UNIVERSIDAD PARA LA COOPERACION INTERNACIONAL (UCI)

PROJECT MANAGEMENT PLAN FOR THE CONSTRUCTION OF THE GEORGETOWN TO LETHEM ROAD, GUYANA

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DEDICATION

I would like to dedicate my work to Maria and Ramiah Roland who have stood by me, through these many months of hard work. Their support and encouragement have been priceless in helping me complete my study.

Secondly, it is also dedicated to my mother, who has taught me never to give up, even when I didn't believe in myself. She made me a believer that anything is possible, and that success indeed comes through hard work.

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ABBREVIATIONS AND ACRONYMS

- Change Control Board (CCB)
- Control Accounts (CA)
- Cost Performance Index (CPI)
- Cost Variance (CV)
- Double Bituminous Surface Treatment (DBST)
- Earned Value (EV)
- Earned Value Management (EVM)
- Environmental Protection Agency (EPA).
- European Union (EU)
- Final Graduation Project (FGP)
- Functional Manager (FM)
- Government of Guyana (GOGY)
- Guyana Police Force (GPF)
- Guyana Telephone Telegraph Company (GTT)
- Guyana Waters Incorporated (GWI)
- International Competitive Bidding (ICB)
- International Organization for Standardization (ISO)
- Invitation to Bid (ITB)
- Ministry of Finance (MOF).
- Ministry of Public Infrastructure MPI
- Monitoring & Evaluation (M&E)
- Organizational Process Assets (OPA)
- Precedence Diagramming Method (PDM).
- Professional Engineer (PE)
- Project Management Body of Knowledge (PMBOK)
- Project Management Institute (PMI)
- Project Team (PT)
- Quality Assurance (CA)
- Quality Control (QC)
- Quality Management Plan (QMP)
- Request for Proposal (RFP)
- Risk Breakdown Structure (RBS)
- Schedule Performance Index (SPI)
- Schedule Variance (SV)
- Specialist Engineer (SE)
- Subject Matter Experts (SMEs)
- SWOT (Strengths, Weaknesses, Opportunities and Threats)
- Terms of Reference (TOR).
- University for International Corporation (UCI)
- Work Breakdown Structure (WBS)
- Works Services Group (WSG)

EXECUTIVE SUMMARY (ABSTRACT)

In Guyana, the Ministry of Public Infrastructure is the main agency responsible for executing the Government's infrastructural development and transport projects. This ministry is considered the country's epicenter of engineering, construction and technical excellence. In keeping with its mandate, in 2012 the Government of Guyana, through the Ministry of Public Infrastructure, engaged the services of a consultant to conduct a feasibility study for the Upgrading of the Road from Georgetown to Lethem. This study signaled the way for approval of project financing for which designs were developed and later reviewed for implementation.

However, over the years construction projects have been executed without a formal project management plan which has resulted in increased project cost and construction delays that impacted the quality of the final deliverables. In fact, the Ministry of Public Infrastructure does not mandate the use of Standard Project Management Plan that is aligned with the good practices recommended by Project Management Institute (PMI) for the implementation of its road construction projects. Construction activities were managed using project specific management system with none project management documentation and documented project plan. While these cover some amount of the subsidiary management plans recommended by Project Management Institute PMI, most prove inadequate to effectively manage construction project activities and have resulted in construction delays, poor quality deliverables and increased projects costs.

A Project Management Plan was therefore required to improve the way the Ministry of Public Infrastructure managed its construction projects and to provide the roadmap for future project team and stakeholders to stay on track for success.

The Final Graduation Project general objectives was to develop a Project Management Plan that is aligned with the good practices recommended by Project Management Institute (PMI) to manage in a better way the Upgrading of the Road from Georgetown to Lethem.

The specific objectives were as follows:

- To develop a project charter to formally authorize the existence of the project and outline the high-level requirements and resources to accomplish the objectives.
- To produce a scope management plan to ensure the road project includes all the work required, and only the work required, for completing the project successfully.
- To create a schedule management in order to better develop and maintain the actual project schedule.
- To develop a cost management plan to maintain an organized approach to tasks while staying aware of cost control to ensure the project is on budget.
- To design a quality management plan that will clearly define what the quality management system is supposed to satisfy in order to achieve project quality.
- To create a resource management plan to better allocate the resource.
- To develop a communications management plan to ensure project communication is effective and the project performance is properly documented.
- To construct a risk management plan to be able to identify, assess and manage project risks.

- To construct a procurement management plan that documents what resources are to be procured from outside the organization, when they are to be procured and from what sources.
- To develop a stakeholder engagement plan to engage stakeholders and create positive relationships by setting objectives and managing the outcome.

The researcher used analytical method to conduct this research. This method entailed the use of facts or information already available to solve the research problem. The main sources used to gather information included A Guide to the Project Management Body of Knowledge (PMBOK® Guide) Sixth Edition, government documents, internet and interviews with key stakeholders in the Ministry of Public Infrastructure. The information was used to analyzed and developed the subsidiary plans used to develop the Project Management Plan proposed for the Final Graduation Project.

The process of meeting the specific objectives, in other words, the development of the project plans to govern the Georgetown to Lethem project was completed during the development of the Final Graduation Project. The Project Charter, Scope Management Plan, WBS, WBS dictionary, Requirements Management Plan, Requirements Document, Requirements Traceability Matrix, Schedule Management Plan, Cost Management Plan, Quality Management Plan, Resource Management Plan, Stakeholder Management Plan, Risk Management Plan, Procurement Management Plan, Stakeholder Management Plan and stakeholder register were all developed in response to the specific objectives.

In conclusion, it is the opinion of the researcher, all the objectives mentioned above were met in the course of this research project, in that a comprehensive project management plan has been developed, using appropriate framework, tools and techniques.

The study findings provide the following recommendations for the Min. of Public Infrastructure:

- Develop the Ministry's project management culture by providing clear, consistent, executive communication regarding the importance of project management objectives and their accomplishment.
- Establish the Ministry ownership and accountability by senior management for strategic objective accomplishment in scope, budget, schedule, and quality.
- Establish measurable team strategic objectives for scope, budget, schedule, and quality and measure their accomplishment.
- Establish the roles, responsibilities, and authority of project managers, project teams, technical managers, and technical leaders.
- Strengthen the consistency of project management across the Ministry through the implementation of consistent project management procedures (Project Plans).
- Revise the Ministry's project management policies, guidelines, and manuals to reflect these consistent project management requirements.
- Develop and maintain project status information regarding project scope, schedule, and budget.
- Continue to emphasize and amplify training and professional development for project managers in the Ministry.

1.0 INTRODUCTION

1.1. Background

In Guyana, the infrastructure sector is basic to the functioning of the economy given its settlement pattern which is far-flung placing increasing demands on the transport network. The Ministry of Public Infrastructure is the main agency responsible for executing the Government's infrastructural development and transport projects. It is considered the country's epicenter of engineering, construction and technical excellence. Its key responsibilities, among others, include the planning, creation and maintenance of major public civil works infrastructure throughout the country.

In 2012, the Government of Guyana through the Ministry of Public Infrastructure engaged the services of a consultant to conduct a feasibility study for the Upgrading of the Road from Georgetown to Lethem. This study signaled the way for approval of project financing from foreign funded agency in collaboration with Government of Guyana. Alternative options together with preliminary cost estimates were prepared, and based on engineering evaluation process and social, environmental, economic and financial analysis and discussion with Ministry of Public Infrastructure and other stakeholder final designs were selected for review and implementation.

The project is now in the final stage of design review and will soon commence implementation. However, over the years construction projects have been executed without a formal project management plan that have resulted in increased project cost and construction delays that impacted the quality of the final deliverables. A Project Management Plan is therefore required to improve the way the Ministry of Public Infrastructure manages its construction projects and provide the roadmap for project team and stakeholders to stay on track for success. This project thus entails the development of project management plan to enhance the planning, execution, monitoring and controlling and closing of the Georgetown to Lethem Road Project.

1.2. Statement of the problem

The problem is that the Ministry of Public Infrastructure does not mandate the use a Project Management Plan that is aligned with the good practices recommended by Project Management Institute (PMI) for the implementation of its road construction projects. Construction activities are managed using project specific management system with little to no project management documentation and documented project plan. While these cover some amount of the subsidiary management plans recommended by Project Management Institute PMI, most prove inadequate to effectively manage construction project activities and have resulted in construction delays, poor quality deliverables and increase projects costs.

It is hoped that with the upgrade of the Georgetown to Lethem road, which forms a critical link between the Coastland and hinterland, an appropriate project management plan will be developed and applied during the execution. It is also expected that monitoring and controlling of the project, and that the closing stages of the project to better managed to assess the construction activities towards achieving project requirements and success.

1.3. Purpose

The purpose of this project is to develop a Project Management Plan that is aligned with the good practices recommended by Project Management Institute (PMI) for the successful implementation of the Georgetown to Lethem Road Construction Project. The project will investigate the project management plans recommended by the Project Management Institute and its application to a real road project as highlighted above.

Over the years construction projects such roads and bridges have been executed without a formal project management plan and has resulted in a series of cost overruns, and construction delay that have overshadowed the intended benefits of the projects themselves. In addition, poor project management performance has resulted in claims and dispute between the client and contractor for extra quantities, delayed completion and

poor quality of work. A project management plan will therefore provide the blueprint needed to better manage project activities and use of resources.

The Project Management Plan will provide a roadmap for the project team and stakeholders to stay on track for success. The expected benefits include:

- A shared vision of what the project will accomplish through common understanding and shared goals and actions that satisfy the project's objectives thus reducing project chaos.
- Clarity on the responsibilities of team members and other organizations in contributing to the goals of the project and encourage teamwork.
- An established schedule and plan to better organized project work and reduce the probability of delays and cost overrun.
- A reduction in dispute between client and contractor through better contracts and resource management.
- An increase change control and reduce scope creep
- A better quality of deliverables through control quality.
- An efficient and economic use of financial and human resources by project tracking and risk management.
- Management of Integration through the development a comprehensive project management plan with the construction activities to create project value.

1.4. General objective

To develop a Project Management Plan that is aligned with the good practices recommended by Project Management Institute (PMI) to better manage the Upgrading of the Road from Georgetown to Lethem.

1.5. Specific objectives

1. To develop a project charter to formally authorize the existence of the project and outline the high-level requirements and resources to accomplish the objectives.

- 2. To produce a scope management plan to ensure the road project includes all the work required, and only the work required, for completing the project successfully.
- 3. To create a schedule management in order to better develop and maintain the actual project schedule.
- 4. To develop a cost management plan to maintain an organized approach to tasks while staying aware of cost control to ensure the project is on budget.
- 5. To design a quality management plan to clearly define what the quality management system is supposed to satisfy in order to achieved project quality.
- 6. To create a resource management plan to better allocate resource by:
 - increasing team visibility
 - keeping track of the schedule and availability
 - having data driven estimates and planning
- 7. To develop a communications management plan to ensure project communication is effective and the project performance is documented properly.
- 8. To construct a risk management plan to better identify, assess and manage project risks.
- 9. To construct a procurement management plan that documents what resources are to be procured from outside the organization, when they are to be procured and from what sources.
- 10. To develop a stakeholder engagement plan to engage stakeholders and create positive relationships by setting objectives and managing their expectations.
- 11. To contribute to the overall improvement of construction projects through the development of project plan.
- 12. Additionally, the project should contribute to the overall improvement of construction projects in the Ministry of Public Infrastructure through the development of project plans.

2.0 THEORETICAL FRAMEWORK

2.1 Company/Enterprise framework

2.1.1 Company/Enterprise background

Guyana officially the Co-operative Republic of Guyana, is a sovereign state on the northern mainland of South America. It is bordered by the Atlantic Ocean on the north, Brazil to the south and southwest, Suriname to the east and Venezuela to the west. With 215,000 square kilometres (83,000 sq. mi), Guyana is the fourth-smallest country on mainland South America (Rites Bhawan, 2018).

In Guyana, the Ministry of Public Infrastructure MPI is a budget agency and government ministry with responsibility for implementing the Government of Guyana's GOGY infrastructural mandate. The Ministry of Public Infrastructure of the Cooperative Republic of Guyana is a government entity aimed at the planning, creating and maintaining of infrastructure public works in Guyana. With its' main branch located in Georgetown, the capital city, and departments spreading across the country, the ministry represents one of the largest ministries in Guyana. For nearly two decades, GOGY, through the MPI and with the assistance of the multilateral development banks (MDBs) has been undertaking a continuous programme to improve and rehabilitate transport and other infrastructure in the country.

Under the Roads Act, Cap 51.01 of the Laws of Guyana, MPI is responsible for the main road infrastructure and the formulation of transport policy and regulations governing the use of roads, including regulating the speed and weight of vehicles. It is also responsible for maintaining the country bridges and river and sea defenses.

In 2001 the GOGY accepted some of the recommendations a European Union (EU) financed study for the improvement of the inner working of the MPI. Some of the recommendation resulting from the study included the creation of a new organizational structure for the agency, and the phased recruitment of additional staff. This saw the implementation of the Works Services Group (WSG), within MPI, a special division with responsibility for the planning,

constructing and maintaining of the public road network and the sea and river defense system (Geoffrey Vaughn, personal communication, November 20, 2018).

2.1.2 Mission and vision statements

Mission

The mission of the Ministry of Public Infrastructure, WSG is to plan, build and maintain a reliable, safe, efficient and cost-effective Main Road Network and Sea and River Defense system to protect life and property; support the movement of people, goods and services; reduce the cost of transportation; promote economic growth and quality of life and protect the environment (K. Cummings, 2018).

By incorporating a Project Management Plan into the planning, building, and maintenance phases of these projects the MPI will be able to better plan and implement its projects to successful completion.

Vision

The vision of the Ministry of Public Infrastructure, WSG is to be the country's epicenter of engineering and technical excellence. Its key responsibilities, among others, include the planning, implementation and maintenance of major public civil works infrastructure throughout Guyana (K. Cummings, 2018).

The project to develop a project Management plan for the implementation of the upgrade of the road from Georgetown to Lethem falls within the vision of MPI. This project will help the MPI towards achieving its' vision by ensuring better management of projects.

2.1.3 Organizational structure

The Ministry of Public Infrastructure, WSG consist of a matrix organizational structure and reflects blend of functional and projectized characteristics. While everyday operations are managed by functional managers such as accounting, personnel, and technical services, it also consists of project managers that coordinate and manage infrastructural projects. These managers

are fully authorized to apply project resources subject to the approval of the Permanent Secretary of the Ministry of Public Infrastructure. The Project Managers/ Engineers are often responsible for coordinating and monitoring all aspects of the implementation of Projects. Most of work of the organization is completed as projects since the success of the organization is based on the successful completion of projects (PMI, 2018).

Figure 1 below represents the organizational structure for the Ministry of Public Infrastructure (MPI). The Permanent Secretary (PS) is the head of this organization and below him are several departments and semi-autonomous agency heads. The Works Services Group (WSG) represents one of the departments that fall under the PS and is directly responsible for planning and implementing the country's road, bridges, and sea defense infrastructure projects.

WSG is considered one of the major stakeholders of the project since it stands to benefit from the implementation of the project, which will serve as an organization process asset for future similar road projects in the organization.



Figure 1 Organizational structure of the Ministry of Public Infrastructure (Source: compiled by author)

2.1.4 Products Offered

The main products offered by the MPI, WSG include the construction and maintenance of roads, bridges, buildings and river and sea defense structures. Additionally, the Ministry also performs feasibility studies, design reviews, interventions and advisory services for other agencies in the country. The FGP will help the MPI with the implementation aspect of its' projects by serving as a roadmap for all project activities. It involves the development of several subsidiary plans that are aligned with the good practices recommended by Project Management Institute (PMI) to better executed, monitored, and controlled the projects and their deliverables (Geoffrey Vaughn, personal communication, November 20, 2018).

2.2 Project Management concepts

2.2.1 Project

According to PMI (2008) a project is a temporary endeavor designed to produce a unique product, service or result with a defined beginning and end. It is usually time-constrained, often by funding or staffing and undertaken to meet unique goals and objectives, typically to bring about beneficial change or added value. In practice, the management of such distinct production approaches requires the development of distinct technical skills and management strategies. The key characteristics of a project are:

- A project has a defined beginning and end.
- The purpose of a project is to create a unique output.
- This output can be a product, service, or a result. Meaning that the unique output produced during the project can be tangible or intangible.

According PMI (2008), there are three main deliverables of a project, that are: 1) Project Charter; 2) Project Scope Statement (linked to WBS), and 3) Project Plan. These three deliverables are developed throughout the development of the processes belonging to the process groups of Initiating and Planning. Presently, the MPI does not mandate the use of a Project Charter nor Project Management Plan for the initiation and execution of its projects, rather projects are implemented based results of the Project feasibility studies which contains the Scope Statement or Terms of Reference (TOR). Most projects are financed and executed by sole on the outcome of this deliverable. Therefore, the focus of this paper is to present the all the deliverables as mentioned above applied to a real-life road construction project to better manage the successful implementation of such a project.

2.2.2 Project management

Project management is more than just implementing activities, it includes the management of limited resources to ensure that the project meets its objectives within the expected quality, timeframe, and budget; and, at the same time, meet the expectations of its stakeholders" (PM4Dev, 2009). According to PMI (2008) Project Management is the application of knowledge, skills, tools and techniques to project activities to meet project requirements".

Project management is the practice of initiating, planning, executing, controlling, and closing the work of a team to achieve specific goals and meet specific success criteria at the specified time. While project management in different sector/activity has many different meanings, in construction it takes on a form in which each project has a defined beginning and ending. It is the planning, organizing, directing, and controlling of company resources for the relatively short-term objective that has been established to complete specific goals and objectives.

Traditionally, project success was assessed on the triple measure set of cost, time, and performance. A project is considered successful if it was completed within its budget estimate, within its initial scheduled time frame, and performed as it was designed to function. The recognition that project success is multi-dimensional raises the question of whether different input factors may have different effects on different project outcomes (Dicky C. Sylvester 2011). It is against this backdrop that the researcher intends to investigate and explain the importance of the MPI having a proper project management plan that is aligned with the good practices recommended by Project Management Institute (PMI) to better manage the construction of the Road from Georgetown to Lethem and future similar road projects.

2.2.3 Project Management Plan

According to PMI (2017, p.86), "a project management plan is the document that describes how the project will be executed, monitored and controlled, and closed. It integrates and consolidates all the subsidiary management plans and baselines, and other information necessary to manage the project." Project Management plans are very important for the planning and executing infrastructural development projects in developing countries such Guyana with limited resources. As stated by Gittinger (1982), "projects provide an important means by which investment and other development expenditures foreseen in plans can be clarified and realized. Sound development plans require good projects, just as good projects require sound planning. The two are interdependent." The development of a Project Manager Plan includes defining project goals and objectives, specifying tasks or how goals will be achieved, what resources are need, and associating budgets and timelines for completion. It also includes implementing the project plan, along with careful controls to stay on the "critical path", that is, to ensure the plan is being managed according to plan.

A proper project management plan greatly helps in the construction process of a project given that a significant number of international high-profile projects fail to be delivered on time and on budget. This is due to a number of undesirable characteristics that are associated with the failure of the projects: budget overruns, compromised project specifications, and missed mile- stones (Dicky C. Sylvester 2011). Construction projects in Guyana have not been exempted from these phenomena as most projects over the years have experienced severe delays and cost overrun and require project management documentation.

In other words, the three basic dimensions of project success, namely time, cost and quality, are often not effectively managed by neither client nor contractor. Hence, to avoid these problems, proper project planning must be practiced. This FGP intends to meet these shortcomings through the implementation of project management plan for road construction projects in Guyana. However, it is necessary to understand that Project management should never be seen as a strict methodology that must be exactly adhered to in order to be effective. Rather, it is a collection of recommended processes which can be applied to meet the demands of projects. More specifically

project management is a collection of processes that can be used throughout the life of a project to aid in its management.

The development of the Final Graduation Project (FGP) will consist of the creation of the Project Management Plan for a road construction project and will be used during implementation to manage the project processes while balancing competing constraints.





2.2.4 Project life cycle

A project lifecycle is a "series of phases that a project passes through from its start to its completion" (Project Management Institute, 2017, p. 19). A project phase is a collection of logically related activities that culminates in the completion of one or more deliverables (Project Management Institute, 2017, p. 20). Developed by the Project Management Institute (PMI), the five phases of project management include conception and initiation, planning, execution, performance/monitoring, and project close.

The project life cycle for a project may include multiple phases or subprojects within the context of a single overall project. Project phases in a complete project life cycle are not the same as project management process groups. In fact, the process groups may need to be repeated for each phase. The end of each phase is marked by a milestone. There are a multitude of phases and milestones currently in use in construction, depending on the organization and the type of project. Dividing the project into phases permits for increased project control by the performing organization. These phases are usually sequential and overlapping (Vipul Shah, 2016). Given that the project phases make up a project life cycle, these phases are tailored to fit a project's needs.



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

A standard construction project at the MPI in general, will the agency project life cycle which consist of five broadly defined project phases:

- 1. Identification generation of the initial project idea and preliminary design
- 2. Preparation detailed design of the project addressing technical and operational aspects
- Appraisal analysis of the project from technical, financial, economic, gender, social, institutional and environmental perspectives
- Implementation & Monitoring execution of project activities, with on-going checks on progress and feedback.
- 5. Evaluation periodic review of the project with feedback for next project cycle and assessment of attainment of objectives.

While most projects follow the above cycle, there is no standard project management plan to guide the project implementation phase. This presents a challenge for managers who adopt varying management approach during construction that are often not aligned with the good practices recommended by Project Management Institute (PMI). Therefore, the FGP provides an opportunity for MPI to improve its project cycle through the implementation of project management plans and project management documentation.





2.2.5 Project management processes

The process groups as defined by PMBOK are: 1) Initiating, 2) Planning, 3) Executing, 4) Monitoring & Controlling, and 5) Closing. These process groups are responsible for the grouping of forty-nine processes established in the framework. Overall these project management processes can be applied during the life of a project to aid in the planning and management of:

- The triple constraints of a project (scope, schedule, budget);
- The project resources (people, equipment, facilities, materials); and
- Other project factors that may have to be planed for and managed, such as project risks, communications, stakeholders, change, and quality.

The application of project management processes within a project will aid in the successful completion of a project and maximizing its output. The FGP will see only the application of the processes involved the first two process groups: initiating and planning over the life of the graduation project to produce the Final Project management Plan for implementation of the actual project. During the implementation of the actual road construction project, other processes associated with remaining process groups will be applied using the plans a roadmap for implementation.

Project Management Process Group	Number of Associated Processes
Initiating	2
Planning	24
Executing	10
Monitoring & Controlling	12
Closing	1
Total	49

 Table 1: Number of processes by Process Groups (Source: compiled by author)

This FGP is focused on the Initiating and Planning Process Groups in the development of a Project Management Plan. The following sections outline these process groups in more detail and provide some context and recommendations with regards to how project management processes can be of value to the FGP.

The Initiating Process Group: These are the processes performed to define a new project or a new phase of an existing project by obtaining authorization to start the project. The Initiating Process Group is considered as the startup project. It refers in general to the beginning of the project, however, given the possibility of different approaches to project management adopted by each institution, it can also be applied to the initialization phase of a project. The Initiating Process Group defines and authorizes the project or a project phase (PMI, 2008).

This process group is related to two Knowledge Areas: Project Integration Management and Project Stakeholder Management. It has two processes, as shown in Table 2.

 Table 2: Process by Knowledge Areas for the initiating Process Group (Source: compiled by author)

Knowledge Areas	Initiating Process
[4] Project Integration Managment	4.1 Develop a project Charter
[13] Project Stakeholder Managment	13.1 Identify Stakeholders

This process group will see the development of project Charter for the FGP which is responsible for publicizing the project to the organization and formalizing the initial actions defined by the project such as scope, time, cost, risk, and people involved, as well as defining and directing the actions of the Project Manager (Mustaro & Rossi, 2013).

Planning Process Group: These are the processes related to the planning activities of the project. This process group has more processes associated with it. There are twenty- four processes associated with all Knowledge Areas defined by PMBOK framework as evidenced in Table 3. In general, it can be considered as the unique process for project management, as the act of management is completely justified by planning (Mustaro & Rossi, 2013).

The Planning Process Group defines and refines objectives and plans the actions required to attain the objectives and scope that the project was undertaken to address (PMI, 2008). The processes belonging to this process group must be executed after the execution of the processes belonging to the Initiating Process Group presented in previous section.

 Table 3: Process by Knowledge Areas for the planning Process Group (Source: compiled by author)

Knowledge Areas	Planning Process Group
[4] Project Integration Management	4.2 Develop Project Management Plan
[5] Project Scope Management	5.1 Plan Scope Management

	5.2 Collect Requirements
	5.3 Define Scope
	5.4 Create WBS
[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
[7] Project Cost Management	7.1 Plan Cost Management
	7.2 Estimate Costs
	7.3 Determine Budget
[8] Project Quality Management	8.1 Plan Quality Management
[9] Project Resource Management	9.1 Plan Resource Management
	9.2 Estimate Activity Resources
[10] Project Communications	
Management	10.1 Plan Communications Management
[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
[12] Project Procurement Management	12.1 Plan Procurement Management
[13] Project Stakeholder Management	13.2 Plan Stakeholder Engagement

For this process group, the Project Plan is the main deliverable and it shall be prepared based on the results of other processes linked to this process group, i.e., the development of the Project Plan is the result of the development of many processes and integration of several subsidiary plans. This plan represents the final deliverable to be used in the implantation of the road construction project.

2.2.6 **Project management knowledge areas**

The PMBOK has established standards and guidelines for project management in the possible ways of Knowledge Areas. The Knowledge Areas defined by the PMBOK are: 1) Project Integration Management, 2) Scope Management 3) Schedule Management, 4) Cost Management, 5) Quality Management; 6) Resource Management, 7) Communication Management, 8) Risk Management; 9) Procurement Management, and 10) Stakeholder Management. These areas of knowledge provide the base for the development of the Project Management Plan (PMI, 2017).

2.2.6.1 Project Integration Management

"Project Integration Management includes the processes and activities to identify, define, combine, unify, and coordinate the various processes and project management activities within the Project Management Process Groups" (Project Management Institute, 2017, p. 69).

Projects have all types of activities going on and there is a need to keep the "whole" thing moving collectively integrating all the dynamics that take place. Managing integration is about unifying the project and developing the project charter, one of only two processes during the Initiation phase and authorizes the project manager. The Project Management Plan is also developed within this knowledge area and is the primary guiding document for the project manager and end result of the planning phase. It is used to ensure a successful outcome to the project. The project management plan is distributed and approved by relevant stakeholders, particularly the project sponsor, and changes are tracked through the change log. Additionally, project integration is used to:

• Direct and Manage Project Work. This process encompasses the production of the project's deliverables.

- Manage Project Knowledge. Most projects require the acquisition of additional knowledge. This requires active management to ensure the project finishes on time and within its budget budget.
- Monitor and Control Project Work. This process contains the work necessary to monitor the project, perform earned value analysis and project status reports, and identify potential project changes.
- **Perform Integrated Change Control.** In this process the change control is carried out. Whether your project requires change request forms, project sponsor approvals, and other administration or if its a basic change log, this process manages project changes.
- Close Project or Phase. This process contains the tasks necessary to close the project, or the project phases.



Figure 5: PMBOK® Guide Project Integration Management Overview. Reprinted from A Guide to the Project Management Body of Knowledge (p. 71), Project Management Institute, 2017, Project Management Institute. Copyright 2017 by Project Management Institute, Inc.

2.2.6.2 Project Scope Management

Project Scope Management includes the processes required to ensure that the project includes all the work required, and only the work required, to complete the project successfully (Project Management Institute, 2017, p.129). This knowledge area involves the project scope, that is, the work that is included within the project this must be broken down and managed through a work breakdown structure or WBS. Since scope changes are one of the top causes of project changes and grief in projects in general, it is very important that the boundaries of the project be well defined from the outset and monitored rigorously (Jon Hartney, 2016). By developing a scope management plan as part of the FGP the project manager will be able to control unauthorized work from entering the project.



Figure 6: PMBOK® Guide Project Scope Management Overview. Reprinted from A Guide to the Project Management Body of Knowledge (p. 130), Project Management Institute, 2017, Project Management Institute. Copyright 2017 by Project Management Institute, Inc.

2.2.6.3 Project Schedule Management

Project Schedule Management includes the processes required to manage the timely completion of the project (Project Management Institute, 2017, p.173). Projects have a definite beginning and a definite ending date. Therefore, there is a need to manage the budgeted time according to a project schedule. Managing time/schedule is about definition, sequencing, resource and duration estimating, schedule development, and schedule control.

This is usually the most time consuming of the knowledge areas. During planning, the project manager must divide the project into tasks and create both a schedule (start and finish dates for each task) and budget for each task. During the project, value management determines the project status at regular status intervals. Because most project changes involve a change to the schedule, it must be continuously re-baselined, and the project management plan updated (and approved by the project sponsor) (Jon Hartney, 2016).

The Schedule Management Plan contains information such as how the schedule will be created, who will be responsible for it, how aggressive it will be enforced, and under what circumstances it will be changed. This will ensure that project stays on track for successful completion by controlling schedule activities through Earned value analysis performed at regular intervals to determine whether the project is ahead or behind schedule, and by how much, at that status point.



Figure 7: PMBOK® Guide Project Schedule Management Overview. Reprinted from A Guide to the Project Management Body of Knowledge (p. 174), Project Management Institute, 2017, Project Management Institute. Copyright 2017 by Project Management Institute, Inc.

2.2.6.4 Project Cost Management

"Project Cost Management includes the processes involved in planning, estimating, budgeting, financing, funding, managing, and controlling costs so that the project can be completed within the approved budget" (Project Management Institute, 2017, p. 231). Projects consume resources, and therefore, there is a need to manage the investment with the realization of creating value

(i.e., the benefits derived exceed the amount spent). Managing costs is about resource planning, cost estimating, budgeting, and control (Adrienne Watt 2012).

The project budget is usually one of the most sensitive parts of a project and must be established through rigorous estimating techniques and monitored to ensure there are no unnecessary changes. Plan Cost Management establishes methodologies with which the project budget will be established, the criteria for changes, and control procedures, Estimate Costs of each task and determine overall project budget.



Figure 8: PMBOK® Guide Project Cost Management Overview. Reprinted from A Guide to the Project Management Body of Knowledge (p. 232), Project Management Institute, 2017, Project Management Institute. Copyright 2017 by Project Management Institute, Inc.

2.2.6.6 Project Quality Management

Plan Quality Management is the process of identifying quality requirements and/ or standards for the project and its deliverables, and documenting how the project will demonstrate compliance with quality requirements and/or standards (Project Management Institute, 2017, p. 277). Managing quality is about quality planning, quality assurance, and quality control to ensure that there is a plan to deal with quality issues.

The Quality Management Plan can be a section of the project management plan or a stand alone document, and it contains the quality specifications for the product or service.



Figure 9: PMBOK® Guide Project Quality Management Overview. Reprinted from A Guide to the Project Management Body of Knowledge (p. 232), Project Management Institute, 2017, Project Management Institute. Copyright 2017 by Project Management Institute, Inc.

2.2.6.7 Project Resource Management

"Project Resource Management includes the processes to identify, acquire, and manage the resources needed for the successful completion of the project" (Project Management Institute, 2017, p. 307).

Projects consist of teams and you need to manage project team(s) during the life cycle of the project. Finding the right people, managing their outputs, and keeping them on schedule is a big part of managing a project.

Managing human resources is about human resources planning, hiring, and developing and managing a project team. The development of the Resource Management Plan identifies the roles/positions required by the project, the minimum requirements for those roles, and how they fit into the overall project structure. By managing resources, the project manager is better able monitor performance to ensure maximum productivity.



Figure 10: PMBOK® Guide Project Resource Management Overview. Reprinted from A Guide to the Project Management Body of Knowledge (p. 308), Project Management Institute, 2017, Project Management Institute. Copyright 2017 by Project Management Institute, Inc.

2.2.6.8 Project Communications Management

"Project Communications Management includes the processes necessary to ensure that the information needs of the project and its stakeholders are met through development of artifacts and implementation of activities designed to achieve effective information exchange (Project Management Institute, 2017).

Communication with stakeholders is often the key factor that allows stakeholders to be satisfied even when unexpected changes happen. It is therefore essential to develop a communications plan to keep all stakeholders "in the loop" throughout the project. The Communications Management Plan identifies the regular communication requirements of each stakeholder and identifies any specific communications procedures for unexpected issues or project changes.



Figure 11: PMBOK® Guide Project Resource Management Overview. Reprinted from A Guide to the Project Management Body of Knowledge (p. 360), Project Management Institute, 2017, Project Management Institute. Copyright 2017 by Project Management Institute, Inc.

2.2.6.9 Project Risk Management

According to PMI, "Project Risk Management includes the processes of conducting risk management planning, identification, analysis, response planning, response implementation, and monitoring risk on a project" (Project Management Institute, 2017, p. 395).

There is a real need to properly identify various risks and manage these risks. Managing risk is about risk planning and identification, risk analysis (qualitative and quantitative), risk response (action) planning, and risk monitoring and control. The Risk Management Plan is used to identifies how the risks will be itemized, categorized, and prioritized.


Figure 12: PMBOK® Guide Project Risk Management Overview. Reprinted from A Guide to the Project Management Body of Knowledge (p. 396), Project Management Institute, 2017, Project Management Institute. Copyright 2017 by Project Management Institute, Inc.

2.2.6.10 Project Procurement Management

"Project Procurement Management includes the processes necessary to purchase or acquire products, services, or results needed from outside the project team" (Project Management Institute, 2017, p. 459).

Contruction Projects procure the services of outside vendors and contractors, including the purchase of equipment. There is a need to manage how vendors are selected and managed within the project life cycle. Managing procurement is about acquisition and contracting plans, sellers' responses and selections, contract administration, and contract closure.

The Procurement Management Plan identifies the outside procurement needs of the project and parameters under which the contractors will be procured. During project execution the contractors must be managed, and the contracts monitored to provide early warning of project changes (Jon Hartney, 2016).



Figure 13: PMBOK® Guide Project Risk Management Overview. Reprinted from A Guide to the Project Management Body of Knowledge (p. 460), Project Management Institute, 2017, Project Management Institute. Copyright 2017 by Project Management Institute, Inc.

2.2.6.11 Project Stakeholder Management

Project Stakeholder Management includes the processes required to identify the people, groups, or organizations that could impact or be impacted by the project, to analyze stakeholder expectations and their impact on the project, and to develop appropriate management strategies for effectively engaging stakeholders in project decisions and execution (Project Management Institute, 2017, p. 503).

Every project impacts people and organizations and is impacted by people and organizations. Identifying these stakeholders early, and as they arise and change throughout the project, is a key success factor. Managing stakeholders is about identifying stakeholders, their interest level, and their potential to influence the project; and managing and controlling the relationships and communications between stakeholders and the project (Jon Hartney, 2016). Therefore, the stakeholders should be actively managed and addressed within the project management plan.



Figure 14: PMBOK® Guide Project Risk Management Overview. Reprinted from A Guide to the Project Management Body of Knowledge (p. 404), Project Management Institute, 2017, Project Management Institute. Copyright 2017 by Project Management Institute, Inc.

2.3 Other applicable theory/concepts related to the project topic and context

The are several other theories/ concepts that are applicable to the project topic and context. This means that project management teams do not need to "re-invent the wheel" by creating their own project management method from scratch. Other applicable theories include:

2.3.1 Construction Project Management

Construction project management (CPM), as the name implies, is focused on projects in the construction industry. But the constraints of time, cost and quality remain the same. Construction Management Plans are plans written to help uniformly direct and control activities during the construction of projects. It can be a plan delivered by the client to map out the entire project from its goals to an evaluation of the process. Sometimes the plan comes from the contractor, who focuses on the construction work primarily. Then there's the plan that puts the project in the context of the site around it, as defined by the rules and regulations of the municipality in which it is being done (Project Manager, 2019).

For the construction phase and activities linked to it, a contractor can prepare a construction management plan to detail the project schedule and costs. It includes the timing of the individual construction tasks, breakdown of the projected costs (and, therefore, the projected profitability), and information about technologies and materials to be used to better manage projects.

2.3.2 Prince 2

PRINCE2 is an acronym for Projects in Controlled Environments. It is a methodology used in Project Management to improve Project management skills. It also helps in gaining an effective output. PRINCE2 is globally recognized certification for project management concepts. The PRINCE2 methodology is based upon a set of 7 principles that are the foundations upon which everything else in the methodology is based on. These include; continued business justification, learn from experience, defined roles and responsibilities, manage by stages, manage by exception, focus on products, and tailor to suit the environment. These principles have been proven in practice over many years to be the most effective ways of managing projects i.e. they are based upon modern best practices in project management and can be applied directly on projects (AXELOS Limited. 2017).

2.3.3 Integrated Project Delivery (IPD)

Integrated Project Delivery (IPD) is a project delivery approach that integrates people, systems, business structures and practices into a process that collaboratively harnesses the talents and insights of all participants to optimize project results, increase value to the owner, reduce waste, and maximize efficiency through all phases of design, fabrication, and construction. A collaborative effort between The American Institute of Architects (AIA) National and AIA California Council, IPD responds to forces and trends at work in the design and construction industry today. At the core of an integrated project are collaborative, integrated and productive teams composed of key project participants. Building upon early contributions of individual expertise, these teams are guided by principles of trust, transparent processes, effective collaboration, open information sharing, team success tied to project success, shared risk and reward, value-based decision making, and utilization of full technological capabilities and support. The outcome is the opportunity to design, build, and operate as efficiently as possible (AIA, 2007).

3.0 METHODOLOGICAL FRAMEWORK

3.1 Information sources

"Being able to research and use materials which back up your study or offer different interpretations of your study area is an essential aspect of studying and learning. Primarily you need to be aware of where to look for information, how to access it and how to use it." according to Skills You Need (2018)

According to dictionary.com, information is the act of telling or imparting knowledge. It also defines a source as anything or place from which something comes, arises, or is obtained. An information source can therefore be considered a person, thing, or place from which knowledge or fact comes, arises, or is obtained. Dictionary.com. Retrieved (2018).

Information can come from virtually anywhere including social media, blogs, personal experiences, books, journal and magazine articles, expert opinions, encyclopedias, and web pages. This information gets generated in various ways and is recorded in a variety of sources which is made available for use by users. Renu Arora (2018)

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3.1.1 Primary sources

"Primary sources are original materials on which other research studies are based". Primary sources present firsthand accounts of discoveries or new information. Information is presented in its original form, uninterpreted or altered by other writers. They are usually evidence or accounts of the events, practices, or conditions being researched and created by a person who directly experienced that event. ("Types of Information source", 2013).

For the development of the Final Graduation Project, the primary information sources that will be used are minutes of meeting, government documents, photographs, surveys, speeches, personal interviews with members of the Ministry of Public Infrastructure, interviews with other stakeholders, such as Consultants, dissertations and information charts. Refer to Chart 1, for the specific primary information sources that will be used.

3.1.2 Secondary Sources

"A secondary source of information is one that was created by someone who did not have first-hand experience or did not participate in the events or conditions being researched." They are generally accounts written after the fact with the benefit of hindsight. Secondary sources discuss, interpret and provide comment on information provided by primary sources. They are not evidence, but rather commentary on and discussion of evidence. karibouconnections.net (2018)

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

Objectives	Information sources		
	Primary	Secondary	
1. To develop a project charter	Minutes of meeting,	PMBOK® Guide, and	
to formally authorize the existence	correspondence,	textbooks	
of the project and outline the high-	government documents,		

Chart 1 Information sources (Source: compiled by author)

level requirements and resources to	interview with key	
accomplish the objectives.	stakeholder, speeches.	
2. To produce a scope	Minutes of meeting,	PMBOK® Guide and
management plan to ensure the road	correspondence,	textbooks
project includes all the work	government documents,	
required, and only the work	interviews with key	
required, for completing the project	stakeholders	
successfully.		
3. To create a schedule	Government documents,	PMBOK® Guide and
management in order to better	interviews with	textbooks
develop and maintain the actual	stakeholders.	
project schedule.		
4. To develop a cost	Correspondence,	PMBOK® Guide and
management plan to maintain an	government documents,	textbooks
organized approach to tasks while	personal interviews with	
staying aware of cost control to	Coordinator WSG,	
ensure the project is on budget.	dissertations and	
	information charts.	
5. To design a quality	Speeches, minutes of	PMBOK® Guide and
management plan to clearly defines	meeting, government	textbooks
what the quality management	documents, personal	
system is supposed to satisfy to	interviews with	
achieved project quality.	Coordinator WSG and	
	other stakeholders,	
	dissertations and	
	information charts.	
6. To create a resource	Minutes of meeting,	PMBOK® Guide and
management plan to better resource	correspondence,	textbooks
allocate by:	government documents,	

• increasing team visibility	personal interviews with	
• keeping track of the	Coordinator WSG and	
schedule and availability	stakeholders, dissertations	
• data driven estimates and	and information charts.	
planning		
7. To develop a	Minutes of meeting,	PMBOK® Guide and
communications management plan	government documents,	textbooks
to ensure project communication	personal interviews with	
are effective and the project	Coordinator WSG and	
performance are documented	other stakeholders,	
properly.	dissertations	
8. To construct a risk	Government documents,	PMBOK® Guide and
management plan to better identify,	personal interviews with	textbooks
assess and manage project risks.	Coordinator WSG and	
	other stakeholders,	
	dissertations and	
	information charts.	
9. To construct a procurement	Minutes of meeting,	PMBOK® Guide and
management plan that documents	surveys, correspondence,	textbooks
what resources are to be procured	government documents,	
from outside the organization, when	interviews	
they are to be procured and from		
what sources.		
10. To develop a stakeholder	Minutes of meeting,	PMBOK® Guide and
engagement plan to engage	surveys, interviews	textbooks
stakeholders and create positive	correspondence,	
relationships by setting objectives	government documents.	
and managing their expectations.		

3.2 Research methods

Research is a scientific and systematic search for pertinent information on a specific topic through objectives and systematic method of finding solution to a problem. The Advanced Learner's Dictionary of Current English lays down the meaning of research as "a careful investigation or inquiry especially through search for new facts in any branch of knowledge. According to Clifford Woody research comprises defining and redefining problems, formulating hypothesis or suggested solutions; collecting, organizing and evaluating data; making deductions and reaching conclusions.

Research methods can then be understood as all those methods/techniques that are used for conduction of research. Research methods or techniques, thus, refer to the methods the researchers use in performing research operations. In other words, all those methods which are used by the researcher during the course of studying his research problem are termed as research methods. shodhganga.inflibnet.ac.in (2018)

The objective of this FGP is to create a project management plan that is aligned with the good practices recommended by Project Management Institute (PMI) through the review of existing knowledge in project management in order to improve construction management of road projects in Guyana. The following type of research technique has been chosen owing to the nature of the problem to be researched, and the availability of data.

3.2.1 Analytical method

The Analytical Method is a generic process combining the power of the Scientific Method with the use of formal process to solve any type of problem. Analytical Research can be subdivided into Historical Research, Philosophical Research, Review, and Research Synthesis (Meta-Analysis).

• Deductive reasoning

Deductive reasoning is a basic form of valid reasoning. Deductive reasoning, or deduction, starts out with a general statement (objectives), and examines the possibilities to reach a specific, logical conclusion (Alina Bradford, 2017).

• Inductive Reasoning

Inductive reasoning makes broad generalizations from specific observations. Basically, there is data, then conclusions are drawn from the data. The researcher must use facts or information already available and analyze these to make a critical evaluation of the material. This type of research is appropriate for the present study since is provides a way to solve the research problem and provide an opportunity for improvement (Alina Bradford, 2017).

Objectives	Research methods	
	Analytical method	
1. To develop a project charter to	This research method will be employed by analyzing	
formally authorize the existence of the	and using data, facts or information from the sources	
project and outline the high-level	identified in Chart 1 above, to guide decision making	
requirements and resources to	when creating the project charter.	
accomplish the objectives.		
2. To produce a scope management	This research method will be employed by analyzing	
plan to ensure the road project includes	and using data, facts or information from the sources	
all the work required, and only the work	identified in Chart 1 above, to guide decision making	
required, for completing the project	when creating the scope management plan.	
successfully.		
3. To create a schedule management	This research method will be employed by analyzing	
in order to better develop and maintain	and using data, facts or information from the sources	
the actual project schedule.	identified in Chart 1 above, to guide decision making	
	when creating the schedule management plan.	
4. To develop a cost management	This research method will be employed by analyzing	
plan to maintain an organized approach	and using data, facts or information from the sources	
to tasks while staying aware of cost	identified in Chart 1 above, to guide decision making	
control to ensure the project is on budget.	when creating the cost management plan.	

5. To design a quality management	This research method will be employed by analyzing	
plan to clearly defines what the quality	and using data, facts or information from the sources	
management system is supposed to	identified in Chart 1 above, to guide decision making	
satisfy to achieved project quality.	when creating the quality management plan.	
6. To create a resource management	This research method will be employed by analyzing	
plan to better resource allocated by:	and using data, facts or information from the sources	
• increasing team visibility	identified in Chart 1 above, to guide decision making	
• keeping track of the schedule and	when creating the resource management plan.	
availability		
• data driven estimates and		
planning		
7. To develop a communications	This research method will be employed by analyzing	
management plan to ensure project	and using data, facts or information from the sources	
communication are effective and the	identified in Chart 1 above, to guide decision making	
project performance are documented	when creating the communication management plan.	
properly.		
properly.8.To construct a risk management	This research method will be employed by analyzing	
properly.8. To construct a risk managementplan to better identify, assess and manage	This research method will be employed by analyzing and using data, facts or information from the sources	
 properly. 8. To construct a risk management plan to better identify, assess and manage project risks. 	This research method will be employed by analyzing and using data, facts or information from the sources identified in Chart 1 above, to guide decision making	
 properly. 8. To construct a risk management plan to better identify, assess and manage project risks. 	This research method will be employed by analyzing and using data, facts or information from the sources identified in Chart 1 above, to guide decision making when creating the risk management plan.	
properly.8.To construct a risk managementplan to better identify, assess and manageproject risks.9.To construct a procurement	This research method will be employed by analyzing and using data, facts or information from the sources identified in Chart 1 above, to guide decision making when creating the risk management plan. This research method will be employed by analyzing	
 properly. 8. To construct a risk management plan to better identify, assess and manage project risks. 9. To construct a procurement management plan that documents what 	This research method will be employed by analyzing and using data, facts or information from the sources identified in Chart 1 above, to guide decision making when creating the risk management plan. This research method will be employed by analyzing and using data, facts or information from the sources	
 properly. 8. To construct a risk management plan to better identify, assess and manage project risks. 9. To construct a procurement management plan that documents what resources are to be procured from outside 	This research method will be employed by analyzing and using data, facts or information from the sources identified in Chart 1 above, to guide decision making when creating the risk management plan. This research method will be employed by analyzing and using data, facts or information from the sources identified in Chart 1 above, to guide decision making	
 properly. 8. To construct a risk management plan to better identify, assess and manage project risks. 9. To construct a procurement management plan that documents what resources are to be procured from outside the organization, when they are to be 	This research method will be employed by analyzing and using data, facts or information from the sources identified in Chart 1 above, to guide decision making when creating the risk management plan. This research method will be employed by analyzing and using data, facts or information from the sources identified in Chart 1 above, to guide decision making when creating the procurement management plan.	
 properly. 8. To construct a risk management plan to better identify, assess and manage project risks. 9. To construct a procurement management plan that documents what resources are to be procured from outside the organization, when they are to be procured and from what sources. 	This research method will be employed by analyzing and using data, facts or information from the sources identified in Chart 1 above, to guide decision making when creating the risk management plan. This research method will be employed by analyzing and using data, facts or information from the sources identified in Chart 1 above, to guide decision making when creating the procurement management plan.	
properly.8.To construct a risk managementplan to better identify, assess and manageproject risks.9.To construct a procurementmanagement plan that documents whatresources are to be procured from outsidethe organization, when they are to beprocured and from what sources.10.To develop a stakeholder	This research method will be employed by analyzing and using data, facts or information from the sources identified in Chart 1 above, to guide decision making when creating the risk management plan. This research method will be employed by analyzing and using data, facts or information from the sources identified in Chart 1 above, to guide decision making when creating the procurement management plan. This research method will be employed by analyzing	
 properly. 8. To construct a risk management plan to better identify, assess and manage project risks. 9. To construct a procurement management plan that documents what resources are to be procured from outside the organization, when they are to be procured and from what sources. 10. To develop a stakeholder engagement plan to engage stakeholders 	 This research method will be employed by analyzing and using data, facts or information from the sources identified in Chart 1 above, to guide decision making when creating the risk management plan. This research method will be employed by analyzing and using data, facts or information from the sources identified in Chart 1 above, to guide decision making when creating the procurement management plan. This research method will be employed by analyzing and using data, facts or information from the sources identified in Chart 1 above, to guide decision making when creating the procurement management plan. This research method will be employed by analyzing and using data, facts or information from the sources 	
 properly. 8. To construct a risk management plan to better identify, assess and manage project risks. 9. To construct a procurement management plan that documents what resources are to be procured from outside the organization, when they are to be procured and from what sources. 10. To develop a stakeholder engagement plan to engage stakeholders and create positive relationships by 	 This research method will be employed by analyzing and using data, facts or information from the sources identified in Chart 1 above, to guide decision making when creating the risk management plan. This research method will be employed by analyzing and using data, facts or information from the sources identified in Chart 1 above, to guide decision making when creating the procurement management plan. This research method will be employed by analyzing and using data, facts or information from the sources identified in Chart 1 above, to guide decision making when creating the procurement management plan. This research method will be employed by analyzing and using data, facts or information from the sources identified in Chart 1 above, to guide decision making 	
 properly. 8. To construct a risk management plan to better identify, assess and manage project risks. 9. To construct a procurement management plan that documents what resources are to be procured from outside the organization, when they are to be procured and from what sources. 10. To develop a stakeholder engagement plan to engage stakeholders and create positive relationships by setting objectives and managing their 	This research method will be employed by analyzing and using data, facts or information from the sources identified in Chart 1 above, to guide decision making when creating the risk management plan. This research method will be employed by analyzing and using data, facts or information from the sources identified in Chart 1 above, to guide decision making when creating the procurement management plan. This research method will be employed by analyzing and using data, facts or information from the sources identified in Chart 1 above, to guide decision making when creating the procurement management plan.	

3.3 Tools

The PMBOK® Guide (2013) defines tools as something "tangible, such as a template or software program, used in performing an activity to produce a product or result.

Objectives	Tools
1. To develop a project charter to formally	Agreements
authorize the existence of the project and outline the	Expert Judgement
high-level requirements and resources to accomplish	Brainstorming
the objectives.	Focus Groups
	Interviews
	Meetings
	Conflict management
	Facilitation
	Meeting Management
	Checklists
	Decision making templates
	Project Charter template
	Project Management Plan template
	Data analysis templates
2. To produce a scope management plan to	Expert Judgement
ensure the road project includes all the work	Data gathering templates
required, and only the work required, for completing	Data Analysis Templates
the project successfully.	Meetings
	Interpersonal and Team Skills
	Voting
	Multi-criteria decision analysis
	Affinity Diagrams

Chart 3 Tools (Source: compiled by author)

	Decomposition
	Inspection
	Interviews
	Focus groups
	Facilitated workshops
	Questionnaires and surveys
	Observations
	Prototypes
3. To create a schedule management in order to	Expert Judgement
better develop and maintain the actual project	Data Analysis Templates
schedule.	Data gathering
	Meetings
	Decision making
	Rolling wave planning
	Leads and Lags
	Gantt Chart
	PERT
	Critical Path Method
	Critical Chain Method
	Schedule Compression
4. To develop a cost management plan to	Expert Judgement
maintain an organized approach to tasks while	Data Analysis Templates
staying aware of cost control to ensure the project is	Data gathering
on budget.	Meetings
	Analogous estimating
	Parametric estimating
	Bottom-up estimating
	Three-point estimating
	Reserve analysis
	Cost of quality

	To – complete performance index
	Software
	Historical information review
	Financing
5. To design a quality management plan to	Expert Judgement
clearly defines what the quality management system	Data gathering
is supposed to satisfy to achieved project quality.	Data analysis Templates
	Multi-criteria Decision analysis
	Data representation Templates
	Tests and Inspection planning
	Meeting
	Audits
	Problem Solving
6. To create a resource management plan to	Expert Judgment
better resource allocate by:	Data Representation Templates
 increasing team visibility 	Meetings
• keeping track of the schedule and availability	Analogous estimating
• data driven estimates and planning	Parametric estimating
	Bottom-up estimating
	Communication Technology
	Negotiation
	Motivation
	Conflict Management
	Recognition and reward
	Training
	Individual and Team Assessment
	Problem solving
	Data Analysis Templates
	Pre-assignment
	Virtual teams

7. To develop a communications management	Expert Judgment
plan to ensure project communication are effective	Communication requirements analysis
and the project performance are documented	Data representation Templates
properly.	Meetings
	Project Reporting
	Political Awareness
	Cultural Awareness
	Communication technology
	Communication models
	Communication methods
	Information management systems
8. To construct a risk management plan to better	Expert Judgment
identify, assess and manage project risks.	Data Analysis Templates
	Meetings
	Data Gathering Templates
	Interpersonal and Team Skills
	Risk Categorization
	Data Representation Templates
	Strategies for Threat
	Strategies for Opportunity
	Contingent Response Strategies
	Strategies for Overall Project Risks
	Audits
9. To construct a procurement management plan	Expert Judgment
that documents what resources are to be procured	Data gathering Templates
from outside the organization, when they are to be	Data Analysis Templates
procured and from what sources.	Meetings
	Source Selection Analysis
	Advertising
	Bidder Conference

	Interpersonal and Team Skills
	Claims Administration
	Inspection
	Audits
10. To develop a stakeholder engagement plan to	Expert Judgment
engage stakeholders and create positive relationships	Data gathering Templates
by setting objectives and managing their	Data Analysis Templates
expectations.	Data Representation Templates
	Meetings
	Prioritization and ranking
	Communication Skills
	Conflict Management
	Cultural Awareness
	Ground Rules

3.4 Assumptions and constraints

"An assumption is a belief of what you assume to be true in the future. You make assumptions based on your knowledge, experience or the information available on hand. These are anticipated events or circumstances that are expected to occur during your project's life cycle." Fahad Usmani (2013)

Assumptions are supposed to be true but do not necessarily end up being true since it isn't supported by factual proof but rather from experience. Sometimes they may turn out to be false, which can affect your project significantly. They add risks to the project because they may or may not be true. Assumptions are events that are outside of the project manager's and team's control. Assumption will be made in detail during the planning stages of the FGP, these will be documented and managed during the life of the projects.

"Constraints on the other hand are limitations imposed on the project, such as the limitation of cost, schedule, or resources, and you have to work within the boundaries restricted by these

constraints. All projects have constraints, which are defined and identified at the beginning of the project." Fahad Usmani (2013)

The PMBOK Guide recognizes six project constraints: scope, quality, schedule, budget, resource, and risk. Out of these six, scope, schedule, and budget are collectively known as the triple constraints. During the FGP Constraints and Assumptions will be identified and documented at high-level during project initiation. They will then be refined and documented in detail as a part of the Define Scope process in project planning and will be used as inputs into many project management processes.

Additionally, assumption analysis will be done as part of the risk management process. This is important to the FGP since the project management plan is affected if assumptions are proven wrong. Constraints and assumptions will need to be identified, tracked and effectively controlled during the project life cycle.

The summary of assumptions and constraints are shown in a chart 4 below.

Objectives	Assumptions	Constraints
 To develop a project charter to formally authorize the existence of the project and outline the high-level requirements and resources to accomplish the objectives. 	The Charter will be completed first. Upper management will foster support and "buy-in" of project goals and objectives.	The Charter must be completed within two weeks. Lack of support from upper management
 To produce a scope management plan to ensure the road project includes all the work required, and only the work required, for completing the project successfully. 	UCI strategic direction will remain the same. Sufficient information is available from UCI, PMI and Ministry of Public Infrastructure MoPI to complete the project. Scope doesn't change. If it	Scope must remain within the limits of FGP (project management plan) and not execution of the actual project.

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

Obje	ctives	Assumptions	Constraints
		should; project will follow a change control approval process	
3.	To create a schedule management in order to better develop and maintain the actual project schedule.	The time alloted for successful completion of the project will be sufficient.	Must complete the project within 3 months; Must finish 30% of the project work within 5 weeks.
4.	To develop a cost management plan to maintain an organized approach to tasks while staying aware of cost control to ensure the project is on budget.	Funding will be available prior to start. The overall cost of day-to- day activity will not increase. Personnel costs will not change overall the project. Economical conditions will stay the same.	Project budget must not exceed Two Hundred Thousand Guyana Dollars GY\$200,000. Project funding sources are limited, with no contingency. Increase economic costs
5.	To design a quality management plan to clearly defines what the quality management system is supposed to satisfy to achieved project quality.	Quality control will be properly planned in the project.	Limited Funds available for quality control. The FGP must satisfy all UCI reviews to be completed.
6.	 To create a resource management plan to better resource allocate by: increasing team visibility keeping track of the schedule 	Individuals will work 40 hours per week. The materials to complete the project will be readily available to be utilized.	Resources have to shared among functional departments Only one (1) personnel assigned

Objectives	Assumptions	Constraints
and availability		to FGP.
• data driven estimates and		
planning		
 To develop a communications management plan to ensure project communication are effective and the project performance are documented properly. 	 A Comprehensive communications plan will be prepared. Project team members will adhere to the Communications Plan. The timeframes listed in the Communications Schedule 	Communication plan not clear. Timeframe listed in communication schedule insufficient.
8. To construct a risk management plan to better identify, assess and manage project risks.	All risks will be identified, and appropriate risk response planned. Risk Assessment will be continuously monitored and updated throughout the life of the project.	Increase project risks above planned response. Lack of resource to monitor risks.
9. To construct a procurement management plan that documents what resources are to be procured from outside the organization, when they are to be procured and from what sources.	All goods and services to acquired from outside the organisation will be readily available. Comprehensive vendor evaluation and selection process will be developed.	Shortages in goods and services locally.
10. To develop a stakeholder engagement plan to engage stakeholders and create positive relationships by setting objectives and managing their expectations.	Comprehensive stakeholder plan will be prepared. All stakeholder requirements will be identified.	Unidentified stakeholders and increase requirements.

3.5 Deliverables

The (Project Management Institute, 2013) defines deliverable 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".

Objectives		Deliverables
1.	To develop a project charter to formally	Project Charter
	authorize the existence of the project and	
	outline the high-level requirements and	
	resources to accomplish the objectives.	
2.	To produce a scope management plan to	Scope Management Plan, Requirements
	ensure the road project includes all the	Management Plan, Requirements
	work required, and only the work	Documentation, Requirements Traceability
	required, for completing the project	Matrix, Project Scope Statement, and Scope
	successfully.	Baseline.
3.	To create a schedule management in order	Schedule Management Plan, Activity List,
	to better develop and maintain the actual	Activity Attributes, Milestone list, Schedule
	project schedule.	Network Diagram, Resources Estimate,
		Schedule Baseline, Project Schedule,
		Schedule Data and Project Calendar.
4.	To develop a cost management plan to	Cost Management Plan, Cost Estimates, Basis
	maintain an organized approach to tasks	of Estimates, Cost Baseline and Project
	while staying aware of cost control to	Funding Requirements
	ensure the project is on budget.	
5.	To design a quality management plan to	Quality Management Plan, and Quality
	clearly defines what the quality	Metrics
	management system is supposed to satisfy	
	to achieved project quality.	

Chart 5 Deliverables ((Source:	compiled by	v author)
		••••••••••••••••••••••••••••••••••••••	,

6.	To create a resource management plan to	Resource Management Plan, Team Charter,
	better resource allocate by:	Resource Requirements, Basis of Estimates,
	• increasing team visibility	and Resource Breakdown Structure.
	• keeping track of the schedule	
	and availability	
	• data driven estimates and	
	planning	
7.	To develop a communications	Communication Management Plan
	management plan to ensure project	
	communication are effective and the	
	project performance are documented	
	properly.	
8.	To construct a risk management plan to	Risk Management Plan, Risk Register, Risk
	better identify, assess and manage project	Report, and Change Requests
	risks.	
9.	To construct a procurement management	Procurement Management Plan, Procurement
	plan that documents what resources are to	Strategy, Bid Documents, Procurement
	be procured from outside the organization,	Statement of Work, Source Selection Criteria,
	when they are to be procured and from	Make or buy Decisions, and Independent
	what sources.	Costs Estimate.
10	To develop a stakeholder engagement	Stakeholder Engagement Plan, and
	plan to engage stakeholders and create	Stakeholder Register
	positive relationships by setting objectives	
	and managing their expectations	

4.0 RESULTS

4.1. PROJECT INTEGRATION MANAGEMENT

Georgetown to Lethem Road Construction - Project Plan

In the development of the Project Plan for the construction of the Georgetown to Lethem Road a Project Charter was developed as part of the first process in the Project Integration Management knowledge area. This charter is prepared to formally authorize the existence of the project, outline the high-level requirements and resources to accomplish the objectives and provide the Project Manager with the authority to apply organizational resources. This information is to make sure there is a clear understanding of what the project is about and that all interested parties share the same aims and objectives thus answering the questions of why the project is being initiated or what the required outcome is, which is more specified in Project Scope and Objectives.

The main source of information used to guide decision making process were the PMBOK Guide Sixth Edition, templates from University for International Corporation (UCI) archives, minutes of meetings and organizational process assets (OPA) from the Ministry of Public Infrastructure. Additionally, an analytical research approach was adopted in the development of project ideas for the creation of the charter. The charter will be used as a reference document as the Georgetown to Lethem Road project moves forward to the execution phase and ultimately throughout the life of the project. The inputs, tools and techniques, and outputs of the process are depicted in Figure 15. (Project Management Institute, 2017, p. 75).



Figure 15. Develop Project Charter: Inputs, Tools & Techniques, and Outputs.

4.1.1 PROJECT CHARTER

Georgetown to Lethem Road Construction - Project Plan

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- 4.1.1.1 Project Overview
- 4.1.1.2 Map of the Area
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- 4.1.1.6 Project objectives
- 4.1.1.7 Project Budget
- 4.1.1.8 Project Organization
- 4.1.1.9 Define Project Assumptions
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- 4.1.1.11 Preliminary Risks
- 4.1.1.12 Project final deliverables
- 4.1.1.13 Major Tasks and Milestones
- 4.1.1.14 Project Implementation
- 4.1.1.15 Acknowledgement and Acceptance

4.1.1.1 Project Overview

This Charter sets forth a framework and expectations for the development of plans and specifications for the construction of Georgetown to Lethem Road. Project plans will be developed in accordance with the PMBOK Guide Sixth Edition taking into considerations policies of the Regions and the Towns across Guyana. Commencement of project activities may begin upon approval of this Project Charter and all required Intergovernmental Agreements and identification of the sources of all needed financial resources necessary to execute it by the Project Sponsor. In this Project Charter the following are to be included: a scope statement; schedule; cost estimate; budget for planning and design; and provisions for public involvement, communications and stakeholder management as required by the lead agency.

4.1.1.2 Map of the Area



Figure 16. Map of Guyana highlighting the Project Road

4.1.1.3 Project Scope

The Government of Guyana through the Ministry of Public Infrastructure (Works Services Group) has taken up the Upgrading, Management and Construction of Georgetown to Lethem Road under Government National Development Strategic policy. The National Strategy Plan identifies the Georgetown to Lethem Road as the essential North-South link in the overall National Transport Network of Guyana. It will join the Rupununi area of the hinterland with the Coastal belt and provide access to the seaport of Georgetown and the inland port of Linden. The areas influenced by the project are Upper Demerara, Mabura Hill, Kurupukari and the Rupununi. The Project will comprise a Standard 2-Lane single carriageway cross-section for Linden Lethem

Road. The road improvement options have added the construction of bridge over the Essequibo River at Kurupukari. The Government of Guyana deems it important to complete Feasibility and Environmental studies and preparation of Preliminary Engineering Design studies for construction of the Georgetown to Lethem Road. These studies are being financed with resources from IDB"s Integration Infrastructure Fund.

4.1.1.4 Project Background

The Georgetown-Linden-Lethem Road is the only corridor that connects the capital to hinterland by land. As such, it serves a critical role in providing regional connectivity and public safety/emergency services. The Georgetown to Linden section of the roadway was upgraded in the past to a two - lane asphaltic road which has severely deteriorated over the years. The rest of the road is a two-lane dirt road, and this results in numerous dip sections and washes in the area of the roadway which can become inundated and difficult or impossible to cross during the rainy season. The entire road from Linden to Lethem is 454 km long, and it has varying usable width of 15m or more, but soon after Linden it narrows down to less than 6m in numerous sections. The existing alignment is generally poor, improvements may be required to most of horizontal and vertical curves, and there is the need for improvements to drainage and erosion protection. The existing pavement consists of an old DBST surfacing from km 0 to km 2.5 the remainder is gravel surfaced. The condition ranges from fair to poor throughout this section of the road. There are 52 bridges on the existing road, most are in poor condition, and are in need of full reconstruction. The main drainage pattern is transversal to the road with many minor and seasonal streams crossing the road. Drainage is often inadequate with insufficient and/or silted pipes and culverts, some of which have collapsed. There is also insufficient drainage leading to the pipes and culverts. Erosion around culverts is a major problem both upstream and downstream, so protection of the road from silting up, the threat of mud slides and the accumulation of gravel from flood deposits are grave concerns.

In addition to providing access to the hinterland of Guyana, the Georgetown-Linden-Lethem road forms part of a potential road transport corridor between northern Brazil and Guyana's Atlantic coast. The Government of Guyana intends to establish a development corridor in the South to attract traffic from Brazil (carrying fertilizer-urea from Trinidad and Tobago and soy

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and rice from Brazil and areas in the South of Guyana), and possibly building an industrial park in the corridor area.

4.1.1.5 Project Justification (Business Need)

Brazil and Guyana share geographical boundaries to Brazil's extreme north and Guyana's extreme south and south-west. The best choice of transport between the two countries, especially for Brazil, is a good road. A road connecting Manaus to Boa Vista and Georgetown would allow for the marketing of products in the industrial free zone of Manaus, the Pole Agro industrial area of Roraima. This road could also serve as a great alternative for the transport of other goods to North America, Europe and Caribbean Countries that are shipped through the ports of Belem or Vile do Conde in Amazonas. The Port of Georgetown would reverse the logic in the heads of the Brazilian strategists. Navigation on the Amazon River is becoming much more expensive when compared with the opportunity to use a port near Georgetown. A ship, for example, that is bound from Asia to Manaus passes in front of the coast of Guyana. Well, there are studies here showing that a ship takes between 5 to 6 days to travel from offshore Georgetown to Manaus. Meanwhile a freight truck between Manaus and Georgetown (approximately 1340 Km) would take one day of travel. Another important factor is that the CARICOM headquarters is in Guyana – the Common Market of the Caribbean, therefore, from Guyana, Brazilian products can reach the Caribbean market in a more economic and aggressive manner.

4.1.1.6 Project Objective

The overall objective is to provide a suitable road to link Boa Vista with the Atlantic Cost in Guyana, assuring the economic, social and security integration of the hinterland and the coastland area in order to:

- Ensure the project obtains maximum value for the investment.
- Increase safety and improve the transportation network.
- Improve living conditions in the hinterland
- Stimulate integration and sustainable development of the hinterland
- Improve border control and security within the south-western region
- Stimulate trade to Brazil

- Reduce travel times.
- Add consistency of travel times during typical conditions.
- Have fewer facility closures due to weather conditions (flooding) or facility maintenance or repairs.
- Have fewer facility closures due to vehicle crashes or other incidents.

Overall Goals and Objectives

The goals and objectives of the overall Georgetown to Lethem Road Construction Project are to have the project completed:

- On-time,
- Within budget,
- With the highest degree of quality,
- In a safe manner for both the individuals working on the project and for the traveling public, and
- In a manner in which the public trusts and supports while maintaining confidence in the project.

Quality measurements, with appropriate targets and tolerances, will be developed and tracked as construction funding is identified to cover schedule, budget, quality, safety, scope control, public trust and confidence, and government requirements.

4.1.1.7 Project Budget

The budget for the Georgetown to Lethem Road is estimated at US\$ 184.25 million.

Estimated Costs:

Project Management	(\$) 296,500
Planning	(\$) 117,500
Design	(\$) 603,000
Right-of-Way	(\$) 1,045,000
Utilities	(\$) 1,250,000
Permits	(\$) 11,000
Construction	<u>(\$) 172,600,000</u>
Sub-total	(\$) 175,923,000

 Contingency
 (\$) 8,327,000

 Estimated Total Project Cost: (\$ total) 184,250,000

4.1.1.8 Project Organization

- 1. Project Management Team
 - **Project Coordinator** assigned by the Ministry of Public Infrastructure
 - The **Project Manager** for the Lead Agency, Dwayne Roland, PE, is hereby authorized to negotiate for resources, delegate responsibilities within the framework of the project, and communicate with all consultants, outside agencies, permitting authorities, utilities, contractors and management, as required, to ensure successful and timely completion of the project. The Project Manager is responsible for monitoring the schedule, establishing cost and scope of the project during planning, designing, implementing and maintaining control over the project by measuring/reporting performance and taking corrective action.
 - Project Engineer
 - Socio-environmental Officer

2. Design Consultant

- Team Leader Designer/Architect
- Office Assistant
- Field Superintendent
- Draftsman
- Architect

3. Supervising Consultant

- Team Leader Highway Engineer
- Structural Engineer/ Bridges Engineer
- Site Engineer
- Quality control Officer
- Socio-environmental Officer

4. Construction Contractor

- Construction Manager Highway engineer
- Structural Engineer/ Bridges Engineer
- Site Foreman

- Quality control and Assurance Officer
- Environmental Officer
- Subcontractors

5. Suppliers

- Road Building Materials Suppliers
- 6. Utilities
 - Guyana Waters Incorporated (GWI)
 - Guyana Telephone Telegraph Company (GTT)

7. Local authorities

- National Democratic Council
- Mayor and City Council

8. Government agencies

- Local Governments Authorities
- Guyana Police Force
- Ministry of Housing
- Ministry of Housing

4.1.1.9 Define Project Assumptions

- The allotted time of Four (4) years for successful completion of the project is sufficient
- Funding will be available prior to start
- Access will be carefully controlled to maintain mobility
- A high amount of storm drain will be needed
- Enough information is available from Ministry of Public Infrastructure MoPI to complete the project
- Ministry of Public Infrastructure will remain committed to the project
- Individuals will work 40 hours per week
- The materials to complete the project will be readily available to be utilized.
- Key Personnel costs will not change overall the project
- Economic conditions will stay relatively constant

- Scope doesn't change
- If it should; project will follow a change control approval process

4.1.1.10 Define Project Constraints

- Scope must remain within the limits of project management plan and not execution of the actual project.
- Schedule must complete the project within 4 years;
- Cost budget of One Hundred and Eighty Four Thousand, Two Hundred and Fifty United States Dollars US\$184,250,000
- Funding not available for relocation of utilities
- Quality Requirements must pass the Ministry Laboratory Tests
- Resources must work within the available resources
- Financing the capital project
- Environmental regulatory requirements
- Annual maintenance costs
- Availability of Specialized construction resources
- Sustaining community support

4.1.1.11 Preliminary risks

- Change in scope
- Unidentified stakeholders
- Increase final project costs
- Price increases on materials over time
- Lack of local Key or specialise personnel
- Damage to property
- Lost of lifes
- Accidents on site
- Non-approval of permits
- New Requirements

- Scheduling delays
- Poor quality of deliverables
- Adverse weather conditions
- Procurement delays
- Local Funds Availability
- Unforeseen Environmental Restrictions
- Utility Conflicts

4.1.1.12 Project Final Deliverables

1. Client Deliverables

- Project charter
- Certificate of completion
- Project Management Plans

2. Consultant Deliverables

- Feasibility study Reports
- Architectural and Engineering Drawings
- Design documents
- Site investigation report
- Tender documents
- Monthly Reports
- Weekly Reports
- Quality control Reports
- Payment Certificates

3. Contractor Deliverables

- Progress report to client
- Completion of Road work
- Completion of Drain work

- Completion of Bridge work
- Miscellaneous works completed
- Structure drawings
- Mechanical drawings
- Environmental Permits
- Traffic Management Plan
- Quality control Reports

4.1.1.13 Major Tasks and Milestones

Table 4: Milestones (Source: compiled by author)

Milestone	Planned Completion Date	
Georgetown to Lethem Road Project	Mon 12/06/24	
Concept Phase – Project Management	Mon 22/01/18	
Appoint Project Manager.	Fri 26/01/18	
Project Proposal	Thu 23/02/18	
Feasibility Studies - Development of Options	Thu 09/08/18	
Analysis and Recommendations	1110 07/00/10	
Business Case	Fri 31/08/18	
Development Phase Project Management	Fri 07/09/18	
Preliminary Design	Fri 02/04/19	
Detailed Design	Thu 03/10/19	
Contract Documents	Wed 23/10/19	
Preliminary Works	Thu 02/01/20	
Procurement	Fri 03/04/20	
Implementation Phase Project Management	Mon 04/05/20	
Construction	Tue 20/03/23	
Contract Administration	Wed 21/03/23	
Official Opening	Tue 21/03/23	

Finalization Phase – Project Management General	Mon 10/04/23
Defects Liability Period	Mon 22/04/24
Project Close Out	Mon 12/06/24

4.1.1.14 Project Implementation

The project is assumed to be implemented over four (4) phases Concept phase, Development Phase, Implementation Phase, Finalization Phase. The period up to 2019 will be taken up with a detailed design, implementation decisions, loan preparation and selection of supervision consultants and contractors. The opening year for economic benefits from the project has been assumed to be 2023.

(2016 – 2018) – Concept Phase

(2019 – 2020) – Development Phase

(2020 – 2023) – Implementation Phase

(2023-2024) – Finalization Phase (Defects Liability Period)

4.1.1.15 Acknowledgement and Acceptance

• **Project Team**: Project manager, Architect, Structural Engineer, Suppliers, Utilities, Contractors, Local authorities, Government agencies and Consultants.

• Project Charter Approval Form

The project charter requires a signature from the project's sponsor. The signature is necessary in order to give authority and make the project official. Depending on the environment in which the project will be completed, there could be more than one signature necessary on the project charter (Mulcahy 2010). Other signature might be from senior manamgent and key stakeholders, and by signing the charter they are approving its content.

Name	Signature	Date

Figure 17: Georgetown to Lethem Road Construction Project Charter. Adapted from Tennessee Business Solutions Methodology (TBSM). Retrieved May 1, 2019 from https: https://www.tn.gov/finance/strategic-technology-solutions/strategic-technology-solutions/tbsm.html

4.2. PROJECT SCOPE MANAGEMENT

Georgetown to Lethem Road Construction - Project Plan

The project scope management plan is developed to ensure the Project manager is able to understand the background and deliverables of the Georgetown to Lethem Road project from the beginning and that he/she can provide clarity to the project team. It gives explanation on the steps that are required to ensure that project includes all the work required, and only the work required, to complete the project and that any changes to the scope should be progressively managed. (Project Management Institute, 2017, p. 129).

The scope management plan documents how the road project scope will be defined, validated, and controlled and developed using information from the project preliminary studies, and assessment reports that were compiled by consultants prior to the development and approval of the project charter. It is therefore important for the project manager and project team to be knowledgeable about the background of the project.

The project scope is intended to follow a predictive life cycle process and is based on a version the project scope statement, work breakdown structure, and its associated WBS dictionary that needs to first be approved. The project is to be executed over a period of four (4) years. Preliminary assessment of drains, culverts, bridges, alignment, and utilities are to be documented. The role of major stakeholders and their requirement(s) are decided and compiled. The preliminary cost requirement (budget) for completion of the project is determined based on preliminary studies and previous experience of other similar projects. High-level risks are identified, and the steps taken to deal with the risks are outlined to improve scope management and avoid scope creep (Project Management Institute, 2017, p. 131).

The developed project charter, quality indicators (Specifications/Standards), life cycle description, enterprise environmental factors, online templates, interviews, feasibility studies and organization process assets from the Ministry of Public Infrastructure were the main inputs in the development of the scope management plan. It is expected that during execution of the project the Scope Management Plan will serves as a written reference guide for how scope will be defined, developed, verified, and controlled.

4.2.1 SCOPE MANAGEMENT PLAN

Georgetown to Lethem Road Construction - Project Plan

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 - 4.2.1.6.3 Product Description
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 - 4.2.1.6.11 Functional Organizations Involved
 - 4.2.1.6.12 Project Milestones
 - 4.2.1.6.13 Attachments / Supporting Documentation
 - 4.2.1.6.14 <u>Approvals</u>
- 4.2.1.7 Work Breakdown Structure (WBS)
- 4.2.1.8 WBS Dictionary
- 4.2.1.9 Deliverable Validation and Acceptance
- 4.2.1.10 Scope Control

4.2.1.11 Sponsor Acceptance

4.2.1.1 Introduction

This Scope Management Plan was created during the project's Planning Process Phase and is considered a component of the final Project Management Plan (PMP). The purpose of the Scope Management Plan is to document the defined scope management approach and processes, as well as the roles and responsibilities for Stakeholders participating in those processes.

The Scope Management Plan provides the scope framework for the Georgetown to Lethem Road Construction Project and presents the view that all stakeholders must have from the project. This plan documents the scope management approach, 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.

The main objective of Georgetown to Lethem Road Construction Project is to upgrade the existing road from Georgetown to Lethem to facilitate regional trade by reducing transport costs; hence international and transit traffic on the Project road are expected to grow rapidly once the corridor is improved. The Project will comprise a Standard 2-Lane single carriageway crosssection for Linden Lethem Road. The road improvement options include the construction of a major bridge over the Essequibo River at Kurupukari and culverts to protect the new infrastructure. Upgrading the whole road to paved standard is considered economically feasible (IDB, 2012).

Given that the project is still is its planning phase it is expected that as the project progresses, additional information will become available that can lead to new insights and may require the project to change its approach and modified its plans. This scope management plan establishes a process that will allow the incorporation of changes by ensuring the changes contribute to the ultimate goal of the project. Changes must be agreed by stakeholders and approved by management and the donor (pm4dev, 2016).

4.2.1.2 Scope Management Approach

For Georgetown to Lethem Road Construction Project, Scope Management will be the responsibility of the Project Manager (Ministry of Public Infrastructure). The scope for this

project is defined by the Scope Statement, Work Breakdown Structure (WBS) and WBS Dictionary. The Project Sponsor, Steering Committee, and Stakeholders will establish and approve documentation for measuring project scope which includes deliverable quality checklists and work performance measurements. Proposed scope changes may be initiated by the Project Coordinator, Project Manager, Stakeholders or any member of the project team. All change requests will be submitted to the project coordinator in order to provide estimate, and to determine the impact the change will have on the schedule and costs if any. It is the project coordinator's responsibility to then evaluate the requested scope change request to the Change Control Board and Project Sponsor for acceptance. When the scope changes are approved by the change control board and project sponsor, the project manager will update all project documents and communicate the scope change to all stakeholders. Based on feedback and input from the project steering committee and stakeholders, the project sponsor is responsible for the acceptance of the final project deliverables and project scope (TBSMScopeManagmentPlan2012).

This scope management plan addresses the following processes:

- Requirements
- Scope Definition
- Work Breakdown Structure (WBS) creation
- Scope Validation & Control

These processes are inter related along with the processes in the other management plans defined in the project management plan. When implemented correctly, the scope management processes will help to effectively manage the triple constraint elements of time, schedule, and cost to support a high-quality project.

4.2.1.3 Roles and Responsibilities

In order to effectively manage the scope of the project it was important to have all roles and responsibilities for scope management clearly defined. This section defines the key roles and responsibilities of the Project Sponsor, Executives Steering Committee, Project Manager, Procurement Manager, Project Team, and other Key Stakeholders who are involved in managing the scope of the project and the need for all parties involved to be aware of their responsibilities
to ensure work is performed on the project is within the planned scope. The project manager is ultimately responsible for scope management, change control management and acceptance of deliverables of the project as defined by the projects' scope. The table below defines the roles and responsibilities for the scope management of the Georgetown to Lethem Road Construction Project.

Name	Role	Responsibility
• Government of	Project Sponsor	Approves Scope Management Plan.
Guyana, Donor		• Provides high-level scope definition
Agencies		(Project Charter).
		• Reviews escalated scope issues and provide
		direction for resolution.
		• Approves major scope change requests.
		• Overall decision-making responsibility for
		Scope Management activities.
Kenneth Jordan	Executive Steering	• Participates in Scope definition activities.
• Geoffrey	Committee	• Provides final approval of Scope
Vaughn	(Permanent Secretary	Management Plan (if decision-making
Ron Rahamon	MOPI,	committee).
	Works Coordinator,	• Reviews major scope change requests and
	Chief Roads&	makes final decision or recommendations to
	Bridges Officer)	the Project Sponsor.
Kester Hinds	Project Coordinator	• Maintaining and monitoring project plans,
		project schedules, work hours, budgets and
		expenditures.
		• Organizing, attending and participating in
		stakeholder meetings.
		• Documenting and following up on
		important actions and decisions from
		meetings.

	Name	Role	Responsibility
			• Ensuring project deadlines are met.
			• Providing administrative support as needed.
•	Dwayne Roland	Project Manager	• Overall responsibility for scope
			management.
			• Oversees the development of the Scope
			Management Plan.
			• Oversees the scope change management
			process.
			• Approves scope change requests within
			his/her authority.
			• Escalates scope and change issues.
			• Ensures that scope changes are incorporated
			into appropriate project documents
•	Narima	Procurement	• May have a role in deliverable verification
	Rodrigues	Manager	and acceptance when the deliverable is
			required under contract terms.
•	Project	Project Team	• Help develop the project scope statement.
	Engineer	Members and Subject	• Submit scope change requests.
•	Socio-	Matter Experts	Review Scope Change requests when
	environmental	(SMEs)	assigned.
	Officer		• Provide feedback as and when required.
			• Participate in team-level scope change
			reviews.
•	Stakeholders	Contractor,	• Provide scope requirements.
		Consultant,	• Initiate scope change.
		community groups.	

Chart 6: Scope Management Roles and responsibility (Source: compiled by author)

4.2.1.4 <u>Requirements Management</u>

4.2.1.4.1 Requirements Management Approach

During the development of the project charter, the definition of high-level stakeholder requirements is initiated. This needs to be progressively elaborated as time passes, as such, stakeholders should later be engaged through interviews and meetings to identify and prioritize the requirements needed to meet all the project objectives. The foundation of this process is the project charter and stakeholder register. From these, the team can identify requirements, collectively discuss details associated with meeting each requirement, conduct interviews and follow-on discussion to clarify the requirements, and document the requirements in sufficient detail to measure them once the execution phase of the project begins. (TBSMScopeManagmentPlan2012). Therefore, these requirements need to be elicited, analyzed, and recorded in sufficient detail to be measured as the project execution begins (PMI 2008).

4.2.1.4.2 Requirement Prioritization Process

The project manager will facilitate stakeholder meetings in order to establish priorities for all project requirements. As the project moves forward and additional constraints are identified or there are issues with resources, it may be necessary for the project team and stakeholders to meet in order to determine what requirements must be achieved, which can be re-baselined, or which can be omitted. Any changes in requirements must be updated in the requirements documents and communicated to all project stakeholders (TBSMRequirementManagmentPlan2012).

4.2.1.4.3 <u>Requirement Traceability Matrix</u>

WBS ID	Req'm t ID	Priority	Requirement Description	Objectives	WBS Deliverables	Owner	Requirement Source	Date of Acceptance	Status
1.1.4		High	Project Charter	Project Justification	Project Charter	Project Sponsor	Business Case	Fri 26/01/18	Completed
1.1.1.	1.1.1.2	High	Appoint Project Manager	Project Management	Porject Manager	MoPI	Project Charter	Fri 31/08/18	Completed
1.2.1	1.21.1	High	 Project Management Plan 	Project execution & Control. Guide Documentation.	Project Management Plans	Project Manager	Project Charter		Ongoing
1.3.3	1.3.3.3	High	 General Road Construction Requirements: The pavement design should fulfil the structural and operational requirements through its design life. It should do so in the most economical manner, i.e., at the lowest possible cost. 	 Increase safety and improve the transportation network. Improve living conditions in the hinterland 	Two lane Highway	Project Manager	Project Charter		Ongoing

		 It should have the flexibility for upgradation as the need arises, without resorting to reconstruction or without the loss of its asset value. 					
1.3.3.4	High	Geometric Design Requirement: Standard 2-Lane" single carriageway road, 7.2m wide pavement plus 2 x 2.4m shoulders. The geometric design in accordance with the AASHTO (2004)" Design Manual and "LRFD Bridge Design specifications by AASHTO for Roads & Bridges.	Improved road layout to reduce travel time and increase economic activities.	Two lane Highway	Project Manager	Project Charter/Scope Management Plan	Ongoing
1.3.3.5	High	Bridge Reconstruction	• Improve border control	Prestress Concrete Bridge	Project Manager	Project Charter/Scope	Ongoing

	 Requirement: Pre-stressed Concrete Bridges with two lane width for Linden Lethem Road. The width of bridges will be 10.5 m. Carriageway – Double Lane – 7.5 m Bridge sidewalk – 1.5 m (both Sides) 	and security within the south-western region		Management Plan	
High 1.3.3.6	 Drainage Requirement: Combination of concrete and earthen drainage with open drains on high embankments. Safety Requirement: Barriers are to be provided at high embankments, sharp 	 Increase runoff and reduce road deterioration. Increase safety and improve the transportation network. 	Reinforced Concrete Drains	Project Charter/Scope Management Plan	

		approaches. The barrier			
		is to be located at the			
		edge of paved			
		shoulders.			
		• Installation of road			
		reflector			
		• Installation of rubble			
		strips in high density			
		area			
·					

 Table 5: Requirement Traceability Matrix (Source: compiled by author)

4.2.1.5 SCOPE DEFINITION

This process takes the high-level product descriptions, assumptions and constraints, as documented in the Project Charter and Preliminary Project Scope Statement and uses them to create a more detailed scope in the Project Scope Statement. The scope for Georgetown to Lethem Road Construction Project is defined through a detailed requirements collection process. This is done by analyzing different design alternatives, expert judgment and stakeholder requirements for the project. Presently, requirements are being identified and analyzed in detail as the project is in its design review and scope finalization phase. Stakeholder engagements have taken place through facilitated workshops, meetings in order to obtain feedback. From this information, the project team will develop the project requirements documentation, the requirements management plan, and the requirements traceability matrix for what the road project will entail.



Figure 18: Project Scope Definition retrieved from: https://investment.infrastructure.gov.au

4.2.1.6 PROJECT SCOPE STATEMENT

The Georgetown to Lethem Road Construction project scope statement provides:

- 4.2.1.6.1 Project Overview
- 4.2.1.6.2 Product Description
- 4.2.1.6.3 Final Deliverables
- 4.2.1.6.4 Project exclusions
- 4.2.1.6.5 Completion Criteria
- 4.2.1.6.6 Success Criteria
- 4.2.1.6.7 Project Boundaries
- 4.2.1.6.8 Assumptions
- 4.2.1.6.9 Constraints
- 4.2.1.6.10 Risks
- 4.2.1.6.11 Functional Organizations Involved
- 4.2.1.6.12 Project Milestones
- 4.2.1.6.13 Attachments / Supporting Documentation
- 4.2.1.6.14 Approvals

4.2.1.6.1 PROJECT OVERVIEW

This is a Road Rehabilitation Project required in accordance with the objectives to provide efficient and safer roads and thus improving the transportation network, living conditions in the hinterland, border control security within the south-western region, and stimulating integration and sustainable development of the hinterland, trade to Brazil.

Brazil and Guyana share geographical boundaries to Brazil's extreme north and Guyana's extreme south and south-west. The best choice to increase security and stimulate economic developed in the hinterland region and improve transport between the two countries, especially for Brazil, is a good road.

4.2.1.6.2 PRODUCT DESCRIPTION

• Standard 2-Lane" single carriageway road.

- Culverts
- Bridges
- Drainage network
- Safety Barriers

4.2.1.6.3 FINAL DELIVERABLES

Client Deliverables

- Project charter
- Certificate of completion
- Project Management Plans

Consultant Deliverables

- Feasiability study Reports
- Architectural and Engineering Drawings
- Design documents
- Site investigation report
- Tender documents
- o Monthly Reports
- Weekly Reports
- Quality control Reports
- o Payment Certificates

Contractor Deliverables

- Progress report to client
- Completion of Road work
- Completion of Drain work
- Completion of Bridge work
- Completion of Traffic Safety features
- o Miscellaneous works completed
- Structure drawings
- Mechanical drawings

- o Environmental Permits
- Traffic Management Plan
- Quality control Reports

4.2.1.6.4 **PROJECT EXCLUSIONS**

- Rigid pavement
- Pipe drain
- Median strip

4.2.1.6.5 COMPLETION CRITERIA:

- Road commissioned
- Bridge commissioned
- Drainage network commissioned
- User Signoff obtained

4.2.1.6.6 SUCCESS CRITERIA:

- Meet all the deliverables and milestones within scheduled time
- the project requirements.
- Completed on budget
- Completed on schedule
- New Road handling traffic flow as specified
- Zero accidents
- User satisfaction

4.2.1.6.7 **PROJECT BOUNDARIES:**

- Completing an initial assessment and assembling existing documentation for the road project.
- Preliminary Design Report for road project.
- Feasibility Studies
- Design Review Reports
- Meetings with stakeholders
- Final Reports

- Construction of Road
- Construction of Bridge
- Construction of culvert
- Construction of drainage network

4.2.1.6.8 ASSUMPTIONS

#	Assumptions:	Impact if False:
A1	The allotted time of Four (4) years for successful completion of the project is adequate.	Schedule delay (completion)
A2	Funding will be available prior to start	Schedule delay (Start)
A3	Access will be carefully controlled to maintain mobility	Congestion Loss of economic activity
A4	A high amount of storm drain will be needed	Cost Saving
A5	Ministry of Public Infrastructure will remain committed to the project	Slow work progress Project abandonment
A6	Individuals will work 40 hours per week	Additional work staff
A7	The materials to complete the project will be readily available to be utilized.	Resource to be source alternatively
A8	Key Personnel costs will not change overall the project	Request Supplemental Provision
A9	Economic conditions will stay relatively constant	Increase or decrease project cost
A10	Scope doesn't change	Change control, Scope Creep

4.2.1.6.9 CONSTRAINTS

#	Constraint:	Imposed by:
	Scope – must remain within the limits of project	Governmental of Guyana,
C1	management plan and not execution of the actual	Sponsor
	project.	
C2	Schedule – must complete the project within 4	Governmental of Guyana,
C2	years	Sponsor
	Cost – budget of One Hundred and Eighty – Four	Governmental of Guyana,
C3	Thousand, Two Hundred and Fifty United States	Sponsor
	Dollars US\$184,250,000	
C4	Funding not available for relocation of utilities	Sponsor
C5	Quality Requirements – must pass the Ministry	Ministry of Public
0.5	Laboratory Tests	Infrastructure
C6	Resources – must work within the available	Governmental of Guyana,
0	resources	Sponsor
C7	Environmental regulatory requirements	Environmental Protection
07		Agency
C 8	Annual maintenance costs	Ministry of Public
		Infrastructure
C9	Availability of Specialized construction resources	Market
C10	Sustaining community support	Neighborhood Democratic and
		Town Council

4.2.1.6.10 Risks:

Risk Statement	Risk Response
Inaccuracies or incomplete	Mitigate: Work with Surveys to verify that
information in the survey file	the survey file is accurate and complete.
could lead to rework of the design.	Perform additional surveys as needed.
	Risk Statement Inaccuracies or incomplete information in the survey file could lead to rework of the design.

	A design change that is outside of the parameters contemplated in the Environmental Document triggers a supplemental EIS which causes a delay due to the public comment period. Users might not be available to	Avoid: Monitor design changes against ED to avoid reassessment of ED unless the opportunity outweighs the threat.
	provide requirements	Mitigate: Change control
Environmental	Potential lawsuits may challenge the environmental report, delaying the start of construction or threatening loss of funding. Protected species and forest may delay construction. Non-approval of permits	Mitigate: Address concerns of stakeholders and public during environmental process. Schedule additional public outreach. Mitigate: Schedule contract work to avoid protected areas. Mitigate: Seek approval permits in advance of construction
R/W	Due to the complex nature of the staging, additional right of way or construction easements may be required to complete the work as contemplated, resulting in additional cost to the project.	Mitigate: Re-sequence the work to enable ROW Certification.

	Due to the large number of parcels	
	and businesses, the condemnation	Mitigate: Work with Right-of- Way and
	process may have to be used to	Project Management to prioritize work and
	acquire R/W, which could delay	secure additional right-of-way resources to
	start of construction by up to one	reduce impact.
	year, increasing construction costs	
	and extending the time for COS.	
	Hazardous materials encountered	
	during construction will require an	Accept: Ensure storage space will be
	on-site storage area and potential	available.
	additional costs to dispose.	
	Unanticipated buried man-made	
	objects uncovered during	Accept: Include a Supplemental
	construction require removal and	Work item to cover this risk.
Construction	disposal resulting in additional	
	costs.	
	There might be a shortage of	
	materials during construction	Mitigate: purchase anead of time
	Damage to property, accidents,	
	and loss of lives	Transfer: Take-out third-party insurance
	Adverse weather conditions	Accept/Mitigate: Include schedule buffers in contract.

4.2.1.6.11 FUNCTIONAL ORGANIZATIONS INVOLVED

Organization	Participation
Consultant (Planning & Design)	Review all contractor designs for tech. compliance
Contractor	Execute roadworks

Consultant (Design Review & Supervision)	Review all consultant & contractor designs for tech. compliance. Supervise construction
Ministry of Public Infrastructure (Project Management)	Project Management Monitoring & Evaluation Training
Ministry of Finance	Program Management Oversee budget Management

4.2.1.6.12 PROJECT MILESTONES

Milestone	Planned Completion Date
Georgetown to Lethem Road Project	Mon 12/06/24
Concept Phase – Project Management	Mon 22/01/18
Appoint Project Manager.	Fri 26/01/18
Project Proposal	Thu 23/02/18
Feasibility Studies - Development of Options Analysis and Recommendations	Thu 09/08/18
Business Case	Fri 31/08/18
Development Phase Project Management	Fri 07/09/18
Preliminary Design	Fri 02/04/19
Detailed Design	Thu 03/10/19
Contract Documents	Wed 23/10/19
Preliminary Works	Thu 02/01/20
Procurement	Fri 03/04/20
Implementation Phase Project Management	Mon 04/05/20

Construction	Tue 20/03/23
Contract Administration	Wed 21/03/23
Official Opening	Tue 21/03/23
Finalization Phase – Project Management General	Mon 10/04/23
Defects Liability Period	Mon 22/04/24
Project Close Out	Mon 12/06/24

4.2.1.6.13 ATTACHMENTS / SUPPORTING DOCUMENTATION

WBS in MS Project with this document

4.2.1.6.14 Approvals:

Project Manager's Signature

I have prepared/reviewed this Project Scope Statement in accordance to the Project Management System (PMS) and based on the information provided to me in the attached documents and in consultation with the Project Sponsor my project team and other Stakeholders.

Name	Signature
Date	

Project Sponsor's Authorization and Approval				
I have reviewed and agree with the information contained in this Project Scope Statement				
Name		Signature		
Date				

Figure 19: Georgetown to Lethem Road Construction Project Scope Statement. Adapted from Tennessee Business Solutions Methodology (TBSM). Retrieved May 1, 2019 from https://www.tn.gov/finance/strategic-technology-solutions/strategic-technology-solutions/tbsm.html

4.2.1.7 CREATION OF THE WORK BREAKDOWN STRUCTURE (WBS) AND DICTIONARY

The Work Breakdown Structure (WBS) and Work Breakdown Structure Dictionary are considered key elements to effectively manage the scope of the Georgetown to Lethem Road as they allow for the effective management of the work required to complete the Project. The WBS subdivided the work required to complete the project into individual work packages not exceeding 40 hours for effective management by project's scope manager. The WBS contains several levels of breakdown of the work, starting with Level 1. Each succeeding level breaks down the project work into component parts. Each level represents a summary of the work below it and can be the basis for reporting. The project is broken down into four (4) main phases: Concept phase, Development phase, Implementation phase and Finalization Phase.

Level 1	Level 2	Level 3	Level 4
1. Georgetown	1.1 Concept Phase	1.1.1 Concept Phase Project	1.1.1.1 Concept Phase – Project Management (General)
to Lethem		Management	1.1.1.2 Appoint Project Manager
Road			1.1.1.3 Community Engagement – Concept Phase
Project		1.1.2 Project Proposal	1.1.2.1 Determine Functional Requirements & Scope.
			1.1.2.2 Produce Project Proposal
		1.1.3 Feasibility Studies -	1.1.3.1 Develop Concept Planning Brief
		Development of Options	1.1.3.2 Procure Concept Planning Consultant
		Analysis and	1.1.3.3 Produce Options Analysis and Recommendations
		Recommendations	1.1.3.4 Recommend Preferred Option
			1.1.3.5 Approved Recommended Option
			1.1.3.6 Develop Preferred Option
		1.1.4 Business Case	1.1.4.1 Review Risk Register and Project Estimate
			1.1.4.2 Produce Business Case
			1.1.4.3 Financial Approval
	1.2 Development	1.2.1 Development Phase	1.2.1.1 Development Phase – Project Management General
	Phase	Project Management	1.2.1.2 Project Plan – Development Phase
			1.2.1.3 Prepare Design Brief
			1.2.1.4 Community Engagement Development Phase
		1.2.2 Preliminary Design	1.2.2.1 Procure Preliminary Design Consultants
			1.2.2.1.1 Produce Preliminary Design
		1.2.3 Detailed Design	1.2.3.1 Procure Detailed Design Consultants
			1.2.3.2 Obtain Legislative Approvals and Permits
			1.2.3.3 Produce Detailed Design
		1.2.4 Contract Documents	1.2.4.1 Produce Contract Documents
			1.2.4.2 Pre-tender Financial Approval
		1.2.5 Preliminary Works	1.2.5.1 Obtain Approval for Preliminary Works
			1.2.5.2 Acquire Right of Way
			1.2.5.3 Procure Public Utility Plant (PUP) Services
	1.2.5.4 Procure Preliminary Works		1.2.5.4 Procure Preliminary Works

This section contains the Work Breakdown Structure (WBS) and related information.

Level 1	Level 2	Level 3	Level 4
			1.2.5.5 Construct Preliminary Works
	-	1.2.6 Procurement	1.2.6.1 Engage Contract Administrator
			1.2.6.2 Procure Contractor
			1.2.6.3 Contract Financial Approval
			1.2.6.4 Contract Award
	1.3 Implementation	1.3.1 Implementation Phase	1.3.1.1 Implementation Phase – Project Management Gen.
	Phase	Project Management	1.3.1.2 Project Plan - Implementation Phase
			1.3.1.3 Community Engagement Implementation Phase
		1.3.2 Contract	1.3.2.1 Practical Completion Certificate
		Administration	1.3.2.2 Project Control
		1.3.3 Construction	1.3.3.1 Surveying and Setting Out
			1.33.2 Earthwork (Clearing, Cut to Fill, Embankment)
			1.3.3.3 Pavement
			1.3.3.4 Bridge/Culvert
			1.3.3.5 Drainage
			1.3.3.6 Traffic Safety
		1.3.4 Principal's	1.3.4.1 Official Opening
		Responsibility	
	1.4 Finalization	1.4.1 Finalization Phase	1.4.1.1 Finalization Phase – Project Management (Gen.)
	Phase	Project Management	1.4.1.2 Project Plan - Finalization Phase
			1.4.1.3 Defects Liability Period
			1.4.1.4 Final Certificate
			1.4.1.5 Community Engagement - Finalization Phase
			1.4.1.6 Complete Project Handover Report
			1.4.1.7 Evaluate Project Performance
			1.4.1.8 Post Implementation Review
			1.4.1.9 Close Out

 Table 6: Work Breakdown Structure (WBS). (Source: compiled by author)



Figure 20: Work Breakdown Structure (WBS)

4.2.1.8 WBS DICTIONARY

This WBS Dictionary should be used with the WBS to provide more detailed information about the work elements of the structure and a more detailed description of deliverables identified in the WBS. The WBS Dictionary contains all the details of the WBS which are necessary to successfully complete the Georgetown to Lethem Road project. Most importantly it contains a definition of each Work Package, which can be thought of as a mini scope statement.

WBS Level	WBS Code	WBS Element Name	Description of Work	Deliverable(s)	Committed Resources	Budget (USD)
1	1	Georgetown to	The Project will comprise			
		Lethem Road	a Standard 2-Lane single			
		Project	carriageway cross-section			
			for Georgetown to			
			Lethem Road. The road			
			improvement options			184,250,000
			include Bridges, Culverts,			
			Traffic Safety measures.			
2	1.1	Concept Phase	This is first phase in the			252,500
			management process for			
			investigating customer's			
			need and presenting a			
			justification.			
3	1.1.1	Concept Phase	Key activities include			45,000
		Project	appointing the project			
		Management	manager and producing a			
			preliminary project			
			plan.			
4	1.1.1.1	Concept Phase –	Activities include project	Project Kickoff	Sponsor/MoF	5,000
		Project	meetings, scheduler's	Meeting	Ministry of	
		Management	time, cost and quality	High-level	Public	
		(General)	management work.	Requirements	Infrastructure	
				Documentation		

Table 7: WBS Dictionary

WBS Level	WBS Code	WBS Element Name	Description of Work	Deliverable (s)	Committed Resources	Budget (USD)
4	1.1.1.2	Appoint Project	A dedicated project	Assigned Project	MoF, Project	20,000
		Manager.	manager needs to be	Manager	Coordinator,	
			appointed.		Computers	
4	1.1.1.3	Community	Involves community's	Needs Analysis	Socioenvironme	20,000
		Engagement –	interaction with	Community	ntal Officer	
		Concept Phase	government, in	Engagement plan	Computers	
			developing and		Projectors	
			implementing the project.		Printers	
3	1.1.2	Project Proposal	The development of a			15,000
			Project Proposal to define			
			the problem and identifies			
			the need for the project.			
4	1.1.2.1	Determine	Determine Functional	Requirements	Project	5,000
		Functional	requirements and scope.	Documentation	Coordinator &	
		Requirements &	Requirements		team.	
		Scope.	should be reviewed for		Computers	
			purpose, necessity,		Projectors	
			feasibility and tolerances.		Printers	
4	1.1.2.2	Produce Project	Producing the Project	Initial Stakeholder	Project	10,000
		Proposal	Proposal.	analysis and impact	Manager &	
				assessment,	Management	
				High-level risks,	Team.	
				Submission of Project	Computers	
				Proposal,	Printers	
				Plans for the conduct of		
				the option analysis.		
3	1.1.3	Development of	Project options must be			167,000
		Options Analysis	identified and studied that			
		and	will satisfy project goals,			
		Recommendation	be cost effective,			
		S	and avoid or minimize			

WBS Level	WBS Code	WBS Element Name	Description of Work	Deliverable(s)	Committed Resources	Budget (USD)
			environmental and right of way impacts to determine the preferred option.			
4	1.1.3.1	Develop Concept Planning Brief	A Concept Planning brief to the external consultant needs to be developed, outlining the scope of works.	Project Brief	Project Coordinator & Management Team. Computers Printers	5,000
4	1.1.3.2	Procure Concept Planning Consultant	This type of work should be procured in accordance with The Guyana Procurement Act 2003 for the Engagement and Use of Consultants.	Planning Consultant	Project Manager & Management Team. Procurement Manager Computers Printers	5,000
4	1.1.3.3	Produce Options Analysis and Recommendation s	The completed Options Analysis is about: - Reviewing the need for the project (Proposal Review) - Developing Options that satisfy the need and functional outcomes; - Ranking Options; - Reviewing link to strategic/business plans; - Recommending preferred option; and	-Environmental Management Plan -Traffic Count Analysis, -Hydraulic Analysis, -Geotechnical Investigation, -Preliminary Pavement Design, -Preliminary Bridge Design, -Preliminary Geotechnical Analysis,	Project Manager, Planning Consultants, Organization Process assets AUTOCAD Software	150,000

WBS Level	WBS Code	WBS Element Name	Description of Work	Deliverable(s)	Committed Resources	Budget (USD)
			- Seeking approval to proceed to the Business Case.	-Option Analysis Report, -Risk Analysis Report, -Value Management Report, -Comparative Cost Estimate - Road Safety Audit -Survey		
4	1.1.3.4	Recommend Preferred Option	Involves a thorough understanding of the customer's need and identifying, evaluating and selecting a preferred option from the partially developed options.	Selection of Preferred Option	Planning Consultants, Project Manager	5,000
4	1.1.3.5	Approved Recommended Option	The objective of this task is to obtain agreement with the preferred option and approval to proceed and further develop the preferred option. The customer approves the preferred option.	Selected Option Approval	Sponsor, Planning Consultants, Project Manager, Customer, Reports	1,000
4	1.1.3.6	Develop Preferred Option	The scope includes the preparation, review and approval of the options analysis report.	-Approved options Analysis Report -Feasibility Report	Sponsor, Planning Consultants, Project Manager, Customer, Reports	1,000

WBS Level	WBS Code	WBS Element Name	Description of Work	Deliverable(s)	Committed Resources	Budget (USD)
3	1.1.4	Project Charter - Business Case	The scope incudes reviewing the project proposal and option analysis report to understand the need and required functional outcomes.			25,500
4	1.1.4.1	Review Risk Register and Project Estimate	The scope includes the review Project Cost Estimates.	Project Document Updates (Cost Estimates)	Sponsor, Planning Consultants, Project Manager, Customer, Reports	5,000
4	1.1.4.2	Produce Business Case	Producing the Business Case is about: - Finalizing Scope Definition; -Preparing preliminary business requirements specification (Brief); - Preparing a draft Project Plan; - Preparing a Concept Estimate (Project Budget);	-Environmental Management Plans, -Traffic Counting & Analysis -Hydraulic Analysis -Geotechnical Investigation -Pavement Design Report -Bridge Design Report -Preferred Option Layout -Risk Analysis -Concept Estimate of Cost -Road Safety Audit -Compile Business	Project Manager, Planning Consultants, Organization Process assets AUTOCAD Software	20,000

WBS Level	WBS Code	WBS Element Name	Description of Work	Deliverable (s)	Committed Resources	Budget (USD)
				Case -Project Proposal Report Funded Projects) -Draft Project Plan -Survey		
4	1.1.4.3	Financial Approval	Financial approval must be secured from a duly Authorized expenditure officer with authority to incur the total amount of expenditure required.	Project Charter	Sponsor/MoF Project Coordinator (MoPI)	500
2	1.2	Development Phase	The Development Phase commences following the approval of the business case and the allocation of organizational resources.			2,975,500
3	1.2.1	Development Phase Project Management	Key activities include the updating of the project plan for this phase, reviewing of the design brief, updating the Community Engagement Planner, review project plan.			77,500
4	1.2.1.1	Development Phase – Project Management General	Activities include project meetings, scheduler's time, cost and quality management work.	Schedule Work program	Project Manager & Team	10,000
4	1.2.1.2	Project Plan –	Activities and tasks are	-Developed Project	Project	42,5000

WBS Level	WBS Code	WBS Element Name	Description of Work	Deliverable (s)	Committed Resources	Budget (USD)
		Development	conducted according to	Plan: Scope	Manager &	
		Phase	the Project Plan. The	Management Plan,	Team	
			project manager monitors	Schedule Management		
			the project's progress	Plan, Cost Management		
			against the schedule and	Plan, Quality		
			plans to ensure activities	Management Plan,		
			remain on track.	Resource Management		
				Plan, Communications		
				Management Plan, Risk		
				Management Plan,		
				Procurement		
				Management Plan,		
				Stakeholder		
				Management Plan,		
				-Updated project		
				Documentation		
4	1.2.1.3	Prepare Design	A design brief needs to be	Design Brief	Project	10,000
		Brief	developed and		Manager &	
			provided to the internal		Team	
			(in-house)/external			
			consultant, outlining the			
			extent of work needed			
			and include clear			
			deliverables.			
4	1.2.1.4	Community	Project stakeholders	Updated Community	Project	15,000
		Engagement	external to the project	Engagement Plan	Manager,	
		Development	team need to be consulted		Socioenvironme	
		Phase	to ensure that the project		ntal Officer	
			reasonably			
			accommodates their			
			needs, and that project			

WBS Level	WBS Code	WBS Element Name	Description of Work	Deliverable (s)	Committed Resources	Budget (USD)
			development is not adversely affected by			
			external issues			
			Community engagement			
			takes			
			place here to confirm and			
			relay past decisions in			
			previous phases, and			
			understand and respond			
			to			
			impacts of road works in			
			communities, including			
			design, construction and			
			maintenance. Ongoing			
			community engagement			
			happens in all phases of			
			the project.			
3	1.2.2	Preliminary	The Preliminary Design			210,000
		Design	Stage:			
			- finalizes the technical			
			solution developed during			
			the Business Case;			
			- reviews the Business			
			Case complied during the			
			- re-justifies the project			
1	1221	Drocure	Preliminary Design can	Selected Preliminary	Project	7.000
	1.2.2.1	Preliminary	be developed internally	Design Consultants	Manager &	7,000
		Design	(in-house) or by engaging	2 congri Consultanto	Team.	
		Consultants	an external consultant.		Procurement	
			Procurement of external		Manager	

WBS Level	WBS Code	WBS Element Name	Description of Work	Deliverable (s)	Committed Resources	Budget (USD)
			consultants shall follow			
			The Guyana Procurement			
			Act 2003.			
4	1.2.2.2	Produce	The Preliminary Design	-Preliminary Design	Design	203,000
		Preliminary	documents should be	documents inclusive of	Consultant,	
		Design	completed, and a	all	Project	
			recommendation	major design	Manager &	
			submitted to the	components and major	Team,	
			client for approval.	structures.	Organizational	
				-Preliminary estimate	Process Assets	
				of the preferred design	(MoPI)	
				solution.	Lessons	
				Works include:	Learned.	
				-Environmental		
				Assessment		
				- I raffic Counting &		
				Analysis		
				-Property Access		
				Hydraulic Analysis		
				-Structural Assessment		
				-Public Utility Plant		
				-Geolechincar -		
				Gootochnical Analysis		
				and Papart		
				-Pavement Design		
				Report		
				-Risk Mitigation and		
				Record		
				-Preliminary Estimate		
				of Cost		

WBS Level	WBS Code	WBS Element Name	Description of Work	Deliverable(s)	Committed Resources	Budget (USD)
				-Road Safety Audit -Survey		
3	1.2.3	Detailed Design	The Detailed Design completes all design activities and finalizes the scope, by providing a full schedule of work for estimating and construction purposes. It is the final element in the preconstruction phase, and results in a design solution in the form of a set of construction contract documents to establish the construction contract.			357,000
4	1.2.3.1	Procure Detailed Design Consultants	The design procurement involves negotiations on scope, schedule and fees that are fair to all parties, and to establish a suitable contract for the performance of the work.	Selected Detailed Design Consultant	Project Manager & Team, Procurement Manager	7,000
4	1.2.3.2	Produce Detailed Design	The detailed design includes engineering drawings and an electronic model for construction purposes. It also delivers final project	Detailed Design Reports. Elements includes: -Environmental Management Hydraulic Analysis &	Design Consultants, Project Manager & Team	350,000

WBS Level	WBS Code	WBS Element Name	Description of Work	Deliverable(s)	Committed Resources	Budget (USD)
			schedules, estimates and all other construction contract documentation relevant to the type of contract proposed.	Design -Public Utility Plant -Lighting -Traffic Signals -Signs -Geotechnical Investigation Analysis -Road Design & Drawings -Bridge Design & Drawings -Contract Documents -Risk Mitigation -Detailed Estimate of Cost -Statutory Approvals -Design Development Report -Project Management Plan -Survey		
3	1.2.4	Contract Documents	Contract documents are to be prepared and include the certified design plans and specifications, which must be prepared to high standards of accuracy and completeness. The appropriate type of contract documentation		Project Manager & Team, Procurement Manager	4,000

WBS Level	WBS Code	WBS Element Name	Description of Work	Deliverable (s)	Committed Resources	Budget (USD)
			will depend on the type of			
4	1.2.4.1	Produce Contract Documents	Includes preparing the invitation documentation, calling/receiving/evaluati ng tenders, conducting contract negotiation, obtaining approval to award contract, and preparing the contract documentation.	Bid Documents: Incitation for Bids Special conditions General conditions Bill of Quantities Drawings Specifications	Project Manager & Team, Procurement Manager & Team	3,000
4	1.2.4.2	Pre-tender Financial Approval	The scope includes seeking approval of Sponsor for Bid documents.	Approval of Bid Document	Project Manager & Team, Procurement Manager & Team	1,000
3	1.2.5	Preliminary Works	Includes approval for preliminary works, right- of way acquisitions (native title, resumptions) utility services relocation requirements (electricity, telecommunications, water, etc.), and procurement and construction of preliminary works.			2,315,000
4	1.2.5.1	Obtain Approval for Preliminary Works	The project manager needs to discuss the necessary preliminary	Approvals	Sponsor/MoF, Project Manager &	5,000

WBS Level	WBS Code	WBS Element Name	Description of Work	Deliverable (s)	Committed Resources	Budget (USD)
			works to be undertaken (what they are, extent of the work, etc.) for the delivery of the project with the customer and sponsor of the project. The customer and sponsor approve the Preliminary Works		Team, Design/Supervi sing consultant,	
4	1.2.5.2	Acquire Right of Way	A more detailed assessment of utility services relocation requirements is undertaken at the preliminary design stage. ROW acquisitions occur during the preparation of the detailed design.	Obtain Native Titles	Ministry of Legal Affairs, Project Manager & team	1,045,000
4	1.2.5.3	Procure Public Utility Plant (PUP) Services	Alterations/relocations of PUP can be one of the most expensive components of a road construction project. The location and size of all such services must be determined early in the process, to allow appropriate adjustments in the proposals to	Alteration/Relocation plans for: -Electricity -Telecommunications -Water	-Project Manager & team -Design/ Supervising Consultant -Guyana Telephone Telegraph Co. (GTT) -Guyana Water	5,000

WBS Level	WBS Code	WBS Element Name	Description of Work	Deliverable(s)	Committed Resources	Budget (USD)
			minimize the cost involved. Relevant authorities must be consulted to obtain accurate information.		Incorporated (GWI) -Guyana Power & Light (GPL)	
4	1.2.5.4	Procure Preliminary Works	Preliminary works Are to be carried out using both simple approval of a works order and full tender process depending on the nature of the works.	Procurement documents: Public Utilities Route Diversions Road Maintenance	-Project Manager & team -Design/ Supervising Consultant Utility companies	10,000
4	1.2.5.5	Construct Preliminary Works	The actual construction of the preliminary works.	Utilities Relocation Route Diversions Road Maintenance Works	Project Manager & team -Design/ Supervising Consultant Contractor Utility companies	1,250,000
3	1.2.6	Procurement	Scope includes procuring the construction contractor and obtaining financial approval.			12,000
4	1.2.6.1	Procure Contractor	The procurement of contractor involves call for registration of interest, tenders	Expression of Interest. Invitation of Bids. Tender Evaluation Report.	Project Manager & team. Procurement	10,000

WBS Level	WBS Code	WBS Element Name	Description of Work	Deliverable(s)	Committed Resources	Budget (USD)
			and tender assessments.		Manager.	
4	1.2.6.2	Contract Financial Approval	Financial approval needs to be obtained from the Sponsor/MoF	Approval of Final Construction costs.	Sponsor/MoF, Project Manager & team. Procurement Manager.	1,000
4	1.2.6.3	Contract Award	Refers to the date the contract is will be awarded to the Construction Contractor.	Road Construction Contractor	Manager & team.	1,000
2	1.3	Implementation Phase	This phase covers the activities necessary to produce, test and commission project deliverables in accordance with the project plan.			172,701,000
3	1.3.1	Implementation Phase Project Management	This phase includes managing the implantation construction contract, issue of the Practical Completion Certificate, cost and quality, and updating the Project Plan/Community Engagement Plan.		Manager & team.	90,000
4	1.3.1.1	Implementation Phase – Project Management	Activities include project meetings, scheduler's time, cost and quality	Minutes of Meetings, Earn Value Management Reports,	Manager & team. Supervising	15,000
WBS Level	WBS Code	WBS Element Name	Description of Work	Deliverable (s)	Committed Resources	Budget (USD)
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		(General)	management work.	Quality control Reports.	Consultant,	
4	1.3.1.2	Project Plan - Implementation Phase	Includes updating, monitoring and managing the project plan, engagement and communication, managing project changes, controlling and reporting progress, revising/updating/resubmi tting Preliminary and Detailed Design and review progress.	Project Management Documents Updates: Scope Management Plan, Schedule Management Plan, Cost Management Plan, Cost Management Plan, Quality Management Plan, Resource Management Plan, Communications Management Plan, Risk Management Plan, Procurement Management Plan, Stakeholder Management Plan.	Manager & team. Supervising Consultant,	35,000
4	1.3.1.3	Community Engagement Implementation Phase	Community engagement takes place here to confirm and relay past decisions in previous phases, and understand and respond to impacts of roads works in communities, including design, construction and maintenance.	Updated Stakeholder Engagement Plan and reports	Manager & team. Supervising Consultant	40,000
3	1.3.2	Contract Administration	The scope includes the establishment of a formal			1,000

WBS Level	WBS Code	WBS Element Name	Description of Work	Deliverable(s)	Committed Resources	Budget (USD)
			project control structure to establish and confirm the mechanisms and the			
			people to facilitate project management.			
4	1.3.2.1	Practical Completion Certificate	The Practical Completion Certificate is to be issued when all the required tests have been carried out, required documents and certificates have been provided and the Contractor has done everything required as a condition precedent to practical completion.	Signed Practical Completion Certificate	Manager & team. Supervising Consultant	1,000
3	1.3.3	Construction	The scope includes the Construction program provided by the roadworks Contractor and how the Project Manager's time is spent in managing/ monitoring the construction milestones.			172,510,000
4	1.3.3.2	Surveying and Setting Out	The scope includes surveying the construction alignments to establish coordinates and elevation.	Surveying Data	-Manager & team. -Supervising Consultant -Contractor -Quantity	100,000

WBS Level	WBS Code	WBS Element Name	Description of Work	Deliverable (s)	Committed Resources	Budget (USD)
					Surveyor	
					-Theodolite	
					-Level	
4	1.3.3.3	Earthwork:	In hilly and mountainous	Road Vertical &	-Manager &	35,000,000
		-Clearing,	terrain where the road	Horizontal Alignment	team.	
		-Cut to Fill,	pass through sloping		-Supervising	
		-Embankment	terrain, earthworks		Consultant	
		Construction	mainly consist of cut to		-Contractor	
			fill excavations.		-Quantity	
			Low lying and flat areas		Surveyor	
			prone to flooding		-Theodolite	
			embankments through		-Level	
			such areas should be		-Dump Trucks	
			constructed 0.5m above		-Grader	
		~	High Flood Level (HFL).	~		
4	1.3.3.4	Subbase	Provide place and	Constructed of subbase	-Manager &	80,000,000
		Pavement, Base	compact 400mm subbase	and base: Sand and	team.	
		Pavement, &	and 100mm base layers.	Loam Subbase layers,	-Supervising	
		Surface Course	Provide, place and	Aggregate Base Layer,	Consultant	
			compact surface layer	Soil Cement Base, and	-Contractor	
			75mm thick.	Aggregate Cement	-Quantity	
				Base.	Surveyor	
				Construction of Surface	-Theodolite	
				Layer: Asphaltic	-Level	
				Concrete.	-Dump Trucks	
					-Grader	
	1005	~			-Rollers	
4	1.3.3.5	Construction of	Construction of abutment,	Prestressed Concrete	-Manager &	32,410,000
		Bridge	Superstructure,	Bridge.	team.	
			Reinforced concrete Box	Concrete Box Culverts	-Supervising	
			Culverts		Consultant	

WBS Level	WBS Code	WBS Element Name	Description of Work	Deliverable (s)	Committed Resources	Budget (USD)
					-Contractor -Quantity Surveyor -Theodolite -Level -Dump Trucks -Grader -Rollers	
4	1.3.3.6	Drainage	Side drains are to be excavated using manual labor or Excavators. Both Earthen and concrete drains are to be constructed.	Concrete & Earthen Drains	-Crane Manager & team. -Supervising Consultant -Contractor -Surveyor -Dump Trucks -Excavator	20,000,000
4	1.3.3.7	Traffic Safety	Installation of Road Safety measure such as traffic lights, rumble strips, speed table, guard rail, and reflectors	Installed Lights, Speed Table, Guard Rail, rumble strips, and reflectors	Manager & team. -Supervising Consultant -Contractor	5,000,000
3	1.3.4	Principal's Responsibility	Setting up the site office, organizing the approval of governments permits, approval payments, (M&E), quality control and official opening.			10,000
4	1.3.4.1	Official Opening	Official opening to be organized and the relevant dignitaries	Project brief, Success Factors Lessons Learned	Sponsor/ MoF, Project Coordinator,	10,000

WBS Level	WBS Code	WBS Element Name	Description of Work	Deliverable(s)	Committed Resources	Budget (USD)
			invited to the opening ceremony.		Manager & team. Consultants, Contractors, Stakeholders	
2	1.4	Finalization Phase	The three main activities in this phase are: handover, evaluation of project performance and closing out the project.			84,000
3	1.4.1	Finalization Phase Project Management	This phase covers the activities necessary to produce, test and commission project deliverables in accordance with the project plan.	-	,	84,000
4	1.4.1.1	Finalization Phase – Project Management (General)	Activities include project meetings, scheduler's time, cost and quality management work.	Monitoring & Evaluation Reports	Project Coordinator, Manager & team. Consultants	20,000
4	1.4.1.2	Project Plan - Finalization Phase	Includes updating, monitoring and managing the Project Plan, engagement and communication, managing project changes, controlling and reporting progress, any revision/updating/resubmi	Project Management Plan updates	Project Coordinator, Manager & team. Consultants	5,000

WBS Level	WBS Code	WBS Element Name	Description of Work	Deliverable (s)	Committed Resources	Budget (USD)
			ssion.			
4	1.4.1.3	Defects Liability Period	The Defect Liability Period commences on the date of Practical Completion. It is the responsibility of the contractor to repair defects, which are attributable to the faults of the contractor, which occur within a specified period (1 year) after the practical completion of	Corrected Defects	Project Coordinator, Manager & team. Consultants	15,000
4	1.4.1.4	Final Certificate	Works. The Final Certificate is issued within 14 days after receipt of the contractor's Final Statement (sets out the details of all claims made by the Contractor which have not been settled or otherwise resolved).	Signed Final Completion Certificate	Project Coordinator, Manager & team.	5,000
4	1.4.1.5	Community Engagement - Finalization Phase	In this phase, it is important to engage customer and stakeholder to ensure that all their concerns are identified and addressed. This is also the	Update Stakeholder engagement Plan	Project Coordinator, Manager & team.	7,000

WBS Level	WBS Code	WBS Element Name	Description of Work	Deliverable (s)	Committed Resources	Budget (USD)
			last practical opportunity for the customers to voice their views.			
4	1.4.1.6	Complete Project Handover Report	Includes confirmation of project completion, receipt of documentation, maintenance arrangements and the actual preparation of the handover report	Final Completion Report	Project Manager, Consultant	15,000
4	1.4.1.7	Evaluate Project Performance	Includes the evaluation of the project against the success criteria and the preparation of the Project Completion Report.	Earn Value Management. Key Performance Indicators	Project Manager & team	5,000
4	1.4.1.8	Post Implementation Review	The Post Implementation Review focuses on outcomes of the project.	Lesson learned	Project Manager,	10,000
4	1.4.1.9	Close Out	These activities cover the tasks associated with closing the project office, including administrative and financial closure.	Accepted final Deliverables	Sponsor/MoF Project Coordinator, Project Manager	2,000
		Contingency				
		Contingency	Unforeseen works			8,327,000

4.2.1.9 DELIVERABLE VALIDATION AND ACCEPTANCE

The project's deliverables and products will be accepted through a formal acceptance process. These processes are designed to ensure that individual deliverables and products are accepted only if they meet their particular acceptance criteria. In the Georgetown to Lethem Road project quality control tests will be carried throughout the project to ensure that quality and design standards are being met. Test results will be measured against project specifications and acceptance criteria before being formally accepted and signed off by the project sponsor.

4.2.1.9.1 Deliverable Validation and Acceptance Form

The Deliverable Acceptance Form is used to track the status of project deliverables as they are produced, verified, validated and finally accepted. This document was developed during the planning stage and is to be completed and signed as deliverables are produced.

Project Title:	Georgetown to Lethem Road Construction – P	roject plan
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Deliverable	<description accepted.="" be="" deliverable="" from="" of="" should="" th="" the="" the<="" these="" to=""></description>
Name	Scope Statement.>
Acceptance	<the against="" be="" criteria="" deliverable="" judged="" the="" which="" will=""></the>
Criteria	
Verification	<how acceptance="" be="" by="" project="" team?="" the="" verified="" will=""></how>
Method	
Validation	<how (i.e.="" acceptance="" be="" by="" client="" customer,<="" sponsor,="" th="" the="" validated="" will=""></how>
Method	user acceptance group?)>
Client Nemo	<the client's="" end="" for="" name="" of="" on="" person="" responsible="" th="" the="" validating<=""></the>
Chefit Name	and accepting the deliverable>
Client	
Signature	
Signature Data	
Signature Date	YYYY-MM-DD

4.2.1.10 CONTROL SCOPE

Any request for change in project scope will be processed through the project's change management procedure, and the proposed scope changes will be reviewed. If the Project Manager and Project Sponsor determine that the request has merit, it will be analyzed for its impact to project time and project costs, and a risk assessment of the scope change will be conducted. It is the responsibility of the project manager and team to control change request by being the first line of defense against unmerited scope change request. If the change is approved, the project's WBS and WBS dictionary will be updated and rebaselined, the project schedule will be updated and may be re-baselined, and the project's requirements set will be updated. A change control board (CCBs) comprising of members of the steering committee members can be setup to review proposed changes and either approve or reject them.

4.2.1.11 SPONSOR ACCEPTANCE

Approved by:

Sponsor

Date: _____

Figure 21: Georgetown to Lethem Road Construction Project Scope Management Plan. Adapted from Tennessee Business Solutions Methodology (TBSM). Retrieved April 10, 2019 from https://www.tn.gov/finance/strategic-technology-solutions/strategic-technology-solutions/tbsm.html

4.3 PROJECT SCHEDULE MANAGEMENT Georgetown to Lethem Road Construction – Project Plan

A well-integrated construction schedule for a highway construction is essential to both meeting the publicly announced project completion date and facilitating government budgeting (namely by accurately predicting future cash flows) (R.-J. Dzeng, W.-C. Wang, 2003).

The construction of the Georgetown to Lethem Road consists of several components or mini projects for which schedules will have to be worked out and integrated. Various consultants, contractors and sub-contractors thus executing different components and often apply differing scheduling practices will have to integrate their schedule into the overall project timeframe as established. Since all projects involved in Georgetown to Lethem Road construction must be completed for the Road project to be successful, managing this integration is considered crucial for the overall success of the project. Rolling wave planning will be used to planned and schedule components such as construction works, and removal of utilities as these will have to be submitted by the contractor to client for approval. These will be planned in greater details as the information concerning construction methodology becomes available.

A realistic project schedule was created using the project charter, the work breakdown structure created during scope management, lessons learned from previous similar projects, organization process assets from the Ministry of Public Infrastructure, and project scheduling software such as Microsoft Project 2010. This schedule management plan is to be used as a roadmap for the construction of the Georgetown to Lethem Road Project. However, before the project execution begins, the project manager should reexamine this schedule and identify if the planned end date is achievable. By using this schedule management plan the project manager will be able to manage the project on lower levels and monitor the overall progress against planned completion times for activities. This is done by measuring variations against the actual plan giving stakeholders a picture of the project's status at any given time (Open Campus, 2019).

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4.3.1 SCHEDULE MANAGEMENT PLAN

Georgetown to Lethem Road Construction - Project Plan

4.3.1.1 INTRODUCTION

This schedule management plan represents a roadmap of how the project is to be executed. The construction of the Linden to Lethem Road involves a complex combination of planning, development, implementation, and finalization of series of activities for the completion of the project. The schedule management plan reflects the time frame of all activities and their relationship with each other. This is important since all activities involved in the road construction must be integrated into the project schedule and completed for the road to be built. The Schedule Management Plan therefore defines the approach the project team will use in monitoring the project schedule and manage changes after the baseline schedule has been approved.

4.3.1.2 SCHEDULE MANAGEMENT APPROACH

The Project schedule was created using the critical path method. The main scheduling tool used was Microsoft Projects 2010 where the activities identified in the project's Work Breakdown Structure (WBS) and WBS Dictionary were further developed to create a schedule model for the Georgetown to Lethem road construction project. This model is to

remain flexible throughout the project as more information becomes available that may require adjustments to risks and value-added activities.

The development of the Schedule management plan followed the six processes as outlined by PMBOK Guide Sixth Edition. Activity definition was carried out first to identify the specific work packages which must be performed to complete each deliverable. This was done by utilizing project specific data such as WBS and WBSS Dictionary. This was followed by Activity sequencing to determine the logical order of work packages and assigned relationships (dependencies) between project activities. Activity duration estimating to complete the work packages, was then used to calculate the number of work periods (measured in hours, days, weeks, and months) required to complete work packages. Given the long-term nature of the road construction and levels of uncertainty and unpredictability it will be the responsibility of the Project Manager and Team to review and adopt practices where necessary in order to respond to the changing needs of the environments. This is part of the adaptive approach taken given that priorities may change as project execution takes place and plans need to be reflective of such changes (PMBOK Guide 2017, pg. 177). The project sponsor and steering committee shall be responsible for final review and approval of all schedule activities before being baselined and the activities executed. This baseline is to be used to monitor and control the project during various phases.

4.3.1.3 ROLES AND RESPONSIBILITIES FOR SCHEDULE DEVELOPMENT

The Project Coordinator will be responsible for facilitating work package definition, sequencing, and estimating duration and resources with the project team. The Project Manager will facilitate the creation of the project schedule using Microsoft projects 2010 and other standard scheduling tool and validate the schedule with the project team, stakeholders, and the Project Sponsor.

The Consultants (Team Leaders) and Contractors (Construction Managers) will be responsible for developing their internal schedules for supervision and execution of roadworks and other preliminary works, which must be submitted to the project coordinator for review to ensure the it corresponds with planned milestones dates before being approved and integrated. The Project Coordinator will obtain schedule approval from the Project Sponsor and baseline the schedule. The project team is responsible for participating in work package definition, sequencing, and duration and resource estimating. The project team will also review and validate the proposed schedule and perform assigned activities once the schedule is approved.

4.3.1.4 SCHEDULE CONTROL AND REPORTING

The project schedule should be reviewed and updated as necessary on a fortnightly basis with actual start, actual finish, and completion percentages which will be provided by task owners. The project manager is responsible for holding fortnightly schedule updates/reviews and reports the project schedule performance information during meetings; determining impacts of schedule variances and, if necessary, provides the Project Sponsor with options for getting the project schedule back on track and under control; submitting schedule change requests; and reporting schedule status in accordance with the project's communications plan.

The Project Management Book of Knowledge (PMBOK) Guide focuses on Earned Value Management (EVM) for measuring and monitoring schedule. It is of importance that the Project Managers clearly understand EVM before deciding to use this method for managing the project schedule.

The project team is responsible for participating in fortnightly schedule updates/reviews; communicating any changes to actual start/finish dates to the project manager; and participating in schedule variance resolution activities as needed. The project sponsor will maintain awareness of the project schedule status and review/approve any schedule change requests submitted by the project manager.

The following scheduled reports will be available at the specified time intervals during the project:

Report	Frequency	Author	Reporting Responsibility
Resource Task Lists	Weekly	Project Scheduler	Generate individual
and Work Packages			resource task lists and work

Report	Frequency	Author	Reporting Responsibility
			packages from the
			scheduling tool and make
			them available to project
			team members.
Project Schedule	Fortnightly	Project Scheduler	Generate the schedule
Report			progress report for use in
			the project status meeting.
Project Master	Fortnightly	Project Scheduler	Generate the updated
Schedule (Gantt chart)			schedule Gantt chart for use
			in the project status
			meeting.
Sponsor Project Report	Monthly	Project Manager	Generate the Sponsor
			project status report for
			presentation to the Project
			Sponsor.

4.3.1.5 SCHEDULE CHANGES AND THRESHOLDS

This section describes the schedule variance thresholds agreed upon for the project. If a team member feels a schedule change is necessary, the Project Manager and the team must meet to review and evaluate the change. The project team determines which tasks are affected, calculates the variance, and generates a list of possible alternatives for consideration. If, after the evaluation is complete, the Project Manager determines that any change exceeds the established thresholds or boundaries, a change request is submitted to the Change Control Board (CCB).

A change request is necessary if either of the following two conditions is true:

- The proposed change is estimated to increase or reduce the work package duration by 10% or more when compared against the baseline.
- The proposed change is estimated to increase or reduce the overall project duration by 10% or more when compared against the baseline.

Any change requests that do not meet these thresholds may be submitted to the project manager for approval.

Once the schedule change request is reviewed and approved, the Project Manager and Project Scheduler record the change request result, store the documents in the project repository, modify the schedule according to the approved change, and communicate the change and impacts to the project team and Stakeholders.

If the project team feels a schedule re-baseline is necessary, a separate change request is submitted for consideration and approval (projectmanagementdocs.com).

4.3.1.6 EFFECT OF SCOPE CHANGES ON SCHEDULE

Any changes in the project scope, which have been approved by the project sponsor, will require the project team to evaluate the effect of the scope change on the current schedule. If the project manager determines that the scope change will significantly affect the current project schedule, he/she may request that the schedule be re-baselined in consideration of any changes which need to be made as part of the new project scope. The project sponsor must review and approve this request before the schedule can be re-baselined (projectmanagementdocs.com/template/project).

4.3.1.7 SPONSOR ACCEPTANCE

Approved by:

Date: _____

Sponsor

Figure 22: Georgetown to Lethem Road Construction Project Schedule Management Plan. Adapted from Tennessee Business Solutions Methodology (TBSM). Retrieved April 10, 2019 from https://www.tn.gov/finance/strategic-technology-solutions/strategic-technology-solutions/tbsm.html

4.3.2 DEFINE ACTIVITIES

Georgetown to Lethem Road Construction - Project Plan

In scope management, Scope Statement, WBS and WBS Dictionary were developed. This resulted in Work packages being formulated. These Work packages were used as inputs in the Define activities process and were broken down further into activities to ensure that work packages are delivered. Each activity was then estimated and scheduled to be monitored and managed during road construction.

Some activities under the road construction deliverable were considered to be long term and complex to adequately break-down the components and schedule it. Under these circumstances the "rolling wave planning" techniques were used to plan activities to the level of details needed. In the Project Management Body of Knowledge (PMBOK) Guide, the output of the Define Activities process is an Activity List, also called Task List and Activity Attributes.

The goal of defining the schedule is for the project team to have a complete understanding of all the work that must be accomplish, by identifying the specific schedule activities that need to be performed to produce the various project deliverables and gives an understanding of the constraints, dependencies and sequence of the activities.

The main tools and techniques used were Decomposition which is the method by which each work package within the WBS is decomposed into schedule activities required to produce the work package deliverables. Templates from formerly executed road construction projects, Rolling wave planning, and Expert judgement (PMBOK3, pp. 128).

The following represents the Activity List for the Georgetown to Lethem Road Construction project:

Task	Task Name	Dependencies
Number		
1	1 Georgetown to Lethem Road Project	
1.1	Concept Phase	
1.1.1	Concept Phase Project Management	
1.1.1.1	Concept Phase – Project Management	2

1.1.1.2	Appoint Project Manager.	5
1.1.1.3	Community Engagement – Concept Phase	6,5
1.1.2	Project Proposal	
1.1.2.1	Determine Functional Requirements & Scope	7
1.1.2.2	Produce Project Proposal	9
1.1.3	Development of Options Analysis and	
	Recommendations	
1.1.3.1	Develop Concept Planning Brief	10
1.1.3.2	Procure Concept Planning Consultant	10
1.1.3.3	Produce Options Analysis and	13
	Recommendations	
1.1.3.4	Recommend Preferred Option	14
1.1.3.5	Approved Recommended Option	15
1.1.3.6	Develop Preferred Option	16
1.1.4	Business Case	
1.1.4.1	Review Risk Register and Project Estimate	17
1.1.4.2	Project Charter - Business Case	19
1.1.4.3	Financial Approval	20
1.2	Development Phase	
1.2.1	Development Phase Project Management	
1.2.1.1	Development Phase – Project Management	21
	General	
1.2.1.2	Project Plan – Development Phase	24
1.2.1.3	Prepare Design Brief	25
1.2.1.4	Community Engagement Development Phase	24
1.2.2	Preliminary Design	
1.2.2.1	Procure Preliminary Design Consultants	26,27
1.2.2.2	Produce Preliminary Design	29
1.2.3	Detailed Design	
1001		20

1.2.3.2	Produce Detailed Design	32
1.2.4	Contract Documents	
1.2.4.1	Produce Contract Documents	33
1.2.4.2	Pre-tender Financial Approval	35
1.2.5	Preliminary Works	
1.2.5.1	Obtain Approval for Preliminary Works	36
1.2.5.2	Acquire Right of Way	36
1.2.5.3	Procure Public Utility Plant (PUP) Services	36
1.2.5.4	Procure Preliminary Works	36
1.2.5.5	Construct Preliminary Works	36
1.2.6	Procurement	
1.2.6.1	Procure Contractor	36,42
1.2.6.2	Contract Financial Approval	44
1.2.6.3	Contract Award	45
1.3	Implementation Phase	
1.3.1	Implementation Phase Project	
1.3.1	ImplementationPhaseProjectManagement	
1.3.1 1.3.1.1	ImplementationPhaseProjectManagement	46
1.3.1 1.3.1.1	ImplementationPhaseProjectManagement	46
1.3.1 1.3.1.1 1.3.1.2	ImplementationPhaseProjectManagement	46
1.3.1 1.3.1.1 1.3.1.2 1.3.1.3	ImplementationPhaseProjectManagement	46 49 50
1.3.1 1.3.1.1 1.3.1.2 1.3.1.3	ImplementationPhaseProjectManagementImplementationPhase – ProjectManagementImplementationPhasePhasePhasePhase	46 49 50
1.3.1 1.3.1.1 1.3.1.2 1.3.1.3 1.3.2	ImplementationPhaseProjectManagement	46 49 50
1.3.1 1.3.1.1 1.3.1.2 1.3.1.3 1.3.2 1.3.2	ImplementationPhaseProjectManagementImplementation Phase – Project ManagementImplementation Phase – Project ManagementGeneralProject Plan - Implementation PhaseCommunityEngagementImplementationPhaseContract AdministrationPractical Completion Certificate	46 49 50 60
1.3.1 1.3.1.1 1.3.1.2 1.3.1.3 1.3.2 1.3.2 1.3.2.1 1.3.3	ImplementationPhaseProjectManagementImplementation Phase – Project ManagementImplementation Phase – Project ManagementGeneralProject Plan - Implementation PhaseCommunityEngagementImplementationPhaseContract AdministrationPractical Completion CertificateConstruction	46 49 50 60
1.3.1 1.3.1.1 1.3.1.2 1.3.1.3 1.3.2 1.3.2 1.3.2.1 1.3.2.1 1.3.3 1.3.3.2	ImplementationPhaseProjectManagementImplementation Phase – Project ManagementImplementation Phase – Project ManagementGeneralProject Plan - Implementation PhaseCommunityEngagementImplementationPhaseContract AdministrationPractical Completion CertificateConstructionSurveying and Setting Out	46 49 50 60 51
1.3.1 1.3.1.1 1.3.1.2 1.3.1.3 1.3.2 1.3.2 1.3.2 1.3.2 1.3.3 1.3.3.2 1.3.3.3	ImplementationPhaseProjectManagementImplementation Phase – Project ManagementImplementation Phase – Project ManagementGeneralProject Plan - Implementation PhaseCommunityEngagementImplementationPhaseContract AdministrationPractical Completion CertificateConstructionSurveying and Setting OutEarthwork:(Clearing, Cut to Fill,	46 49 50 60 51 55
1.3.1 1.3.1.1 1.3.1.2 1.3.1.3 1.3.2 1.3.2 1.3.2.1 1.3.3 1.3.3.2 1.3.3.3	ImplementationPhaseProjectManagementImplementation Phase – Project ManagementImplementation Phase – Project ManagementGeneralProject Plan - Implementation PhaseCommunityEngagementImplementationPhaseContract AdministrationPractical Completion CertificateConstructionSurveying and Setting OutEarthwork:(Clearing, Cut to Fill, Embankment Construction)	46 49 50 60 51 55
1.3.1 1.3.1.1 1.3.1.2 1.3.1.3 1.3.2 1.3.2 1.3.2 1.3.3 1.3.3.3 1.3.3.4	ImplementationPhaseProjectManagementImplementation Phase – Project ManagementImplementation Phase – Project ManagementGeneralProject Plan - Implementation PhaseCommunityEngagementImplementationPhaseContract AdministrationPractical Completion CertificateConstructionSurveying and Setting OutEarthwork:(Clearing, Cut to Fill,Embankment Construction)SubbaseSubbasePavement, BasePavement, &	46 49 50 60 51 55 55 56

1.33.5	Construction of Bridge	57
1.3.3.6	Construct Drainage	57
1.3.3.7	Implement Traffic Safety measures	58,59
1.3.4	Principal's Responsibility	
1.3.4.1	Official Opening	60
1.4	Finalization Phase	
1.4.1	Finalization Phase Project Management	
1.4.1.1	Finalization Phase – Project Management	62
	General	
1.4.1.2	Project Plan - Finalization Phase	65
1.4.1.3	Defects Liability Period	66
1.4.1.4	Final Certificate	67
1.4.1.5	Community Engagement - Finalization Phase	68
1.4.1.6	Complete Project Handover Report	69
1.4.1.7	Evaluate Project Performance	70
1.4.1.8	Post Implementation Review	71
1.4.1.9	Close Out	72

 Table 8: Activity List. (Source: compiled by author)

4.3.2.1 Milestone list

It will be the job of the project manager to impose milestones highlighted in the project. A summary of milestones is also included in the project Charter. Deviations from the planned activities are detected when the milestone arrives, and the project has not completed the activities required for the milestone. A list of appropriate milestones is created as a part of the Define Activities process. This milestone list becomes a part of the project management plan and is added to the project scope statement and WBS dictionary as part of iterations in planning.

The following have been designated as milestones for the project schedule:

- Concept Phase Project Management
- Appoint Project Manager.
- Project Proposal

- Feasibility Studies Development of Options Analysis and Recommendations
- Business Case
- Development Phase Project Management
- Preliminary Design
- Detailed Design
- Contract Documents
- Preliminary Works
- Procurement
- Implementation Phase Project Management
- Construction
- Contract Administration
- Official Opening
- Finalization Phase Project Management General
- Defects Liability Period
- Project Close Out

4.3.3 SEQUENCE ACTIVITIES

In this process, the relationships between project activities were identified and documented thus creating a logical sequence for project work to obtain the greatest efficiency. The list of activities and milestones were used as input for this process, these activities and milestones are sequenced in the order of work performance.

Predecessor and successor activities were mapped in a logical relationship to create the project schedule (PMI 2017). This was done utilizing the both manual techniques and Microsoft projects software as a way of creating checks and balance. The main techniques used for this process was the Precedence Diagramming Method (PDM). The output of Sequence Activities is a Project Schedule Network Diagram.

The following represents the Project Schedule Network Diagram for the Georgetown to Lethem Road Construction project and was developed using Microsoft projects 2010:





Chart 7: Sequence Activities (Source: Compiled by Author)

4.3.4 ESTIMATE ACTIVITY DURATION

During this process the activity lists, milestone list, Organizational Process Asset and Enterprise environmental factors were all used as input to assign an estimate of duration for each activity. The main source of information was from historical information from similar projects and consultations with experts in this field. Duration includes the actual amount of time worked on an activity.

Team members from similar projects were also consulted to ascertained lessons learnt and the amount of time activities would usually take to complete. The typical unit for measuring the duration of an activity is days (8 Hours) or weeks (5 days). There are three schedule constraints that govern when an activity starts or finish: the first one includes that an activity must be completed by no earlier than a specific date, this means that an activity may occur at any time after a specified date but no earlier that the given date, this constrain is oriented to meet a deadline. Another constraint defines that an activity must be completed no later than a given date. The last type of is a constraint that imposes that an activity must be complete on a given date, no earlier or later.

In order to estimate how long an activity would take required an understanding of the availability of resources, the type of skills needed to do the work and the budget limitations to obtain resources. This happen directly after cost estimating. In the Project Management Body of Knowledge (PMBOK), the main output of the Estimate Activity Duration process is Activity Duration Estimates.

In order to estimate activity duration a number of techniques were used these included Analogous Estimating and Expert Judgment as described above and Bottom Up Estimating, whereby each task is given an estimate and the total is rolled up into the overall project estimate. Project deadlines are expressed in terms of days of the month. Given the longterm nature of project and uncertainties contingencies (reserves) were also built into estimate to account for risks, and these contingencies will decrease as the task is performed.

Task	Task Name	Duration	Resource
Number			
1	1 Georgetown to Lethem Road Project	1672 days	
1.1	Concept Phase	173 days	
1.1.1	Concept Phase Project Management	23 days	
1.1.1.1	Concept Phase – Project Management	14 days	Sponsor/MoF Ministry of Public Infrastructure
1.1.1.2	Appoint Project Manager.	4 days	MoF, Project Coordinator, Computers
1.1.1.3	Community Engagement – Concept Phase	5 days	Socioenvironmental Officer Computers Projectors Printers
1.1.2	Project Proposal	15 days	
1.1.2.1	Determine Functional Requirements & Scope	7 days	Project Coordinator & team. Computers Projectors Printers
1.1.2.2	Produce Project Proposal	8 days	Project Manager & Management Team. Computers Printers
1.1.3	Development of Options Analysis and	119 days	
	Recommendations		
1.1.3.1	Develop Concept Planning Brief	2 days	Project Coordinator & Management Team. Computers Printers
1.1.3.2	Procure Concept Planning Consultant	60 days	Project Manager & Management Team. Procurement Manager Computers Printers
1.1.3.3	Produce Options Analysis and Recommendations Recommend Preferred Option	45 days 1 day	Project Manager, Planning Consultants, Organization Process assets AUTOCAD Software Planning Consultants.
			- initial consultants,

			Project Manager
1.1.3.5	Approved Recommended Option	5 days	Sponsor, Planning Consultants, Project Manager, Customer, Reports
1.1.3.6	Develop Preferred Option	7 days	Sponsor, Planning Consultants, Project Manager, Customer, Reports
1.1.4	Business Case	16 days	
1.1.4.1	Review Risk Register and Project Estimate	2 days	Sponsor, Planning Consultants, Project Manager, Customer, Reports
1.1.4.2	Project Charter - Business Case	7 days	Project Manager, Planning Consultants, Organization Process assets AUTOCAD Software
1.1.4.3	Financial Approval	7 days	Sponsor/MoF Project Coordinator (MoPI)
1.2	Development Phase	405 days	
1.2.1	Development Phase Project	37 days	
	Management		
1.2.1.1	DevelopmentPhase–ProjectManagement General	5 days	Project Manager & Team
1.2.1.2	Project Plan – Development Phase	30 days	Project Manager & Team
1.2.1.3	Prepare Design Brief	2 days	Project Manager & Team
1.2.1.4	Community Engagement Development Phase	3 days	Project Manager, Socioenvironmental Officer
1.2.2	Preliminary Design	105 days	
1.2.2.1	Procure Preliminary Design Consultants	45 days	Project Manager & Team, Procurement Manager
1.2.2.2	Produce Preliminary Design	60 days	Design Consultant, Project Manager & Team,

			Organizational Process
			Lessons Learned.
1.2.3	Detailed Design	132 days	
1.2.3.1	Procure Detailed Design Consultants	45 days	Project Manager & Team, Procurement Manager
1.2.3.2	Produce Detailed Design	87 days	Design Consultants, Project Manager & Team
1.2.4	Contract Documents	14 days	Project Manager & Team, Procurement Manager
1.2.4.1	Produce Contract Documents	7 days	Project Manager & Team, Procurement Manager & Team
1.2.4.2	Pre-tender Financial Approval	7 days	Project Manager & Team, Procurement Manager & Team
1.2.5	Preliminary Works	51 days	
1.2.5.1	Obtain Approval for Preliminary Works	21 days	Sponsor/MoF, Project Manager & Team, Design/Supervising consultant,
1.2.5.2	Acquire Right of Way	21 days	Ministry of Legal Affairs, Project Manager & team
1.2.5.3	Procure Public Utility Plant (PUP) Services	21 days	Project Manager & team Design/ Supervising Consultant Guyana Telephone Telegraph Co. (GTT) Guyana Water Incorporated (GWI) Guyana Power & Light (GPL)
1.2.5.4	Procure Preliminary Works	30 days	-Project Manager & team -Design/ Supervising Consultant Utility companies
1.2.5.5	Construct Preliminary Works	51 days	Project Manager & team Design/ Supervising Consultant Contractor Utility companies

1.2.6	Procurement	66 days	
1.2.6.1	Procure Contractor	45 days	Project Manager & team. Procurement Manager.
1.2.6.2	Contract Financial Approval	7 days	Sponsor/MoF, Project Manager & team. Procurement Manager.
1.2.6.3	Contract Award	14 days	Manager & team.
1.3	Implementation Phase	772 days	
1.3.1	Implementation Phase Project	21 days	Manager & team.
	Management		
1.3.1.1	ImplementationPhase–ProjectManagement General	7 days	Manager & team. Supervising Consultant,
1.3.1.2	Project Plan - Implementation Phase	7 days	Manager & team. Supervising Consultant,
1.3.1.3	Community Engagement Implementation Phase	7 days	Manager & team. Supervising Consultant
1.3.2	Contract Administration	1 day	
1.3.2.1	Practical Completion Certificate	1 day	Manager & team. Supervising Consultant
1.3.3	Construction	750 days	
1.3.3.2	Surveying and Setting Out	120 days	Manager & team. Supervising Consultant Contractor Quantity Surveyor Theodolite Level
1.33.3	Earthwork: (Clearing, Cut to Fill, Embankment Construction)	225 days	Manager & team. Supervising Consultant Contractor Quantity Surveyor Theodolite Level Dump Trucks Grader
1.3.3.4	Subbase Pavement, Base Pavement, & Surface Course	225 days	Manager & team. Supervising Consultant Contractor Quantity Surveyor Theodolite Level Dump Trucks

			Grader
			Rollers
1.33.5	Construction of Bridge	90 days	Manager & team.
			Supervising Consultant
			Contractor
			Quantity Surveyor
			Theodolite
			Level
			Dump Trucks
			Grader
			Crono
1336	Drainage	aveb 00	Manager & team
1.5.5.0	Drainage	90 days	Supervising Consultant
			Contractor
			Surveyor
			Dump Trucks
			Excavator
1.3.3.7	Traffic Safety	90 days	Manager & team.
		2	Supervising Consultant
			Contractor
1.3.4	Principal's Responsibility	1 day	
1.3.4.1	Official Opening	1 day	Sponsor/ MoF,
			Project Coordinator,
			Manager & team.
			Consultants, Contractors,
1.4		201.1	Stakeholders
1.4	Finalization Phase	321 days	
1.4.1	Finalization Phase Project	321 days	
	Management		
1.4.1.1	Finalization Phase – Project Management	14 days	Project Coordinator,
	General		Manager & team.
	General		Consultants
1.4.1.2	Project Plan - Finalization Phase	7 days	Project Coordinator,
			Manager & team.
1 4 1 2		0.01	Consultants
1.4.1.3	Detects Liability Period	263 days	Project Coordinator,
			Manager & team.
1 1 1 1	Final Cartificate	1 day	Project Coordinator
1.4.1.4		1 uay	Manager & team
1415	Community Engagement - Finalization	14 dave	Project Coordinator
1.7.1.3	Community Engagement - I manzation	17 uays	Monagor & toom

1.4.1.6	Complete Project Handover Report	7 days	Project Manager,
			Consultant
1.4.1.7	Evaluate Project Performance	7 days	Project Manager & team
1.4.1.8	Post Implementation Review	7 days	Project Manager,
1.4.1.9	Close Out	1 day	Sponsor/MoF
			Project Coordinator,
			Project Manager

 Table 9: Duration Estimates. (Source: compiled by author)

4.3.5 DEVELOP SCHEDULE

During this process a professional project schedule was developed after analyzing planned sequences, durations, resource requirements, and schedule constraints. The planned start and finish dates for project activities were also determined. The critical path method was used to establish minimum project duration.

The following represents the information used to develop the project schedule for the Georgetown to Lethem Road Construction project.

Task Name	Duration	Start	Finish
1 Georgetown to Lethem Road Project	1672 days	Tue 02/01/18	Wed 12/06/24
Start	0 days	Tue 02/01/18	Tue 02/01/18
1.1 Concept Phase	173 days	Tue 02/01/18	Thu 30/08/18
1.1.1 Concept Phase Project Management	23 days	Wed 03/01/18	Fri 02/02/18
1.1.1.1 Concept Phase – Project Management	14 days	Wed 03/01/18	Mon 22/01/18
1.1.1.2 Appoint Project Manager.	4 days	Tue 23/01/18	Fri 26/01/18
1.1.1.3 Community Engagement – Concept Phase	5 days	Mon 29/01/18	Fri 02/02/18

1.1.2 Project Proposal	15 days	Mon 05/02/18	Fri 23/02/18
1.1.2.1 Determine Functional Requirements & Scope	7 days	Mon 05/02/18	Tue 13/02/18
1.1.2.2 Produce Project Proposal	8 days	Wed 14/02/18	Fri 23/02/18
1.1.3 Feasibility Studies - Development of Options Analysis and Recommendations	119 days	Mon 26/02/18	Thu 09/08/18
1.1.3.1 Develop Concept Planning Brief	2 days	Mon 26/02/18	Tue 27/02/18
1.1.3.2 Procure Concept Planning Consultant	60 days	Tue 27/02/18	Mon 21/05/18
1.1.3.3 Produce Options Analysis and Recommendations	45 days	Tue 22/05/18	Mon 23/07/18
1.1.3.4 Recommend Preferred Option	1 day	Tue 24/07/18	Tue 24/07/18
1.1.3.5 Approved Recommended Option	5 days	Wed 25/07/18	Tue 31/07/18
1.1.3.6 Develop Preferred Option	7 days	Wed 01/08/18	Thu 09/08/18
1.1.4 Business Case	16 days	Fri 10/08/18	Fri 31/08/18
1.1.4.1 Review Risk Register and Project Estimate	2 days	Fri 10/08/18	Mon 13/08/18
1.1.4.2 Project Charter - Business Case	7 days	Tue 14/08/18	Wed 22/08/18
1.1.4.3 Financial Approval	7 days	Thu 23/08/18	Fri 31/08/18
1.2 Development Phase	405 days	Mon 03/09/18	Fri 03/04/20
1.2.1 Development Phase Project Management	37 days	Mon 03/09/18	Tue 23/10/18

1.2.1.1 Development Phase – Project Management General	5 days	Mon 03/09/18	Fri 07/09/18
1.2.1.2 Project Plan – Development Phase	30 days	Mon 10/09/18	Fri 19/10/18
1.2.1.3 Prepare Design Brief	2 days	Mon 22/10/18	Tue 23/10/18
1.2.1.4 Community Engagement Development Phase	3 days	Mon 10/09/18	Wed 12/09/18
1.2.2 Preliminary Design	105 days	Wed 24/10/18	Tue 02/04/19
1.2.2.1 Procure Preliminary Design Consultants	45 days	Wed 24/10/18	Tue 08/01/19
1.2.2.2 Produce Preliminary Design	60 days	Wed 09/01/19	Tue 02/04/19
1.2.3 Detailed Design	132 days	Wed 03/04/19	Thu 03/10/19
1.2.3.1 Procure Detailed Design Consultants	45 days	Wed 03/04/19	Tue 04/06/19
1.2.3.2 Produce Detailed Design	87 days	Wed 05/06/19	Thu 03/10/19
1.2.4 Contract Documents	14 days	Fri 04/10/19	Wed 23/10/19
1.2.4.1 Produce Contract Documents	7 days	Fri 04/10/19	Mon 14/10/19
1.2.4.2 Pre-tender Financial Approval	7 days	Tue 15/10/19	Wed 23/10/19
1.2.5 Preliminary Works	51 days	Thu 24/10/19	Thu 02/01/20
1.2.5.1 Obtain Approval for Preliminary Works	21 days	Thu 24/10/19	Thu 21/11/19
1.2.5.2 Acquire Right of Way	21 days	Thu 24/10/19	Thu 21/11/19
1.2.5.3 Procure Public Utility Plant (PUP) Services	21 days	Thu 24/10/19	Thu 21/11/19

1.2.5.4 Procure Preliminary Works	30 days	Thu 24/10/19	Wed 04/12/19
1.2.5.5 Construct Preliminary Works	51 days	Thu 24/10/19	Thu 02/01/20
1.2.6 Procurement	66 days	Fri 03/01/20	Fri 03/04/20
1.2.6.1 Procure Contractor	45 days	Fri 03/01/20	Thu 05/03/20
1.2.6.2 Contract Financial Approval	7 days	Fri 06/03/20	Mon 16/03/20
1.2.6.3 Contract Award	14 days	Tue 17/03/20	Fri 03/04/20
1.3 Implementation Phase	772 days	Mon 06/04/20	Tue 21/03/23
1.3.1 Implementation Phase Project Management	21 days	Mon 06/04/20	Mon 04/05/20
1.3.1.1 Implementation Phase – Project Management General	7 days	Mon 06/04/20	Tue 14/04/20
1.3.1.2 Project Plan - Implementation Phase	7 days	Wed 15/04/20	Thu 23/04/20
1.3.1.3 Community Engagement Implementation Phase	7 days	Fri 24/04/20	Mon 04/05/20
1.3.2 Contract Administration	1 day	Tue 21/03/23	Tue 21/03/23
1.3.2.1 Practical Completion Certificate	1 day	Tue 21/03/23	Tue 21/03/23
1.3.3 Construction	750 days	Tue 05/05/20	Mon 20/03/23
1.3.3.1 Surveying and Setting Out	120 days	Tue 05/05/20	Mon 19/10/20
1.3.3.2 Earthwork: (Clearing, Cut to Fill, Embankment Construction)	225 days	Tue 20/10/20	Mon 30/08/21
1.3.3.3 Subbase Pavement, Base Pavement, & Surface Course	225 days	Tue 31/08/21	Mon 11/07/22

1.3.3.4 Construction of Bridge	90 days	Tue 12/07/22	Mon 14/11/22
1.3.3.5 Drainage	90 days	Tue 12/07/22	Mon 14/11/22
1.3.3.6 Traffic Safety	90 days	Tue 15/11/22	Mon 20/03/23
1.3.4 Principal's Responsibility	1 day	Tue 21/03/23	Tue 21/03/23
1.3.4.1 Official Opening	1 day	Tue 21/03/23	Tue 21/03/23
1.4 Finalization Phase	321 days	Wed 22/03/23	Wed 12/06/24
1.4.1 Finalization Phase Project Management	321 days	Wed 22/03/23	Wed 12/06/24
1.4.1.1 Finalization Phase – Project Management General	14 days	Wed 22/03/23	Mon 10/04/23
1.4.1.2 Project Plan - Finalization Phase	7 days	Tue 11/04/23	Wed 19/04/23
1.4.1.3 Defects Liability Period	263 days	Thu 20/04/23	Mon 22/04/24
1.4.1.4 Final Certificate	1 day	Tue 23/04/24	Tue 23/04/24
1.4.1.5 Community Engagement - Finalization Phase	14 days	Wed 24/04/24	Mon 13/05/24
1.4.1.6 Complete Project Handover Report	7 days	Tue 14/05/24	Wed 22/05/24
1.4.1.7 Evaluate Project Performance	7 days	Thu 23/05/24	Fri 31/05/24
1.4.1.8 Post Implementation Review	7 days	Mon 03/06/24	Tue 11/06/24
1.4.1.9 Close Out	1 day	Wed 12/06/24	Wed 12/06/24
Project End	0 days	Wed 12/06/24	Wed 12/06/24

The completed project schedule (Gantt Chart) is in Appendix 4.

4.4 PROJECT COST MANAGEMENT Georgetown to Lethem Road Construction – Project Plan

Project Cost Management describes and execute all the processes involved in planning, estimating, budgeting, financing, funding, managing, and controlling costs so that the project can be completed within the approved budget. Project Cost Management is considered vital to construction of the Georgetown to Lethem because it will enable informed, timely decisions to be made during the execution of the project. During the execution of the project, procedures for project control and record keeping become indispensable tools to managers and other participants in the construction process. These tools serve the dual purpose of recording the financial transactions that occur as well as giving managers an indication of the progress and problems associated with a project (C. Hendrickson 1998).

In this discussion, we consider the processes involved in the planning, estimating, budgeting, financing, funding, managing, and controlling costs during the construction of the Georgetown to Lethem Road. Therefore, it is important for the project manager and team to understand the use of cost management tools/techniques to interpret accounting information to effectively manage project cost.

4.4. PROJECT COST MANAGEMENT

Georgetown to Lethem Road Construction – Project Plan

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- 4.4.1 Cost Management Plan
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 - 4.4.1.6 Acceptance
- 4.4.2 Cost Estimation
- 4.4.3 Budget Determination
- 4.4.4 Cost Change Control Process
- 4.4.5 Cost Estimate Update

4.4.1 COST MANAGEMENT PLAN

4.4.1.1 Introduction

The purpose of this Cost Management Plan is to define the methodology by which costs associated with the Construction Georgetown to Lethem Road will be managed throughout the project lifecycle. This is necessary to ensure the successful completion of the project within the allotted budget constraints. The Cost Management Plan details the processes for managing the financial resources that are to be followed through all stages of the Georgetown to Lethem Road Construction project. In order to ensure the successful completion of the project within the allotted budget, this plan sets the format and standards by which the project costs are measured, reported and controlled. Several cost components are associated with this project, and metrics, cost variance considerations, and reporting activities will be outlined in this plan. To complete this project successfully, all key project members and stakeholders must adhere to and work within this Cost Management Plan and the overall project plan it supports.

This Cost Management Plan will:

- Outline the overall project cost management approach
- Outline how the project cost, budget and source of funding will be determined
- Identify who is responsible for managing costs, including who has the authority to approve changes to the project, its budget or sources of funding
- Identify the methods to be used for quantitatively measuring and reporting on cost performance
- Identify the reporting formats, frequency and to whom they are presented

4.4.1.2 Project Cost Management Approach

• <u>Overview</u>

The Cost Management Plan approach for the Construction of the Georgetown to Lethem Road requires that the project resources assist in establishing and managing the total cost of ownership of the project.

• Cost Planning and Estimating

Once the needs of the Construction of the Georgetown to Lethem Road Project have been determined, the project team will finalize the resource and staffing requirements necessary for the successful completion of the project. The Project Manager and construction contractor team lead will complete the internal and external WBS respectively. Control accounts and staff labor categories will be created in each WBS element. Based on the labor costs and planned duration of each WBS element, an estimate will be determined. WBS element costs will then be totaled and used to request funding for the project. Once the project budget is approved, the Project Manager will compare the allocation for each WBS element against the overall budget and adjust allocations as necessary to comply with the project budget. Once all allocations have been reviewed and approved by the project manager, the project cost will be baselined. The project cost baseline may only be changed with authorization by the Project Sponsor.

<u>Cost Tracking</u>

All project team members and contractors will record their work associated with the Construction of the Georgetown to Lethem Road Project on the appropriate timesheets using the appropriate labor categories and WBS cost accounts. Before close of business on the final business day of each month, the Project Manager will collect all of the timesheets and calculate the labor costs associated with each cost account. Additionally, any invoices associated with project capital equipment or other materials, licensing, or insurance will be copied by the receiving department each month and a copy will be provided to the Project Manager. The Project Manager will calculate actual costs for all cost categories and WBS elements and compare these actual costs to the projected baseline costs on a monthly basis. These comparisons will be used to generate the data for all metrics and status reports as well as variance analysis. Actual costs and cost variances must be reported regularly to steering committees and project sponsors. Any cost change over five (5) percent requires project steering committee approval. Costs for this project will be managed at the fourth (4) level of the Work Breakdown Structure (WBS). Control Accounts (CA) will be created at this level to track costs. Earned Value (EV) calculations for the CA's will measure and manage the financial performance of the project.

4.4.1.3 Cost Management Roles & Responsibilities

The following represents the expectations for roles and responsibilities for the cost management:

<u>Project Sponsor</u>

The Project Sponsor for the Construction of the Georgetown to Lethem Road Project is the Ministry of Finance (MoF). The sponsor is responsible for the approval of the Construction of the Georgetown to Lethem Road Project's cost management plan. Additionally, the sponsor is responsible for approving the project's budget and is the approving authority for any additional funding that may be needed. The Project Sponsor has the authority to make changes to the project to bring it back within budget.

• Project Coordinator

The Project Coordinator (MoPI) will work with the Project Sponsor (MoF) to define various roles and expectations for resources involved in managing the overall project cost. These role definitions should define ownership for review and approval of all project expenses, project cost establishment, review of budget tracking system details, and day-to-day cost detail management. The Project Coordinator will be responsible for managing and reporting on the project costs throughout the duration of the project.

• Project Manager

The Project Manager for the Construction of the Georgetown to Lethem Road Project is Supervising Consultant. The Project Manager Consultant is responsible for the day to day management of project funds. He/ She is also responsible for the development of an internal Work Breakdown Structure (WBS) which covers all work to be performed by the operations group. The Project Manager is authorized to execute the expenditure of project funds as necessary in accordance with the cost management plan and allocated project budget. The Project Manager/consultant may not authorize the use of any additional funding without prior approval from the Project Coordinator and Project Sponsor. The Project manager is required to establish metrics and variance analysis tools in order to provide status updates once a month to the Project Coordinator. During the monthly project status meeting, the Project Manager will present and review the project's cost performance for the preceding month. Performance will be measured using earned value,
as defined below. The Project Manager is responsible for accounting for cost deviations with options for resolving project budget shortages or overages to the Project Coordinator, who will then relate to Project Sponsor, Project Steering Committee and Change Control Board.

• Project Team

The project team is responsible for executing assigned work in accordance with the cost management plan. They are also required to assist the Project Manager in the implementation of metrics and variance analysis tools to ensure all project deliverables are performed within the allocated budget constraints.

<u>Contractor Support</u>

The contractor providing construction and related support for the Construction of the Georgetown to Lethem Road is responsible for providing an initial project cost estimate which includes all costs associated with the road works construction of the project. Additionally, the contractor shall provide a WBS which includes all construction work packages and their associated costs. The contractor is responsible for executing work packages in accordance with all approved budget and funding requirements.

4.4.1.4 Cost Performance Measurement

In order to measure project performance, several metrics will be used to capture cost and schedule performance for the Construction of the Georgetown to Lethem Road project. The following metrics will be compiled and reported by the Project Manager:

- Cost Performance Index (CPI) will be reported monthly and is the project's EV/AC
- Schedule Performance Index (SPI) will be reported monthly and is the project's EV/PV
- Control thresholds for CPI and SPI are:
 - Yellow: within +/- 20% must be reported to the Project Sponsor. If it is determined that there is no effect on the project's cost baseline then there may be no further action required.

Red: greater than +/- 20% must be reported to the Project Sponsor.
 Corrective measures must be taken to move the project back to an acceptable performance level (process detail in paragraph 3.3).

Earned	Value	Frequency of Reporting	Yellow	Red
Metric				
СРІ		Monthly	0.8≤CPI≤1.2	CPI<0.8 or CPI>1.2
SPI		Monthly	0.8≤SPI≤1.2	SPI<0.8 or SPI>1.2

- Cost Variance (CV) will be reported monthly and is the project's AC subtracted from EV
- Schedule Variance (SV) will be reported monthly and is the project's PV subtracted from EV

One chart will be created for each of the above metrics. The Project Manager will present these charts to the Project Sponsor at the Monthly Project Status Meeting on the 5th of each month.

4.4.1.5 Cost Variance Response Process

Cost management measures will be reported in the monthly Project Status Report. All cost variances outside of the thresholds identified in this Cost Management Plan will be identified, along with any planned corrective actions. Change requests triggered by project cost overruns will be identified and tracked in the monthly status report.

• Cost Variance Corrective Action Plan:

The Project Manager will present the Project Coordinator and Project Sponsor with options for corrective actions within five business days from when the cost variance is first reported. The Cost Variance Corrective Action Plan will detail the actions necessary to bring the project back within budget and the means by which the effectiveness of the actions in the plan will be measured. If the corrective actions to be taken result in a change, the project's overall Change Control Process must be followed as well. Upon acceptance, the Cost Variance Corrective Action Plan will become a part of the Project Schedule and the project will be updated to reflect the corrective actions. The two Condition levels are shown in the table below.

4.4.1.6 ACCEPTANCE

Approved by:

Date: _____

<Name of Approver> Construction of the Georgetown to Lethem Road

Figure 23: Georgetown to Lethem Road Construction Project Cost Management Plan. Adapted from Tennessee Business Solutions Methodology (TBSM). Retrieved May 1, 2019 from https://www.tn.gov/finance/strategic-technology-solutions/strategic-technology-solutions/tbsm.html

4.4.2 COST ESTIMATION

The Cost Management Plan for Construction of the Georgetown to Lethem Road documents the methods to be used to manage and control the many internal and external cost components. Metrics and variance analysis must be applied to these cost components throughout the project lifecycle for tracking, re-estimating and adjusting the project budget if needed. Prior to the estimate stage, the project had been divided into work packages in a Work Breakdown Structure (WBS). These work packages have been used as the bases for estimation. Each item in the Work Breakdown Structure is estimated to produce a final task estimate for each task. Each estimate was produced using either analogous or parametric estimating techniques. Costs estimates were prepared using the best information available at the time of estimation.

• Overall Project Cost

Following the production of estimates the final project estimate is produced. A 'bottom-up' approach was used to develop the final cost estimate for each of the cost component involved with each project activity by adding each estimate together to produce an overall estimate for the project. At this stage the contingencies were considered using identified major risks to the budget to determine how much of a potential contingency might be allocated to it.

Table 10: Cost Estimate (Source: Compiled by Author)

Item No	Description of Work	Unit	Qty.	Budget (USD)
	Scope: The Project will comprise a Standard 2-Lane single carriageway cross-section for Georgetown to Lethem Road. The road improvement options include			
	Bridges, Culverts, Traffic Safety measures.			
1.1	Concept Phase			
1.1.1	Concept Phase Project Management			
1.1.1.1	Perform keys activities include project meetings, scheduler's time, cost and quality management work.	Sum		5,000
1.1.1.2	Carry work required to appoint Project Manager.	Sum		20,000
1.1.1.3	Community Engagement – Concept Phase: Involves community's interaction with government, in developing and implementing the project.	Sum		20,000
1.1.2	Project Proposal			
1.1.2.1	Determine Functional requirements and scope – Requirements should be reviewed for purpose, necessity, feasibility and tolerances.	Sum		5,000
1.1.2.2	Develop Project Proposal.	Sum		10,000
1.1.3	Development of Options Analysis and Recommendations			167,000
1.1.3.1	Develop Concept Planning Brief outlining the scope of works.	Sum		5,000
1.1.3.2	Procure Concept Planning Consultant: This type of work should be procured in accordance with The Guyana Procurement Act 2003 for the Engagement and Use of Consultants.	Sum		5,000
1.1.3.3	Produce Options Analysis and Recommendations.	Sum		150,000
1.1.3.4	Compile Recommendation of Preferred Option	Sum		5,000
1.1.3.5	Carryout activities necessary for Approval.	Sum		1,000
1.1.3.6	Develop Preferred Option - The scope includes the preparation, review and approval of the options analysis report.	Sum		1,000
1.1.4	Project Charter -Business Case			
1.1.4.1	Review Risk Register and Project Estimate - The scope includes the review Project Cost Estimates.	Sum		5,000
1.1.4.2	Produce the Business Case: Finalizing Scope, Definition; Preparing preliminary business	Sum		20,000

Item No	Description of Work	Unit	Qty.	Budget (USD)
	requirements specification (Brief); Preparing a draft Project Plan; Preparing a Concept Estimate (Project Budget)			
1.1.4.3	Financial Approval - Financial approval must be secured from a duly Authorized expenditure officer with authority to incur the total amount of expenditure required.	Sum		500
	Sub-total			252,500
1.2	The Development Phase			
1.2.1	Development Phase Project Management			
1.2.1.1	Carryout Project Management Activities - include project meetings, scheduler's time, cost and quality management work.	Sum		10,000
1.2.1.2	Develop Project Plan - Activities and tasks are conducted according to the Project Plan. The project manager monitors the project's progress against the schedule and plans to ensure activities remain on track.	Sum		42,5000
1.2.1.3	Prepare Design Brief to consultant, outlining the extent of work needed and include clear deliverables.	Sum		10,000
1.2.1.4	Execute community engagement.	Sum		15,000
1.2.2	Preliminary Design			
1.2.2.1	Procure Preliminary Design. Procurement of external consultants shall follow. The Guyana Procurement Act 2003.	Sum		7,000
1.2.2.2	Produce Preliminary Design	Sum		203,000
1.2.3	Detailed Design			
1.2.3.1	Procure Detailed Design Consultants suitable for the performance of the work.	Sum		7,000
1.2.3.2	Produce Detailed Design - The detailed design includes engineering drawings and an electronic model for construction purposes.	Sum		350,000
1.2.4	Contract Documents			
1.2.4.1	Produce Contract Documents - Includes preparing the invitation documentation, calling/receiving/evaluating tenders, conducting contract negotiation, obtaining approval to award contract, and preparing the contract	Sum		3,000

Item No	Description of Work	Unit	Qty.	Budget (USD)
	documentation.			
1.2.4.2	Pre-tender Financial Approval - The scope includes seeking approval of Sponsor for Bid documents.	Sum		1,000
1.2.5	Preliminary Works			
1.2.5.1	Obtain Approval for Preliminary Works	Sum		5,000
1.2.5.2	Acquire Right of Way	Sum		1,045,000
1.2.5.3	Procure Public Utility Plant (PUP) Services	Sum		5,000
1.2.5.4	Preliminary works. Are to be carried out using both simple approval of a works order and full tender process depending on the nature of the works.	Sum		10,000
1.2.5.5	Construct Preliminary Works	Sum		1,250,000
1.2.6	Procurement			12,000
1.2.6.1	The procurement of contractor involves call for registration of interest, tenders and tender assessments.	Sum		10,000
1.2.6.2	Contract Financial Approval from the Sponsor/MoF	Sum		1,000
1.2.6.3	Obtain Contract Award	Sum		1,000
	Sub-total			2,975,500
	Sub-total			2,975,500
1.3	Sub-total Implementation Phase			2,975,500
1.3 1.3.1	Sub-total Implementation Phase Implementation Phase Project Management			2,975,500 90,000
1.3 1.3.1 1.3.1.1	Sub-total Implementation Phase Implementation Phase Project Management Implementation Phase – Project Management. Activities include project meetings, scheduler's time, cost and quality management work.	Sum		2,975,500 90,000 15,000
1.3 1.3.1 1.3.1.1 1.3.1.2	Sub-totalImplementation PhaseImplementation Phase Project ManagementImplementation Phase – Project Management.Activities include project meetings, scheduler's time, cost and quality management work.Project Plan - Implementation Phase. Includes updating, monitoring and managing the project plan, engagement and communication, managing project changes, controlling and reporting progress, revising/updating/resubmitting Preliminary and Detailed Design and review progress.	Sum		2,975,500 90,000 15,000 35,000
1.3 1.3.1 1.3.1.1 1.3.1.2 1.3.1.2	Sub-totalImplementation PhaseImplementation Phase Project ManagementImplementation Phase – Project Management.Activities include project meetings, scheduler's time, cost and quality management work.Project Plan - Implementation Phase. Includes updating, monitoring and managing the project plan, engagement and communication, managing project changes, controlling and reporting progress, revising/updating/resubmitting Preliminary and Detailed Design and review progress.Carryout Community engagement to relay past decisions in previous phases, and understand and respond to impacts of roads works in communities.	Sum Sum		2,975,500 90,000 15,000 35,000 40,000
1.3 1.3.1 1.3.1.1 1.3.1.2 1.3.1.3 1.3.1.3	Sub-total Implementation Phase Implementation Phase Project Management Implementation Phase – Project Management. Activities include project meetings, scheduler's time, cost and quality management work. Project Plan - Implementation Phase. Includes updating, monitoring and managing the project plan, engagement and communication, managing project changes, controlling and reporting progress, revising/updating/resubmitting Preliminary and Detailed Design and review progress. Carryout Community engagement to relay past decisions in previous phases, and understand and respond to impacts of roads works in communities. Contract Administration	Sum Sum		2,975,500 90,000 15,000 35,000 40,000

Item No	Description of Work	Unit	Qty.	Budget (USD)
	have been carried out, required documents and certificates have been provided and the Contractor has			
	done everything required as a condition precedent to			
	practical completion.			
1.3.3	Construction			
1.3.3.2	Surveying and Setting Out. The scope includes surveying the construction alignments to establish coordinates and elevation.	Sum		100,000
1.3.3.3	Earthwork: Clearing, Cut to Fill, Embankment Construction	Sum		35,000,000
1.3.3.4	Subbase Pavement, Base Pavement, & Surface Course. Provide place and compact 400mm subbase and 100mm base layers. Provide, place and compact surface layer 75mm thick.	Sum		80,000,000
1.3.3.5	Construction of Bridge. Construction of abutment, Superstructure, Reinforced concrete Box Culverts	Sum		32,500,000
1.3.3.6	Construction of Earthen and concrete drains.	Sum		20,000,000
1.3.3.7	Installation of Road Safety measure such as traffic lights, rumble strips, speed table, guard rail, and reflectors	Sum		5,000,000
1.3.4	Principal's Responsibility			
1.3.4 1.3.4.1	Principal's Responsibility Organize Official opening ceremony.	Sum		10,000
1.3.4 1.3.4.1	Principal's Responsibility Organize Official opening ceremony. Sub-total	Sum		10,000 172,701,000
1.3.4 1.3.4.1	Principal's Responsibility Organize Official opening ceremony. Sub-total	Sum		10,000 172,701,000
1.3.4 1.3.4.1 1.4	Principal's Responsibility Organize Official opening ceremony. Sub-total Finalization Phase	Sum		10,000 172,701,000
1.3.4 1.3.4.1 1.4 1.4.1	Principal's Responsibility Organize Official opening ceremony. Sub-total Finalization Phase Finalization Phase Project Management	Sum		10,000 172,701,000
1.3.4 1.3.4.1 1.4 1.4.1 1.4.1.1	Principal's Responsibility Organize Official opening ceremony. Sub-total Finalization Phase Finalization Phase Project Management Project Management - Activities include project meetings, scheduler's time, cost and quality management work.	Sum Sum		10,000 172,701,000 20,000
1.3.4 1.3.4.1 1.4 1.4.1 1.4.1.1 1.4.1.2	Principal's ResponsibilityOrganize Official opening ceremony.Sub-totalSub-totalFinalization PhaseFinalization Phase Project ManagementProject Management - Activities include project meetings, scheduler's time, cost and quality management work.Project Plan - Includes updating, monitoring and managing the Project Plan, engagement and communication, managing project changes, controlling and reporting progress.	Sum Sum		10,000 172,701,000 20,000 5,000
1.3.4 1.3.4.1 1.4 1.4 1.4.1.1 1.4.1.2 1.4.1.3	Principal's ResponsibilityOrganize Official opening ceremony.Sub-totalSub-totalFinalization PhaseFinalization Phase Project ManagementProject Management - Activities include project meetings, scheduler's time, cost and quality management work.Project Plan - Includes updating, monitoring and managing the Project Plan, engagement and communication, managing project changes, controlling and reporting progress.Defect Liability Period - It is the responsibility of the contractor to repair defects, which are attributable to the faults of the contractor, which occur within a specified period (1 year) after the practical completion of works.	Sum Sum Sum		10,000 172,701,000 20,000 5,000 15,000

Item No	Description of Work	Unit	Qty.	Budget (USD)
	after receipt of the contractor's Final Statement			
	(sets out the details of all claims made by the			
	Contractor which have not been settled or			
1/15	Community Engagement finalization In this phase it	Sum		7 000
1.4.1.3	is important to engage customer and stakeholder to	Sum		7,000
	ensure that all their concerns are identified and			
	addressed. This is also the last practical opportunity			
	for the customers to voice their views.			
1.4.1.6	Complete Project Handover Report. Includes	Sum		15,000
	confirmation of project completion, receipt of			
	documentation, maintenance arrangements and the			
	actual preparation of the handover report.			
1.4.1.7	Evaluate Project Performance	Sum		5,000
1.4.1.8	Perform Post Implementation Review to focus on	Sum		10,000
	outcomes of the project.			
1.4.1.9	Execute Close Out. These activities cover the tasks	Sum		2,000
	associated with closing the project office, including			
	administrative and financial closure.			
	Sub-total			84,000
	Total			177,923,000
	Contingency	Sum		8,327,000
	Grand Total			184,250,000

4.4.3 BUDGET DETERMINATION

Once the needs of the Georgetown to Lethem road have been determined, the project team will finalize the resource and staffing requirements necessary for the successful completion of the project. The Project Manager will complete the internal and external Work Breakdown Structure (WBS) respectively. Control accounts and staff labor categories will be created in each WBS element. Based on the labor costs and planned duration of each WBS element, an estimate will be determined. WBS element costs will then be totaled and verified against the allotted project budget. Once the project budget is approved, the Project Coordinator will compare the allocation for each WBS element against the overall budget and adjust allocations as necessary to comply with the project budget. Once all

allocations have been reviewed and approved by the Project Manager, the project budget will be baselined. The project budget baseline may only be changed with authorization by the Project Sponsor.

Budget Summary

The budget for the Georgetown to Lethem Road is estimated at US\$ 184.25 million.

Estimated Costs:	
Project Management	(\$) 296,500
Planning	(\$) 117,500
Design	(\$) 603,000
Right-of-Way	(\$) 1,045,000
Utilities	(\$) 1,250,000
Permits	(\$) 11,000
Construction	<u>(\$) 172,600,000</u>
Sub-total	(\$) 175,923,000
Contingency	<u>(\$) 8,327,000</u>
\mathbf{D} (\mathbf{U}) (\mathbf{D}) (\mathbf{D}) (\mathbf{U}) ($$	101050000

Estimated Total Project Cost: (\$ total) 184,250,000

4.4.4 COST CHANGE CONTROL PROCESS

If the Construction of the Georgetown to Lethem Road Project exceeds its thresholds at any time for its CPI or SPI, corrective measures will be considered and implemented in order to bring the project back into an acceptable range of performance. The Project Manager and Team will consider all control measures which will result in correcting the project performance. A detailed analysis of all control measures will be presented to the Project Coordinator and Sponsor. The analyses will consist of:

- General description of the control measure •
- Personnel involved
- Timeline to implement
- Issues or concerns regarding implementation
- Expected effect on project performance •

All control measures will be reviewed by the Project Coordinator and Sponsor. Upon approval from the Project Sponsor, the Project Manager will lead the implementation of the authorized control measure. The Project Manager must also complete any change requests required in accordance with the project's change control process.

In some isolated circumstances it may be necessary to re-baseline a project's costs. Every effort should be taken to avoid this. However, if necessary, only the Project Sponsor may authorize this action.

• Earned Value Management

During the implementation and execution of Georgetown to Lethem Road Construction Project EVM will be used to measure the project's progress and performance by combining scope, schedule and cost into a single integrated system of monitoring and reporting.

• S – Curve Report

Reports will be presented as an S-Curve Report, to give project stakeholders a clear visual report showing how the project is trending. See appendix: 5 for details.



Figure 24: S-Curve Report Source: (http://industrialaudit.com)

4.4.5 COST ESTIMATE UPDATE

Cost Estimates will be Review and project cost re-calculated and update where necessary following refinement of the Georgetown to Lethem Road design and will also incorporate recommendations from the Final Design report. Currently, Project Manager is responsible for cost estimates. The resulting project costs for an anticipated June 2024 completion is: *Total Project Cost Estimate: \$184,250,00*

	YEAR	2018	2019	2020	2021	2022	2023	2024
Concept Phase	Concept Phase Project Management	35,000	10,000					
	Project Proposal	15,000						
	Development of Options Analysis and Recommendations	120,000	47,000					
	Project Charter - Business Case	25,500						
Development Phase	Development Phase Project Management	30,000	47,500					
	Preliminary Design	50,000	160,000					
	Detailed Design		220,250	136,750				

Chart8: Summary of projected costs (includes ROW/Design/Mitigation) for various construction years.

	Contract Documents			4,000				
	Preliminary Works			2,234,500	80,500			
	Procurement	2,000	2,000	2,000	2,000	2,000	2,000	
	Implementation Phase Project Management				55,000	35,000		
Implementation Phase	Contract Administration				1,000			
	Construction				55,000,000	55,000,000	55,000,000	7,510,000
	Principal's Responsibility						10,000	
Finalization Phase	Finalization Phase Project Management							84,000
	Sub-total	277,500	486,750	2,377,250	55,138,500	55,037,000	55,012,000	7,594,000
	Contingency	81,750	81,750	81,750	2,000,000	2,000,000	2,000,000	2,081,750
	Total Cost per year	359,250	568,500	2,459,000	57,138,500	57,037,000	57,012,000	9,675,750
	Project Total	359,250	927,750	3,386,750	60,525,250	117,562,250	174,574,250	184,250,000

4.5 PROJECT QUALITY MANAGEMENT

Georgetown to Lethem Road Construction - Project Plan

Project quality management encompasses the processes and activities for incorporating an organization's quality policy regarding planning, managing, and controlling project and product requirements for the project in order to meet stakeholders' objectives. In this discussion, quality is referred to as what the customers or stakeholders need from the project deliverables (quality requirements and/ or standards) and how the project will achieve compliance to those quality requirements and/ or standards. According to *A Guide to the Project Management Body of Knowledge (PMBOK*® *Guide)*, quality is "the degree to which a set of inherent characteristics fulfill requirements." During Roadworks construction, the project manager will be responsible for overseeing the implementation of the project quality management plan. The main intention of this plan is to deliver a final product and or service that meet the quality requirements and/ or standards as set out by customer or stakeholder. This is considered very important to the success of the Georgetown to Lethem Road Construction project, given that without customer satisfaction there can be no quality (Stephanie Ray, 2018).

4.5.1 QUALITY MANAGEMENT PLAN

Georgetown to Lethem Road Construction – Project Plan

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4.5.1.1 INTRODUCTION

The purpose of the Georgetown to Lethem Road Construction Project Quality Management Plan is to establish a process to ensure that all project goals, objectives, and deliverables are completed with an acceptable level of quality. This is usually accomplished by managing the processes and procedures for ensuring quality planning, assurance, and control are all conducted. In short, to ensure quality, you must meet the needs of the stakeholder (Global Knowledge 2017).

This Quality Management Plan establishes the activities, systems, policies, and procedures that address the Work and provide documented evidence that the Work has been performed in accordance with the contract documents thus ensuring the quality of the product or process upon the completion of the project. Quality management therefore assures the quality of the project deliverables and the quality of the processes used to manage and create those deliverables. The purpose of this plan is to:

- Ensure quality is planned
- Define how quality will be managed
- Define quality control activities
- Define acceptable quality standards

Consequently, it is imperative that all stakeholder provide enhanced oversight to assure design quality assurance/quality control.

4.5.1.2 QUALITY MANAGEMENT APPROACH

The quality management approach for the Construction of the Georgetown to Lethem Road will help ensure quality is planned for both the product and processes. In order to ensure the success of this project and meet its quality objectives, an integrated quality approach will be utilized to define quality standards, measure quality and continuously improve quality throughout the project. This Quality Management Plan (QMP) encompasses the policies, program, organizational responsibilities, procedures, and means of ensuring that all disciplines, aspects, and elements of the Work complies with quality requirements and/ or standards by outlining a strict set of requirements (metrics) for ensuring the work is properly planned and checked. This includes quality reviews during design of the Project,

preparation and approval of detailed work plans prior to each of the significant construction operations, review of all necessary details to perform each operation, and ensuring all controls are in place to verify work is compliant.

The QMP describes the processes, procedures and details of reviews and checks that will be performed on the design of the Project components and outlines the inspections and tests that will be performed on construction materials and workmanship to ensure the overall quality of the constructed project. This project quality approach incorporates the involvement of stakeholders and quality assurance team members early in the project phases to determine requirements. These requirements become the foundation for the work of the project. This QMP is considered to be a living document, subject to ongoing review and revision to better meet the needs of its stakeholders over the life of the Project. Revisions to improve the quality procedures and processes are therefore expected to promote the ability to meet Project requirements. The quality management plan identifies three key components.

1. Objects of quality	2. Quality Measure	3. Quality Evaluation
review		Methods
Project Processes	Process Quality Standards	Quality Management/
		Assurance Activities
	Stakeholder Expectations	
Project Deliverables	Deliverable Quality	Quality Control Activities
	Standards	
	Completeness and	
	Correctness Criteria	

Chart 9: Key Components of the Quality Management Plan Source: (compiled by author)

4.5.1.3 QUALITY PLANNING

Quality planning is the process of identifying quality requirements and/or standards for the project and product, and documenting how the project will demonstrate compliance. The deliverables and processes to be reviewed for the Georgetown to Lethem Road Construction Project, and their corresponding quality standards, are detailed in the Quality Assurance and Quality Control sections of this document.

The QMP is created during the Planning Phase of the project, and is a parallel activity with other processes through the lifecycle of the project. During the planning phase, the project manager and project team determine how to test or inspect the product, deliverables, or services to meet the stakeholders' needs and expectations, as well as how to meet the goal of the products performance and reliability. PMI 2017. The intended audience is the Project Sponsor, Project Coordinator, Project Manager, project team, and any senior leaders whose support is needed to carry out the plan. Implementation of and compliance with the QMP is the shared responsibility of all project personnel. Both project management and technical staff are thus integrated with and committed to the success of overall quality management.

Quality planning also includes establishing the quality definition, quality standards, and identification of the quality metrics to be applied. These processes are described in details below.

4.5.1.3.1 Quality Specific Definitions

Quality terminology, unless defined or modified elsewhere in the QMP, shall have the meaning defined in ISO 9001. Terms used in ISO 9001 shall have the meanings defined below:

- Customers the Users of the roadways, MoPI, Customer Groups and key stakeholders
- Organization the Developer's organization, including any Affiliates and Contractors.
- **Product** the Work.
- **Quality control** the part of quality management focused on fulfilling quality requirements.
- **Suppliers** Contractors.

4.5.1.3.2 Quality Standards

ISO 9001: 2000 – Internationally accepted quality standard issued and administered by International Organization for Standardization which specifies requirements for a quality management system where an organization:

- needs to demonstrate its ability to consistently provide product that meets customer and applicable regulatory requirements, and
- aims to enhance customer satisfaction through the effective application of the system, including processes for continual improvement of the system and the assurance of conformity to customer and applicable regulatory requirements.

4.5.1.3.1 Technical Standards - Construction

Technical Specification Manual for Road Maintenance and Construction, MoPI

The Technical Specification Manual shall provide the quality requirements for the construction phase of Work and incorporates the following divisions into the quality procedures:

Division 01- General

Section 01010- General Requirements Section 01020- Contractors Program Section 01030- Safety and Traffic Control Section 01035-Temporary Diversion for Traffic Section 01040- Quality Control Section 01050- Environmental Management Section 01060- Service Quality Level Criteria

Division 02 Site and Earthworks

Section 02010- Site Clearance Section 02020- Demolition and Removals Section 02030- Earthworks Section 02033- White Sand Embankment Section 02035- Select Sub-Grade Section 02040- Structural Excavation and Backfill Section 02050- Treatment of Surface Defects Section 02060- Clay Blanket Section 02070- Roadside Improvement Materials **Division 03 Sub-Base and Base** Section 03010- White Sand Sub-Base Section 03020- White Sand/Sand Clay Lower Base Course Section 03021- Cement Treated White Sand/Sand Clay Lower Base Course Section 03025- Reclaimed Unestablished Lower Base Course Section 03040- Aggregate Base

Division 04 Pavement

Section 04010- Prime Coat

Section 04011- Tack Coat Section 04030- Asphalt Concrete and Sand Asphalt Section 04050- Surface Dressing Section 04060- Sand Seal Coat Section 04070- Slurry Seal

Division 05 Minor Drainage

Section 05020- Concrete Drainage Channels Section 05030- Cleaning and Shaping Existing Open Drains Section 05040- Riprap Slope Protection Section 05050- Gabions Section 05060- Anti Crack Geotextiles Section 05061-Geotextiles to Structures Section 05070- Waterpr00fting To Structures Section 05080- Weep hole To Structures

Division 06 Incidental Road Works

Section 06010- Concrete Kerb Section 06020- Concrete Driveways Section 06030- Steel Beam Guardrail

Division 07 Signs, Markings, Signals and Lighting

Section 07010- Traffic Signs Section 07011- Reference Markers Section 07020- Road Markings Section 07030- Raised Pavement Markers Section 07040- Traffic Signals Section 07050- Street Lighting

Division 08 Bridges and Box Culverts

Section 08010- Piling Section 08020- Concrete for Structures and Other Uses Section 08030- Prestressed Concrete Section 08060- Steel Structures Section 08070- Pneumatically Placed Concrete Section 08080- Elastomeric Bridge Bearings Section 08090- HDPE Pipe

Division 09 Incidental Structural Works

Section 09010- Barriers and Hand Rails Section 09020-Paint Section 09070-Concrete Repairs Section 09080-Timber Section 09090- Epoxy Materials

Division 10 Dayworks

Section 10010- Dayworks

 Environmental Protection Standards/Legislation – Guyana Act No. 11 of 1996 Environmental Protection Act 1996.

4.5.1.3.3 Quality Metrics

Quality metric specifically describes a project or product attribute and how Control Quality process will verify compliance to it (PMI 2017). This quality planning process identifies the metrics the Team will use. The Project Coordinator and Quality Manager, in collaboration with the Team Leads and Process Owners, have identified and developed the quality metrics applicable to the Georgetown to Lethem Road Construction project. The metrics, which are based on the quality standards established by the Project Team, will be refined during the different phases of the project, and documented in updates to this Quality Management Plan. The Project Team will use the quality metrics to evaluate whether the project is achieving its goals.

4.5.1.4 QUALITY MANAGEMENT

The quality management team will perform quality management activities that incorporates the Ministry of Public Infrastructure's quality policies and guidelines into the Georgetown to Lethem Road Construction project. They will perform quality functions with a comprehensive and systematic examination of the design and construction documents. They will evaluate the quality management plans and provide ways of increasing the probability of meeting those requirements as well as identifying ineffective processes and cause of poor quality (PMI 2017).

4.5.1.4.1 QUALITY ASSURANCE

The focus of quality assurance is on the processes used in the project. Quality assurance ensures that project processes are used effectively to produce quality project deliverables. Quality is assured in the Georgetown to Lethem Road Construction project by assigning full-time, dedicated, and competent staff to perform the quality functions of auditing and surveilling of quality processes and procedures used throughout the project lifecycle. The Project Coordinator from Ministry of Public Infrastructure, along with its consultant

(Project Manager) will be responsible for the development of deliverables and assure that the stated quality control procedures are being followed.

The following table identifies:

- The project processes subject to quality assurance.
- The quality standards and stakeholder expectations for that process.
- The quality assurance activity
- How often or when the quality assurance activity will be performed.

Project Process	Process Quality Standards/ Stakeholder Expectations	Quality Assurance Activity	Frequency/Interval
QA1. Develop/refine project charter	100% compliance with framework	Audit charter updates by phase	Once per project phase
QA2. Develop/refine project plan	100% compliance with framework	Audit plan content and updates, project priorities, and task estimation	Once per project phase
QA3. Execute and control project per project plan	95% compliance with framework	Audit/surveillance of the following project activities:✓Quality✓Communications✓Project progress	Weekly Monthly Monthly
QA4. Approve each project stage	100% compliance with framework	Audit stage checkpoints	Once per project phase/stage
QA5. Close project with post project review	100% compliance with framework	Audit project reviews by phase	Once per project phase

Chart 10: Quality Assurance Criteria Source: (Project Management Docs.com. Retrieved April 22, 2019)

• Quality Audits

Quality audits and surveillances shall be scheduled, planned, and conducted on an ongoing basis covering all project quality related activities and project phases. The audit/

surveillances schedule will be maintained current and available to the Client upon request. Internal quality audits will be performed at least quarterly. Quality audits consist of an evaluation of the effectiveness of a specific process such as purchasing, document control, submittals, risk management, etc. Quality surveillances consist of an evaluation of the effectiveness of a specific activity and follow up of actions required in a previously performed audit. Qualified, trained and experienced quality personnel, independent of those responsible for the activity being audited, shall conduct audits and surveillances. Results of quality audits and surveillances shall be documented and distributed to the manager of the audited activity and the QM for reporting to the Executive Management Committee. The person responsible for the audited department shall conduct investigative actions to determine and document the cause of any problems that are found during the audit and implement corrective actions to resolve the problem and prevent recurrence.

4.5.1.5 QUALITY CONTROL

Quality control is focused on the products and deliverables of the project. In the Georgetown to Lethem Road Construction Project quality control will be achieved by assigning full-time, dedicated, and competent staff to perform the quality functions of monitoring project deliverables to verify that the deliverables are of acceptable quality and are complete and correct, and includes techniques such as the inspection, analysis, and actions required to ensure quality output.

The Georgetown to Lethem Road Construction project QC process involves the following steps:

- Verifying, validating, and monitoring of work products to ensure the requirements for quality and scope of work are being fulfilled
- Inspecting deliverables and documentation and comparing these items to a standard of quality defined by the stakeholders of the project
- Verifying that both the user's requirements and technical specifications are met before and after the work product is approved and is promoted into a stable production environment
- Monitoring output of workflows progress, detecting problems and defects, and allowing for corrections prior to delivery of work products or services

The following table identifies:

- The major deliverables of the project that will be tested for satisfactory quality level.
- The quality standards and the correctness and completeness criteria established for the project deliverable. Included are any organizational standards that need to be followed.
- The quality control activities that will be executed to monitor the quality of the deliverables.
- How often or when the quality control activity will be performed.

Chart 11: Quality Control Criteria Source: (Project Management Docs.com. Retrieved April 22, 2019)

Project Deliverable	Deliverable Quality Standards/ Completeness and Correctness Criteria	Quality Control Activity	Frequency/Int erval
Feasibility Study	QC1. Conforms to expert commentary regarding clarity and conciseness (95%)	Checking of drawing Checking of calculation compliance with regulatory and code requirements	During project initiation
Project Charter – Business case	QC2. Aligned with industry best practices (90%)	Project Management Institute alignment per Project Management Book of Knowledge, 6 th edition	During Overall framework design
Project Management Plans/Project plans	QC3. Aligned with industry best practices (90%)	Project Management Institute alignment per Project Management Book of Knowledge, 6 th edition	Weekly by topic
Preliminary Design Report	QC4. Meets the needs of stakeholders and design specification. (95%)	Checking of Drawings To be checked in accordance with established standards (e.g. Highway Design Manual and local standards).	Once during initial design

Project Deliverable	Deliverable Quality Standards/ Completeness and Correctness Criteria	Quality Control Activity	Frequency/Int erval	
Final Design Report	QC5. Meets design specification as set out in the TOR criteria (90%)	Checking of Calculations Checking of Drawings To be checked in accordance with established standards (e.g. Highway Design Manual and local standards).	Once during plan design	
Bidding/ Contract Documents	QC6. Meets standards as set out in Procurement Act 2003.	Review for compliance with procurement law	Once prior to commencement	
Asphaltic Concrete highway	QC7. Design & Maintenance Specification (100%)	Determination of Moisture Content Determination of Atterberg Limits Particle Size Distribution Compaction test California Bearing Ratio (CBR) Test Dynamic Cone Penetrometer (DCP) Test Density and Absorption Tests	Weekly Testing during roadworks	
Prestressed concrete Bridges	QC8. Design & Maintenance Specification (100%)	Compressive Strength Slump Tests	Weekly Testing during construction	
Reinforced concrete drains	QC9. Design & Maintenance Specification (100%)	Compressive Strength Slump Tests	Weekly Testing during construction	
Traffic Signs and Road Markings	QC10. Structured traffic standards (100%)	Delivery consultation by training provider	Once during installation	
Final project Report	QC12. Meets contractual requirement (100%).	Manager & Team review Sponsor review	Once prior to close out	

4.5.1.5.1 Inspection

Initial Inspections are performed at the beginning of any Definable Feature of Work and must be repeated if the required standard of work is not being met.

Follow-Up Inspections are performed daily to ensure that the control established during Preparatory Meeting and Initial Inspection continues to provide a product that conforms to the contractual requirements.

4.5.1.5.2 Testing

A list of tests required to verify that control measures are adequate are delineated in the specifications.

Failing tests are cleared by one of the following methods:

- 1. Retest Retest if there is any doubt that the first test was not adequate.
- 2. Rework Re-inspect and re-test.
- 3. Failed Material Remove, replace, re-inspect and re-test.

4.5.1.6 QUALITY MANAGEMENT ROLES AND RESPONSIBILITIES

Quality control begins with assigning the most appropriate person to each task. Each member of the team should be responsible for controlling the quality of the product. The qualifications of the team members overseeing and doing the work should be identified. All team members should be in constant communication with the each other and the Project Manager in regard to project status, schedule, and any issues that might arise during the construction of the Georgetown to Lethem Road.

The duties and responsibilities of each of the project members in coordinating and guiding the project efforts are described below:

- Sponsor/ MoF Responsible for allocation of resources and monitoring of the project to ensure adherence to the project objectives, schedule, budget, approvals, and ensuring that the QC/QA plan is in place and being implemented. Provides periodic audits of technical work and performance of respective staff.
- MoPI Project Manager Responsible for Independent Quality Control.
- **Contractor Project Managers** Responsible for completion of project scope and tasks, and adherence to project schedule and budget, including QA/QC program.

The Project Managers allocate resources to various elements of the work, establish and implement the Quality Management Plan, schedule the various activities and adjust plans as the work progresses to identify potential problem areas and resolve them in a timely manner. Responsible for technical review and approval of project documents before issuance to the reviewing agency; certifies that each submittal has been prepared and checked in accordance with MoPI standards, policies, and procedures, sound engineering practices and represents a quality product; and maintains frequent contact and communication with the Consultant/ Project Manager to assure satisfaction with the progress and performance.

- Consultant/ Project Manager The Consultant Project Manager reviews and monitors the implementation of the QA/QC practices and processes and ensures consistency with Caltrans standards, policies, and procedures. The Consultant Project Manager identifies the quality control actions required to be taken, the resources to be applied to these quality control actions, and interaction of these activities with the other elements of work. In this process, it is essential that the Consultant Project Manager clearly identify the personnel involved and their duties; allocate time, effort, and resources to the quality control function; and reviews and revises the allocated resources appropriately as the work progresses. The Consultant Project Manager is responsible for production of the execution of the Quality Management Plan. The Consultant Project Manager reports administratively to the Project Managers and works closely with them in the early identification and resolution of any product deficiencies. This includes but is not limited to:
 - Perform periodic reviews of quality control documentation;
 - Identification and control of nonconforming conditions
- **Technical Staff** Technical staff are held accountable by their Consultant Project Manager for the quality of the work produced within their respective disciplines. In this capacity, technical staff establishes operating guidelines and areas of responsibility within the activity; monitors the work periodically to assure adherence to the contract scope of services and to the established reviewing

procedures to ensure consistency with MoPI standards, policies, and procedures, advises the Consultant Project Manager regarding the progress of work and of any circumstances that may require particular attention; reviews work prior to submittal to the Project Managers for quality control review; resolves QC review comments; insures comments are incorporated into the final document and reviews completed work before it is transmitted to the Project Managers for approval and submittal to the reviewing agencies.

4.5.1.7 QUALITY CONTROL REPORTING PLAN

Quality was managed rigorously but informally during early Phase of the project. As the project progress quality will be manage according to this quality management plan. The project manager will monitor quality and report exceptions to the project coordinator and sponsor.

The following log will be use to itemize, document and track to closure items reported through quality management activities.

Exception ID Number	Review Date	Deliverable Reviewed	Findings	Resolution	Resolution Date
QC-Exc-1					
QC-Exc-2					

Quality Control Log

4.5.1.8 ACCEPTANCE

Approved by:

Date: _____

<Name of Approver> Georgetown to Lethem Road Construction – Project Plan

Figure 25 Georgetown to Lethem Road Quality Management Plan. Adapted from *Project Management Docs*. Retrieved April 22, 2019 from http://www.projectmanagementdocs.com/template/Quality-Management-Plan.doc

4.6 PROJECT RESOURCE MANAGEMENT

Resource planning and management is one of the most important ingredients for competitiveness and profitability in today's construction industry. (Fadi A. Karaa and Anas Y. Nasr, 1986). In the Georgetown to Lethem Road Construction Project Cost Management is considered critical to success of the project and should be controlled by utilizing equipment and labor in the most efficient way possible. This is achieved by minimizing the total cost of resources through the efficient use of equipment, people, materials, knowledge and time.

The Resource Management Plan is therefore an important guide for the effective management of scarce resources. The Project Charter, Quality Management Plan, Scope Baseline, Project Documents, Enterprise Environmental Factors, and Organizational Process Assets were the main inputs into the creation of the plan. In addition, expert judgement data presentation and meetings were the tools and techniques utilized to identify the resources required, the roles and responsibilities on high level.

Given the project is still in the planning stages the project manager does not have all the information necessary for resources assigned to the project to plan in detailed. Historical information or industry standards are used to provide a higher degree of confidence in estimates, when available.

It is expected that during construction as more information becomes available indicating the types and duration of resources necessary these will be planned in detailed warranting changes within the project schedule and resource plan. Therefore, resource management and planning should continue throughout the project life cycle.

4.6.1 RESOURCE MANAGEMENT PLAN

Georgetown to Lethem Road Construction – Project Plan.

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4.6.1.1 INTRODUCTION

The purpose of the Georgetown to Lethem Road Construction Resource Management Plan is to achieve project success by ensuring the appropriate physical resources and team resources with the necessary skills are acquired, and trained if any gaps in skills are identified, team building strategies are clearly defined, and team activities are effectively managed. If used effectively, this plan will serve as a tool to aid in the management of physical and team resource activities throughout the project lifecycle until closure. This plan includes information regarding the following topics:

- Roles and responsibilities of team members throughout the project
- Project organization charts
- Staffing management plan to include:
 - How resources will be acquired
 - Timeline for resources/skill sets
 - Training required to develop skills
 - How performance reviews will be conducted
 - Recognition and rewards system

The resource plan was created utilizing the project schedule that was detailed in the schedule management plan for the information known, and the types of resources needed for each task. It is expected that as the project progresses single task owner will be assigned to each task.

4.6.1.2 PROJECT TEAM ROLES AND RESPONSIBILITIES

The roles and responsibilities for the Georgetown to Lethem Road Construction Project are essential to project success. All team members must clearly understand their roles and responsibilities in order to successfully perform their portion of the project. Listed below are the roles and responsibilities for the Georgetown to Lethem Road project team resources:

- **Project Manager (PM):** responsible for the overall success of the Georgetown to Lethem Road Construction Project. The PM will be responsible for reporting project status in accordance with the communications management plan. The PM will evaluate the performance of all project team members and communicate their performance to functional managers. The PM is also responsible for acquiring human resources for the project through coordination with functional managers.
- **Project Team (PT):** responsible for gathering of requirements for the design and construction of various aspects of the road construction Project. PT's performance will be managed by the PM.
- **Training Lead (TL):** The TL is responsible for training all key stakeholders on design, construction and the proper maintenance of the roadway. The TL will coordinate training times/locations with each department's training advocate. The TL will provide training status to the PM in accordance with the project communications management plan.
- Functional Managers (FM): While not part of the project team, functional managers are part of the MoPI and are responsible for providing resources for the project in accordance with the project staffing plan. For example, the Human Resource managers is responsible for working with the PM to determine skill sets required and approving resource assignments and conducting performance appraisals of assigned resources based, in part, on the PM's feedback regarding project performance.
- Specialist Engineer (SE): Manages day-to-day activities of technical staff who are engaged in the technical management aspects of the project. Leads in the technical disciplines of the project, unlike the Project Coordinator and Project Manager who will focus on the overall project management of the project. Partners with other departments in Ministry of Public Infrastructure to acquire appropriate technical assistance for such areas as design, surveying, GIS, and testing. Provides leadership and support to technical staff that are augmented to the project throughout the project life cycle.

4.6.1.3 PROJECT ORGANIZATION CHARTS

The following RACI chart shows the relationship between project tasks and team members. Any proposed changes to project responsibilities must be reviewed and approved by the Project Manager. Changes will be proposed in accordance with the project's change control process. As changes are made, all project documents will be updated and redistributed accordingly.

Chart 12: RACI Chart Source: (Compiled by author)

Roles	Project Sponsor	Project Coordinator	Project Manager	Training Lead	Specialist Engineer	Functional Manager	Project Team	Steering Committee
Requirement Gathering	A	R	R	Ι	С	С	Ι	Ι
Road Design	С	А	А	Ι	R	С	Ι	Ι
Project Charter	А	R	R	Ι	Ι	Ι		А
Project Communication	Ι	А	R	Ι	Ι	Ι	Ι	Ι
Management Plans	Ι	А	R	Ι	С	Ι	Ι	С
Roadworks	Ι	А	А	Ι	R	R	Ι	С
Contracts	С	А	А	Ι	С	R	Ι	С
Project Scope	С	А	R	Ι	С	Ι	С	С
Permits & Approval	Ι	А	А	Ι	Ι	Ι	R	С
Change requests	А	А	R	Ι	Ι	Ι	А	С
Training	Ι	А	Α	R	Ι	Ι	Ι	Ι
Status Report	Ι	А	R	Ι	Ι	Ι	Ι	Ι

Key:

R – Responsible for completing the work

A – Accountable for ensuring task completion/sign off

C – Consulted before any decisions are made

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

4.6.1.4 STAFFING MANAGEMENT

Day-to-day management of the project management staff for Georgetown to Lethem Road Construction is the responsibility of the Project Coordinator. The Project Manager/Consultant Team Lead is responsible for managing the activities of the site engineers and clerk of works and other project staff assign to supervise the road construction. The road works Manager will be responsible for managing the day to day work program of the road works staff.

• Staff Acquisition

The Project Coordinator, with support from the Project Sponsor, will negotiate with functional and department managers to identify and assign resources in accordance with the project organizational structure approved in the project charter. The first phase will entail the assignment of project manager. This plan shall also identify various external sourcing mechanisms to hire new project resources. All resources and their anticipated project assignment timeframe must be approved by the appropriate functional/department manager before the resource may begin any project work. The project team must be co-located at the site office provided by the works contractor.

Resource Calendars

The Georgetown to Lethem Road Project will last for 5 years. The chart below provides an estimate of the number of resources required per month for the project. A sample resource calendar is located (Appendix 6).

Vendor/State Partnering Approach

For the Georgetown to Lethem Road Construction Project, the team will implement a model in which the Ministry of Public Infrastructure management (agency) management team is expected to work side by side with the consultants to supervise the works contractor/ subcontractors to deliver the project. This partnership will facilitate the training and knowledge transfer process to prepare the agency management team to operationalize, own, and maintain the infrastructure developed.

Though the supervising consultants are important and are used to implement project deliverables, the Ministry of Public Infrastructure (MoPI) has responsibility for overall review and approval for the quality of works produced by the contractors. Additionally, knowledge transfer of consultancy expertise to MoPI staff is required on all project phases throughout the project lifecycle, rather than waiting to transition information at the end of a project.

4.6.1.5 PROJECT TEAM TRAINING

• Staff Training

When new staff joins the project, the Project Manager will provide a project orientation. The orientation should include discussions related to the following topics:

- Background of the Project
- Current Status of the Project
- Specific Job Duties and Expectations
- Introduction to the Staff and Consultants
- Overview of the Facility and Infrastructure
- Overview of the Project Processes, including time reporting, attendance, and status meetings

• Performance Reviews

The project manager will review each team member's assigned work activities at the onset of the project and communicate all expectations of work to be performed. The project manager will then evaluate each team member throughout the project to evaluate their performance and how effectively they are completing their assigned work. Prior to releasing project resources, the project manager will meet with the appropriate functional manager and provide feedback on employee project performance. The functional managers will then perform a formal performance review on each team member.

• Recognition and Rewards

Although the scope of this project does not allow for monetary rewards, there are several planned recognition and reward items for project team members. The Project Coordinator will with appropriate agency staff to identify potential opportunities for recognition and rewards.

Suggested Rewards:

- Upon successful completion of the Project, Staff Celebration Party.

- Upon successful completion of the project, any team member who satisfactorily completed all assigned work packages on time will receive a certificate of thanks from the Sponsor.

4.6.1.6 ACCEPTANCE

Approved by:

Date: _____

<Approvers Name> [Project Name] Executive Sponsor

Date: _____

<Approvers Name> [Project Name] Project Director/Manager

Figure 26: Georgetown to Lethem Road Resource Management Plan. Adapted from Tennessee Business Solutions Methodology (TBSM). Retrieved May 20, 2019 from https://www.projectmanagementdocs.com/template/project-planning/resource-management-plan/#ixzz5oqdrl9C1

4.7 PROJECT COMMUNICATIONS MANAGEMENT

Georgetown to Lethem Road Construction – Project Plan

To ensure that information is communicated effectively to meet the needs of the various stakeholders at the correct time throughout the life of the project, this Communications Management Plan, was developed using the *PMBOK Guide* Sixth Edition. It involves developing a strategy based on both the needs of the project and the project's stakeholders. From that strategy this communication s management plan is developed to ensure that the appropriate messages are communicated to stakeholders in various formats and various means as defined by the communication strategy (Project Management Institute, 2017, p. 362).

4.7.1 COMMUNICATIONS MANAGEMENT PLAN Georgetown to Lethem Road Construction – Project Plan

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APPENDIX 5 – (SAMPLE) COMMUNICATION MATRIX APPENDIX 6 – DELIVERY VEHICLES & MEDIA APPENDIX 7 - GUIDELINES FOR MEETINGS APPENDIX 8 - PROJECT TEAM DIRECTORY

4.71 INTRODUCTION

This Communications Management Plan serves as a guide for communications throughout the life of the Georgetown to Lethem Road Construction project and will be updated as communication needs change. It identifies and defines the stakeholders of the projects with whom it is critical to communicate. The purpose of this communication management plan is simply to ensure that all formal communications with the project stakeholders are managed properly. This communications plan is essential for the proper management of the Georgetown to Lethem Road Construction Project, ensuring its objectives are achieved in a timely manner with financial prudence whilst attaining user acceptance.

4.7.2 COMMUNICATIONS MANAGEMENT APPROACH AND CONSTRAINTS

The communication matrix will serve as the guide for all project communications. The project manager will work with the communication owner to verify the communication is complete and make updates to the plan. The communications specialist will assist the

communication representative in disseminating required information. Changes to the communication plan- including frequency, objective, and owner for planned communications and additions to the communications plan will be reviewed with the project executive sponsors at the monthly status update meetings. Updates to the plan will be distributed to stakeholders as needed. Individual communications to stakeholders or stakeholder groups to complete deliverables within the project plan will not be recorded in the project communication plan.

4.7.3 STAKEHOLDER COMMUNICATION REQUIREMENTS

As part of identifying all project stakeholders, the project manager will communicate with each stakeholder in order to determine their preferred frequency and method of communication. This feedback will be maintained by the project manager in the project's Stakeholder Register. The stakeholder register is used to define the communications requirements.

Each stakeholder or stakeholder group was identified along with their project requirements, expectations and communications goal. The communication goal was determined by understanding their level of power on the project and level of interest in the project. Based on the scores, the stakeholder is aligned with one of four goals for communications: Keep Satisfied, Monitor, Manage Closely and Keep Informed. The communications mechanism and content will align with the goals and expectations for each stakeholder. See the Stakeholder Register for the breakdown (UW Stevens Point, 2017).

Standard project communications will occur in accordance with the Communication Matrix; however, depending on the identified stakeholder communication requirements, individual communication is acceptable and within the constraints outlined for this project. In addition to identifying communication preferences, stakeholder communication requirements must identify the project's communication channels and ensure that stakeholders have access to these channels. The project manager and communications specialist will ensure the stakeholders have access to the communication channels identified. Once all stakeholders have been identified and communication requirements are established, the project team will maintain this information in the project's Stakeholder

Register and use this, along with the project communication matrix as the basis for all communications.

			Communication			
Role	Description	Communication	Responsibilities	Name/Group		
		Needs				
Project Team Stakeholders						
Sponsor	Champions the project; provides high level vision	Thorough understanding of Project Charter and Project Management Plan	and direction for key communication strategies	MoF/Bank		
		Up-to-date Project Status Project Risks and Responses Project issues and obstacles	Communicates business vision			
		Sponsorship-specific communications tactics/techniques	high-level issue resolution decisions			
		Communications should be presented in summary format unless the Project Sponsor requests more detailed communications	Approves and/or delivers strategic project communications			
Project Coordinator	The Project Coordinator owns and drives the solution delivery process. He/she mobilizes and uses the project team to complete the project successfully. This role is responsible and accountable for the overall	Business vision from Executive Sponsor Immediate notice of business decisions, policy changes, etc. that could impact execution of the project Status from project team leadership Communication initiatives, artifacts, review and approval processes	Communicates project progress and directions to the Sponsors ensure careful documentation of all meetings and be responsible for editing and ensuring consistency in project communication.	MoPI		

Chart 13: High-level Stakeholder Communications Requirements Source: (Compiled by author)
Role	Description	Communication Needs	Communication Responsibilities	Name/Group
		Project Team St	akeholders	
	planning,		They will also	
	execution and		provide leader	
	control of the		talking points for	
	project,		critical updates to	
	communication		Agency employees	
	communication.		regarding project	
			progress.	
	I	Project Team Stakehol	der	I
Project	The Program	The Program Manager	Oversees the	Consultant
Manager	Manager	is responsible for	implementation of	
	oversees the	overall program costs	the project on a	
	project at the	and profitability as	daily basis,	
	and owns most	detailed	working with the	
	of the resources	communications than	project team to	
	assigned to the	the Project Sponsor.	ensure consistent	
	project.		communication.	
			Perponsible for	
			clear timely	
			documented	
			correct	
			communication	
			with project teem	
			and executive	
			loodorship	
			leadership	
			Provides feedback	
			to project team	
			members.	
Key	Stakeholders	Project progress	Reads	Steering
Stakeholders	includes all	updates	communications	Committee,
	individuals and		and performs tasks	Project Team,
	organizations	Benefits of new system	accordingly.	Customers,
	who are	System		Technical lead
	can impact the	implementation dates		
	project.	implementation dates		
	r -J	Training dates		
	These are the			
	stakeholders			
	with whom we			

Role	Description	Communication Needs	Communication Responsibilities	Name/Group
		Project Team St	akenolaers	
	need to communicate with and are not included in the other roles defined in this section.			

4.7.4 COMMUNICATIONS ASSESSMENT & ANALYSIS

• Communications Matrix

The Georgetown to Lethem Road Construction Communication Management Plan includes an assessment and analysis of the Agency's existing communications that impact the project's stakeholder populations. The result of this assessment and analysis is recorded in the Communication Matrix (Appendix 7), along with a numerical rating of the effectiveness of each communication item based on feedback from Agency personnel. This rating allows the Georgetown to Lethem Road Construction project team to take advantage of existing Agency communication vehicles for project-related communication.

The analysis of the Ministry of Public Infrastructure communications found that communications are delivered mainly orally and are documented in some cases. However, there is no one person dedicated to ensuring Agency-wide communication is effective. It usually up to the department heads and functional managers to ensure that the employee in their departments receive the information on the lower level. Often these leaders, managers and supervisors forget to share the information or fail to provide context for the message due to their own workloads.

To help the MOPI leaders disseminate information about the project more effectively, the Georgetown to Lethem Road Construction Project Coordinator will ensure careful documentation of all meetings and be responsible for editing and ensuring consistency in project communication. They will also provide leader talking points for critical updates to Agency employees regarding project progress. The analysis of current Agency communications also found that the Agency leader meetings, WhatsApp group and the Agency's intranet site were the most effective as delivery vehicles for disseminating

messages that invite positive action and behavior. The Georgetown to Lethem Road Construction Project will take advantage of these methods to disseminate project-related information.

It was also determined that the Georgetown to Lethem Road Construction Project communication needs will also require development of new communication vehicles to ensure that critical project-related messaging reaches the appropriate stakeholder groups. As the project identifies and creates these vehicles, they will be added to the Communication Matrix (Appendix 8).

4.7.5 COMMUNICATION METHODS AND TECHNOLOGIES

The communication methods are based on several factors: stakeholder communication requirements, available technologies, and organizational standards. All project communication will be maintained as agreed to in this plan. There will be an approval process for communications distributed to the broad group of stakeholders or any communications posted to large audiences (email, website, other). Tactical or activity-based communications may require review depending on the content. If the communication content is noteworthy, controversial or breaking news, then the Project Manager and Project Coordinator will assess and determine the level of review needed. All normal project communications for status and deliverable follow-up do not need the review.

• Common methods of communication on the project will be:

Website with general project information, status updates, project documents (including deliverables) and decisions

- Email for status updates, deliverable updates and task follow-up/completion
- Project management/activity tracking software Microsoft Teams
- Meetings this includes using the standard meetings for various groups for project updates and project meetings that are schedule to complete the work of the project. This can include face to face and web conference meetings
- Chat- informal conversations and phone calls for individual discussions. If there are significant findings during the call or chat that could impact the project, the details should be recorded in the appropriate project location
- Face to Face informational meetings on campus for faculty, staff, and students

4.7.6 COMMUNICATION STANDARDS

Approved Templates and other artifacts for Georgetown to Lethem Road Project stakeholder communications:

- logo
- email signature
- MS Word Document template
- MS PowerPoint Slide design template
- Share Drive and file naming conventions
- Intranet Site (internal to project team)
- Intranet Site (external stakeholders)

4.7.7 GUIDELINES FOR MEETINGS

Included in this resource plan is a template to help project team members conduct and participate in project meetings (Appendix 9).

4.7.8 PROJECT TEAM DIRECTORY

Project Team directory will be tied to the email system at the organization so that information is continually up-to-date as changes are made via the already-existing email system administration function. This information should be available, via a link, on the Project Team intranet site. Included in this resource plan is a template to help project team members conduct and participate in project meetings (Appendix 10).

4.7.9 ACCEPTANCE

Approved by:

Date: _____

<Approvers Name>

[[]Project Name] Executive Sponsor

Figure 27: Georgetown to Lethem Road Communication Management Plan. Adapted from project management docs. Retrieved May 20, 2019 from https://www.projectmanagmentdocs.com/

4.8 PROJECT RISK MANAGEMENT

Georgetown to Lethem Road Construction - Project Plan

Research has shown that well-designed risk management plans can decrease problems encountered on a project by as much as 90 percent (Amanda Dcosta, 2019). According the PMBOK a risk is any uncertain event or condition that might affect your project. Not all risks are negative. Some events or conditions can help your project and is referred as an opportunity, but it's still handled just like a risk. The Georgetown to Lethem Road construction project plan therefore follows a combination of project management methodology, and risk management process as described in the PMBOK Guided Seventh Edition in order to effectively diminishing unexpected project risks.

Risk management planning was completed early during the Georgetown to Lethem Road Construction project planning stage since it is considered crucial to successfully performing the other project management phases. The risk management plan identifies and establishes the activities of risk management for the Georgetown to Lethem Road Construction project in the project plan. It involved assemble of various reports, project documents, through various departments and also from prior project reports to identify all possible project risks. High level risks recorded in the project scope were all documented in the Risk Register.

4.8.1 RISK MANAGEMENT PLAN

Georgetown to Lethem Road Construction - Project Plan

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4.8.1.5 Risk Assessment
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4.8.1.7 Risk Monitoring, Controlling, And Reporting
4.8.1.8 Acceptance

4.8.1.1. INTRODUCTION

A risk is an event or condition that, if it occurs, could have a positive or negative effect on a project's objectives. The purpose of the Risk Management Plan for Georgetown to Lethem Road Construction Project is to establish the framework in which the project team will identify risks and develop strategies to mitigate or avoid those risks. This plan also defines how risks associated with the project will be recorded and monitored throughout the lifecycle of the project.

4.8.1.2. RISK MANAGEMENT APPROACH

The basic Risk Management approach for the Georgetown to Lethem Road Construction Project is to identify critical risks and take necessary action before issues arise that impact project objectives. The Ministry of Public Infrastructure has hired a design and supervising consultant to assist in identifying and quantifying project risk using probabilistic techniques, and then choosing delivery and contracting strategies that can best control and mitigate these risks. The processes would include risk *identification, assessment, analysis, mitigation, allocation, and monitoring and updating.* Risk information identified by the project team will be entered into the Risk Register. The Project Manager will maintain the Risk Register, and Risk information will be a principal topic in all the status meetings.

New risks will be reviewed to determine if mitigation action is required. The most likely and highest impact risks will be added to the project plan to ensure that the assigned risk managers take the necessary steps to implement the mitigation response at the appropriate time during the project. Upon completion of the project, during the closing process, the Project Manager will analyze each risk and review the risk management process. Based on this analysis, the Project Manager will identify any improvements that can be made to the risk management process for future projects. These improvements will be captured as part of the lessons learned knowledge base (TBSM, 2019).

4.8.1.3 ROLES AND RESPONSIBILITIES

The table below provides an overview of the Roles & Responsibilities for the Georgetown to Lethem Road Construction Project Risk Management activities.

Table 11: Roles and ResponsibilitySource: (Compiled by author)

Role	Responsibilities		
Project Manager	• Chairs the risk assessment meetings		
	• Coordinates with Risk Managers to determine if the risk is unique		
	• Identifies risk interdependencies across projects and verifies if risk is internal or external to project		
	• Assigns risk classification and tracking number		
	• Continually monitors the projects for potential risks throughout the project lifecycle		
	• Analyzes any new risks that are identified and add these items to the Risk Register		
Risk Manager	• Coordinates with the Senior Project Director to identify the risks, the dependencies of the risk within the project, and the context and consequence of the risk		
	• Determines the impact, timing, and priority of the risk		
	• Formulates the risk statements		
	• Monitors and controls risk that have been identified		
	• Reviews and updates the top ten risk list [timeframe, as needed, every two weeks, etc.]		
	• Escalates issues & problems to management		
Risk Owners	• Determines which risks require mitigation and contingency plans		
	• Generates the risk mitigation and contingency strategies and performs a cost benefit analysis of the proposed strategies		
	• Monitors, controls, and updates the status of the risk throughout the project lifecycle		
	• Aids in the development of the risk response and risk trigger		
	• Carries out the execution of the risk response, if a risk event occurs		
	• Participates in the review, re-evaluation, and modification of the probability and impact for each risk item on a weekly basis		
	• Identifies and participates in the analysis of any new risks that occur		
	• Escalates issues/problems to PM that significantly impact the projects triple constraint or trigger another risk event to occur		
	• Highlights risks that require action prior to the next weekly review		
	• Identifies and escalates risks where strategy is not effective or productive (causing the need to execute the contingency plan)		

Role	Responsibilities
Other Key Stakeholders	• Assists in identifying and determining the context, consequence, impact, timing, and priority of the risk

4.8.1.4 RISK IDENTIFICATION

The objectives of risk identification are to (1) identify and categorize risks that could affect the project and (2) document these risks. The outcome of risk identification is a list of risks. Risk identification begin with an examination of issues and concerns created by the project development team. These issues and concerns can be derived from an examination of the project description, work breakdown structure, cost, estimate, design and construction schedule.

The following methods will be used to assist in the identification of risks associated with Georgetown to Lethem Road Construction Project:

- Expert Interviews
- Risk Assessment Meetings
- Historical Reviews of Similar Projects
- Brainstorming
- Interviewing
- SWOT (Strengths, Weaknesses, Opportunities and Threats)
- Diagramming

The Risk Register will be updated as needed. High level Risk sources have been classified according to project phases for potential risks and include:

• Risk Breakdown Structure (RBS)

A risk breakdown structure organizes the risks that have been identified into categories using a table with increasing levels of detail to the right. The RBS is therefore a hierarchical structure of potential risk sources. The RBS is an invaluable aid to understanding the risks faced by the project. The RBS can be used to structure and guide the risk management process. Below is the RBS for this project.

Table 12: Risk Breakdown Structure (RBS)

Source: (compiled by author)

Risk Code	Risk Type	Level 1	Level 2
1	Concept - Planning	I. Uncertain political and public support	Failure to gain public trust
2	Development	I. Changes in design requirements II. Technical uncertainties Errors or omissions in quantities, inaccurate unit prices	New Stakeholders requirements. Lack of Review of preliminary design
3	Implementation	I. Implementation delays	Failure to recruit and assign persons with qualifications and experience suitable for the project management position
		II. Design change III. Additional design and planning work	Design review Additional stakeholder requirements
4	Political/funding	 I. Timely availability of counterpart funding II. Inability to spend within required timescale III. Reduction in overall sponsor funding will result in shortfall 	Insufficient funding Slow Project Execution Insufficient funding
		IV. Increased Construction Cost V. Delay in securing funding	Increase scope Failure to meet Disbursement Requirement
5	Property acquisition	 I. Delays in acquiring property II. Lack of alternative accommodation for Vendors 	Court Challenge Non -availability of suitable land for relocation
6	Statutory	I. Processing of Environmental and other Construction permit aligned to construction programme	Non-compliance with statutory requirements
7	Utilities and services	I. Utility relocation delaying road works	Lack of Coordination
8	Health and safety performance	I. Accident or injury to site personnel causes delay or claims	Poor Safety Practice by workers

		II. Accident or injury to	Poor Safety Procedure
		general public - either	
		pedestrian or through road	
0	Adverse weather	I Suspension of Works	Inadequate flood protection to
,	Auverse weather	during heavy rainfall	finished works
		II. Storm water Flooding	Excessive settlement. climate
			change, culvert requirements
			extensive to those assumed in
			the design
10	Quality failure	I. Poor quality materials -	Lack of Technical
		delay due to rejection of	Specification
		materials	
		II. Poor quality workmanship	Lack of Technical
			Specification
11	Environmental	I. Noise complaints and	Equipment Operation
		general dissatisfaction from	
		II Dust complaints and	Equipment Operation
		general dissatisfaction from	
		stakeholders	
		III. Vibration complaints and	Equipment Operation
		general dissatisfaction from	
10		stakeholders	
12	Operational	I. Poor Maintenance	Insufficient funding
		II. Vehicle Weight Control	The creation of structures
		of-Way	within the right-of-way of
		of way	public roads contributes to
			congestion
		IV Road use behaviors and	Failure to use pedestrian and
		enforcement	bicycle facilities to be
			constructed
		V. Premature pavement failure	Poor Pavement Design
		during operation.	
		VI. Damage / disruption to	Poor co-ordination of works,
		nignway network due to	poor quality
		companies	
		VII. Decrease in customer	Continued deterioration of the
		satisfaction	highway network.

4.8.1.5 RISK ASSESSMENT:

Once risks have been identified, they must be assessed for potential severity of loss and probability of occurrence. This is why, in the assessment process is critical to make the best guesses possible in order to properly prioritize.

Source. Adapted from Kisk Assessment Methodologies and Procedures, ita 2004.			
OBJECTIVES FOR RISK	EXPECTED OUTCOMES		
ASSESSMENT			
 Identify implementation challenges— 	 Better understanding of environmental, 		
political, public acceptance, approvals	engineering, and construction issues facing		
 Establish order of magnitude costs by 	each project alternative.		
option	 Order of magnitude risk costs and possible 		
 Identify major design and construction 	total cost range for each option		
risks			
 Identification, quantification, and 	 List of major project risks 		
likelihood of major scope, budget, and	Reasonable estimate of risk costs and		
schedule risks for all major project	probable total project costs and duration.		
components	 Long list of risk mitigation strategies 		
 General definition of and total probable 	 Preliminary risk management plan, 		
project costs	focused on design and constructability risks		
 Risks of alternative design concepts, 	 Preliminary risk allocation planning 		
procurement methods			
■ Identification, quantification, and	■ List of major critical risks, prioritization		
likelihood of all identifiable scope, budget,	of risks based on impacts to total project		
and schedule risks for all project	cost and duration.		
components	 Estimate of risk costs and probable total 		
 Detailed definition of base costs, risk 	project costs and duration.		
costs, and total probable project costs	 Costs/benefits of risk mitigation and risk 		
■ Validation of reasonableness of	allocation strategies.		
contingencies in project budget and	Risk management and allocation plan		
schedule.			

Chart 14: Objectives of Risk Assessment

Source: Adapted from Risk Assessment Methodologies and Procedures. fta 2004.

 Targeted assessment of construction 	 Analysis of specific problems
problems, causes, and potential cost/	■ Costs/benefits of possible corrective
schedule impacts.	actions.
 Identification and systematic evaluation of 	■ Corrective action plan that will allow
possible corrective actions.	project sponsors/owners to maintain (or
	recover) schedule and avoid cost overruns.

• Risk Prioritization & Categorization

After the potential risks have been identified, the project team then evaluates each risk based on the probability that a risk event will occur. The potential loss associated with the probability of a risk is the next step in the risk management process.

In order to determine the severity of the risks identified by the team, a probability and impact factor will be assigned to each risk. This process will allow the Project Manager to prioritize risks based upon the potential impact to the project.

The probability and impact of occurrence for each identified risk will be assessed by the Project Manager and Risk Manager, with input from the project team using the following approach:

Probability

- ✓ High Between 66.7% and 100% probability of occurrence
- ✓ Medium Between 33.3% and 66.7% probability of occurrence

✓ Low – Below 33.3% probability of occurrence

Impact

- ✓ High Risk that has the potential to greatly impact project cost, project schedule or performance (3)
- ✓ Medium Risk that has the potential to slightly impact project cost, project schedule or performance (2)
- \checkmark Low Risk that has relatively little impact on cost, schedule or performance (1)



PROBABILITY AND IMPACT MATRIX

Considering the RBS, the risks to be taken into account with their respective probability and impact are as follows:

Fable 13: Impact and	Probability values.	Source (co	ompiled by	author)
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Risk Code	Risk Detail	Impact	Probability
1.1	Uncertain political and Public Support	3	2
2.1	Changes in design requirements	3	3
2.2	Technical uncertainties Errors or omissions in quantities, inaccurate unit prices	3	2
3.3	Implementation Delays	3	3
3.4	Design Changes	3	2
3.5	Additional Design and Planning Work	3	3
4.1	Timely availability of counterpart funding	3	2
4.2	Inability to spend within required timescale	2	2
4.3	Reduction in overall sponsor funding will result in shortfall	3	1
4.4	Increased Construction Cost	3	2
4.5	Delay in securing funding	3	2
5.1	Delays in acquiring property	2	3
5.2	Lack of alternative accommodation for Vendors	3	2
6.1	Processing of Environmental and other Construction permit aligned to construction programme	3	2
7.1	Utility relocation delaying road works		2
8.1	Accident or injury to site personnel causes delay or claims	3	2
8.2	Accident or injury to general public - either pedestrian or through road traffic accident	3	2
9.1	Suspension of Works during heavy rainfall	2	2
9.2	Stormwater Flooding	2	2
10.1	Poor quality materials - delay due to rejection of material	3	2
10.2	Poor quality workmanship	2	3
11.1	Noise complaints and general dissatisfaction from stakeholders	2	2
11.2	Dust complaints and general dissatisfaction from stakeholders	2	2
11.3	Vibration complaints and general dissatisfaction from stakeholders	2	1
12.1	Poor Maintenance	2	2
12.2	Vehicle Weight Control	2	2

12.3	Enforcement of the Right-of-Way	2	2
12.4	Road use behaviors and enforcement	2	2
12.5	Premature pavement failure during operation	3	3
12.6	Damage / disruption to highway network due to work by utility companies	2	1
12.7	Decrease in customer satisfaction	2	2

The representation of the risks listed above in the Probability and Impact Matrix would be as follows:

PROBABILITY			
	1	2	3
1		11.3, 12.6	4.3
1MPACT		4.1, 9.1, 9.2, 11.1, 12.1, 12.2, 12.3, 12.4, 12.7	3.2, 4.1, 4.4, 4.5, 5.2, 6.1, 8.1, 8.2, 10.1
3		1.1, 5.1, 10.2	1.2, 3.1, 3.3, 12.5

Chart 15: Probability and Impact Matrix

After risks are assigned a probability and impact, the Project Manager will move forward with risk response planning.

4.8.1.6 RISKS RESPONSE PLANNING

After the risk has been identified and evaluated, the project team develops a risk mitigation plan, which is a plan to reduce the impact of an unexpected event and to ensure that the risk will be addressed and managed appropriately.

For each major risk, one of the following approaches will be selected:

- Avoid Eliminate the threat or condition or avoid impact to the project objectives by eliminating the cause. The project plan may need to be altered to account for the risk avoidance. Avoidance may be achieved by changing scope, adding time, or adding resources.
- Mitigate Identify ways to reduce the probability or the impact of the risk. These steps may be costly and time-consuming but could be preferable to allowing the risk to go forward in an unmitigated state.
- Accept –The project team accepts that the risk exists and makes no change to the project plan to address the risk. No response strategy is identified.
- Contingency Define actions to be taken in response to risks.
- Transfer Shift the consequence and ownership of a risk by making another party responsible (buy insurance, outsourcing, etc.).

The Project Risk Manager will lead the project team in developing responses to each identified risk. As more risks are identified, they will be qualified, and the team will develop the response. These risks will also be added to the Risk Register and the project plan to ensure they are monitored at the appropriate times and are responded to accordingly. High level risk responses are outlined in the project charter.

4.8.1.7 RISK MONITORING, CONTROLLING, AND REPORTING

The Risk Register for Georgetown to Lethem Road Construction Project is a log of all identified risks, their probability and impact to the project, the category they belong to, mitigation strategy, and when the risk is estimated to occur. This register was created in the early planning phase of the project. Based on the identified risks and timeframes in the risk register, applicable risks will be added to the project plan.

The level of risk on Georgetown to Lethem Road Construction Project will be tracked, monitored, controlled and reported throughout the project lifecycle. The most likely and greatest impact risks will be added to the project schedule to ensure that proper monitoring occurs during the time of risk exposure. As risks are added to the project schedule, a Risk Manager will be assigned. Critical risks will also be assigned a risk owner(s) who will track, monitor, and control their assigned risks (TBSM, 2019).

Included in this risk plan is a risk register, see (Appendix 11).

4.8.1.8 ACCEPTANCE

Date: _____

<Approvers Name> [Project Name] Executive Sponsor

Date: _____

<Approvers Name> [Project Name] Project Manager

Figure 28 Georgetown to Lethem Road Resource Management Plan. Adapted from project management docs. Retrieved May 20, 2019 from https://www.projectmanagementdocs.com/

4.9 PROJECT PROCUREMENT MANAGEMENT

Georgetown to Lethem Road Construction - Project Plan

The construction of the Georgetown to Lethem Road will require the procurement of goods and services from vendors outside the organization in order to successfully execute project work. Project Procurement Management was therefore added as one of the project objectives to establish and maintain relationships with vendors of goods and services during the project life cycle. This process was conducted after Project Scope, Quality, Cost, Schedule and Resource Management and resulted in the development of the Procurement Management Plan and Strategy to be used during construction. The main source of information used as inputs into its development were PM templates, Charter, Project Management Plans, Requirements Documentation, Risk Register, Stakeholder Register, and Organizational Process Assets. The tools and techniques were expert judgement, Data Gathering, and meetings. Giving the project is still in the planning stages Bid documents will not be prepared as these will have to be informed by the acquisition needs of the project during execution, however high-level templates were produced to guide the process.

4.9.1 PROCUREMENT MANAGEMENT PLAN

Georgetown to Lethem Road Construction - Project Plan

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4.9.1.10 DECISION CRITERIA
4.9.1.11 VENDOR MANAGEMENT
4.9.1.12 ACCEPTANCE

4.9.1.1 INTRODUCTION

This Procurement Management Plan sets the procurement framework for the Georgetown to Lethem Road Construction Project. It will serve as a guide for managing the procurements throughout the life of the project and will be updated as acquisition needs change. This plan identifies and defines the items to be procured, the types of contracts to be used in support of this project, the contract approval process, and decision criteria. The first part, planning, involves the creation of the official procurement management plan and strategy. The decisions made involve which items will be internally procured and which items will be externally outsourced.

During the early planning phase, the high-level procurement needs of the project were identified will be further development during execution. For each external vendor requirement, the Terms of Reference should be prepared to serve as a written statement of what work the contractor will do. Procurement documents will consist of a Request for Proposal and Invitation to Bid. Additionally, the procedures used to solicit proposals and/or bids as well as the decision-making criteria are determined at this stage.

4.9.1.2 PROCUREMENT MANAGEMENT APPROACH

The Project Coordinator will provide oversight and management in collaboration with appropriate agency, procurement and management staff for all procurement activities under Georgetown to Lethem Road Project. The Project Manager will work with the project team to identify all items to be procured for the successful completion of the project. The Project Coordinator will then review the procurement list with the Project Steering Committee (PSC) for approval. The process involves determining whether to acquire outside support and, if so what to acquire, how to acquire it, how much is needed, and when to acquire it.

4.9.1.3 PROCUREMENT OVERVIEW

The first component to be procured will be engineering designs and supervising consultants as this component will also oversee the client's interest in the project by supervising the construction of the road works component. The road works construction component forms the largest element of the project and therefore has the largest staffing requirement, most of which will be subcontracted out by the main road works contractor.

4.9.1.4. ACQUISITION PLAN

• Human Resource

i. Internal

The Project Management team will be assigned by the Ministry of Public Infrastructure to coordinate the various project elements to safeguard the client's interest. The Ministry of Finance has responsibility for managing the overall project budget and is ultimately responsible for any approval of final project cost.

Ministry of Public Infrastructure	Number	Needed by
Project Coordinator	1	22/01/18
Project Manager	1	22/01/18
Project Engineer	2	22/10/18
Socio-environmental Officer	1	22/10/18
Monitor & Evaluation Officer (M&E)	1	22/10/18
Ministry of Finance		

 Table 14: Internal Project Resources. Source (compiled by author)

• Department of the Budget	1	22/01/18

ii. External

All External human resources are acquired through the procurement process. **Table 15: External Project Resources. Source (compiled by author)**

Engineering Services Component	Number	
Team Leader	1	24/10/18
Structural Engineer	1	24/10/18
Bridge Engineer	1	24/10/18
• QA/QC	2	24/10/18
Site Engineer	4	06/04/20
Road Works		
Project Manager	1	06/04/20
Structural Engineer	1	05/05/20
Bridge Engineer	1	05/10/20
Environmental Officer	1	06/04/20
• QA/QC	1	06/04/20
Project Engineer	4	06/04/20
Workers	200	06/04/20
Monitor and Evaluation (M & E)		
M&E Officer	1	

• Other Resource

The following procurement items and/or services have been determined to be essential for completion and success of Georgetown to Lethem Road Construction Project. The following list of items/services, justification, and timeline are pending and subject to review and approval project coordinator and sponsor.

Item/Service	Justification	Needed By
Vehicles	Needed for Transporting staff on	31/10/19
	construction site.	

 Table 16: Other Project Resources. Source (compiled by author)

Site Office	Needed for housing of the supervising	15/01/20
complete with	consultants and roadworks contractor.	
utilities		
Construction	Needed for building of the roadway,	20/03/23
Materials	drains, culvert, bridges, and road safety	
	item	
Construction	Hosting will be included or outsourced	20/03/23
Equipment		

• Make/Buy Decisions

The steps highlighted below provides a practical guide to the make-or-buy decision process methodology that the project manager can used to determine how to acquire resources for the Georgetown to Lethem road construction project. The make-or buy methodology is one of the most critical strategic decisions within logistics outsourcing and should be taken in a structured and consistent manner. The high-level steps are as follows:

- evaluate whether outsourcing is right for your company;
- determine exactly what functions to outsource and the performance expectations;
- determine the implications and costs
- use a well-defined professional selection process to evaluate and select which provider(s) are right for the job.





Figure 29: – **Financial element of "make-it" decision** Source: M. F. Greaver

Figure 30: – **Financial element of "buy-it" decision** Source: M. F. Greaver

4.9.1.5 TYPE OF CONTRACT TO BE USED

All items and services to be procured for Georgetown to Lethem Road Construction project will be solicited under firm-fixed price contracts. The project team will work with the Agency Fiscal Office and Procurement staff to define the item types, quantities, services and required delivery dates. The Procurement Manager will then solicit bids via Request for Proposal (RFP) and Invitation to Bid (ITB) from various vendors in order to procure the items within the required time frame and at a reasonable cost under the firm fixed price contract once the vendor is selected.

4.9.1.6 PROCUREMENT RISKS

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

- Unrealistic schedule and cost expectations for vendors
- Manufacturing capacity capabilities of vendors
- Conflicts with current contracts and vendor relationships
- Potential delays in shipping and impacts on cost and schedule
- Questionable past performance for vendors
- Potential that final product does not meet required specifications

4.9.1.7 PROCUREMENT RISK MANAGEMENT

Risk management is the processes involved in mitigating the possibility of unforeseen events adversely affecting the project objectives. The Georgetown to Lethem Road Construction Project procurement risks will be managed in accordance with the project's risk management plan. Additionally, any decisions regarding procurement actions must be approved by the project sponsor.

4.9.1.8 SELECTION PROCESS

• Sourcing Approach and Justification

Engineering and consultancy services will be obtained through International Competitive Bidding (ICB) procurement process. This will be done through Request for Proposals (RFP), Invitation to Bid (ITB) and other procurement method appropriate.

• Evaluation and Award

Bids and proposals will be evaluation based on satisfying the project components requirements such as, key personnel, equipment, and experience in carrying out the required works or services. Contract will then be awarded to the lowest responsive bidder of proposal.

• Contract Management

All contracts will be managed directly by the Ministry of Public Infrastructure with the exception of the road works contract which will be supervised by a Supervising Consultant. The project Manager is also responsible for ensuring all contractors and consultant confirm to resources requirement and their availability this includes obtaining commitments to used staff for specific durations.

4..9.1.9 STANDARDIZED PROCUREMENT DOCUMENTATION

The procurement document has been standardized to in order to facilitate successful completion of the contracts and project. The following standard documents will be used for project procurement activities:

- Standard Request for Proposal Template to include
 - Background
 - Proposal process and timelines
 - Proposal guidelines
 - Proposal formats and media
 - Source selection criteria
 - Pricing forms
 - Statement of work
 - Terms and Conditions

- Internal source selection evaluation forms
- Non-disclosure agreement
- Letter of intent
- Firm fixed price contract
- Procurement audit form
- Procurement performance evaluation form
- Lessons learned form

4.9.1.10 DECISION CRITERIA

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

- Comparison of outsourced cost versus in house sourcing
- Mandatory Requirements
- Vendor financial documentation
- General Qualifications & Experience (vendor and proposed staff)
- Past performance Technical Qualifications
- Quality
- Ability of the vendor to provide all items by the required delivery date
- Software Demonstration and/or Oral Presentation
- System Infrastructure Impact
- Cost

These criteria will be measured by the Agency Evaluators, Project Coordinator, and Subject Matter Experts (SME), and the Project Manager. The final decision will be made based on these criteria as well as available resources.

4.9.1.11 VENDOR MANAGEMENT

The Project Manager is ultimately responsible for managing vendors. In order to ensure the timely delivery and high quality of products from vendors, the Project Manager or his/her designee will meet weekly with the purchasing and contracts department along with each vendor to discuss the progress for each procured item. The purpose of these meetings is to review all documented specifications for each product as well as to review the quality test

findings. This forum will provide an opportunity to review each item's development or the service provided in order to ensure it matches the requirements established in the project specifications. It also serves as an opportunity to ask questions or modify contracts or requirements ahead of time in order to prevent delays in delivery and schedule.

4.9.1.12 ACCEPTANCE

Approved by:

Date: _____

<Approvers Name> [PROJECT NAME] Executive Sponsor

Date: _____

<Approvers Name> [PROJECT NAME] Project Manager

Source: (Project Management Docs, 2012)

4.10 PROJECT STAKEHOLDER MANAGEMENT

Georgetown to Lethem Road Construction - Project Plan

Project Stakeholder Management commence in early stages of the Georgetown to Lethem road project during the initiation process group and is critical to the success of the Georgetown to Lethem Road Construction project. Stakeholder Management is considered a strategic discipline that successful project managers use to win and sustain support for their projects from others, both internal and external to their project and to the project's organization (Forman, J. B. & Discenza, R. 2012).

The Stakeholder Engagement Plan for the Georgetown to Lethem Road Construction Project will be managed through an iterative process, which manages stakeholders using the plan as a guide to action for the life of the project.

4.11.1 STAKEHOLDER ENGAGEMENT PLAN

Georgetown to Lethem Road Construction - Project Plan

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4.10.1.1 INTRODUCTION
4.10.1.2 IDENTIFY PROJECT STAKEHOLDERS—THE REGISTER
4.10.1.3 KEY STAKEHOLDERS
4.10.1.4 STAKEHOLDER ANALYSIS
4.10.1.5 STAKEHOLDER ENGAGEMENT MANAGEMENT PLAN
4.10.1.6 ACCEPTANCE

4.10.1.1 INTRODUCTION

The Stakeholder Management Strategy for Georgetown to Lethem Road Project will be used to identify and classify project stakeholders; determine stakeholder power, interest, and influence; and analyze the management approach and communication methodology for project stakeholders. This will allow for the identification of key influential stakeholders to solicit input for further project planning and gain support as the project progresses.

The stakeholder register was created during project initiation using a high-level list of stakeholders and information that are already known. During Planning and Execution, the Project Manager will be responsible for adding more detail to this document. The stakeholder register is used to ensure the appropriate people or groups are contacted and are part of the team forming process and kickoff. During planning, further details concerning influence and impact were added to this document which were then used to create the project plans. Inputs into the stakeholder register may come from many different sources including, but not limited to, Sponsor, senior leadership in the ministry of public infrastructure, business case, charter, analysis/research, subject matter experts, and interaction with other stakeholders.

4.10.1.2 IDENTIFY PROJECT STAKEHOLDERS—THE REGISTER

The purpose of the stakeholder register is to document who is impacted by the Georgetown to Lethem Road project, and their influence and impact on the project. This document is considered an important tool towards project planning, team forming and developing, defining success criteria, communicating, governing, and defining tasks and

responsibilities. A complete stakeholder register is created early in the project (see Appendix 12) and will be monitored throughout the life of the project to increase the likelihood of success by ensuring appropriate stakeholder engagement.

The following criteria will be used to determine if an individual will be included as a stakeholder:

- Will the individual or his/her organization be directly or indirectly affected by this project?
- Does the individual or this/her organization hold a position from which he/she can influence the project?
- Does the individual have an impact on the project's resources (material, personnel, funding)?
- Does the individual or his/her organization have any special skills or capabilities the project will require?
- Does the individual potentially benefit from the project or is he/she in a position to resist this change?

Individuals who satisfy one or more of the above criteria are identified as a stakeholder.

4.10.1.3 KEY STAKEHOLDER

As a follow up to Identify Stakeholders, the project team will identify key stakeholders who have the most influence on the project or who may be impacted the most by it. These key stakeholders are those who also require the most communication and management which will be determined as stakeholders are analyzed. Once identified, the Project Manager will develop a plan to obtain their feedback on the level of participation they desire, frequency and type of communication, and any concerns or conflicting interests they have.

4.10.1.4 STAKEHOLDER ANALYSIS

Once all Georgetown to Lethem Road Project stakeholders have been identified, the project team will categorize and analyze each stakeholder. The purpose of this analysis is to determine the stakeholders' level of power or influence, plan the management approach for each stakeholder, and to determine the appropriate levels of communication and participation each stakeholder will have on the project.

Once all stakeholders have been categorized, the project team will utilize a power/interest matrix to illustrate the potential impact each stakeholder may have on the project. The chart below will be used to establish stakeholders and their levels of power and interest for use on the power/interest chart as part of the stakeholder analysis.





Key Player - High impact, high Influence: these are the stakeholders that must be fully engaged and make the greatest efforts to satisfy.

Important Player - High impact, low Influence: Put enough work in with these stakeholders to keep them satisfied, but not so much that they become bored with the message.

Affected Player - Low impact, high Influence: Keep these stakeholders adequately informed, and talk to them to ensure that no major issues are arising. These stakeholders can often be very helpful with the detail of the project.

Potential Player - Low impact, low Influence: Again, monitor these stakeholders, but do not bore them with excessive communication.

4.10.1.5 CREATE A STAKEHOLDER ENGAGMENT PLAN

The stakeholder analysis produces substantial information and data. The next step is to understand, organize, and then apply the analysis results (data and information captured) to drive project success.

This stakeholder engagement plan documents the approach that will increase support and decrease negative impacts of stakeholders throughout the life of the Georgetown to Lethem Road project. It identifies the key stakeholders along with the level of power and influence they have on the project. The stakeholder management plan should describe the strategies and actions that will be used to manage the stakeholders according to their power and interest in the project (Project Management Docs, 2012).

4.10.1.6 ACCEPTANCE

Approved by:

<Approvers Name> [PROJECT NAME] Executive Sponsor Date: _____

Date: _____

<Approvers Name> [PROJECT NAME] Project Director/Manager

Source: (Project Management Docs, 2012)

5.0 CONCLUSIONS

The Georgetown to Lethem Road Construction Project Management Plan (PMP) responds to the issues identified at the start of the project by the researcher.

The report recognizes the importance of developing a project management plan that is aligned with the good practices recommended by Project Management Institute (PMI) through the review of existing knowledge in project management in order to improve construction management of road projects in Guyana. It aims to improve the way the Ministry of Public Infrastructure manage the implementation of the Georgetown to Lethem Road Construction Project by providing a roadmap (Project Plans) for the project to be successful.

The Project management plan was developed using an analytical research method and the PMBOK Guide sixth edition and is considered very important for the organization to govern the Georgetown to Lethem Road Construction Project across the project lifecycle. Moreover, applying the proper tools during the process planning and implementation can further lead to reaching the goals of the project.

The planning phase of the project involved the crystallizing of the project goals, the development of the concepts, tools, techniques, and technical requirements and planning for implementation. These activities will require a number of iterations and revisions to work out the client's needs and optimize project effectiveness.

5.1 ACHIEVEMENT OF THE STUDY OBJECTIVES

The **general objective** of this project was to develop a Project Management Plan that is aligned with the good practices recommended by Project Management Institute (PMI) to better manage the construction of the Road from Georgetown to Lethem across the project life cycle which is to be used as a roadmap to improve the likelihood of success in the project implementation environment.

A comprehensive literature study was conducted to ascertain the impact of project management across the project life cycle. This review covered project management concepts in particularly the construction sector. The literature available reveals an abundance of information on project management and its ability to successfully influence the outcomes of projects.

In terms of the frameworks and process, this study was conducted using an analytical research method and applying inductive and deductive reasoning to arrive at a conclusion. The project contained both exploratory and descriptive components which informed the use of both qualitative and quantitative information gathering methods. Primary data were obtained via interviews and applications of the PMBOK Guide tools and techniques.

The process of meeting the **specific objectives**, in other words, the development of the project plans to govern the Georgetown to Lethem project in the context of project management and the overall outcome, is summarized below.

- The Project Charter was created to capture and organize the business needs, objectives, project description, preliminary scope statement, initial project risks, project deliverables, summary milestones, and project budget and authorize the project manager.
- 2. The Scope Management Plan was created for specific objective number two, along with the WBS, WBS dictionary, Requirements Management Plan, Requirements Document, and Requirements Traceability Matrix, were developed from a table or template, capturing the information gathered during meetings with project stakeholders and from project document reviews.
- 3. The Schedule Management Plan along with activity list, schedule network diagrams were all created as the output from specific objective number three.
- 4. The Cost Management Plan was created as the output from specific objective number four. It entailed the development the project budget, and other project funding Requirements.
- 5. The Quality Management Plan was created as the output from specific objective number five, in order to ensure that quality was built into the project's processes and product.
- 6. The Resource Management Plan was created to address specific objective number six, and entails a comprehensive list based on their roles and responsibilities to manage project resource throughout the project.

- 7. The Stakeholder Management Plan along with a list of all stakeholders and their roles and responsibilities was created in address specific objective number seven.
- 8. The Risk Management Plan was created in response to specific objective number eight. Additionally, a Risk Register was developed to monitor and response to project risks.
- 9. The Procurement Management Plan deliverable was created for specific objective nine to identify the project's procurement management approach, types of contracts used and contract approval process.
- 10. The Stakeholder Management Plan and stakeholder register were developed for specific objective ten to manage stakeholder engagement throughout the project.

In conclusion, all of the specific objectives were met during the development of this research project, in that **a comprehensive project management plan has been developed**, using appropriate framework, tools and techniques.

5.2 KNOWLEDGE CONTRIBUTION

The project contributed to knowledge in through the following:

- Improving of construction productivity through PM.
- Integration of project management documents.
- Improvement of project management information and communication.
- Improvements in the exchange of information among different actors of construction projects.
- Development of an organizational model to manage construction projects.

This project has contributed to improving the management of construction projects through project plans and therefore the improvement of project scope, time, cost, quality, and client satisfaction.

6.0 RECOMMENDATIONS

The study findings provide the following recommendations for the Ministry of Public Infrastructure in the management of the Georgetown to Lethem Road Construction Project and strongly support the idea that they should be implemented incrementally over a period time as the organization matures. Together they provide the elements of a reformed project management process.

- 1. Develop the Ministry's project management culture by providing clear, consistent, executive communication regarding the importance of project management objectives and their accomplishment.
- 2. Establish the Ministry ownership and accountability by senior management for strategic objective accomplishment in scope, budget, schedule, and quality.
- 3. Establish measurable team strategic objectives for scope, budget, schedule, and quality and measure their accomplishment.
- 4. Establish the roles, responsibilities, and authority of project managers, project teams, technical managers, and technical leaders.
- 5. Strengthen the consistency of project management across the Ministry through the implementation of consistent project management procedures (Project Plans).
- 6. Revise the Ministry's project management policies, guidelines, and manuals to reflect these consistent project management requirements.
- 7. Develop and maintain project status information regarding project scope, schedule, and budget.
- 8. Continue to emphasize and amplify training and professional development for project managers in the Ministry.

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APPENDICES

APPENDIX 1 – PROJECT CHARTER

Appendix 1: FGP Charter PROJECT CHARTER Formalizes the project start and confers the project manager with the authority to assign company resources to the project activities. Benefits: it provides a clear start and well defined project boundaries.		
Date	Project Name:	
April 12, 2019	Project Management Plan for the Construction of the Georgetown to Lethem Road, Guyana.	
Knowledge Areas / Processes	Applicacion Area (Sector / Activity)	
Knowledge areas: Project Integration Management Project Scope Managment Project Schedule Managment Project Cost Managment Project Quality Mangment Project Resource Management Project Communications Management Project Risk Management Project Procurement Mangagement Project Stakeholder Management Project Stakeholder Management Project Stakeholder Management Planning Executing	Construction	
Monitoring and Controlling closing		
Start date	Finish date	
November 5, 2018	July 8, 2019	
Project Objectives (general and specific)		

General objective:

To develop a Project Management Plan that is aligned with the good practices recommended by Project Management Institute (PMI) to better manage the Upgrading of the Road from Georgetown to Lethem. **Specific objectives:**
- 1. To develop a project charter to formally authorize the existence of the project and outline the high-level requirements and resources to accomplish the objectives.
- 2. To produce a scope management plan to ensure the road project includes all the work required, and only the work required, for completing the project successfully.
- 3. To create a schedule management in order to better develop and maintain the actual project schedule.
- 4. To develop a cost management plan to maintain an organized approach to tasks while staying aware of cost control to ensure the project is on budget.
- 5. To design a quality management plan to clearly defines what the quality management system is supposed to satisfy to achieved project quality.
- 6. To create a resource management plan to better resource allocate by:
 - increasing team visibility
 - keeping track of the schedule and availability
 - data driven estimates and planning
- 7. To develop a communications management plan to ensure project communication are effective and the project performance are documented properly.
- 8. To construct a risk management plan to better identify, assess and manage project risks.
- 9. To construct a procurement management plan that documents what resources are to be procured from outside the organization, when they are to be procured and from what sources.
- 10. To develop a stakeholder engagement plan to engage stakeholders and create positive relationships by setting objectives and managing their expectations.

Project purpose or justification (merit and expected results)

The project to development a Project Management Plan for the upgrading of the road from Georgetown to Lethem in Guyana is based on the need for the Government of Guyana through the Ministry of Public Infrastructure to better managed construction projects in the country. Over the years construction projects such roads and bridges have been executed without a formal project management plan and has resulted in a series of cost overruns, and construction delay that has overshadowed the intended benefits of the projects themselves. In addition, poor project management performance has resulted in claims and dispute between the client and contractor for extra quantities, delayed completion and poor quality of work. A project management plan will therefore provide the blueprint needed to better manage project activities and use of resources.

With the Government of Guyana through the Ministry of Public Infrastructure soon to commence the Upgrading, Management and Construction of Georgetown to Lethem Road which falls under its National Development Strategic policy, as an essential North-South link in the overall National Transport Network of Guyana. The development of the project management plan will ensure there's a proper plan for executing, monitoring, controlling and completing the project based on requirements.

In short, the Project Management Plan will provide a roadmap for the project team and stakeholders to stay on track for success. It can also serve as an organization process asset and lesson learn for the management of future similar road projects in Guyana. The expected benefits include:

- A shared vision of what the project will accomplish and actions that satisfy the project's goals
- Clarity on the responsibilities of team members and other organizations in contributing to the goals of the project.
- Organized project work
- Reduction in dispute between client and contractor
- Increase change control and reduce scope creep
- Better quality of deliverables.
- Efficient and economic use of resources
- Management of Integration
- Reduction in cost overrun

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

The development of a comprehensive project management plan that coordinates all subsidiary plan components to define the basis of all project work and how the work will be performed. Project management plan components include:

- Scope Management Plan
- Schedule Management Plan
- Cost Mangement Plan
- Quality Management Plan

- Resource Management Plan
- Communications Management Plan
- Risk Management Plan
- Procurement Management Plan
- Stakeholder Mangement Plan

Assumptions

- The time alloted for successful completion of the project will be sufficient
- Funding will be available prior to start
- Sufficient information is available from UCI, PMI and Ministry of Public Infrastructure MoPI to complete the project
- UCI strategic direction will remain the same
- Ministry of Public Infrastructure will remain committed to the project
- Individuals will work 40 hours per week
- The materials to complete the project will be readily available to be utilized.
- The overall cost of day-to-day activity will not increase
- Personnel costs will not change overall the project
- Economical conditions will stay the same
- Scope doesn't change
- If is should; project will follow a change control approval process

Constraints

- Scope must remain within the limits of project management plan and not execution of the actual project.
- Schedule must complete the project within 3 months; Must finish 30% of the project work within 5 weeks
- Cost budget of Two Hundred Thousand Guyana Dollars GY\$200,000
- Quality Requirements must pass all UCI reviews
- Resources must work within the available resources

Preliminary risks

No.	Risk	Cause	Effect	Impact
1	Materials may not be available when needed.	Late delivery, Not in stock	Late submission of deliverables	missed deadlines, poor quality and cost
2	UCI can request chances	Poor quality of submission Corrections needed	Better quality submission	overruns. Improve quality and cost overruns.
3	Time alloted too short to comlete the project	Increase scope; Slow progress	Incomplete submission; Late submission Poor quality final submission	missed deadlines, poor quality and cost overruns.
4	Funding not available from start	Delayed commitments;	Unable to fund project activities	missed deadlines, poor quality and cash flows
5	Changes in UCI strategic direction	Increase or decrease time to complete the project	Early or late Final Graduation Project	Scope, time, quality
6	Scope Creep	Additional Requirements; Gold plating; Poor Change control	Changing a project's definition and required outcomes without an increase in budget, resources or time	missed deadlines and Resource constraints.
7	Lack of project information	Internet connection; Change in comitiment from MoPI	Incomplete submission; Late submission Poor quality final submission	missed deadlines, poor quality and cost overruns.
Induo	+			

Te estimate roject budget is GY\$200,000									
Milestones and dates									
Task Name	Start	Finish							
Final Graduation Project	Mon 05/11/18	Mon 08/07/19							
FGP Start	Mon 05/11/18	Mon 05/11/18							
1, Graduation Seminar	Mon 05/11/18	Fri 14/12/18							
1.1, FGP Deliverables	Mon 05/11/18	Fri 07/12/18							
1.1.1, Charter	Mon 05/11/18	Fri 09/11/18							
1.1.2, WBS	Mon 05/11/18	Fri 09/11/18							
1.1.3, Chapter I. Introduction	Mon 12/11/18	Fri 16/11/18							
1.1.4, Chapter II. Theoretical framework	Mon 19/11/18	Fri 23/11/18							
1.1.5, Chapter III. Methodological framework	Mon 26/11/18	Fri 30/11/18							
1.1.6, Annexes	Mon 12/11/18	Fri 07/12/18							
1.1.6.1, Bibliography	Mon 03/12/18	Fri 07/12/18							
1.1.6.2, Schedule	Mon 12/11/18	Fri 16/11/18							
1.2, Graduation Seminar approval,	Mon 10/12/18	Fri 14/12/18							
2, Tutoring process	Mon 17/12/18	Mon 13/05/19							
2.1, Tutor	Mon 17/12/18	Fri 04/01/19							
2.1.1, Tutor assignment	Mon 17/12/18	Tue 18/12/18							
2.1.2, Communication	Wed 19/12/18	Fri 04/01/19							
2.2, Adjustments of previous chapters (If needed)	Mon 07/01/19	Fri 11/01/19							
2.3, Charter IV. Development (Results)	Mon 14/01/19	Fri 19/04/19							
2.4, Chapter V. Conclusions	Mon 22/04/19	Wed 01/05/19							
2.5, Chapter VI. Recommendations	Thu 02/05/19	Mon 13/05/19							
Tutor approval	Mon 13/05/19	Mon 13/05/19							
3, Reading by reviewers	Tue 14/05/19	Mon 03/06/19							
3.1, Reviewers assignment request	Tue 14/05/19	Mon 20/05/19							
3.1.1, Assignment of two reviewers	Tue 14/05/19	Wed 15/05/19							
3.1.2, Communication	Thu 16/05/19	Fri 17/05/19							
3.1.3, FGP submission to reviewers	Mon 20/05/19	Mon 20/05/19							
3.2, Reviewers work	Tue 21/05/19	Mon 03/06/19							
3.2.1, Reviewer	Tue 21/05/19	Mon 03/06/19							
3.2.1.1, FGP reading	Tue 21/05/19	Fri 31/05/19							
3.2.1.2, Reader 1 report	Mon 03/06/19	Mon 03/06/19							
3.2.2, Reviewer	Tue 21/05/19	Mon 03/06/19							
3.2.2.1, FGP reading	Tue 21/05/19	Fri 31/05/19							
3.2.2.2, Reader 2 report	Mon 03/06/19	Mon 03/06/19							
4, Adjustments	Tue 04/06/19	Mon 01/07/19							
4.1, Report for reviewers	Tue 04/06/19	Fri 14/06/19							
4.2, FGP update	Mon 17/06/19	Mon 17/06/19							
4.3, Second review by reviewers	Tue 18/06/19	Mon 01/07/19							

5, Presentation to Board of Examiners	Tue 02/07/19	Mon 08/07/19
5.1, Final review by board	Tue 02/07/19	Wed 03/07/19
5.2, FGP grade report	Thu 04/07/19	Mon 08/07/19
FGP End	Mon 08/07/19	Mon 08/07/19

Relevant historical information

The existing road from Georgetown-Linden-Lethem is about 554 km long. While Georgetown to Linden is a two-lane asphaltic road most of the alignment is classified as a two-lane rural road with average 6.0m wide gravel pavement, no shoulders. The road is generally flat and runs north – south. The existing alignment is generally poor, improvements required to most of horizontal and vertical curves, and to allow improvements to drainage and erosion protection. The existing pavement consists of an old DBST surfacing from km 0 to km 2.5 the remainder is gravel surfaced. The condition is fair to poor throughout. Maintenance is inadequate.

There are also 52 bridges on the existing road, most are in poor condition, and are in need of full reconstruction. The main drainage pattern is transversal to the road with many minor and seasonal streams crossing the road. Drainage is often inadequate with insufficient and/or silted pipes and culverts, some of which have collapsed. There is also insufficient drainage leading to the pipes and culverts. Erosion around culverts is a major problem both upstream and downstream; and protection of the road from silting up, mud slides and gravel from flood deposits is a concern.

A preliminary feasibility study was done to determine the practicability of project. Alternative options together with preliminary cost estimates have been carried out, and based on engineering evaluation process and social, environmental, economic and financial analysis and discussion with Ministry of Public Infrastructure and other stakeholders, preferred alternate options were selected for preliminary design. The project is in the final stage of design review and planning followed by implementation. The project management plan is to be used to guide the implementation of the project.

Stakeholders								
Direct stakeholders:								
 Project Manager – Dwayne Roland 								
 Lecturer – Carlos Brenes 								
 University for International Cooporation UCI 								
Minister of Public Infrastructure								
Indirect stakeholders:								
Government of Guyana								
• Drivers								
Farmers								
Manaufacturers								
Residence								
Guyana Police Force								
Project Manager: Dwayne Alston Roland	Signature:							
	J. 7 D							
	S. Fulling							
Authorized by:	Signature:							



Appendix 3: FGP Schedule Updated

						FINAL GRA	DUATION P	ROJECT DEVELO	PMENT SCH	EDULE							
D	Task	Task Name		Duration	Start	Finish	Qtr 4, 2018			Qtr 1, 2019			Qtr 2, 2019			Qtr 3, 2019	
	Mode						Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	
1		Final Grad	luation Project	166 days	Mon 05/11/1	1 Mon 08/07/19										-,	
2		FGP Sta	rt	0 days	Mon 05/11/1	8Mon 05/11/18		♦ 05/11									
3		1,Grad	uation Seminar	30 days	Mon 05/11/1	4Frl 14/12/18		,								1	
4		1.1,F	GP Dellverables	25 days	Mon 05/11/1	a Fri 07/12/18											
5		1.3	1.1,Charter	5 days	Mon 05/11/1	&Fr109/11/18										1	
6		1.	1.2,WB5	5 days	Mon 05/11/1	EFr109/11/18											
-		1.	1.3, Chapter I. Introduction	5 days	Mon 12/11/1	8Fr116/11/18		: F .								1	
8	2	1.: fra	1.4, Chapter II. Theoretical amework	5 days	Mon 19/11/18	Fri 23/11/18]								
9	3	1.: fra	1.5, Chapter III. Methodological amework	5 days	Mon 26/11/18	Fri 30/11/18			\mathbf{h}								
10	*	1.1	1.6,Annexes	20 days	Mon 12/11/1	l Fri 07/12/18			±1							1	
11	3		1.1.6.1,Bibliography	5 days	Mon 03/12/1	£Fr107/12/18			ъ								
12	-		1.1.6.2,Schedule	5 days	Mon 12/11/1	8Fri 16/11/18		- t 🍋								1	
13	-	1.2,6	iraduation Seminar approval,	5 days	Mon 10/12/1	8Fri 14/12/18		1	- 1 -								
14	-	Z,Tutor	ing process	96 days	Mon 17/12/1	Mon 13/05/19		1	-							1	
15	7	2.1,T	utor	5 days	Mon 17/12/1	Frl 04/01/19		1	- H-	_							
16	-	2.3	1.1, Tutor assigment	2 days	Mon 17/12/1	ETue 18/12/18			*.							1	
17	-	2.3	1.2,Communication	3 days	Wed 19/12/1	£Fr104/01/19			- -								
18	-	2.2,A	djustments of previous	5 days	Mon	Fri 11/01/19				1						1	
19	-	chap	ters (If needed)	70 days	07/01/19	Eri 19/04/10											
	2	2.3,0 (Resu	lits)	70 days	14/01/19	1113/04/19											
20	3	2.4,0	hapter V. Conclusions	8 days	Mon 22/04/1	SWed 01/05/19								L			
1	2	2.5,0	hapter VI. Recommendations	8 days	Thu 02/05/19	Mon 13/05/19										1	
2	<u> </u>	Tuto	r approval	0 days	Mon 13/05/1	SMon 13/05/19		1									
3		3, Read	ng by revlewers	15 days	Tue 14/05/19	0 Mon 03/06/19		1							-		
24	-	3.1,R	eviewers assigment request	5 days	Tue 14/05/19	0 Mon 20/05/19								ц п			
!5	3	3.3	1.1, Assigment of two reviewer	s 2 days	Tue 14/05/19	Wed 15/05/19		i I						Ť		1	
26	3	3.1	1.2, Communication	2 days	Thu 16/05/19	Fri 17/05/19								- K -			
27	3	3.	1.3,FGP submission to	1 day	Mon 20/05/19	Mon 20/05/19								۴.			
8	-	370	eviewers work	10 days	Tue 71/05/10	Mon 03/06/14									-		
9		3.2,0	1 Reviewer	10 days	Tue 71/05/10	Mon 03/06/11		1						i-	-	1	
0		3.	3.2.1.1.EGP reading	9 days	Tue 21/05/19	Fri 31/05/19											
11			3.7.1.7 Reader 1 report	1 day	Mon 03/05/19	Mon 03/06/19		1							1	1	
12	-		7 Reviewer	10 days	Tue 71/05/10	Mon 03/06/19								-	-		
33		3.	3 7 7 1 EGP reading	0 days	Tue 21/05/10	Er(31/05/10											
14			3.2.2.1,FOF reading 3.7.7.7 Reader 7 report	1 day	Mon 03/05/19	Mon 03/06/19									1		
15		A Adhur	tments	20 days	Tue 04/05/10	Mon 01/07/19		1							}	- i	
36		4,A0j05	aport for reviewers	20 days	Tue 04/06/19	Ex114/06/10									*	•	
37		4.1,6	eport for reviewers	a days	Map 17/05/19	(Map 17/06/19											
38		4.2,1	or opulate acond raviaw by raviaword	10 days	Tue 18/06/10	Mon 01/07/19									- ÷		
30	□ 	4.3,3 E Bross	econorieview by reviewers	Edour	Tue 03/03/19	Mon 02/07/19											
40	-	5,Prese	mation to board of Examiner	5 uays	Tue 02/07/19	won 08/07/19										¥ .	
40		5.1,F	in ai review by board	2 days	Tue 02/07/19	wed 03/07/19		1								*	
91	-S	5.2,F	GP grade report	3 days	Thu 04/07/19	Mon 08/07/19											_
			Task		Project Summary	y i <u> </u>	- i	Inactive Milesto	one •		Manual Su	ummary Roll up		Deadli	ne	÷	
			Constraint and the second s		and the second			service of the set. Not set the set of				a second dealers		Contraction in			_
roject:	FGP_Generic_S	chedule_U	Split		External lasks			macuve summa	ary F		Manual Su	immary	•	 Critical 		(
roject: late:We	FGP_Generic_S ed 01/05/19	chedule_U	Split Milestone 🔶		External Milestor	ne 🔶		Manual Task	iry F	1	Manual Su Start-only	immar y	c .	Critica	l Split		

Appendix 4: Construction of Georgetown to Lethem Road Schedule



APPENDIX 5: S – CURVE REPORT



APPENDIX 6 – (TEMPLATE) RESOURCE CALENDER

Pesource Calender																
Constructive Galeriner																
Project Delivery Model						Start Date	Phase End	Yr. 2018	Yr. 2019	Yr. 2020	Yr. 2021	Yr. 2022	Yr. 2023	Yr. 2024		
Project Solution Delivery Summary:					Project	1/2/2018	12/6/2024									
Project Analysis/Requirements					-						_					
Project Design																
Project Development/Build																
Project Defects liability Period																
Project Close out																
Resource Requirements			_	_						_			_			
Organizational Area	Role	OTY	Rate	%	Name	Requested Start Date	Projected End date	2018	2019	2020	2021	2022	2023	2024	Total	Total Cost Allocated
					Namo	Months/Year		12	24	36	48	60	72	84		
STAFFING (EMPLOYEES))															
Ministry of Finance																
Ministry of Public Infrastructure																
						Sub Total:									0	\$0
						1										
STAFFING (CONTRACTOR	4)															
Sub-contractor				<u> </u>												
Gub constatuti																
		+		<u> </u>		Sub Total:		0	0	0	0	0	0	0	0	50
INCREMENTAL STAFFING	(CONSULTAN	ITS)														
Design Consultants																
Supervsing Consultants																
						SubTotal		0	0	0	0	0	0	0	0	50
S/W, H/W, SUPPORT, EQUIPMENT AND	OTHER EXPEN	ISES				our rous.										V 0
Surveying Equipment																\$0
Road contruction Equipment																\$0
																\$0
						SubTotal:		\$0	\$0	\$0	\$0	\$0	\$0	\$0		\$0
					TO	TAL PROJECT HOURS:		0	0	0	0	0	0	0	0	\$0
					TOTAL HARDWARE	AND SOFTWARE COST:		\$0	\$0	\$0	\$0	\$0	\$0	\$0		\$0
			M	ANAGE	MENT RESERVE @:	10.00%										\$0
					1	TOTAL PROJECT COST:										\$0

Assumes full time to equal 40 hours/week of productive effort

Communication	Objective of	Medium	Frequency	Audience	Owner	Deliverable	Format
Туре	Communication						
Kickoff Meeting	Introduce the project team and the project. Review project objectives and management approach.	– Face to Face	Once	 – Project Sponsor – Project Team – Stakeholders 	Project Manager	– Agenda – Meeting Minutes	 Soft copy archived on SharePoint site and project website.
Project Team Meetings	Review status of the project with the team.	– Face to Face – Conference Call	Weekly	– Project Team	Project Manager	– Agenda – Meeting Minutes – Project Schedule	 Soft copy archived on SharePoint site and project website.
Project website	Provide project updates focused on the stakeholder groups with the goal to keep informed. Collect and answer questions and comments from campus community.	- Website	Once, content updated weekly	All stakeholders with a focus on the "keep informed" group	Project Manager	Website	Software
Project Team Status Meetings	Review status of the project with the team and institution project sponsors and project	- Face to Face	As needed, at least monthly	Project Team, institution project sponsors and institution project	Project Manager	-Status report - Meeting Minutes - Risk register updated	 Soft copy and hardcopy archived on SharePoint site and project website.

APPENDIX 7 – (TEMPLATE) COMMUNICATION MATRIX FOR GEORGETOWN TO LETHEM ROAD CONSTRUCTION PROJECT

	managers			managers		Communication	
						plan	
						updated	
						 Project plan 	
						updated	
Team	Share the status	Email	Monthly	-Steering	Project	-Status report	Email
Updates	of the project			Committee	Coordinator		
Project Status	Report the status	Email	Monthly	– Project	Project Manager	 Project Status 	– Soft copy
Reports	of the project			Sponsor		Report	archived on
	including			– Project Team		– Project	SharePoint site
	activities,			- Stakeholders		Schedule	and project
	progress, costs			- PMO			website.
	and issues.						

APPENDIX 8 – DELIVERY VEHICLES & MEDIA

Delivery	Advantages	Disadvantages
Vehicle/Media		
Meeting &	Brands messaging to large audience;	Paper-based and easily discarded
Conference	advertising	
Materials		
Speeches	Shows support for initiative if	Temporary "high"; if not delivered
	delivered by Sponsor or respected	by respected individual, can fall
0 *	Influencer; can motivate/inspire	flat and be counter-productive
Community	Offers non-project team	Can be expensive, technically
Outreacnes	stakenoiders the opportunity to see	challenging, fisk of instability if
	something tangible rather than just	to implementation:
	done well: best if done in context of	to implementation,
	a business process	
Employee Forums	Offers the opportunity for	If not well facilitated, the forum
	employees to assuage their curiosity	could become a "gripe session": all
	with questions; promotes inclusion	questions/comments cannot be
	in the change and thus can promote	scripted nor anticipated; risk of
	trust	creating, rather than decreasing,
		anxiety and erode trust
Brochures	Graphics appeal to visual learners;	Paper-based and easily discarded;
	can tell a story and be more	graphics or messages can become
	memorable than a large	confused if not concise enough
	communication; color and	
	movement in graphics can create	
×74 ×	excitement	
Videos	Can be watched on individual's	Can be expensive to produce a
	personal timetable; multi-sensory	quality product; some end users
	experience enhances message	might not be capable of watching
	and a sense of fun to relieve anyiety	DVDs can be time consuming:
Audio	Can be listened to on individual's	Can be expensive to produce a
	personal timetable: good for	quality product: some end users
	travellers who need quick updates	might not be capable of listening to
		audio files on-line and producing
		CD's can be time consuming;
Newsletters	Consistently delivered updates	If not already consistently
	covering wide variety of business	delivered, may not get noticed;
	related, as well as technology related	should not be the only delivery
	content; graphics can cause	vehicle for messages
	excitement; if "pushed" may have	
	enough readership for message to be	

Delivery Vehicle/Media	Advantages	Disadvantages
· cincic, iviculu	accepted; can be delivered in paper	
	or on-line	
Fact Sheets	Appeals to those who need more rather than less information; can be delivered via paper or on-line	Sometimes difficult to gather timely, correct facts; must be continually updated; if in paper, facts can become obsolete quickly, leading to false information out in the field
Frequently Asked Questions	Way to proactively answer questions that can be anticipated; non- threatening way for any stakeholder to ask a question and have it answered without repercussion; answers can reach entire stakeholder population; project team can use the questions to determine topics about which the end users might be anxious	If published in paper, quickly obsolete, leading to outdated information out in the field; if questions are not answered in a timely fashion, can erode trust in the project and cause anxiety
Signs/Posters	Excellent, inexpensive, constant reminders that the change is coming; can be motivating; picture can evoke emotion and tie current project to overall strategy	Though relatively inexpensive, excellent graphics/photos can add costs; all stakeholders may not be in a workplace with walls upon which to hang signs
Facilitated Group Meetings	Promotes inclusion and ownership among stakeholders; allows discussion of sensitive issues in a safe environment; promotes decision-making and action planning; promotes understanding of all stakeholders' perspectives	If not facilitated tightly by an impartial, objective, trained facilitator, can devolve into conflict and/or non-action; can waste time and damage the reputation of the project
Project Team Intranet Site	Promotes open, documentable communication among project team members; large announcements can be distributed real-time; depending on content, can be motivational and promote high performance team behaviors; content does not have to become obsolete	If not kept up-to-date, becomes a liability; cannot force the project team members to review the site frequently
Stakeholder Intranet Site	Perfect for sending change messages, project status, calls for participation, lessons learned, frequently asked questions, benefits achieved, problems resolved, etc.	If not kept up to date, becomes a liability; cannot force the project team members to review the site frequently

APPENDIX 9 – GUIDELINES FOR MEETINGS

Meeting Agenda

Meeting Agenda will be distributed at least 1 business day in advance of the meeting. The Agenda should identify the presenter for each topic along with a time limit for that topic. The first item in the agenda should be a review of action items from the previous meeting.

Meeting Minutes

Meeting minutes/notes will be distributed within 2 business days following the meeting. Meeting minutes/notes will include the status of all items from the agenda along with new action items and the Parking Lot list.

Action Items

Action Items are recorded in both the meeting agenda and minutes. Action items will include both the action item along with the owner of the action item. Meetings will start with a review of the status of all action items from previous meetings and end with a review of all new action items resulting from the meeting. The review of the new action items will include identifying the owner for each action item.

Meeting Chairperson

The Chairperson is responsible for distributing the meeting agenda, facilitating the meeting and distributing the meeting minutes. The Chairperson will ensure that the meeting starts and ends on time and that all presenters adhere to their allocated time frames.

Note Taker

The Note Taker is responsible for documenting the status of all meeting items, maintaining a Parking Lot item list and taking notes of anything else of importance during the meeting. The Note Taker will give a copy of their notes to the Chairperson at the end of the meeting as the Chairperson will use the notes to create the Meeting Minutes.

Parking Lot

The Parking Lot is a tool used by the facilitator to record and defer items which aren't on the meeting agenda; however, merit further discussion at a later time or through another forum. A parking lot record should identify an owner for the item as that person will be responsible for ensuring follow-up. The Parking Lot list should be included in the meeting minutes.

Appendix 10 - Project team directory

Role	Name	Organization/	Email	Phone	
		Department			
Project	MoF/Bank	Ministry of	awhite@finace.gov.gy	(592) 603 3412	
Sponsor		Finance			
Project	MoPI				
Coordinator					
Project	Consultant				
Manager					
Specialist	Consultant				
Engineer					
Project	MoPI/				
Team	Consultant				
Construction	Contractor				
Manager					
Project					
Stakeholders					

APPENDIX 11 - RISK REGISTER

RBS Code	Risk	Possible Cause	Impact (1-3)	Probability (1-3)	Total Risk Score (=PxI)	Consequences	Owner	Trigger
1.0								
1.1	Uncertain political and Public Support.	Lack of transparency	High (3)	Medium (2)	6	Major	Project Coordinator	Public Resistance
2.0								
2.1	Changes in design requirements.	New Stakeholder added to the project	High (3)	High (3)	9	Major	Project Manager	New stakeholder added.
2.2	Technical uncertainties Errors or omissions in quantities, inaccurate unit prices.	Lack of training	High (3)	Medium (2)	6	Major	Project Manager	Design Review
3.0	Implementation							
3.1	Implementation delays	Failure to recruit and assign persons with qualifications and experience suitable for the project management positions.	High (3)	High (3)	9	Major	Sponsor/ Government of Guyana	Constant rescheduling of recruitment
3.2	Design change	Design Review	High (3)	Medium (2)	6	Moderate	Consultant	Increase Scope Changes
3.3	Additional design and planning work.	Additional stakeholder requirements	High (3)	High (3)	9	Major	Project Manager	New consultation with stakeholders
4.0	Political/Funding							

RBS Code	Risk	Possible Cause	Impact (1-3)	Probability (1-3)	Total Risk Score (=PxI)	Consequences	Owner	Trigger
4.1	Timely availability of counterpart funding	Insufficient funding	High (3)	Medium (2)	6	Moderate	Sponsor/ Government of Guyana	Funding is redirected
4.2	Inability to spend within required timescale	Slow Project Execution	Mediu m (2)	Medium (2)	4	Moderate	Project Team	Slow progress/ rework (SPI/CPI)
4.3	Reduction in overall sponsor funding will result in shortfall	Insufficient funding	High (3)	Low (1)	3	Moderate	Sponsor	Funding is redirected
4.4	Increased Construction Cost	Increase scope	High (3)	Medium (2)	6	Moderate	Project Manager	Costs increase (poor quality materials/ inaccurate cost estimates)
4.5	Delay in securing funding	Failure to meet Disbursement Requirement	High (3)	Medium (2)	6	Moderate	Sponsor/ Government of Guyana	Delayed project start date
5.0	Property Acquisition							
5.1	Delays in acquiring property	Court Challenge	Mediu m (2)	High (3)	6	Moderate	Project Manager	Contract lacks full access to site
5.2	Lack of alternative accommodation for Vendors	Non -availability of suitable land for relocation	High (3)	Medium (2)	6	Moderate	Socio- environment al Officer	Protest action
6.0	Statutory Consents							
6.1	Processing of Environmental and other Construction permit	Non-compliance with statutory requirements	High (3)	Medium (2)	6	Moderate	Socio- environment al Officer	Delayed project Start/ Permits delayed or take longer than

RBS Code	Risk	Possible Cause	Impact (1-3)	Probability (1-3)	Total Risk Score (=PxI)	Consequences	Owner	Trigger
	aligned to construction programme							expected
7.0	Utilities and Services							
7.1	Utility relocation delaying road works	Lack of Coordination	High (3)	Medium (2)	6	Moderate	Project Manager	Contractor lacks full possession of the site
8.0	Health & Safety Perfo	ormance						
8.1	Accident or injury to site personnel causes delay or claims	Poor Safety Practice by workers	High (3)	Medium (2)	6	Moderate	Project Team	Staff reject safety procedures
8.2	Accident or injury to general public - either pedestrian or through road traffic accident	Poor Safety Procedure	High (3)	Medium (2)	6	Moderate	Project Team	Staff reject safety procedures
9.0	Adverse weather							
9.1	Suspension of Works during heavy rainfall	Inadequate flood protection to finished works.	Mediu m (2)	Medium (2)	4	Moderate	Project Team	Hurricane/ Prolong rainfall
9.2	Stormwater Flooding	Excessive settlement, climate change, culvert requirements are different and more extensive to those assumed in the	Mediu m (2)	Medium (2)	4	Moderate	Project Manager	Hurricane/ Prolong rainfall

RBS Code	Risk	Possible Cause	Impact (1-3)	Probability (1-3)	Total Risk Score (=PxI)	Consequences	Owner	Trigger
		design						
10.0	Quality Failure							
10.1	Poor quality materials - delay due to rejection of materials	Lack of Technical Specification	High (3)	Medium (2)	6	Moderate	Quality Control Manager	Frequent failed laboratory tests
10.2	Poor quality workmanship	Lack of Technical Specification	Mediu m (2)	High (3)	6	Moderate	Quality Control Manager	Frequent Rework
11.0	Environmental							
11.1	Noise complaints and general dissatisfaction from stakeholders	Equipment Operation	Mediu m (2)	Medium (2)	4	Moderate	Socio- environment al Officer	Stakeholder complaint
11.2	Dust complaints and general dissatisfaction from stakeholders	Equipment Operation	Mediu m (2)	Medium (2)	4	Moderate	Socio- environment al Officer	Stakeholder complaint
11.3	Vibration complaints and general dissatisfaction from stakeholders	Equipment Operation	Mediu m (2)	Low (1)	2	Minor	Socio- environment al Officer	Stakeholder complaint
12.0	Operational							
12.1	Poor Maintenance	Insufficient funding	Mediu m (2)	Medium (2)	4	Moderate	Ministry of Public Infrastructur e	Delayed Road Condition Survey
12.2	Vehicle Weight Control	Overloaded truck axle	Mediu m (2)	Medium (2)	4	Moderate	Ministry of Public Infrastructur	Drivers reject new procedures

RBS Code	Risk	Possible Cause	Impact (1-3)	Probability (1-3)	Total Risk Score (=PxI)	Consequences	Owner	Trigger
							e	
12.3	Enforcement of the Right-of-Way	The erection of structures within the right-of-way of public roads contributes to congestion	Mediu m (2)	Medium (2)	4	Moderate	Ministry of Public Infrastructur e/ Guyana Police Force	Increase travel time
12.4	Road use behaviors and enforcement	Failure to use pedestrian and bicycle facilities to be constructed	Mediu m (2)	Medium (2)	4	Moderate	Ministry of Public Infrastructur e/ Guyana Police Force	Motorist reject new procedures
12.5	Premature pavement failure during operation.	Poor Pavement Design	High (3)	High (3)	9	Major	Project Manager	Prolong high axle vehicles loads/ Poor quality construction
12.6	Damage / disruption to highway network due to work by utility companies	Poor co-ordination of works, poor quality reinstatements	Mediu m (2)	Low (1)	2	Minor	Project Manager	Monitor Pavement
12.7	Decrease in customer satisfaction	Continued deterioration of the highway network.	Mediu m (2)	Medium (2)	4	Moderate	Project Manager	Monitor Pavement/ Feedback

Appendix 12: Stakeholder Register Source: D. Roland (2019)

STAKEHOLDER REGISTER											
Name of Project:	Georgetown to Let	them Road									
Date:	06/04/2019	06/04/2019									
Name	Department	Title	Role on Project	Type of Stakeholder	Type of Communication	Expectations	Influence (E.g. ability to effect changes to planning or execution) – low or high?	Impact (E.g. level of impact /involvement) – low or high?	Stakeholder Category & Action		
Government of Guyana, Financial Institution	MoF	Project Sponsor	Project Sponsor	Internal	Meetings Personal Communication Reports Presentation Announcements	Project to fulfill Business Case objectives: process efficiencies, improved transportation along roadway	High	High	Manage closely		
Kenneth Jordan, Geoffrey Vaughn, Ron Rahamon	MoPI	Permanent Secretary MOPI, Works Coordinator, Chief Roads Officer	Steering Committee Members	Internal	Meetings Personal Communication Reports Presentation Announcements	On-time, and On- Budget Delivery, Dispute resolution	High	High	Manage closely		
Kester Hinds	MoPI	Project Coordinator	Stakeholder Engagement	Internal	Meetings Personal Communication Reports Presentation Announcements	Clear requirements, On-time, and On- Budget Delivery with the required Quality	High	High	Manage closely		
Dwayne Roland	MoPI	Manager	Project Manager	Internal	Meetings Personal Communication Reports Presentation Announcements	Clear requirements, On-time, and On- Budget Delivery with the required Quality	High	High	Manage closely		

Narima Rodrigues	MoPI	Manager	Procurement Management	Internal	Meetings Personal Communication Reports Presentation Announcements	Clear requirement, On-time Delivery	High	High	Manage closely
Project Team	MoPI	Project Engineer	Site Supervision	Internal	Meetings Personal Communication Reports Presentation Announcements	Clear requirements, skilled resources, timely-sign-off	High	High	Manage closely
Project Team	MoPI	Socio-environmental Officer	Environmental Supervision	Internal	Meetings Personal Communication Reports Presentation Announcements	Clear requirements, skilled resources, timely-sign-off	High	High	Manage closely
Regulatory agency	EPA	Environmental Officer	Environmental Oversight	External	Meetings, Emails, Letters	Kittle to no effective adverse effect to the environments and residents	High	Low	Adequately informed
Consultant	External Firm/company	Team Leader/Project Manager	Design/Supervision	External	Meetings Personal Communication Reports Presentation Announcements	On-time, and On- Budget Delivery with the required Quality, Clear requirements, skilled resources, timely sigh-off, minimal rework	High	High	Manage closely
Contractor	External Firm/company	Contractor	Roadworks	External	Meetings Personal Communication Reports Presentation Emails Letters Announcements	On-time, and On- Budget Delivery with the required Quality, Clear requirements, skilled resources, timely sigh-off, minimal rework	High	High	Manage closely

Utility Companies	GTT, GPL, GWI	Site Foreman	Utility Relocation and Management	External	Meetings, Emails, Letters	Minimum disruption of service provided, On-time, and On- Budget Delivery.	Low	Low	Monitor for change
Leslie James	GPF	Police Commissioner	Road Safety Education	External	Meetings, Emails, Letters	Reduce Road Accidents	Low	High	keep them satisfied
Community Residence	NDC	Road users	Provide requirements	External	Meetings, Personal Communication, Presentation, Letters, Announcements	Improved travel time, minimum disruption of daily activities	High	High	Manage closely

Appendix 13: FGP Philology Letter

Certificate of Review

Academic Advisor Master's Degree in Project Management (MPM) Universidad Para La Cooperacion Internacional (UCI) June 17, 2019

Dear Academic Advisor,

Re: Philosophical Review of Final Graduation Project submitted by Dwayne Alston Roland in partial fulfillment of the requirements for the Masters in Project Management (MPM) Degree

I hereby confirm that **Dwayne Alston Roland** has made all corrections to the Final Graduation Project document as I have advised. I have reviewed the document for structural, grammatical, and typographical errors and have recommended the appropriate corrections. In my opinion, the document is now accurate in the use of English Language.

I have a Bachelor of Education (English) from the University of Guyana. A copy of same is attached.

Sincerely,

K. Walcott .

Kerna Alexis Walcott, B.Ed. (English) Email: kernawalcott67@gmail.com

UNIVERSITY OF GUYANA



Kerna Alexis Walcott

having completed the course of study approved by the University and passed the prescribed examinations has this day been admitted by the Academic Board

to the General Degree of

Bachelor of Education (ENGLISH) PASS WITH DISTINCTION

dated this Twenty-seventh day of Ceteber 2111

Chancellor

Vice-Chancellor and Principal

Registrar