UNIVERSIDAD PARA LA COOPERACION INTERNACIONAL
(UCI)

PROJECT MANAGEMENT PLAN FOR
A ROAD MAINTENANCE MANAGEMENT SYSTEM

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FINAL GRADUATION PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR THE
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UNIVERSIDAD PARA LA COOPERACION INTERNACIONAL
(UCI)

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

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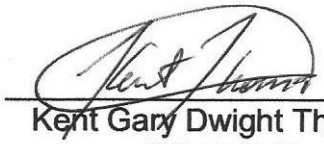

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STUDENT

August, 2016

DEDICATION

I would like to dedicate this study to my beloved family and friends, and to the instructors and classmates who participated in this programme. I would also like to dedicate this study to Professor Carlos Brenes whose guidance was instrumental in the completion of the framework for the Final Graduation Project. This research project is also dedicated to the tutor, Professor María Lorena López, and the reviewers who assisted in the completion and finalization of the study.

Finally, I would like to dedicate this study to my mother and the Almighty God whose dual support have molded me into the person I am today.

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ABBREVIATIONS AND ACRONYMS

- BRAGSA – Roads, Buildings and General Services Authority
- Cabinet – Cabinet of GoSVG
- EDF-PMU – European Development Fund
- GoSVG – Government of St.Vincent and the Grenadines
- MoCP – Ministry of Central Planning
- MOTW – Ministry of Transport and Works
- NEMO – National Emergency Management Organisation
- PMU – Project Management Unit
- RMMS – Road Maintenance Management System
- SVG – Saint Vincent and the Grenadines

Project Phase Identifiers and Other Identifiers

- Project Initiation and Planning Activities(I)
- Roads Classification(R)
- Road Maintenance Management System(IT) – Software Development Life Cycle
- Legal Aspects(L)
- RMMS Road Maintenance Program Execution Activities(EX)
- Project Closing Phase(C)
- Procurement ID – PCM+#
- Cost ID – CST+#
- Project Team Members – P+#
- Consultants from BRAGSA – C+#

EXECUTIVE SUMMARY (ABSTRACT)

This Project Management Plan set out a structured approach for the Project Management Unit of The Roads, Buildings and General Services Authority (BRAGSA) to establish a Road Maintenance Management System (RMMS) in St.Vincent and the Grenadines (SVG). The main parameters laid out by the sponsors were that the system: classifies and differentiates roads; consolidates road data; Incorporates rehabilitation and maintenance costs; allows for future development and manipulation to improve prioritization accuracy; and, maintains an objective, data-driven approach. The condition and need for maintenance of the road network include: roaduser population; access; primary and secondary uses of the roads; current status of road; the roads' most recent rehabilitation time; exposure to geophysical, meteorological and environmental hazards; and, political intervention.

The output of the RMMS will be utilized for all future maintenance planning and decision making specifically to create Annual Work Plans, Individual Programmes and Long Range Maintenance Plans. The Project Management Unit (PMU) is tasked with the incubation and facilitation of the RMMS in its early stage development after which it will later transition out of the project phase and into the regular organizational mechanisms.

The Project Management Plan enlists the standard ten knowledge areas as defined by the Project Management Body of Knowledge (PMBOK) and is a proposed design to improve project implementation and control by the PMU, soliciting better efficiency / effectiveness, a quality driven approach, stakeholder satisfaction and a seamless integration into the regular organizational mechanisms. Moreover, manageable and measureable objectives were created for the PMU by analysing the risks, stakeholders, authority structures, communications and other factors --- which then set out milestones which gauge project performance and further develop the project management requirements of the RMMS project.

This project compiled the nine (9) project management plans and their deliverables creating a project framework which can successfully create a road maintenance management system software and a legal policy and Revised Roads Act for St.Vincent and the Grenadines. The project management proposal created a scope management plan which analyzes current road prioritization and defined the requirements and activities of the RMMS as the new regime for decision making in future prioritization of road maintenance projects and validated the work breakdown structure of the Project Management Unit; developed a time management plan which defined the sequence of activities, estimated resources and duration, and fully defined the schedule of the RMMS system implementation; established a cost management plan in order to estimate the budget for the project

to implement cost management and control procedures. Furthermore, this project management proposal explored the project risks, constraints, assumptions to understand risks to the project of the RMMS and create a risk management plan to properly coordinate countermeasures; detailed a stakeholder management plan to identify both internal and external stakeholders, their influence and expectations of the RMMS and manage stakeholder engagement; created a communications management plan to properly manage multimedia communications between internal and external stakeholders, defined communication pathways, ensured proper reporting / authority structure and standardize important communications. The project management proposal ensured the development of a human resource required to complete the implementation of the RMMS, defined policy on the acquisition of the project team members and the development and management structure of the project team, Detailed a procurement management plan to analyse equipment, hardware and software needs and procurement strategy to detail procurement stakeholders and procurement methods and finally, ensured a quality management plan is in place to ensure quality assurance and management.

The Project Management Plan organized the activities and work into six (6) phases: Project initiation and planning activities; Roads classification; Road maintenance management system – software development life cycle; Legal aspects; RMMS road maintenance program execution activities; Project closing.

From the project results, it can be concluded that successful project management of multidisciplinary projects such as the RMMS project is dependent heavily on a project manager with a background in PMI Standards and who is capable of the following: managing scope, time, cost and quality constraints; allocating resources and personnel as necessary; and, properly performing stakeholder management through consistent and effective communication.

In general, the Roads, Buildings and General Services Authority (BRAGSA) and the Government of St.Vincent and the Grenadines can improve operations significantly by including a project management approach to phases of a project from project proposal and project execution to project closing. These organizations can gain remarkable benefits by creating template documents for Project Management. Project Management is a relatively new methodology to local organisations and the business environment. Therefore, phased approaches to its implementation should be adopted. In the long-term, maybe ten (10) years from now, it would be highly beneficial if all project managers and organizational heads were at least partially-versed in project management methodology.

1 INTRODUCTION

In order to provide the relevant background information for a better understanding of the project management plan presented in this document, the following information serves as a general orientation on the different national and institutional matters of interest.

1.1 BACKGROUND

St.Vincent and the Grenadines is a multi-island country, formed by volcanic activity located at 13°10′N 61°14′W in the Caribbean Sea. The 384km^2 country has approximately 700km of infrastructure serving a population of 110,000. Figure 1 summarizes the position of the country in the Caribbean. The main island is generally mountainous especially in the central regions. – It is made up of 50% of 30 degrees slopeland and 20% of 20 degrees slopeland and borded with black, volcanic sand beaches while the smaller Grenadines are generally low dry hills with white sand beaches (GoSVG, 2002). Most of the population is scattered around low-lying areas especially near riversides. Figure 2 shows the main island, its topography(elevation) and drainage distribution. The rivers serve many purposes such as for washing and irrigation.

Figure 1 Position of St.Vincent and the Grenadines in the Caribbean

Soils are generally volcanic in nature. Northern soils are coarse volcanic aggregates from the frequent eruptions of La Soufriere Volcano. High-level yellow earth/brown Tephra soils are found above the 600ft contour area and valley floors are covered with fertile alluvial deposits. There are also shoal clay soil deposits on the south western coast and shallow, acidic soils in the mountain range.

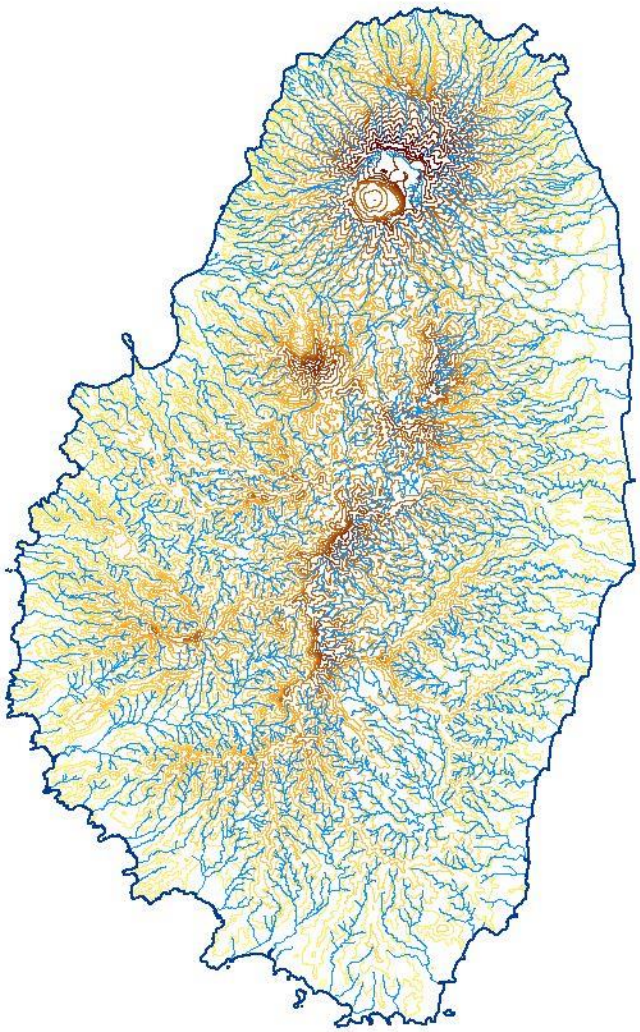


Figure 2 Drainage and Elevation of St.Vincent

From Figure 2, it can be seen that the main island is covered by many rivers and the central areas of the country are at high elevation. Watersheds lead to major

floodzones in the low lying lands which are also the highly populated areas and the areas of highest road infrastructural density.

The island is affected by various natural, man-made, geophysical and meteorological hazards which negatively affect its economic development and has direct adverse effects on local infrastructure. St.Vincent and the Grenadines is among the most disaster-prone countries in the world leading to regular damage to road infrastructure and these events tend to affect feeder roads and rural roads. Flooding and landslides often occur leading to damage to road infrastructure. In recent events, damage to road infrastucture has increased drastically.

Road maintenance in SVG is currently under the purview of the Roads, Buildings and General Services Authority (BRAGSA). An example of the current Road Prioritization sheet is found in Annex 4. Criteria which affect the condition and need for maintenance of the road network include:

1. Size of the population that uses the roads (city, town, community, etc.);
2. Access (areas, landuse and infrastructure which the roads give access to such as rural, private, community linkage, schools, etc.);
3. Primary and secondary uses of the roads (agriculture, tourism, etc.);
4. Current status of road condition (prevalence of road failure, potholes etc.);
5. Time period since the roads' most recent rehabilitation;
6. Exposure to geophysical, meteorological and environmental hazards; and,
7. Political intervention.

(*This is not an exhaustive list – only a reflection of the current system of road maintenance.)

A Road Maintenance Management System (RMMS) is an iterative database-driven geospatial reference system which integrates geospatial information, statistical data and modern asset inventory systems to prioritize roads by their need for road maintenance throughout the country to improve decision making for future road maintenance projects. This proposal studies the current system and promotes a project management-oriented approach intended to pilot the creation of a Road Maintenance Management System by the Project Management Unit under the Roads, Bridges and General Services Authority.

Improvements and the general ubiquitousness of geographic information systems software and personnel trained in geospatial analysis througout the world has exacerbated the speed of implementation of systems such as RMMS/RAMS in the transportation sectors of many developed countries. In the United States, many states have upgraded their RMMS systems to RAMS to fully manage all road and traffic assets, while countries such as India have initiated the implementation of RMMS. Lesser developed countries have been encouraged to implement these systems through donors, funding agencies and more developed countries. These agencies / countries lend technical support and training to local stakeholders to expediate the capacity building necessary for the creation of RMMS systems.

The Road Maintenance Management System (RMMS) originates as one of the requirements of the Road Management and Rural Road Improvement Programmes in Saint Vincent and the Grenadines (SVG) under the 11th European Development Fund (EDF). The project document under the 11th EDF states in part:

> *The overall objective of the intervention is to enhance the quality of and to improve climate change resilience of the road network in particular rural roads, in Saint Vincent and the Grenadines. This will*

contribute to the stimulation of economic activities in rural communities and reduced vulnerability in climate change.

The specific objectives of the intervention will be to (a) strengthen the national road management and maintenance programme whilst minimizing environmental impacts and (b) upgrade and "climate-proof" village and feeder roads.

The proposed project is aligned with the national priorities in the road sector which are to upgrade the road network through developing a comprehensive road maintenance programme and to upgrading village and feeder roads to facilitate greater rural and economic activity.

The main requirements of the project by the coordinating body, Ministry of Central Planning of the Government of SVG (hereon, MoCP) and the European Development Fund Project Mamagement Unit (EDF-PMU) and the Donors is that the system:

1. Classifies and differentiates roads;
2. Consolidates road data;
3. Incorporates rehabilitation and maintenance costs;
4. Allows for future development and manipulation to improve prioritization accuracy; and,
5. Maintains an objective, data-driven approach.

The road network is currently in varying states of disrepair. The western section of the primary highway is medium to highly maintained, while secondary and tertiary roads are in a lower state of maintenance due to the limited funding available for road infrastrucure maintenance.

The majority of funding for local infrastructural upgrade and maintenance comes from regional and international donors. Sponsorship for this project is through the 11th European Development Fund and is coordinated through the local line government ministry, The Ministry of Central Planning. The geomorphological and meteorological situation of the country and the worldwide push for disaster risk reduction and sustainability of developing countries, including rural and agricultural sector improvements, have caused donors to insist upon improved prioritization and climate-resilient designs in road management. Donors have also insisted upon the need for objectivity in road maintenance project determination and the need to limit ~~to~~ external interventions such as political and personal influence.

The RMMS includes a direct update to the current Road Network GIS map, which was built by INES Ingenieros Consultores in 2013 as part of the Regional Disaster Vulnerability Reduction Project (RDVRP), and an SQL-based interface for data input.

The legal backdrop of the road system of Saint Vincent and the Grenadines can be found in the Roads Act of 1957 (Government of St.Vincent and the Grenadines, 1957). This Act included a classification system for roads which was entirely relevant at its inception. However, as the road network became more diverse, this system has since been superceded by different classification systems under various bodies purposed with roles which involved the road network (repair, rehabilitation, policing).

The Ministry of Central Planning (MoCP) tasked the PMU to also analyze the Roads Act and suggest updates to ensure the legal framework exists for the proper functioning of the PMU, to better reflect the current road network and to unify the road network classification system among the various bodies throughout the

country. After analysis by both BRAGSA and MoCP personnel, it was suggested that the Roads Authority should take legal responsibility for the road naming process for public roads.

There have previously been multiple naming regimes for road classification employed by St. Vincent and the Grenadines. With the great push towards improvement in the agricultural sector and rural growth, two specific subclasses of roads have been highlighted by the donor organization, they are: 1) Feeder Roads and 2) Rural Roads. A feeder road is defined as a tertiary road which leads to agricultural lands. A rural road is any tertiary road which leads to smaller communities. Improvements to these classes of roads are intended to become a greater priority in future road development with the hope of opening up the country to greater economic growth. Figure 3 identifies some examples of road network infrastructure in need of repairs.

Figure 3 Examples of Roads in Need of Repair in St.Vincent and the Grenadines

This study intends to carry out the initiating and planning processes of ten (10) knowledge areas of a project management plan to ensure the proper functionality and high productivity of the Project Management Unit which will implement the RMMS according to the parameters put forward by the sponsors, the EDF.

1.2 STATEMENT OF THE PROBLEM

Many stakeholders regionally, internationally and throughout St.Vincent and the Grenadines have stated that the poor state of road infrastructure within the country is one of the main issues hindering sustainable development. They have questioned the prioritization of roads in the past and have requested a more

objective approach to road maintenance prioritization. This project incorporates the development of a project management proposal for a Road Maintenance Management System (RMMS) to improve future maintenance of road infrastructure in St. Vincent and the Grenadines.

1.3 PURPOSE

This proposal is the Project Management Plan for the Project Management Unit to carry out the establishment of the Road Maintenance Management System (RMMS) and formalize its implementation to coordinate future road maintenance projects in St.Vincent and the Grenadines. This plan will evaluate the current status of road maintenance prioritization, establish new norms, identify project risks, delineate legal aspects of road management and establish a firm project management oriented backbone for the future maintenance of the Road Network of St.Vincent and the Grenadines.

The project management proposal endeavours to formalize all necessary components of the project including scope, time and other knowledge areas, while predicting as much risk to project completion as possible by organizing and planning project activities and resource alotment clearly and succintly.

The expected benefits of the project are improvements to the project management capacity of the organization (by instilling PMP recognized procedures), and knowledge area management. The project also endeavours to ensure the proper documentation of the necessary processes to complete the Road Maintenance Management System.

1.4 GENERAL OBJECTIVE

To propose a project management plan to execute the Road Maintenance Management System (RMMS) in Saint Vincent and the Grenadines within the organization of Buildings, Roads, and General Services Authority (BRAGSA) according to project management standards.

1.5 SPECIFIC OBJECTIVES

The specific objectives are to:

1. Create a scope management plan which analyzes current road prioritization and defines the requirements and activities of the RMMS as the new regime for decision making in future prioritization of road maintenance projects and validate the work breakdown structure of the Project Management Unit.
2. Develop a time management plan which defines the sequence of activities, estimates resources and duration, and fully defines the schedule of the RMMS system implementation.
3. Establish a cost management plan in order to estimate the budget for the project, to implement cost management and control procedures.
4. Explore the project risks, constraints, assumptions to understand risks to the project of the RMMS and create a risk management plan to properly coordinate countermeasures.
5. Detail a stakeholder management plan to identify both internal and external stakeholders, their influence and expectations of the RMMS and manage stakeholder engagement.
6. Create a communications management plan to properly manage multimedia communications between internal and external stakeholders, define communication pathways, ensure proper reporting / authority structure and standardize important communications.
7. Ensure the development of a human resource management plan which identifies the skills required to complete the implementation of the RMMS, defines

policy on the acquisition of the project team members and the development and management structure of the project team.

8. Detail a procurement management plan to analyse equipment, hardware and software needs and procurement strategy to detail procurement stakeholders and procurement methods.

9. Ensure a quality management plan is in place to ensure quality assurance and management.

2 THEORETICAL FRAMEWORK

2.1 COMPANY/ENTERPRISE FRAMEWORK

2.1.1 Company/Enterprise background

The Building, Roads, and General Services Authority (BRAGSA) was created on July 1st, 2009 under the "BRAGSA Act" (Government of St. Vincent and the Grenadines, 2009) by the Unity Labour Party Government, after consultations with FDL Consult Inc.. Through the Act, the Authority combined the services of two functional bodies of the government:

1. the General Equipment and Services Corporation (GESCO) which was involved in the rental of heavy equipment, repairs to government vehicles and mining / sales of construction raw materials.
2. The Roads Division of Ministry of Transport and Works which was involved in roads and buildings maintenance.

The Authority has since been the sole body in charge of roads maintenance. The body also subcontracts road maintenance and in cases where road rehabilitation has to take place, this is done through the Chief Engineer's Office of the Ministry of Transport and Works. BRAGSA's responsibilities and works are summarized in Figure 4 below:

Road Infrastructure Maintenance	
Building Infrastructure Maintenance	
Emergency Response	

Sales of Aggregate and Construction Materials	
River, Sewerage and Drainage Cleaning and Works	
Contracted Structural Works	

Figure 4 BRAGSA Operations

2.1.2 Mission and vision statements

The Mission Statement of BRAGSA is:

> *BRAGSA will operate ethically to effectively and efficiently construct and maintain infrastructure, and provide products and services of the highest quality and standards to all stakeholders while promoting the growth and development of its human resources.*

The Vision Statement of BRAGSA is:

> *To be an established institution with a motivated and committed staff providing highly regarded, high quality products and services in all areas of roads, buildings and general services required for development nationwide.*

Inherently, the RMMS project is intended to increase the ethical choices made in road maintenance by creating an objective system which cannot be as easily influenced by stakeholders with personal, socially inefficient motivations. The RMMS project will improve upon what exists by automating the current prioritization system. This project management plan also incorporates the recruitment and training of personnel to fill the needs of the RMMS thereby improving the human resources within the organization. This project management plan formalizes effective and efficient procedures to implement the RMMS project while improving upon the standard, quality and legal foundation of the delivery of road maintenance by BRAGSA.

2.1.3 Organizational Structure

The Roads, Bridges and General Services Authority(BRAGSA) is headed by a Board of Governors selected by the Government of St.Vincent and the Grenadines and a Chief Executive Officer. The organization is then further divided into four (4)

functional areas which answer directly to the CEO. Each Functional Area is headed by a senior officer who reports directly to the CEO / select committees of the Board of Governors. The functional heads of each area and the organizational chart are introduced in Figure 5 and their functions are as follows:

1. Commercial Services: charged with the responsibility of mining operations of sand and aggregate, gasoline sales and general upkeep of equipment and vehicles of BRAGSA and other government organizations / departments.
2. Infrastructural Services: charged with maintenance of public infrastructure of all types throughout the country. This division is separated into Roads Maintenance Division and Buildings Maintenance Division.
3. Finance: charged with the overview of financial day-to-day activity of BRAGSA; payments, wages, etc.
4. HR/Admin: charged with the higher level management of BRAGSA, recruitment of personnel, etc.

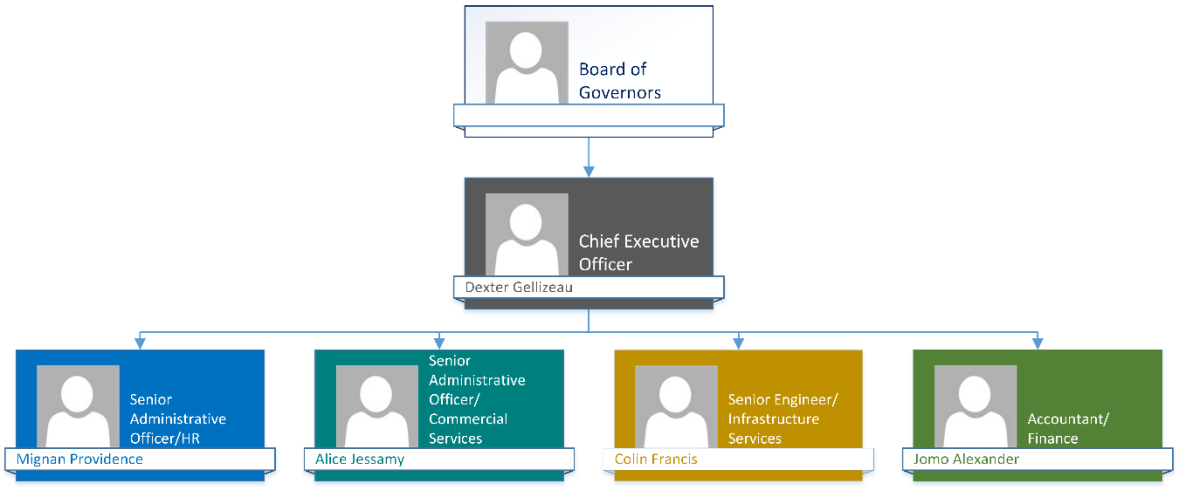


Figure 5 Organizational Chart of BRAGSA

The RMMS Project will be managed under a Project Management Unit (PMU) which will be under the direct supervision of the senior engineer, who manages the day-to-day functioning of the Infrastructural Services Department. The senior engineer answers directly to the CEO. Reporting to the senior engineer are the

engineers of the Building Maintenance Division and the Roads Maintenance Division. Both divisions currently have a functional engineers' assistants who are supported by multiple maintenance officers (Building Maintenance Officers – BMOs and Roads Maintenance Officers – RMOs). This Division is then made up of the various skilled and unskilled workmen both permanently and temporarily employed. The organizational structure of the Infrastructural Services Division is presented in Figure 6:

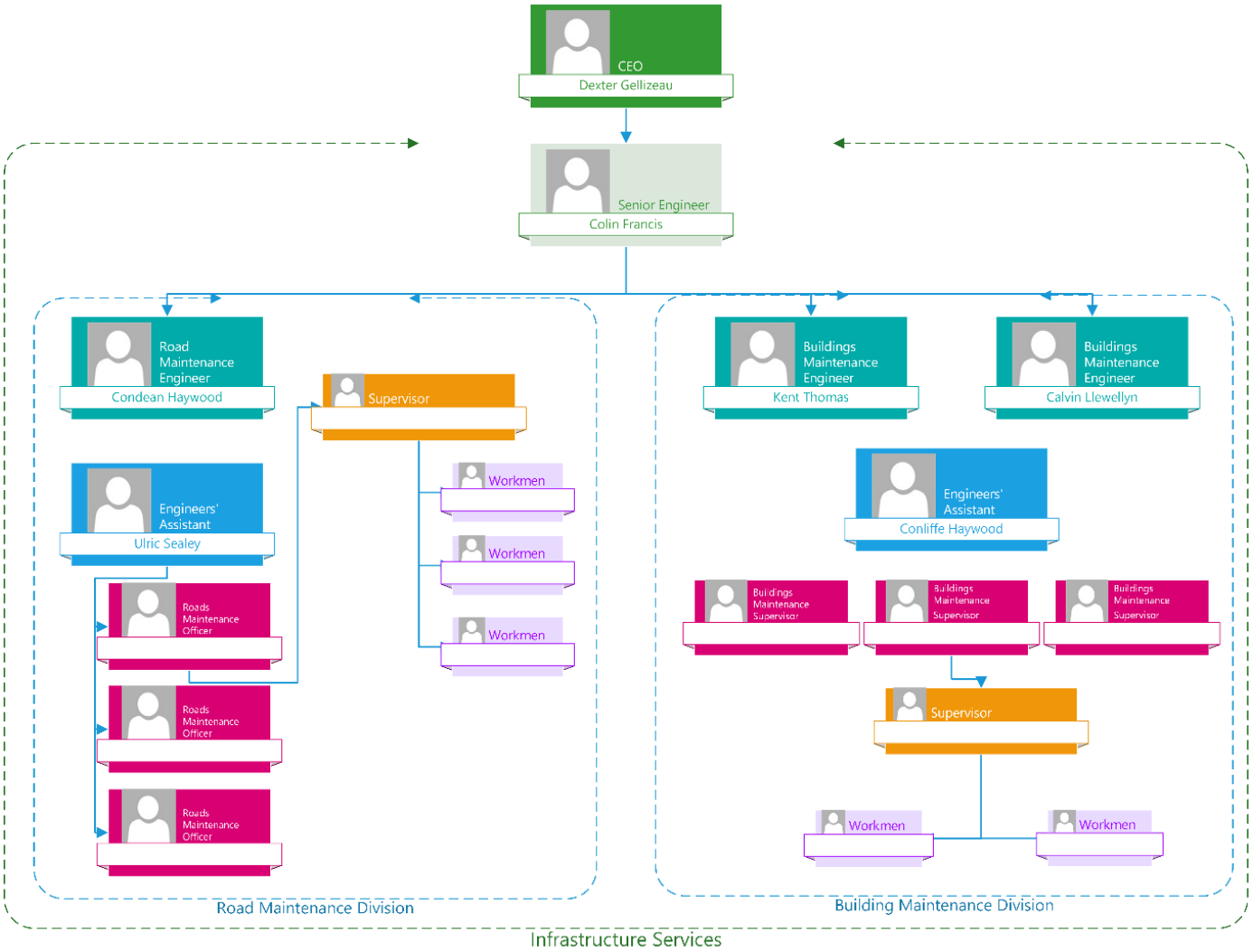


Figure 6 Organizational Chart of Infrastructural Services Division

The Infrastructural Services Division is tasked with the general upkeep of roads, buildings and public infrastructure throughout the country. This project is embarked upon to develop a Project Management Proposal of a Road Maintenance Management System (RMMS) and its implementation by a Project Management Unit formed under the organization Roads, Buildings and General Services Authority (BRAGSA) to ensure that road maintenance funding is used as appropriately as possible, that is, impacts as many road-users as possible, impacts the roads in most need of repair. Human resource for the establishment of the PMU – including needs assessment, recruitment and training and policies – is elaborated upon in the Human Resources Management Plan. The organizational structure of the proposed PMU is shown in Figure 7:

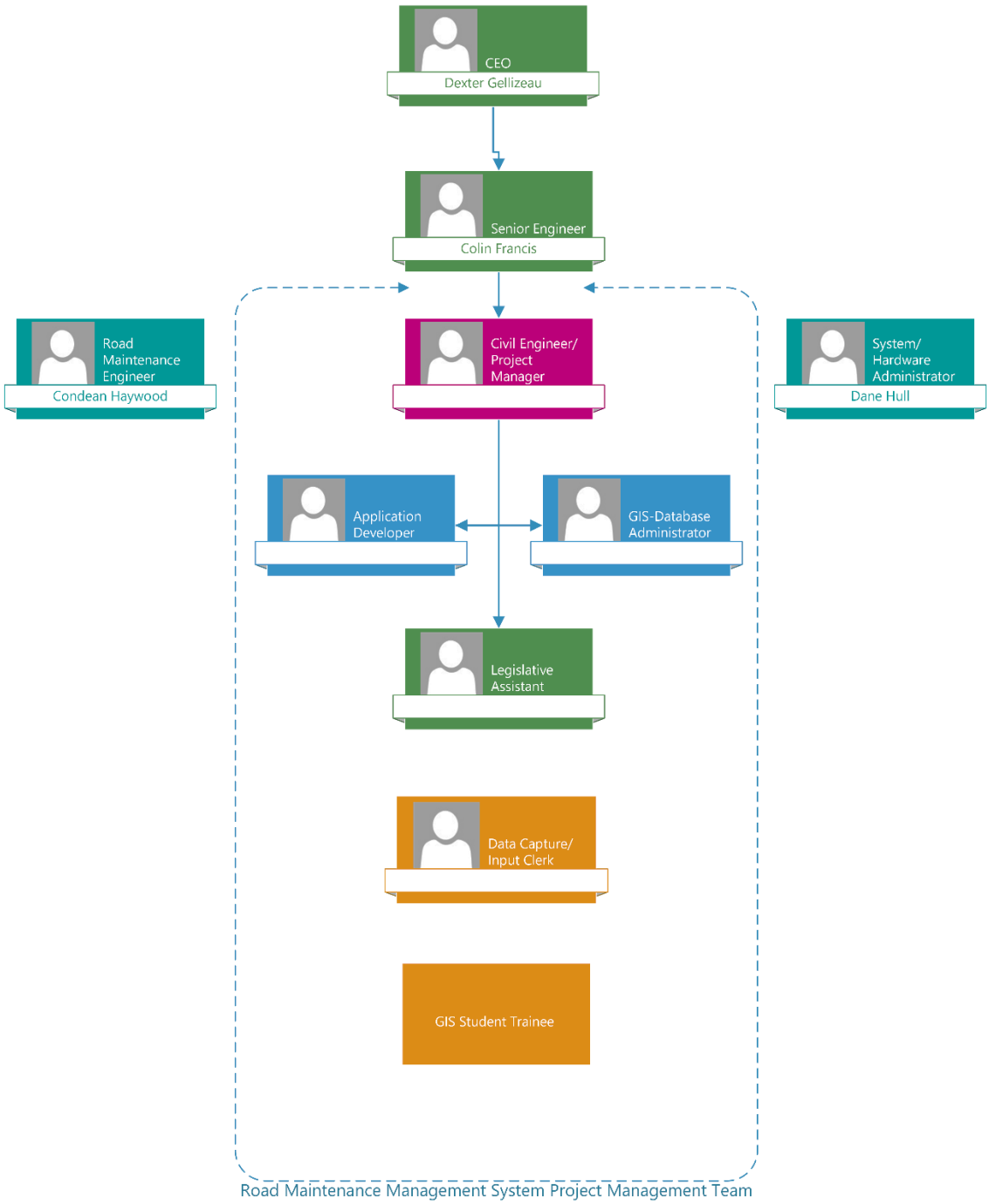


Figure 7 Proposed Organizational Chart of the Project Management Unit

2.2 PROJECT MANAGEMENT CONCEPTS WITHIN THE ORGANIZATION

2.2.1 Project

A project is a temporary endeavour undertaken to create a unique product or service. This project highlights the different aspects of a project management plan which will be implemented under a PMU tasked with: a) the creation of a Roads Maintenance Management System for the country of St.Vincent and the Grenadines, its related documents and outputs; and b) the amendment of the Roads Act of 1957. The latter is needed for the RMMS to be fully implemented, for the roads authority (currently BRAGSA) to have binding legal support, and for the modernization and unification of the road classification system.

2.2.2 Current Project Management

Projects are usually managed under the engineers within BRAGSA and are carried out by supervisors, workmen and personnel throughout the country. Projects are sponsored by external stakeholders who approach the CEO of BRAGSA with a basic project outline detailing some baselines for the project completion such as cost and time budgets. This information is then disseminated to engineers who carry out further investigation and make determination of project parameters. There are very few set procedures and processes in projects which are not recurring. An example of a non-recurring project is the rehabilitation of the Milton Cato Memorial Hospital Morgue. This project was sponsored by the Pan-American Health Organization and was brought to BRAGSA through the Ministry of Health and the Environment of the Government of St.Vincent and the Grenadines. This project had a specific time-frame of three (3) months and a budget. The task was embarked upon but was not finished within these parameters. Often, projects are brought at the last minute to the organization when the sponsor is about to pull its resources out of the hands of the Ministries of the GoSVG. This inherently means

that some projects are “set up to fail” but BRAGSA often has no choice but to take them due to its status as a statutory body.

Project Management templates have been developed over the years for recurring projects, such as the Road Cleaning Programme and Schools’ Summer Repair Programme. These documents are used among engineers and are not officially organizational assets. Standardized organizational assets related to project management are low-level documentation for supervisors such as time sheets, estimates sheets and work progress reports.

The 11th EDF’s main interest in the implementation of the RMMS is that when funding is allocated to St.Vincent and the Grenadines for Road Maintenance through the EDF or other donors, for example, the World Bank (WB), International Monetary Fund (IMF) and the Organization of Eastern Caribbean States (OECS), the RMMS will output a prioritized list of roads which are in dire need ~~for~~ of repairs. This list will then be utilized for final decision making / allocation of projects from the funds.

2.3 RMMS MANAGEMENT AS A PMU TASK

The reasons for the implementation of a PMU and the utilization of project management standards are to: manage this task to ensure the probability of failure is reduced; ensure the projects' objectives are delivered well within budget; ensure the productivity of the project members can be directly managed and staffing can be increased and decreased throughout the project management cycle on a needs basis; and, schedule the project within a specific time-frame with the intention of increasing cost savings through quick delivery.

2.3.1 What is a Road Maintenance Management System(RMMS)?

A Road Maintenance Management System (RMMS) is a database-driven road inventory status and maintenance prioritization system utilizing geospatial referencing to analyze comparatively, road maintenance and rehabilitation needs. In this regard, the RMMS differs from a Road Asset Management System (RAMS) which is focused on maintenance, upgrading and the operation of all road assets. The RMMS utilizes statistical analysis of criteria such as road quality, environment, traffic and cost to ascertain the needs assessment of repair and comparatively value the need between different sections of roads throughout the country/state/region in question.

The output of the RMMS will be utilized for annual work plans, individual programmes and long range maintenance plans. Primary examples of these three situations are as follows:

1. A sponsor intends to release funding for a road maintenance programme and requires a list of priority roads which the funding will be used to repair -- for example, one of the components of the 11th EDF is a road maintenance project which will utilize the RMMS to suggest four roads for repairs. (*Programme*)

2. The government uses local funding to sponsor road maintenance and requires the list of priority roads. These projects are often created by line government bodies for specific purposes – for example, the Ministry of Agriculture seeking to improve agricultural roads in a specific district to support new agricultural infrastructure (palletization plants, market areas, etc.). (*Programme*)
3. BRAGSA utilizes the list of priority ~~r~~oads to suggest a recurring annual road maintenance programme to Cabinet. This programme will be of a rolling annual nature, updated as roads are maintained and will become one of the primary deliverables of BRAGSA in each year's national budget. (*Annual Work Plan*)
4. An annual status report of the national road network for Cabinet and other ministries' perusal. (*Long Range Plan*)
5. A long-term road maintenance plan for future budgeting purposes. (*Long Range Plan*)

2.4 THEORY OF PROJECT MANAGEMENT

The Project Management Institute (PMI) standards incorporate ten knowledge areas as defined by the Project Management Body of Knowledge (PMBOK) which are important in representing “a complete set of concepts, terms, and activities” (PMBOK, Project Management Institute, 2013) that give structure to a professional approach to project management. These knowledge areas act as a guide for project managers, while the five project management process groups “which follow the high-level process of project management” (Rita Mulcahy, et al; 2013) is generalized as what a project management team needs to do to manage the work.

The ten (10) knowledge areas are: (1) project integration management, (2) project scope management, (3) project time management, (4) project cost management, (5) project quality management, (6) project human resource management, (7) project communications management, (8) project risk management, (9) project procurement management, and (10) project stakeholder management. The ten (10) knowledge areas are defined (Chapter 4-13, PMBOK, Project Management Institute, 2013) by the following:

Project integration management are “the processes and activities to identify, define, combine, unify, and coordinate the various processes and project management activities within the project management process groups”. The PMBOK states that integration has the characteristics of “unification, consolidation, communication and integrative actions” – these actions are used to seamlessly control the project from inception to completion. Project scope management are “the processes required to ensure that the project includes all the work required, and only the work required, to complete the project successfully”. Project time management are “the processes required to manage the timely completion of the project” and to support the scheduling of the scope, activities and resource

allocation. Project cost management are “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 quality management are “the processes and activities of the performing organization that determine quality policies, objectives, and responsibilities so that the project will satisfy the needs for which it was undertaken”. Project human resource management are “the processes that organize, manage, and lead the project team”. Project communication management is defined as “the processes that are required to ensure timely and appropriate planning, collection, creation, distribution, storage, retrieval, management, control, monitoring, and the ultimate disposition of project information” – project communication management defines the interaction between the project team and internal and external stakeholders. Project risk management are “the processes of conducting risk management planning, identification, analysis, response planning, and controlling risk on a project” – positive and negative risks and uncertainties in projects is inevitable and often found throughout the project; controlling risk is the project manager’s greatest action to ensure project success. Project procurement management are “the processes necessary to purchase or acquire products, services, or results needed from outside the project team” – proper management of procurement ensures budgetary constraints and control of costs are met effectively. Project stakeholder management are “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” – stakeholders are to a project analogous to the audience, critics and supporters of an actor; ensuring their happiness and creating an inclusive approach to stakeholder input improves the probability of project success.

Chart 1 Project Management Process Group and Knowledge Area Mapping (PMBOK, Project Management Institute, 2013)

Knowledge Areas	Project Management Process Groups				
	Initiating Process Group	**Planning Process Group**	**Executing Process Group**	**Monitoring and Controlling Process Group**	**Closing Process Group**
4. Project Integration Management	4.1 Develop Project Charter	4.2 Develop Project Management Plan	4.3 Direct and Manage Project Work	4.4 Monitor and Control Project Work 4.5 Perform Integrated Change Control	4.6 Close Project or Phase
5. Project Scope Management		5.1 Plan Scope Management 5.2 Collect Requirements 5.3 Define Scope 5.4 Create WBS		5.5 Validate Scope 5.6 Control Scope	
6. Project Time Management		6.1 Plan Schedule Management 6.2 Define Activities 6.3 Sequence Activities 6.4 Estimate Activity Resources 6.5 Estimate Activity Durations 6.6 Develop Schedule		6.7 Control Schedule	
7. Project Cost Management		7.1 Plan Cost Management 7.2 Estimate Costs 7.3 Determine Budget		7.4 Control Costs	
8. Project Quality Management		8.1 Plan Quality Management	8.2 Perform Quality Assurance	8.3 Control Quality	
9. Project Human Resource Management		9.1 Plan Human Resource Management	9.2 Acquire Project Team 9.3 Develop Project Team 9.4 Manage Project Team		
10. Project Communications Management		10.1 Plan Communications Management	10.2 Manage Communications	10.3 Control Communications	
11. Project Risk Management		11.1 Plan Risk Management 11.2 Identify Risks		11.6 Control Risks	

Knowledge Areas	Project Management Process Groups				
	Initiating Process Group	**Planning Process Group**	**Executing Process Group**	**Monitoring and Controlling Process Group**	**Closing Process Group**
		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	12.2 Conduct Procurements	12.3 Control Procurements	12.4 Close Procurements
13. Project Stakeholder Management	13.1 Identify Stakeholders	13.2 Plan Stakeholder Management	13.3 Manage Stakeholder Engagement	13.4 Control Stakeholder Engagement	

The five (5) project management process groups are: (a) initiating, (b) planning, (c) executing, (d) monitoring & controlling, and (e) closing. The five (5) process groups are defined (Chapter 3, PMBOK, Project Management Institute, 2013) by the following:

Initiating process group are “processes performed to define a new project or a new phase of an existing project by obtaining authorization to start the project or phase”. The Planning process group are the “processes required to establish the scope of the project, refine the objectives, and define the course of action required to attain the objectives that the project was undertaken to achieve. The Executing process group are the processes “performed to complete the work defined in the project management plan to satisfy the project specifications”. The Monitoring and Controlling process group are the “processes required to track, review, and regulate the progress and performance of the project; identify any areas in which changes to the plan are required; and initiate the corresponding changes. The Closing process group are the processes which “finalize the activities across all process groups to formally close the project or phase”. These process groups and the processes they consist of can be summarized by the following table:

Chart 2 Rita's Process Chart (Rita Mulcahy, 2013)

INITIATING	PLANNING(This is the only process group with a set order)	EXECUTING	MONITORING & CONTROLLING	CLOSING
Select project manager	Determine how you will plan for each knowledge area	Execute the work according to the PM plan	Take action to control the project	Confirm work is done to requirements
Determine company culture and existing systems	Determine detailed requirements	Produce product deliverables(product scope)	Measure performance against the performance measurement baseline	Complete procurement closure
Collect processes, procedures, and historical information	Create project scope statement	Gather work performance data	Measure performance against other metrics in the PM plan	Gain final acceptance of the product
Divide large projects into phases	Assess what to purchase and create procurement documents	Request changes	Analyze and evaluate performance	Complete financial closure
Understand the business case	Determine planning team	Implement only approved changes	Determine if variances warrant a corrective action or other change request	Hand off completed product
Uncover initial requirement, assumptions, risks, constraints, and existing agreements	Create WBS and WBS dictionary	Continuously improve	Influence the factors that cause changes	Solicit feedback from the customer about the project
Assess project and product feasibility within the given constraints	Create Activity list	Follow processes	Request changes	Complete final performance reporting
Create measurable objectives	Create network diagram	Determine whether processes are correct and effective(quality assurance)	Perform integrated change control	Index and archive records
Develop project charter	Estimate resource requirements	Perform quality audits	Approve or reject changes	Gather final lessons learn and update knowledge database
Identify stakeholders and determine their expectations, influence and impact	Estimate time and cost	Acquire final team	Update the PM plan and project documents	
	Determine critical	Manage people	Inform stakeholders	

	path		of the results of change requests	
	Develop schedule	Evaluate team and individual performance	Monitor stakeholder engagement	
	Develop budget	Hold team-building activities	Manage configuration	
	Determine quality standards, processes, and metrics	Give recognition and rewards	Create forecasts	
	Create process improvement plan	Use issue logs	Gain acceptance of interim deliverables from the customer	
	Determine all roles and responsibilities	Facilitate conflict resolution	Perform quality control	
	Plan communications and stakeholder engagement	Release resources as work is completed	Perform risk reassessments and audits	
	Perform risk identification, qualitative and quantitative risk analysis, and risk response planning	Send and receive information, and solicit feedback	Manage reserves	
	Go back – iterations	Report on project performance	Control procurements	
	Finalize procurement documents	Hold meetings		
	Create change management plan	Select sellers		
	Finalize the “how to execute and control” parts of all management plans			
	Develop realistic and final PM plan and performance measurement baseline			
	Gain formal approval of the plan			
	Hold kickoff meeting			

This project utilizes the initiating and planning process groups of the nine (9) knowledge areas to improve project implementation and control at the PMU soliciting better efficiency / effectiveness, a quality driven approach, stakeholder satisfaction and a seamless integration into the regular organizational mechanisms. Moreover, manageable and measureable objectives are created for the PMU by analysing the risks, stakeholders, authority structures, communication

and other factors. These are then used to set out milestones to guage project performance and further develop the project management requirements of the RMMS project.

3 METHODOLOGICAL FRAMEWORK

3.1 INFORMATION SOURCES

3.1.1 Primary sources

- Primary sources are “the raw materials of history” derived directly from first-hand accounts of the time period or participants to the event or information in question. These may include documents, letters, articles, speeches, personal accounts such as diaries, oral interviews from the time and photographs (Roy Rosenzweig Center for History and New Media at George Mason University , 2016; United States Legislative Information, 2016). Primary Sources utilized in this project include:
    1. Documents such as:

the BRAGSA Act, The Roads Act of 1957, the Road Management and Rural Road Improvement Programme in Saint Vincent and the Grenadines (SVG) under the 11th European Development Fund (EDF), and The BRAGSA Human Resources Policy Document, Roads Maintenance Management System Roads Manual 1992.

2. Interviews with:

Minister of Transport and Works, Hon. Julian Francis; the Chief Engineer, Mr. Brent Bailey; the Town Planner, Tyrone Ballah; the Project Officer of EDF-PMU, Mrs. Sekai Bowman; the Senior Administrative Officer / HR, Ms. Mignan Providence; and Communications Manager at BRAGSA, Mrs. Roxtanne Millington.

3.1.2 Secondary sources

- A secondary source is any indirect source produced after an event or from accounts which are passed on by nonparticipants in the event; often it is an author who writes about an action someone else has taken. Secondary sources utilized in this project include:
    1. Interviews with:

The CEO of BRAGSA, Mr. Dexter Gellizeau, the Road Maintenance Engineer, Mr. Condean Haywood, Lawyer Ms. Isis Gonsalves, and Lawyer Mr. Ronald Marks.

The following (Chart 1) summarizes the information sources utilized in developing the RMMS project management proposal and categorizes primary and secondary information sources by objectives.

Chart 3 Information sources

Objectives	**Information sources**	
	Primary	**Secondary**
1. Create a scope management plan which analyzes current road prioritization and defines the requirements and activities of the RMMS as the new regime for decision making in future prioritization of road maintenance projects and validate the work breakdown structure of the Project Management Unit.	the Road Management and Rural Road Improvement Programme in Saint Vincent and the Grenadines(SVG) under the 11th European Development Fund(EDF),	CEO of BRAGSA Dexter Gellizeau, Road Maintenance Engineer Condean Haywood,
2. Develop a time management plan which defines the sequence of activities, estimates resources and duration, and fully defines the schedule of the RMMS system implementation.	the Road Management and Rural Road Improvement Programme in Saint Vincent and the Grenadines(SVG) under the 11th European Development Fund(EDF);	CEO of BRAGSA Dexter Gellizeau
3. Establish a cost management plan in order to estimate the budget for the project, to implement cost management and control		CEO of BRAGSA Dexter Gellizeau, Road Maintenance Engineer Condean Haywood, Lawyer Isis Gonsalves, Lawyer Ronald Marks

Objectives	Information sources	
	Primary	Secondary
procedures.		
4. To explore the project risks, constraints, and assumptions to understand risks to the project of the RMMS and create a risk management plan to properly coordinate countermeasures.	the Road Management and Rural Road Improvement Programme in Saint Vincent and the Grenadines (SVG) under the 11th European Development Fund (EDF),	
5. To detail a stakeholder management plan to identify both internal and external stakeholders, their influence and expectations of the RMMS and manage stakeholder engagement.	the Road Management and Rural Road Improvement Programme in Saint Vincent and the Grenadines(SVG) under the 11th European Development Fund(EDF; Project Officer of EDF-PMU Sekai Bowman; Minister of Transport and Works, Hon. Julian Francis; Chief Engineer Brent Bailey, Town Planner Tyrone Ballah	CEO of BRAGSA Dexter Gellizeau
6. Create a communications management plan to properly manage multimedia communications between internal and external stakeholders, define communication pathways, ensure proper reporting / authority structure and standardize important communications.	Communications Manager at BRAGSA, Roxtanne Millington; Project Officer of EDF-PMU Sekai Bowman	

Objectives	Information sources	
	Primary	**Secondary**
7. Ensure the development of a human resource management plan requiredto complete the implementation of the RMMS, defines policy on the acquisition of the project team members and the development and management structure of the project team.	The BRAGSA Human Resources Policy Document, Senior Administrative Officer/HR Mignan Providence	
8. Detail a procurement management plan to analyse equipment, hardware and software needs and procurement strategy to detail procurement stakeholders and procurement methods.		CEO of BRAGSA Dexter Gellizeau, Road Maintenance Engineer Condean Haywood,
9. Ensure a quality management plan is in place to ensure quality assurance and management.	the Road Management and Rural Road Improvement Programme in Saint Vincent and the Grenadines(SVG) under the 11th European Development Fund (EDF)	

3.2 RESEARCH METHODS

3.2.1 Analytical-Synthesis method

This method includes: (a) the analytic method which is the breaking down of larger objectives into simpler elements thereby making them more achievable; and, (b) the synthesis method which is the building up or combination of several simpler elements which are made of known facts. When used together, they allow for

objectives to be separated into achievable elements before the objective is re-established from these elements and a deliverable is produced. (Prakash, 2016).

The following (Chart 2) summarizes the research method and details how this method was utilized in developing each objective carried out by the RMMS project management proposal.

Chart 4 Research methods

Objectives	Research Methods	
1. Create a scope management plan which analyzes current road prioritization and defines the requirements and activities of the RMMS as the new regime for decision making in future prioritization of road maintenance projects and validate the work breakdown structure of the Project Management Unit.	Analytic-synthetic method	Analyse the different elements of the Project and their feasibility before reorganizing these elements to ascertain the feasiblity of the Project on a whole and its requirements for completion.
2. Develop a time management plan which defines the sequence of activities, estimates resources and duration, and fully defines the schedule of the RMMS system implementation..	Analytic-synthetic method	
3. Establish a cost management plan in order to estimate the budget for the project, to implement cost management and control	Analytic-synthetic method	Analyse the different aspects of the current organization standards then créate a document which corresponds with how these aspects may

Objectives	Research Methods	
procedures.		influence the Project.
4. Explore the project risks, constraints, assumptions to understand risks to the project of the RMMS and create a risk management plan to properly coordinate countermeasures.	Analytic-synthetic method	Analyse the risks and constraints involved in the execution of this Project then créate solutions and a plan to limit some risks involved.
5. Detail a stakeholder management plan to identify both internal and external stakeholders, their influence and expectations of the RMMS and manage stakeholder engagement.	Analytic-synthetic method	Analyse and identify stakeholders their needs and expectations and créate a communications approach to properly manage stakeholders.
6. Create a communications management plan to properly manage multimedia communications between internal and external stakeholders, define communication pathways, ensure proper reporting / authority structure and standardize important communications.	Analytic-synthetic method	Determine the need for communication pathways and authority levels, utilize previous informations(stakeholder register) to créate a functional plan toward communications.
7. Ensure the development of a human resource management plan requiredto complete the implementation of the RMMS, defines policy on the acquisition of the project team members and the development and management structure of	Analytic-synthetic method	

Objectives	Research Methods	
the project team.		
8. Detail a procurement management plan to analyse equipment, hardware and software needs and procurement strategy to detail procurement stakeholders and procurement methods.	Analytic-synthetic method	
9. Ensure a quality management plan is in place to ensure quality assurance and management.	Analytic-synthetic method	Ascertain the requirements of different stakeholders involved and the scope/time involved in reaching the milestones which they expect. Produce a plan toward reaching their expectations.

3.3 TOOLS AND TECHNIQUES

- Tools (and techniques) are the different methodologies of carrying out project management tasks.

The following (Chart 3) summarizes the Tools and Techniques utilized in developing the RMMS project management proposal and categorizes them by objectives carried out by the project.

Chart 5 Tools and Techniques

Objectives	Tools and Techniques
1. Create a scope management plan which analyzes current road prioritization and defines the requirements and activities of the RMMS as the new regime for decision making in future prioritization of road maintenance projects and	Expert Judgement, Brainstorming, meeting management

Objectives	Tools and Techniques
validate the work breakdown structure of the Project Management Unit.	
2. Develop a time management plan which defines the sequence of activities, estimates resources and duration, and fully defines the schedule of the RMMS system implementation..	Expert Judgement, Prototype
3. Establish a cost management plan in order to estimate the budget for the project, to implement cost management and control procedures.	Brainstorming, Meeting Management, Document Analysis
4. Explore the project risks, constraints, assumptions to understand risks to the project of the RMMS and create a risk management plan to properly coordinate countermeasures.	Meetings, Brainstorming
5. Detail a stakeholder management plan to identify both internal and external stakeholders, their influence and expectations of the RMMS and manage stakeholder engagement.	Expert Judgement
6. Create a communications management plan to properly manage multimedia communications between internal and external stakeholders, define communication pathways, ensure proper reporting / authority structure and standardize important communications.	Expert Judgement, Questionnaires and Surveys
7. Ensure the development of a human resource management plan requiredto complete the implementation of the RMMS, defines policy on the acquisition of the project team members and the development and management structure of the project team.	Brainstorming, Expert Judgement,
8. Detail a procurement management plan to analyse equipment, hardware and software needs and procurement strategy to detail procurement stakeholders and procurement	Expert Judgement

Objectives	Tools and Techniques
methods.	
9. Ensure a quality management plan is in place to ensure quality assurance and management.	Brainstorming, Expert Judgement,

3.4 ASSUMPTIONS AND CONSTRAINTS

- Assumptions can be defined as “circumstances and events that need to occur for the project to be successful, but are outside the total control of the project team” while constraints can be defined as “things that might restrict, limit, or regulate the project”. (Assumptions & Constraints, 2016).

The following (Chart 4) summarizes assumptions and constraints involved in the development of the RMMS project management proposal.

Chart 6 Assumptions and Constraints

Objectives	Assumptions	Constraints
1. Create a scope management plan which analyzes current road prioritization and defines the requirements and activities of the RMMS as the new regime for decision making in future prioritization of road maintenance projects and validate the work breakdown structure of the Project Management Unit.	The scope if itemized thoroughly will have a manageable number of tasks which can be completed within the time available.	Stakeholders may change the requirements while the time available does not change, leading to increased risk to project completion.
2. Develop a time management plan which defines the sequence of activities, estimates resources and duration, and fully defines the	The project will have enough time to be completed while reaching milestones in a timely manner.	Time may change according to stakeholder needs which is a known organizational issue.

Objectives	Assumptions	Constraints
schedule of the RMMS system implementation..		
3. Establish a cost management plan in order to estimate the budget for the project, to implement cost management and control procedures.	All documents and interviews are easily accessible.	Documents may not be for public use.
4. Explore the project risks, constraints, assumptions to understand risks to the project of the RMMS and create a risk management plan to properly coordinate countermeasures.	Major Project Risks can be properly documented and forecasted with appropriate solutions	Some risks may be perceived as minor and later become major.
5. Detail a stakeholder management plan to identify both internal and external stakeholders, their influence and expectations of the RMMS and manage stakeholder engagement.	Stakeholders all show interest in the completion of project objectives.	Some stakeholders may have strong influence and have their own agendas.
6. Create a communications management plan to properly manage multimedia communications between internal and external stakeholders, define communication pathways, ensure proper reporting / authority structure and standardize important communications.	Communications and Authority levels can be easily determined and reporting structures can be simple and straight-forward.	Communications that is most appropriate for the project may not align with external stakeholder objectives and may also not align with the organization’s typical communications methodology.

Objectives	Assumptions	Constraints
7. Ensure the development of a human resource required to complete the implementation of the RMMS, defines policy on the acquisition of the project team members and the development and management structure of the project team.	An organized HR plan will allow for the right personnel to be in the best positions to ensure strong productivity.	Local Human Resources may not have the personnel necessary nor the training readily available. Stakeholders may have strong influence on hiring and firing within the organization.
8. Detail a procurement management plan to analyse equipment, hardware and software needs and procurement strategy to detail procurement stakeholders and procurement methods.	Early Procurement of basic resources can allow for works to begin promptly and thereby assure stakeholders of the organization's capability to handle the project.	Procurement of specialized equipment is difficult within the country and may require additional time thereby impacting time management.
9. Ensure a quality management plan is in place to ensure quality assurance and management.	The project will have a high quality of output while reaching milestones in a timely manner.	

3.5 DELIVERABLES

- A deliverable is a service or product which a project delivers to the client after closing. A deliverable is time sensitive, tangible, measurable and specific (B., Kermit; studioD, 2016).

The following chart (Chart 5) summarizes the deliverables of the RMMS project management proposal:

Chart 7 Deliverables

Objectives	Deliverables
1. Create a scope management plan which	Scope Management Plan, WBS, WBS Dictionary,

Objectives	Deliverables
analyzes current road prioritization and defines the requirements and activities of the RMMS as the new regime for decision making in future prioritization of road maintenance projects and validate the work breakdown structure of the Project Management Unit.	Activity List, Milestone List, project scope statement
2. Develop a time management plan which defines the sequence of activities, estimates resources and duration, and fully defines the schedule of the RMMS system implementation..	Time Management Plan, Schedule Management Approach, Schedule baseline
3. Establish a cost management plan in order to estimate the budget for the project, to implement cost management and control procedures.	Budget, Cost Management Plan, Cost baseline
4. Explore the project risks, constraints, assumptions to understand risks to the project of the RMMS and create a risk management plan to properly coordinate countermeasures.	Risk Management Plan Personnel Needs Assessment, Job Descriptions, Organizational Assets Data, Responsibility Assignment Matrix (RAM), Human Resource Management Plan
5. Detail a stakeholder management plan to identify both internal and external stakeholders, their influence and expectations of the RMMS and manage stakeholder engagement.	Stakeholder Management Plan, Stakeholder Register
6. Create a communications management plan to properly manage multimedia communications between internal and external stakeholders, define communication pathways, ensure proper reporting / authority structure and standardize important communications.	Communications Management Plan, Change Request Plan, Change Log

Objectives	Deliverables
7. Ensure the development of a human resource management plan requiredto complete the implementation of the RMMS, defines policy on the acquisition of the project team members and the development and management structure of the project team.	Personnel Needs Assessment, Job Descriptions, Organizational Assets Data, Responsibility Assignment Matrix (RAM), Human Resource Management Plan
8. Detail a procurement management plan to analyse equipment, hardware and software needs and procurement strategy to detail procurement stakeholders and procurement methods.	Equipment Needs Assessment, Procurement Management Plan
9. Ensure a quality management plan is in place to ensure quality assurance and management.	Quality Management Plan, Quality Metrics, Quality Control and Quality Assurance Activities, Inspection Procedures, Submittal

4 RESULTS

4.1 PROJECT MANAGEMENT PLAN

This section contains nine (9) management plans which comprise the project management plan. The section contains the basic outline of the “Plan Management” process for each management plan. This project was originally initiated by personnel of the Buildings, Roads and General Services Authority (BRAGSA), the Ministry of Central Planning of the Government of SVG (MoCP), and the European Development Fund Project Management Unit (EDF-PMU).

Some deliverables were pre-defined in the initial meetings to decrease scope creep or risk from project commencement to closing. These predefined deliverables are presented within each of the following plans. Frequent phased stakeholder meetings are central to this Project Management Plan, many processes are carried out during these meetings, the lead-up and the follow-up. In the following chart (Chart 6), the baselines for this project are defined as:

Chart 8 Project Baselines

Project Baselines
Project Scope Baseline: • The Project Scope covers the building the Road Maintenance Management System, Drafting of Legislation and Policy(The Revised Roads Act), and Initiation of the Pilot Road Maintenance Programme
Project Schedule Baseline: • 3 Years from Project Kick-Off to Implementation - 2 Years alotted to the building the Road Maintenance Management System, Drafting of Legislation and Policy, and Initiation of the Pilot Road Maintenance Programme - 1 Year alotted to the Pilot Road Maintenance Programme
Project Cost Baseline: • $12 Million Euros($34.7 million XCD) - $400,000 Euros($1.16 million XCD) allocated to the building the Road Maintenance Management System, Drafting of Legislation and Policy, and Initiation of the Pilot Road Maintenance Programme - $11.6 Million Euros($33.5 million XCD) allocated to Pilot Road Maintenance Programme

4.2 ORGANISATIONAL ASSETS

The main organizational assets utilized by this project are the HR Policy Document of BRAGSA, The Onsite Job Priority Assessment Form (Appendix 4) and two consulting project team members. The HR Policy Document is employed as a guide for the roles and responsibilities definitions of project team members, project team members acquisition and human resource development. The Onsite Job Priority Assessment Form is the basis on which the first priority criteria for the RMMS are defined. There will be two consultants (C1, C2) from BRAGSA working with the project team to ensure the efficient completion of the RMMS project and to ensure that the RMMS is effective and applicable to the organization.

4.3 RELEVANT ABBREVIATIONS AND ACRONYMS

- BRAGSA – Roads, Buildings and General Services Authority
- Cabinet – Cabinet of GoSVG
- EDF-PMU – European Development Fund
- GoSVG – Government of St.Vincent and the Grenadines
- MoCP – Ministry of Central Planning
- MOTW – Ministry of Transport and Works
- NEMO – National Emergency Management Organisation
- PMU – Project Management Unit
- RMMS – Road Maintenance Management System
- SVG – Saint Vincent and the Grenadines

Project Phase Identifiers and Other Identifiers

- Project Initiation and Planning Activities(I)
- Roads Classification(R)
- Road Maintenance Management System(IT) – Software Development Life Cycle
- Legal Aspects(L)
- RMMS Road Maintenance Program Execution Activities(EX)
- Project Closing Phase(C)
- Procurement ID – PCM+#
- Cost ID – CST+#
- Project Team Members – P+#
- Consultants from BRAGSA – C+#

4.4 SCOPE MANAGEMENT PLAN

"*Create a scope management plan which analyzes current road prioritization and defines the requirements and activities of the RMMS as the new regime for decision making in future prioritization of road maintenance projects and validate the work breakdown structure of the Project Management Unit.*" – Objective 1

4.4.1 Plan Scope Management

(Section 5.1, PMBOK, Project Management Institute, 2013)

The Plan Scope Management determines the definition, validation and control of the Project Scope. The Project Charter, Project Management Plan, the Enterprise Environmental Factors (Infrastructure, Organization's culture) and the Organizational Process Assets (policies, procedures and historical information) were utilized during meetings between the Project Manager and the European Development Fund Project Management Unit(EDF-PMU) to build a Scope Management Plan.

Scope management will be carried out using the Microsoft Project platform utilizing Gantt Charts. Scope, Schedule and Cost tracking will be actively performed by the project manager. The project scope progress and activity status will be reviewed on a weekly basis by the project manager and additional resources within the budget will be acquired or reduced according to the risk management mitigation strategies. Scope progress will be communicated to stakeholders using signoff meetings throughout the project.

4.4.1.1 Requirements Management Plan

The requirements management plan will analyze, document, monitor and control project requirements. The execution phases of the RMMS project, namely Road Maintenance Management System (IT) – Software Development Life Cycle and

Legal Aspects (L) phases, occur concurrent and parallel to one another. Other phases will have a sequential relationship. These relationships are visualized in the following figure (Figure 8):

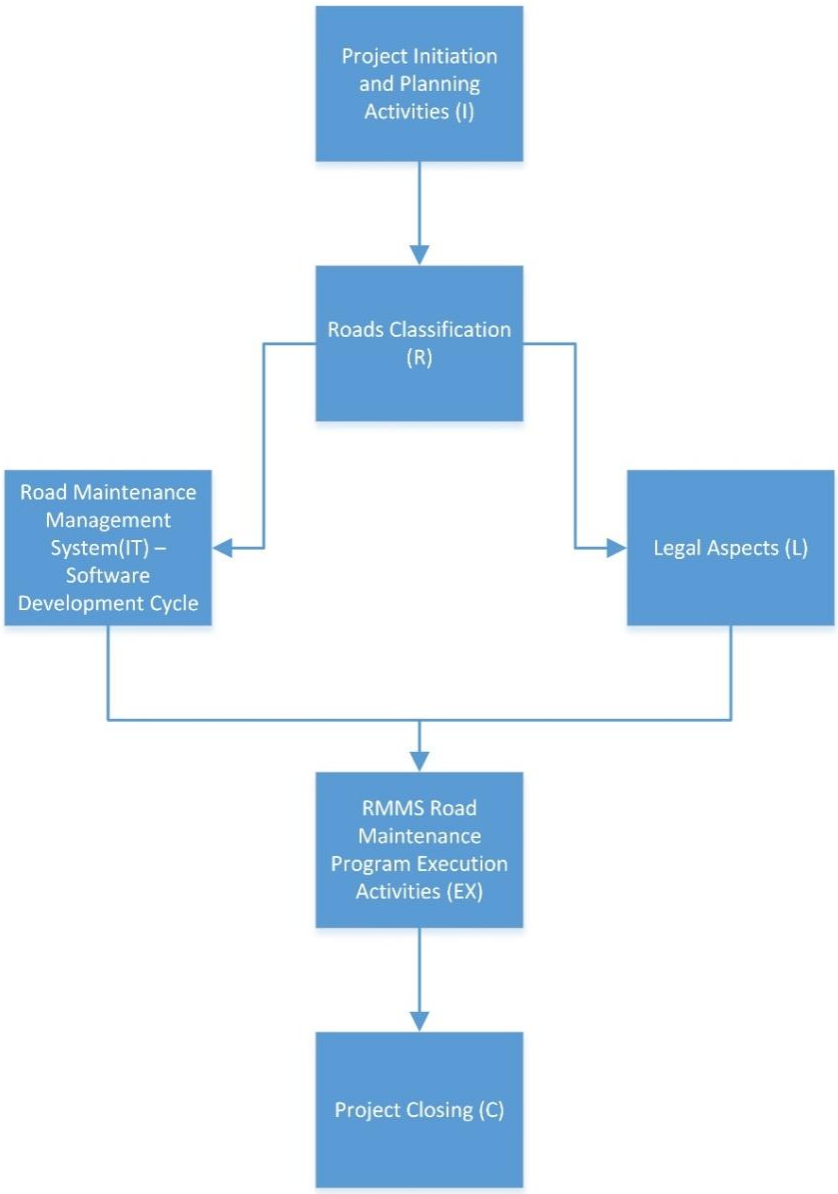


Figure 8 Project Phase Relationship

Requirements of the major stakeholders are prioritized over other stakeholders. Product Changes will occur through logging of change requests, which must be

approved by the project manager before any changes can occur. Change requests are traced, tracked and reported through the communication management plan.

4.4.2 Collect Requirements

(Section 5.2, PMBOK, Project Management Institute, 2013)

Requirements are collected by using meetings, group decision-making and interviews between the project team and the coordinating body. The main requirements of the project were defined by the coordinating body, Ministry of Central Planning of the Government of SVG (hereon, MoCP) and the European Development Fund Project Management Unit (EDF-PMU) and the donors. These requirements state that the product scope of the RMMS system:

1. Classifies and differentiates roads;
2. Consolidates road data;
3. Incorporates rehabilitation and maintenance costs;
4. Prioritizes Road Maintenance by criteria determined by the Roads Authority;
5. Allows for future development and manipulation to improve prioritization accuracy; and,
6. Maintains an objective, data-driven approach.

After expert analysis by both BRAGSA and MoCP personnel, it was suggested that the Roads Authority should take legal responsibility for the road naming process for public roads. This suggestion is to create a legal framework for the RMMS to function. The need for review and revision of the relevant legislation is included within the scope of RMMS project. The requirements for review of the legal framework by the MoCP is that “the new legislation and policy will align itself with local and regional legal and judicial norms and provide a simple transition from

draft into law". Other major stakeholders have not stated any requirements, therefore, the requirements of these stakeholders is defined as "successful project completion". The business requirements of BRAGSA are increased efficiency in road maintenance prioritization and management of roads data. The project is required to meet the stakeholders' needs throughout its life cycle and therefore requires multiple communication opportunities between the project team and the stakeholders. This is to facilitate future development of stakeholder requirements. During the course of the activity: Pilot of RMMS Prioritization to Choose Roads for Maintenance (EX4), the current and established Prioritization System which utilizes the Onsite Job Priority Assessment Form will be compared to the output of the RMMS Project to benchmark, compare and improve the new prioritization system. These requirements are documented and attached to the stakeholders' register to ensure proper traceability between stakeholder and future / current project requirements.

4.4.3 Define Scope

(Section 5.3, PMBOK, Project Management Institute, 2013)

The Define Scope process defines the project and product scope and the boundaries / limitations. The high level scope was defined using the Project Charter and Requirements Documentation by the coordinating body, Ministry of Central Planning of the Government of SVG(hereon, MoCP), the European Development Fund Project Management Unit (EDF-PMU) and the donors. Expert judgement is the most appropriate tool for these definitions in the Planning phase. The Product Scope defines the output of the RMMS Project as two components, they are:

1. The Revised Roads Act
2. The Road Maintenance Management System (RMMS) application

These Product Scope allows for the creation of the project scope satement and updates to the project management plan and documents.

4.4.3.2 Project Scope Statement

The project scope statement is**:**

To carry out the establishment of the Road Maintenance Management System and formalize its implementation to coordinate future road maintenance projects in St.Vincent and the Grenadines, evaluate the current status of road maintenance prioritization, establish new norms, delineate legal aspects of road management, and establish a firm project management oriented backbone to the future of maintenance of the road network of St.Vincent and the Grenadines.

4.4.4 Create WBS

(Section 5.4, PMBOK, Project Management Institute, 2013)

The planning team in meetings with the EDF-PMU defined the subdivisions of the project deliverables, project scope statement and project work into its more manageable elements using the techniques of decomposition and expert judgement. The work breakdown structure highlights the major work packages to carry out the work of the project phases. These packages are then broken down into activities which highlight the specifics of each work package. The WBS is represented in the following chart(Chart 7) and figure(Figure 9):

Chart 9 Work Breakdown Structure

ID#	Name
Project Initiation and Planning Activities(I)	
I1	Acquire Planning Team
I10	Acquire Software Development Team
I11	Acquire Legislative Assistant
I12	Team Meeting for Roles and Responsibilities Assignments
Roads Classification(R)	
R5	Signoff Meeting of Proposed Work Phases(IT,L)
Road Maintenance Management System(IT) – Software Development Life Cycle	

ID#	Name
IT27	Build API
IT33	Deployment of the System
Legal Aspects(L)	
L4	Draft Legislation on the Modernization of the Roads Act of Saint Vincent and the Grenadines
L5	Draft of Policy Documentation of the Road Maintenance Management System
L6	Submission for Review of the Draft Legislation by Attorney General's Office
RMMS Road Maintenance Program Execution Activities(EX)	
EX1	Establishment of the RMMS
EX4	Pilot of RMMS Prioritization to Choose Roads for Maintenance
EX8	Creation of Road Maintenance Project Using Pilot Roads
EX9	Stakeholder Workshop
EX11	Implement Public Awareness Strategy
Project Closing Phase(C)	
C1	Revised Roads Act Forward to Cabinet for Approval
C2	Policy Document Forward to Cabinet for Approval
C3	Project Forwarded to Cabinet for Approval
C4	Project Closing

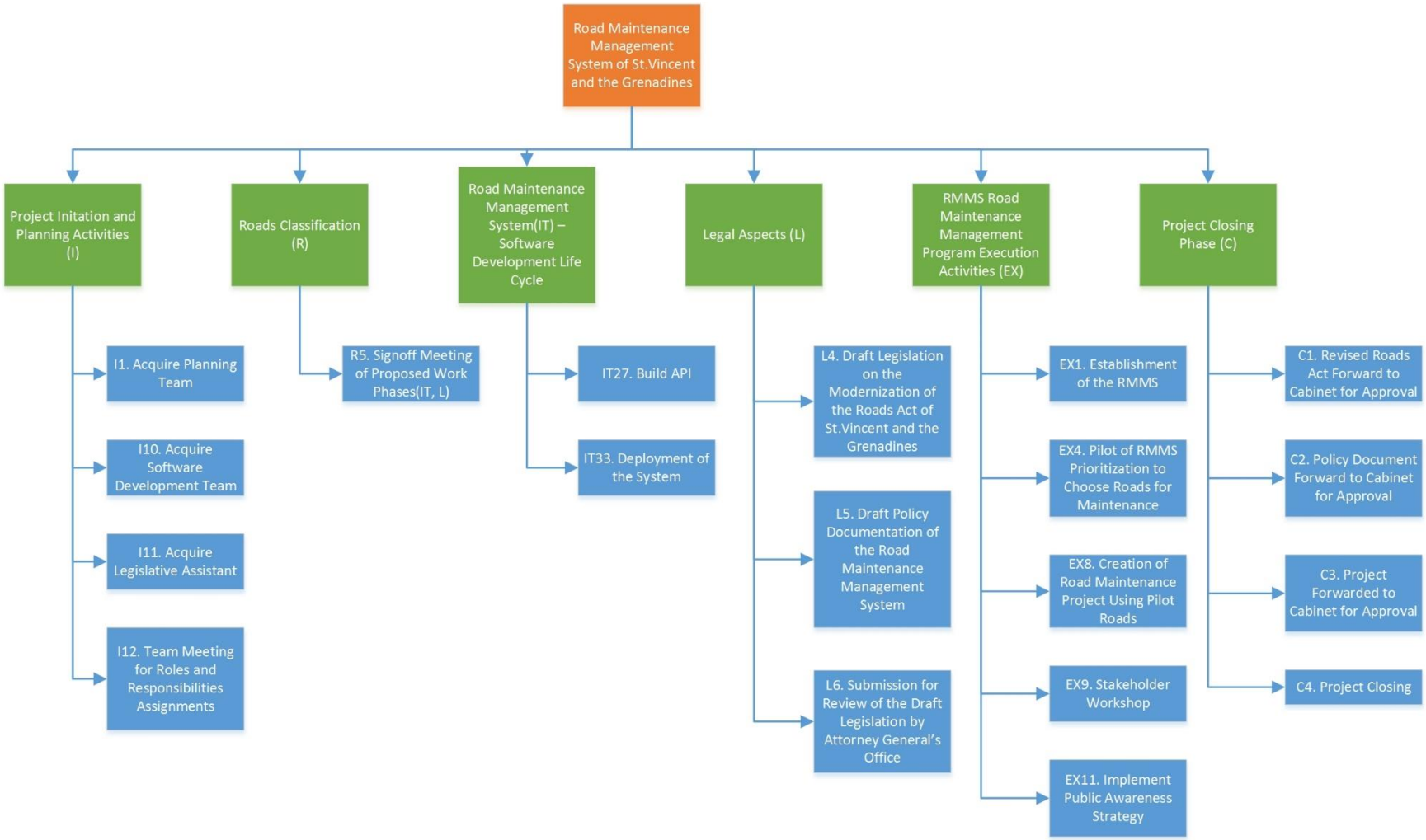


Figure 9 WBS Arranged by Major Activities

4.4.4.1 WBS Dictionary

The WBS Dictionary provides further information on work packages involved in the RMMS Project. These include detailed activity, deliverables and scheduling information informing the project team about each component in the WBS. The WBS Dictionary also details the resources and materials required to carry out the specific activity and is used as a tracking mechanism for work package completion. An example of the WBS Dictionary for Build App Work Package follows:

Chart 10 WBS Dictionary

WBS Dictionary(Example)										
Project Name	**Road Maintenance Management Project**					**WBS ID#**	**IT27**			
WBS Name	**Build Api**									
Activity										
ID#	**Name**	**Human Resource**			**Other Resource**			**Materials**	Total	
		Hours	**Rate**	**Total**	**Hours**	**Rate**	**Total**	**Total**		
IT1	Meeting with the Customer and Stakeholders									
IT2	Planning and Requirements Analysis									
IT3	Establish Project Vision									
IT4	Conduct Project									

WBS Dictionary(Example)										
Project Name	**Road Maintenance Management Project**				**WBS ID#**	**IT27**				
WBS Name	**Build Api**									
Activity										
ID#	**Name**	**Human Resource**			**Other Resource**			**Materials**	Total	
		Hours	**Rate**	**Total**	**Hours**	**Rate**	**Total**	**Total**		
	Feasibility									
IT5	Defining the System Requirements									
IT6	Establishing the System Requirements									
IT7	Meeting with Customer and Stakeholders - Signoff of System Requirements									
IT8	Defining System Architecture									
IT9	Development of Comprehensive System Architecture Document									
IT10	Review of the									

WBS Dictionary(Example)										
Project Name	**Road Maintenance Management Project**				**WBS ID#**	**IT27**				
WBS Name	**Build Api**									
Activity										
ID#	**Name**	**Human Resource**			**Other Resource**			**Materials**	Total	
		Hours	**Rate**	**Total**	**Hours**	**Rate**	**Total**	**Total**		
	Document									
IT11	Signoff Meeting of Comprehensive System Architecture Document Meeting									
IT12	Create an Entity Relationship Diagram									
IT13	Modelling System Entities									
IT14	Create Database Tables									
IT15	Addition of Road GIS data to Database									
IT16	Addition of Road Maintenance data to									

WBS Dictionary(Example)										
Project Name	**Road Maintenance Management Project**				**WBS ID#**	**IT27**				
WBS Name	**Build Api**									
Activity										
ID#	**Name**	**Human Resource**			**Other Resource**			**Materials**	Total	
		Hours	**Rate**	**Total**	**Hours**	**Rate**	**Total**	**Total**		
	Database									
IT17	Create Audit Tables									
IT18	Database Modelling									
IT19	Create Audit Triggers									
IT20	Testing Audit Triggers									
IT21	Design Interface Mockups in Photoshop									
IT22	Review of Interface Mockups									
IT23	Signoff Meeting of Interface Mockups									
IT24	Build Interface									
IT25	Program Interface									

WBS Dictionary(Example)										
Project Name	**Road Maintenance Management Project**					**WBS ID#**	**IT27**			
WBS Name	**Build Api**									
Activity										
ID#	**Name**	**Human Resource**			**Other Resource**			**Materials**	Total	
		Hours	**Rate**	**Total**	**Hours**	**Rate**	**Total**	**Total**		
IT26	Coding Prioritization Weights									

4.5 TIME MANAGEMENT PLAN

"*Develop a time management plan which defines the sequence of activities, estimates resources and duration, and fully defines the schedule of the RMMS system implementation.*" – Objective 2

The project was alotted a total of three (3) years for completion as directed by the European Development Fund Project Management Unit (EDF-PMU). The project, including building the Road Maintenance Management System, drafting of legislation and policy, and initiation of the pilot road maintenance programme was scheduled for 1-2 years from project initiation and Year 3 was alotted to execution of the pilot road maintenance programme.

The execution phase is not covered within the scope of this project because the execution phase is a regional tender which is beyond the scope of the project. The schedule duration is 223 days. The road maintenance management system (IT) – software development life cycle is closed with the phase RMMS road maintenance programme execution activities (EX) which carries out the formulation of a road maintenance project to further test and calibrate the RMMS software. The five (5) phases of the RMMS Project which creates and tests the RMMS software and formulates the legislation for its implementation led to the project closing (C) which is the final submission of the RMMS documents and software for approval by the Cabinet of the Government of St.Vincent and the Grenadines. This timeline comprises:

1. Project initiation and planning activities (I) – 125 days
2. Roads classification (R) – 54 days
3. Road maintenance management system (IT) – software development life cycle – 150 days
4. Legal aspects (L) – 132 days
5. RMMS road maintenance programme execution activities (EX) – 51 days
6. Project closing (C) – 37 days

   *Same phases occurr concurrently with different project resources.

4.5.1 Plan Schedule Management

(Section 6.1, PMBOK, Project Management Institute, 2013)

The Schedule is established using expert advice from multiple lawyers for the legal aspects and from a small-scale internet and application development company in St.Vincent and the Grenadines. The schedule is tracked using Gantt Charts built in Microsoft Project. The unit of measure utilized is days for activities while the project team is managed on an hourly rate. This allows the flexibility of hiring and firing and increases pinpoint resource allocation if it is necessary to improve the progression of the project. Resources utilized by this project are personnel / labour. Each project team member is hired according to their specific skills to carry out activities in their field of expertise with additional resource levelling possible by allocating the P4 Data Capture / Input Clerk and P5 GIS Student Trainee. Activity Durations are estimated using expert judgement.

4.5.2 Define Activities

(Section 6.2, PMBOK, Project Management Institute, 2013)

The activity list is defined using expert judgement and meetings with major stakeholders to divide the project scope and deliverables into smaller, more manageable parts. Each activity represents the effort needed to complete a work package. The WBS, WBS dictionary and activity list are defined concurrently. The attributes of each activity are defined during this process.

4.5.2.1 Activity List

Activities are separated into their different phases using ID activity identifiers such as I, R, IT, L, EX, C. These identifiers allow for tracking of resources / personnel allotment to each activity and for differentiation between the type of outcomes and schedule for each activity. The activity list follows in Chart 9:

Chart 11 Activity List

ID#	Activity
Project Initiation and Planning Activities(I)	
I1	Acquire Planning Team
I2	Stakeholder Meeting
I3	Develop Stakeholder Register
I4	Develop Project Communications Strategy
I5	Develop Stakeholder Requirements List
I6	Initiate BRAGSA Procurement Policy
I7	Develop Procurement List of Equipment and Software
I8	Tender for Procurement
I9	Initiate BRAGSA HR Policy
I10	Acquire Software Development Team
I11	Acquire Legislative Assistant
I12	Team Meeting for Roles and Responsibilities Assignments
Roads Classification(R)	
R1	Interviews with Stakeholders
R2	Research of Roads Classification in St.Vincent and the Grenadines
R3	Review of the Roads Classification Standards
R4	Review of the Road Infrastructure GIS Data of St.Vincent and the Grenadines
L1	Review of the Roads Act of Saint Vincent and the Grenadines
R5	Signoff Meeting of Proposed Work Phases(IT,L)
Road Maintenance Management System(IT) – Software Development Life Cycle	
IT1	Meeting with the Customer and Stakeholders
IT2	Planning and Requirements Analysis
IT3	Establish Project Vision
IT4	Conduct Project Feasibility
IT5	Defining the System Requirements
IT6	Establishing the System Requirements
IT7	Meeting with Customer and Stakeholders - Signoff of System Requirements
IT8	Defining System Architecture
IT9	Development of Comprehensive System Architecture Document
IT10	Review of the Document
IT11	Signoff Meeting of Comprehensive System Architecture Document Meeting
IT12	Create an Entity Relationship Diagram
IT13	Modelling System Entities

ID#	Activity
IT14	Create Database Tables
IT15	Addition of Road GIS data to Database
IT16	Addition of Road Maintenance data to Database
IT17	Create Audit Tables
IT18	Database Modelling
IT19	Create Audit Triggers
IT20	Testing Audit Triggers
IT21	Design Interface Mockups in Photoshop
IT22	Review of Interface Mockups
IT23	Signoff Meeting of Interface Mockups
IT24	Build Interface
IT25	Program Interface
IT26	Coding Prioritization Weights
IT27	Build API
IT28	Design System Test Questionnaire
IT29	Internal Testing of the System
IT30	External Testing of the System with Stakeholders
IT31	Corrections and Changes to Improve Quality Standards of the System Requirements
IT32	Perform Focus Group Final Test
IT33	Writing of the User Manuals
IT34	Training of the Users
IT35	Deployment of the System
Legal Aspects(L)	
L2	Roads Act of Saint Vincent and the Grenadines Amendments
L3	Signoff Meeting of Revised Roads Act of Saint Vincent and the Grenadines
L4	Draft Legislation on the Modernization of the Roads Act of Saint Vincent and the Grenadines
L5	Draft of Policy Documentation of the Road Maintenance Management System
L6	Submission for Review of the Draft Legislation by Attorney General's Office
RMMS Road Maintenance Program Execution Activities(EX)	
EX1	Establishment of the RMMS
EX2	Introduction of Current Road Maintenance Criteria into RMMS
EX3	Calibration of the RMMS Prioritization
EX4	Pilot of RMMS Prioritization to Choose Roads for Maintenance
EX5	Investigation of Pilot Roads for Maintenance
EX6	Signoff Meeting to Review Pilot Roads data and Discuss Calibration Criteria Calibration

ID#	Activity
EX7	Recalibration of Prioritization Criteria
EX8	Creation of Road Maintenance Project Using Pilot Roads
EX9	Stakeholder Workshop
EX10	Develop Public Awareness Strategy
EX11	Implement Public Awareness Strategy
Project Closing Phase(C)	
C1	Revised Roads Act Forward to Cabinet for Approval
C2	Policy Document Forward to Cabinet for Approval
C3	Project Forwarded to Cabinet for Approval
C4	Project Closing

4.5.2.2 Milestone List

The milestone list represents significant points or events in the project which lead to the creation of a specific milestone / deliverable. These milestones are used as reference points for project contracts. Each milestone has no duration but is a direct output of project activities as displayed in the following chart(Chart 10):

Chart 12 Milestones List

ID#	Activity	Milestone
Project Initiation and Planning Activities(I)		
I1	Acquire Planning Team	Planning Team Roster
I10	Acquire Software Development Team	Software Development Team Roster
I11	Acquire Legislative Assistant	Legislative Drafter
I12	Team Meeting for Roles and Responsibilities Assignments	Responsibility Assignment Matrix, Jobs Description
Roads Classification(R)		
R5	Signoff Meeting of Proposed Work Phases(IT,L)	
Road Maintenance Management System(IT) – Software Development Life Cycle		
IT27	Build API	API
IT33	Deployment of the System	RMMS System

ID#	Activity	Milestone
Legal Aspects(L)		
L4	Draft Legislation on the Modernization of the Roads Act of Saint Vincent and the Grenadines	Draft Revision of the Roads Act of Saint Vincent and the Grenadines
L5	Draft of Policy Documentation of the Road Maintenance Management System	Draft Policy on Road Maintenance Management System
L6	Submission for Review of the Draft Legislation by Attorney General's Office	Attorney General's Suggestions for Changes to Documents
RMMS Road Maintenance Program Execution Activities(EX)		
EX1	Establishment of the RMMS	RMMS System
EX4	Pilot of RMMS Prioritization to Choose Roads for Maintenance	RMMS System Field Test
EX8	Creation of Road Maintenance Project Using Pilot Roads	Road Maintenance Project
EX9	Stakeholder Workshop	
EX11	Implement Public Awareness Strategy	Public Awareness Campaign
Project Closing Phase(C)		
C1	Revised Roads Act Forward to Cabinet for Approval	Final Document Forwarded to Cabinet
C2	Policy Document Forward to Cabinet for Approval	Final Document Forwarded to Cabinet
C3	Project Forwarded to Cabinet for Approval	Final Document Forwarded to Cabinet
C4	Project Closing	Finish

4.5.3 Sequence Activities

(Section 6.3, PMBOK, Project Management Institute, 2013)

The sequence activities process is important for identifying and documenting relationships among different activities, milestones and phases of a project. The sequence activities process is carried out using the precedence diagramming method (PDM) to create a schedule model which represents each activity graphically on a network diagram by the project manager and EDF-PMU team.

The PDM represents Finish-to-Start (FS), Finish-to-Finish (FF), Start-to-Start (SS) and Start-to-Finish (SF) logical relationships between different activities. The dependencies, leads and lags were estimated using the Microsoft Project Platform. The activity resources and duration chart (Chart 11, Pg 57-60) and the following network diagram (Figure 10) show the logical relationships between the activities of the RMMS project:

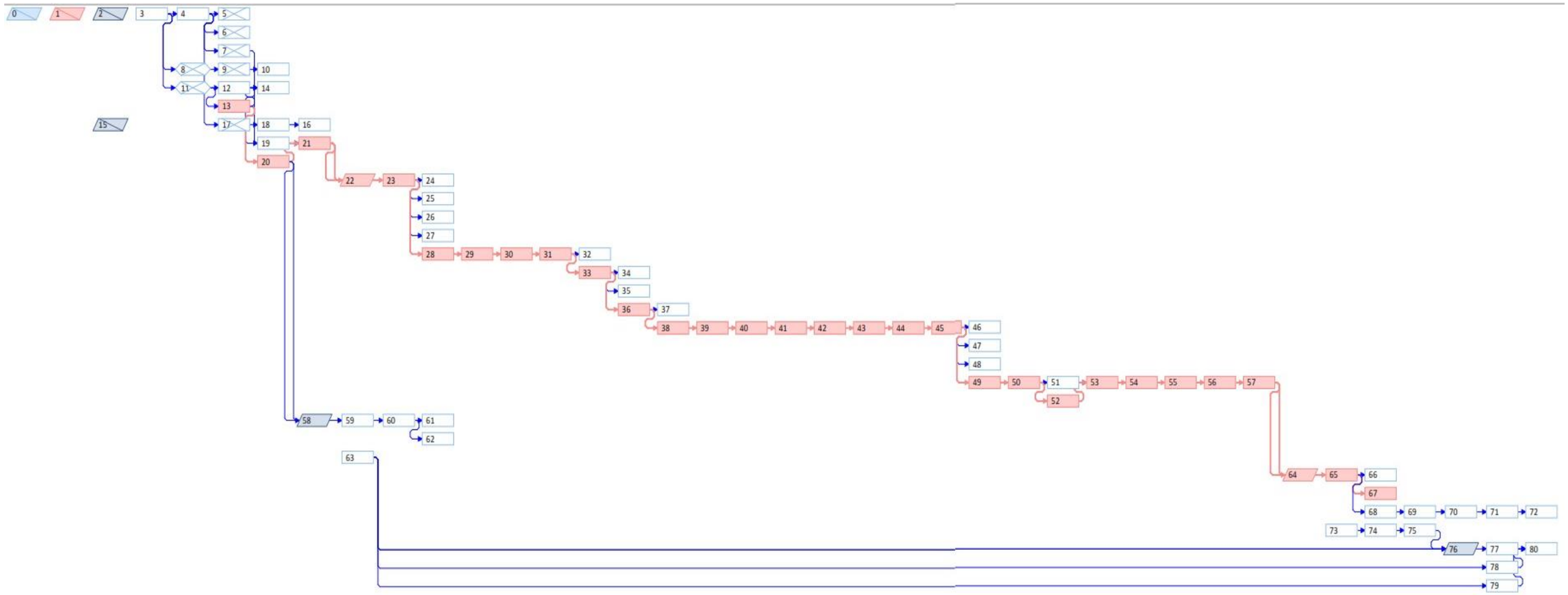


Figure 10 Network Diagram

4.5.4 Estimate Activity Resources and Durations

(Section 6.4-6.5, PMBOK, Project Management Institute, 2013)

The activity list, human resource list and the network diagram are utilized for resource and duration estimation of each activity. This process is carried out by the project manager and the EDF-PMU team during meetings using expert judgement and group decision-making from external professionals in the legal and programming fields and internal professionals of BRAGSA. The following chart(Chart 11) displays the activity list, duration and resources:

Chart 13 Activity Resources and Duration

ID	ID#	Task Name	Duration	Predecessors	Resource Names
0		Road Maintenance Management System	223 days		
1		Road Maintenance Management System of Saint Vincent and the Grenadines Project	223 days		
2	I	Project Initiation and Planning Activities(I)	124.88 days		
3	I1	Acquire Planning Team	30 days		C1 ,C2 ,P1
4	I2	Stakeholder Meeting	14 days	3	C1 ,C2 ,P1
5	I3	Develop Stakeholder Register	1 day	4	C1 ,C2 ,P1
6	I4	Develop Project Communications Strategy	2 days	4	C1 ,C2 ,P1
7	I5	Develop Stakeholder Requirements List	1 day	4	C1 ,C2 ,P1
8	I6	Initiate BRAGSA Procurement Policy	0 days	3	C1 ,C2 ,P1
9	I7	Develop Procurement List of Equipment and Software	1 day	8	C1 ,C2 ,P1
10	I8	Tender for Procurement	36 days	9	C1 ,C2

ID	ID#	Task Name	Duration	Predecessors	Resource Names
					,P1
11	I9	Initiate BRAGSA HR Policy	0 days	3	C1 ,C2 ,P1
12	I10	Acquire Software Development Team	60 days	11	C1 ,C2 ,P1
13	I11	Acquire Legislative Assistant	90 days	11	C1 ,C2 ,P1
14	I12	Team Meeting for Roles and Responsibilities Assignments	3 days	12,13	C1 ,C2 ,P1 ,P2 ,P3 ,P4 ,P5 ,P6
15	R	Roads Classification(R)	54 days		
16	R1	Interviews with Stakeholders	3 days	18	P1
17	R2	Research of Roads Classification in St.Vincent and the Grenadines	3 days	4	P1
18	R3	Review of the Roads Classification Standards	3 days	17	P1
19	R4	Review of the Road Infrastructure GIS Data of St.Vincent and the Grenadines	3 days	12	P2 ,P3
20	L1	Review of the Roads Act of Saint Vincent and the Grenadines	3 days	13	C1 ,P6
21	R5	Signoff Meeting of Proposed Work Phases(IT,L)	3 days	19,7,20	P1 ,P2 ,P3 ,P4 ,P5 ,P6
22	IT	Road Maintenance Management System(IT) – Software Development Life Cycle	150 days	21	
23	IT1	Meeting with the Customer and Stakeholders	4 days	21	P2 ,P3 ,P1
24	IT2	Planning and Requirements Analysis	6 days	23	P2 ,P3
25	IT3	Establish Project Vision	6 days	23	P2 ,P3
26	IT4	Conduct Project Feasibility	8 days	23	P2 ,P3
27	IT5	Defining the System Requirements	8 days	23	P2 ,P3
28	IT6	Establishing the System Requirements	7 days	23	P2 ,P3
29	IT7	Meeting with the Customer and Stakeholders - Signoff of System Requirements	4 days	28	P2 ,P3 ,P1
30	IT8	Defining System Architecture	14 days	29	P2 ,P3

ID	ID#	Task Name	Duration	Predecessors	Resource Names
31	IT9	Development of Comprehensive System Architecture Document	21 days	30	P2 ,P3
32	IT10	Review of the Document	13 days	31	P2 ,P3
33	IT11	Signoff Meeting of Comprehensive System Architecture Document Meeting	4 days	31	P2 ,P3 ,P1
34	IT12	Create an Entity Relationship Diagram	2 days	33	P2 ,P3
35	IT13	Modelling System Entities	2 days	33	P2 ,P3
36	IT14	Create Database Tables	1 day	33	P2 ,P3
37	IT15	Addition of Road GIS data to Database	2 days	36	P2 ,P3
38	IT16	Addition of Road Maintenance data to Database	1 day	36	P2 ,P3
39	IT17	Create Audit Tables	1 day	38	P2 ,P3
40	IT18	Database Modelling	1 day	39	P2 ,P3
41	IT19	Create Audit Triggers	1 day	40	P2 ,P3
42	IT20	Testing Audit Triggers	1 day	41	P2 ,P3
43	IT21	Design Interface Mockups in Photoshop	1 day	42	P2 ,P3
44	IT22	Review of Interface Mockups	1 day	43	P2 ,P3
45	IT23	Signoff Meeting of Interface Mockups	4 days	44	P2 ,P3
46	IT24	Build Interface	18 days	45	P2 ,P3
47	IT25	Program Interface	18 days	45	P2 ,P3
48	IT26	Coding Prioritization Weights	2 days	45	P2 ,P3
49	IT27	Build API	21 days	45	P2 ,P3
50	IT28	Design System Test Questionnaire	2 days	49	P2 ,P3 ,P1
51	IT29	Internal Testing of the System	3 days	50	P2 ,P3 ,P1
52	IT30	External Testing of the System with Stakeholders	3 days	50	P2 ,P3 ,P1
53	IT31	Corrections and Changes to Improve Quality Standards of the System Requirements	2 days	51,52	P2 ,P3 ,P1
54	IT32	Perform Focus Group Final Test	2 days	53	P2 ,P3 ,P1
55	IT33	Writing of the User Manuals	17 days	54	P2 ,P3 ,P1

ID	ID#	Task Name	Duration	Predecessors	Resource Names
56	IT34	Training of the Users	4 days	55	P2 ,P3 ,P1
57	IT35	Deployment of the System	2 days	56	P2 ,P3 ,P1
58	L	Legal Aspects(L)	132.13 days	20	
59	L2	Revisions to the Roads Act of Saint Vincent and the Grenadines	39 days	20	C1 ,C2 ,P1 ,P6
60	L3	Signoff Meeting of Revised Roads Act of Saint Vincent and the Grenadines	4 days	59	P1 ,P6
61	L4	Draft Legislation on the Modernization of the Roads Act of Saint Vincent and the Grenadines	60 days	60	P6
62	L5	Draft of Policy Documentation of the Road Maintenance Management System	60 days	60	P6
63	L6	Submission For Review By the Attorney General's Office	2 days		P1 ,P6
64	EX	RMMS Road Maintenance Program Execution Activities(EX)	51 days	57	
65	EX1	Establishment of the RMMS	1 day	57	C1 ,C2 ,P2 ,P3
66	EX2	Introduction of Current Road Maintenance Criteria into RMMS	2 days	65	P2 ,P3
67	EX3	Calibration of the RMMS Prioritization	2 days	65	P2 ,P3
68	EX4	Pilot of RMMS Prioritization to Choose Roads for Maintenance	2 days	65	C1 ,P1 ,P2 ,P3
69	EX5	Investigation of Pilot Roads for Maintenance	3 days	68	C1 ,P4 ,P5
70	EX6	Signoff Meeting to Review Pilot Roads data and Discuss Calibration Criteria Calibration	4 days	69	P1 ,P3 ,C1
71	EX7	Recalibration of Prioritization Criteria	1 day	70	P2 ,P3
72	EX8	Creation of Road Maintenance Project Using Pilot Roads	1 day	71	C1
73	EX9	Stakeholder Workshop	5 days		P1 ,P3
74	EX10	Develop Public Awareness Strategy	1 day	73	P1
75	EX11	Implement Public Awareness Strategy	1 day	74	P1

ID	ID#	Task Name	Duration	Predecessors	Resource Names
76	C	Project Closing(C)	36.88 days	75,63	
77	C1	Revised Roads Act Forward to Cabinet for Approval	21 days	63	P1
78	C2	Policy Document Forward to Cabinet for Approval	21 days	63	P1
79	C3	Project Forwarded to Cabinet for Approval	21 days	63	P1
80	C4	Project Closing	1 day	77,78,79	P1

4.6 COST MANAGEMENT PLAN

"*Establish a cost management plan in order to estimate the budget for the project, to implement cost management and control procedures*." – Objective 3

4.6.1 Plan Cost Management

(Section 7.1, PMBOK, Project Management Institute, 2013)

The cost management plan of the RMMS project is defined using the techniques of expert judgement and meetings between the BRAGSA team (project manager and consultant engineer) and the staff of the EDF-PMU. These meetings utilize the enterprise environmental factors and organizational process assets to create a cost management plan and cost baseline. The project was committed £400,000 Euros ($1.16 million XCD) in Phase 1 and an additional £11.6 million Euros ($33.5 million XCD) for Phase 2. This Phase 2 is the regional Caribbean Single Market Economy tender for the Execution of the Pilot Road Maintenance Programme. This project scope only includes Phase 1.

4.6.1.1 Cost Management Approach

Project costs are directly tracked in the work breakdown structure using rules of performance measurement such as the estimated budget and the calculation of earned value (EV). The earned value is tracked using cost variances (CV), schedule variance (SV), schedule performance index (SPI) and cost performance index (CPI). A Variance of CPI or SPI between 0.1 and 0.2 must be reported to the project manager with a reason and a detailed corrective plan to carry out change control procedures; any variance above 0.15 must be reported to the major stakeholders. The project management software utilized for project cost management is Microsoft Project Platform for Gantt Charts and other charts.

Cost reporting is carried out during the project status report. Each report includes a “cost management” section. This section will detail all performance metrics, variances and any corrective plans which are carried out. Change requests which are triggered by this procedure are documented and tracked using this report and will continue with all future reports.

The basic project measurements and the precision required to assist in cost management by the project manager are listed in the following chart (Chart 12). The acceptable range of accuracy used is 10% of a unit.

Chart 14 Project Measurements

Measurement	Unit/Precision
Work	Staff Hours (+/- 1 hr)
Distance	Feet/Inches (+/- 6 in/0.5ft)
Volume	Cubic Yards (+/- 0.5 cu.yd)
Cost	$XCD (+/- $10XCD)

4.6.2 Estimate Costs

(Section 7.2, PMBOK, Project Management Institute, 2013)

The estimate cost process is carried out using analogous estimating by the project manager with consultation from a local independent expert who has experience programming a similar project (the national insurance services database) and local independent lawyers with experience in legislative drafting. The activity cost estimates for all activities in the RMMS project is £120,576.32 Euros ($348,910.00XCD) broken down as follows:

- Project initiation and planning activities (I) **$107,280.00**
- Roads classification (R) **$13,940.00**

- Road maintenance management system (IT) – software development life cycle **$115,420.00**
- Legal aspects (L) **$69,030.00**
- RMMS road maintenance program execution activities(EX) **$12,520.00**
- Project closing (C) **$30,720.00**

These costs are estimated from the labour resources allocated to each activity. Further estimated expenditures include the cost of procurement of hardware resources which amounts to $60,000XCD and is appended to the activity “Tender for Procurement (I8)” in the project initiation and planning activities (I) phase of the project. These estimates were approved by the EDF-PMU and can only be changed through the project’s change control procedures. This project utilizes many of the existing frameworks and organizational process assets of BRAGSA to decrease overall costs of achieving this project. The following chart(Chart 13) introduces the Activity Cost Estimates of the RMMS Project:

Chart 15 Activity Cost Estimates

ID	ID#	Task Name	Cost Baseline
0		Road Maintenance Management System	$348,910.00
1		Road Maintenance Management System of Saint Vincent and the Grenadines Project	$348,910.00
2	**I**	**Project Initiation and Planning Activities(I)**	**$107,280.00**
3	I1	Acquire Planning Team	$480.00
4	I2	Stakeholder Meeting	$4,500.00
5	I3	Develop Stakeholder Register	$480.00
6	I4	Develop Project Communications Strategy	$960.00
7	I5	Develop Stakeholder Requirements List	$480.00
8	I6	Initiate BRAGSA Procurement Policy	$10,000.00
9	I7	Develop Procurement List of Equipment and Software	$480.00
10	I8	Tender for Procurement	$68,640.00
11	I9	Initiate BRAGSA HR Policy	$1,000.00
12	I10	Acquire Software Development Team	$0.00

ID	ID#	Task Name	Cost Baseline
13	I11	Acquire Legislative Assistant	$17,760.00
14	I12	Team Meeting for Roles and Responsibilities Assignments	$2,500.00
15	**R**	**Roads Classification(R)**	**$13,940.00**
16	R1	Interviews with Stakeholders	$2,500.00
17	R2	Research of Roads Classification in St.Vincent and the Grenadines	$1,440.00
18	R3	Review of the Roads Classification Standards	$1,440.00
19	R4	Review of the Road Infrastructure GIS Data of St.Vincent and the Grenadines	$1,920.00
20	L1	Review of the Roads Act of Saint Vincent and the Grenadines	$2,640.00
21	R5	Signoff Meeting of Proposed Work Phases(IT,L)	$4,000.00
22	**IT**	**Road Maintenance Management System(IT) – Software Development Life Cycle**	**$115,420.00**
23	IT1	Meeting with the Customer and Stakeholders	$3,000.00
24	IT2	Planning and Requirements Analysis	$1,920.00
25	IT3	Establish Project Vision	$2,560.00
26	IT4	Conduct Project Feasibility	$2,560.00
27	IT5	Defining the System Requirements	$2,560.00
28	IT6	Establishing the System Requirements	$4,480.00
29	IT7	Meeting with the Customer and Stakeholders - Signoff of System Requirements	$3,000.00
30	IT8	Defining System Architecture	$8,960.00
31	IT9	Development of Comprehensive System Architecture Document	$13,440.00
32	IT10	Review of the Document	$5,120.00
33	IT11	Signoff Meeting of Comprehensive System Architecture Document Meeting	$3,000.00
34	IT12	Create an Entity Relationship Diagram	$640.00
35	IT13	Modelling System Entities	$640.00
36	IT14	Create Database Tables	$640.00
37	IT15	Addition of Road GIS data to Database	$640.00
38	IT16	Addition of Road Maintenance data to Database	$640.00
39	IT17	Create Audit Tables	$640.00
40	IT18	Database Modelling	$640.00
41	IT19	Create Audit Triggers	$640.00

ID	ID#	Task Name	Cost Baseline
42	IT20	Testing Audit Triggers	$640.00
43	IT21	Design Interface Mockups in Photoshop	$640.00
44	IT22	Review of Interface Mockups	$640.00
45	IT23	Signoff Meeting of Interface Mockups	$3,500.00
46	IT24	Build Interface	$8,320.00
47	IT25	Program Interface	$8,320.00
48	IT26	Coding Prioritization Weights	$640.00
49	IT27	Build API	$13,440.00
50	IT28	Design System Test Questionnaire	$1,120.00
51	IT29	Internal Testing of the System	$2,500.00
52	IT30	External Testing of the System with Stakeholders	$2,500.00
53	IT31	Corrections and Changes to Improve Quality Standards of the System Requirements	$1,120.00
54	IT32	Perform Focus Group Final Test	$1,120.00
55	IT33	Writing of the User Manuals	$10,080.00
56	IT34	Training of the Users	$4,000.00
57	IT35	Deployment of the System	$1,120.00
58	**L**	**Legal Aspects(L)**	**$69,030.00**
59	L2	Revisions to the Roads Act of Saint Vincent and the Grenadines	$17,650.00
60	L3	Signoff Meeting of Revised Roads Act of Saint Vincent and the Grenadines	$2,500.00
61	L4	Draft Legislation on the Modernization of the Roads Act of Saint Vincent and the Grenadines	$24,000.00
62	L5	Draft of Policy Documentation of the Road Maintenance Management System	$24,000.00
63	L6	Submission For Review By the Attorney General's Office	$880.00
64	**EX**	**RMMS Road Maintenance Program Execution Activities(EX)**	**$12,520.00**
65	EX1	Establishment of the RMMS	$640.00
66	EX2	Introduction of Current Road Maintenance Criteria into RMMS	$640.00
67	EX3	Calibration of the RMMS Prioritization	$640.00
68	EX4	Pilot of RMMS Prioritization to Choose Roads for Maintenance	$1,120.00
69	EX5	Investigation of Pilot Roads for Maintenance	$1,000.00

ID	ID#	Task Name	Cost Baseline
70	EX6	Signoff Meeting to Review Pilot Roads data and Discuss Calibration Criteria Calibration	$2,500.00
71	EX7	Recalibration of Prioritization Criteria	$1,000.00
72	EX8	Creation of Road Maintenance Project Using Pilot Roads	$0.00
73	EX9	Stakeholder Workshop	$2,500.00
74	EX10	Develop Public Awareness Strategy	$2,000.00
75	EX11	Implement Public Awareness Strategy	$480.00
76	**C**	**Project Closing(C)**	**$30,720.00**
77	C1	Revised Roads Act Forward to Cabinet for Approval	$10,080.00
78	C2	Policy Document Forward to Cabinet for Approval	$10,080.00
79	C3	Project Forwarded to Cabinet for Approval	$10,080.00
80	C4	Project Closing	$480.00

4.6.3 Determine Budget

(Section 7.3, PMBOK, Project Management Institute, 2013)

The activity cost estimates are aggregated with other costs to establish the cost baseline. The Cost Baseline is used to track project performance as stated in the cost management approach section. The material costs defined in this project reflect the estimated cost to procure the necessary hardware. Contingencies and tax are defined by BRAGSA's policy as 15% and 10% of the subtotal of material cost and labour cost. The contingencies are a simplified method of calculating the identified risks and unidentified risks and their impact on project cost. The contingencies are increased with the higher risk a project poses and the limitations of the resources that can be levelled. Contingencies can range from low risk 10% to extreme risk 35%. This project is determined as a low risk project in comparison to BRAGSA's previous project work. A financial cost is included to increase the productivity of staff through monetary incentives. The cost baseline of the project is £120,576.32 Euros ($486,137.50XCD). This value is well below the £400,000

Euros ($1.16 million XCD) committed to this phase. The following chart(Chart 14) introduces the project budget breakdown of the RMMS Project:

Chart 16 Project Budget

ID#	Description	Cost(XCD)
	Direct Labor	$ 262,600.00
CST1	**Sum of Labor Costs**	**$ 262,600.00**
	Hardware Procurement	$ 60,000.00
CST2	**Sum of Material/Equipment Cost**	**$ 60,000.00**
	Fixed Costs(Meetings, Rental, etc.)	$ 26,310.00
	Financial(Incentives etc.)	$ 40,000.00
CST3	**Sum of Other Costs**	**$ 66,310.00**
CST4	**Estimated Project Cost**	**$ 388,910.00**
CST5	**Tax(10% of CST4)**	**$ 38,891.00**
CST6	**Contigency(15% of CST4)**	**$ 58,336.50**
CST7	**Total Project Cost(CST4+CST5+CST6)**	**$ 486,137.50**

*Contingency of 15% is based on BRAGSA normal calculation.

*Tax of 10% is based on BRAGSA normal calculation.

*1.00 EUR = 2.89 XCD (Currency Converter, 2017)

4.7 QUALITY MANAGEMENT PLAN

"*Ensure a quality management plan is in place to ensure quality assurance and management.*" – Objective 9

The quality of a project is the degree to which the characteristics of the RMMS fulfill stakeholder satisfaction and requirements, and the project processes decrease rework / costs while increasing productivity. BRAGSA currently has no quality policies or plans in place and therefore this project is a pilot for future quality protocols and policies in the organization. The main priorities of quality management are to ensure that the RMMS system is functional for roads management personnel of BRAGSA, and that it is legally able to be implemented upon approval by cabinet. The legality of the RMMS system requires changes to be made to the current legislation of the country. Other priorities include ensuring that there are standards throughout the project in documentation and quantifiable standards for abstract metrics such as "stakeholder satisfaction" to ensure the effective progression of the project.

4.7.1 Plan Quality Management

The RMMS project utilizes benchmarking of the improved weighting criteria used for prioritization in the RMMS versus what was originally used in the Onsite Job Priority Assessment Form (Appendix 4). The RMMS Project expanded the weighting criteria to include:

- Population (GIS of the enumeration districts allows for the addition of population in nearby area);
- Access (areas, landuse and infrastructure which the roads give access to such as rural, private, community linkage, schools, etc.);
- Primary and secondary uses of the roads (agriculture, tourism, etc.);
- Current status of road condition (prevalence of road failure, potholes etc.);

- Time period since the roads' most recent rehabilitation;
- Exposure to geophysical, meteorological and environmental hazards.

While the current method(Onsite Job Priority Assessment , Appendix 4) only utilizes four (4) weighted criteria, namely:

- Safety
- Inconvenience
- Level of Traffic / Use
- Level of Damage

A more robust system increases the redundancy of the road maintenance prioritization by using statistical analysis to understand the linkages between each criteria to further enhance the system's redundancies. This system is database-centered therefore the tracking of information and statistical analysis of data will be much more easily carried out than the previous paper-based system. The criteria utilized will be iterative and further improved throughout the life of the system, well beyond the project's life cycle.

For process / activity quality control, The cost of quality (COQ) is a very important technique in ensuring that meeting the quality requirements of the project does not have a negative impact on the project, for example overworking team members to ensure quality. To decrease the COQ, this project incorporates stakeholder meetings and internal preparatory sessions as the main quality control and assurance measures. The entire project team is involved and responsible for ensuring that the high quality of the final product. The project manager is ultimately responsible to ensure that the project team and stakeholders worked to maximize the quality of the RMMS.

4.7.1.1 Process Improvement Plan

The RMMS project utilizes an inspection sequence. In the lead-up and the follow-up to stakeholder meetings a procedure is carried out which ensures the most polished iteration of the phase / deliverables is brought to stakeholders, and after further alterations the iteration moves to the next phase. The inspection procedure is as follows:

- Each project deliverable (interim or final) that is prepared for stakeholder meetings for quality assurance by external stakeholders must first go through a set procedure for quality control.
- This procedure includes inspection by internal stakeholders (the Project Team) of all mockups. Each project team member is required to document their personal issues and satisfaction with the current iteration of the deliverable.
- The issues are entered into the change request log.
- The project manager inspects the change request log and approves necessary changes considering the impacts to project scope, schedule, cost and quality.
- The project deliverable is re-worked according to this outcome.
- A follow-up quality control inspection is carried out by the team.
- The project deliverable is re-worked if necessary to final iteration.
- The iteration number is documented in the project documentation system.
- The stakeholder meeting is commenced to allow external stakeholders to inspect this current iteration of the deliverable.
- Questionnaires are administered to collect stakeholders' opinions / information / issues / data.
- This process is repeated according to their issues / satisfaction.
- The deliverable is reworked accordingly.
- Interim deliverables are carried on to the next phase of their development and final deliverables are carried on to the next phase of the project.

The use of the inspection sequence with scheduled activities permits process improvement to enhance the value of activities while limiting the COQ impact on the project's cost by utilizing internal stakeholders (the Project Team). The inspection sequence is illustrated as follows in Figure 11:

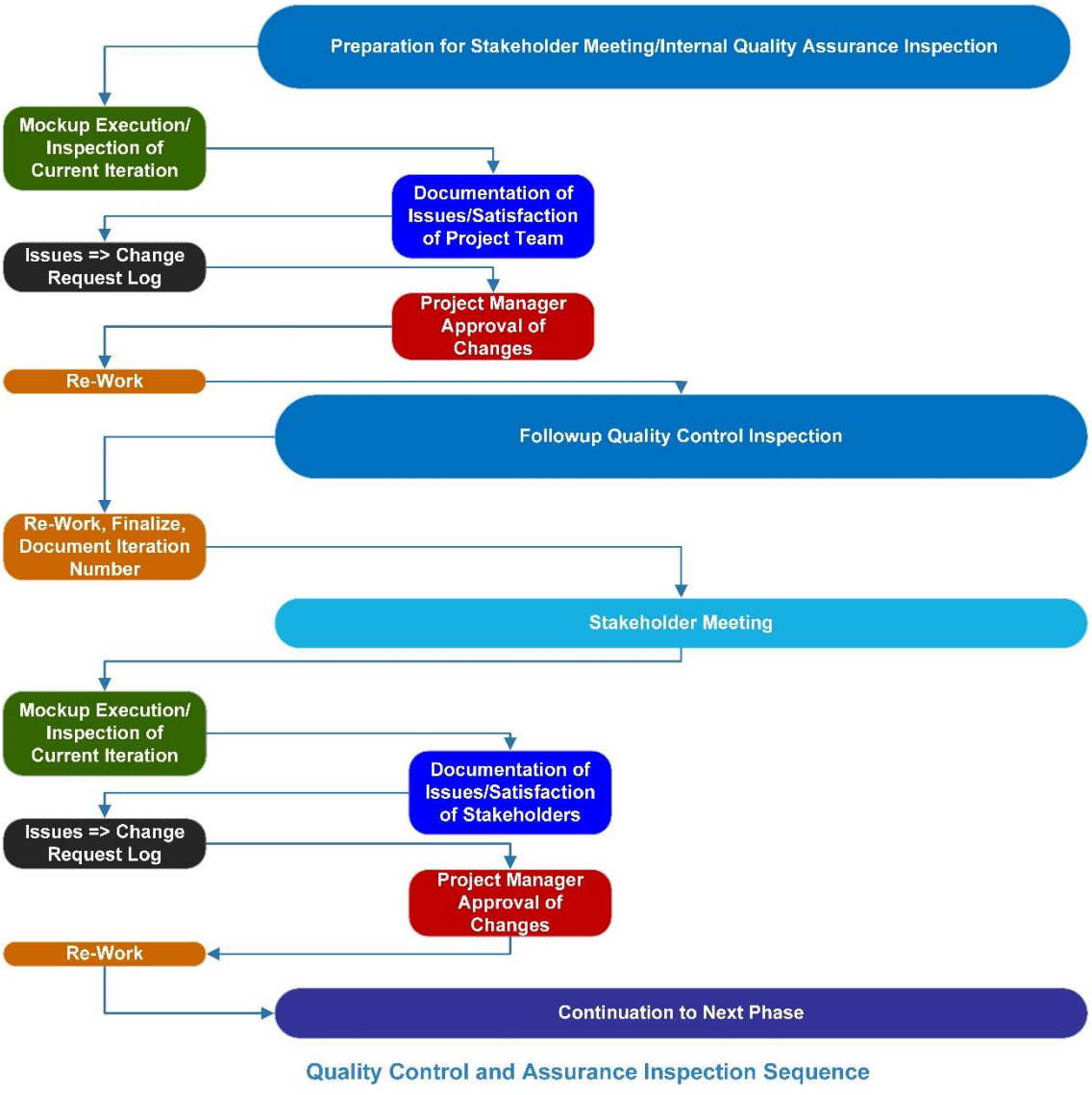


Figure 11 Process Improvement Method

4.7.1.2 Product Testing

The system built by the software development team is tested each step along its progression by both internal staff and stakeholders through multiple quality control and assurance meetings and their lead-up inspection sequence. This method allows for multiple insights into the functioning of the RMMS and improvements that can be made to the system to cater to a wider range of users (such as future users). This method also allows the team to more rigorously test the system. The revision of the Roads Act and the creation of both new legislation and policy will be done through consultation with the Attorney General's office. This is the standard procedure for legislative drafting in St.Vincent and the Grenadines.

Finally, IT28 and IT29 are internal and external testing of the system. These give both the project team members and stakeholders the opportunity to test the final product, ensure that it meets the standards and requirements of stakeholders and creation of a manual for future users, utilizing the inputs of external and internal stakeholders of different backgrounds and aptitudes. Chart 15 highlights the activities in the project where process improvement and inspection procedure will take place:

Chart 17 Quality Assurance and Quality Control Activities

ID#	Name
Project Initiation and Planning Activities(I)	
I2	Stakeholder Meeting
I12	Team Meeting for Roles and Responsibilities Assignments
Roads Classification(R)	
R3	Interviews with Stakeholders
R5	Signoff Meeting of Proposed Work Phases(IT,L)
Road Maintenance Management System(IT) – Software Development Life Cycle	
IT1	Meeting with the Customer and Stakeholders

ID#	Name
IT7	Meeting with Customer and Stakeholders - Signoff of System Requirements
IT11	Signoff Meeting of Comprehensive System Architecture Document Meeting
IT23	Signoff Meeting of Interface Mockups
IT28	Internal Testing of the System
IT29	External Testing of the System with Stakeholders
IT32	Training of the Users
Legal Aspects(L)	
L3	Signoff Meeting of Revised Roads Act of Saint Vincent and the Grenadines
RMMS Road Maintenance Program Execution Activities(EX)	
EX6	Signoff Meeting to Review Pilot Roads data and Discuss Calibration Criteria Calibration
EX9	Stakeholder Workshop
EX10	Develop Public Awareness Strategy
Project Closing Phase(C)	
C1	Revised Roads Act Forward to Cabinet for Approval
C2	Policy Document Forward to Cabinet for Approval
C3	Project Forwarded to Cabinet for Approval
C4	Project Closing

4.7.1.3 Project Document Quality Control

A 4-level filing system is established for quality control of documents throughout the project. These levels are:

- **Level 1** -- the original document or sectional ID. “Document Name + Level 1 ID”
- **Level 2** -- the subsidiary documents. “Document Name + Level 1 ID + Level 2 ID”

- **Level 3** -- the other documents affected by the previous two levels or those which may be required for consideration. “Document Name + Level 1 ID + Level 2 ID + Level 3 ID” for documents in the current section or “Document Name + Sectional ID + + Level 2 ID + Level 3 ID” for documents from other sections.
- **Level 4** -- the final output which utilizes the structure. “Level 1 ID + _ + Document Name + Level 4 ID”, this system allows Level 4 documents to be easily identified as the project manager’s input or final output.

This Project Documentation System is illustrated in Chart 16:

Chart 18 Project Documentation System

Level 1	Level 2	Level 3	Level 4
20170120_Change_Log_01	Basic Description_011	Impact Analysis_0141	01_Approval_N
	Scope Impact_012	Quality Mgmt_0421	
	Schedule Impact_013	Quality Assurance_0422	
	Cost Impact_014	Quality Control_0423	

4.7.1.4 Quality Metrics

Quality metrics define the project’s attributes and what methods will be used to control and monitor quality. Quality metrics at this stage in the project are qualitative and further improvement on the quality management plans will quantify more metrics to further monitor the quality of the project. The quality metrics defined for this project are:

1. Product defect rate
2. Stakeholder problems

3. Stakeholder satisfaction
4. Testing problems
5. Testing satisfaction
6. Document accuracy
7. Document completeness
8. Document usability
9. Document expandability

These Quality Metrics are further developed in the following chart(Chart 17):

Chart 19 Quality Metrics

ID#	Item	Description	Measurement method	Reporting	Acceptable Tolerance	
					upper	lower
001	Product Defect Rate	Mean time to Failure during Product Development Phases	Each prototype of the RMMS system is internally tested by project team members in attempts to “cause errors” in an effort to prevent a defective product/prototype from taken to stakeholder testing.	Change Request Log, Possible Return to Previous Activity	Low	Zero
002	Stakeholder Problems	The project includes multiple meetings which are used to define Stakeholder Satisfaction with the project phases; these meetings require stakeholder participation to improve the quality of the outcomes of the project. Stakeholder Issues and problems will be defined during these meetings and forwarded to the Change Request Log for further consideration.	Questionnaire are administered in final 10 minutes of meetings with stakeholders.	Change Request Log, Possible Return to previous Activity	Low	Zero
003	Stakeholder Satisfaction				High	Medium

ID#	Item	Description	Measurement method	Reporting	Acceptable Tolerance	
					upper	lower
004	**Testing Problems**	These metrics document mean time to failure and bugs and errors experienced during testing phases.	Testing during IT29 and IT30 will be attended by multiple personnel who not only document problems and comments but administer questionnaires to stakeholders in the final 10 minutes of meetings to capture testing outcomes.	Change Request Log, Possible Return to previous Activity	Low	Zero
005	**Testing Satisfaction**				High	High
007	**Document Accuracy**	These metrics are utilized to define the quality of the documents produced by the RMMS project, such as the Policy document, the User Manuals and the Revised Roads Act	L6: Submission for Review of the Draft Legislation by Attorney General's Office – This phase allows third party legislative drafters to critique the documents before final submission	Iteration by Attorney General's Office Suggestions	High	High
008	**Document Completeness**				High	Medium
009	**Document Usability**				High	High
010	**Document Expandability**				High	Medium

4.8 HUMAN RESOURCES MANAGEMENT PLAN

"*Ensure the development of a human resource management plan which identifies the skills required to complete the implementation of the RMMS, defines policy on the acquisition of the project team members and the development and management structure of the project team.*" - Objective 5

4.8.1 Human Resources and Environmental Factors

BRAGSA has an established human resources policy and therefore, the human resource management plan must adhere to this policy. This will make it more cost-effective to utilize BRAGSA's internal mechanism to manage the human resource outside of the project, while decreasing the need for scheduling major human resource related activities.

St.Vincent and the Grenadines lacks opportunities and methods to improve and develop Human Resources. Many projects factor in the cost for personnel to travel to other countries to improve upon their skills or to hire external professionals to carry out training workshops and seminars locally. Both methods increase the cost of executing the Project considerably, therefore, this project utilized strict skills criterium for hiring to limit the need for external skills development.

4.8.2 Human Resource Management Plan

(Section 9.1, PMBOK, Project Management Institute, 2013)

Human resource is the main resource allocated in this project as the RMMS project requires skilled workers to complete specific tasks mentioned in the activity list (Chart 9) to complete the scope of the project. The human resource management plan is designed to assist the project manager in identifying roles, staffing requirements, management, reporting relationships and roles of the project's human resource. The initial planning team members includes the project manager, BRAGSA's roads maintenance engineer and BRAGSA's

system / hardware administrator. Initial planning of the RMMS project is carried out using expert judgement and meetings with the EDF-PMU stakeholders.

4.8.2.1 Staff Management Plan

The project team members (P1, P2, P3, P4, P5, P6) are recruited externally while the project consultants (C1,C2) are assigned to the project from BRAGSA. The project manager utilizes the project schedule and time management plan to track project team members' productivity and performance. Recognition and rewards are awarded to team members for good performance, such as completing activities ahead of schedule. Training needs are minimal for the project as project team members were recruited for the specific skills to contribute to the project and the project is a short-term endeavour.

4.8.2.2 Staff Requirements

The planning team carries out a needs assessment using the activity list, deliverables, BRAGSA's human resource policy document and objectives of the RMMS project to assess the staffing roles / requirements and necessary skills. The suggested wages and rates are defined using the local standard wages.
Chart 18 introduces the Staff Requirements and other information for each project team member:

Chart 20 Staff Requirements

ID	Role	Necessary Skills	Rate (per hour)	Overtime Rate(per hour)	Desired Skill Level				Human Resource Skills Development
					A	B	C	D	
P1	Project Manager	• Team Leadership • Infrastructural Engineering background • Local knowledge • GIS Background • Strategic Thinker • Comprehensive knowledge of Asset Management Systems and their functioning • Advisory knowledge on legislative drafting	$60.00	$90.00	X				• Send for PMP training, • Send for Legislative Drafting short training, Database Management short training
P2	GIS Database Administrator	• Data model design • Data validation and quality • Version management • Spatial data management • Database configuration • Data model implementation • Database security • Performance tuning • Data backup and recovery • Data replication • DBMS software upgrades and service packs	$40.00	$60.00		X			

ID	Role	Necessary Skills	Rate (per hour)	Overtime Rate(per hour)	Desired Skill Level				Human Resource Skills Development
					A	B	C	D	
P3	Application Developer	• Database Modelling in MySQL • Application Building in Javascript • Front-End and Back-End Development • Basic Web Development Skills • GIS API Building • ArcGIS and QGIS Background	$40.00	$60.00	X				
P4	Data Capture/Input Clerk	• Capable of shadowing senior personnel	$15.00	$22.50			X		• Scheduled Training with Application Developer and GIS Database Administrator
P5	GIS Student Trainee	• Assist the team with various duties while learning skills by “Learn, See, Practice, Do” Process.	$10.00	$15.00				X	• On the Job Training
P6	Legislative Assistant	• Familiarity with local constitution • Clear, Concise and accurate use of English legal jargon and language. • Identify and resolve legal/drafting problems, research legal precedent and able to apply the law to solve problems • Capable of working with a less qualified team to understand the relevant issues, background and requirements. • Capable of assessing legal risks and future issues. • Capable of drafting policy documents and legal documents.	$50.00	$75.00	X				

ID	Role	Necessary Skills	Rate (per hour)	Overtime Rate(per hour)	Desired Skill Level				Human Resource Skills Development
					A	B	C	D	
		• Capable of transfer of legal knowledge to national personnel and advice on future recommendations							
C1	System/ Hardware Administrator	• BRAGSA Staff • Project Consultant • Initial Planning Team • Hardware Procurement Consultant	-	-			X		
C2	Road Maintenance Engineer	• BRAGSA Staff • Project Consultant • Initial Planning Team • Road Infrastructure Engineer • Logistics and Data acquisition Advisor	-	-		X			

4.8.2.3 Reporting and Authority Relationships

Reporting relationships for the project team is defined by the planning team. Reporting methods are defined within the communications management plan. External communications must be authorized by the project manager. The following figure(Figure 12) represents the authority and reporting relationships within the project team:

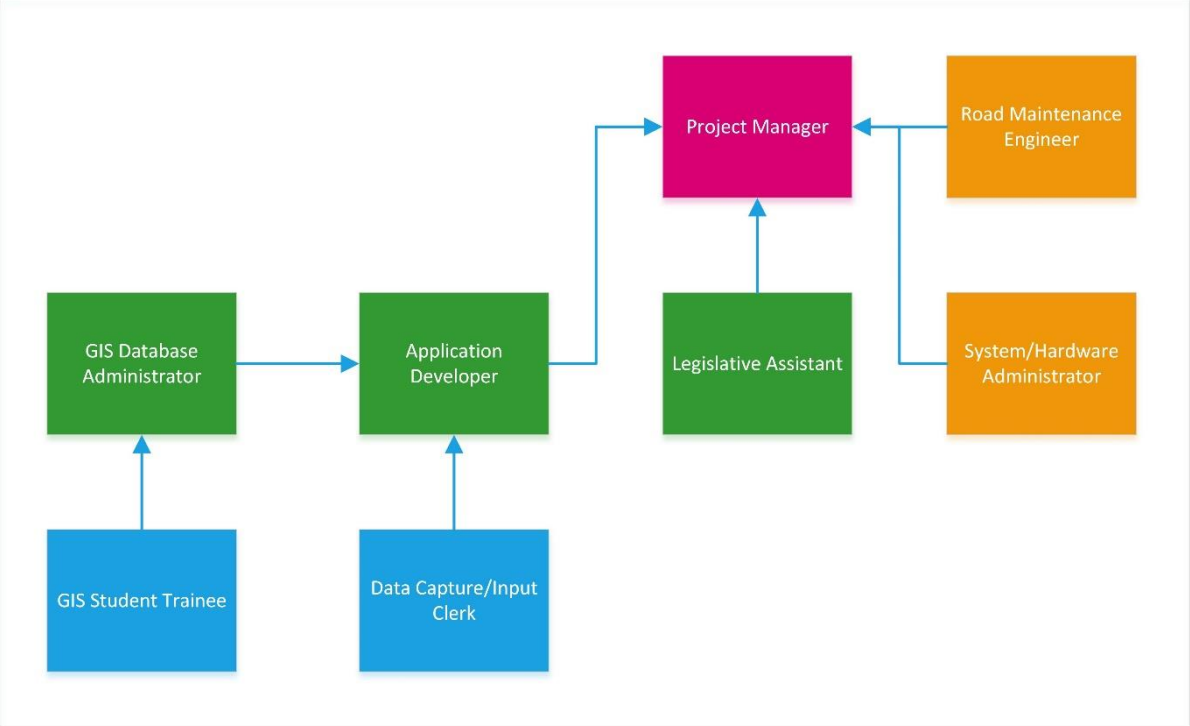


Figure 12 Reporting and Authority Relationships

4.8.2.4 Responsibility Assignment Matrix

The responsibility assignment matrix defines the allocation of each project team member to activities in the RMMS project. Stakeholders are included in this list to show the stakeholder participation throughout the project. The following chart(Chart 19) represents the Responsibility Assigmment Matrix of the RMMS

Project including Project Team Responsibility and Stakeholders Participation for each activity of the RMMS Project:

Chart 21 Responsibility Assignment Matrix

ID#	WBS Element	Project Team Responsibility								Stakeholders Participation			
		P1	P2	P3	P4	P5	P6	C1	C2	S1	S2	S3	S4
Project Initiation and Planning Activities(I)													
I1	Acquire Planning Team												
I2	Stakeholder Meeting												
I3	Develop Stakeholder Register												
I4	Develop Project Communications Strategy												
I5	Develop Stakeholder Requirements List												
I6	Initiate BRAGSA Procurement Policy												
I7	Develop Procurement List of Equipment and Software												
I8	Tender for Procurement												
I9	Initiate BRAGSA HR Policy												
I10	Acquire Software Development Team												
I11	Acquire Legislative Assistant												
I12	Team Meeting for Roles and Responsibilities Assignments												
Roads Classification(R)													
R1	Interviews with Stakeholders												
R2	Research of Roads Classification in St.Vincent and the Grenadines												
R3	Review of the Roads Classification Standards												
R4	Review of the Road Infrastructure GIS Data of St.Vincent and the Grenadines												
L1	Review of the Roads Act of Saint Vincent and the Grenadines												
Road Maintenance Management System(IT) – Software Development Life Cycle													
IT1	Meeting with the Customer and Stakeholders												

ID#	WBS Element	Project Team Responsibility								Stakeholders Participation			
		P1	P2	P3	P4	P5	P6	C1	C2	S1	S2	S3	S4
IT2	Planning and Requirements Analysis												
IT3	Establish Project Vision												
IT4	Conduct Project Feasibility												
IT5	Defining the System Requirements												
IT6	Establishing the System Requirements												
IT7	Meeting with Customer and Stakeholders - Signoff of System Requirements												
IT8	Defining System Architecture												
IT9	Development of Comprehensive System Architecture Document												
IT10	Review of the Document												
IT11	Signoff Meeting of Comprehensive System Architecture Document Meeting												
IT12	Create an Entity Relationship Diagram												
IT13	Modelling System Entities												
IT14	Create Database Tables												
IT15	Addition of Road GIS data to Database												
IT16	Addition of Road Maintenance data to Database												
IT17	Create Audit Tables												
IT18	Database Modelling												
IT19	Create Audit Triggers												
IT20	Testing Audit Triggers												
IT21	Design Interface Mockups in Photoshop												
IT22	Review of Interface Mockups												
IT23	Signoff Meeting of Interface Mockups												

ID#	WBS Element	Project Team Responsibility								Stakeholders Participation			
		P1	P2	P3	P4	P5	P6	C1	C2	S1	S2	S3	S4
IT24	Build Interface												
IT25	Program Interface												
IT26	Coding Prioritization Weights												
IT27	Build API												
IT28	Design System Test Questionnaire												
IT29	Internal Testing of the System												
IT30	External Testing of the System with Stakeholders												
IT31	Corrections and Changes to Improve Quality Standards of the System Requirements												
IT32	Perform Focus Group Final Test												
IT33	Writing of the User Manuals												
IT34	Training of the Users												
IT35	Deployment of the System												
Legal Aspects(L)													
L2	Roads Act of Saint Vincent and the Grenadines Amendments												
L3	Signoff Meeting of Revised Roads Act of Saint Vincent and the Grenadines												
L4	Draft Legislation on the Modernization of the Roads Act of Saint Vincent and the Grenadines												
L5	Draft of Policy Documentation of the Road Maintenance Management System												
L6	Submission for Review of the Draft Legislation by Attorney General's Office												
RMMS Road Maintenance Program Execution Activities(EX)													

ID#	WBS Element	Project Team Responsibility								Stakeholders Participation			
		P1	P2	P3	P4	P5	P6	C1	C2	S1	S2	S3	S4
EX1	Establishment of the RMMS												
EX2	Introduction of Current Road Maintenance Criteria into RMMS												
EX3	Calibration of the RMMS Prioritization												
EX4	Pilot of RMMS Prioritization to Choose Roads for Maintenance												
EX5	Investigation of Pilot Roads for Maintenance												
EX6	Signoff Meeting to Review Pilot Roads data and Discuss Calibration Criteria Calibration												
EX7	Recalibration of Prioritization Criteria												
EX8	Creation of Road Maintenance Project Using Pilot Roads												
EX9	Stakeholder Workshop												
EX10	Develop Public Awareness Strategy												
EX11	Implement Public Awareness Strategy												
Project Closing Phase(C)													
C1	Revised Roads Act Forward to Cabinet for Approval												
C2	Policy Document Forward to Cabinet for Approval												
C3	Project Forwarded to Cabinet for Approval												
C4	Project Closing												

4.8.2.5 Resource Calendars

The resource calender identifies the working hours of each project team member during the course of the project. The resource calendar for each project team member is represented visually in the following charts:

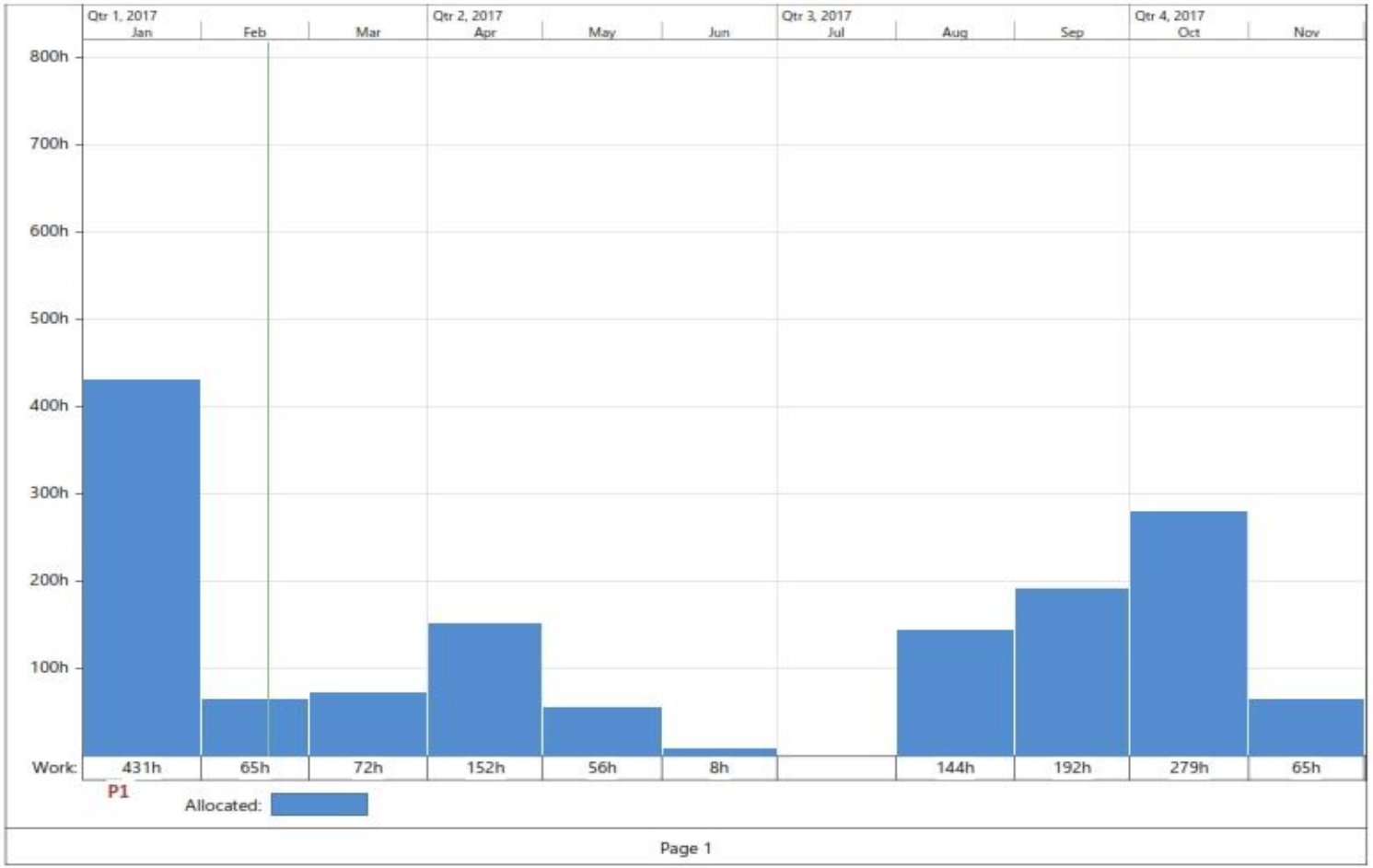


Figure 13 Resource Calendar of the Project Manager(P1)

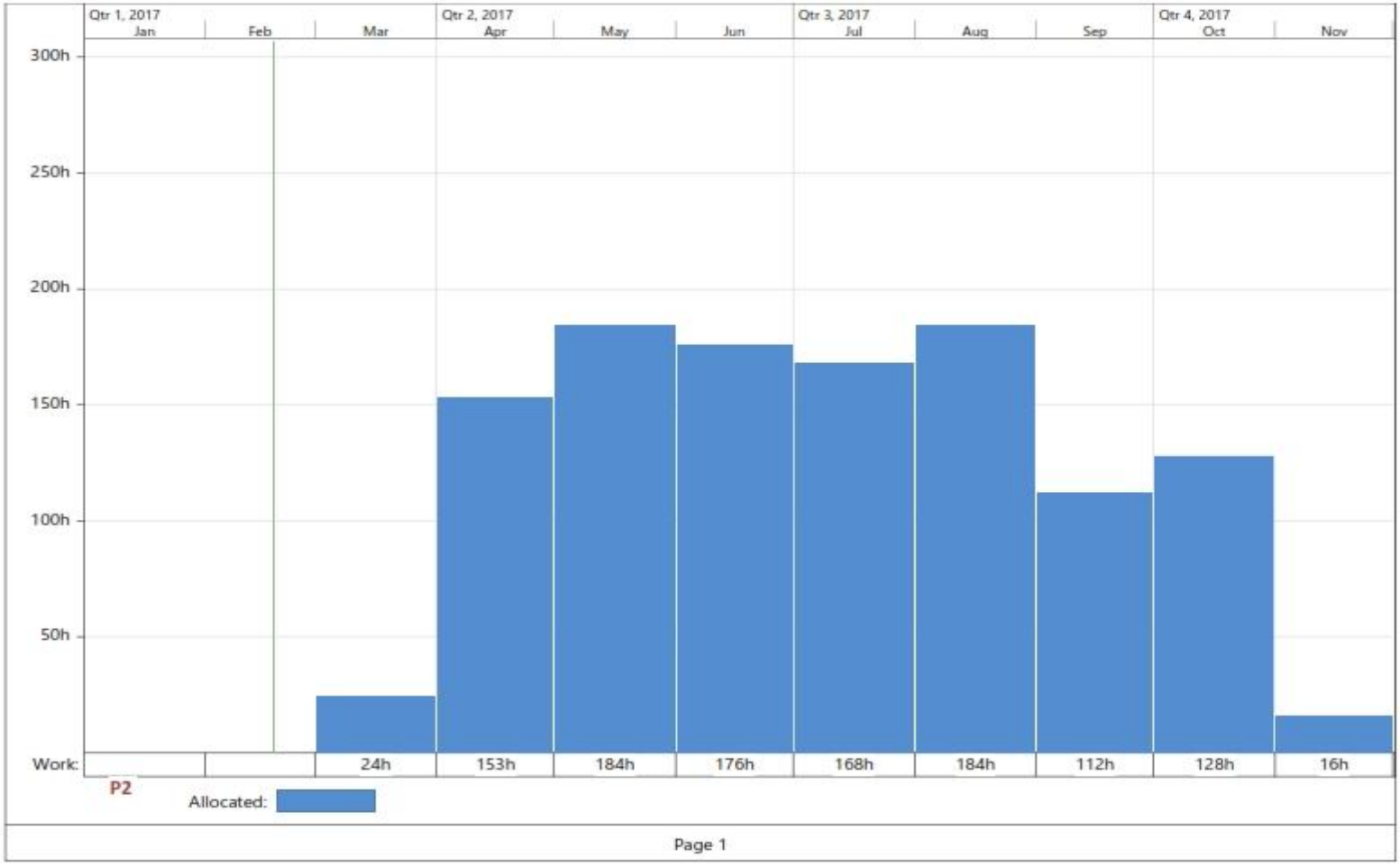


Figure 14 Resource Calendar of the GIS Database Administrator(P2)

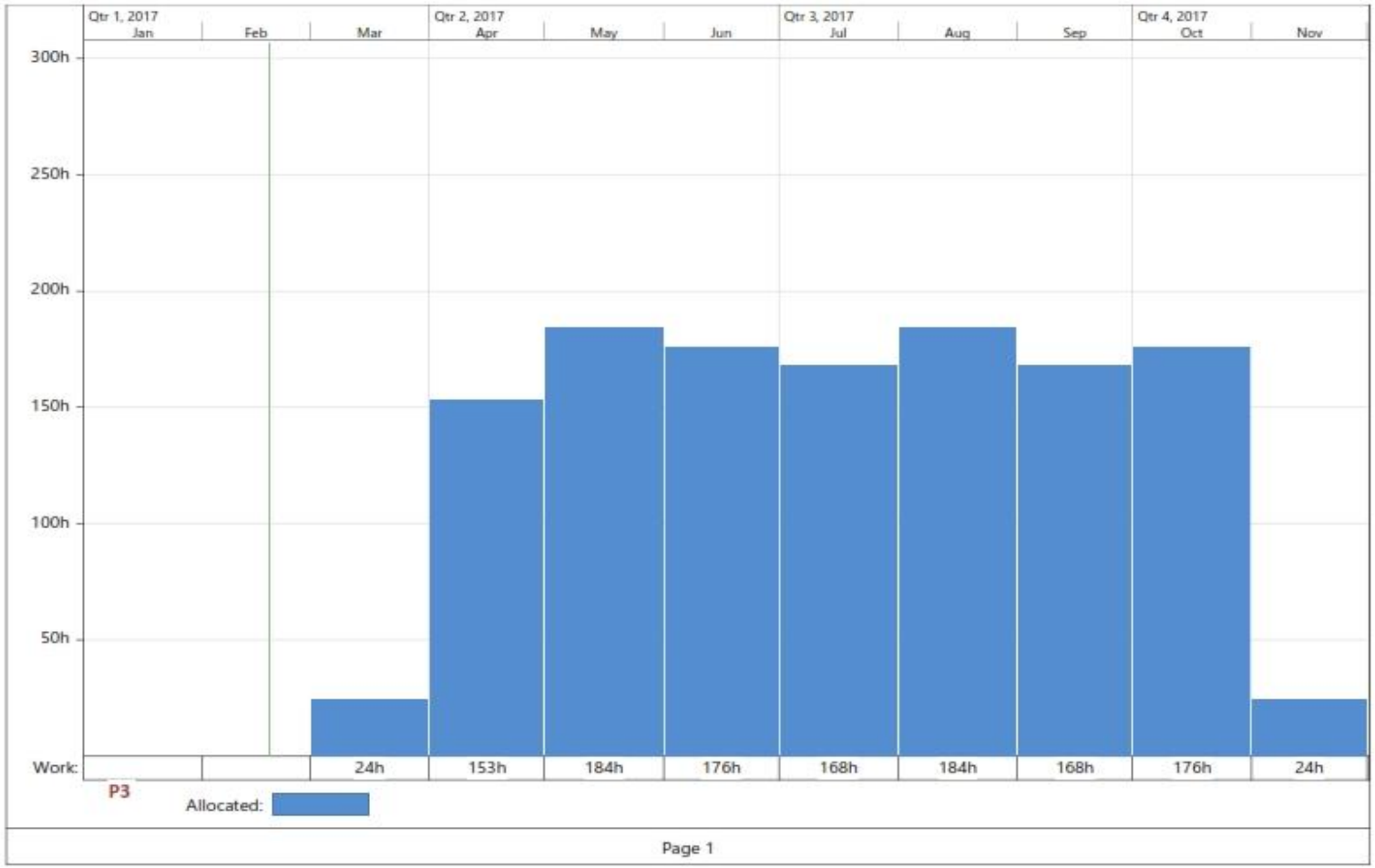


Figure 15 Resource Calendar of the Application Developer(P3)

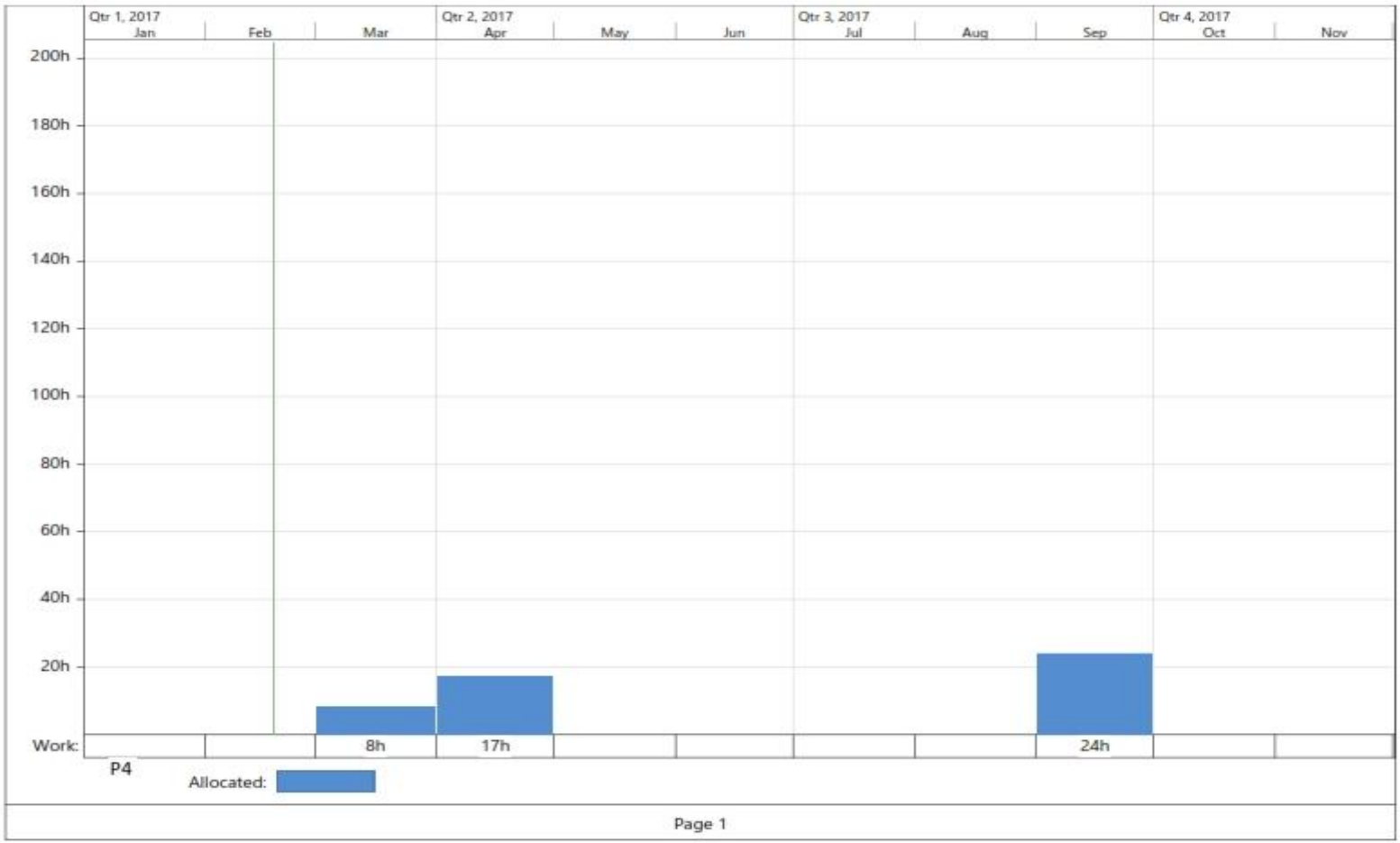


Figure 16 Resource Calendar of the Data Capture/Input Clerk(P4)

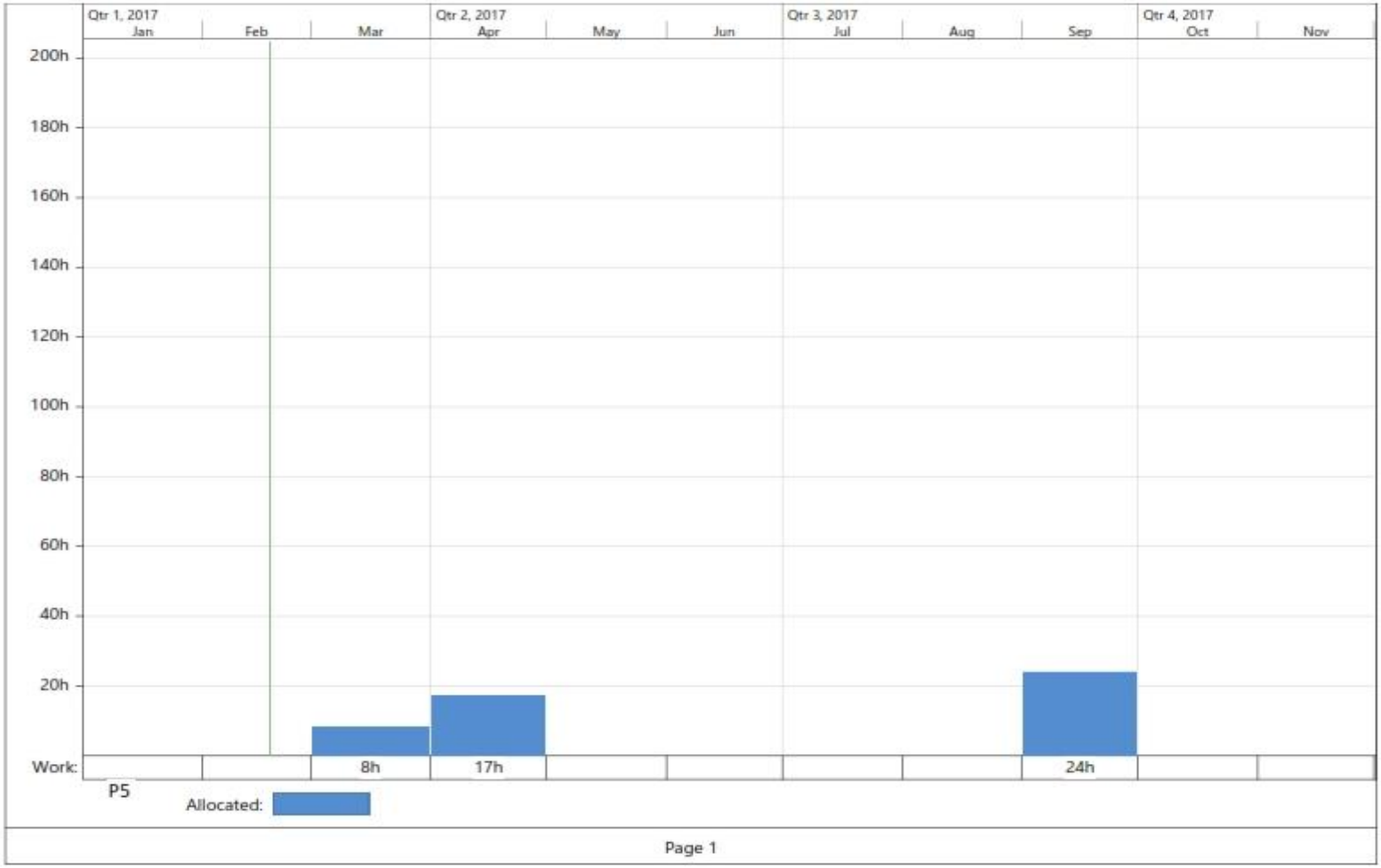


Figure 17 Resource Calendar of the GIS Student Trainee(P5)

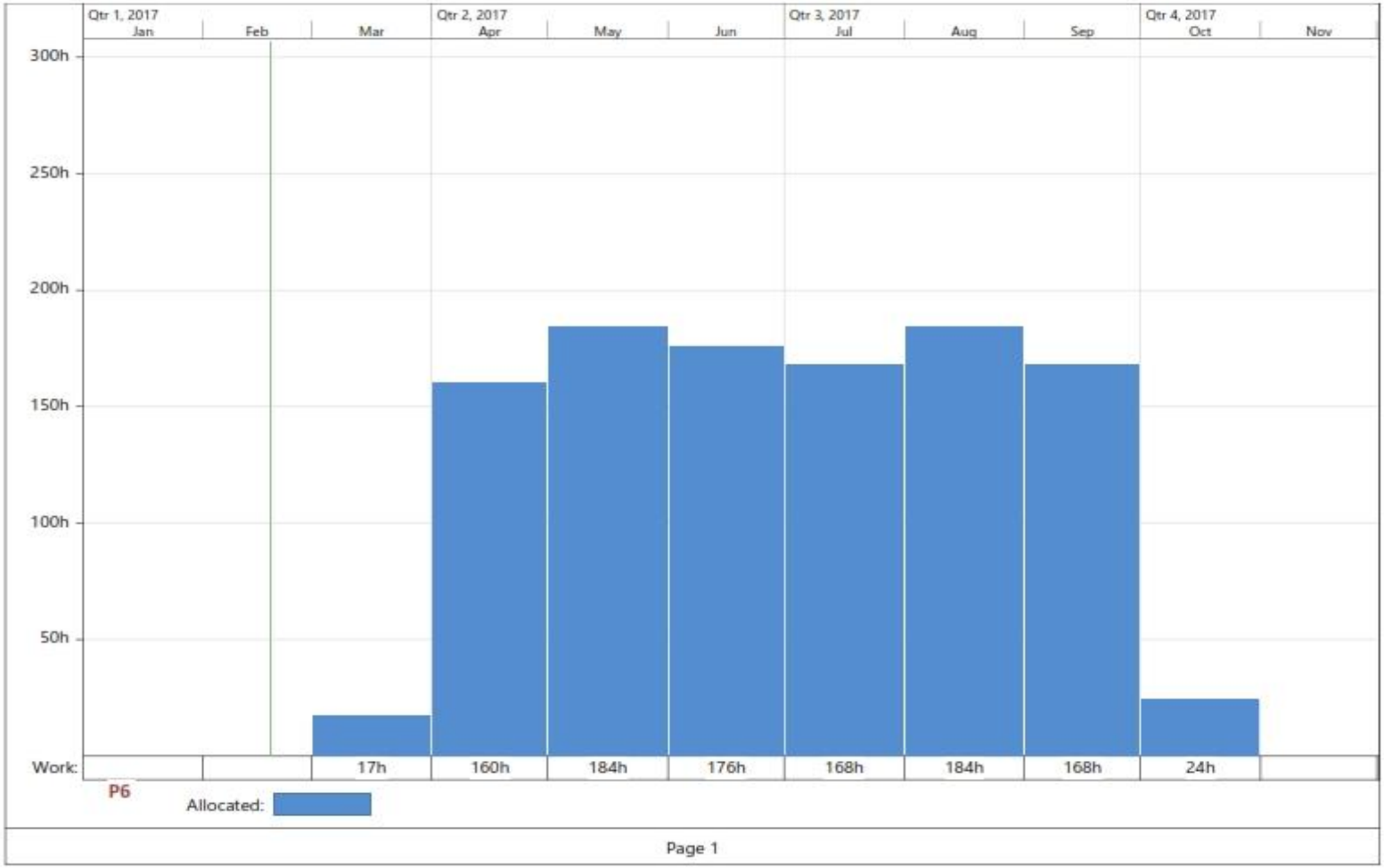


Figure 18 Resource Calendar of the Legistative Assistant(P6)

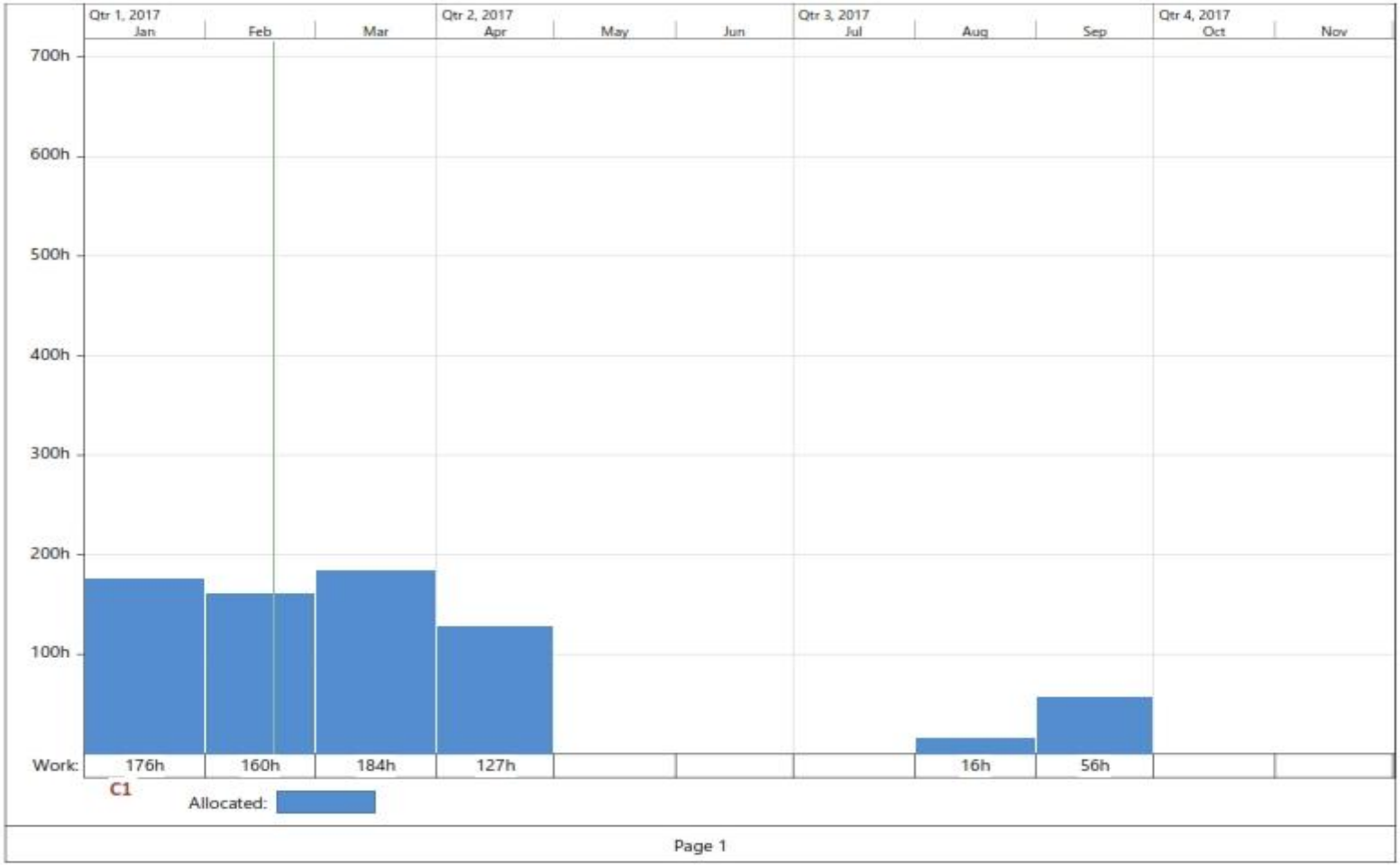


Figure 19 Resource Calendar of the System/Hardware Administrator(C1*)*

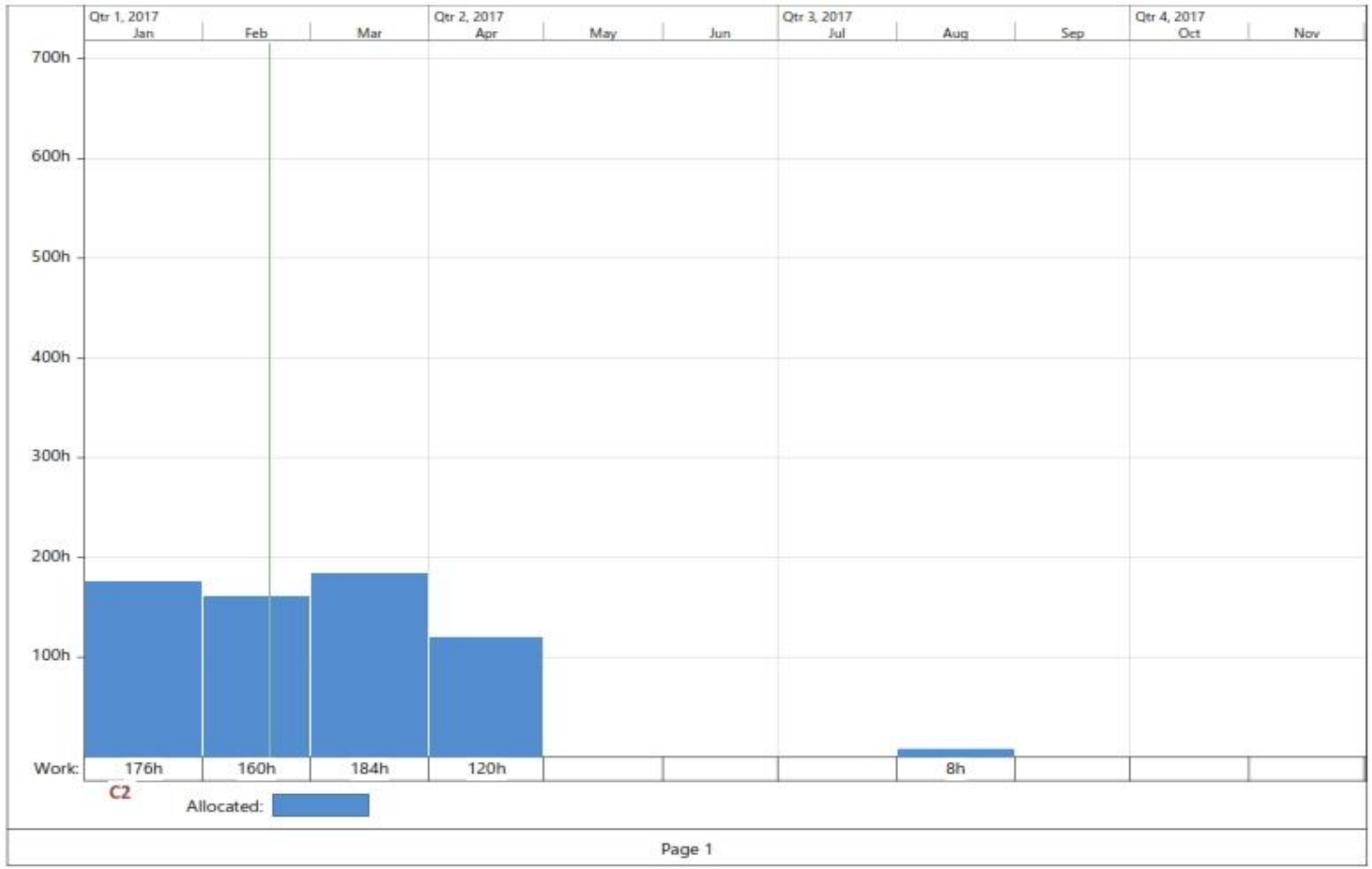


Figure 20 Resource Calendar of the Road Maintenance Engineer(C2)

4.9 COMMUNICATIONS MANAGEMENT PLAN

"*Create a communications management plan to properly manage multimedia communications between internal and external stakeholders, define communication pathways, ensure proper reporting / authority structure and standardize important communications.*" – Objective 3

The communications management plan of the RMMS project is defined during meetings by the BRAGSA team and the staff of the EDF-PMU utilizing the stakeholder register, enterprise environmental factors and the organizational process assets. Communications management is assigned $89,540.00 budget in the cost management plan and is spread across the many phases of the project. The following chart(Chart 20) represents the cost and processes involved in the communications management of the RMMS project:

Chart 22 Cost and Activities of Communication Management in the RMMS Project

ID	ID#	Task Name	Cost Baseline
2	**I**	**Project Initiation and Planning Activities(I)**	
4	I2	Stakeholder Meeting	$4,500.00
5	I3	Develop Stakeholder Register	$480.00
6	I4	Develop Project Communications Strategy	$960.00
7	I5	Develop Stakeholder Requirements List	$480.00
14	I12	Team Meeting for Roles and Responsibilities Assignments	$2,500.00
15	**R**	**Roads Classification(R)**	
16	R1	Interviews with Stakeholders	$2,500.00
17	R2	Research of Roads Classification in St.Vincent and the Grenadines	$1,440.00
21	R5	Signoff Meeting of Proposed Work Phases(IT,L)	$4,000.00
22	**IT**	**Road Maintenance Management System(IT) – Software Development Life Cycle**	
23	IT1	Meeting with the Customer and Stakeholders	$3,000.00
29	IT7	Meeting with the Customer and Stakeholders - Signoff of System Requirements	$3,000.00
33	IT11	Signoff Meeting of Comprehensive System Architecture Document Meeting	$3,000.00
45	IT23	Signoff Meeting of Interface Mockups	$3,500.00

ID	ID#	Task Name	Cost Baseline
51	IT29	Internal Testing of the System	$2,500.00
52	IT30	External Testing of the System with Stakeholders	$2,500.00
55	IT33	Writing of the User Manuals	$10,080.00
56	IT34	Training of the Users	$4,000.00
58	**L**	**Legal Aspects(L)**	
60	L3	Signoff Meeting of Revised Roads Act of Saint Vincent and the Grenadines	$2,500.00
63	L6	Submission For Review By the Attorney General's Office	$880.00
64	**EX**	**RMMS Road Maintenance Program Execution Activities(EX)**	
70	EX6	Signoff Meeting to Review Pilot Roads data and Discuss Calibration Criteria Calibration	$2,500.00
73	EX9	Stakeholder Workshop	$2,500.00
74	EX10	Develop Public Awareness Strategy	$2,000.00
75	EX11	Implement Public Awareness Strategy	$480.00
76	**C**	**Project Closing(C)**	
77	C1	Revised Roads Act Forward to Cabinet for Approval	$10,080.00
78	C2	Policy Document Forward to Cabinet for Approval	$10,080.00
79	C3	Project Forwarded to Cabinet for Approval	$10,080.00

4.9.1 Plan Communications Management

(Section 10.1, PMBOK, Project Management Institute, 2013)

The plan communications management process develops an approach to project communications which utilizes organizational assets to highlight and fulfill each stakeholder’s needs and requirements for communicating effectively.

These meetings define the tools and techniques involved in communications management of the RMMS project. These include communication methods, meetings, performance / internal reports, brochures, policy documents and communication models. This process ensures that the information distributed to

stakeholders included the correct medium, style, interaction models, facilitation and presentation methods.

4.9.1.1 Communications Management Approach

An effective communications management plan considers the audience (stakeholders both external and internal) and their level of power and Influence. The plan also suggests how to keep each stakeholder engaged throughout the project by disemminating knowledge and information depending upon the level of engagement by the "identify stakeholder" process.

Stakeholders are classified as major (S1, S2) and minor (S3, S4) using meetings and expert judgement by the project manager. The communication requirements level of each stakeholder is also established by these methods. The communication requirements level of each stakeholder is listed in the following chart(Chart 21):

Chart 23 Stakeholder Register and Communication Requirements

Stakeholder	Full Name	Classification	Communication Requirements
Minister - MOTW	Hon. Julian Francis	S1	HIGH
CEO- BRAGSA	Dexter Gellizeau	S1	HIGH
Senior Engineer-BRAGSA	Colin Francis	S3	LOW
Chief Engineer - MOTW	Brent Bailey	S1	HIGH
Ministry of Transport and Works		S4	LOW
Ministry of Central Planning – mainly the staff of the European Development Fund Project Management Unit (EDF-PMU)		S1	HIGH
BRAGSA Staff – mainly Road Maintenance Personnel		S2	HIGH

Stakeholder	Full Name	Classification	Communication Requirements
Ministry of Agriculture		S4	LOW
National Emergency Management Organization(NEMO)		S4	LOW
Ministry of Physical Planning		S4	LOW
Area Politicians		S3	LOW
Area Representatives		S3	LOW
General Public		S2	HIGH
Commercial Motorists and other motorists		S2	HIGH
Agricultural Transportation Stakeholders		S2	HIGH
Farmers		S2	HIGH
Road Infrastructure Engineers and Contractors		S4	LOW
Communications Manager(BRAGSA)	Roxtanne Millington	S4	LOW

*the colour scheme is defined by Chart 28.

Communication with stakeholders is summarized as follows:

1. Stakeholder meetings is the primary source of communication between the majority of stakeholders and the project team.
2. Each stakeholder meeting is focused on updating project stakeholders on specific project outputs.
3. There are ten meetings with each meeting scheduled over a three day period.
4. The three-day period is utilized to carry out an iterative inspection sequence of the project output.
5. Interim reports are furnished to major stakeholders (S1,S2) and furnished upon request by minor stakehodlers (S3,S4).
6. Interim reports are prepared in semi-formal style.
7. Final reports are submitted upon phase completion or milestone achievements.
8. Final report(s) are prepared in formal style and submitted only to major stakeholders (S1, S2).

9. The project manager rapport is built through an “open door” policy, telephone calls, emails and one-to-one meetings between stakeholders and the project manager.
10. Confidential information is released by the project manager after consultation with the Minister of Transport and Works (MOTW) and the CEO of BRAGSA.
11. Updates to the communications management plan will be relayed to the CEO of BRAGSA by the project manager to utilize organizational assets such as the communications manager of BRAGSA, if necessary.

The interim report utilizes the basic format and semi-formal style of the informal reports between engineers and the senior engineer / CEO of BRAGSA. A mockup of the interim report follows in Figure 21:

From: Project Manager Engr. Kent Thomas

To: CEO Gellizeau, Snr. Engr. Francis

Date: 20/01/2017

Subject: **Interim Report on the Development of the API**

* please refer to the activity list furnished on 18/01/2017

Since our Last Interim Report during Activity (IT11), the project team has managed to improve upon the functionality of the "Comprehensive Architecture Document" through issues reported by fourteen (14) stakeholders during the meeting IT11 - Signoff Meeting of Comprehensive System Architecture Document Meeting and have already achieved the next stage of development in IT12 – Create an Entity Relationship Diagram. The achievement of IT12 in six (6) man hours has put us ahead schedule by one (1) day thanks to the Hard work of the team. The project has managed to stay completely within budget and there is still the procurement of one (1) PC which has yet to be required.

Figure 21 Interim Report of the RMMS Project

4.9.1.2 Commnications Matrix

The communications matrix is a communications tool or model which examines the receiver, communicator, method, feedback and communication type relationships within the project. The following chart (Chart 22) represents the communications matrix of the Road Maintenance Management System (RMMS):

Chart 24 Communications Matrix of the RMMS Project

Communication Type	Stakeholder/ Receiver	Information	Timing/ Frequency	Method/ Mechanism	Feedback	Sender/ Communicator
Stakeholder Signoff Meetings and Product Testing	S1, S2, S3, S4, Project Team Members	Communications between Project Team and Stakeholders at each Milestone	Multiple Activities	Informal and Formal meetings allowing stakeholders to voice their concerns and interests and also dedicated to improving stakeholder engagement	Direct Contact	Project Team
Draft Documents	S1, S2, S3, S4, Project Team Members	Specific Milestones each have their documents	Upon Request	Drafts of Final Documents for perusal of major stakeholders before finalization for Signoff meetings	Return of Document with Corrections, Questions and Addendum	Project Manager
Final Documents for Approval	S1, S2, S3, S4	Documents for Approval during Signoff meetings	Before Signoff Meetings		Return of Document with Corrections, Questions and Addendum	Project Manager
Mass Media Communication	S3, S4	Open Communication to the Public about project advances	Weekly Updates	Maintain an Active Twitter and Facebook account will be	Social media comments and questions	GIS Student Trainee, with Project Manager Approval on

Communication Type	Stakeholder/ Receiver	Information	Timing/ Frequency	Method/ Mechanism	Feedback	Sender/ Communicator
		and outcomes		created which only documents project milestones and progress		Each Post
Road Naming Brochure(Policy Document)	S1, S2, S3, S4, Cabinet	This document labels all new roads added to the current roads database in each period.	The project will output the first Road Naming Brochure as part of the Policy Document; every 5 years an updated brochure will be produced by BRAGSA.			Project Team
Road Project Programme Proposal	Cabinet	Output of EX8, Pilot Roads Project created by the RMMS	One off	Documents showing pictures and information of the roads that the RMMS prioritization system created.	Approval/Disapproval by Cabinet	Project Team
Interim Project Status Reports	S1, S2, S3, S4	Updates on current level of implementation of the Project	Upon Request	Phone Call, email or Documents to show project schedule advancement	Return of Document with Corrections, Questions and Addendum	Project Manager

Communication Type	Stakeholder/ Receiver	Information	Timing/ Frequency	Method/ Mechanism	Feedback	Sender/ Communicator
Project Status Reports	S1, S2	Special Updates created by the Project Manager for Major Stakeholders	Monthly	Phone Call, email or Documents to show project schedule advancement	Return of Document with Corrections, Questions and Addendum	Project Manager
Team Status Changes	S1	Internal Document for Human Resources Management, Issues and Changes	Infrequent	Documents showing personnel, reason for change, effect on the project and proposed replacement	Approval/Disapproval of CEO	Project Manager
Priority Assignments	S1, Project Team Members	Assignments given to specific team members to improve Resource Levelling	Infrequent	Document stating specific objective, deadline, schedule and tasks of the team member	Confirmation by project team member	Project Manager

The communications management plan utilizes the change request process to alter / reconfigure or re-work any issues or risks which may impact the triple constraints (time, cost, schedule) of the project and to inform relevant stakeholders of these issues. A mockup of the change request plan follows in Figure 22:

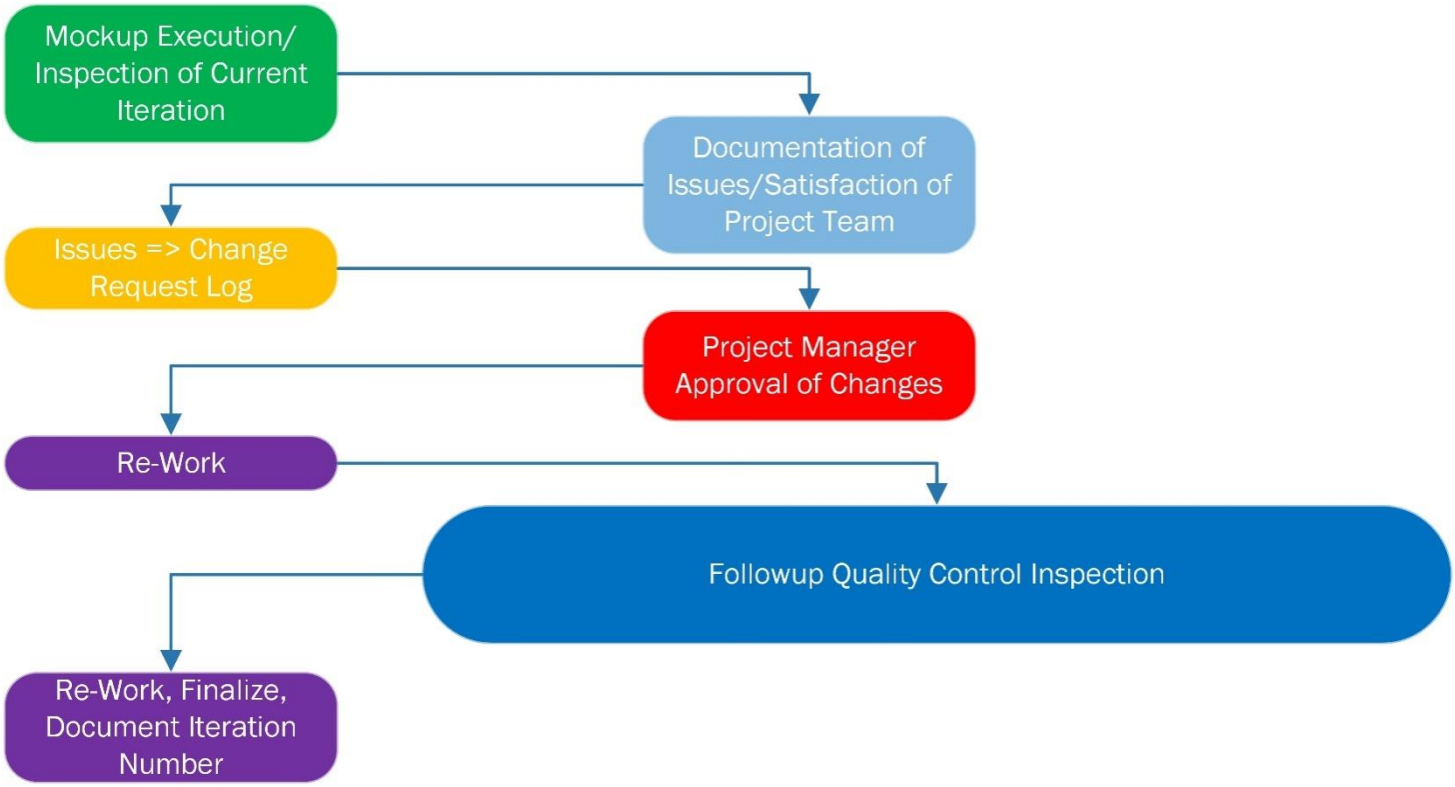


Figure 22 Change Request Plan

All changes which are suggested, approved and completed must be properly documented to modify the cost and schedule plans and to create traceable evidence of changes over the life of the project. These changes are documented in the change log. A mock-up of the change log follows in Chart 23:

Chart 25 Change Log

#	Origin	Description	Date Received	Date Required	Impact to Project Scope	Impact to Project Schedule	Impact to Project Cost	Approval(Yes/ No)
1	Example: IT23 – Signoff Meeting of Interface Mockups	3 major stakeholders stated interface needs to be 1) more colourful 2) more eye-catching	5/2/17	5/3/17	No Effect	Increases Project Schedule as Interface Mockups must be redesigned	Increase in work hours for the Application Developer	Yes
2	Example: IT30 - External Testing of the System with Stakeholders	Stakeholders state that Requirements are inadequate and changes are necessary with little additional information			Increase in Project Scope to further ascertain stakeholder new requirements	Increase in Project Schedule	Increase in work hours for project team	No

4.10 RISK MANAGEMENT PLAN

"*Explore the project risks, constraints, assumptions to understand risks to the project of the RMMS and create a risk management plan to properly coordinate countermeasures.* " – Objective 4

Risk management is a very new concept to personnel of BRAGSA. In prior projects, there was no consideration of project risks and how to solve them. Many projects were carried out with project risks only being factored in after risk had occurred.

A risk is defined as any event or occurrence which can prevent or hinder the progression of the project or project completion. This definition leads to a few points for consideration. These are:

- There are different levels of risks, some more serious than others.
- The definition is so wide that there will be some risks which are very obvious and some which are less obvious.
- Risks may occur in every component of a project and at anytime in a project schedule.
- Some risks can be identified during the initiation and planning phases of a project while others later in the project's lifecycle.

4.10.1 Plan Risk Management

(Section 11.1, PMBOK, Project Management Institute, 2013)

Project risks are identified initially by meetings between the planning team and the EDF-PMU. Project team members are involved in sending information and data through reports to improve tracking of project risks. The Process of Identifying Risks (Section 11.2, PMBOK, Project Management Institute, 2013) is a continuous process which was performed monthly throughout the project by the project

manager. The project manager utilized expert judgement and meetings with internal and external stakeholders. The project manager is responsible for the monitoring of project metrics, activities, schedule, quality, scope and cost to track the risks involved in each of these aspects.

Risk categories: The categories provide a high level grouping of causes of risks. The risk categories defined by the project team were:

1. Project size
2. Project definition
3. Project leadership
4. Project staffing
5. Project management
6. Software

Risk probabilities / impacts: risk analysis requires multiple levels of risk probability and impact to differentiate between each risk and how they affect time, cost, scope and quality of the RMMS project. Stakeholder tolerances are not well-defined. The risk probabilities classification follows:

1. Certainty
2. Somewhat likely
3. Unlikely

Risk levels are utilized with treshold values to monitor risks throughout the project. Risk levels are classified as:

1. High
2. Medium
3. Low

The risk categories are utilized to create a risk breakdown structure of possible hazards which may occur. Figure 23 illustrates the Risk Breakdown Structure:

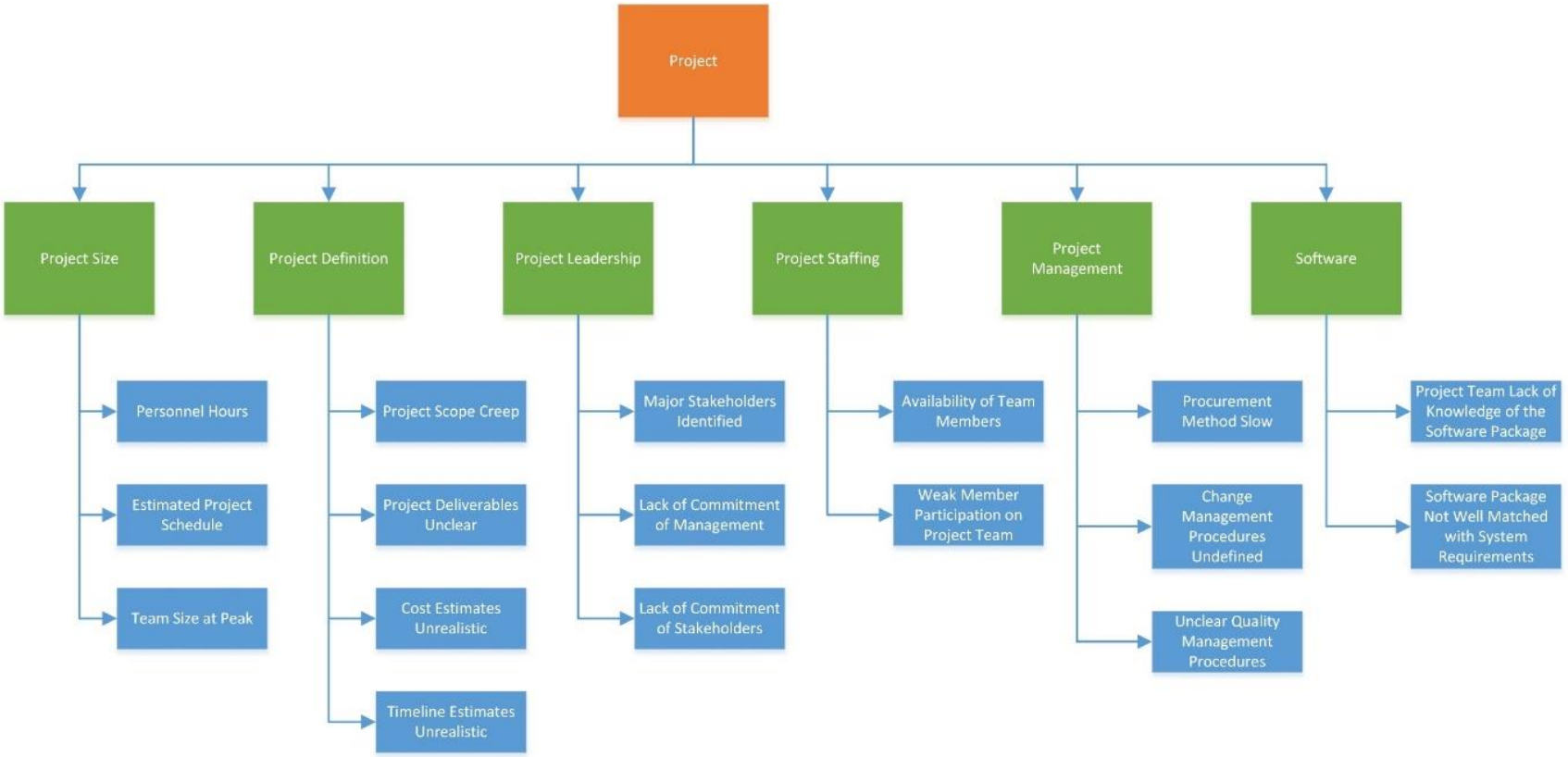


Figure 23 Risk Breakdown Structure

4.10.1.1 Risk Reporting and Documentation

The risk management plan utilizes the change request plan to perform risk correction. Project team members monitor the risk thresholds involved in activities they perform and inform the project manager when risk threadholds have / have not been exceeded. The project manager consults the mitigation strategies and creates an interim report for major stakeholders. This report is input into the change log and change request mechanism of the RMMS project. This methodology is visualized in the following figure (Figure 24):

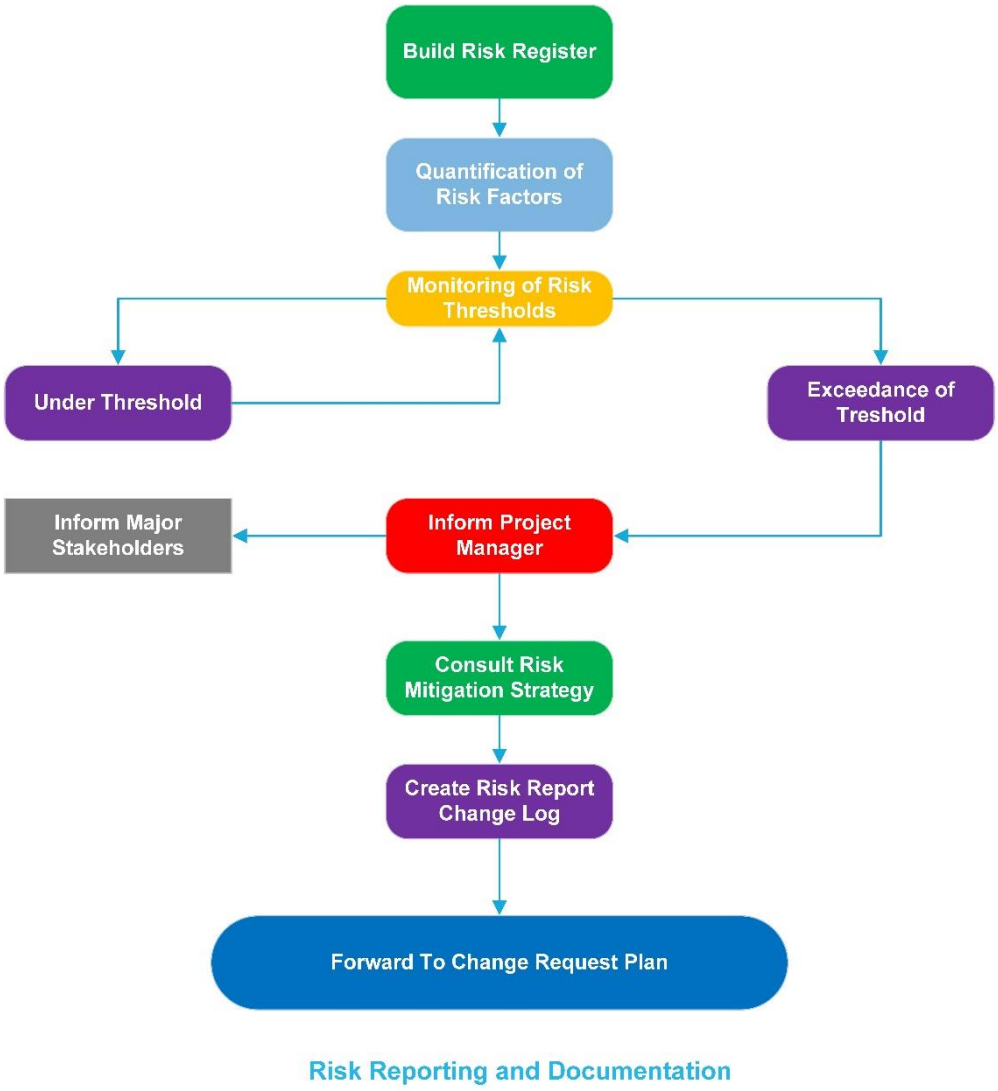


Figure 24 Risk Reporting and Documentation

4.10.2 Identify Risks

(Section 11.2, PMBOK, Project Management Institute, 2013)

Risks are identified by the project team and project manager and the factors which lead to these risks are documented. This process creates the risk register, which is updated throughout the project depending upon changes to risk factors. The team

to be more risk-averse will discuss risks regularly and identify new risk factors or scenarios which will then be reviewed by the project manager. The project manager and team considers risk response / mitigation and contingencies for these identified risks. The techniques utilized by the project team to identify risks are:

1. Documentation and review of the project management plan and its subsidiary plans.
2. Expert judgement and checklist analysis by the project team.
3. The project manager tracks the different plans and activity cost estimates and activity durations to assess risk thresholds for the overall RMMS project. The project manager also utilizes the root-cause analysis technique to determine the underlying causes which led to the development of risks beyond the risk treshold.
4. Each project team member is involved in the development of preventative actions and mitigation strategies which must to be authorized by the project manager.

4.10.2.1 Risk Register

(Section 11.2.3.1, PMBOK, Project Management Institute, 2013)

The initial data and information accumulated by the planning team and the EDF-PMU team are utilized to create the identify risks process output: the risk register. The initial risk register estimates the risk types from the risk breakdown structure, the risk level, the risk likelihood (probability), and preliminary mitigation strategies decided by the planning team. The risk register follows in Chart 24:

Chart 26 Risk Register

Risk	Risk Level L/M/H	Likelihood of Event	Mitigation Strategy
Project Size			
Personnel Hours	**H:** Over 1500	**Certainty**	Assigned Project Manager, engaged consultant, comprehensive project management approach and communications plan
Estimated Project Schedule	**M:** Over 500 days	**Certainty**	The project schedule and timeline was created to guide the project through each phase and to ensure that frequent baseline reviews of all constraints can be carried out.
Team Size at Peak	**H:** Over 6 members	**Certainty**	Comprehensive communications plan, frequent meetings, tight project management oversight
Project Definition			
Project Scope Creep	**L:** Scope generally defined, subject to revision	**Unlikely**	The Project Management plan outlines the various activities involved in the project and this is actively tracked by the Project Manager
Project Deliverables Unclear	**L:** Well defined	**Unlikely**	The Activities list and Milestones define the major deliverables involved in the project.
Cost Estimates Unrealistic	**L**: Thoroughly predicted by industry experts using proven practices to 15% margin of error	**Unlikely**	Included in project plan, subject to amendment as new details regarding project scope are revealed
Timeline Estimates Unrealistic	**M:** Timeline assumes no derailment	**Somewhat likely**	Timeline reviewed monthly by three groups (Project Manager, Major and Minor Stakeholders) to prevent undetected timeline creep.
Project Leadership			
Major Stakeholders Identified	**L:** Identified	**Unlikely**	Multiple stakeholder signoff meetings are implemented within the project to seek active feedback.
Lack of Commitment of Management	**L:** The Project Manager and CEO of BRAGSA have participated since pre-inception meetings and are interested in the completion of the project	**Unlikely**	Multiple stakeholder signoff meetings are implemented within the project to seek active feedback.
Lack of Commitment of	**L:** Major stakeholders can easily appreciate the	**Somewhat likely**	Multiple stakeholder signoff meetings are implemented

Risk	Risk Level L/M/H	Likelihood of Event	Mitigation Strategy
Stakeholders	value of the project to national development		within the project to seek active feedback.
Project Staffing			
Availability of Team Members	**L:** Team members are full-time paid project staff.	**Unlikely**	Continuous review of project momentum by all levels. Consultant to identify any impacts caused by unavailability. If necessary, increase commitment by participants to full time status
Weak Member Participation on Project Team	**L:** Members are allocated specific tasks	**Unlikely**	Project Team participation and activity progress will be actively scrutinized by the Project Manager to perform resource leveling or weeding out of weak members.
Project Management			
Procurement method slow	**L:** Procurement will take place early in the schedule	**Unlikely**	N/A
Change Management Procedures undefined	**L:** Well-defined	**Unlikely**	Change Log and Quality Control and Assurance Inspection Sequence Well-Defined
Unclear Quality Management Procedures	**L:** Well-defined and accepted	**Unlikely**	Change Log and Quality Control and Assurance Inspection Sequence Well-Defined
Software			
Project Team Lack of Knowledge of the Software Package	**L:** Team is picked by proficiency with the software package, very few packages are utilized and industry standard packages.	**Unlikely**	Human Resource Development for lesser skilled Team members to improve the team proficiency and productivity.
Software Package Not Well Matched with System Requirements	**L:** Software Package is industry standard and specifically chosen for its ability to carry out the tasks involved.	**Unlikely**	Software was designated in initiating meetings with MoCP and BRAGSA because it is ubiquitous on the local market and can perform the tasks outlined by the project.

4.11 PROCUREMENT MANAGEMENT PLAN

"*Detail a procurement management plan to analyse equipment, hardware and software needs and procurement strategy to detail procurement stakeholders and procurement methods.*" – Objective 8

Project procurement assesses the needs that must be met by securing products and services. Equipment that was required by the team is separated into software and hardware. All software required are designated and procured through the Organizational Process Assets of MoCP and BRAGSA because these software ubiquitous on the local market and can perform the tasks outlined by the project.

The tendering procedure is affected by Enterprise environmental factors, including various local legislations which define the tendering procedures. In St.Vincent and the Grenadines, public tenders are carried out and managed locally or regionally depending upon their budget. Tenders below $100,000 XCD are managed by the Tenders' Board of St.Vincent and the Grenadines. Any tender above the $100,000 XCD treshold is transferred to the regional Caribbean Single Market and Economy (CSME) Tenders' Board. Procurement is performed in the early stages of the RMMS project by the following activities(Chart 25) and is allotted thirty-seven (37) days duration:

Chart 27 Procurement Activities

ID#	Task Name	Duration
I6	Initiate BRAGSA Procurement Policy	0 days
I7	Develop Procurement List of Equipment and Software	1 day
I8	Tender for Procurement	36 days

4.11.2 Plan Procurement Management

(Section 12.1, PMBOK, Project Management Institute, 2013)

In St.Vincent and the Grenadines, the standard operating procedure is:

1. Expert judgement is used to ascertain the needs of the project (equipment or other) from the requirements documentation, WBS and WBS Dictionary. In this project, the equipment needs are identified by the P1 project manager, the C1 system / hardware administrator and the consultants. All other undocumented resources are provided by BRAGSA upon request. The schematics are documented and a tender document is created.
2. The system / hardware administrator carries out market research to determine the estimated cost for all equipment. These estimates are used as evaluation criteria in the tendering process.
3. These documents are submitted to the Tenders' Board.

The following chart(Chart 26) lists the equipment required by the project team, the estimated procurement cost (budget) and the specifications which are used as evaluation criteria during the tendering phase. Each Item is given a procurement identification number (PCM#) to allow for separate tenders.

Chart 28 Evaluation Criteria for Tendering of Equipment

ID#	Item	Estimated Procurement Cost(XCD)	Specification
PCM1-PCM4	4 Workstations	$20,000.00	• Intel Core i7-6785R Processor, (8M Cache, 3.90 GHz) • 1 TB HD Serial ATA 7200 RPM • 12 GB DDR4 800 MHz ECC SDRAM • Windows 10 Professional 64-Bit • 8GB GDDR5X, RGB LED, 10 CM Fan, 10 Power Phases, Double BIOS, 3D Graphics Card • Dual 16X DVD+/- RW/CD-RW

ID#	Item	Estimated Procurement Cost(XCD)	Specification
			Combo (Multi-drive) • Ports: USB 3.0, IEEE, microphone, headphone, serial, parallel, PS/2, audio in, audio out, Integrated Gigabit Network Card (10/100/1000) • USB Keyboard, USB Optical mouse • Digital HD 24” flat panel LED Monitor for High Res 7 4K Displays (3840 x 2160), 3D • Office Suite: Microsoft Office with Project 2016 Professional Ed. • Latest version of NOD32 Antivirus • Updated version of Pop up blockers • All Program, Driver and OS Discs included • UPS: 1500VA, Input/Output 120/230 V Lightening & Surge Protection
PCM5-PCM6	Photocopiers & Printers	$10,000.00	• Heavy duty Network Colour Laser printers/Photocopier: Two (2), for 7” x 7” to 14.33” x 20.5”, ADF up to 40 ppm, with 1200 x 600 x 8 dpi/256 resolution Level Gray Scale (equivalent/greater) • 16.0 sec mon / 27.0 full colour (equivalent / greater) • Plain Paper, Envelopes, Transparencies, Labels & Card Stock/ 7.2” W X 11.0 / 17.0” L • 16 lbs. Bond – 110 lbs Index (All Trays including By-pass Tray) • 500 Sheets Collated, with catch tray • 512 MB page memory, 1 GB Device Memory and 40 GB Hard Drive (equivalent / greater) • 10/100 Based Ethernet, USB 2.0 (Optional Wireless 802.11 b/g/n) • Windows 98, NT 4.0, 2000, Me, XP, Vista, 7, Server 2008

ID#	Item	Estimated Procurement Cost(XCD)	Specification
			• 50 Page ADF • Finisher, Accounting, Data Security, Fax Module & Scanning Kits
PCM7	Scanner	$500.00	• 2400 – 4800 dpi, automatic document feeder with at least a 50 sheet capacity, network ready, output in at least tiff, mtiff, jpg, pdf, 100 – 240 VAC
PCM8-PCM9	2 Desktop Printer	$800.00	• For letter to legal size, Colour Multifunction LaserJet, 24 ppm
PCM10	Accessories	$10,000.00	• Toner, Drum, Paper

4.11.2.1 Procurement Approach

Hardware procurement is carried out on a local tender because the total estimated budget for the equipment (estimated $60,000) is lower than the $100,000XCD threshold. The procurement approach of the local Tenders' Board is as follows:

1. A request for expression of interest (ROI) for equipment procurement is advertised by the Tenders' Board on the National Government Website and in the local newspapers. The ROI requests interested persons/organizations/sellers' to acquire the ROI documents, read the procurement information and criteria for selection within these documents and submit relevant information about their organization for consideration.
2. The interested organizations are weaned down to those which most satisfy the ROI criteria. These sellers' proposals are considered according to understanding of the need, overall cost, warranty, business

size and type, risk involved, past performance of sellers and financial capacity of the sellers.

3. The project team and other consultants with the Tenders' Board will then choose a tender winner from among the companies/individuals.
4. Procurement then follows.

4.12 STAKEHOLDER MANAGEMENT PLAN

"*Detail a stakeholder management plan to identify both internal and external stakeholders, their influence and expectations of the RMMS and manage stakeholder engagement.*" - Objective 5

The stakeholder management plan is important to manage the engagement of stakeholders effectively to ensure complete buy-in and support of project milestones and outputs.

4.12.1 Identify Stakeholders

(Section 13.1, PMBOK, Project Management Institute, 2013)

In the initial stages of the project, the direct and indirect stakeholders are identified. These stakeholders include all the people, groups, political members, private individuals, ministries of government, technical professionals and organizations, etc. which may be impacted by the project or may impact the project. These results are documented and the following stakeholder register is created(Chart 27):

Chart 29 Stakeholder Register

Position	Full Name	Classification	Power	Influence	Expectations/Requirements	Engagement Classification
Minister - MOTW	Hon. Julian Francis	S1	HIGH	HIGH	None Registered	Supporter
CEO- BRAGSA	Dexter Gellizeau	S1	HIGH	HIGH	Project Completion BRAGSA Policies observance. Improvement to Road Maintenance Prioritization and Scheduling Improvement to Road Maintenance Project development	Leading
Senior Engineer- BRAGSA	Colin Francis	S3	HIGH	LOW	Project Completion	Neutral
Chief Engineer - MOTW	Brent Bailey	S1	HIGH	HIGH	None Registered	Neutral
Ministry of Transport and Works		S4	LOW	LOW	Improvement to Road Maintenance	Supporter
Ministry of Central Planning – mainly the staff of the European Development Fund		S1	HIGH	HIGH	Efficient Project Execution	Supporter

Position	Full Name	Classification	Power	Influence	Expectations/Requirements	Engagement Classification
Project Management Unit (EDF-PMU)						
BRAGSA Staff – mainly Road Maintenance Personnel		S2	LOW	HIGH	Improvement to Road Maintenance Prioritization	Neutral
Ministry of Agriculture		S4	LOW	LOW	Improvement to Feeder and Farming Roads Maintenance Increased prioritization for Feeder and Farming Roads	Supporter
National Emergency Management Organization(NEMO)		S4	LOW	LOW	Improvement to Road Maintenance	Neutral
Ministry of Physical Planning		S4	LOW	LOW	Improvement to Road Maintenance Prioritization Improvement and Regular Updates to Road GIS	Supporter
Area Politicians		S3	HIGH	LOW	Improvement to Community and Feeder Roads Maintenance	Supporter
Area Representatives		S3	HIGH	LOW	Improvement to Community and Feeder Roads Maintenance	Supporter
General Public		S2	LOW	HIGH	Improvement to Road Maintenance	Supporter
Commercial		S2	LOW	HIGH	Improvement to Community	Supporter

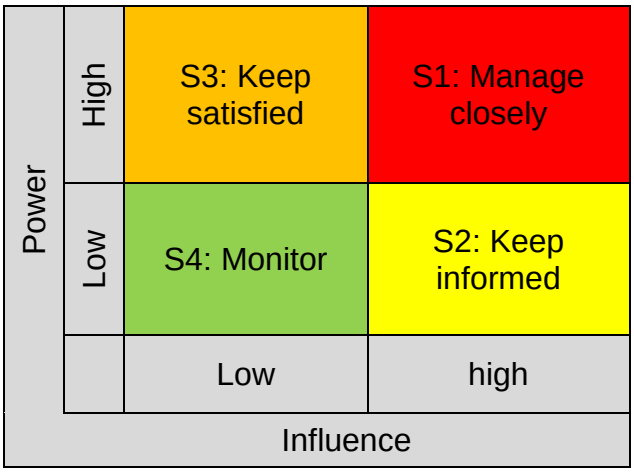
Position	Full Name	Classification	Power	Influence	Expectations/Requirements	Engagement Classification
Motorists and other motorists					and Feeder Roads Maintenance	
Agricultural Transportation Stakeholders		S2	LOW	HIGH	Improvement to Feeder and Farming Roads Maintenance Increased prioritization for Feeder and Farming Roads	Supporter
Farmers		S2	LOW	HIGH	Improvement to Feeder and Farming Roads Maintenance Increased prioritization for Feeder and Farming Roads	Supporter
Road Infrastructure Engineers and Contractors		S4	LOW	LOW	Improvement to Road Maintenance Prioritization	Resistor
Communications Manager(BRAGSA)	Roxtanne Millington	S4	LOW	LOW	Future Communications and Public Awareness Will be carried out by The Communications Officer's Office	Resistor

*the colour scheme is defined by Chart 28.

4.12.1.1 Stakeholder Analysis

The project planning team and the EDF-PMU personnel perform a stakeholder analysis and use expert judgement to determine the stakeholders' expectations and impacts on the project. The stakeholders' register is augmented using questionnaires, meetings and interviews with the identified stakeholders. Major stakeholders are identified as S1, S2 and minor stakeholders are identified as S3, S4 as shown on the power/influence grid in Chart 28:

Chart 30 Power/Influence Grid



4.12.2 Plan Stakeholder Management

(Section 13.2, PMBOK, Project Management Institute, 2013)

The plan stakeholder management process considers the most appropriate strategies for each stakeholder in the stakeholders' register to ensure proper signoff on the various milestones, decisions and the execution of interim activities of the project. Current enterprise environmental factors, such as the political climate, are considered with organizational process assets, such as historical information gained from meetings with the CEO of BRAGSA, to provide insights and information which are used to refine the RMMS project for managing stakeholders needs.

The stakeholder management strategies affect the communications management plan by suggesting the level and type of communications necessary for each stakeholder. Four stakeholder management strategies are determined: monitor, keep informed, keep satisfied and manage closely by the power and Influence grid. The proper communication type to ensure stakeholder engagement for each of these classifications are determined and tabulated as follows in Chart 29:

Chart 31 **Stakeholder Management Strategies**

	Monitor	Keep Informed	Keep Satisfied	Manage Closely
Management Strategy	• Public Awareness Campaign • Open Door invitation policy for Direct Update Information to Project	• Key Messages • Project Outline Information • Roads Legislation and Policy Update Information • Open Door invitation policy for Direct Update Information to Project	• Key Messages • Project Outline Information • Copies of Mockup of Application • Regular Reporting by Phone Call with Project Manager • Open Door invitation policy for Direct Update Information to Project	• Copies of Final Reports. • Copies of Interim Reports. • Copies of Mockup of Application. • Regular Reporting by Phone Call with Project Manager. • Invited to Meetings • Open Door invitation policy for Direct Update Information to Project

*the colour scheme is defined by Chart 28.

The planning team uses analytic techniques to determine the engagement level of the stakeholders and simplify the classification to resistant, neutral and supportive, then allows for stakeholder testing of the final product before public awareness campaigns are carried out. The engagement classification of stakeholders is added to the stakeholders' register.

Management, monitoring and control of stakeholder engagement is performed using multiple activities and communication strategies throughout the project cycle. Communication strategies are listed within the stakeholder management strategies. The activities within this project which incorporated stakeholder engagement and feedback are tabulated as follows in Chart 30:

Chart 32 Stakeholder Engagement Activities

ID#	Name
Project Initiation and Planning Activities(I)	
I2	Stakeholder Meeting
I12	Team Meeting for Roles and Responsibilities Assignments
Roads Classification(R)	
R3	Interviews with Stakeholders
R5	Signoff Meeting of Proposed Work Phases(IT,L)
Road Maintenance Management System(IT) – Software Development Life Cycle	
IT1	Meeting with the Customer and Stakeholders
IT7	Meeting with Customer and Stakeholders - Signoff of System Requirements
IT11	Signoff Meeting of Comprehensive System Architecture Document Meeting
IT23	Signoff Meeting of Interface Mockups
IT28	Internal Testing of the System
IT29	External Testing of the System with Stakeholders
IT32	Training of the Users

ID#	Name
Legal Aspects(L)	
L3	Signoff Meeting of Revised Roads Act of Saint Vincent and the Grenadines
RMMS Road Maintenance Program Execution Activities(EX)	
EX6	Signoff Meeting to Review Pilot Roads data and Discuss Calibration Criteria Calibration
EX9	Stakeholder Workshop
EX10	Develop Public Awareness Strategy
Project Closing Phase(C)	
C1	Revised Roads Act Forward to Cabinet for Approval
C2	Policy Document Forward to Cabinet for Approval
C3	Project Forwarded to Cabinet for Approval

5 CONCLUSIONS

As a result of the development of the research objectives, the following conclusions were reached:

- Analytic-synthetic methods can be implemented effectively for the final project management proposal and its component management plans. Simplifying each management plan and process into its elements allowed for a project manager to effectively carry out his / her duties while keeping each particular element in check and reintroducing those elements to the final work product when it is needed.

Other conclusions include:

1. A well-documented WBS and activity list is the foundation to proper project management planning. Activity lists allow the project manager to track project progress and to ensure that project requirements are fulfilled before continuing to the next phase.
2. Resource and personnel allocation to tasks increases the effectiveness of project work and time management poses a simple-to-follow metric for project progression.
3. Budgeting and the allocation of resources are closely established as a metric for project progression. A project manager who closely follows capital input and output of a project is more likely to have a firm understanding of the risks to completion of the project.
4. BRAGSA and other bodies in St. Vincent and the Grenadines can benefit from the early exploration of risks, constraints and assumptions associated with projects by creating proper mitigation and countermeasures strategies to manage and identify risks.
5. Stakeholders' management is an untapped project management skill or resource to project fulfillment in St.Vincent and the Grenadines. Stakeholders may not be actively engaged in projects but including opportunities for

stakeholders to be engaged / informed about the project is the project manager's goal in these scenarios.

6. Public relations and communication can be used as a structure for the implementation of various other project processes and metrics. A good communication management plan keeps the stakeholders engaged and ensures that stakeholders are involved in the improvement and implementation of quality standards throughout the project.
7. Project managers must ensure that each personnel added to a project is effectively occupied with tasks and therefore, human resource allocation must ensure that each person has the necessary skills and work ethic to perform their duties. An effective management structure allows for a defined communication method.
8. In St.Vincent and the Grenadines procurement methods are strictly dictated for public projects and may not be in the best interest of the project but in the best interest on the local economy by forcing tenders below $100,000XCD to stay within the local vendor pool.
9. Quality management is a high cost process in St.Vincent and the Grenadines if considered separately from other project processes. Quality assurance and control must take place in tandem with other project processes.

6 RECOMMENDATIONS

In general, the Roads, Buildings and General Services Authority (BRAGSA) and the Government of St.Vincent and the Grenadines can improve significantly by adopting a project management approach to all phases of a project: from project proposals and project execution to project closing. Project management is a relatively new methodology to local organisations and the business environment. Therefore, phased approaches to its implementation should be adopted but with a long-term perspective. Perhaps ten (10) years from now, it would be highly beneficial if all project managers and organizational heads were at least partially-versed in project management methodology. These organizations can find remarkable benefits from creating template documents for project management.

1. Scope management is the cornerstone of proper project execution and is often the limitation to cost effective execution in St.Vincent and the Grenadines. Many projects are carried out with poorly defined scope leading to cost overrun and project failure. The Road Maintenance Management System (RMMS) has a specific set of objectives which allows for simple scope management and work breakdown structure creation.

2. The time allotted to projects is well beyond the amount needed for full completion and this is one of the strongest supports for recommending this project management system (RMMS) to local government.

3. A cost management plan can assist BRAGSA and local government to keep within the parameters of the project baselines. Proper budgeting is often limited due to the slow funding of projects but creating a management plan in the preliminary stages of the project will allow the government and other sponsors to

properly understand at which phases / time the project will need further monetary injections.

4. It is recommended that project risks and organizational risks be well-defined so this historical information can easily be implemented in all future projects or as a basis for future risk analysis.

5. Stakeholder management has become one of the strongest areas of improvement in BRAGSA for the past two (2) years. Proper stakeholder management and understanding of stakeholders' requirements improve not only the project success probability but also improve the public relations of the Authority (BRAGSA).

6. Communication planning is one of the severe limitations of BRAGSA with very few modern media outlets and limited inclusion of stakeholders in project communications. This has led to severe criticisms of the Authority (BRAGSA) by the public. A proper communications plan gives all-inclusive opportunities for stakeholders to be part of the project and focuses on multi-medium approaches.

7. Human resource capacity on the local market must be improved considerably because there are very few local personnel trained in the fields required by this project this may lead to increased cost for human resources.

8. Procurement is a double-edged sword on the local market. While procurement of equipment and materials has a specific methodology, there is no set rules structure on the local market for services and therefore, many projects including the RMMS must procure services on the regional market with no local providers being allowed to tender. In the preliminary planning of this project, the consultant offered to carry out the software development phase at 1/3 of the price

mentioned in this document but due to the rules of the tender, the consultant was incapable of tendering.

9. It is recommended that high level definitions of quality, quality metrics and quality management be created for each organization in the local government to easily approach quality management in subsidiary plans and project proposals.

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8 APPENDICES

8.1 APPENDIX 1: FGP CHARTER

PROJECT CHARTER	
Date	**Project Name:**
22-08-16	Project Management Plan for a Road Maintenance Management System
Knowledge Areas / Processes	**Applicacion Area (Sector / Activity)**
Knowledge areas: Project Scope Management, Project Time Management, Project Cost Management, Project Quality Management, Project Human Resource Management, Project Communications Management, Project Risk Management, Project Procurement Management, Project Stakeholder Management **Process groups: Initiating, Planning**	Infrastructural Maintenance, Management Systems, Government
Start date	**Finish date**
10/10/16	3/13/17
Project Objectives (general and specific)	
General objective: To propose a Project Management Plan to execute the Road Maintenance Management System(RMMS) in Saint Vincent and the Grenadines within the organization of Roads, Buildings and General Services according to Project Management Standards Specific objectives: 1. Create a scope management plan which analyzes current road prioritization and defines the requirements and activities of the RMMS as the new regime for decision making in future prioritization of road maintenance projects and validate the work breakdown structure of the Project Management Unit. 2. Develop a time management plan which defines the sequence of activities, estimates resources and duration, and fully defines the schedule of the RMMS system implementation.. 3. Establish a cost management plan in order to estimate the budget for the project, to implement cost management and control procedures. 4. Explore the project risks, constraints, assumptions to understand risks to the project of the RMMS and create a risk management plan to properly coordinate countermeasures. 5. Detail a stakeholder management plan to identify both internal and external stakeholders, their influence and expectations of the RMMS and manage stakeholder engagement. 6. Create a communications management plan to properly manage multimedia communications between internal and external stakeholders, define communication pathways, ensure proper reporting / authority structure and standardize important communications. 7. Ensure the development of a human resource management plan requiredto complete the implementation of the RMMS, defines policy on the acquisition of the project team members and the development and management structure of the project team. 8. Detail a procurement management plan to analyse equipment, hardware and software needs and procurement strategy to detail procurement stakeholders and procurement methods. 9. Ensure a quality management plan is in place to ensure quality assurance and management.	
Project purpose or justification (merit and expected results)	
The Project Management Plan for the Project Management Unit to carry out the establishment of the Road Maintenance Management System and formalize its implementation to coordinate future road maintenance projects in St.Vincent and the Grenadines. This Plan will evaluate the current status of road maintenance prioritization, establish new norms, identify project risks, delineate legal aspects of road management and establish a firm project management oriented backbone to the future of maintenance of the Road Network of St.Vincent and the Grenadines. The Project Management Proposal endeavours to formalize all necessary components of the project including scope, time and	

other knowledge areas; while predicting as much risk to project completion as possible by organizing and planning project activities and resource alotment clearly and succintly.
The expected benefits of the project is the improvement to the project management capacity of the organization by instilling PMP recognized procedures and knowledge area management. The project also endeavors to ensure the proper documentation of the necessary processes to complete the Road Maintenance Management System.

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

1. Scope Management Plan, WBS, WBS Dictionary, Activity List, Milestone List, project scope statement
2. Time Management Plan, Schedule Management Approach, Schedule baseline
3. Budget, Cost Management Plan, Cost baseline
4. Risk Management Plan Personnel Needs Assessment, Job Descriptions, Organizational Assets Data, Responsibility Assignment Matrix (RAM), Human Resource Management Plan
5. Stakeholder Management Plan, Stakeholder Register
6. Communications Management Plan, Change Request Plan, Change Log, Communications Matrix
7. Personnel Needs Assessment, Job Descriptions, Organizational Assets Data, Responsibility Assignment Matrix (RAM), Human Resource Management Plan
8. Equipment Needs Assessment, Procurement Management Plan
9. Quality Management Plan, Quality Metrics, Quality Control and Quality Assurance Activities, Inspection Procedures

Assumptions

The Project is feasible, the sponsors share interest with Project management team in the completion of the project
All documents and interviews are easily accesible.
Major Project Risks can be properly documented and forecasted with appropriate solutions
Stakeholders all show interest in the completion of project management plan objectives.
Communications and Authority levels can be easily determined and reporting structures can be simple and straight-forward.
Limited Delay in the Approval of the FGP.
The project will have enough time to be completed while reaching milestones in a timely manner.
The Search for Reviewers will not be long.

Constraints

Sponsors may not allocate funds as needed.
Documents may not be for public use.
Some risks may be perceived as minor and later become major.
Some stakeholders may have strong influence and have their own agendas.
Communications that is most appropriate for the project may not align with external stakeholder objectives and may also not align with the organization's typical communications methodology.
Scope/Time may change according to stakeholder needs which is a known organizational issue.

Preliminary risks

The Main Risk which will be faced if other entities involved in the road sector(Ministry of Transport and Works, Ministry of Planning, Police Department) hinder or slow the process of the implementation of the RMMS which may decrease the donors interest in continual funding of the project thereby impacting time, cost and scope and causing possibly shutdown of the project on a whole. This has impacted past projects which require multi-department collaboration.

Budget

Budget is negligible. Project is done with inhouse funding.

Milestones and dates

Milestone	Start date	End date
Final Graduation Project	Mon 10/10/16	Mon 3/13/17
2 Tutoring process	Mon 10/10/16	Mon 1/23/17
2.1 Tutor	Mon 10/10/16	Fri 1/13/17
2.1.1 Tutor assigment	Mon 10/10/16	Mon 10/10/16
2.1.2 Communication	Tue 10/11/16	Wed 10/12/16
2.2 Adjustments of previous chapters (If needed)	Thu 10/13/16	Wed 12/14/16
2.3 Charter IV. Development (Results)	Thu 12/15/16	Fri 1/13/17

2.3.1 Project Scope Management Plan	Mon 12/26/16	Fri 1/13/17
2.3.2 Project Time Management Plan	Mon 12/26/16	Fri 1/13/17
2.3.3 Project Cost Management Plan	Mon 12/26/16	Fri 1/13/17
2.3.4 Project Quality Management Plan	Mon 12/26/16	Fri 1/13/17
2.3.5 Project Human Resource Management Plan	Mon 12/26/16	Fri 1/13/17
2.3.6 Project Communications Management Plan	Mon 12/26/16	Fri 1/13/17
2.3.7 Project Risk Management Plan	Mon 12/26/16	Fri 1/13/17
2.3.8 Project Procurement Management Plan	Mon 12/26/16	Fri 1/13/17
2.3.9 Project Stakeholder Management Plan	Mon 12/26/16	Fri 1/13/17
2.4 Chapter V. Conclusions	Mon 1/16/17	Wed 1/18/17
2.5 Chapter VI. Recommendations	Thu 1/19/17	Mon 1/23/17
Tutor approval	Mon 1/23/17	Mon 1/23/17
3 Reading by reviewers	Tue 1/24/17	Fri 2/10/17
3.1 Reviewers assigment request	Tue 1/24/17	Wed 2/1/17
3.1.1 Assigment of two reviewers	Tue 1/24/17	Fri 1/27/17
3.1.2 Communication	Mon 1/30/17	Tue 1/31/17
3.1.3 FGP submission to reviewers	Wed 2/1/17	Wed 2/1/17
3.2 Reviewers work	Thu 2/2/17	Fri 2/10/17
3.2.1 Reviewer	Thu 2/2/17	Fri 2/10/17
3.2.1.1 FGP reading	Thu 2/2/17	Thu 2/9/17
3.2.1.2 Reader 1 report	Fri 2/10/17	Fri 2/10/17
3.2.2 Reviewer	Thu 2/2/17	Fri 2/10/17
3.2.2.1 FGP reading	Thu 2/2/17	Thu 2/9/17
3.2.2.2 Reader 2 report	Fri 2/10/17	Fri 2/10/17
4 Adjustments	Mon 2/13/17	Mon 3/6/17
4.1 Report for reviewers	Mon 2/13/17	Fri 2/17/17
4.2 FGP update	Mon 2/20/17	Mon 2/20/17
4.3 Second review by reviewers	Tue 2/21/17	Mon 3/6/17
5 Presentation to Board of Examiners	Tue 3/7/17	Mon 3/13/17
5.1 Final review by board	Tue 3/7/17	Wed 3/8/17
5.2 FGP grade report	Thu 3/9/17	Mon 3/13/17
FGP End	Mon 3/13/17	Mon 3/13/17

Relevant Historical Information

Roads, Buildings and General Services Authority(BRAGSA) was created on July 1st, 2009 under the "BRAGSA Act" by the Government of Saint Vincent and the Grenadines, after consultations with FDL Consult Inc.. The Authority combined the services of two functional bodies of the government:

1. The General Equipment and Services Corporations(GESCO) which was involved in the rental of heavy equipment, repairs to government vehicles and mining/sales of construction raw materials.
2. The Roads Division of the Ministry of Transport and Works which was involved in public road and building infrastructure maintenance.

The Authority has since been the sole body in-charge of road infrastructure maintenance. The body also subcontracts road maintenance while complete road rehabilitation or addition of new road infrastructure is done throuhg the Chief Engineer's Office of the Ministry of Transport and Works. There has been one previous attempt at creating an RMMS in 1992 by contractors of the Caribbean Development Bank. This system has seen very limited implementation since its completion and will be directly superceded by the output of the Road Maintenance Management System project.

Stakeholders

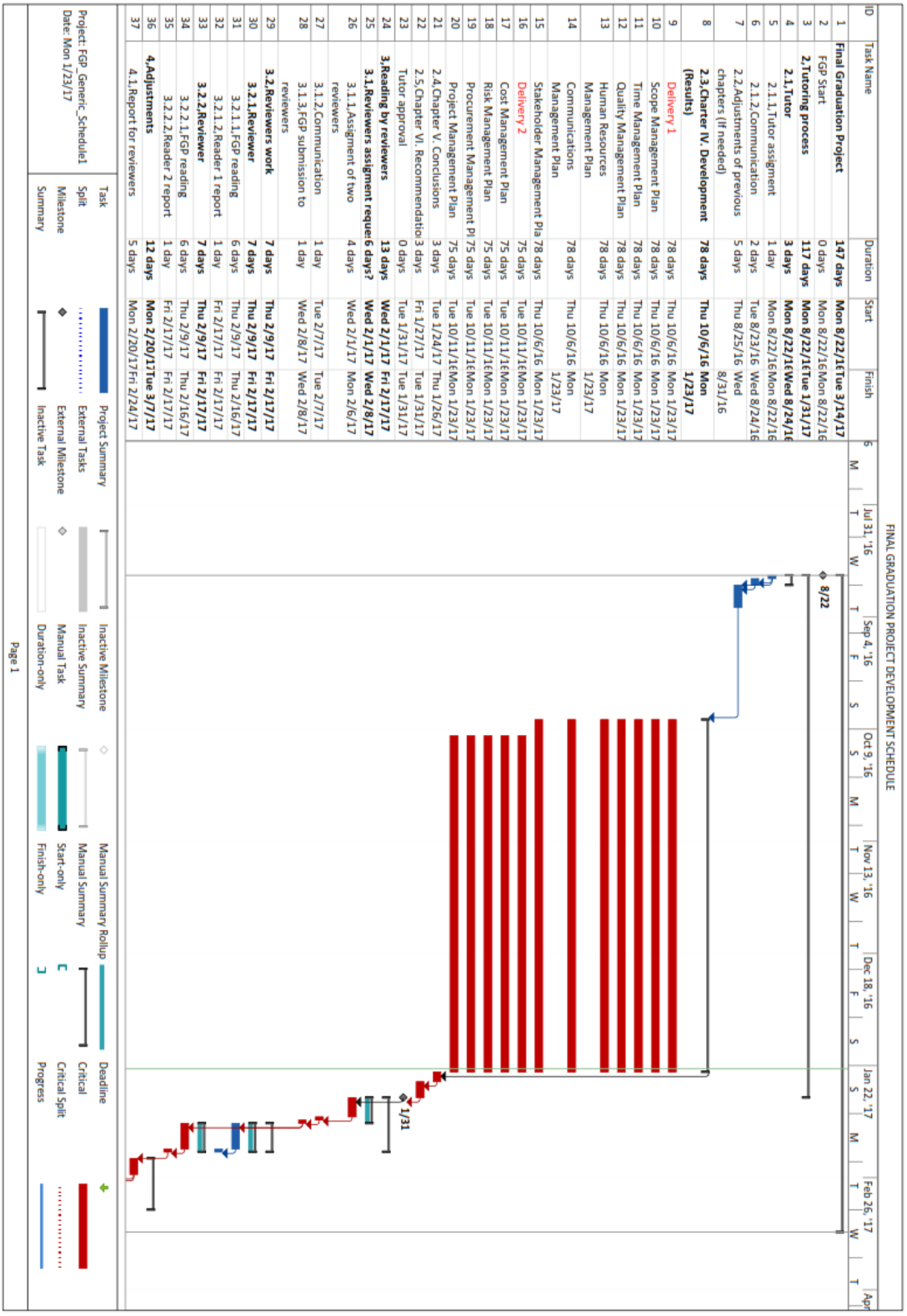
Direct stakeholders:

Roads, Buildings and General Services Authority(BRAGSA), Road Infrastructure Engineers and Contractors, Ministry of Transport and Works(MoTW). the Minister of Transport and Works, the Chief Engineer, Communications Manager(BRAGSA), Road Maintenance Personnel, Media Professionals, Farmers, Agricultural Transportation Stakeholders, Pedestrians, Commercial

Motorists and other motorists. Indirect stakeholders: Area Politicians, Area Representatives, General Public, National Emergency Management Organization(NEMO), Ministry of Physical Planning, Ministry of Agriculture	
Project Manager: **KENT GARY DWIGHT THOMAS**	**Signature:** 
Authorized by:	**Signature:**

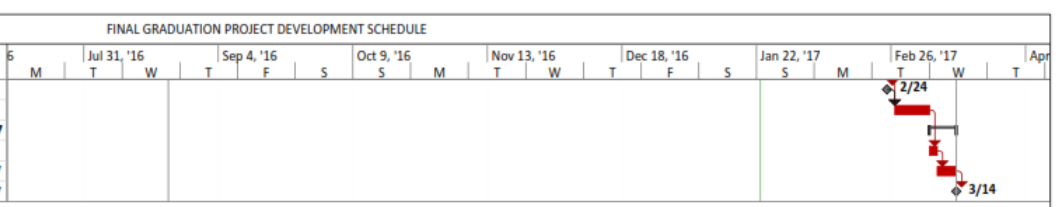
8.2 APPENDIX 2: FGP WBS

8.3 APPENDIX 3: FGP SCHEDULE



FINAL GRADUATION PROJECT DEVELOPMENT SCHEDULE

ID	Task Name	Duration	Start	Finish
38	4.2,FGP update	0 days	Fri 2/24/17	Fri 2/24/17
39	4.3,Second review by reviewers	7 days	Mon 2/27/17	Tue 3/7/17
40	**5,Presentation to Board of Examin**	**5 days**	**Wed 3/8/17**	**Tue 3/14/17**
41	5.1,Final review by board	2 days	Wed 3/8/17	Thu 3/9/17
42	5.2,FGP grade report	3 days	Fri 3/10/17	Tue 3/14/17
43	FGP End	0 days	Tue 3/14/17	Tue 3/14/17



Project: FGP_Generic_Schedule1
Date: Mon 1/23/17

Task	Project Summary	Inactive Milestone	Manual Summary Rollup	Deadline
Split	External Tasks	Inactive Summary	Manual Summary	Critical
Milestone	External Milestone	Manual Task	Start-only	Critical Split
Summary	Inactive Task	Duration-only	Finish-only	Progress

8.4 APPENDIX 4: SAMPLE ONSITE JOB PRIORITY ASSESSMENT FORM

Onsite Job Priority assessment Form

(Revised Oct. 2012)

Tick box next to conditions/situations as observed on inspection of the Road section.

Safety Considerations:

[1] **No major safety concerns** generated. [ ]

[2] Situation poses the **potential to damage a passing vehicle**. [ ]

[3] Situation poses **treat to pedestrians**. during heavy rain [✓]

[4] Situation **may cause serious accidents**. [ ]

[5] Situation is **potentially life threatening**. [ ]

Inconvenience Considerations:

[1] **No major inconvenience** is generated. [ ]

[2] Situation is as **minor & Avoidable Annoyance**. [ ]

[3] Situation is a **Minor but Unavoidable Annoyance**. [ ]

[4] Situation is a **Major & Unavoidable Annoyance** [ ]

[5] Situation renders the **Structure/ Road Unusable**. during heavy rain [✓]

Public Facility Access

[1] If structure fails **only infrastructure will be affected**. [ ]

[2] Structure **affects only area not frequently used**. [ ]

[3] The Structure **negatively affects Residential area**. [✓]

[4] The Structure negatively affects persons travelling to a **Recreational site or School**. [ ]

[5] The Structure negatively **affects vehicles travelling to a Hospital or Clinic in the area**. [ ]

Damage level considerations:

[1]There is **only Cosmetic Damage**, will not worsen. [ ]

[2]There is **Localized, Minor Damage**, which will not deteriorate. [ ]

[3] There is **localized Minor Damage** but will continue to deteriorate slowly. [✓]

[4] There is **Localized Major Damage**, which will continue to deteriorate quickly. [ ]

[5] There is Widespread Major Damage **Reconstruction required**. [ ]

Job Priority Category Ratings Multiplier:

Priority Category	Category Rating	
Safety	10 × 3	30
Inconvenience	8 × 5	40
Level of Traffic/Use	6 × 2	12
Level of Damage	6 × 3	18
		100