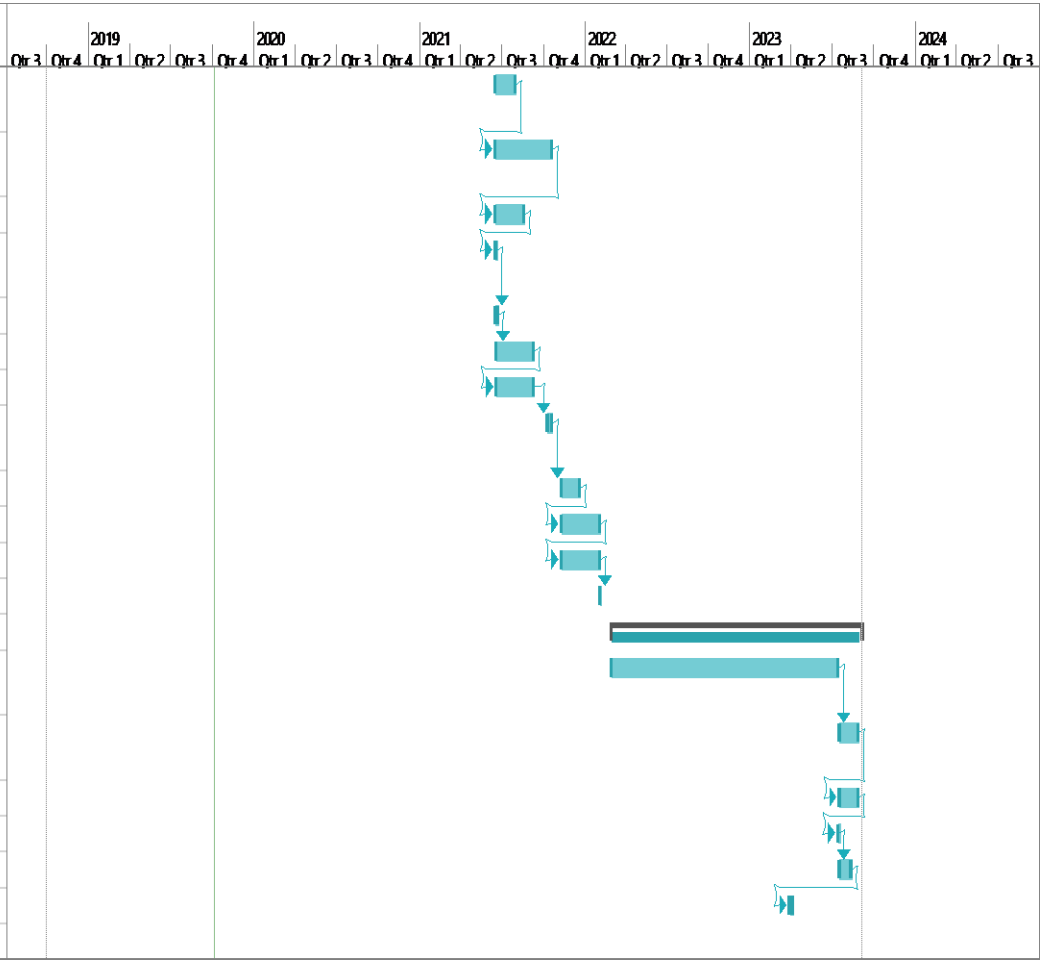


Figure 9: Ghantt Chart- West Coast Road Rehabilitation Project (Source: Compiled by author)

Based on the development of the schedule, the project will be completed within the allotted time frame assigned.

4.3.6 Control Schedule

The control schedule process defines how the project's schedule will be controlled throughout the life of the project. The project consultant and the contractor of the West Coast Road play a vital role in ensuring that the project remains as per the established schedule. The contract agreement between the Ministry of Infrastructure Ports, Energy and Labour and the consultant/contractor for the project destincively states the duration of the contract period for the established works to be conducted. Upon receiving bid documents, prospective consultants/contractors indicate their schedule for the execution of works. They are bounded by this contract and failure to comply to this schedule will result in penalties being imposed as defined by the contractual agreement between the MIPEL and the contract awardee.

The Project Manager will assume responsibility for reviewing and updating completion percentages to the schedule. They are to ensure that the contractor/consultant remains on schedule through monitoring the progress of works. Should any deviances be revealed, the MIPEL will convene a meeting to discusss the reasons for the delay. Should the need for a change in schedule arise an assessment of this potential change must be made to determine the impact on scheduled tasks, and how this change in schedule will impact cost, the duration of the project and the need for additional resources. Meetings will be held as deemed necessary with the project team to assess schedule variances. The Project Manager is ultimately responsible for the review and recommendation process for schedule requests and subsequently refers this to the Chief Engineer who either rejects the change request if it does not apply to the intent of the project or convenes a change

control meeting to review the change request further and perform a further impact assessment of the change to the schedule.

Upon acceptance of the change by the Change Control Board, the Project Manager will update all project documents and communicate the change to all project team members upon which the schedule will be re-baselined.

4.4 Project Cost Management

Cost Management Plan
West Coast Road Rehabilitation Project
Ministry of Infrastructure, Ports, Energy and Labour
Government of St. Lucia

The Cost management processes according to PMBOK®Guide are defined by the following processes:

- Plan Cost Management
- Estimate Costs
- Determine Budgets
- Control Costs

4.4.1 Plan Cost Management

The Plan Cost Management for the West Coast Rehabilitation Project will determine the cost of all the resources which are required to complete the project and establish the procedures and policies which are required by the project team to plan, estimate, and budget, manage, and control the cost of the project. (PMBOK®Guide 2016). In order to create the Cost Management plan, the project management plan, project charter, schedule management plan, risk management plan, enterprise environmental factors and the organizational process assets were utilized for the West Coast Road Rehabilitation Project. The tools and techniques utilized were data analysis, expert judgment which utilized cost analysis from previous road rehabilitation projects and meetings. The Plan Cost Management process provides guidance and direction to the Project Team on how the project costs should be developed and managed throughout the duration of the project.

4.4.2 Estimate Costs

The estimate costs process for the West Coast Road Rehabilitation Project will inform the total cost of all resouces needed to complete all of the required work for the project. The inputs for this process include the Project management subsidiary plans which included the quality management plan and the scope baseline. Project documents utilized for this process included the lessons learnt register, the project schedule, resource requirements and the risk register. Enterprise environmental factors and organizational process assets were also utilized for this process. The estimates for the project are calculated based on the predefined scope of the project. This process is conducted in collaboration with the Quantity Surveying unit of the MIPEL and conducted in consultation with the engineers of the Department through document briefs which entails the scope of works for the Project. The Project Manager and Chief Engineer oversees the process and ensures that the scope of the project is accurately assessed to estimate the required costs to determine the project budget.

The total cost for each individual activity was estimated using analogous estimating particularly based on the cost of recent past road projects conducted by the MIPEL. Unit costs of the required resources were multiplied by the number of days required to complete the activity. The example below shows the cost per resources required to calculate the cost for WBS Activity 1.14, Activity 250.

Activity Code	ITEM	Rate (EC$)
250	Geotechnical Engineer	1,750.00/day
	Technician (Geotechnical Investigation)	125.00/day
	Boring Machine (Rental)	2,500.00/day
	Truck (Geotechnical Investigation- Rental)	575.00/day

Figure 10: Activity 250 (Source: Compiled by author)

The total resources required for this activity are depicted below:

- Geotechnical engineer
- 4 Technicians,
- 1 boring machine,
- 1 truck.

The cost therefore for this activity with a duration of 20 days is shown below:

Activity Code	Quantity	ITEM	Rate (EC$)	Total Cost
250	1	Geotechnical Engineer	1,750.00/day	$35,000.00
	4	Technician (Geotechnical Investigation)	125.00/day	$10,000.00
	1	Boring Machine (Rental)	2,500.00/day	$50,000.00
	1	Truck (Geotechnical Investigation- Rental)	575.00/day	$11,500.00

	$106,500.00
Pro-rata Project Office Cost	$2,861.43
	$109,361.43

Figure 11: Activity 250 (Source: Compiled by Author)

This process to estimate cost was used for each activity in the workpackages for the West Coast Road Rehabilitation project based on the duration of the activity, required resouces and the rate for the resources. Totals for individual activities were tallied for the entire project and subsequently resulted in the toal budget for the project. This will be further shown in the determine budget process for the Cost Management plan.

4.4.3 Determine Budget

According to PMBOK®Guide, the determine budget process for a project is the process of aggregating the estimated cost of individual activities or work packages to establish an authorized cost baseline. The inputs for this process are the Project managament plans including the cost management plan, resource management plan and the scope baseline. The tools and techniques used in this process were expert judgement and the use of historical and financing information. This process led to obtaining the cost baseline for the project as well as updates to the project schedule and risk register for the project. The budget chart was compiled based on the cost estimates for each activity which can be subsequenty aggregated to obtain each individual wok package total for the project. It is assumed that contingency reserves and management reserves for the project are 10% and 3% respectively.

The budget for the project as per the activities according to the Work Breakdown Structure is seen in figure 12 below:

Activity Name	Resources/ (EC$)	Supervision (EC$)	Project Office Cost (EC$)	General Items for works contract (EC$)	Total cost (EC$)
Procure consultants	Included in project office cost.		$292,500.00		$292,500.00
Undertake traffic studies	$85,000.00		$2,283.77		$87,283.77
Undertake topographic surveys	$135,000.00		$3,627.16		$138,627.16
Undertake geotechnical studies	$106,500.00		$2,861.43		$109,361.43
Undertake utility assessment	$47,250.00		$1,269.51		$48,519.51
Undertake Engineering designs	$732,000.00		$19,667.27		$751,667.27
Consult the public	$42,350.00		$1,137.85		$43,487.85
Undertake cost estimate	$30,000.00		$806.04		$30,806.04
Prepare bid documents	$52,500.00		$1,410.56		$53,910.56
Procure works contractor	$58,125.00		$1,561.69		$59,686.69
Carry out kick off meeting	$3,025.00		$81.28		$3,106.28
Supervise works		N/A	N/A	N/A	N/A
Construct bridge foundation	$32,560.00	$2,110.20	$874.82	$1,538.07	$37,083.09
Construct Bridge Abutment /Pier	$84,700.00	$5,489.38	$2,275.71	$4,001.05	$96,466.14
Construct bridge bearings	$14,500.00	$939.74	$389.58	$684.95	$16,514.27
Construct composite bridge support beams	$121,140.00	$7,851.04	$3,254.77	$5,722.40	$137,968.22
Place steel reinforcement for deck and barriers	$108,000.00	$6,999.44	$2,901.73	$5,101.70	$123,002.87
Place utility ducts in bridge deck	$6,000.00	$388.86	$161.21	$283.43	$6,833.49
Construct concrete deck and barriers	$6,625.24	$429.38	$178.01	$312.96	$7,545.59
Construct bridge joints	$1,312.00	$85.03	$35.25	$61.98	$1,494.26
Construct asphalt overlay	$28,917.60	$1,874.14	$776.95	$1,366.01	$32,934.70

Paint bridge	$13,717.50	$889.03	$368.56	$647.99	$15,623.07
Build slope stabilization	$240,000.00	$15,554.32	$6,448.29	$11,337.10	$273,339.71
Dig earthen drains	$135,000.00	$8,749.30	$3,627.16	$6,377.12	$153,753.58
Construct lined drains	$261,500.00	$16,947.73	$7,025.95	$12,352.72	$297,826.39
Repair concrete drains	$46,300.00	$3,000.69	$1,243.98	$2,187.12	$52,731.78
Construct retaining walls	$82,886.00	$5,371.81	$2,226.97	$3,915.36	$94,400.15
Repair masonry retaining walls	$52,808.80	$3,422.52	$1,418.86	$2,494.58	$60,144.76
Construct road widening including ancillary works	$948,000.00	$61,439.56	$25,470.73	$44,781.55	$1,079,691.84
Place road sub base	$5,460,000.00	$353,860.75	$146,698.51	$257,919.04	$6,218,478.30
Place subbase/base in laybys at tourist view points	$92,800.00	$6,014.34	$2,493.34	$4,383.68	$105,691.35
Place subbase/base in bus stops	$100,800.00	$6,532.81	$2,708.28	$4,761.58	$114,802.68
Repair culverts	$12,980.00	$841.23	$348.74	$613.15	$14,783.12
Reconstruct culverts	$51,160.00	$3,315.66	$1,374.56	$2,416.69	$58,266.91
Relocate telecommunication infrastructure	$450,000.00	$29,164.35	$12,090.54	$21,257.06	$512,511.95
Replace old infrastructure with new	$2,269,956.70	$147,115.12	$60,988.88	$107,228.03	$2,585,288.73
Relocate power lines	$300,000.00	$19,442.90	$8,060.36	$14,171.38	$341,674.63
Place road base in road box	$15,663,743.60	$1,015,161.91	$420,851.26	$739,922.65	$17,839,679.43
Construct concrete curbs to laybys at tourist viewpoints	$22,880.00	$1,482.85	$614.74	$1,080.80	$26,058.39
Construct concrete curbs to laybys at bus stops	$30,460.00	$1,974.10	$818.40	$1,438.87	$34,691.36
Construct asphalt overlay to roads	$15,663,743.60	$1,015,161.91	$420,851.26	$739,922.65	$17,839,679.43
Place asphalt to laybys at tourist viewpoints	$35,200.00	$2,281.30	$945.75	$1,662.77	$40,089.82
Place asphalt to bus laybys	$105,600.00	$6,843.90	$2,837.25	$4,988.32	$120,269.47
Construction of bus shelters	$410,000.00	$26,571.96	$11,015.82	$19,367.55	$466,955.33

Construct Amenities	$255,000.00	$16,526.46	$6,851.30	$12,045.67	$290,423.44
Erect signage to bus stops and tourist viewpoints	$5,200.00	$337.01	$139.71	$245.64	$5,922.36
Erect vertical road signs	$520,000.00	$33,701.02	$13,971.29	$24,563.72	$592,236.03
Place road markings	$1,215.00	$78.74	$32.64	$57.39	$1,383.78
Install traffic safety devices	$125,000.00	$8,101.21	$3,358.48	$5,904.74	$142,364.43
Issue taking over certificate		$2,250.00	$0.00		$2,250.00
Undertake supervision during defects liability period.		$202,500.00	$702,000.00		$904,500.00
Prepare final account for works contract		$67,500.00	$58,500.00		$126,000.00
Prepare project closeout report		$0.00	$0.00		$0.00
Issue performance certificate		$2,250.00	$0.00		$2,250.00
Prepare as built drawings		$3,500.00	$0.00		$3,500.00
Close project office		$15,750.00	$13,650.00		$29,400.00
	$45,051,456.04	**3129801.7**	**$2,277,086.20**	**$2,067,117.47**	**52525461.41**

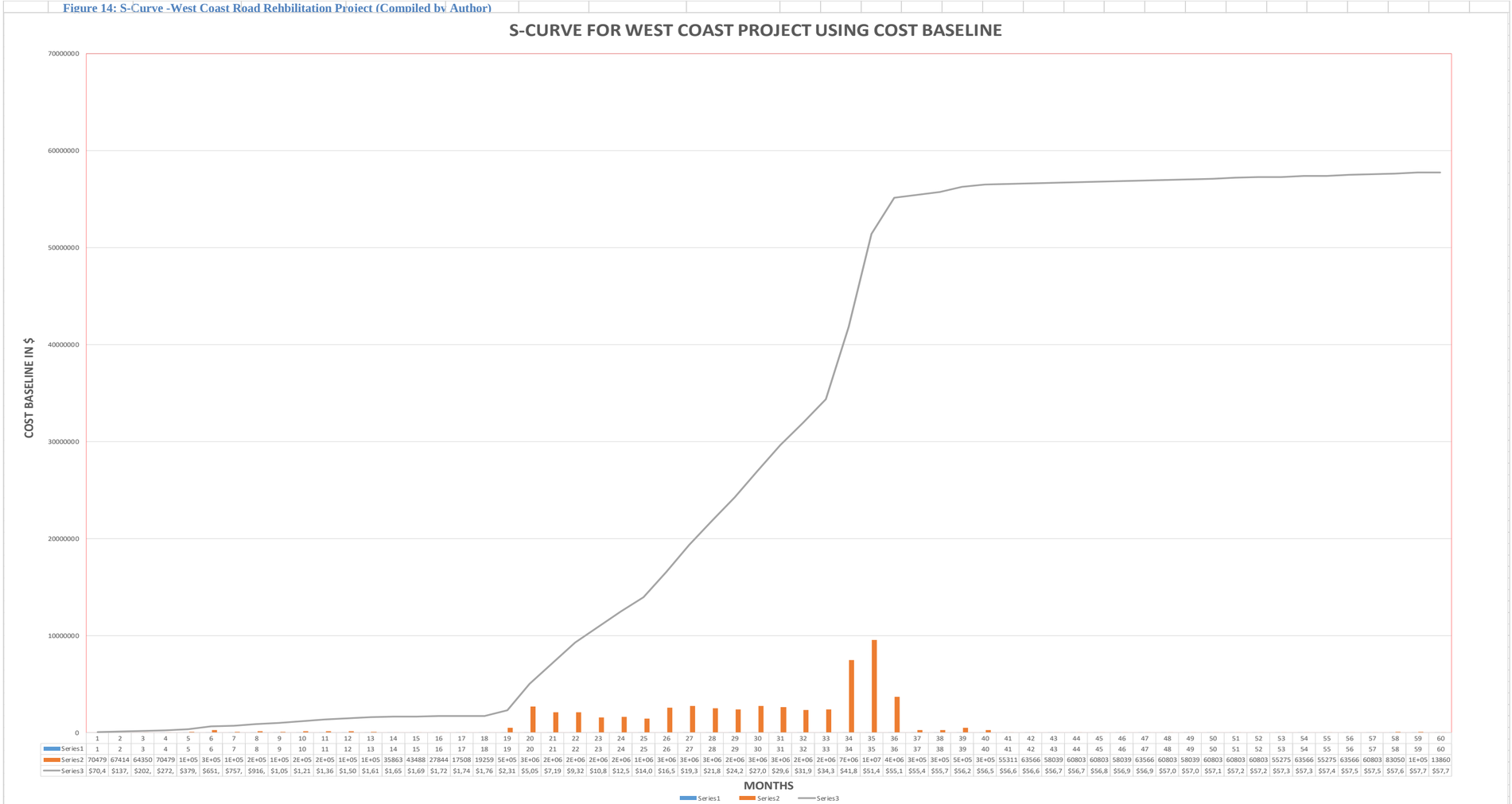
Figure 12: Budget List- West Coast Road Rehabilitation Project (Source: Compiled by Author)

Construction Costs	$43,759,706.04			
Supervision cost		$3,129,801.71		
Project Office Cost			$2,277,086.20	
General Items				$2,067,117.45
Design Cost	$1,291,750.00			
Base cost				$52,525,461.40
Contingency Reserve	10% of base cost			5,252,546.14
Management Reserve	3% of base cost			1,575,763.84
	Base cost plus contingency reserve of 10%- Cost baseline			$57,778,007.54
	Cost baseline plus management reserve of 3%- Project budget			**$59,353,771.39**

Figure 13: Allocation of Cost- West Coast Road Rehabilitation Project (Compiled by Author)

The cost estimates for the West Coast Road Rehabilitation project are directly linked to the schedule of activities for the project. This enables the development of the S curve for the project based on the time frame established for the project. The S-Curve for the West Coast Road Rehabilitation Project is presented in the diagram below. The S-curve shows that the project will be completed within the allotted time frame and budget as indicated in the underlying constraints of the project

Figure 14: S-Curve -West Coast Road Rehbilitation Project (Compiled by Author)



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Series1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Series2	70479	67414	64350	70479	1E+05	3E+05	1E+05	2E+05	1E+05	2E+05	2E+05	1E+05	1E+05	35863	43488	27844	17508	19259	5E+05	3E+06	2E+06	2E+06	2E+06	2E+06	1E+06	3E+06	3E+06	3E+06	2E+06	3E+06	3E+06	2E+06	2E+06	2E+06	7E+06	1E+07	4E+06	3E+05	3E+05	5E+05	3E+05	55311	63566	58039	60803	60803	58039	63566	60803	58039	60803	60803	60803	55275	63566	55275	63566	60803	83050	1E+05	13860
Series3	$70,4	$137,	$202,	$272,	$379,	$651,	$757,	$916,	$1,05	$1,21	$1,36	$1,50	$1,61	$1,65	$1,69	$1,72	$1,74	$1,76	$2,31	$5,05	$7,19	$9,32	$10,8	$12,5	$14,0	$16,5	$19,3	$21,8	$24,2	$27,0	$29,6	$31,9	$34,3	$41,8	$51,4	$55,1	$55,4	$55,7	$56,2	$56,5	$56,6	$56,6	$56,7	$56,7	$56,8	$56,9	$56,9	$57,0	$57,0	$57,1	$57,2	$57,2	$57,3	$57,3	$57,4	$57,5	$57,5	$57,6	$57,7	$57,7

KEY

MONTHLY COSTS

S-CURVE

PROJECT MONTHS

4.4.4 Control Costs

The Control cost function as defined by PMBOK®Guide allows for monitoring the status of a project to ensure that product costs adhere to the established cost baseline. This requires analysis and monitoring of the expenditures for the project. The key advantage of utilizing control costs is that it allows for monitoring of cost variances from the established plan and enables the Project Manager/ Project Team to take corrective action to reduce negative risk implications to the project.

The cumulative S-Curve is utilized during the process to control costs for the project. The claims submitted by the contractor to MIPEL for works performed will be plotted against the preliminary S-Curve to determine the actual deviations from the cost baseline. The Project Manager for the West Coast Road Rehabilitation Project will assume ultimate responsibility for controlling the costs of the Project and conduct monthly site meetings throughout the duration of the project.The cost variance for the project will be calculated as the difference between earned value (EV) and the actual costs (AC) of the project. It the variance for the project is equal to 0 the project is considered to be on budget, if the variance is negative the project is over budget and if positive the project is under budget.

Earned value metrics will also be utilized to analyze the project's cost using the following:

- Schedule Performance Index (SPI)
- Cost Performance Index (CPI)
- Schedule Variance (SV)
- Cost Variance (CV)

For the West Coast Road Rehabilitation projects, an SPI and CPI greater than one indicates that the Schedule Performance and Cost Performance are favourable

whilst and SPI and CPI calculation which is less than one indicates an unfavourable condition. An unfaourable SPI and CPI will prompt discussions amongst the Project Manager, Project Team as to the measures which are needed to control costs for the project.

Should the project deviate from the cost baseline requirements and change requests are required to accommodate costs, this would need to be authorized based on its value by either the Chief Engineer, Permanent Secretary or the Change Control Board. Rescoping may also be considered, contingency or management reserves utilized or other financing initiatives would have to be sourced to meet the project costs. The following table highlights the change classification and authority.

Change Classification and Authority

Classification	Authority
Minor – up to EC$50,000.00	Chief Engineer
Major – $50,000.00 - $100,000.00	Permanent Secretary
Critical – over EC$100,000.00	Change Control Board

Figure 15: Change Classification and Authority West Coast Road Rehabilitation Project (Compiled by Author)

4.5 Project Quality Management

Quality Management Plan
West Coast Road Rehabilitation Project
Ministry of Infrastructure, Ports, Energy and Labour
Government of St. Lucia

The Quality Management processes according to PMBOK®Guide are defined by the following processes:

- Plan Quality Management
- Manage Quality
- Control Quality

4.5.1 Plan Quality Management

The Plan Quality Management process for the West Coast Road Project involves identifying the requirements which are necessary to ensure that quality requirements and standards are incorporated into the project. The consequences of non-adherence to a quality management plan into a road project can have negative spillover effects including economic losses, escalated costs, accidents, higher operational vehicle costs for motorists and reputational risks for all parties involved in the project particularly the Ministry of Infrastructure, Ports Energy and Labour who are charged with the responsibility of providing a superior road network for citizens of St. Lucia.

The inputs used for this process were the Project Charter, Project documents, enterprise environmental factors and organizational process assets. The tools and techniques utilized during the process were expert judgment, data analysis and meetings. The Plan quality management process determines the quality which must be established throughout the entire project life cycle. The West Coast Road Project must adhere to the International Highway and road codes, FIDIC for road

construction management, HDM4 for road planning and assessment and the works must be undertaken as per British and AASHTO's Standards as directed by the Department of Infrastructure, Ports Energy and Labour. The quality management plan for the West Coast Road Project will define how quality will be managed, controlled, the activites involved, assign responsibilitites for managing quality and ensure that quality standards are adherered to as a critical component of the Project management plan for the project.

4.5.2 Manage Quality

The Manage quality process is the ultimate responsibility of the Project Engineer and Project Manager of the Ministry of Infrastructure Ports Energy and Labour and the Consultant who are held accountable to ensure that the established quality assurance plan is complied with and remains compliant with the works conducted during the project. This refers to quality requirements which must adhere to the established standard as it relates to the quality standards for all aspects throughout the duration of the project life. This is to ensure that all of the works carried out during the road construction period meet the highest establish standards. All contractors must have a Quality Assurance Plan which must be approved by the MIPEL and validated throughout the project. The inputs for the manage quality process are the subsidiary project management plans, organizational process assets, project documents which include the lessons learnt register, quality control measurements and the quality metrics for the project. Quality management involves identifying and following quality requirements, auditing the results of quality control measurements and using quality measurements to control quality, recommending

changes if necessary. The following list indicates some of the quality requirements which must be maintained during the West Coast Road Rehabilitation Project:

- The hydraulic design of drainage structures and bridges must be resilient and cater for climate change impacts.
- Construction shall be in accordance with the UK National Design Standards and Guidelines (Design Manual for roads and bridges) and specifications for Highway Works developed by the UK Department of Transport.
- Works shall be undertaken in accordance with the Works and Roads Act of Saint Lucia.
- All Contractors must have a Health and Safety Plan which conforms to ILO (International Labor Organization) rules.
- All works must conform to existing Environmental and Social Policy.
- Execution of the Project must be done in conformity with the Environmental Management plan.
- Deconstruction and disposal of waste must to be in accordance with existing Waste Management Policy.
- Construction must be carried out in such a manner so as to minimize inconvenience to all road users.
- Testing of materials must be conducted to meet the established standards.
- The Geometric Designs of the project must be in accordance with the UK Transport and Road Research Laboratory (TRRL)-Road note 6 and AASHTO (American Association of State, Highway and Transportation Officials) standards.

The Project Engineer assisted by the project team and supervisory consultant will perform daily audits of the works being undertaken and the various metrics defined as part of the quality requirements. Should non-conformance be discovered, this will be conveyed to the contractor of the project as often as required throughout the project life cycle to ensure all processes are complied with according to the quality

management plan. The tools and techniques utilized during this process are check sheets, meetings and site visits.

4.5.3 Control Quality

An iterative quality process will be utilized throughout the project life-cycle and will include measuring process metrics and performing analysis of that data which ensures that quality standards are being maintained and to provide information for the improvement of quality processes where required. The control quality process ensures that compliance is maintained for the products and services being delivered for the West Coast Road Rehabilitation project. Conformance must be maintained based on the guidelines established during the plan quality management process.

The control quality process assesses whether the products and services which are being utilized on the project meet the baseline quality requirements. In order to control quality site inspections are conducted by the Project Engineer/ Supervisory consultant to monitor works in progress. This is to ensure that the works are being constructed according to the quality specifications detailed in the terms of reference and agreed to between both parties via the contractual agreement. Materials, equipment and methods shall comply with the standards the relevant British Standards and Codes of Practice.

Material samples will be taken prior to the commencement of works and subsequently, tested in accordance with the relevant British Standards where applicable. Testing is a critical component which is utilized to control quality on the project. For the West Coast road Project Testing assessments are conducted using the Materials and testing laboratory located at the Ministry of Infrastructure, Ports Energy and Labour. Deliverables must be measured and adhere to the established

standards and tolerance levels for the quality requirements. Among the tests being conducted to control quality on the West Coast Road Rehabilitation Project are:

- Asphalt tests,
- Gradiation Tests,
- Hardness on Aggregate Tests,
- Flakiness Index,
- Compressive strength of Concrete,
- Slump Tests,
- California Bearing Rate (CBR) test.

Quality control tests are conducted by the MIPEL are used to test the defined metrics econcompassing those listed above. The test below is a sample asphalt test conducted at the MIPEL to ensure that the asphalt tests meet the established quality benchmarks. The values highlighted in green indicates the acceptable values for the test conducted. In this instance the asphalt test was successful. However, in instances where the established values are not met the Project Engineer/ Project Manager will inform the supervisory consultant/contractor who must take corrective action to ensure that the acceptable levels are complied with for the tests.

Project: West Coast Road Rehabilitation Project

Sampled by : Site Personnel

Quality tests performed on Asphalt

Sample Date	Location	Bitumen Content %	Bulk Density mg/mg3	V. M. A %	Air Voids %	Voids Filled %	Stability Kn	Flow mm	Percentage Passing BS Test Sieves		Stability Flow Ratio Kn/mm
									0.15	0.075	
16/09/19	LHS	6.3	2.311	14.9	3.9	73.5	14.9	3.2	9.6	5.2	4.5
16/09/19	RHS	6.9	2.301	16.5	4.3	74.2	16.2	3.5	9.9	5.5	4.6
16/09/19	LHS	6.4	2.324	14.9	3.3	77.5	13.7	3.2	9.1	5.1	4.3
16/09/19	RHS	7	2.294	16.9	4.4	73.6	17.4	3.4	10	5.7	5.1
Specified Limits		5. 0-7.0	> 2	>13	3. 0-5. 0	65-75	>8.0	2.0 -3.5	8.0 - 16.0		4.0 - 10.0

Figure 16- Asphalt Quality Control Test e.g- West Coast Road Rehabilitation Project (Compiled by Author)

The following Quality assurance log will be used to assess other varying quality requirements needed for the project.

Quality Assurance log							
Date	Process Measured	Required Result	Actual Result	Acceptable? (Y/N)	Comments/Recommendations	Responsibilty	Date Rectified

Figure 17- Quality Assurance log- West Coast Road Rehabilitation Project (Compiled by Author)

4.6 Project Resource Management

Resource Management Plan
West Coast Road Rehabilitation Project
Ministry of Infrastructure, Ports, Energy and Labour
Government of St. Lucia

The Resource Management processes according to PMBOK®Guide are defined by the following processes:

- Plan Resource Management
- Estimate Activity Resources
- Acquire Resources
- Develop Team
- Manage Team
- Control Resources

4.6.1 Plan Resource Management

The Resource component is the one of the most integral aspect of the West Coast Road Rehabilitation Project. This process will detail the methodology used for the recruitment of the human resources for the project and the management strategy to be utilized as well as the processes required to identify and aquire all other resources needed to successfully undertake the project. It is critical that this process be carefully and accurately planned to ensure that the right personnel with the most applicable skills are assigned to the project tasks and that staff are managed to meet the established goals of the project. The Project Manager is responsible for the

Human Resource functions and for recruiting, motivating, developing competencies and the skills sets of the team. The definition of roles and responsibilities serves as a means to clarify decision making responsibilities, sources of authority, communication to appropriate individuals, and accountability for project deliverables. A flat structure which allows for efficiency is used for this project. Trained professionals are expected to be available for the duration of the project. The consultant and the contractor as per the contractual agreement for the project are responsible for providing all human resources, equipment and material which are required to undertake the works being undertaken as defined by their respective contractual obligations to the project.

The inputs required to undertake this process are the scope baseline, project documents, enterprise environmental factors and organizational process assets whilst the tools and techniques required for the process are expert judgement, utilizing organizational theory and meetings. The chart below shows the RACI chart by the MIPEL. This RACI chart shows the relationship between roles and responsibilities as it relates to project assignments and the human resources assigned.

Chart 9 RACI Chart (Source: A. Providence, Author, and September 2019)

	Permanent Secretary	Chief Engineer	Project Specialist	Project Manager	Consultant/Contractor	Project Team
Feasibility Studies and Designs	A	C	I	C	R	I
Road Safety Assessment	A	C	I	C	R	C/I
Change Requests	A	C	C	R	I	I
Procurement – Construction And Supervisory Consultant	A	C	C	R	I	I
Road Construction	A	C	C	C/I	R	C/I
Recruitment of staff	A	R	I	C/I	I	I
Project Monitoring and Oversight	A	C	I	R	I	C/I
Site Management	A	C		A		I
Project Communications	A	I		A	I	I
Stakeholder Management	A	I		A	I	I

Key

R	Responsible	Human Resource who performs work
A	Accountable	Human Resource who is ultimately Accountable
C	Consulted	Human Resource that needs to provide feedback and contribute
I	Informed	Human Resource that needs to know of the decision or action

4.6.2 Estimate Activity Resources

The Estimate Activity Resources process will be carried out solely for the Human Resource aspect of the project using the inputs of the Project Management Plan including the resource management plan and scope baseline, projects documents enterprise environmental factors as well as organizational process assets. The tools and techniques are data analysis, expert judgment and meetings. The Lessons learnt from past road projects will also be used as a guide to inform the Human Resource personnel who are needed for the project. The consultants and contractors procured to complete designs and civil works for the project will be solely accountable for ensuring that their Human Resource capabilities, materials equipment and all other resources required to complete their works are estimated accurately in order to successfully complete the project tasks.

4.6.3 Acquire Resources

The acquire resources process according to PMBOK®Guide is the process which involves the acquisition of all the resources which are needed to complete the project. This process is performed periodically during the life cycle of the project. For the purpose of the West Coast Road rehabilitation project, the resources which are to be acquired are the Human Resources for the project. All other resources which are required to complete the project will be provided by the consultant/ contractor who is procured to complete construction of the design/ works involved for the project. Regarding the Human Resource Personnel required for the project by the MIPEL, Civil Servants with the requisite qualifications for the various positions will be appointed on a short term basis as required to work on the project. Where civil servants cannot be identified the vacant position will be advertised externally to identify a suitable candidate for the desired post.

The diagram shows the planned Human Resource Chart for the project.

Chart 10 Human Resource Chart 1 (Source: A. Providence, Author, September 2019)

Human Resource Title	Description of Role	Qualifications Required
Permanent Secretary	Responsible for the overall administration and management of the Ministry of Infrastructure, Ports, Energy and Labour	MSC Accounting/ Business Administration + 15 years progressive ecperience in the government service
Project Manager	Oversees the effective and timely achievement of project delivery through efficient coordination of project implementation	MSc Engineering + 5 years'experience in the management of civil engineering project
Chief Engineer	Overall supervision of Engineers and consultancy/contractual works.	MSc Engineering + 10 years'experience in the management of civil engineering project
Project Engineer (s)	Assists the Project Manager in the revision of infrastructure works, supervisión of engineering consultation and administration of contracts	BSc Civil Engineering + 7 years in engineering design supervision and project implementation

Project Specialist	Supports the Project Manager in the development of project systems, tools and team capacity development to advance efficient project implementation and delivery	MSc in Social Sciences plus certification project management + 5 years project management experience
Monitoring and Evaluation Officer	Develops monitoring and impact indicators for the project success; monitoring systems, monitor and evaluate overall progress on achievement of results;	BSc Business Administration, Economics or related field. At least 5 years of experience in the design and implementation of projects
Community Liaison Officer	Responsible for the formulation and implementation of the project stakeholder participation plan, communication strategies and gender awareness	BSc in social sciences or mass communication + 7 years' experience in stakeholder assessment
Administrative Assistant/Accounting Officer	Provides administrative support for the efficient operation and keeping accounting records of the Project Unit	BSc in Management Studies or equivalent plus two (2) experiences in a post at Grade 10

Typical Resources (Human Resources/ Materials and Equipment) required for the consultancy and contractual works include:

Chart 11 Human Resource Chart 2 (Source: A. Providence, Author, September 2019)

Human Resources
• Project Manager
• Traffic Engineer
• Traffic Counters
• Traffic Count Survey Technician
• Engineering Surveyors ,
• Survey Technician
• Geotechnical Engineer
• Technician (Geotechnical Investigation)
• Utilities Engineer
• Technician (Utilities)
• Team leader (Designs)
• Design Engineer
• CAD Technician
• Team Leader
• Quantity Surveyor
• Quantity Surveying Team
• Team Leader/ Chief Resident Engineer
• Resident Engineer

Materials /Equipment	
• Boring Machine	• Concrete
• Truck (Geotechnical Investigation-)	• Reinforcement
• Formwork	• Formwork
• Steel	• Relocate Telecom Services
• Bearing Pads	• Replace Old Water Infrastructure
• Concrete	• Asphalt -50mm
• Formwork	• Prefabricated Structure
• Steel (15 tons)	• Signs (Bus stops +Tourist view points)
• Bridge Joints	• Traffic Signs
• Asphaltic Concrete – 75mm	• Road Marking
• Painting	• Guardrails
• Geogrid	
• Vertivert	
• Formwork	
• Rubble	
• Concrete	
• Crusher Run -200mm	
• Asphalt -125mm	

Chart 12 Materials and Equipment (Source: A. Providence, Author, September 2019)

4.6.4 Develop Team

The Project Manager will facilitate capacity development and team enhancement activities to promote cohesion and a conducive environment to advance efficient project delivery. The inputs required for the develop team process includes project team assignments, resource calendars, resource management plan, enterprise environmental factors and organizational process assets. The tools and techniques include meetings, interpersonal and team skills namely conflict management, motivating, negotiating and team building activities. The team development strategies also include, but however will not be limited to monthly team meetings and internal or external training workshops to enhance the skills set of the project team. A team collaboration platform will be used to support productivity and team communication.

4.6.5 Manage Team

The process of managing the project team will address management functions associated with communication, recognition and assessment of team objectives. The Project Manager is tasked with the responsibility of managing the project team and ensuring success of the human resource activities for the project during the project's life cycle. At the onset of the project, the Project Manager will communicate with the team members to inform them of all expectations of the work to be performed. The Manager is also responsible for evaluating each team member's performance, assess how effectively they are completing their tasks and provide feedback to the team members. The Recognition and rewards of staff members will be manifested through salary payments and a staff recognition session at the end of the period.

4.6.6 Control Resources

The control resources function will ensure that the Resources required for the completion of activities on the project will be available when needed to ensure that the project is being executed according to plan. This process will be performed by the Project Manager during the entire project life cycle to ensure that all assigned Human Resources are available and where shortfalls exist, to ensure that required staff are hired to achieve the completion of works for the successful outcome of the project. Acoountability to ensure that resources for contractual works are fulfilled resides with the consultant/contractor for the West Coast Road Rehabilitation Project.

4.7 Project Communications Management

Communications Management Plan
West Coast Road Rehabilitation Project
Ministry of Infrastructure, Ports, Energy and Labour
Government of St. Lucia

The Communications Management processes according to PMBOK®Guide are defined by the following processes:

- Plan Communications Management
- Manage Communications
- Monitor Communications

4.7.1 Plan Communications Management

The PMBOK®Guide 6th edition describes Project Communication Management as “the processes required to ensure timely and appropriate planning, creation, distribution, storage, retrieval, management, control, monitoring and the ultimate disposition of project information. Plan Communications Management is the process of developing an effective communications methodology for project communications based on all stakeholder needs and requirements during the project. In order to create the Plan Communications Management for the West Coast Road Rehabilitation Project, the inputs required includes the stakeholder register, project management plan, organizational process assets, and enterprise environmental factors. The Plan communications process is crucial to the success of the project as frequent and timely communication engaging all stakeholders of the project is essential to keep everyone informed and to assist in eliminating project mishaps which will negatively affect project outcomes.

Accurate communication through the appropriate channels allows for project issues to be communicated efficiently. Plan Communications Management is vital to ensure a successful project outcome.

A meeting with the Project Manager for the West Coast Road Rehabilitation Project revealed the following communication strategy depicted in the communications Matrix below as a guide to inform the management of communications for the project. Though the communication matrix depicts the medium for the type of communication required, this may vary during the project depending on the sensitivity and urgency to share the information.

Chart 13 Communications Matrix (Source: A. Providence, Author, September 2019)

Stakeholder	**Information needs - messages**	**Responsibility/ Owner**	**Communication deliverable**	**Medium**	**Frequency**
Policy Directorates	Project progress, issues management and national impact	Project Manager	project briefings, summary reports	Face to Face	Monthly

Donor Agencies	Project progress, issues management and national impact	Project Team	Progress reports, project review mission, emails	Face to Face/Email	As required
Permanent Secretary/Chief Engineer – MIPEL	Project progress, issues management and national impact	Project Manager	project briefings, progress reports	Face to Face	Daily
Motorists /Mini Bus & Taxi Drivers	Project progress and benefits	Project Team	public service announcement, press notifications, town hall meetings	Face to Face/ Meetings	Monthly
Political Interest Group	Project progress and benefits	Project Manager/ Chief Engineer	public service announcement, press	Face to Face/ Emails	As required

			notifications, town hall meetings		
Pedestrians	Project progress and benefits	Project Team	public service announcement, press notifications, town hall meetings	Face to Face/ Emails/ Media communication	Bi-weekly
Micro Enterprise owners	Project progress and benefits	Project Manager	Public service announcement, press notifications, town hall meetings	Face to Face/ Emails/ Media communication	Quarterly
St. Lucia Hotel and Tourism Authority	Project progress and benefits	Project Manager/ Chief Engineer	Public service announcement, press notifications, social media,	Emails	Monthly

			town hall meetings		
Medium and Large business owners	Project progress and benefits	Project Team	public service announcement, press notifications, social media, town hall meetings	Emails	Monthly
Home & Land Owners & Crop Owners	Progress and impact on property	Progress Manager/Project Team/Chief Engineer	public service announcement, press notifications, social media, meetings	Face to Face	Monthly
Community groups	Project progress and benefits	Project Team	public service announcement, press notifications,	Face to Face/ Media communication	Monthly

			social media, meetings		
Government agencies	Project progress and national impact, avenues for collaboration	Project Manager	Progress reports/project briefing/steering committee	Face to Face/ Emails/ Media communication	Weekly
District Representatives	Project progress and national impact	Project Manager/ Chief Engineer	public service announcement, press notifications, meetings	Face to Face/ Emails/ Media communication	Bi-Weekly
Visitors	Project progress and safety measures	Project Team	press notifications,	Media communication	Monthly
Project Implementation Unit (PM Office)	Project progress, issues	Project Sponsor/ Project	Progress reports, progress meetings	Face to Face/ Emails	Weekly

	management and national impact	Manager/ Chief Engineer			
Project team	Project progress, issues management and national impact, team development	Project Manager	Team meetings, progress reports, team collaborative platforms	Face to Face/ Emails	Daily
Consultant/Contractor	Project information and profile	Project Manager/ Project Team/ Chief Engineer	Correspondence and meetings	Face to Face/ Emails	Daily

4.7.2 Manage Communications

Effective and timely communication is required amongst all team member and stakeholders of the project. The Communications Matrix for the West Coast road project is utilized as the primary reference tool to manage communications for the project as it contains the type of information which must be communicated, the frequency of communication, and the Human resource personnel assigned responsibility for dissemination of the information to the appropriate audience. The need for any spontaneous communications during the duration of the project are executed as necessary by the Project Manager who assumes ultimate responsibility for the communications strategy by creating, distributing, and storing the required information for the project. The Project Manager ensures that there is timely, efficient and effective flows of communication between the Project Team and all stakeholders of the Project.

4.7.3 Monitor Communications

The objective of the Monitor communications process for the West Coast Road Rehabilitation project is to ensure that the communications plan is meeting the established objectives. The Monitor Communications process for the project is performed throughout the project's life cycle and is the primary responsibility of the Project Manager who ensures that each stakeholder is communicated with in the established manner. This process ensures that communication plans are deriving the desired benefits and reaching the intended audience in the most effective and useful manner. The monitoring communications process may reveal the need to amend aspects of the communications strategy to better satisfy the needs of the intended audience by changing the communication channels or the frequency of the information as deemed necessary by the Project Manager.

4.8 Project Risk Management

Risk Management Plan
West Coast Road Rehabilitation Project
Ministry of Infrastructure, Ports, Energy and Labour
Government of St. Lucia

The Risk Management processes according to PMBOK®Guide are defined by the following processes:

- Plan Risk Management
- Identify Risks
- Perform Qualitative Risk Analysis
- Perform Quantitative Risk Analysis
- Plan Risk Responses
- Implement Risk Responses
- Monitor Risks

4.8.1 Plan Risk Management

Plan risk management is the process of determining how risk will be managed throughout the project's life cycle for the West Coast Road Rehabilitation Project. A risk as defined by PMBOK®Guide is an uncertain event that may or may not occur. The purpose of the risk management plan for the West Coast Road Rehabilitation project is to establish the framework in which the project team will identify risks and develop strategies to accept, mitigate, transfer or avoid those risks. This process will be conducted at the inception of the project and at various intervals during the project. The Project Charter, Procurement documents, Stakeholder register, Activity cost, Activity durations, organizational process assets and enterprise environmental factors are used as inputs to the process.

Expert Judgement and meetings are the tools utilized during the risk plan risk management process. The plan aims to identify, analyze, monitor and control risk throughout the West Coast Road Rehabilitation Project to eliminate any negative implications to the project and maximize any opportunities which may exist.

4.8.2 Identify Risks

The identify risk process was conducted by all Project Team members for the West Coast Road Rehabilitation Project. During this process, team members engaged in identifying all risks to the project, the nature of the risks identified and the sources of the risk. The inputs for this process included all subsidiary project management plans whilst the tools and techniques utilized were data gathering and data analysis which included checklists, SWOT analysis, meetings, interviews and brainstorming. The risk register for the West Coast Road Rehabilitation Project will be created and maintained by the Project Manager. The identify risk process is an iterative process required throughout the project as new risks can emerge at any stage during the project's life cycle. The MIPEL Project Team has identified risks under the following Risk Categories for the West Coast Road Rehabilitation Project:

- Construction
- Design
- Financial
- Site

4.8.3 Perform Qualitative Risk Analysis

The Perform qualitative risk analysis for the project were conducted by the project team lead by the Project Manager and resulted in the prioritization of risks and the assessment of their probability and impact on the overall project. For this process the risk register, assumption log, Enterprise environmental factors and organizational process assets were utilized as well as project documents and the subsidiary project management plans. The risk assessment was further conducted using a probability and impact matrix. The project team will review, update and strategize for project risks and issues at scheduled team meetings or as determined by the Project Manager.

The tables below summarizes the classification of probability and the classification of impact for the West Coast Road Rehabilitation Project. The risk register was utilized to document information and to prioritize risks by amalgamating the probability of occurrence and impact of the risk.

The red zone represents high risks/impacts, the brown zone represents average risks/impacts and the blue zone represents low risks/impacts. Expert judgement and meetings were utilized to determine which risks can be categorized as having a high, medium or low probability or impact on the project. This was solely based on subjectivity by all participants.

Classification of probability		
Level	Value	Meaning
High	3	There are risk factors (previous experience or evaluation results) which together indicate a high probability of occurrence.
Average	2	The risk could occur, but there are no factors indicating high likelihood of occurrence
Low	1	Experience makes it possible to conclude that the possibility of risk occurrence is low, or it may not provide sufficient basis to consider it an average or higher

Figure 18: Classification of Risk Probability- West Coast Road Rehabilitation Project (Source: Compiled by Author)

Classification of Impact		
Level	Value	Meaning
High	3	Critical effect on project results and sustainability
Average	2	Although the consequence is considered significant, its significance is less than in the high level
Low	1	The effect is not considered significant, or there are insufficient reasons to believe that the risk is a threat to the results

Figure 19: Classification of Risk Impact- West Coast Road Rehabilitation Project (Source: Compiled by Author)

4.8.4 Perform Quantitative Risk Analysis

The inputs for this process are the subsidiary project management plans, project documents, enterprise environmental factorsand organizational process assets. This process requires the quantitative analysis for risk exposure and risk analysis and

provides objectivity and evidence to support the type of risk response which is needed to plan risk for the West Coast Road Rehabilitation project. For the purpose of this project, Perform quantitative risk analysis was not utilized as the MIPEL does not contain the required capacity to perform this analysis.

4.8.5 Plan Risk Responses

The plan risk response process is the process during the planning of the West Coast Road Rehabilitation project where appropriate actions and strategies are devised by the project team to respond to the risks identified. During this process risk owners are also identified for the risks to address any threats they may pose or to maximize any opporunities. Appropriate risk responses are critical to the success of the project as they can lead to the minimization of threats which will negatively affect the outcome of the project. Similarly, inappropriate risk responses can have adverse effects on the project. In order for this process to be realized, meetings were held with the project team to devise the risk actions which were needed. Project management plans, project documents, expert judgement, data gathering and organizational process assets were the tools and techniques which were used.

The appropriate risk responses for dealing with the threats to the project are listed below:

Chart 14 Risk Register with prioritization and responses (Source: A. Providence, Author, September 2019)

Date	Risk	Risk Category	Probability	Impact	Total Risk Score	Risk Priority	Risk Response	Risk Owner
22/09/19	Possibility of a cost overrun during the construction phase	Construction	3	3	9	High	Risk avoidance: Follow the cost baseline. Risk transfer: The contractor will need to assume the additional costs.	Project Manager
22/09/19	Delays might occur during the construction phase, caused by the State or by the contractor. This affects the cost and schedule of the projects.	Construction	3	2	6	High	Risk mitigation: In case it is caused by the State, there are mechanisms required to both allow extensions of time to the contractor to complete its construction obligations and grant compensation to the contractor.	Project Manager

22/09/19	Labor disputes might happen during the project and might affect performance in different stages.	Construction	2	1	2	Low	Risk transfer: In case the delay is caused by the contractor, the MIPEL should be able to veto if the delays result in requirements not met.	Chief Engineer
22/09/19	There could be delays because of defective materials.	Construction	1	1	1	Low	Risk transfer: Having insurance on the materials.	Chief Engineer
22/09/19	Natural disasters may occur during the construction phase and cause delays and or loss of resources.	Construction	3	2	6	High	Risk transfer: Having insurance for this kind of scenarios so compensation of material damages can be applied.	Project Manager

22/09/19	Delays in preliminary approvals including Environmental Imapact Assessments, Utility Assessments	Design	1	2		Low	Risk avoidance: Responsible organizations and Utility companies to be engaged very early in the design process to allow for input of their concerns into the designs.Since it is only the Department of Physical Planning that can compulsorily acquire land the application for the consents required for that acquisition will be carried out through that Department. The level of expropriation is to be determined early in the design exercise.	Project Manager
22/09/19	Detailed Design approvals and consents might be delayed and might cause cost increases or and cancellation of Project.	Design	2	3	6	High	Risk avoidance: Monitor and control the schedule baseline of the project. Risk mitigation: communicating in advance any possible circumstances that might delay the construction phase.	Project Manager

22/09/19	Delay in final approval of detailed construction drawings that could result in increased cost of design or delay of the project.	Design	2	2	4	Average	Risk avoidance: Monitor and control the schedule baseline of the project.Risk mitigation: communicating in advance any possible circumstances that might delay the construction phase	Chief Engineer
22/09/19	Changes in design and construction standards once the construction has started.	Design	3	2	6	High	Risk avoidance: early identification of likely changes to incorporate them before the start of works. Risk transfer: MIPEL must assume the risk if the original design was defective.	Chief Engineer
22/09/19	Volatility in foreign currencies can affect payments to contractors, consultants and suppliers.	Financial	2	1	2	Low	Risk mitigation: Contract will include clause for fixed currency conversion during contract period.	Project Manager
22/09/19	There are additional lands that could be necessary for the construction.	Site	2	3	6	High	Risk avoidance: The lands would need to be identified and acquired by the State.	Project Manager

22/09/19	Too much use of the roads connected to the project and that might affect the access to it.	Site	1	2	2	Low	Risk avoidance: A detailed environmental management plan will define the responsibility of the contractor with regards to minimizing disruptions along the project route. Necessary traffics signs in roads need to be added.	Chief Engineer
22/09/19	Protestors or people accessing the project could affect the security measures.	Site	1	2	2	Low	Risk avoidance: Stakeholders management to assure effective communication with the communities. Security around the access points to ensure the access only to people allowed.Risk mitigation: Etablish an action plan if the scenario happens.	Project Manager
22/09/19	Latent defects in the existing infrastructure will have impact in constructions costs.	Site	2	1	2	Low	Risk mitigation and transfer: Identify the areas were these defects might occur according to the state of the existing roads. If within time frame of the contract, the contractor should be liable and should repair defects.	Chief Engineer

4.8.6 Implement Risk Responses

The inputs required for the Implement Risk Responses are project documents which includes the risk register, lessons learnt register, project management plans and organizational process assets. The tools and techniques include expert judgement and interpersonal and team skills. The implement risk responses for the project ensures that the risk responses for the project are carried out as agreed by all members of the project team. The result of this is to ensure that all risk exposure are kept at a mínimum and that threats to the project are eliminated and opportunities to the project are capitalized upon. This process ensures that team members actually act on the risk responses to ascertain that overall project risk is minimized. Oversight of this process is the responsibility of the Project Manager for the project.

4.8.7 Monitor Risks

Monitor risk is the process of monitoring the implementation of agreed upon risk response plans, tracking identified risks, identifying and analyzing new risks and evaluating risk process effectiveness. (PMBOK®Guide 2016). The monitor risk process serves as a form of control for the West Coast Road Rehabilitation project where all risks to the project are monitored by the Project Manager and the overall project team who reports on and ascertains that the current risk management plan is effective, whether risk management policies are being adhered to and meeting the intended objectives of the project. This process also identifies whether there are any new eminent threats to the project and the relevant strategy which is required to mitigate against that risk. For the West Coast Road Rehabilitation project this process is iterative throughout the project and all team memebers are integral in monitoring risks for the project. Work performance data, project documents which includes the lessons learnt register and risk register, work performance reports are

integral to this process while audits and meetings are the tools utilized during this process.

4.9 Project Procurement Management

Procurement Management Plan
West Coast Road Rehabilitation Project
Ministry of Infrastructure, Ports, Energy and Labour
Government of St. Lucia

The Procurement Strategy processes according to PMBOK®Guide are defined by the following processes:

- Plan Procurement Management
- Conduct Procurement Management
- Control Procurement Management

4.9.1 Plan Procurement Management

Plan procurement management is the process of documenting project procurement decisions specifying the approach and identifying potential sellers. The key benefit of this process is that it determines whether to acquire goods and services from outside the project (PMBOK®Guide 2016). The Plan Procurement Management is the process of documenting the decisions of project procurement and to detail the procurement strategy for the West Coast Road Rehabilitation project. The procurement activities for the selection of consultants/contractors for this project is guided by the Caribbean Development Bank's procurement guidelines and the

Finance Administrative Act of St. Lucia. The inputs for the Plan procurement process for the West Coast Road Rehabilitation Project include the Project Charter, the subsidiary project management plans and project documents. The tools and techniques for the process includes source selection analysis, expert judgement and meetings. The Project Manager is responsible for managing the procurement process according to CDB guidelines in collaboration with the Ministry of Finance of the Government of St. Lucia. Any proposed contract with an estimated value of under $100,000 can be awarded through a direct award process within the MIPEL where approval must be granted by the Prime Minister through the Permanent Secretary within the Ministry of Finance. However, for the West Coast Road Rehabilitation Project, the contract values exceed this baseline cost, which therefore leads to a tendering process for all services required for the project. The following shows the services required for the West Coast Road Rehabilitation Project based on the source selection criteria analysis correlating with the procurement methodology.

Service required	**Procurement Method**
Feasibility Study and Detailed Designs	Quality and Cost Based Selection
Road Safety Assessment	Single Source
Road Rehabilitation and Bridge Construction	International Competitive bidding
Project Supervisory Consultant	Quality and Cost Based Selection

Figure 20- Procurement Methods-West Coast Road Rehabilitation Project

4.9.2 Conduct Procurement Management

The inputs required for the conduct procurement process includes Project management plan subsidiary documents, project documents including the Project schedule, lessons learnt register, risk register and stakeholder register. The tools

and techniques utilized during this process were expert judgement, advertising, data analysis which includes proposal evaluation and negotiation skills. The Project Manager is responsible for commencing the procurement process by developing and advertising expressions of interest (EOI) for consultancy services and contractor services for the West Coast Road Rehabilitation project based on the terms of reference developed for the services to be provided. The Central Tenders Board (CTB) located within the Ministry of Finance will be responsible for receiving the EOI's and provide the Project Manager copies of the documents for evaluation. An evaluation committee of at least three (3) persons approved by the CTB will evaluate and shortlisted prospective bidders.

The Project Manager subsequently prepares an evaluation report and submits this report to the CDB for "no objection" and to the CTB for approval. The approved shortlisted bidders will be invited to submit proposals using a prescribed template from the CDB. All proposals will be received and opened by the CTB. Subsequent to the opening the CTB will make the proposals available to the approved evaluation committee. These proposals will be evaluated using a technical and financial criteria. The technical and financial evaluation report inclusive of the proposals will be submitted to the CDB for "no objection" and CTB for approval. A contract will be awarded to the top ranked bidder based on the technical and financial evaluation. The Project Manager will facilitate the negotiation and contract award process. All meetings for this process must be documented. Figure 20 depicts how the procurement process is conducted.

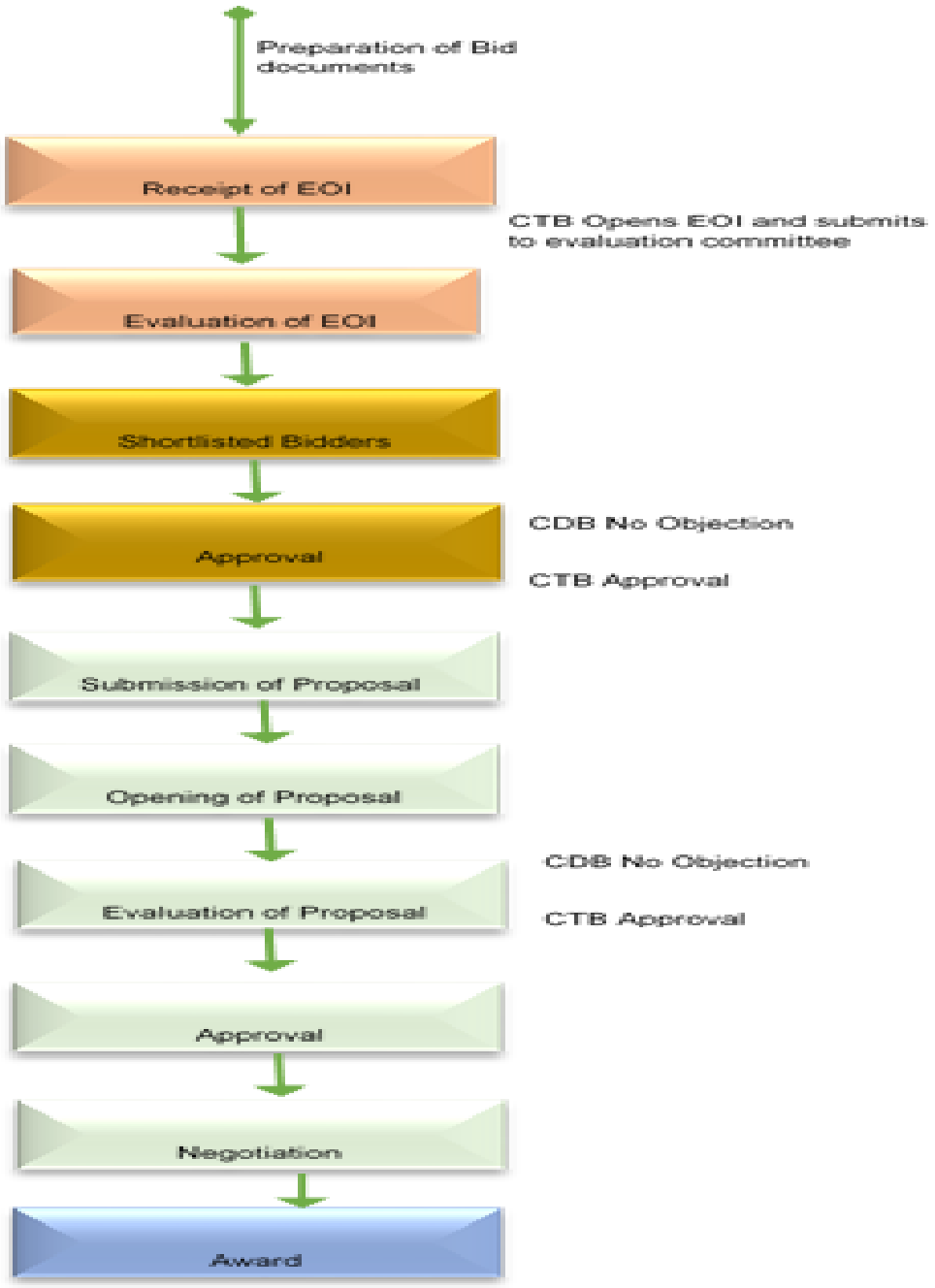


Figure 21: Tendering Process- West Coast Road Rehabilitation Project (Source: Compiled by Author)

4.9.3 Control Procurement

The project Manager will assume reponsibility for the control procurement function for the West Coast Road Rehabilitation Project. During this process the Project

manager will ensure that procurement is being conducted in line with the established procurement guidelines by the Caribbean Development Bank as well as the Finance Administration Act of St. Lucia. The Project Manager is responsible for overseeing the procurement relationship with the consultant/ contractor and ensures that they are operating within the established framework to provide the established contractual obligations based on the procurement guidelines for the West Coast Rehabilitation Project.

During this process the MIPEL ensures that through active contract management that the contractor delivers the deliverables as agreed. This entails checks against the schedule of deliverables to monitor progress and to compare project deliverables against the contractual obligations to ensure that they are compliant. In instances where changes and corrections are required both parties must agree to the changes. Once there is consensus amongst the parties, an amendment is prepared where both parties must sign. In the case of changes regarding costs, the contractor submits a quote for changes and once within budget, must be submitted though the established change management process.

In closing out of the contract for the project, the Ministry of Infrastructure must accept all the deliverables and all reports as meeting the established requirements for the project. This is accomplished through inspection and verifying that all quality requirements meets the established standards. Following the completion of physical works, the taking over certificate is issued and the defects liability period commences. Prior to this, final accounts must be made which includes any otutstanding payments to be made to the contractor.This is followed by the defects liability period equivalent to one year, where the performance certificate is subsequently issued. To adequately control procurement both parties must act within the contract boundaries. It is also fundamental that effective and timely communication is utilized and the relevant authorizations administered to ensure an effective procurement process.

4.10 Project Stakeholder Management

Stakeholder Management Plan
West Coast Road Rehabilitation Project
Ministry of Infrastructure, Ports, Energy and Labour
Government of St. Lucia

The Stakeholder Management processes according to PMBOK®Guide are defined by the following processes:

- Identify Stakeholders
- Plan Stakeholder Engagement
- Manage Stakeholder Engagement
- Monitor Stakeholder Engagement

The Stakeholder Management plan for the West Coast Road Rehabilitation Project will identify all project stakeholders and determine their level of power, interest, and influence for the project. The accurate classification of stakeholders is critical to the stakeholder management and communication process to ensure that support and adequate feedback is gained throughout the duration of the project. Active and frequent communication and efficient stakeholder management enables for adequately addressing all stakeholder interests while accomplishing all project objectives. “The stakeholder management process includes the processes required to identify the people, groups or organizations that could impact or be impacted by the project.” (PMBOK®Guide 2016)

4.10.1 Identify Stakeholders

The identify stakeholders process is the process of identifying project stakeholders regularly and analyzing and documenting relevant information regarding their interests, involvement, interdependencies, influence and potential impact on project success. (PMBOK®Guide 6th edition). For the West Coast Road rehabilitation project, the identification of stakeholders was conducted using expert judgments and a series of meetings which were used to analyze and develop a shared understanding of the relevant stakeholders required for the project. This process was ongoing throughout the lifecycle of the project and carried out as required to identify all relevant stakeholders during each project phase. Information regarding all stakeholders who are impacted by the project and how to engage them is critical throughout the duration of the project.

The inputs utilized during this process were the project management plan, project charter, organizational process assets and enterprise environmental factors. To

assist with stakeholder identification and analysis, the Stakeholder Analysis Register categorized by Stakeholder Group was created.

The stakeholder analysis captures the following information:

- Stakeholders
- Internal/External stakeholders
- Power/Interest Identification
- Issues/Concerns/Opportunities

Chart 15 Stakeholder Register (Source: A. Providence, Author, September 2019)

Stakeholders	**Internal/External**	**Power High(H) Low(L)**	**Interest High (H) Low (L)**	**Issues/ Concerns/Opportunities**
Permanent Secretary	Internal	H	H	Effective project delivery, resilient infrastructure, National Development, efficient use of funds
Project Manager	Internal	H	H	Effective project delivery, resilient infrastructure

Chief Engineer – MIPEL	Internal	H	H	National Development, effective project delivery, relationship with donor agency
Government agencies	External	L	H	National development, resilient infrastructure policy implementation
Project Implementation Unit (PM Office)	External	H	H	Efficient Project delivery
Engineers	Internal	H	H	Effective project delivery, resilient infrastructure, National Development, delivery of quality expectations
Project team	Internal	H	H	National Development, effective project delivery, relationship with donor agency, team accountability
Project Specialist	Internal	L	H	National Development, effective project delivery, relationship with donor agency
Consultant/Contractor	External	L	H	Project experience and profesional profile
Community Liaison Officer	External	L	H	Road safety, access to social and economic hubs
Environmental Monitoring Officer	External	L	H	climate resilience, preservation of the environment

Administrative Assistant/Accounting Officer	External	L	H	Efficient use and accountability of funds
Policy Directorates	External	L	H	National Development, effective project delivery, relationship with donor agency
Donor Agencies	External	H	H	National development, climate resilience, gender inclusivity, effective use of funds
Motorists /Mini Bus & Taxi Drivers	External	L	H	Reduced travel time, maintenance cost of vehicle, road safety
Political Interest Group	External	L	H	National Development, effective project delivery, relationship with donor agency
Pedestrians	External	L	H	Road safety, access to social and economic hubs
Micro Enterprise owners	External	L	H	Easy access to market, profitability, impact on business
SLHTA	External	L	H	Access to tourism attractions
Medium and Large business owners	External	L	H	Motorable roads, reduced travel time
Home & Land Owners & Crop Owners	External	L	H	Value of land, threats to land ownership
Community groups	External	L	H	Employment opportunities, community development

District Representatives	External	L	H	Employment opportunities, community development, preservation of political interest
Visitors	External	L	L	Road safety, access to tourism sites and attraction

4.10.2 Plan Stakeholder Engagement

In order to plan the stakeholder engagements, project documents which included the stakeholder register, risk register and the project schedule were utilized. As part of the organizational process assets, the lessons learnt repository which contained information regarding stakeholder preferences and the past involvement of stakeholders in road projects conducted by the Ministry of Infrastructure, Ports, Energy and Labour were utilized. Information on previous projects on the composition of stakeholder groups and organizations were also utilized for the project. Expert Judgment, meetings and data analysis were also used to plan stakeholder engagement. A stakeholder assessment matrix will be used to assess the perceived current

level of stakeholder engagement for the project and the desired level required to ensure a successful project outcome. The stakeholders for the project were classified based on the following categories

- Unaware-Not aware of the project
- Resistant- stakeholders who are resistant to change and do not support the project
- Neutral- Stakeholders who are neither supportive or supportive of the project
- Supportive-stakeholders who fully support the project
- Leading-stakeholders who are fully supportive of the project and are fully involved in ensuring that the project outcomes are achieved.

The Stakeholder assessment matrix below shows the current level of stakeholder engagement and the desired level of stakeholder engagement which is needed for the project.

C represents the current level of engagement
D represents the desired level of engagemen

Chart 16 Stakeholder Assessment Matrix (Source: A. Providence, Author, September 2019)

Stakeholders	Unaware	Resistant	Neutral	Supporting	Leading
Permanent Sectreary					C, D
Project Manager					C,D

Chief Engineer – MIPEL				C,D	
Government agencies				C,D	
Project Implementation Unit (PM Office)					
Engineers					C,D
Project team					C,D
Project Specialist					C,D
Consultant/Contractor					C,D
Community Liaison Officer			C	D	
Environmental Monitoring Officer		C		D	
Administrative Assistant/Accounting Officer			C	D	
Policy Directorates				C,D	
Donor Agencies				C,D	
Motorists /Mini Bus & Taxi Drivers		C		D	
Political Interest Group				C,D	
Pedestrians			C	D	
Micro Enterprise owners				C,D	
SLHTA				C,D	

Home & Land Owners & Crop Owners		C		D	
Community groups	C			D	
District Representatives				C,D	
Visitors	C			D	

Power / Interest Grid for Stakeholder Analysis

Power		
High		Permanent Secretary, Project Manager Chief Engineer. Engineers, Project Team, Policy Directorates
	Administrative Assistant/Accountant, Visitors	Government agencies, project implementing unit, Project specialist, Consultant/ Contractor, community laison officer, Environmental monitoring officer, Donor Agencies, Motorists/Minibuses/Taxi Drivers, Political Interet groups, Pedestrians, Micrornterprise owners, SLHTA, Home owners/ Land owners/ Crop owners, community groups, district representatives
	Low	High
	Interest	

Figure 22: Power/ Interest Analysis WCRR Project (Compiled by author)

4.10.3 Manage Stakeholder Engagement

The Manage stakeholder engagement is the process of actively engaging with all stakeholders of the project and ensuring that communication is effective and that their issues and concerns during the project are addressed in order to gain support for the project outcomes. During this process, stakeholders are apprised of the goals of the project, how it will benefit them, the risks involved in the project and clarification is provided for any issues which they may have. The inputs utilized to guide the Manage stakeholder engagement process include the risk management plan, communications management plan, lessons learnt register and stakeholder register. The project team engaged in managing the stakeholder process will be involved in accurately documenting queries raised and feedback from all stakeholders to ensure that there is an effective exchange of communication. The Issues Log will be utilized to document issues or risks identified by stakeholders and used as a basis to propose solutions to those concerns.

4.10.4 Monitor Stakeholder Engagement

The Monitor stakeholder engagement process is the process of monitoring stakeholder relationships and tailoring strategies for engaging stakeholders through modifications of engagement strategies and plans (PMBOK®Guide 6th edition). This process is ongoing throughout the duration of the West Coast Road Rehabilitation project assesses how effective and impactful stakeholder engagement activities are and the necessary improvements which are required. Direct communication is solicited from all stakeholders through various communication mediums including

email, site meetings, and progress meetings and community meetings at the local level. This will enable stakeholders to communicate their concerns and issues surrounding the project and provide the project team with the required information to address the issues raised as the project progresses.

5. CONCLUSION

The implementation of the West Coast Road Rehabilitation Project forms part of the overall Mission Statement of the Ministry of Infrastructure, Ports, Energy and Labour with the aim of “Creating an environment that fosters sustainable, social and economic growth of Saint Lucia through the development of a superior road and transportation network.” Numerous benefits are to be realized from this project for major communities and facilities which are vital for economic activities. This project will improve livelihoods, the overall standard of living of residents by facilitating improved accessibility between major communities and the efficient distribution of goods and services which are vital for socio economic development. To ensure that these benefits are realized, the project must be executed in the most effective manner by the Ministry of Infrastructure, Ports, Energy and Labour and all other counterparts and relevant sakeholders involved in this critical processs. It is for this reason interalia, that the Project Management plan must be developed for this project to ensure, that once precisely and accurately followed, the project will deliver the expected benefits to residents given the project management framework developed and recommended by PMBOK®Guide as the best practices to be followed for the successful attainment of project outcomes.

The objectives/deliverables as established through the Project Management Plan, were based on best practices of the Project Management Institue (PMI) to manage the upgrading of the West Coast Road Rehabilitation Project in an effort to improve road infrastructure for the benefit of all citizens in St. Lucia. This was achieved through the development of a Project management plan which set the foundation for the successful delivery of the project based on the underlying project management knowledge areas. These objectives were achieved as follows:

1. The project Charter for the project was developed which officially marks the commencement of the Project for the upgrading of the West

Coast Road project and gave the project Manager the authority to assign resources to the project.

2. The Scope Management plan for the Project defined all the work required to complete the West Coast Road Rehabilitation Project. This was determined through the requirements for the project, activitites defined by the WBS to encompass the desired scope for the project. The scope management plan ensures that only the work required for the project is detailed. This therefore eliminates scope creep and enables the project to be conducted effectively based on the integration of cost, resources and the desired schedule within which the project needs to be completed.

‘

3. The schedule/ time management plan was developed to ensure that the Project is completed within the stipulated time frame. This process followed from the scope management plan where the work packages and the respective activities for the project were determined and validated. The completion of this project within the allotted time frame will lead to the realization of timely benefits for all road users and will positively impact the project’s overall success.

4. The cost management plan for the West Coast Road Rehabilitation Project was developed to ensure that the project remained within the desired budget. The funding from this project incorporated grant funding as well as concessional loan funding from the Caribbean Development bank. Microsoft Excel was the tool fundamentally utilized during this process to determine the costs required for each activity and ultimately the cost baseline and budget for the West Coast Road Rehabilitation Project.

5. The resource management plan developed for the project resulted in the identifcation, acquisition and management of all the required resources needed to ensure that all project deliverables are met for the project. For the West Coast Road Rehabilitation project, resources would be provided internally predominantly through human resource capacities. The bulk of the resources would be outsourced through consultancy and contractual services.

6. The communications management plan is a vital component of the West Coast Road Rehabilitation project as all stakeholders must be kept informed on project deliverables.This process must be done in a timely manner to ensure that information is diseminated and can be acted upon appropriately to ensure that all relevant stakeholders are engaged appropriately based on the needs of the project at any given time during the project life cycle.

7. Risks are eminent with all projects undertaken. The risk management plan for the West Coast Road Rehabilitation project enabled the accurate identification, monitoring and analysis of all possible risk factors which may implicate the project. Risks were assigned owners so that they would be held accountable for the implementation of risk responses. The entire project team must be actively engaged in the identification, monitoring and communication of all risks which will impact the project.

8. The procurement strategy for the project allowed for the selection of the services required to complete the project based on the agreed upon source criteria analysis. The procurement strategy for the project detailed the methodology for planning, conducting and controlling procurements for the upgrading of the West Coast Road Rehabilitation Project.

9. Stakeholders are critical to the success of the West Coast Road Rehabilitation Project. The stakeholder management plan ensured that all stakeholders are accurately identified and categorized and that they are adequately and appropriately engaged based on their level of power/interest in the project. It is imperative that stakeholders are adequately monitored and managed during the course of the project.

6. RECOMMENDATIONS

1. The MIPEL should invest in tools required to complete quantitative risk analysis for all projects. Quantitative risk is a numerical quantification of the effect of risks on the overall project. This process is followed by the qualitative risk process and is objective as opposed to the the subjectivity of qualitative risk. This would assist the MIPEL as assumptions are currently being made for example, with respect to contingency reserves required for the project.

2. There should be greater investments geared towards adopting the best Project Management practices during all projects conducted by MIPEL. This will ensure greater management of Projects and will bring value to the projects delivered and ultimately to road users and residents of St. Lucia.

3. There should exist an information system and document management to ensure that project information are electronically stored and

archived and readily available for referrals. The work of the department is heavily centered around the delivery of road projects. Therefore information management systems would lead to greater efficiencies and the ability to retrieve pertinent information in an organized manner.

4. The MIPEL should counduct the procurement function within one focal point. The fact that certain procurement funtions are conducted within the Ministry of Finance, can lead to delays in communications, beauraucracies and inefficiencies. I would also recommend that as part of educating team members, under developing team as part of Resource Management, that more training should be provided on procurement regulations. This also refers to general guidelines with reference to the submission of bids as it was evident that there lacks comprehensive insight in this regard.

5. The estimate activity process should be improved to ensure that staff are appropriately allocated to project deliverables. The staff are confined to the resources available within the Ministry in most instances and this can result in assignments to more than one road project which may be burdensome and lead to overwork.

6. The MIPEL should attempt where possible to value all transactions subject to foreigh exchange volatilities to the USD currency to eliminate cost risks to the project based on foreign exchange rate fluctuations.

7. MIPEL should utilize the processes and tools and templates as developed by the FGP and ensure that all aspects are planned precisely and adhered to for each of the project management areas.

8. MIPEL should engage in a more formal collect requirements process. The Scope of the works for the project is most instances are predefined

by the MIPEL. Consultation is made with stakeholders, however due to the budget available for the works of the project, though due consideration is given as much as possible to stakeholder recommendations, this may not necessarily be integrated as a result of budget or practicality. This therefore is a restriction to developing the scope for the project.

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8. Appendices

PROJECT CHARTER Formalizes the project start and confers the project manager with the authority to assign company resources to the project activities. Benefits: it provides a clear start and well defined project boundaries.	
Date	**Project Name:**
May 2019	Project Management Plan for the Upgrading of the West Coast Road Project in St. Lucia.
Knowledge Areas / Processes	**Applicacion Area (Sector / Activity)**
Should indicate the knowledge areas and process groups which are related to the project **Knowledge areas: Integration, Scope Schedule, Cost, Quality, Resource, Communications, Risk, Procurement, Stakeholder.** **Process groups: Initiate, Plan, Control, Monitor**	Infrastructure-Construction
Start date	**Finish date**
May 2019	October 2019
Project Objectives (general and specific)	

General Objective

To develop a Project Management Plan based on best practices of the Project Management Institue (PMI) to manage the Upgrading of the West Coast Road Project to improve road infrastructure for the benefit of all citizens in St. Lucia.

Specific objectives:

- To develop a project Charter which officially marks the commencement of the Project Management Plan for the Upgrading of the West Coast Road project.
- To integrate all project management activities within the project management process groups through project integration management.
- To construct a scope management plan which ensures that the project scope is well defined, developed, monitored and controlled
- To create a schedule/ time management plan to ensure that planning the Upgrading of the road network is done within the established time frame.
- To develop a cost management plan to ensure that the project remains within budget.
- Tp develop a quality management plan which includes planning, mangaging and controlling quality requirements to ensure that the project meets quality standards and project objectives.
- To develop a Resource management plan to identify, acquire and manage resouces needed for the project.
- To develop a communications management plan to ensure timely and appropriate means of communication are adhered to to meet project deliverables.

- To develop a risk management plan for the accurate identification, monitoring and analysis of all possible risk factors which may implicate the project.

- To create a stakeholder management plan to ensure that all stakeholders are accurately identified and categorized.
- To develop a procurement strategy which would be used to plan, conduct and control procurements for the Upgrading of the Millenium Highway and West Coast Road Project.

Project purpose or justification (merit and expected results)

The road network is critical to facilitate the movement of persons, goods and services and is an extremely vital infrastructural componet which facilitates economic growth and the overall national development. The proper management and continous maintenace of the country's road network serves as a vital connection to major social and economic hubs. The Government of St. Lucia recognizes this and due to fiscal constrains have not been able to embark on the necessary maintainance of some ot the island's premiere road networks as it shoud.

With full understanding of the dire need for the improvement of our road networks, the Government of St. Lucia was able to source grant funding from the Government of the United Kingdom, through the Department for International Development (DFID). The fund is designed to "provide critical infrastructure which will lay the foundation for growth and prosperity, poverty reduction and increased resilience to climate change in the Caribbean".

Consequently, the rehabilitation of the West Coast Road corridor will contribute to improved road safety; climate resilience; reduction in economic vulnerabilities through improved access for the agricultural and tourism sectors; improving efficiency in the north-south movement of goods and services to the country's ports and generate positive social impacts. The upgrade will also reduce the economic cost associated with travelling by commuters, improve productivity and contribute to overall national development indices.This project will establish the required project management best practices to be used in planning the activities associated with the delivery of the West Coast Road Upgrading project. The goal is to provide efficiency in the delivery of project activities and to develop the necessary baselines to establish how the project is performing.

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

The development of this project management plan will be based on the underlying principles of the Project Management Institute (PMI) which will develop the roadmap for planning the Upgrade to the West Coast Road project.

The Subsidiary Plans will therefore include:

- The Scope Management Plan
- The Schedule Management Plan
- The Cost Management Plan
- The Quality Management Plan
- The Resource Management Plan
- The Communications Management Plan
- The Risk Management Plan
- The Procurement Management Plan
- The Stakeholder Management Plan

Appendix 1- FGP Charter

Assumptions

It is assumed that the student has all the required knowledge and expertise from courses completed in the MPM Program to complete the Project Management Plan.
It is assumed that the project deliverables will remain the same.
It is assumed that the student will receive all required support from UCI.

Constraints

Project management plan must be completed in three months
Only one resouce (Project Manager) is assigned to develop the Project Management Plan

Preliminary risks

Feedback which is not timely from the support Team for the MPM Program may lead to increased pressures to meet deadlines by the student.
Instructions and directives which are not clearly disemminated and understood by the student may lead to delays in meeting Project milestone deadlines.

Budget

The project planning budget is $0.00.

Milestones and dates

Milestone	Start date	End date
Final Graduation Project	May 13th,19	November 8th, 19
FGP Start	May 13th, 19	May 13th, 19
Graduation Seminar	May 13th, 19	June 14th, 19
Tutoring Process	June 17th,19	Sept 13th, 19
Reading by Reviewers	Sep 16th, 19	October 4th, 19
Adjustments	October 7th, 19	November 8th, 19
Presentation to Board of Examiners/FGP End	November 8th, 19	November 8th, 19

Relevant historical information

The Government of Saint Lucia is charged with responsibility for the continued maintenance of the road network on the island. The management of this infrastructure generates surmountable pressures on the country's limited financial resources. These pressures have been exacerbated by the severity and impact of recent climatic shocks and the degradation of the road infrastructure. The mandate of the Ministry of Infrastructure Ports, Energy and Labour throughout the country's history has been to be the flagship Ministry critical to the achievement of infrastructural and national development. through the construction and maintenance of road infrastructure in St.Lucia. As such, they are tasked with managing the troad rehabilitation which is needed on the West Coast Road.

Stakeholders

Direct stakeholders:

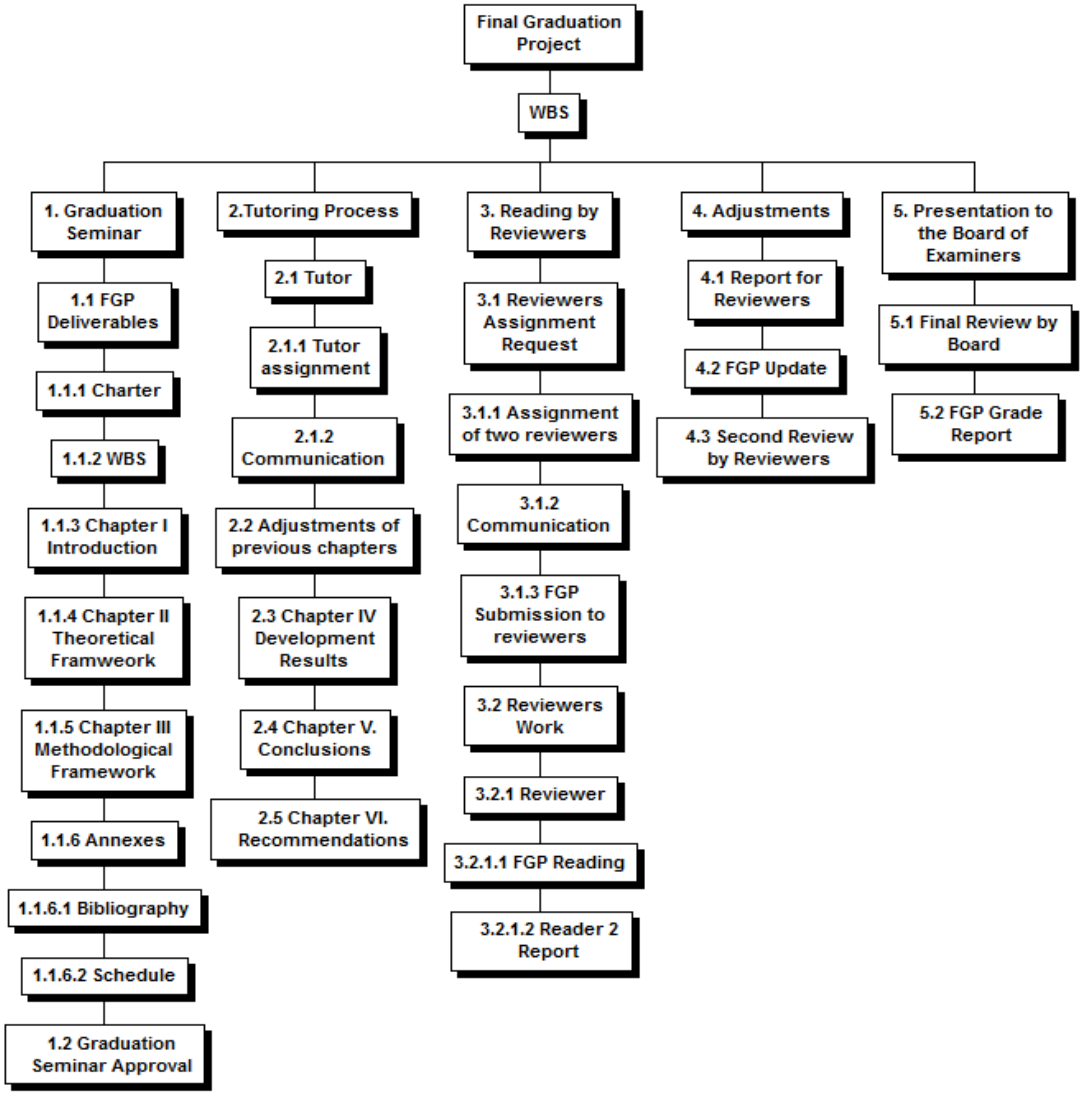
Project Manager-Alice Profidence
University of International Cooperation (UCI)
Professor Carlos Brenes
Project Sponsor
Board of Examiners
Government/Citizens of St. Lucia
Ministry of Infrastructure, Ports, and Energy

Indirect stakeholders:

Academic Assistant
Reviewers

Project Manager: Alice Providence	**Signature:**
Authorized by:	**Signature:**

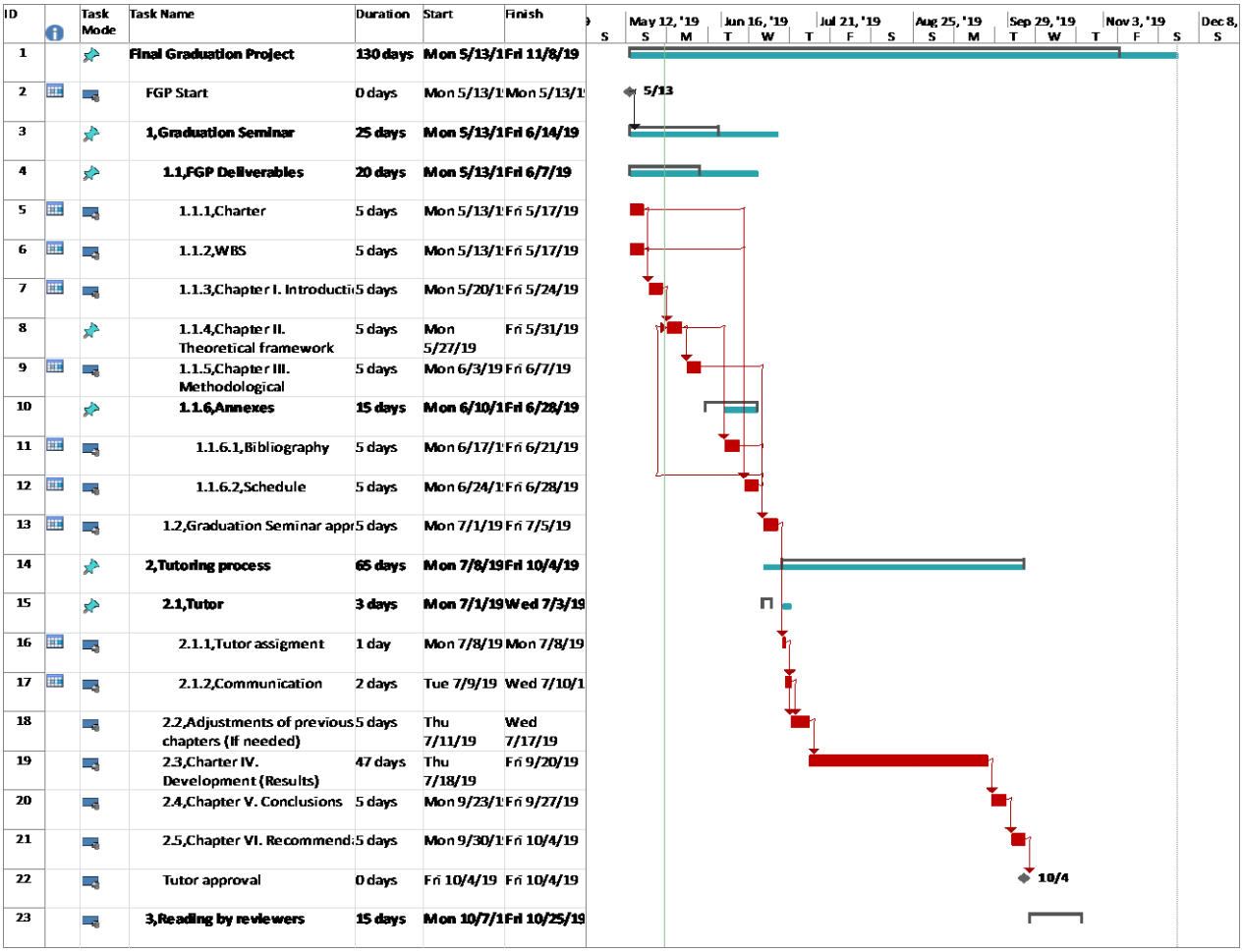
Appendix 2: Final Graduation Project Work Breakdown Structure



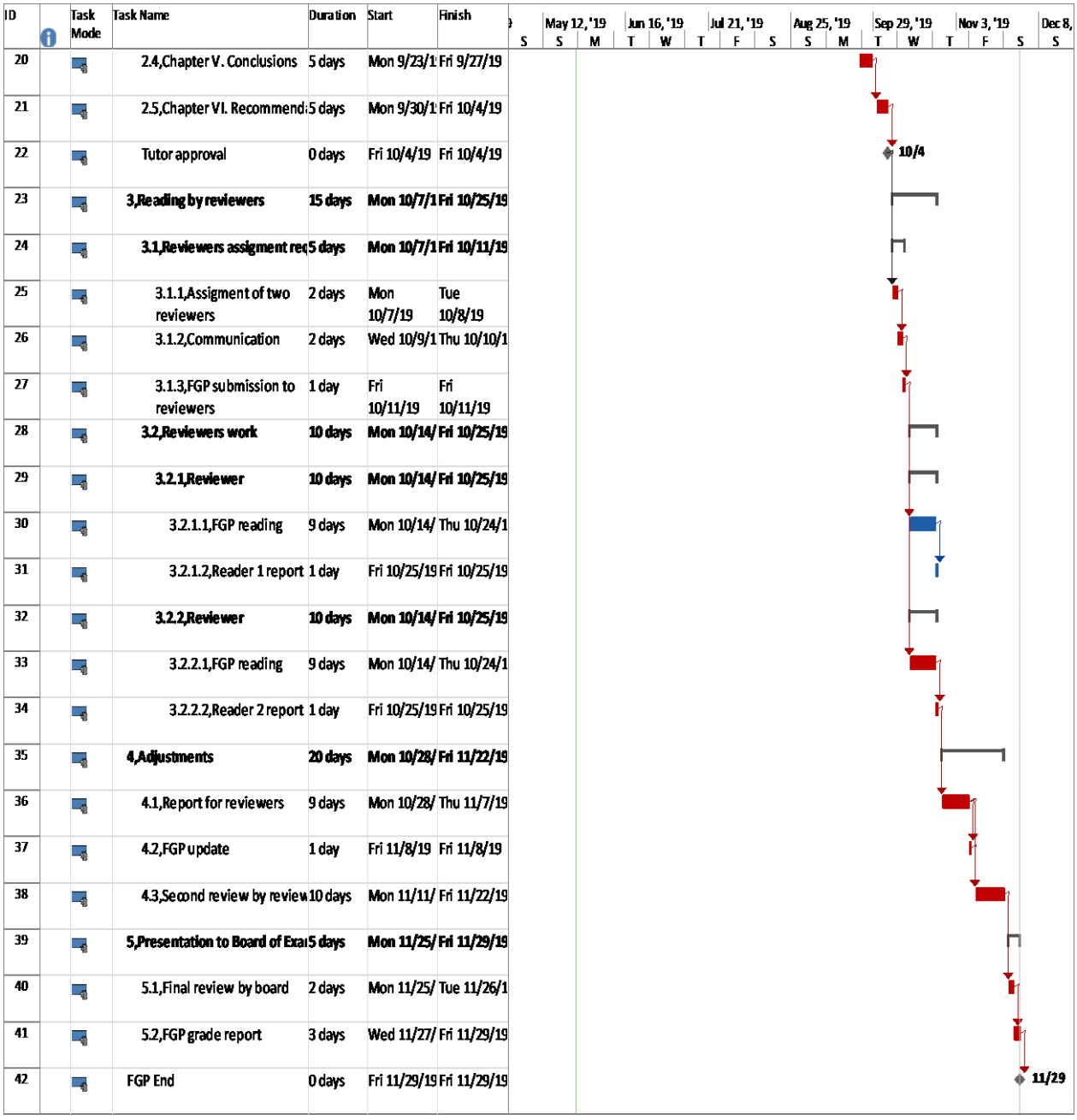
No.	Task
1	**Final Graduation Seminar**
1.1	FGP Deliverables
1.1.1	Charter
1.1.2	WBS
1.1.3	Chapter I. Introduction
1.1.4	Chapter II. Theoretical Framework
1.1.5	Chapter III. Methodological Framework
1.1.6	Annexes
1.1.6.1	Bibliography
1.1.6.2	Schedule
1.2	Graduation Seminar Approval
2	**Tutoring Process**
2.1	Tutor
2.1.1	Tutor Assignment
2.1.2	Communication
2.2	Adjustments of previous Chapters (If needed)
2.3	Chapter IV (Development Results)
2.4	Chapter V. Conclusions
2.5	Chapter VI. Recommendations
3	**Reading by viewers**
3.1	Reviewers assignment request
3.1.1	Assignment of two reviewers
3.1.2	Communication
3.1.3	FGP Submission to reviewers
3.2	Reviewers work
3.2.1	Reviewer
3.2.1.1	FGP Reading

3.2.1.2	Reader 1 Report
3.2.2	Reviewer
3.2.2.1	FGP Reading
3.2.2.2	Reader 2 Report
4	**Adjustments**
4.1	Report for viewers
4.2	FGP Update
4.3	Second review by reviewers
5	**Presentation to Board of Examiners**
5.1	Final Review by Board
5.2	FGP Grade Report

Appendix 3: FGP Schedule

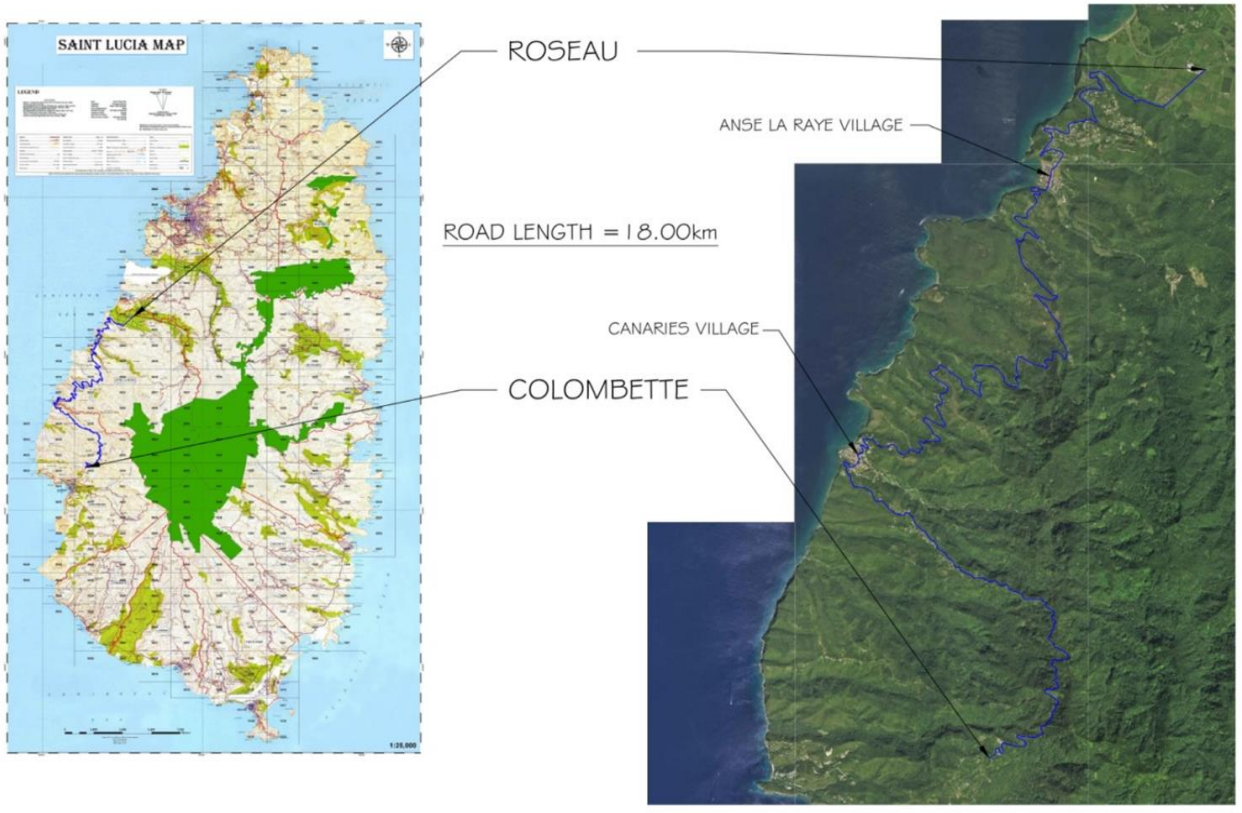


ID	Task Mode	Task Name	Duration	Start	Finish
1		**Final Graduation Project**	**130 days**	**Mon 5/13/19**	**Fri 11/8/19**
2		FGP Start	0 days	Mon 5/13/19	Mon 5/13/19
3		**1,Graduation Seminar**	**25 days**	**Mon 5/13/19**	**Fri 6/14/19**
4		**1.1,FGP Deliverables**	**20 days**	**Mon 5/13/19**	**Fri 6/7/19**
5		1.1.1,Charter	5 days	Mon 5/13/19	Fri 5/17/19
6		1.1.2,WBS	5 days	Mon 5/13/19	Fri 5/17/19
7		1.1.3,Chapter I. Introducti	5 days	Mon 5/20/19	Fri 5/24/19
8		1.1.4,Chapter II. Theoretical framework	5 days	Mon 5/27/19	Fri 5/31/19
9		1.1.5,Chapter III. Methodological	5 days	Mon 6/3/19	Fri 6/7/19
10		**1.1.6,Annexes**	**15 days**	**Mon 6/10/19**	**Fri 6/28/19**
11		1.1.6.1,Bibliography	5 days	Mon 6/17/19	Fri 6/21/19
12		1.1.6.2,Schedule	5 days	Mon 6/24/19	Fri 6/28/19
13		1.2,Graduation Seminar appr	5 days	Mon 7/1/19	Fri 7/5/19
14		**2,Tutoring process**	**65 days**	**Mon 7/8/19**	**Fri 10/4/19**
15		**2.1,Tutor**	**3 days**	**Mon 7/1/19**	**Wed 7/3/19**
16		2.1.1,Tutor assigment	1 day	Mon 7/8/19	Mon 7/8/19
17		2.1.2,Communication	2 days	Tue 7/9/19	Wed 7/10/19
18		2.2,Adjustments of previous chapters (If needed)	5 days	Thu 7/11/19	Wed 7/17/19
19		2.3,Charter IV. Development (Results)	47 days	Thu 7/18/19	Fri 9/20/19
20		2.4,Chapter V. Conclusions	5 days	Mon 9/23/19	Fri 9/27/19
21		2.5,Chapter VI. Recommend	5 days	Mon 9/30/19	Fri 10/4/19
22		Tutor approval	0 days	Fri 10/4/19	Fri 10/4/19
23		**3,Reading by reviewers**	**15 days**	**Mon 10/7/19**	**Fri 10/25/19**



ID	Task Mode	Task Name	Duration	Start	Finish
20		2.4,Chapter V. Conclusions	5 days	Mon 9/23/1	Fri 9/27/19
21		2.5,Chapter VI. Recommend	5 days	Mon 9/30/1	Fri 10/4/19
22		Tutor approval	0 days	Fri 10/4/19	Fri 10/4/19
23		**3,Reading by reviewers**	**15 days**	**Mon 10/7/1**	**Fri 10/25/19**
24		**3.1,Reviewers assigment req**	**5 days**	**Mon 10/7/1**	**Fri 10/11/19**
25		3.1.1,Assigment of two reviewers	2 days	Mon 10/7/19	Tue 10/8/19
26		3.1.2,Communication	2 days	Wed 10/9/1	Thu 10/10/1
27		3.1.3,FGP submission to reviewers	1 day	Fri 10/11/19	Fri 10/11/19
28		**3.2,Reviewers work**	**10 days**	**Mon 10/14/**	**Fri 10/25/19**
29		**3.2.1,Reviewer**	**10 days**	**Mon 10/14/**	**Fri 10/25/19**
30		3.2.1.1,FGP reading	9 days	Mon 10/14/	Thu 10/24/1
31		3.2.1.2,Reader 1 report	1 day	Fri 10/25/19	Fri 10/25/19
32		**3.2.2,Reviewer**	**10 days**	**Mon 10/14/**	**Fri 10/25/19**
33		3.2.2.1,FGP reading	9 days	Mon 10/14/	Thu 10/24/1
34		3.2.2.2,Reader 2 report	1 day	Fri 10/25/19	Fri 10/25/19
35		**4,Adjustments**	**20 days**	**Mon 10/28/**	**Fri 11/22/19**
36		4.1,Report for reviewers	9 days	Mon 10/28/	Thu 11/7/19
37		4.2,FGP update	1 day	Fri 11/8/19	Fri 11/8/19
38		4.3,Second review by review	10 days	Mon 11/11/	Fri 11/22/19
39		**5,Presentation to Board of Exa**	**5 days**	**Mon 11/25/**	**Fri 11/29/19**
40		5.1,Final review by board	2 days	Mon 11/25/	Tue 11/26/1
41		5.2,FGP grade report	3 days	Wed 11/27/	Fri 11/29/19
42		FGP End	0 days	Fri 11/29/19	Fri 11/29/19

Appendix 4: Map of West Coast Road



Appendix 5: Linguistics Credentials

Christella Duplessis-Sutherland (B.Ed 2007; OCT 2013)
83 Hughes Crescent, Ajax, Ontario L1T3P7

TO WHOM IT MAY CONCERN

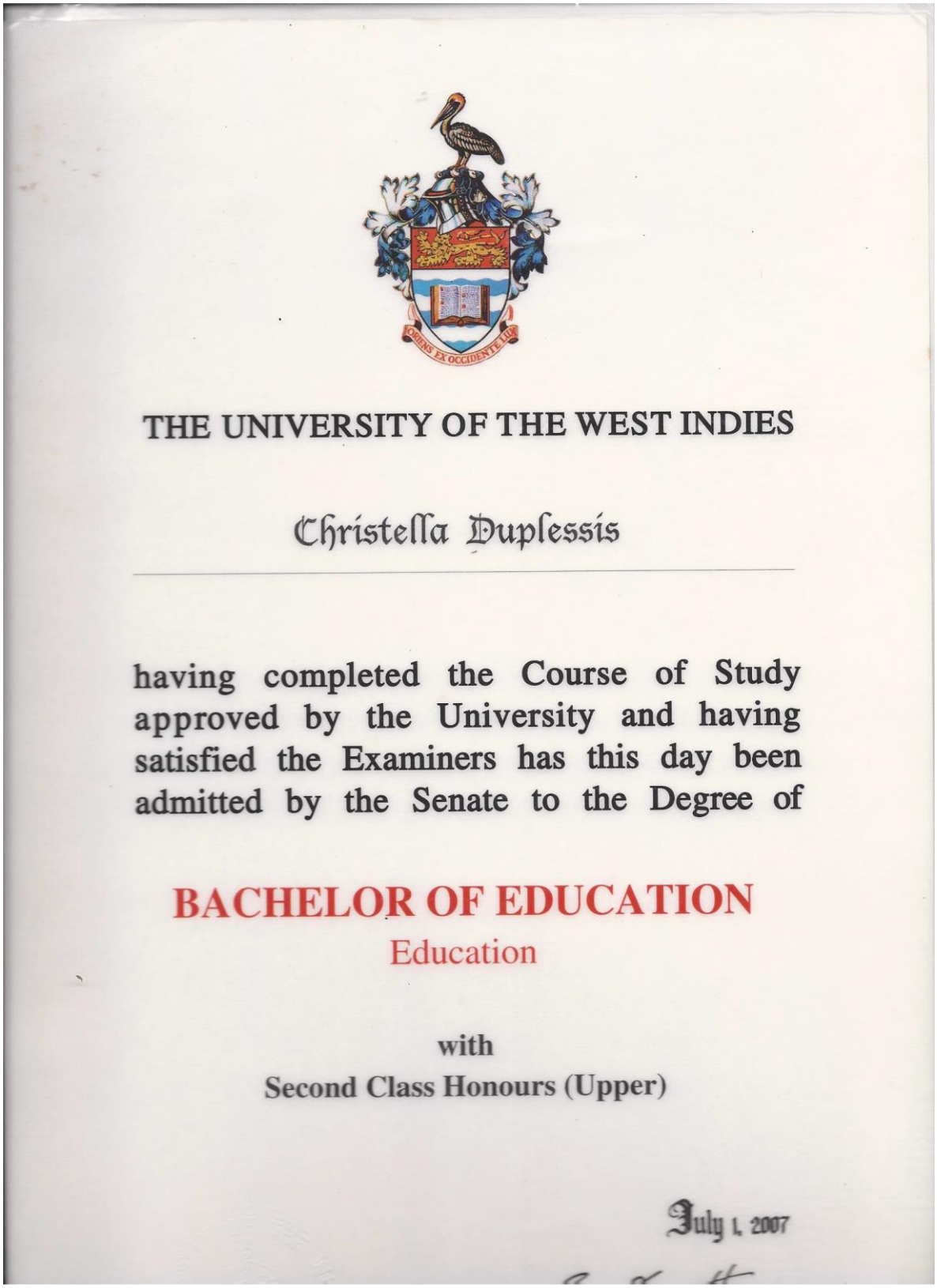
Reference is made to the final Graduation Project submitted by Ms. Alice Providence as a requirement to complete her Master's Degree in Project Management. I have reviewed the document and made recommendations based on grammatical changes throughout the document. Ms. Providence has made corrections as per the suggested recommendations and changes. I certify that the language used in this document is accurate in the use of the English Language.

I hold a Bachelor's Degree in Language Arts from the University of the West Indies (2007). I held the position of Reading Specialist with the Centre of Excellence for Teacher Training (CCETT) at the Sir Arthur Lewis Community College (2008-2009). I have also spent over 25 years as a classroom teacher. I have included a few proofs of my credentials.

Sincerely,

C. Sutherland

Christella Duplessis- Sutherland



THE UNIVERSITY OF THE WEST INDIES

Christella Duplessis

having completed the Course of Study approved by the University and having satisfied the Examiners has this day been admitted by the Senate to the Degree of

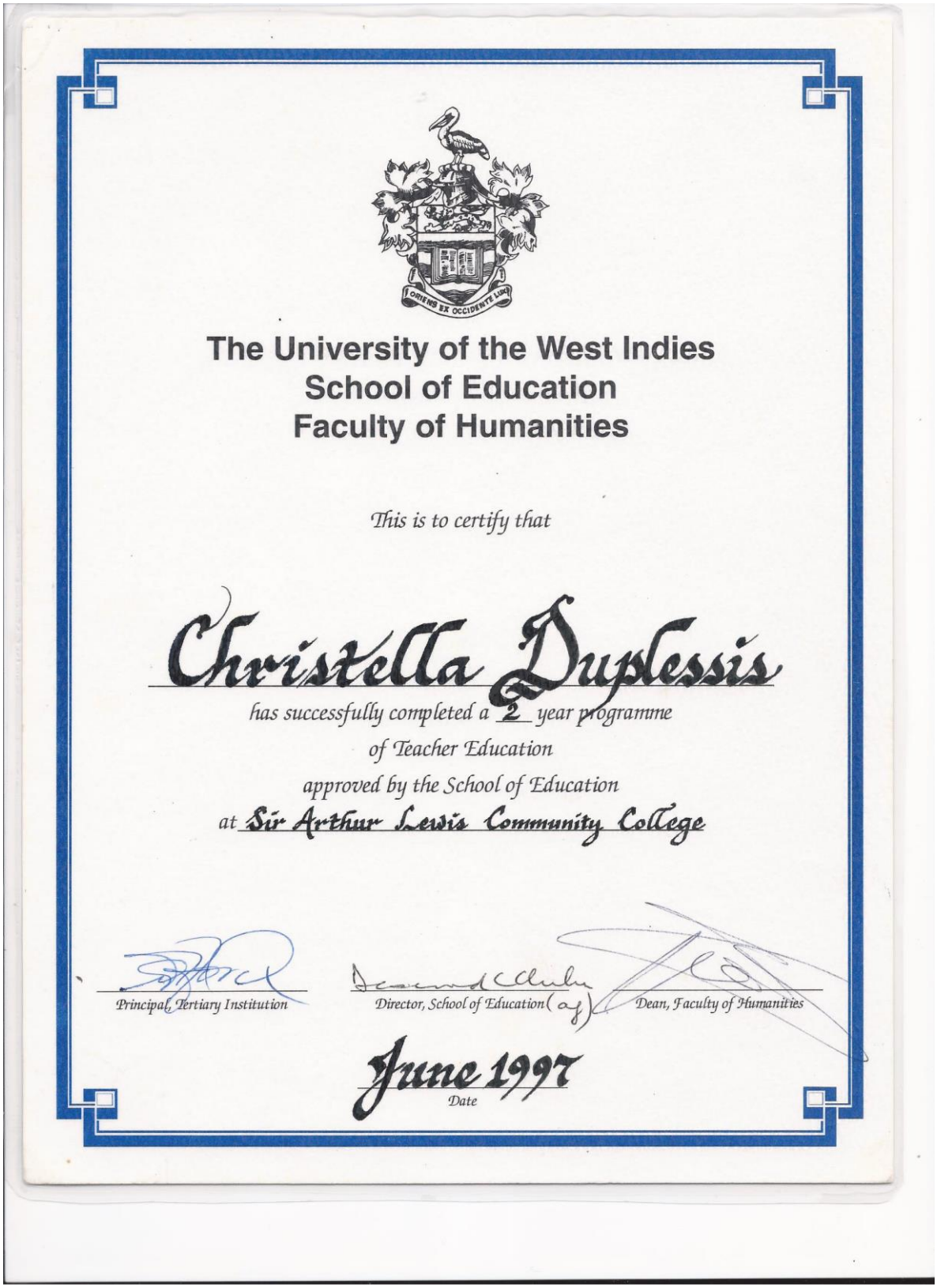
BACHELOR OF EDUCATION

Education

with

Second Class Honours (Upper)

July 1, 2007



The University of the West Indies
School of Education
Faculty of Humanities

This is to certify that

Christella Duplessis

has successfully completed a 2 *year programme*
of Teacher Education
approved by the School of Education
at Sir Arthur Lewis Community College

Principal, Tertiary Institution

Director, School of Education (ag)

Dean, Faculty of Humanities

June 1997
Date

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TRANSCRIPT OF ACADEMIC RECORD
Page: 1
Date Issued: 18-MAR-2013
Level: Undergraduate

Record of: Christella Duplessis **Student ID:** 20052698 **Date of Birth:** 27-APR-1974

Course Level: Undergraduate
Student Type: Completed
Only Admit: 2005/2006 Semester I

Current Program
Bachelor of Education
Program : Education BED TLI
College : Humanities & Education
Major : Education
Maj/Concentration : Teaching of Language Arts

Degrees Awarded Bachelor of Education 01-JUL-2007
Primary Degree
Program : Education BED TLI
College : Humanities & Education
Campus : Tertiary Level Institutions
Major : Education
Maj/Concentration : Teaching of Language Arts
Inst. Honors: Second Class Honours (Upper)

SUBJ	NO.	C	COURSE TITLE	CRED	GRD	PTS	R
INSTITUTION CREDIT:							
2005/2006 Semester I							
Humanities & Education							
Education							
New First Time							
EDCU	2101	T	Curr Theory, Planning & Prac	3.00	C-	5.10	
EDLS	2301	T	Read/Writ Strategies for Acad	3.00	B	9.00	
EDPS	2011	T	Princ Of Educ Psychology	3.00	A	12.00	
EDRS	2201	T	Intro To Res Methods In Ed	3.00	B	9.00	
LING	1402	T	Intro to Language Structure	3.00	A-	11.10	
			Total Earned Credits 15.00				

********** CONTINUED ON NEXT COLUMN **********

SUBJ	NO.	C	COURSE TITLE	CRED	GRD	PTS	R
Institution Information continued:							
2005/2006 Semester II							
Humanities & Education							
Education							
Continuing							
EDLA	2112	T	Struc & Nature of Lang Arts	3.00	C+	6.90	
EDME	2211	T	Testing, Measuremt & Eval I	3.00	B+	9.90	
EDPH	2016	T	Philosophy of Education	3.00	B+	9.90	
EDRS	2202	T	Basic Data Anal with the Comp	3.00	C+	6.90	
LING	1401	T	Intro to Lang & Linguistics	3.00	A	12.00	
			Total Earned Credits 15.00				
2006/2007 Semester I							
Humanities & Education							
Education							
Continuing							
EDLS	3004	T	Curr & Instr Issu In Lit Stud	3.00	A	12.00	
EDPS	3804	T	Princ Of Social Psychology	3.00	A	12.00	
EDRS	3501	T	The B Ed Study	0.00	IP	0.00	
EDTK	3304	T	Media & Technology In Ed	3.00	A	12.00	
LING	2101	T	Language Acquisition	3.00	A-	11.10	
			Total Earned Credits 12.00				
2006/2007 Semester II							
Humanities & Education							
Education							
Completed							
EDLA	3005	T	Pedagog Issues in Lang Arts	3.00	B+	9.90	
EDRS	3501	T	The B Ed Study	6.00	A+	25.80	
EDSO	3102	T	The Social Context of Educ	3.00	A	12.00	
EDTE	3404	T	Issues in Teacher Education	3.00	C+	6.90	
LING	2102	T	Language Learning & Teaching	3.00	B-	8.10	
			Total Earned Credits 18.00				

********** CONTINUED ON PAGE 2 **********

Registrar: _____

Date: Mar 18, 2013

Original transcripts bear an impressed seal and an original signature. This record is released with the consent of the student, and is not to be forwarded to any third party without the consent of the student. Information to assist in the evaluating the transcript is on the reverse side.