UNIVERSIDAD PARA LA COOPERACIÓN INTERNACIONAL
(UCI)

PROPOSAL OF A METHODOLOGY FOR IMPROVING PROJECT MANAGEMENT OF DISTRIBUTION POWER LINE EXPANSIONS IN BELIZE ELECTRICITY LIMITED

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DEDICATION

This proposal is dedicated to my late father, Ralph Nuñez Sr., and mother, Leticia Cooper-Nuñez. Their love, discipline and teaching is the foundation on which I rest. The traits I possess, like hardworking and tenacity, are not innate, but forged by my parents. I have long considered them my role models. I am constantly reminded of their lessons and its continued contribution in my life. These contributions are immeasurable, and for that, I remain forever indebted and truly grateful.

ACKNOWLEDGMENTS

The support I have received in the preparation of the proposal has been overwhelming. My entire family has been understanding and helpful during this process. My mother Leticia Cooper-Nuñez, and my brothers Ravei and Ainsworth Nuñez were encouraging. My wife Dawn Sampson-Nuñez, and my children Raheemah, Kovith, Zhane, Laila and Kayla Nuñez provided moral support, and sacrificed precious family time.

Belize Electricity Limited as a company, System Planning & Engineering as a division, and Project as a department made it possible to gather the requisite information. The project team that worked on the projects and the Senior Manager Mr. Derek Davis deserves special mention.

Universidad para la Cooperación Internacional faculty that contributed to each course I had the privilege of taking was instrumental. The work that was done during the courses equipped me with an improved understanding of project management. With this newly acquired knowledge, and the assistance of Fabio Muñoz Jiménez, the proposal was birthed.

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ABBREVIATIONS AND ACRONYMS

BEL - Belize Electricity Limited

EU – European Union

FGP – Final Graduation Project

GIS – Geographic Information System

HR – Human Resources

ICB – International Competitive Bidding

IFI – International Financial Institution

IPP – Independent Power Producer

NCB – National Competitive Bidding

PMBOK Guide® – Guide to Project Management Body of Knowledge

PMI – Project Management Institute

PR – Public Relationship

PUC - Public Utilities Commission

RFP – Request for Proposals

RTFP - Full Tariff Review Proceeding

SSS – Single Source Selection

UCI - Universidad para la Cooperación Internacional

WBS – Work Breakdown Structure

EXECUTIVE SUMMARY (ABSTRACT)

Belize Electricity Limited (BEL), the sole distributor of electricity in the country of Belize, provides safe and reliable electricity. BEL had an expansive power grid, which provided electricity to 83% of the household population. To electrify such a large volume of the population, BEL had to conduct Distribution Line Extension projects. These projects allowed for the advancement of the country and improvement in the lives of citizens. Once completed, the line extensions were commissioned and BEL maintains the lines. BEL has actively embarked on a goal to increase the coverage in the country. The rapid growth and sparse population of the country created some challenges in achieving this goal.

The individual Distribution Line Extension projects generally were similar in nature. Conventionally, the execution of the projects were in a standard fashion, and in line with BEL's policies and procedures. These policies and procedures did not necessarily translate to project management best practices.

The project management processes in place were those that were previously established. There had been incremental changes to these processes, but there were still areas that required improvement. A review of the current process was conducted. The practices that were determined to be beneficial to the management of projects were highlighted and recommended for future use. Practices found wanting were recommended for modification based on Project Management Body of Knowledge (PMBOK Guide®) Fifth Edition.

The general objective was "To develop a methodology that will ensure consistency in the procedures and practices to select, execute, manage and close projects in Belize Electricity Limited for the improved management of Distribution Power Line projects."

There were four specific objectives. The first was "To analyze current project management practices used to select, execute, manage and close Distribution Power Line projects to determine the company's current position." The second was

“To create project management templates to be used in the management of projects by Belize Electricity Limited to enhance the management of Distribution Power Line projects.” The third was “To create project management templates to be used in the management of projects by Belize Electricity Limited to enhance the management of Distribution Power Line projects.” The fourth was “To create an implementation strategy for the successful implementation of the methodology to provide a seamless transition of best project management practices.”

The proposed methodology conducted utilized several research methods to achieve its objective. The research methods used were analytical, applied, quantitative and empirical. Of the many distribution projects executed, a small sample of projects were selected and the files for these projects were reviewed. The processes of ongoing projects were observed and documented. Based on observation and information received from the project files, the processes were identified and compared to PMBOK Guide® project management best practices.

The results found from the research conducted were catalogued comprehensively using the project management knowledge areas. A detailed and thorough look into the projects identified was conducted. The exercises conducted during the project were documented. The information harvested provides a clear portrait of the management of Distribution Power Line projects.

In the conclusion, the stated general and specific objectives were revisited. The results derived from the research conducted indicates that BEL has processes in place to manage Distribution Power Line projects. While BEL’s processes are not perfectly aligned with best practices outlined in the PMBOK Guide®, it has a solid foundation. Templates were created to provide guidance, and enhance the management of projects.

It is recommended that a thorough assessment of the proposed improvement, and the impact it may have on the current structure must be determined. To ensure a smooth transition, the implementation of proposed process enhancement must be strategic and sustainable. A committee must be established and tasked with

governing the implementation and remain abreast with project management best practices.

1 INTRODUCTION

1.1 Background

Given the nature, volume and frequency of Distribution Power Line Expansion projects, BEL served as a suitable candidate for a proposal of a methodology. The methodology should improve the project management of Distribution Power Line expansions in BEL.

Belize is located in Central America and the Caribbean with a population of 324,528 and has land mass of 8,867 square miles (Census 2010). It is comprised of six districts and two major cayes. Within these district and cayes, there are two cities, seven towns and 190 villages. The layout of the country is such that the municipalities are scattered to the furthest regions of the country. This can pose a challenge for an organization providing national service.

BEL is the sole licensed distributor of electricity in the country of Belize. The Public Utilities Commission (PUC) regulates BEL. The PUC conducts a Full Tariff Review Proceeding (FTRP) every four years to determine the regulated values. These values are review semiannually.

BEL had 315 employees, as stated in the 2016 annual report, total assets valued at BZD$545 million, and served 90,635 customers' accounts. To serve their current customer base, BEL had approximately 1,875 miles of transmission line (annual report 2016, p1) and 1,700 miles of distribution line. With this impressive infrastructure, only 83.5% percent of households in the country were being served by BEL. However, this was a long way from its humble beginnings. The Government of Belize (GOB) first established Belize Electricity Board 1950, and provided generated power to the city and major towns (Annual Report, 2007 p.1). The company was privatized in 1992, and it was renamed BEL. Fortis Inc. acquired majority shares in 1999. (Annual Report, 2007 p.1). Massive expansion of the grid

took place thereafter, and continued, to meet the country's demand. In 2011, the Government of Belize regained controlling interest of BEL.

As communities in the country of Belize emerged and evolved, the need for Distribution Line Expansion remains a constant. A clear and well-devised methodology for managing Distribution Line Extension would have assisted project efficiency greatly.

1.2 Statement of the problem

The project department in the System Planning and Engineering Division was responsible for the execution of major Distribution Line Extensions. The projects were selected using a rudimentary feasibility study. A licensed surveyor, surveyed the route of the power line for the approved projects, established and staked the locations[1] of the poles and anchors to be planted, and cleared the power line route of vegetation that would impede the construction of the power line. Vegetation also had the potential to trip the system[2] and disrupt the flow of power after the line was energized. The pole planting contractor would plant the poles and anchors at the location indicated by the surveyor and approved by the engineer. The line construction ensued immediately thereafter. The framing & stringing construction contractor was responsible for the framing of the poles, the stringing, tension and tying of the conductors, and the installation of hardware. Upon completion of the power line, the inspection and commissioning took place.

The general sequence and procedures remained the same for all Distribution Line Extensions. The company implemented three European Union (EU) funded project

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[1] Locates are the specific identification of underground property belonging to electric company, communication company, gas company, water company or any other entity at that specific location.

[2] After a fault occurs on the grid, the protections in place will isolate that area form the grid. The isolated area will remain without power until the fault is identified and rectified.

in last ten years. These grant contracts required an element of project management that was foreign to the organization at the time. The implementation of the project had its challenges because it deviated from conventional practice. Despite the initial reception, some aspects were a vital part of the organization's management of the projects. However, some areas of project management were lacking but desperately needed. The project management of Distribution Line Extension Projects would have offered a more effective, orderly and timely completion of projects.

1.3 Purpose

The project department in BEL is comprised of two teams that carry out Distribution Power Line Extension. One unit is responsible for projects funded by the company and the other for externally funded projects. The focus of the investigation was on the processes conducted by both teams with an emphasis on funded projects. The funded project guidelines were more in line with best project management practices. This is not to say that there were no areas for improvement.

An investigation of current project management practices will provide a better understanding of what is in place. Take stock of the fulfilled requirements on both teams. Find corresponding project management best practices. Determine the differentiation between current practice and project management best practices. Select improvement methods that are most feasible and beneficial to implement. Examine cost benefit analysis of implementing better project management practices.

BEL is a progressive and dynamic company and is constantly seeking opportunities to improve. The entity welcomes technological advancement and areas for improvement. Note will be taken of findings and recommendations stemming from this research. The implementation of the project will yield some results for the organization.

The benefits derived from the project were as follows:

- The ability to determine project viability in advance.
- Improve project organization.
- Streamline project processes.
- Efficiently coordinate project staff and resources.
- Anticipate and cater for project deliverable timeline and budget cost.
- Possess the ability to track project progress.

1.4 General objective

To develop a methodology that will ensure consistency in the procedures and practices to select, execute, manage and close projects in Belize Electricity Limited for the improved management of Distribution Power Line projects.

1.5 Specific objectives

1. To analyze current project management practices used to select, execute, manage and close Distribution Power Line projects to determine the company's current position.

2. To compare current project management procedures with standard project management processes to identify the practices that are in accordance with best project management practices, and areas for improvement.

3. To create project management templates to be used in the management of projects by Belize Electricity Limited to enhance the management of Distribution Power Line projects.

4. To create an implementation strategy for the successful implementation of the methodology to provide a seamless transition of best project management practices.

2 THEORETICAL FRAMEWORK

2.1 Company/Enterprise Framework

2.1.1 Company/Enterprise background.

BEL began by providing and distributing 100% generated power. As the demand for electricity grew, other power producers were sought to aid in meeting the power demand. Independent Power Producers (IPP) rely on various source of power. BEL purchased and distributed renewable energy. Of the power distributed in 2016, 56% was from a renewable energy sources (Belize Electricity Limited 2016 Annual Report, 2017). Accessing renewable and affordable power means lower rates to customers.

With the current infrastructure in place, BEL can provide safe reliable power to its customer base. The transmission and distribution power lines in the power grid requires service and maintenance to maintain reliability. The company prides itself on service to customers.

2.1.2 Mission and vision statements.

As an established company with clear strategic direction. BEL has shared and indoctrinated employees in its mission, vision and values. As indicated on the company's website *http://www.bel.com.bz/Mission_Vision_Values.aspx*, the mission vision and values are noted below.

2.1.2.1 Company's mission.

To provide reliable electricity at the lowest sustainable cost, stimulate national development and improve the quality of life in Belize.

2.1.2.2 Company's vision.

A model of excellence

2.1.2.3 Company's values.

- Reliability
- Integrity
- Teamwork
- Respect
- Passion for Excellence

2.1.3 Organizational structure.

BEL has a Board of Directors comprising of twelve members. Their appointment is in accordance with the Company's Articles of Association by virtue of special share, board appointment and 10% shareholder rule. The Board of Directors is responsible for the governance and setting of the company's policies and direction. The directions are shared with the top management of the company for implementation.

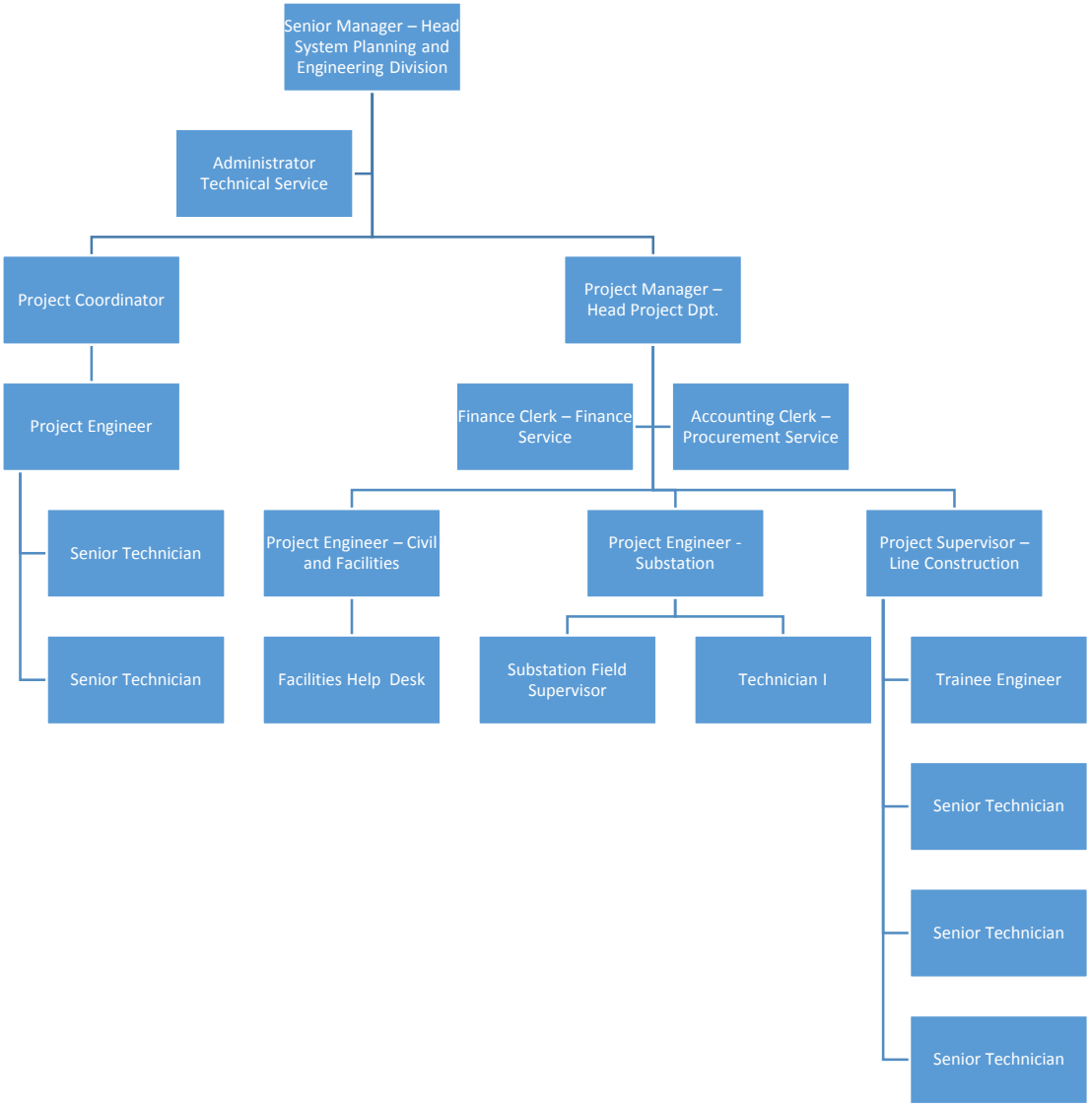
The Company has a hierarchical structure with six management levels. Level one consist of the Chief Executive Officer (CEO). Level two consist of Five Senior Managers. Level three consist 13 Heads of Department (HOD). Level four consist of 13 Engineers and Superintendents. Level five consist of 44 Supervisors. Level six consist of 26 Senior Technicians, Trainee Engineers, Analysts and Auditors.

In order to properly delineate responsibilities there are several departments and within these departments several units. There is the Executive services, Public Relations, Human Resource, Information and Communication Systems, Finance, Customer Service, Purchasing & Stores, Business Planning, Energy Supply, Transmission & Distribution, and System Planning & Engineering. The largest department is Transmission & Distribution (T&D) followed by Customer Service.

Both Departments has representation in the ten Load Centers[3] located across the country.

For the purpose of this proposed methodology, the focus will be on the System Planning & Engineering Division. The division consists of two departments, the Project Department and Engineering Department. The Engineering Department lends engineering support to Distribution Line Expansion projects and the Project Department manages and execute the Distribution Line Expansion projects.

[3] Load Center is a distribution hub. The transmission voltage is stepped down at a substation for distribution of power to surrounding communities. An office is located at or near the substation in the major municipality to conduct business.



Own Elaboration, Taken from BEL's Project Department Hierarchical Structure

Figure 1: Project department organizational structure

2.1.4 Products offered.

BEL earns revenue from the distribution of electrical power to customers. BEL purchases power from Independent Power Producers (IPP), and facilitates the transmission and distribution of that electrical power to the customers. BEL sources economic power at any given time, which translates to the lowest rate for customers. The construction, maintenance and expansion of the grid ensures secure reliable electricity to existing and new customers.

There remains unserved households in the country that are outside the BEL's power grid. To serve these households and increase the company's customer base, the power grid requires extension. Distribution Line Extension projects address the issue of unserved households.

2.2 Project Management concepts

2.2.1 Project.

The term, project, is used loosely and in some instances incorrectly. While there are various meanings, the essence remains the same. For the purpose of this document, definition provided by PMI was used. The PMBOK Guide® (PMI, 2013) states:

> A project is a temporary endeavor undertaken to create a unique product, service, or result. The temporary nature of projects indicates that a project has a definite beginning and end. The end was reached when the project's objectives have been achieved or when the project is terminated because its objectives will not or cannot be met, or when the need for the project no longer exists. A project may also be terminated if the client (customer, sponsor, or champion) wishes to terminate the project. Temporary does not necessarily mean the duration of the project is short. It refers to the project's engagement and its longevity. Temporary does not typically apply to the product, service,

> or result created by the project; most projects are undertaken to create a lasting outcome. For example, a project to build a national monument will create a result expected to last for centuries. Projects can also have social, economic, and environmental impacts that far outlive the projects themselves. (p.3)

The PMBOK Guide® (PMI, 2013), goes on to discuss the operational work within an organization that are repetitive and guided by procedures.

Within BEL, the Project Department is responsible for major project. The department by no means has a monopoly on the company' projects. Each department is responsible for the management of their respective projects. The identification of projects and routine operations seems a challenge at BEL. The categorization of undertaking is a testament to the confusion. Even the project department is not immune from incorrectly categorizing its undertaking. The Distribution Line Extension projects that is the subject of the document and falls under the purview of the Project Department are textbook examples of project.

2.2.2 Project management.

PMBOK Guide® (PMI, 2013), defines project management as:

> Project management is the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements. Project management is accomplished through the appropriate application and integration of the 47 logically grouped project management processes, which are categorized into five Process Groups. (p. 5)

Project success is determined by the delivery time of projects and cost in relation to the budget. The success rate of a project hinges on how well the project was managed. According to Heagney (2012), success rate in the Information Technology Industry is 17% and rework cost in the Construction Industry is 30%. Emphasis should be placed, from the onset, on getting the adequate support and on properly

planning. Various organization employ various management techniques to navigate the challenges of project management. The time spent on managing projects allows the profession to hone certain skills that can be used on future projects. The application of established best practices as indicated in the PMBOK can go a long way to attaining success.

The most seasoned Project Managers and staff with more project experiences are placed in the Project Department. BEL's project management practice is the same as the operational management practice. Where difference occurred was when an international Financial Institution (IFI) insisted on the adherence to their project management guidelines. The execution of the IFI funded projects has enhanced the Project Department performance and ushered in new project management best practices. Incremental standardization is expected of additional best project management practices. PMBOK Guide® (PMI, 2013) states;

> Due to the potential for change, the development of the project management plan is an iterative activity and is progressively elaborated throughout the project's life cycle. Progressive elaboration involves continuously improving and detailing a plan as more detailed and specific information and more accurate estimates become available. (p. 6)

The organization has come to terms with the fact the Project Department manages projects slightly different from the operational departments. The Distribution Line Extension projects conducted by the Project Department are similar in nature. The management of the project should have been relatively consistent barring unique constraints.

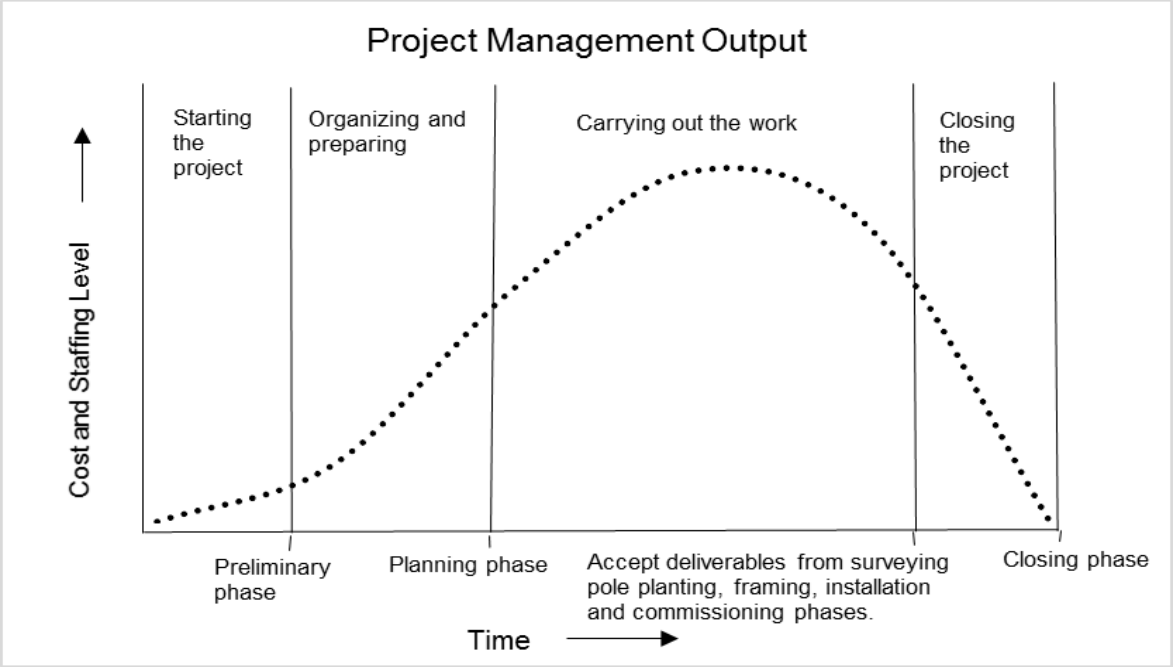
2.2.3 Project life cycle.

The project life cycle was representative of the effort required at various intervals throughout the life of the project. As the project went through each phase, there were

certain resource requirements that were expected. PMBOK Guide® (PMI, 2013) defines project life Cycle as;

> A project life cycle is the series of phases that a project passes through from its initiation to its closure. The phases are generally sequential, and their names and numbers are determined by the management and control needs of the organization or organizations involved in the project, the nature of the project itself, and its area of application. The phases can be broken down by functional or partial objectives, intermediate results or deliverables, specific milestones within the overall scope of work, or financial availability. Phases are generally time bounded, with a start and ending or control point. A life cycle can be documented within a methodology. The project life cycle can be determined or shaped by the unique aspects of the organization, industry, or technology employed. While every project has a definite start and a definite end, the specific deliverables and activities that take place in between will vary widely with the project. The life cycle provides the basic framework for managing the project, regardless of the specific work involved. (p. 38)

A pictorial representation of the project life cycle was the generic life cycle structure. The life cycle structure displays the phases of the project, key deliverables, time, cost and staffing level.



Own elaboration, taken from (PMI, 2013)

*Figure 2***:** Project life cycle

A typical Distribution Line Extension project was divided into eight phases in a sequential relationship.

2.2.3.1 Phase 1: Preliminary.

An initial site visit was conducted to determine the scope of the Distribution Line Extension. A proposed plan was drawn determining the layout of the line extension and number of customers that would have access to power. A cost estimate to complete the planned work was prepared. Based on the estimate provided, the project was selected for implementation. Once selected the project proceeded to the next phase.

2.2.3.2 Phase 2: Planning.

With the approval in place, planning for the project execution was able to commence. The scope of the project was clearly outlined and shared with associated and interested parties. The acquisition of plant, equipment and human resources was taken into consideration. The corresponding cost and schedule of the project was determined based on the requirements, risk and quality expected from the project. The procurement of goods and services required were also catered for in the planning phase.

2.2.3.3 Phase 3: Surveying.

Utilizing competitive bidding, a qualified surveyor was selected to establish the best possible route for the power line. Taking the topography into consideration and the designated utility corridor, stakes identifying the location of the poles and anchors were planted. Where easements on private property was required, the surveyor facilitated that process. The Project Engineer once again inspected and verified the route as adequate. The route was cleared of potentially harmful vegetation that would impede work or disrupt power supply.

2.2.3.4 Phase 4: Pole Planting.

With finalized route established, a revised cost estimate and bill of quantity prepared, materials were requested from inventory, and transported to the project site. Competitive bidding was used to select the Pole Planting contractor. Where the poles and anchors were planted, an inspection was necessary to confirm if there was any pipes or underground cables in the area. Where pipes or underground cables were present, caution was taken when planting poles and anchors. The poles and anchors were planted in a specific manner and to a specific depth, as prescribed by the company’s distribution standards. The poles and anchors were compacted firmly for rigidity.

2.2.3.5 Phase 5: Framing and Stringing of Cables.

Competitive bidding was used to select the Framing and Stringing contractors. The successful contractor was responsible for the having capable linemen to execute the required work. The poles were framed to the specified structure type as indicated in the drawings provide to the contractors. The framing were fasten properly to the pole and insulators attached and were free of damage. The conductors were strung and tensioned with the required force. The conductor must have been free of kinks, abrasions and excessive sag.

2.2.3.6 Phase 6: Installation of Hardware.

The engineer provided location and specification of the transformers, arrestors or any other device required on the power line. The contractor proceeded to install all hardware as per the instructions provided by the engineer.

2.2.3.7 Phase 7: Commissioning of Power Line.

Upon completion of the distribution power line, a technical staff from the project team and a Line Supervisor inspected the line. The Line Supervisor was from the load center where the construction occurred. Corrective work was carried out when identified. With all parties satisfied, the distribution power line was energized.

2.2.3.8 Phase 8: Closing of Project.

With the project complete, all outstanding contracts were closed. As built drawing was generated depicting the actual line in place with all hardware and identifying numbers. The as built drawing was passed to the Geographic Information System (GIS) Technician for inputting.

2.2.4 Project management processes.

To properly plan and manage projects a structure must be created. Outlining sequence and processes. Project Management Institute (2013) defines process as “a set of interrelated actions and activities performed to create a pre-specified product, service, or result” (p. 47). Speaking specifically to project management processes, Project Management Institute (2013) adds, “each process is characterized by its inputs, the tools and techniques that can be applied, and the resulting outputs” (p. 47). There are forty-seven project management processes. Project Management Institute states, “these processes ensure the effective flow of the project throughout its life cycle. These processes encompass the tools and techniques involved in applying the skills and capabilities” (p. 47).

These project management groups are compiled and categorized into five groups. The groups are interactive as depicted in figure 2 below. The categorization of the groups is, as stated by Project Management Institute (2013) stated:

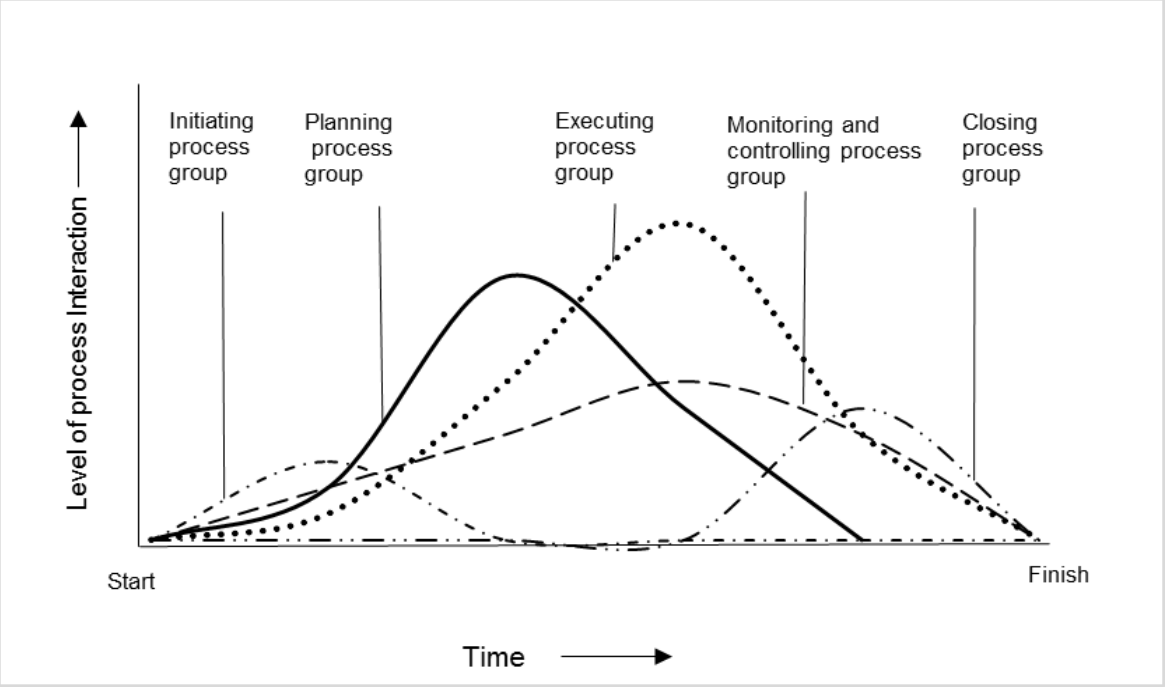
Initiating Process Group. Those processes performed to define a new project or a new phase of an existing project by obtaining authorization to start the project or phase.

Planning Process Group. Those processes required to establish the scope of the project, refine the objectives, and define the course of action required to attain the objectives that the project was undertaken to achieve.

Executing Process Group. Those processes performed to complete the work defined in the project management plan to satisfy the project specifications.

Monitoring and controlling Process Group. Those 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.

Closing Process Group. Those processes performed to finalize and formally close all activities across all Process Groups.



Own elaboration, taken from (PMI, 2013))

Figure 3: Process Group Interaction in Project

The process groups of interest for this document are the Initiating Process Group and Planning Process Group.

For the Distribution Line Extension projects activities within the initiating Process Group included preparation of proposal, identifying stakeholders and requesting approval. The proposal prepared was complete with costing, drawing and estimated number of potential customers. The stakeholders identified were those that impacted or influenced the project. Government agencies, local government officials and key

partners were identified. Approval to proceed with the project was sought from top management.

The planning process group is charting of the project with clearer plans. As the scope of the project became more specific, the timeframe and the budget became firmer. The scope of the project was determined by site visit to assess the current situation. How many homes were in need of power supply and what infrastructure was required to provide it? The timeframe was critical as well. When it was an opportune time to construct the line, and were their time constraints on the project? How much money would have been considered a reasonable investment based on the potential returns? These questions remained constant reminders of constraints as the project was planned.

2.2.5 Project management knowledge areas.

In addition to the five processes, the forty-seven processes are further classified into knowledge areas. There are ten knowledge areas. Project Management Institute (2013) states “a Knowledge Area represents a complete set of concepts, terms, and activities that make up a professional field, project management field, or area of specialization. These ten Knowledge Areas are used on most projects most of the time” (p. 60). The knowledge area provides the input required, the tools and technique used, and the output derived.

2.2.6 Project Integration Management.

2.2.6.1 Develop project charter (Initiating process group).

Project Management Institute (2013) defines develop project charter as “The process of developing a document that formally authorizes the existence of a project and provides the project manager with the authority to apply organizational resources to project activities” (p. 63).

Table 1

Develop Project Charter: Input Tools & Technique

Inputs	Tools & Techniques	Outputs
Project statement of work	Expert judgment	Project charter
Business case	Facilitation techniques	
Agreements		
Enterprise environmental factors		
Organizational process assets		

Own elaboration, taken from (PMI, 2013)

2.2.6.2 Develop project management plan (Planning process group).

Project Management Institute (2013) defines develop project management plan as "the process of defining, preparing, and coordinating all subsidiary plans and integrating them into a comprehensive project management plan. The project's integrated baselines and subsidiary plans may be included within the project management plan" (p. 63).

Table 2

Develop Project Management Plan: Input, Tools & Technique, and Output

Inputs	Tools & Techniques	Outputs
Project charter	Expert judgment	Project management plan
Outputs from other processes	Facilitation techniques	
Enterprise environmental factors		
Organizational process assets		

Own elaboration, taken from (PMI, 2013)

2.2.7 Project Scope Management.

2.2.7.1 Plan scope management (Planning process group).

Project Management Institute (2013) defines plan scope management as “the process of creating a scope management plan that documents how the project scope will be defined, validated, and controlled” (p. 105).

Table 3

Plan Scope Management: Input, Tools & Technique, and Output

Inputs	Tools & Techniques	Outputs
Project management plan	Expert judgment	Scope management plan
Project charter	Meetings	Requirements management plan
Enterprise environmental factors		
Organizational process assets		

Own elaboration, taken from (PMI, 2013)

2.2.7.2 Collect requirements (Planning process group).

Project Management Institute (2013) defines collect requirements as “the process of determining, documenting, and managing stakeholder needs and requirements to meet project objectives” (p. 105)

Table 4

Collect Requirements: Input, Tools & Technique, and Output

Inputs	Tools & Techniques	Outputs
Scope management plan	Interviews	Requirements documentation
Requirements management plan	Focus groups	Requirements traceability matrix

Stakeholder management plan	Facilitated workshops	
Project charter	Group creativity techniques	
Stakeholder register	Group decision-making techniques	
	Questionnaires and surveys	
	Observations	
	Prototypes	
	Benchmarking	
	Context diagrams	
	Document analysis	

Own elaboration, taken from (PMI, 2013)

2.2.7.3 Define Scope (Planning process group).

Project Management Institute (2013) defines define scope as "the process of developing a detailed description of the project and product" (p. 105)

Table 5

Define Scope: Input, Tools & Technique, and Output

Inputs	**Tools & Techniques**	**Outputs**
Scope management plan	Expert judgment	Project scope statement
Project charter	Product analysis	Project documents updates
Requirements documentation	Alternatives generation	
Organizational process assets	Facilitated workshops	

Own elaboration, taken from (PMI, 2013)

2.2.7.4 Create WBS (Planning process group).

Project Management Institute (2013) defines create WBS as “the process of subdividing project deliverables and project work into smaller, more manageable components” (p. 105)

Table 6

Create WBS: Input, Tools & Technique, and Output

Inputs	Tools & Techniques	Outputs
Scope management plan	Decomposition	Scope baseline
Project scope statement	Expert judgment	Project documents updates
Requirements documentation		
Enterprise environmental factors		
Organizational process assets		

Own elaboration, taken from (PMI, 2013)

2.2.8 Project Time Management.

Plan schedule management (Planning process group)

Project Management Institute (2013) defines Develop Plan Schedule Management as “The process of establishing the policies, procedures, and documentation for planning, developing, managing, executing, and controlling the project schedule” (p. 141).

Table 7

Plan Schedule Management: Input, Tools & Technique, and Output

Inputs	Tools & Techniques	Outputs
Project management plan	Expert judgment	Schedule management plan
Project charter	Analytical techniques	

Enterprise environmental factors	Meetings	
Organizational process assets		

Own elaboration, taken from (PMI, 2013)

2.2.8.1 Define activities (Planning process group).

Project Management Institute (2013) defines define activities as "the process of identifying and documenting the specific actions to be performed to produce the project deliverables" (p. 141).

Table 8

Define Activities: Input, Tools & Technique, and Output

Inputs	**Tools & Techniques**	**Outputs**
Schedule management plan	Decomposition	Activity list
Scope baseline	Rolling wave planning	Activity attributes
Enterprise environmental factors	Expert judgment	Milestone list
Organizational process assets		

Own elaboration, taken from (PMI, 2013)

2.2.8.2 Sequence activities (Planning process group).

Project Management Institute (2013) defines sequence activities as "the process of identifying and documenting relationships among the project activities" (p. 141).

Table 9

Sequence Activities: Input, Tools & Technique, and output

Inputs	**Tools & Techniques**	**Outputs**
Schedule management plan	Precedence diagramming method (PDM)	Project schedule network diagrams
Activity list	Dependency determination	Project documents updates
Activity attributes	Leads and lags	

Milestone list		
Project scope statement		
Enterprise environmental factors		
Organizational process assets		

Own elaboration, taken from (PMI, 2013)

2.2.8.3 Estimate activity resources (Planning process group).

Project Management Institute (2013) defines estimate activity resources as "the process of estimating the type and quantities of material, human resources, equipment, or supplies required to perform each activity" (p. 141).

Table 10

Estimate Activity Resources: Input, Tools & Technique, and Output

Inputs	**Tools & Techniques**	**Outputs**
Schedule management plan	Expert judgment	Activity resource requirements
Activity list	Alternative analysis	Resource breakdown structure
Activity attributes	Published estimating data	Project documents updates
Resource calendars	Bottom-up estimating	
Risk register	Project management software	
Activity cost estimates		
Enterprise environmental factors		
Organizational process assets		

Own elaboration, taken from (PMI, 2013)

2.2.8.4 Estimate activity duration (Planning process group).

Project Management Institute (2013) defines estimate activity durations as “The process of estimating the number of work periods needed to complete individual activities with estimated resources” (p. 141).

Table 11

Estimate Activity Duration: Input, Tools & Technique, and Output

Inputs	Tools & Techniques	Outputs
Schedule management plan	Expert judgment	Activity duration estimates
Activity list	Analogous estimating	Project documents updates
Activity attributes	Parametric estimating	
Activity resource requirements	Three-point estimating	
Resource calendars	Group decision-making techniques	
Project scope statement	Reserve analysis	
Risk register		
Resource breakdown structure		
Enterprise environmental factors		
Organizational process assets		

Own elaboration, taken from (PMI, 2013)

2.2.8.5 Develop schedule (Planning process group).

Project Management Institute (2013) defines develop schedule as “The process of analyzing activity sequences, durations, resource requirements, and schedule constraints to create the project schedule model” (p. 141).

Table 12

Develop Schedule: Input Tools & Technique, and Output

Inputs	Tools & Techniques	Outputs

Schedule management plan	Schedule network analysis	Schedule baseline
Activity list	Critical path method	Project schedule
Activity attributes	Critical chain method	Schedule data
Project schedule network diagrams	Resource optimization techniques	Project calendars
Activity resource requirements	Modeling techniques	Project management plan updates
Resource calendars	Leads and lags	Project documents updates
Activity duration estimates	Schedule compression	
Project scope statement	Scheduling tool	
Risk register		
Project staff assignments		
Resource breakdown structure		
Enterprise environmental factors		
Organizational process assets		

Own elaboration, taken from (PMI, 2013)

2.2.9 Project Cost Management.

Plan cost management (Planning process group)

Project Management Institute (2013) defines plan cost management as "The process that establishes the policies, procedures, and documentation for planning, managing, expending, and controlling project costs" (p. 193).

Table 13

Plan Cost Management: Input, Tools & Technique, and Output

Inputs	**Tools & Techniques**	**Outputs**
Project management plan	Expert judgment	Cost management plan
Project charter	Analytical techniques	
Enterprise environmental factors	Meetings	
Organizational process assets		

Own elaboration, taken from (PMI, 2013)

2.2.9.1 Estimate costs (Planning process group).

Project Management Institute (2013) defines estimate cost as “the process of developing an approximation of the monetary resources needed to complete project activities” (p. 193).

Table 14

Estimate Cost: Input, Tools & Technique, and Output

Inputs	**Tools & Techniques**	**Outputs**
Cost management plan	Expert judgment	Activity cost estimates
Human resource management plan	Analogous estimating	Basis of estimates
Scope baseline	Parametric estimating	Project documents updates
Project schedule	Bottom-up estimating	
Risk register	Three-point estimating	
Enterprise environmental factors	Reserve analysis	
Organizational process assets	Cost of quality	
	Project management software	
	Vendor bid analysis	
	Group decision-making techniques	

Own elaboration, taken from (PMI, 2013)

2.2.9.2 Determine budget (Planning process group).

Project Management Institute (2013) defines determine budget as “The process of aggregating the estimated costs of individual activities or work packages to establish an authorized cost baseline” (p. 193).

Table 15

Determine Budget: Input, Tools & Technique, and Output

Inputs	Tools & Techniques	Outputs
Cost management plan	Cost aggregation	Cost baseline
Scope baseline	Reserve analysis	Project funding requirements
Activity cost estimates	Expert judgment	Project documents updates
Basis of estimates	Historical relationships	
Project schedule	Funding limit reconciliation	
Resource calendars		
Risk register		
Agreements		
Organizational process assets		

Own elaboration, taken from (PMI, 2013)

2.2.10 Project Quality Management.

2.2.10.1 Plan quality management (Planning process group).

Project Management Institute (2013) defines plan quality management as "The process of identifying quality requirements and/or standards for the project and its deliverables and documenting how the project will demonstrate compliance with quality requirements" (p. 227).

Table 16

Plan Quality Management: Input, Tools & Technique, and Output

Inputs	Tools & Techniques	Outputs
Project management plan	Cost-benefit analysis	Quality management plan
Stakeholder register	Cost of quality	Process improvement plan
Risk register	Seven basic quality tools	Quality metrics
Requirements documentation	Benchmarking	Quality checklists

Enterprise environmental factors	Design of experiments	Project documents updates
Organizational process assets	Statistical sampling	
	Additional quality planning tools	
	Meetings	

Own elaboration, taken from (PMI, 2013)

2.2.11 Project Human Resource Management.

2.2.11.1 Plan Human Resource Management (Planning process group).

Project Management Institute (2013) defines plan human resource management as "The process of identifying and documenting project roles, responsibilities, required skills, reporting relationships, and creating a staffing management plan" (p. 255).

Table 17

Plan Human Resource Management: Input, Tools & Technique, and Output

Inputs	**Tools & Techniques**	**Outputs**
Project management plan	Organization charts and position descriptions	Human resource management plan
Activity resource requirements	Networking	
Enterprise environmental factors	Organizational theory	
Organizational process assets	Expert judgment	
	Meetings	

Own elaboration, taken from (PMI, 2013)

2.2.12 Project Communication Management.

2.2.12.1 Plan Communication Management (Planning process group).

Project Management Institute (2013) defines plan communication management as "the process of developing an appropriate approach and plan for project

communications based on stakeholder's information needs and requirements, and available organizational assets" (p. 287).

Table 18

Plan Communication Management: Input, Tools & Technique, and Output

Inputs	Tools & Techniques	Outputs
Project management plan	Communication requirements analysis	Communications management plan
Stakeholder register	Communication technology	Project documents updates
Enterprise environmental factors	Communication models	
Organizational process assets	Communication methods	
	Meetings	

Own elaboration, taken from (PMI, 2013)

2.2.13 Project Risk Management.

2.2.13.1 Plan Risk Management (Planning process group).

Project Management Institute (2013) defines plan risk management as "the process of defining how to conduct risk management activities for a project" (p. 309).

Table 19

Plan Risk Management: Input, Tools & Technique, and Output

Inputs	Tools & Techniques	Outputs
Project management plan	Analytical techniques	Risk management plan
Project charter	Expert judgment	
Stakeholder register	Meetings	
Enterprise environmental factors		
Organizational process assets		

Own elaboration, taken from (PMI, 2013)

2.2.13.2 Identify risks (Planning process group).

Project Management Institute (2013) defines identify risk as “the process of determining which risks may affect the project and documenting their characteristics” (p. 309).

Table 20

Identity Risks: Tools & Technique, and Output

Inputs	Tools & Techniques	Outputs
Risk management plan	Documentation reviews	Risk register
Cost management plan	Information gathering techniques	
Schedule management plan	Checklist analysis	
Quality management plan	Assumptions analysis	
Human resource management plan	Diagramming techniques	
Scope baseline	SWOT analysis	
Activity cost estimates	Expert judgment	
Activity duration estimates		
Stakeholder register		
Project documents		
Procurement documents		
Enterprise environmental factors		
Organizational process assets		

Own elaboration, taken from (PMI, 2013)

2.2.13.3 Perform qualitative risk analysis (Planning process group).

Project Management Institute (2013) defines perform qualitative risk analysis as “the process of prioritizing risks for further analysis or action by assessing and combining their probability of occurrence and impact” (p. 309).

Table 21

Perform Qualitative Risk Analysis: Input, Tools & Technique, and Output

Inputs	Tools & Techniques	Outputs
Risk management plan	Risk probability and impact assessment	Project documents updates
Scope baseline	Probability and impact matrix	
Risk register	Risk data quality assessment	
Enterprise environmental factors	Risk categorization	
Organizational process assets	Risk urgency assessment	
	Expert judgment	

Own elaboration, taken from (PMI, 2013)

2.2.13.4 Perform quantitative risk analysis (Planning process group).

Project Management Institute (2013) defines perform quantitative risk analysis as "The process of numerically analyzing the effect of identified risks on overall project objectives" (p. 309).

Table 22

Perform Quantitative Risk Analysis: Input, Tools & Technique, and Output

Inputs	Tools & Techniques	Outputs
Risk management plan	Data gathering and representation techniques	Project documents updates
Cost management plan	Quantitative risk analysis and modeling techniques	
Schedule management plan	Expert judgment	
Risk register		
Enterprise environmental factors		
Organizational process assets		

Own elaboration, taken from (PMI, 2013)

2.2.13.5 Plan risk response (Planning process group).

Project Management Institute (2013) defines plan risk response as “the process of developing options and actions to enhance opportunities and to reduce threats to project objectives” (p. 309).

Table 23

Plan Risk Responses: Input, Tools & Technique, and Output

Inputs	Tools & Techniques	Outputs
Risk management plan	Strategies for negative risks or threats	Project management plan updates
Risk register	Strategies for positive risks or opportunities	Project documents updates
	Contingent response strategies	
	Expert judgment	

Own elaboration, taken from (PMI, 2013)

2.2.14 Project Procurement Management.

2.2.14.1 Plan Procurement Management (Planning process group).

Project Management Institute (2013) defines plan procurement management as “the process of documenting project procurement decisions, specifying the approach, and identifying potential sellers” (p. 355).

Table 24

Plan Procurement Management: Input, Tools & Technique, and Output

Inputs	Tools & Techniques	Outputs
Project management plan	Make-or-buy analysis	Procurement management plan
Requirements documentation	Expert judgment	Procurement statement of work
Risk register	Market research	Procurement documents
Activity resource requirements	Meetings	Source selection criteria

Project schedule		Make-or-buy decisions
Activity cost estimates		Change requests
Stakeholder register		Project documents updates
Enterprise environmental factors		
Organizational process assets		

Own elaboration, taken from (PMI, 2013)

2.2.15 Project Stakeholder Management.

2.2.15.1 Identify Stakeholders (Initiating process group).

Project Management Institute (2013) defines identify stakeholder as "the process of identifying the people, groups, or organizations that could impact or be impacted by a decision, activity, or outcome of the project; and analyzing and documenting relevant information regarding their interests, involvement, interdependencies, influence, and potential impact on project success" (p. 391).

Table 25

Identify Stakeholder: Input, Tools & Technique, and Output

Inputs	**Tools & Techniques**	**Outputs**
Project charter	Stakeholder analysis	Stakeholder register
Procurement documents	Expert judgment	
Enterprise environmental factors	Meetings	
Organizational process assets		

Own elaboration, taken from (PMI, 2013)

2.2.15.2 Plan Stakeholder Management (Planning process group).

Project Management Institute (2013) defines plan stakeholder management as "The process of developing appropriate management strategies to effectively engage

stakeholders throughout the project life cycle, based on the analysis of their needs, interests, and potential impact on project success" (p. 391).

Table 26

Plan Stakeholder Management: Input, Tools & Technique, and Output

Inputs	**Tools & Techniques**	**Outputs**
Project management plan	Expert judgment	Stakeholder management plan
Stakeholder register	Meetings	Project documents updates
Enterprise environmental factors	Analytical techniques	
Organizational process assets		

Own elaboration, taken from (PMI, 2013)

The knowledge areas indicated those that will be required to prepare this document. The processes identified are viewed as they impact the knowledge areas for the Distribution Line Extension projects.

3 METHODOLOGICAL FRAMEWORK

3.1 Information Sources

Merriam-Webster (n.d.) defines information as “the communication or reception or intelligence” and “knowledge obtained from investigation, study, or instruction”. (p.1). Information can emanate from several sources in varying forms. Information can be in the form of magazines, articles, report, books, electronic data, online information, experiences and observations to name a few. The information sources used for this paper are primary sources and secondary sources.

3.1.1 Primary sources.

Primary sources are conduit of primary data. ITHACA College (n.d) states:

> To primary source provides direct or first hand evidence about an event, object, person, or work of art. Primary sources include historical and legal documents, eyewitness accounts, results of experiments, statistical data, pieces of creative writing, audio and video recordings, speeches, and art objects. Interviews, surveys, fieldwork, and Internet communications via email, listservs, blogs, and newsgroups are also primary sources. In the natural and social sciences, primary sources are often empirical studies-research where an experiment was performed or direct observation was made. The results of empirical studies are typically found in scholarly articles or papers delivered at conferences.(p.3)

The Primary sources were project files, reports, interviews with staff that partook in the project and Project Management Institute (PMI) PMBOK Guide® Fifth Edition. Supporting documents related to the distribution project were filed in hard copy. These documents consist of correspondence with stakeholders, bid evaluations, contract agreements, payments, change request, and variations to contracts among other materials. Project reports submitted to stakeholders were viewed for data.

Project team members would be interviewed. The PMBOK Guide® (PMI, 2013) provides standardize project management best practice.

3.1.2 Secondary sources.

Secondary sources are conduit of secondary data. ITHACA College (n.d) states, “Secondary sources describe, interpret, discuss, comment upon, analyze, evaluate, summarize, and process primary sources. Secondary source materials can be published in newspapers or popular magazines, book or movie reviews, or articles found in scholarly journals that discuss or evaluate someone else's original research” (p.3).

The secondary sources were company policies, online materials and interview with Information & Communication System Department. The company’s manuals of authority displayed the authority of each position within the organisation. This document was frequently updated based on the policies implemented and job descriptions. The human resource policies governed the movement and entitlements of employees. The purchasing & Stores policies governed the procurement of services and material, and payment for services rendered. Online materials would be researched to identify possible templates that can be utilized for Distribution Line Extension projects. The management information system that can best facilitate the proposed methodology would be determined by interviews with Information & Communication System Department.

3.1.2.1 Chart 1. Information sources.

Objectives	**Information sources**	
	Primary	**Secondary**
To analyze current project management practices used to select, execute, manage and close Distribution Power Line projects to determine the company's current position.	1 – Research the project files with correspondence, contracts, payments, change request and variations. 2 - Monthly reports prepared by the project Coordinator.	1 – Research BEL's updated manuals of authority 2 – Research BEL's update organization chart
To compare current project management procedures with standard project management processes to identify the practices that are in accordance with best project management practices, and areas for improvement.	1 – Research PMBOK Guide® fifth edition 2 – Research BEL's updated manuals of authority 3 – Interview Project Manager	1 – Research project management practice in place 2 – Research BEL's Purchasing & Store policies. 3 – Research BEL's Human resource policies. 4 – Research project management guidelines practiced under funded project contracts 5 – Research online samples
To create project management templates to be used in the	1 – Research PMBOK Guide® fifth edition	1 – Interview Information & Communication Systems Dept.

Objectives	Information sources	
	Primary	**Secondary**
management of projects by Belize Electricity Limited to enhance the management of Distribution Power Line projects.	2 – Interview Project Manager	2 – Research online samples
To create an implementation strategy for the successful implementation of the methodology to provide a seamless transition of best project management practices.	1 – Interview Project Manager 2 – Interview Senior Manager	1 – Research BEL's manual of authority.

Chart 1: Information sources

3.2 Research methods

Walliman (2011) states, "research methods are a range of tools that are used for different types of enquiry" (p. 1). The investigation conducted was systematic. Walliman (2011) adds, "They represent the tools of the trade, and provide you with ways to collect, sort and analyse information so that you can come to some conclusions." (p. 7). Varying research methods were employed in compiling this document.

3.2.1 Analytical method.

Walliman (2011) states, “Sources in the form of texts and documents provide a great deal of data about society, both historically and of the present. There is a wide range of analytical method that can be applied to analysis of the subtleties of text.” (p. 138).

3.2.2 Applied method.

Walliman (2011) states, *“*Although research aimed merely at gaining greater knowledge and understanding of a phenomenon has little or no ethical consequences – the expansion of scientific knowledge is generally regarded as a good thing – applied research is more easily subjected to ethical investigation.” (p. 46).

3.2.3 Quantitative method.

Walliman (2011) states, “quantitative data is most easily analysed, and there is a vast array of test that can be applied according to the nature of the data and what you want to interrogate it for.” (p. 64). Walliman (2011) adds, “Number are used to record much information about science and society, for example pressures, bending forces, population densities, cost indices etc. This type of data is called quantitative data.” (p. 71)

3.2.4 Empirical method.

Walliman (2011) states “Inductive reasoning states form specific observations or sensory experiences and then develops a general conclusion from them.” (p. 17). Williman (2011) adds, “we should ensure that we make a large number of observations, we repeat them under a large range of circumstances and conditions and that no observations contradicts the generalization we have made from the repeated observations.” (p. 18)

3.2.5 Method engagement.

Research Information gathered for the proposed methodology will be done via observation, interviews and content-analysis.

- The ongoing Distribution Line Extension projects were observed.
- Interviews were conducted with the staff members that were engaged in the project or could have provided helpful information.
- Project files were analyzed to extract pertinent information.

3.2.6 Chart 2. Research methods.

Objectives	**Research methods**			
	Analytical method	Applied method	Quantitative method	Empirical method
To analyze current project management practices used to select, execute, manage and close Distribution Power Line projects to determine the company's current position.	Past and current project files were reviewed and analyzed.		A sample of the distribution project population was selected for analysis.	Project management practices were observed on ongoing projects.
To compare current project management procedures with standard project	Identify what current project management practices are	Research project management best practices and		

Objectives	Research methods			
	Analytical method	Applied method	Quantitative method	Empirical method
management processes to identify the practices that are in accordance with best project management practices, and areas for improvement.	effective and what practices need to be revised.	determine the most suitable.		
To create project management templates to be used in the management of projects by Belize Electricity Limited to enhance the management of Distribution Power Line projects.	Given the nature of the project, ascertain what key information must be captured.	Search for templates that meets BEL's expectations, and adapt where necessary.		
To create an implementation strategy for the successful implementation of	Research company structure and determine how best to	Input from the Senior Manager, Project Manager and		

Objectives	Research methods			
	Analytical method	Applied method	Quantitative method	Empirical method
the methodology to provide a seamless transition of best project management practices.	implement the methodology.	Project coordinator on experience.		

Chart 2: Research methods

3.3 Tools

Merriam-Webster defines tool as “something (such as an instrument or apparatus) used in performing an operation or necessary in the practice of a vocation or profession.” To conduct the research several tools were employed.

3.3.1 Expert judgment.

Project Management Institute (2013) states “expert judgment is applied to all technical and management details during this process. Such expertise is provided by any group or individual with specialized knowledge or training and is available from many sources” (p. 71).

3.3.2 Interviews.

Project Management Institute states, “interviewing experienced project participants, sponsors and other executives, and subject matter experts can aid in identifying and defining the features and functions of the desired product deliverables. Interviews are also useful for obtaining confidential information.” (p. 114).

3.3.3 Observation.

Project Management Institute states, “observations provide a direct way of viewing individuals in their environment and how they perform their jobs or tasks and carry out processes. It is particularly helpful for detailed processes when the people that use the product have difficulty or are reluctant to articulate their requirements.” (p. 116).

3.3.4 Document analysis.

Project Management Institute states “document analysis is used to elicit requirements by analyzing existing documentation and identifying information relevant to the requirements. There are a wide range of documents that may be analyzed to help elicit relevant requirements.” (p. 117).

3.3.5 Analytical Technique.

Project Management Institute states, “analytical techniques are applied in project management to forecast potential outcomes based on possible variations of project or environmental variables and their relationships with other variables” (p. 91).

3.3.6 Cost-benefit analysis.

Project Management Institute states, “the primary benefits of meeting quality requirements include less rework, higher productivity, lower costs, increased stakeholder satisfaction, and increased profitability. A cost-benefit analysis for each quality activity compares the cost of the quality step to the expected benefit” (p. 235).

3.3.7 Chart 3. Tools.

Objectives	Tools
To analyze current project management practices used to select, execute, manage and close Distribution Power Line projects to determine the company's current position.	1 – Interview staff members engaged in Distribution Line Extension projects. 2 – Document analysis on project files. 3 – Expert judgment from senior personnel 4 – Observation on project processes
To compare current project management procedures with standard project management processes to identify the practices that are in accordance with best project management practices, and areas for improvement.	1 – Interview staff members engaged in Distribution Line Extension projects. 2 – Document analysis on project files. 3 – Analytical technique to make evaluation on information received 4 – Expert judgment from senior personnel 5 – Cost-benefit analysis on the pros and cons on implementing new processes
To create project management templates to be used in the management of projects by Belize Electricity Limited to enhance the management of Distribution Power Line projects.	1 – Analytical technique to make evaluation on information received 2 – Expert judgment from senior personnel
To create an implementation strategy for the successful implementation of the methodology to provide a seamless	1 – Analytical technique to make evaluation on information received

transition of best project management practices.	2 –Expert judgment from senior personnel

*Chart 3***:** Tools

3.4 Assumptions and constraints

3.4.1 Assumption.

UCI (2016) states “an assumption is a fact assumed to be true for purposes of project planning. As the project advances, the validity of assumptions needs to be confirmed. There may be time, budget, management support, scope, and other types of assumptions” (p. 24).

The assumption for the document are as follows:
1 - It is assumed that Belize Electricity Limited will grant permission to execute the proposal of a methodology.
2 - It is assumed that all pertinent information can be readily sourced.
3 - It is assumed that interviews with key staff members can be conducted timely.
4- It is assumed that the department Senior Manager will grant the use of confidential information.

3.4.2 Constraints.

UCI (2016) defines constraints as “A limiting factor that affects the execution of a project, program, portfolio” (p. 24)

Time: The period to complete the Final Graduation Project as imposed by UCI.
Time that would be allowed by Belize Electricity Limited to conduct interviews with staff.
Cost: Budget to conduct visits and meetings.

Budget for administrative expense to cover printing of documents, stationaries, telephone, and data charges etc...

Scope: While the operations department did small distribution extensions, the methodology was focus on major Distribution Line Expansions carried out by the project department.

3.4.2.1.1 Chart 4. Assumptions and constraints

Objectives	Assumptions	Constraints
To analyze current project management practices used to select, execute, manage and close Distribution Power Line projects to determine the company's current position.	1 - Belize Electricity Limited will grant permission to execute the proposal of a methodology. 2 - Pertinent information can be readily sourced. 3 - Interviews can be conducted timely. 4 - Senior Manager will grant the use of confidential information	1 - Time to conduct interviews with staff. 2 - Budget to conduct visits and meetings. 3 - Budget for administrative expense 4 - The methodology will focus on major Distribution Line Expansions
To compare current project management procedures with standard project management processes to identify the practices that are in accordance with best project management practices, and areas for improvement.	1 - Pertinent information can be readily sourced 2 - Interviews can be conducted timely 3 - Senior Manager will grant the use of confidential information	1. Time to conduct interviews with staff. 2. Budget to conduct visits and meetings. 3. Budget for administrative expense
To create project management templates to be	1 - Pertinent information can be readily sourced.	1 - Time to conduct interviews with staff.

Objectives	Assumptions	Constraints
used in the management of projects by Belize Electricity Limited to enhance the management of Distribution Power Line projects.	2 - Interviews can be conducted timely. 3 - Senior Manager will grant the use of confidential information	2 - Budget to conduct visits and meetings. 3 - Budget for administrative expense
To create an implementation strategy for the successful implementation of the methodology to provide a seamless transition of best project management practices.	1 - Belize Electricity Limited will grant permission to execute the proposal of a methodology. 2 - Interviews can be conducted timely. 3 - Senior Manager will grant the use of confidential information	1- The time frame to complete the Final Graduation Project

Chart 4: Assumptions and constraints

3.5 Deliverables

Project Management Institute (2013) defines deliverable as “any unique and verifiable product, result or capability to perform a service that is required to be produced to complete a process, phase, or project. Deliverables are typically tangible components completed to meet the project objectives and can include elements of the project management plan” (p. 84). Project Management Institute (2013) further states “deliverables are produced as outputs from processes performed to accomplish the project work as planned and scheduled in the project management plan” (p. 81).

The deliverables for the completing this document are as follows:

- Project charter
- Introduction

- Theoretical framework
- Methodology
- Executive summary
- Integration management
- Scope management
- Time management
- Cost management
- Quality management
- Human resource management
- Communication management
- Risk management
- Procurement management
- Stakeholder management
- Recommendations
- Adjustments
- Conclusions
- Finalize document
- Defend document

3.5.1 Chart 5. Deliverables.

Objectives	Deliverables
To analyze current project management practices used to select, execute, manage and close Distribution Power Line projects to determine the company's current position.	Document with the analysis of the current situation of project management in the organization.

To compare current project management procedures with standard project management processes to identify the practices that are in accordance with best project management practices, and areas for improvement.	Procedure being employed for projects and its alignment with project management processes.
To create project management templates to be used in the management of projects by Belize Electricity Limited to enhance the management of Distribution Power Line projects.	Integration management – Project management plan template Scope management – Scope management plan template Time management – Schedule management plan template Cost management – Cost management plan template Quality management – Quality management plan template Human resource management – Human resource management plan template Communication management – Communication plan template Risk management – Risk register template Procurement management – procurement plan template Stakeholder management – Stakeholder register template

To create an implementation strategy for the successful implementation of the methodology to provide a seamless transition of best project management practices.	Strategy for the implementation of the methodology. Strategy for the implementation of the methodology.

*Chart 5***:** Deliverables

4 RESULTS

4.1 Topic related to specific objective 1: The resulting analysis of current project management practices.

4.1.1 Methodology used.

4.1.1.1 Quantitative method.

There were several Distribution Line Extension projects carried out by BEL, and these projects remain integral in meeting the country's growing demand. The projects were generally similar in nature with the exception of those conducted under the auspices of IFIs. The Paid for Installation (PFI) projects and company-sanctioned projects were operated under BEL's policies and procedures. The IFI funded projects were operated primarily under the institution's guidelines in conjunction with BEL's guidelines. From 2010 to 2016, there were 78 PFI projects, 68 BEL projects and 89 IFI projects undertaken of various sizes. Of all the IFI projects, 28 were selected for further research.

4.1.1.2 Analytical method

The 28 projects selected for research were in various phases. The documentation of these projects were readily available and easily accessible. These projects were evaluated and analyzed to derive at the result presented.

Table 27

List of Projects and Communities Benefitting

COMMUNITY	LOCATION
St. Margaret's Village	Cayo District, Through 5 Blues Lake Road
Second New Site	Stann Creek District, Dangriga Town
Silk Grass Village	Stann Creek District, Southern Highway
Pomona Valley	Stann Creek District, Hummingbird Highway
San Juan Village	Stann Creek District, Southern Highway
Red Bank Village	Stann Creek District, Off Southern Highway
Hummingbird Community	Stann Creek District, Hummingbird Highway
Santa Rosa Village	Stann Creek District, Southern Highway
Middlesex Village	Stann Creek District, Hummingbird Highway
Valley Community	Stann Creek District, Hummingbird Highway
Maya Center	Stann Creek District, Southern Highway
Santa Cruz Village-Southside	Stann Creek District, Southern Highway
Riversdale Village	Stann Creek District, Placencia Road
Georgetown Village	Stann Creek District, Off Southern Highway
Bella Vista Village-Outskirts	Stann Creek District, Southern Highway
Cowpen Village	Stann Creek District, Off Southern Highway
San Roman	Stann Creek District, Off Southern Highway
Maya Mopan Village	Stann Creek District, After GeorgeTown
Steadfast Village	Stann Creek District, Hummingbird Highway
Sarawee Village	Stann Creek District, Hummingbird Highway
Trench Town area	Stann Creek District, Independence Village
Noralez Extension	Stann Creek District, Independence Village
Mullins River Village	Stann Creek District, Off Hummingbird Highway
Survival Lane Extension	Stann Creek District, Independence Village
New Site Independence	Stann Creek District, Independence Village
Trio Village	Toledo District, off Southern Highway
Esparanaza Village	Toledo District, Off Monkey River road
Sittee River Village	Stann Creek District, After Hopkins

4.1.1.3 Empirical method

The projects identified were in varying stages. Several were completed, but not closed while others had work ongoing. This presented an opportunity to observe the execution, monitoring, controlling and closing of the projects. All project sites were visited and the management of the projects were reviewed. The files on the projects were available for viewing.

4.1.2 Selection.

Belize Electricity Limited has an impressive 83.5% coverage of household in Belize based on the 2010 census. Since 2010 there has been a steady increase in customer accounts. Customer accounts is inclusive of households, commercial and industrial businesses. Given the expansion of the power line over the last seven years it is safe to assume that is an increase in coverage. The increase maybe marginal and slightly offset with the increase in households.

Figure 4: BEL Customer accounts

With the formation of new settlements and the extension of established settlements, the selection of communities and extension were carried out. The communities were selected by conducting and selecting a rudimentary feasibility of the projects. The

unit cost for potential customer and the unit cost for house lots benefiting from the proposed Distribution Line Extension were compared. Potential customers were deemed those with constructed houses and were living in these houses. House lots were categorized with and without a structure erected.

Table 28

Project Costing Analysis

NO.	PROJECT NAME	DESCRIPTION	PROJECT COST	NUMBER OF LOTS	NUMBER OF CUSTOMERS	COST PER LOT	COST PER CUSTOMER
1	St. Margaret's Village	Cayo District, Through 5 Blues Lake Road	$164,256.79	101	70	$1,626.30	$2,346.53
2	Second New Site	Stann Creek District, Dangriga Town	$72,314.32	13	6	$5,562.64	$12,052.39
3	Silk Grass Village	Stann Creek District, Southern Highway	$222,298.30	142	33	$1,565.48	$6,736.31
4	Pomona Valley	Stann Creek District, Hummingbird Highway	$86,202.00	62	11	$1,390.35	$7,836.55
5	San Juan Village	Stann Creek District, Southern Highway	$119,238.14	47	20	$2,536.98	$5,961.91
6	Red Bank Village	Stann Creek District, Off Southern Highway	$142,336.38	63	26	$2,259.31	$5,474.48
7	Hummingbird Community	Stann Creek District, Hummingbird Highway	$100,070.46	40	21	$2,501.76	$4,765.26
8	Santa Rosa Village	Stann Creek District, Southern Highway	$135,939.72	83	36	$1,637.83	$3,776.10
9	Middlesex Village	Stann Creek District, Hummingbird Highway	$109,205.56	7	4	$15,600.79	$27,301.39
10	Valley Community	Stann Creek District, Hummingbird Highway	$79,097.07	14	6	$5,649.79	$13,182.84
11	Maya Center	Stann Creek District, Southern Highway	$71,250.04	48	24	$1,484.38	$2,968.75
12	Santa Cruz Village-Southside	Stann Creek District, Southern Highway	$191,029.62	121	36	$1,578.76	$5,306.38
13	Riversdale Village	Stann Creek District, Placencia Road	$36,957.39	18	4	$2,053.19	$9,239.35
14	Georgetown Village	Stann Creek District, Off Southern Highway	$68,427.15	16	6	$4,276.70	$11,404.53
15	Bella Vista Village-Outskirts	Stann Creek District, Southern Highway	$111,834.83	59	12	$1,895.51	$9,319.57
16	Hopkins Village	Stann Creek District, Off Southern Highway	$46,019.51	35	15	$1,314.84	$3,067.97
17	San Roman	Stann Creek District, Off Southern Highway	$28,859.18	20	6	$1,442.96	$4,809.86
18	Maya Mopan Village	Stann Creek District, After GeorgeTown	$41,613.01	26	7	$1,600.50	$5,944.72
19	Steadfast Village	Stann Creek District, Hummingbird Highway	$17,354.36	6	2	$2,892.39	$8,677.18
20	Sarawee Village	Stann Creek District, Hummingbird Highway	$57,878.27	12	3	$4,823.19	$19,292.76
21	Trench Town area	Stann Creek District, Independence Village	$125,694.06	30	15	$4,189.80	$8,379.60
22	Noralez Extension	Stann Creek District, Independence Village	$119,343.32	84	24	$1,420.75	$4,972.64
23	Mullins River Village	Stann Creek District, Off Hummingbird Highway	$160,360.57	25	12	$6,414.42	$13,363.38
24	Survival Lane Extension	Stann Creek District, Independence Village	$67,049.96	57	14	$1,176.32	$4,789.28
25	New Site Independence	Stann Creek District, Independence Village	$22,032.25	19	6	$1,159.59	$3,672.04
26	Trio Village	Toledo District, off Southern Highway	$97,550.86	53	23	$1,840.58	$4,241.34
27	Esparanaza Village	Toledo District, Off Monkey River road	$157,418.43	50	20	$3,148.37	$7,870.92
28	Sittee River Village	Stann Creek District, After Hopkins	$57,878.27	12	3	$4,823.19	$19,292.76

Based on the analysis provided from the study top management reviewed and made final selection on the extension projects to be carried out during the year. To obtain the information required to make an informed decision, the communities had to be visited. A map of the area was received or created. It was necessary for the map to be a true representation of the community layout, and similar to the map at the Ministry of Natural Resources. The roads and property boundary must be clearly indicated. A technician from BEL identified the quantity and location of homes in relation to the map. The technician would outline the route of the distribution power line route from the existing grid to all unserved homes in the area.

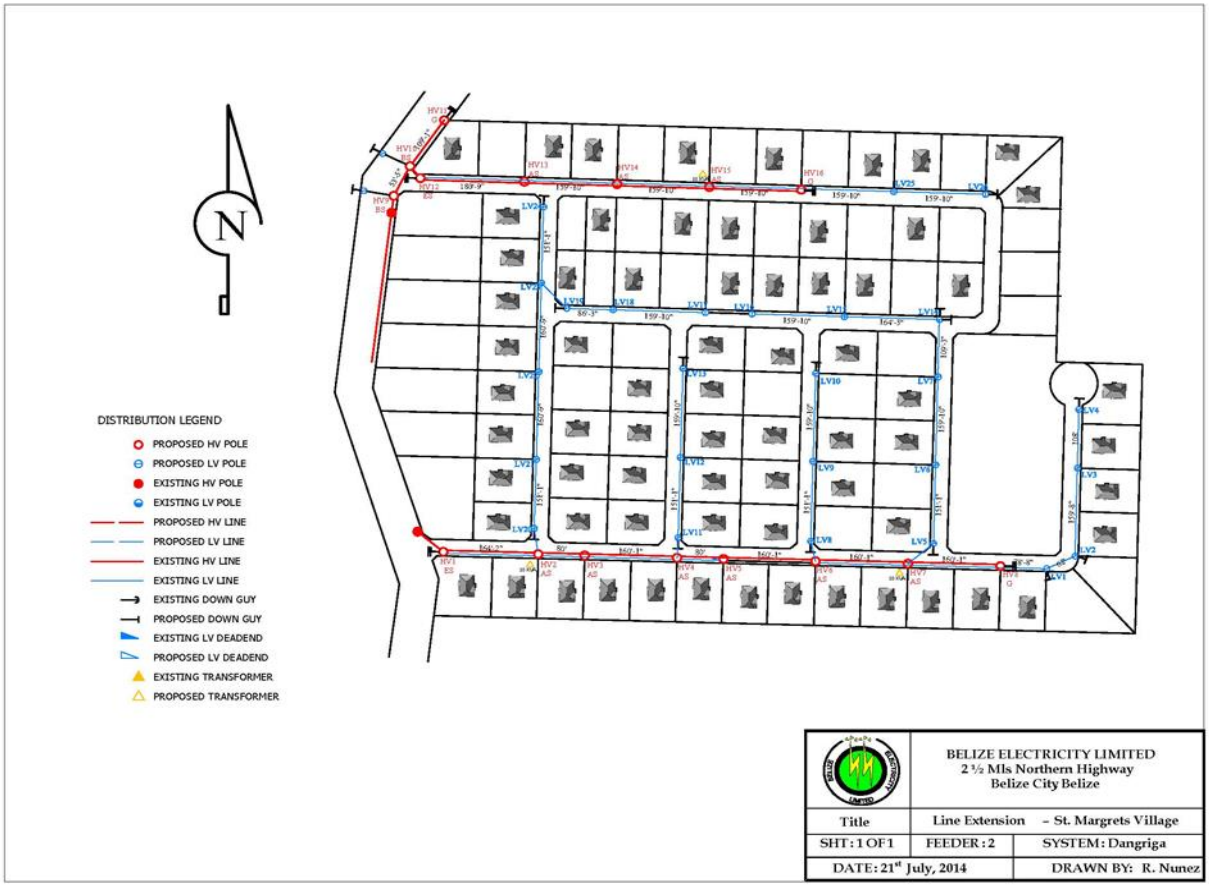


Figure 5: Typical map of community layout

The department's project engineer is responsible to review and amend, where necessary, the designed layout prepared by the technician. With the information provided in the maps, a cost estimate was prepared. The cost estimate reflected the cost to complete the construction of the Distribution Line Extension.

BELIZE ELECTRICITY LIMITED
DISTRIBUTION DEPARTMENT
PROJECT COSTING

SYSTEM/LOAD CENTER: _____ **DATE:** _____
ESTIMATE No: _____
S/O No: _____

COST ESTIMATE: _____
Project Address: _____
Customer Name: _____
Customer Contact Number: _____

QUAN.	DESCRIPTION	UNIT	UNIT COST	TOTALS
	MATERIALS			
	POLES AND ANCHORS			
0	30' Poles Class 3	ea	$ 417.35	$ -
0	40' Poles Class 3	ea	$ 674.78	$ -
0	45' Poles Class 3	ea	$ 761.59	$ -
0	50' Poles	ea	$ 1,145.00	$ -
0	55' Poles Class 2	ea	$ 1,226.67	$ -
	Anchor - Swamp	ea	$ 412.22	$ -
0	Anchor 10" - Screw Tripleye	ea	$ 93.46	$ -
	Corrugated Galv. Steel Pole Crib	ea	$ 1,448.50	$ -
	HV HARDWARE ASSEMBLY			
	Intermediate Arm Complete w/Hardware	ub	$ 324.46	$ -
	Dead End Arm & Assembly	ub	$ 806.95	$ -
0	Tension Arm (only)	ea	$ 438.12	$ -
0	Intermediate Arm (only)	ea	$ 184.29	$ -
0	Grip, 1/0 Conductor	ea	$ 3.58	$ -
0	Grip, 2/0 Conductor	ea	$ 3.32	$ -
0	Grip, 4/0 Conductor	ea	$ 6.60	$ -
	Grip, 394.5 Kcmil	ea	$ 11.18	$ -
0	Shackle	ea	$ 4.98	$ -
0	Epoxilator - 25 kV	ea	$ 19.70	$ -
0	Epoxilator - 46 kV	ea	$ 133.77	$ -
0	Eye Bolt 3/4 x 14"	ea	$ 11.39	$ -
0	Eye Bolt 3/4 x 12"	ea	$ 9.83	$ -
0	Machine Bolt 3/4" x 14"	ea	$ 1.80	$ -
0	Machine Bolts 3/4 x 12"	ea	$ 3.29	$ -
0	Post Type Insulator 27 kV	ea	$ 25.91	$ -
0	Post Type Insulator 46 kV	ea	$ 133.77	$ -
0	Post Type Insulator Stud - Stud - 3/4"Ø	ea	$ 4.18	$ -
0	Bolt-Double Arming 5/8"x12" Full Thread, Assembly - Complete	ea	$ 57.16	$ -
0	Pole Top Bracket	ea	$ 29.20	$ -
	Socket Eye Ball Clevis	ea	$ 8.06	$ -
0	Sq. Curved Washer 5/8"x3"x3"	ea	$ 1.57	$ -
0	Strain Clamp for 1/0 AAAC conductor	ea	$ 15.60	$ -
0	Sq. Curved Washer 3/4" x 3" x 3"	ea	$ 1.69	$ -
0	Ext. Link- 10" w. Clevis Pin & Cotter	ea	$ 17.88	$ -
0	Angle Clamp	ea	$ 54.27	$ -
0	Soft Drawn Aluminium Tie Wire #4 AWG	ft	$ 0.19	$ -
0	Eye Nut 3/4"	ea	$ 2.75	$ -
0	Lock Nut 3/4"	ea	$ 0.78	$ -
0	Machine Bolt 5/8" x 12 "	ea	$ 1.81	$ -
0	Parallel Groove Clamp for Ground Wire	ea	$ 10.49	$ -
0	Parallel Groove Clamp for Overhead Wire	ea	$ 10.09	$ -
0	Splice Butt 1/0 Al. 2 Cu (1/0 Sleeve)	ea	$ 14.67	$ -
	LV HARDWARE ASSEMBLY			
	Intermediate Hardware (Complete)	ub	$ 60.80	$ -
	Deadend Assembly (Complete)	ub	$ 24.31	$ -
0	LV Spreader Bracket with bolt 5/8" X 12"	ea	$ 39.03	$ -
0	Soft Drawn Aluminium Tie Wire #6 AWG	ft	$ 0.26	$ -
0	LV D-Iron	ea	$ 5.93	$ -
0	Insulator-Spool	ea	$ 1.16	$ -
0	Wire Holder	ea	$ 5.13	$ -
	GUYING			
0	Guy Wire Steel - 3/8"	ft	$ 0.91	$ -
0	Guy Grip - 3/8"	ea	$ 4.61	$ -
0	Guy Attachment	ea	$ 5.85	$ -
0	Guy Strain Insulator	ea	$ 3.90	$ -
0	Guy Side Walk Assem (Pole Fitting)	ea	$ 25.17	$ -
0	Guy Side Walk Assem (Guy Fitting)	ea	$ 30.73	$ -
0	Pipe, 2" Galv. Steel	ea	$ 26.42	$ -
0	Guy Guards, Polyethylene,Yellow	ea	$ 11.89	$ -

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	TRANSFORMERS					
	POLEMOUNT					
0	TXF - 10 KVA; 6.6 KV - 120/240 V	ea	$	1,714.45	$	-
0	TXF - 25 KVA; 6.6 KV - 120/240 V	ea	$	2,239.01	$	-
0	TXF - 50 KVA; 6.6 KV - 120/240 V	ea	$	2,940.89	$	-
0	TXF - 100 KVA; 6.6 KV - 120/240 V	ea	$	6,427.01	$	-
0	TXF - 10 KVA;11 KV - 120/240 V	ea	$	-	$	-
0	TXF - 25 KVA; 11 KV - 120/240 V	ea	$	2,769.09	$	-
0	TXF - 50 KVA; 11 KV - 120/240 V	ea	$	3,886.98	$	-
0	TXF - 100 KVA; 11 KV - 120/240 V	ea	$	5,829.00	$	-
0	TXF - 25 KVA; 13.2 KV - 120/240 V	ea	$	5,706.53	$	-
0	TXF - 50 KVA; 13.2 KV - 120/240 V	ea	$	4,033.24	$	-
0	TXF - 100 KVA; 13.2 KV - 120/240 V	ea	$	13,890.00	$	-
0	TXF - 10 KVA; 22 KV - 120/240 V	ea	$	2,156.85	$	-
0	TXF - 25 KVA; 22 KV - 120/240 V	ea	$	2,602.41	$	-
0	TXF - 50 KVA; 22 KV - 120/240 V	ea	$	3,402.02	$	-
0	TXF - 100 KVA; 22 KV - 120/240 V	ea	$	9,091.44	$	-
	STAINLESS STEEL L/CREEP BUSHING 25 KVA; 22 KV - 120/240 V	ea	$	3,100.00	$	-
	STAINLESS STEEL L/CREEP BUSHING 50 KVA; 22 KV - 120/240 V	ea	$	3,783.30	$	-
	STAINLESS STEEL L/CREEP BUSHING 100 KVA; 22 KV - 120/240 V	ea	$	11,027.87	$	-
	TXF - 45 KVA; 6.6 KV - 208Y/120 V, POLEMOUNT	ea	$	8,026.94	$	-
	TXF - 45 KVA; 13.2 KV - 208Y/120 V, POLEMOUNT	ea	$	9,841.44	$	-
	TXF - 45 KVA; 22 KV - 208Y/120 V, POLEMOUNT	ea	$	7,022.23	$	-
	PADMOUNT					
0	TXF - 50 KVA; 6.6 KV - 240/120V, PADMOUNT(1P)	ea	$	7,436.46	$	-
0	TXF - 100 KVA; 6.6 KV - 240/120 V, PADMOUNT(1P)	ea	$	9,798.32	$	-
0	TXF - 50 KVA; 22 KV - 240/120 V, PADMOUNT (1P)	ea	$	8,651.07	$	-
0	TXF - 100 KVA; 22 KV - 240/120 V, PADMOUNT(1P)	ea	$	9,056.06	$	-
0	TXF - 45 KVA; 6.6 KV - 208Y/120 V, PADMOUNT	ea	$	17,085.00	$	-
0	TXF - 112.5 KVA; 6.6 KV - 208Y/120 V, PADMOUNT	ea	$	22,908.95	$	-
0	TXF - 225 KVA; 6.6 KV - 208Y/120 V, PADMOUNT	ea	$	27,119.09	$	-
0	TXF - 500 KVA; 6.6 KV - 208Y/120 V, PADMOUNT	ea	$	48,189.81	$	-
0	TXF - 112.5 KVA; 11 KV - 208Y/120 V, PADMOUNT	ea	$	21,657.20	$	-
0	TXF - 500 KVA; 11 KV - 208Y/120 V, PADMOUNT	ea	$	25,125.00	$	-
0	TXF - 45 KVA; 22 KV - 208Y/120 V, PADMOUNT	ea	$	18,506.56	$	-
0	TXF - 112.5 KVA; 22 KV - 208Y/120 V, PADMOUNT	ea	$	22,767.95	$	-
0	TXF - 225 KVA; 22 KV - 208Y/120 V, PADMOUNT	ea	$	22,275.39	$	-
0	TXF - 500 KVA; 22 KV - 208Y/120 V, PADMOUNT	ea	$	35,347.00	$	-
0	CABLE JUNCTION ENCLOSURE (DUMMY TXF)	ea	$	3,031.00	$	-
	CONDUCTORS					
	Overhead					
	123.3 Kcmil AAAC, "AZUSA', Bare Overhead Conductor	ft	$	0.63	$	-
	394.5 Kcmil AAAC Bare Overhead Conductor	ft	$	1.33	$	-
	Triplex, #4 Al. 7 Str., Polyethylene Insul., AAAC NEUTR.	ft	$	0.92	$	-
	Triplex, 2/0 Al. 7 Str., Polyethylene Insul., AAAC NEUTR.	ft	$	1.95	$	-
	Triplex, 4/0 Al. 19 Str, Polyethylene Insul., AAAC NEUTR.	ft	$	3.30	$	-
	Quadruplex, 2/0 Al. 7 Str., Polyethylene Insul., AAAC NEUTR.	ft	$	2.97	$	-
	Quadruplex, 4/0 Al. 19 Str, Polyethylene Insul., AAAC NEUTR.	ft	$	4.34	$	-
0	Staples	ea	$	0.20	$	-
	Air break switch (Delta Switch)	ea	$	5,761.92	$	-
	Underground					
	Underground Cable - 350 MCM XLPE	ft	$	24.12	$	-
	OKONITE - 1/0, 25kV F/S 260 MIL (EPR), 1/C	ft	$	5.37	$	-
0	Cable, #6 Bare Wire, Stranded, Hard Drawn, Cu	ft	$	0.92	$	-
0	Cable, #2 Bare Wire, Stranded, Hard Drawn, Cu	ft	$	2.27	$	-
0	Cable, #6 Insulated Cu. Single Core	ft	$	0.89	$	-
	Cable, #2 Single Core Copper	ft	$	1.93	$	-
	1/0 Cu. Single Core Cable	ft	$	3.62	$	-
0	2/0 Al. Single Core Cable	ft	$	0.91	$	-
0	4/0 Al. Single Core Cable	ft	$	1.16	$	-
	350MCM AL. 600V Secondary	ft	$	2.49	$	-
0	500 MCM Cu. Single Core Cable	ft	$	25.49	$	-
0	Cable, #6 Earth Wire Bare (Single Core)	ft	$	0.92	$	-
	TRANSFORMERS ACCESSORIES					
0	Bail Clamp - 2/0-#6, ESC2/02XB	ea	$	17.27	$	-
0	Fuse Cutout - 15KV, BIL 95, 100 A, I.A. 10000A	ea	$	125.10	$	-
0	Fuse Cutout, 27 KV, BIL 125, 100 A, I.A. 8000A	ea	$	115.83	$	-
	Arrestor, Distribution, 9KV, 7.65 MCOV	ea	$	54.46	$	-
	Arrestor, Riser Pole, 9KV, CAT #221608-7224	ea	$	73.47	$	-
0	Arrester 24 kv -DynaVar Distribution Class PDV (MCOV 19.5 kV)	ea	$	100.61	$	-
0	Arrester 27 kv - DynaVar Riser Pole (PVR) Surge	ea	$	126.26	$	-
0	Hotline Clamp 1/0-#6, BC2/0-FTP-XB	ea	$	17.36	$	-
0	Ground Rod & Clamp 5/8"	ea	$	13.72	$	-
	Cluster Mount Bracket	ea	$	429.44	$	-
	Cluster Bracket Adaptor - Vertical	ea	$	52.58	$	-
0	Fuse Link - 2K Replaceable Head	ea	$	5.44	$	-

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0	Fuse Link - 3K Replaceable Head	ea	$	5.61	$	-
0	Fuse Link - 6K Replaceable Head	ea	$	5.40	$	-
0	Fuse Link - 8K Replaceable Head	ea	$	5.22	$	-
0	Fuse Link - 12K Replaceable Head	ea	$	5.23	$	-
0	Fuse Link - 15K Replaceable Head	ea	$	5.20	$	-
0	Fuse Link - 25K Replaceable Head	ea	$	6.05	$	-
0	Pin Terminal 2/0, Bimetallic, AL	ea	$	9.19	$	-
0	Pin Terminal 4/0- 250 MCM, Bimetallic, AL	ea	$	8.55	$	-
	CONNECTORS					
	Insulinks #2 - #4	ea	$	0.86	$	-
	Insulinks #4- #4	ea	$	0.78	$	-
	Insulinks #4- #6	ea	$	0.78	$	-
	Linkit 2/0 -2/0	ea	$	2.39	$	-
	Linkit 4/0 -4/0	ea	$	1.35	$	-
	#4 Service Grips	ea	$	1.37	$	-
	#2 Service Grips	ea	$	0.94	$	-
	2/0 Service Grips	ea	$	0.92	$	-
	YHO 150, # 4 - 2/0, WR189	ea	$	0.82	$	-
	YHD 250, # 4 - 4/0, WR379	ea	$	1.27	$	-
0	YHD 300, 2/0 - 2/0, WR279	ea	$	1.27	$	-
	YHD 350, 2/0 - 4/0, WR399	ea	$	1.63	$	-
0	YHD 400, 4/0 - 4/0, WR419	ea	$	1.63	$	-
	YHN 450	ea	$	5.08	$	-
0	YHN 500	ea	$	2.58	$	-
	NB500, 500MCM - 500MCM	ea	$	5.79	$	-
	NB50040, 500 MCM - 4/0	ea	$	5.94	$	-
	LUGS					
	# 2 - Double hole Ø 1-3/8" Std Barrel	ea	$	4.83	$	-
	1 x 1/2 hole, Std Barrel 1/0 YA25A9	ea	$	5.92	$	-
	1 x 3/8 hole, Std Barrel 2/0 YA26AL	ea	$	7.63	$	-
	1 x 1/2 hole, Std Barrel 4/0 YA28L	ea	$	4.80	$	-
	1 x 1/2" Ø Long Barrel, 250 MCM	ea	$	9.08	$	-
	350 MCM Lug - 1 x 5/8 Hole, Std Barrel	ea	$	21.60	$	-
	500 MCM Burndy YA34-L6	ea	$	15.64	$	-
	UNDERGROUND ACCESSORIES					
0	Pedestal Box	ea	$	359.02	$	-
	Termination 15 kV - Indoor	ea	$	123.47	$	-
0	Termination 25 kV - Outdoor	ea	$	292.45	$	-
	Loadbreak Elbow 15 kV, 200A	ea	$	59.18	$	-
0	Loadbreak Elbow 25 kV, 200A	ea	$	66.69	$	-
0	Feed Thru Insert 25 kV	ea	$	252.09	$	-
	Splice Kit 15 Kv - #2-4/0	ea	$	247.04	$	-
	Splice Kit 25 kV	ea	$	525.00	$	-
0	Bushing Well Inserts - 25 kV 2702A1	ea	$	252.09	$	-
0	Mount, Terminator/Arrestor Cat. No CTB-EMB	ea	$	91.09	$	-
0	Cable Postioner, Cat No, CCS820	ea	$	38.00	$	-
0	Stand OFF Bracket APP-1114	ea	$	41.88	$	-
0	Conduit Strap Kit, Cat No. CSTK6-Hubbell	ea	$	10.46	$	-
	Cott Marker Post 3"x 6ft with BEL Markings	ea	$	78.03	$	-
0	Elastimold 274J3 (3 Way Junction)	ea	$	408.34	$	-
0	Lag Srews 1/2 " dia. x 2 1/2" Length	ea	$	0.51	$	-
	Concrete Slabs (2 ft. long, 1 ft. wide)	ea	$	24.00	$	-
	4" Galv. Straps	ea	$	3.14	$	-
	4" PVC Pipe Sch 40 (20 ft length)	ea	$	106.62	$	-
	4" PVC Elbows Sch 40	ea	$	16.24	$	-
	4" Long Sweep Elbows	ea	$	27.53	$	-
	4" Sch 40 (45 degree) Elbow	ea	$	27.53	$	-
	4" coupling	ea	$	7.45	$	-
	6" PVC Pipe Sch 40 (20 ft length)	ea	$	191.92	$	-
	6" PVC Elbows Sch 40	ea	$	58.46	$	-
	6" Sch 40 (45 degree) Elbow	ea	$	59.73	$	-
	6" PVC Pipe Sch 26 (20 ft length)	ea	$	221.07	$	-
	6" PVC Elbows Sch 26	ea	$	58.46	$	-
	6" Sch 26 (45 degree) Elbow	ea	$	64.43	$	-
	6" coupling	ea	$	25.59	$	-
	6" Galv. Straps	ea	$	13.16	$	-
	STREETLIGHTS					
	Street Light Assembly	ub	$	277.53	$	-
	Street Light Fixture (only)	ea	$	210.10	$	-
	Street Light Arm 1.25 x 4	ea	$	30.31	$	-
	Photocell	ea	$	10.66	$	-
	Connector, 2/0 - #10, WR139	ea	$	1.28	$	-
	Connector, Blackburn, 4/0 - #10,	ea	$	2.07	$	-
	Bulb 150 Watts	ea	$	12.17	$	-
	#12 Single Copper	ft	$	0.24	$	-
	LABOUR					

	Lineman	hr	$	15.00	$	-
	Supervisor	hr	$	19.00	$	-
	CONTRACTS					
	Trenching (including pipe install, filling, compacting, tape, slabs)	ft		#N/A		#N/A
	Line Clearing (Virgin Vegetation)	acres		#N/A		#N/A
	Surveying	miles		#N/A		#N/A
0	Pole Installation	ea		#N/A		#N/A
	Pole Spot	ea		#N/A		#N/A
0	Anchors Install	ea		#N/A		#N/A
	Anchors Install (rock anchor)	ea		#N/A		#N/A
	Install Anchor using Jack Hammer	ea		#N/A		#N/A
	Blasting	ea		#N/A		#N/A
	Run UDR cable in conduit	ft		#N/A		#N/A
	Right of Way	ea		#N/A		#N/A
	Transformer Plinth (materials and installation)	ea		#N/A		#N/A
	Transformer Plinth installation with elevated concrete -flood areas	ea		#N/A		#N/A
	Stringing 1/0 AAAC conductor (Azusa)	Span		#N/A		#N/A
	Stringing 394.5 Conductor (Canton)	Span		#N/A		#N/A
	Contracts (Pole Installation Special Cases)					
	Pole Installation in Rock	ea		#N/A		#N/A
	Pole Installation in Stone	ea		#N/A		#N/A
	Pole Installation (10 ft. within energized line)	ea		#N/A		#N/A
	Plumb Pole (Install Upright)	ea		#N/A		#N/A
	Push Brace Pole (To keep pole upright)	ea		#N/A		#N/A
	Pole Bearing Plates (Swamp areas as required)	ea		#N/A		#N/A
	Pole Crib (Installation)	ea		#N/A		#N/A
	To install Baulking Board (Swamp areas as required)	ea		#N/A		#N/A
	Contracts (Pole Removal Special Cases)					
	Pole Removal (10 ft. within energized line)	ea		#N/A		#N/A
	Remove Pole Crib	ea		#N/A		#N/A
	Remove Pole and Backfill Hole (Contractor to own and dispose of pole)	ea		#N/A		#N/A
	Remove Pole and Backfill Hole (BEL to own pole)	ea		#N/A		#N/A
	Remove Pole Stump and Backfill Hole	ea		#N/A		#N/A
	Remove Pole with Baulking Board	ea		#N/A		#N/A
	Removal of Anchor	ea		#N/A		#N/A
	ACCOMMODATION & SUBSISTENCE					
	Meals	ea	$	15.00	$	-
	Rooms	ea	$	100.00	$	-
	TRANSPORTATION					
	Pick-up Truck	hr	$	20.00	$	-
	Light Duty Aerial Device	hr	$	30.00	$	-
	Backhoe, Excavator & Crane Truck	hr	$	30.00	$	-
	Heavy Duty Material Handler	hr	$	30.00	$	-
	Mileage	mls	$	1.10	$	-
	Digger Derrick	hr	$	40.00	$	-
	Transportation of Materials	trips	$	1,700.00	$	-
	Air Flights					
	Air Flight (Bze to Placencia)	ea	$	342.30	$	-
	Boat	hr	$	55.00	$	-
	Golf Cart	hr	$	60.00	$	-
	Subtotal : Materials				$	-
	Subtotal : Labour				$	-
	Subtotal : Contracts					#N/A
	Subtotal : Accommodation & Subsistence				$	-
	Subtotal : Transportation				$	-
	Contingency				$	-
	Engineering, Supervision & Overheads					#N/A
	Material Recovery				$	-
	GRAND TOTAL					#N/A

Prepared By: *Ralph Nunez* **Technician** **Checked By:** **Supervisor** **Date:** 0

COMMENTS & NOTES:

File: Copy of Project Costing Model_Apr_2014-Macro
Tab: CostEst
Date: 26/08/2017, 11:36 AM

Figure 6: Typical cost estimate template

4.1.3 Execution.

All the preparatory work was done at this point. The plans were drawn, bills of material prepared and project cost estimate completed. The procurement of materials and contractors was carried out. Contractors and suppliers were secured via competitive bidding.

It was necessary for the materials utilized for the projects to meet a specific requirement. The manufacturers for these materials are US based companies. The delivery lead time for these materials ranged from 4 weeks to 8 weeks. Given the lead time for materials and the fact that these materials were frequently used for the company's operation, these materials were stocked at the company's storage facility. To secure materials an inventory transfer for the required materials was prepared. The materials were transported to the respective project site for construction.

Utilizing the preliminary plan prepared by BEL technicians, the contractor responsible for surveying the line ensured that the power line route was within the utility corridor, reserved for electrical power lines. In the rear occasions where this was unavoidable the surveyor was responsible for securing the easements needed. After ensuring there were no underground obstructions, the surveyor would stake the location of the poles and anchors. The stakes were planted to a sufficient depth and were colour coded to differentiate anchors and the varying height of poles. The surveying contractor provided a hard and soft copy of the drawing indicating the layout of the power line.

The main cause of hindrance to power line construction in the rural communities was vegetation. With the final route established, a contractor was selected to remove vegetation from the distribution line right-of-way. The right-of-way spans 30 ft. wide with 15 ft. on both sides of the route center line.

The pole planting contractor was responsible for the planting of the poles and anchors at the location indicated by the surveyor's stake.

The framing and stringing contractor was responsible for the framing of the power line poles, stringing of the conductors and tensioning of the conductors.

Once the power line was inspected and to the satisfaction of the project engineer the line was commissioned.

4.1.4 Management.

Several department partook in the management of the project. The ultimate responsibility lied with the Project Coordinator. The procurement of contractors and suppliers were conducted by the Project Coordinator and the Manager Purchase and Stores department. The issuing of contracts and payments were the responsibility of the Project Engineer with assistance of Purchasing and Stores and Finance Department. The inspection of the project was the responsibility of the Project Engineer and the reporting of the project was the conducted by the Project Coordinator.

4.1.5 Closure.

The project was audited and a comparison of estimated project material and cost was made with the actual Distribution Line Extension. Excess materials were returned to BEL's storage facility. The hardware added to the power grid was recorded and included in the company's assets.

4.1.6 Current flow chart.

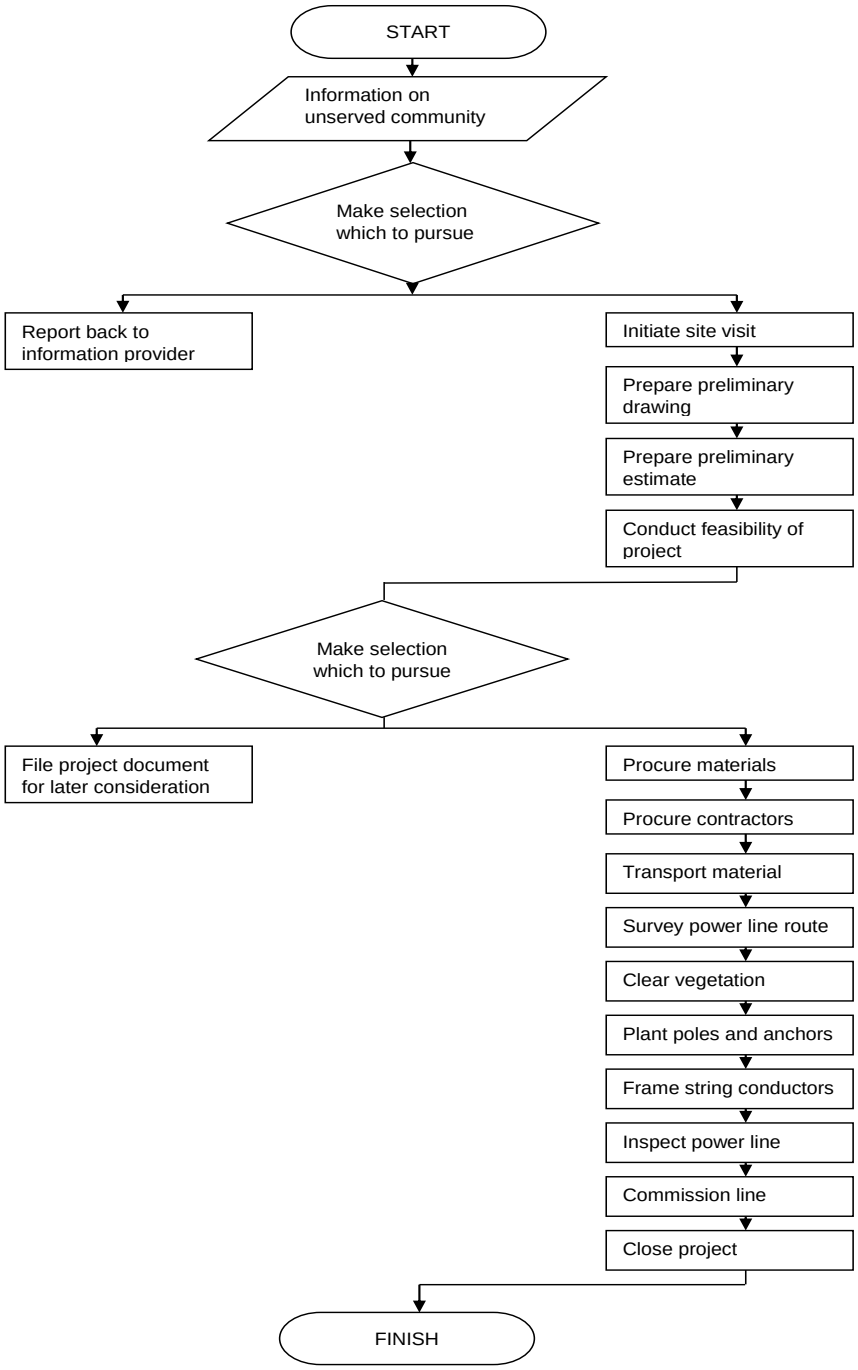

Figure 7: Current flow chart

4.2 Topic related to specific objective 2: The resulting comparison of current and standard project management processes.

4.2.1 Methodology used.

4.2.1.1 Analytical method.

The project management practices utilized for the projects researched were noted to determined effectiveness. All project management practices employed by the project was documented. The identified practices were not categories in theory or practice in standard project management processes. Effective practices were highlighted and practices that required enhancement identified.

4.2.1.2 Applied method.

The project management process and their respective knowledge areas were documented. The project management practices under the project were aligned with the standard project management processes. Best project management practices were used to enhance less effective project management practices.

4.2.2 Project integration management.

4.2.2.1 Initiating process.

The distribution power line projects were similar in nature, but each project varied and was unique. The preparation and planning for the projects were limited to the selection and conventional norm. Putting in place a Project Charter would capture what the project encompasses and determine the true feasibility of the project. The scope of the project should be outlined and the plan to execute carefully thought out. The utilization of resources can be planned in advance.

4.2.2.2 Planning process.

Project Management Institute (2013) states “The project management plan is the document that describes how the project will be executed, monitored, and controlled.” The project base lines included scope baseline, schedule baseline and cost baseline. In addition to the baseline there were several subsidiary plans namely; Scope Management Plan, Requirement Plan, Schedule Management Plan, Cost Management Plan, Quality Management Plan, Process Improvement Plan, Human Resource Management Plan, Communication Management Plan, Risk Management Plan, Procurement Management Plan, and Stakeholder Management Plan.

4.2.2.3 Executing process.

The activities and deliverables identified to complete the project required a competent management. The implementation of the project required the execution of the project with leadership and direction to accomplish the project plans. All changes needed to be noted and actions taken to complete.

4.2.2.4 Monitoring and controlling process.

The advancement of the project was to be monitored and recorded. This would have been effective to determine progress and make projections of work package completion. Comparisons were able to be made between planned and actual budget, schedule and scope of the project. The project progress change is often inevitable. To address these changes it was necessary to establish an integrated change control process. The Senior Manager was responsible for vetting and making decisions of proposed changes. A formal change request process was to be initiated and documented at every stage. The report provided to stakeholders would be furnished with information that would provide a portrait of the state of the project.

4.2.2.5 Closing process.

The manner in which the projects were to be closed should also have been considered in the integration stage of the project. The projects were to be closed properly. All the activities and deliverables were to be completed. All the plans prepared were to be executed to completion. Where changes were made they should have been recorded, documented and updated. The lessons learned should be utilized to improve processes on future projects.

4.2.3 Project scope management.

4.2.3.1 Planning process.

The project scope was not clearly articulated or documented. However, the experience of the staff and guidance from the company's Distribution Standards[4] allowed consistency when outlining work. A comprehensive scope of work was prepared outlining the execution, managing, documenting and describing the processes and deliverables of the project. The work packages were to be categorized in form of a WBS.

4.2.3.2 Monitoring and controlling process.

The scope of work was presented to the Senior Manager for review, and sent to the sponsor for acceptance. The accepted scope of work was the baseline used to monitor and measure project progress. All amendment to the scope of work was requested and approved by the project sponsor.

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[4] Distribution Standards is a document prepared and updated by the Planning Department which depicts the standards for distribution power lines.

4.2.4 Project time management.

4.2.4.1 Planning process.

Project time management was lacking in the execution of several distribution power line projects. To improve the area more emphasis should have been placed on the creation of processes to better plan and manage the project Schedule. The activities should have been clearly defined and cumulatively sufficient to successfully complete the project. The activities should have been ordered in a sequential manner and the relationship between activities identified. There was an understanding of the sequencing activities based on previous experience. Project managers interviewed listed activities, but they varied. The activities should have been standardized and resources required should have been estimated so their availability could have been planned. The duration and timeframe of the activity should have been determined and scheduled. There were several variations of the planning time management, but no standardized template.

4.2.4.2 Monitoring and controlling process.

A clearly established work schedule was only as effective as the realistic estimation of resources and duration, and the proper execution of the activity. To ensure that the activities were in compliance with the estimate and quality standards identified, the activities required careful monitoring and controlling. The status of the project schedule required frequent updating and where necessary corrective and preventive action could have been taken to address irregularities. Any deviation from the established schedule must have been formally requested from the Senior Manager. Where approval was granted a revised schedule must have been prepared and further monitored and controlled.

4.2.5 Project cost management.

4.2.5.1 Planning process.

Given the scope of the project, the activities involved and the resources that were required for the execution of the project, cost was estimated and budgeted. The method in which the project cost allocation, spending and reporting should have been determined. This determination would be based on personal experience of the project, or vicarious experience of others. Historical data and lessons learnt from past projects would assist in avoiding the pit falls experienced. The allocation of cost to activities allowed for a rational decision to be made on the best method of executing those activities. When estimating, contingency must be included to cater for unforeseen eventualities.

4.2.5.2 Monitoring and controlling process.

Adherence to the budget was vital to the project success. As such, the movement of funds was to be thoroughly accessed and properly recorded. This practice ensured project completion to the agreed scope. There should have been keen monitoring of the planned budget cost versus the actual cost. The monitoring should have been done constantly and at the activity level where the individual impact of overrunning or underrunning was less significant. Where variances proved significant enough to impact the completion of the project, a change in the scope should have been presented to alter the outcome. With constant monitoring these variances could have been identified early and corrective measures implemented quickly.

4.2.6 Project quality management.

4.2.6.1 Planning process.

With all the requisite plans in place, planning for quality in the distribution power line projects became manageable by BEL. The engagement of the supplier was

conducted with the lead of the Purchasing and Stores department. For consistency in the distribution network, the specification of all the materials required were standard. Purchasing and Stores department also assisted with the safe transportation of materials from the storage facility to the work site. The company provided internal training for its technicians on line construction management. There was also a Distribution Standard document, prepared and updated by BEL that was issued to all technical staff and line contractors. The Distribution Standards depicted the appearance of standard structures and the method of erection. Where the quality planning could have improved was the inclusion of a quality checklist that would be given to the contractor and more established inspections. While supervision of the project was conducted, inspection was presumed to be occurring simultaneously. The only true inspection was the final inspection of the project.

4.2.6.2 Executing process.

The objective of executing the quality management plan was to ensure conformity with the plan. The materials received should have been as requested and required to complete the project. The materials were transported by selected transporters with the equipment and the requisite training to handle BEL materials. The constant supervision by technicians or supervisors presented some safeguard against the contractors engaging in negligent practices. Not only would the quality of work be at risk, but potentially property and life. While quality is very importance, BEL prides itself on being safety conscious. Upon completion of the project, a final inspection was conducted. The existing quality assurance in place, as wanting as it was, had been accepted. There was clearly room for improvement, but with no clear owner of the process the minimum requirements were acceptable.

4.2.6.3 Monitoring and controlling process.

The monitoring and controlling of quality as it presently stands in BEL can prove challenging. With no clear or even current project scope, project schedule or project

cost, the comparison with actual performance would be difficult to obtain. With the implementation of new plans, the monitoring and controlling of quality could be more effective and yield better results. Improvement in the process and deliverables would be realized.

4.2.7 Project human resource management.

4.2.7.1 Planning process.

To determine the human resources required the project scope, the estimate activity resources, the estimate activity duration and estimate cost must have been clearly understood. A practice in BEL was to appoint and move staff based on availability rather than requirement. As a result, projects had suffered time delay. The planning for human resources was vital to executing the project in a timely manner and within budget. While the company was not projectized, as it related to project undertaking and the secondment of employees an hierarchical chart needed to be created with the roles and responsibilities of each individual team member. The duration of the employee or contractor stint with the project must have been indicated along with acquisition and release dates.

4.2.7.2 Executing process.

The project team had to be assembled with members equipped with the requisite aptitude. Given the relative size of the organization employees from within the organization can be seconded to the project. Where specific expertise was required that could not have been identified in-house, contract employees would be sought. The project team would be divorced from BEL, and would operate within the company's policies and procedures. Contracted employees must have been familiar with those policies and procedures. BEL offers training in power line construction and the use of software that are standardized in the organization. Where other agencies are involved, and they have their own guidelines, training is sought so team

members become familiar with agency's guidelines. With the varying personalities sharing a common goal, the Project Manager had the burden of coordinating and managing the team. The team members' performances should have been appraised regularly. The performance individually and collectively must have been satisfactory for project success. Where necessary, alternation to the team structure should have been made to enhance performance and increase fluidity of process flow.

4.2.8 Project communication management.

4.2.8.1 Planning process.

The sharing and dissemination of information was crucial. The stakeholders involved in the project should have received relevant and timely information. A complete assessment of the stakeholders, and the medium of communication available must have been conducted. The community benefitting, governmental agencies, the project teams and BEL would have been considered key stakeholders. The nature and manner of key communication between these and other stakeholders must have been selected and outlined. The information deemed necessary for communication must have been disseminated from a selected stakeholder to the identified recipient. The main type of communication for the projects researched were meetings and the channels used primarily email and telephone. These meetings were impromptu and were done to address looming or pending crisis. However, there were standing quarterly meetings with sponsor and weekly meetings with the project team. Where other organizations were involved, the need to publicise the project was included in a communication plan specifically for this purpose. Sensitizing the general public of the funding source, it used and subsequent impact on the improvement of lives is demanded.

4.2.8.2 Executing process.

The Project Manager or his designate was responsible for the execution of the communications as initially outlined. BEL has a Public Relations (PR) department that is responsible for disseminating the company's information within the organization and to the general public. For communication within the team and among stakeholders directly involved in the project, the Project Manager or his designate would take the lead. Responsibilities include spearheading the meetings and ensuring that information was funnelled through proper channels and arrived at the designated location. These communications were often of a technical nature or specific progress of the project. For Communication with stakeholders not directly involved with the project, but might have had a stake, the PR department took the lead with the assistance of the Project Manager. The execution of a carefully laid out communication plan was not without its challenges. Where the need for changes occurred the communication plan had to be updated and approved by the Senior Manager.

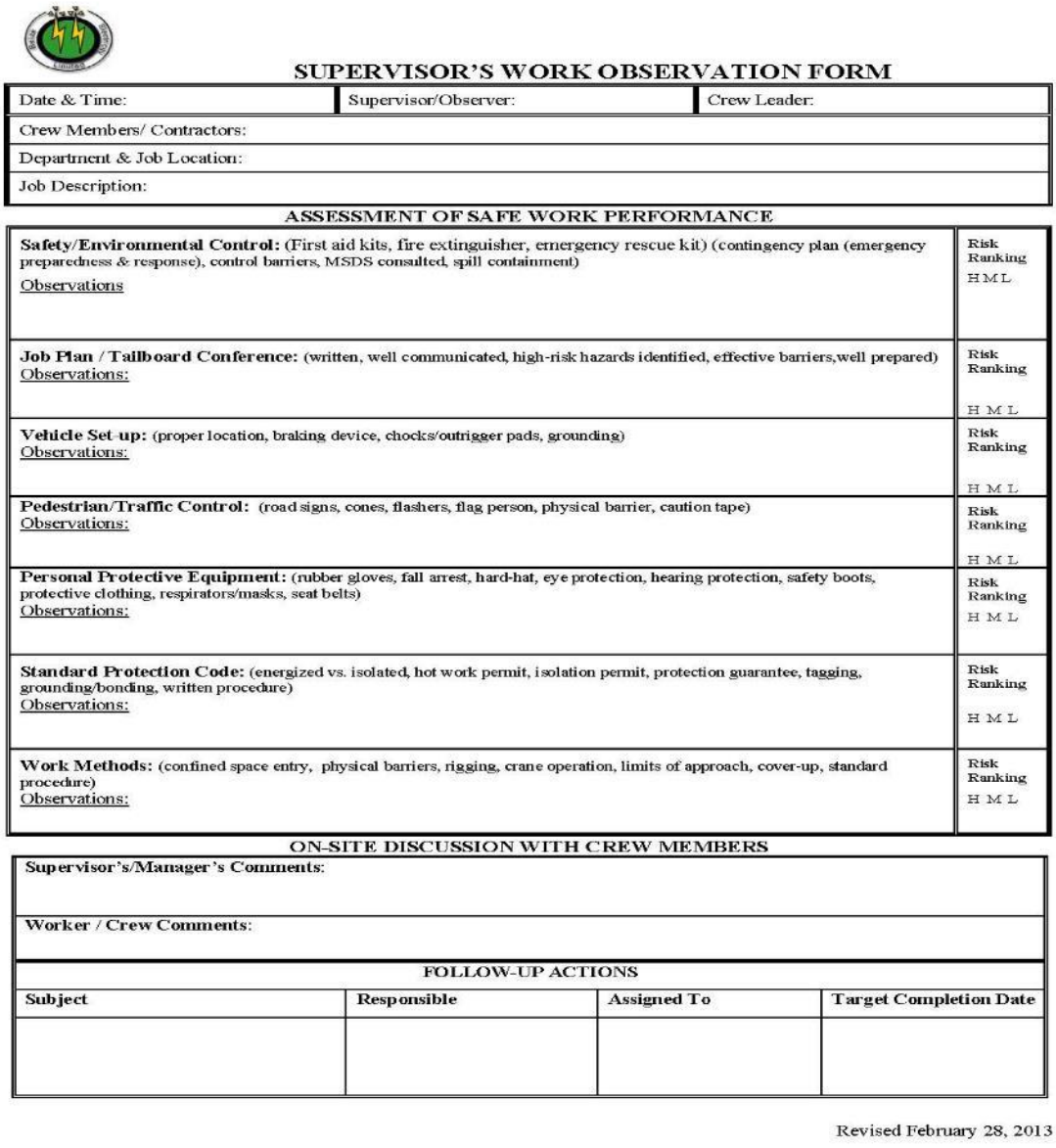
4.2.8.3 Monitoring and controlling process.

With an established plan emphasis should have been placed on the adherence to the plan. There needed to be accountability from those responsible for the execution of the various communication activities. The activities were to be executed in a timely manner with desired impact. Communication had the capability to impact project deliverables, and as such it was imperative to ensure that requisite information was shared with relevant stakeholders. There is also a cost associated with project communication. This cost would be budgeted, and requires management. In addition to the management of the communication budget, the recording and documenting of communication activities was equally important. The meeting's minute and resolutions derived would be documented and shared in line with the communication

plan. Where new communication activities were derived from a previous activity a change to the communication plan was requested.

4.2.9 Project risk management.

4.2.9.1 Work Observation Form.



SUPERVISOR'S WORK OBSERVATION FORM

Date & Time:	Supervisor/Observer:	Crew Leader:
Crew Members/ Contractors:		
Department & Job Location:		
Job Description:		

ASSESSMENT OF SAFE WORK PERFORMANCE

Safety/Environmental Control: (First aid kits, fire extinguisher, emergency rescue kit) (contingency plan (emergency preparedness & response), control barriers, MSDS consulted, spill containment) Observations	Risk Ranking H M L
Job Plan / Tailboard Conference: (written, well communicated, high-risk hazards identified, effective barriers,well prepared) Observations:	Risk Ranking H M L
Vehicle Set-up: (proper location, braking device, chocks/outrigger pads, grounding) Observations:	Risk Ranking H M L
Pedestrian/Traffic Control: (road signs, cones, flashers, flag person, physical barrier, caution tape) Observations:	Risk Ranking H M L
Personal Protective Equipment: (rubber gloves, fall arrest, hard-hat, eye protection, hearing protection, safety boots, protective clothing, respirators/masks, seat belts) Observations:	Risk Ranking H M L
Standard Protection Code: (energized vs. isolated, hot work permit, isolation permit, protection guarantee, tagging, grounding/bonding, written procedure) Observations:	Risk Ranking H M L
Work Methods: (confined space entry, physical barriers, rigging, crane operation, limits of approach, cover-up, standard procedure) Observations:	Risk Ranking H M L

ON-SITE DISCUSSION WITH CREW MEMBERS

Supervisor's/Manager's Comments:
Worker / Crew Comments:

FOLLOW-UP ACTIONS

Subject	Responsible	Assigned To	Target Completion Date

Revised February 28, 2013

Figure 8: Work observation form (BEL safety form)

4.2.9.2 Planning process.

The nature of the work required to construct distribution power line is high risk. BEL recognized the risk and made every effort to safeguard its employees and the general public. BEL is a very safety conscious organization, so much so the Safety department has a vital function. The Safety Health & Environment department identifies, track and reports on BEL's risk exposure in its operations and projects. The Project Manager looked closely at activities in the project, and identified risk specific to distribution power line projects. Where risk were consistent with those identified by Safety Health & Environment, established analysis would be performed and planned responses utilized. Where risk were unique to the project, the Project Manager would be tasked with creating quantitative risk analysis and plan risk response. The projects had contingency reserves to address known project risk identified by the Project Manager.

4.2.9.3 Monitoring and controlling process.

With the risk identified and response plan in place, the monitoring, tracking and recording was able to commence. As the project progressed, response strategies were put in place. Where the risk were unavoidable, they materialized into issues. These issues again would have required close attention. Residual risk and unknown risk might have materialized as the project progressed. The Safety Health & Environment constantly monitors specific risk company wide. These risks are recorded and report because they are a part of the company's target. Work observations are conducted on projects in an effort to identify risk that where not taken into consideration.

4.2.10 Project procurement management.

4.2.10.1 Procurement Plan for Projects Researched.

Table 29

Procurement Plan for project research

#	Type	Description of the procurement action	Entity who will manage the procurement action	Procurement Method	Amount	Launch of procurement action	Duration	Date of contract signature
1	Work	This will include procuring the necessary works required in Distribution Line construction.	The Project department in collaboration with Purchasing & Stores of BEL will manage the procurement process.	Given the threshold for the cost of the work, National Competitive Bidding will be conducted to identify a suitable contactor.	**$497,461.13**	July 2016	Eight Months	March 2017
1a	Work	This will include the preparation for and installation of service entrances.	The Project department in collaboration with Purchasing & Stores of BEL will manage the procurement process.	Given the threshold for the cost of the work, National Competitive Bidding will be conducted to identify a suitable contactor.	**$66,5432.43**	March 2017	Four Months	July 2017
2	Service	This will include surveying contracts and transportation of materials to site.	The Project department in collaboration with Purchasing & Stores of BEL will manage the procurement process.	Given the threshold for the cost of the work, National Competitive Bidding will be conducted to identify a suitable contactor.	**$207,393.60**	May 2016	Three Months	July 2016
3	Supplies	This will include procurement of poles, conductors and hardware.	The Project department in collaboration with Purchasing & Stores of BEL will manage the procurement process.	Given the threshold for the cost of the work, International Competitive Bidding will be conducted to identify a suitable contactor.	**$1,938,112.66**	February 2016	Six Months	July 2016

Own elaboration from BEL contract

4.2.10.2 Planning Process.

Given the nature of the business, BEL procures materials and services on a regular basis. To facilitate this, there is a department, Purchasing and Stores, solely responsible for the acquisition of goods and services on behalf of the company. Having been in place for some time, policies and guidelines have been established. These policies and guidelines are updated as improvement in the processes are identified. The entire company must be in compliance with these policies. Where IFIs are involved, they often bring and expect compliance with their procurement policies and guidelines. As a practice, the more stringent of the policies should be the one followed. Decide on which procurement policies would be used, and identify what goods and services was to be outsourced. Goods and services that were outsourced were estimated to determine the method of procurement. Estimated goods and services that were outsourced was based on past contract. These work were executed and compared with the cost to have the work done in-house. The various steps needed to conduct the procurement of the goods or services were documented and scheduled. The scheduled of these procurement activities coincided with project deliverables.

4.2.10.3 Executing Process.

With clear and detailed guidelines in place the execution of procurement was less chaotic. The requisites documents as outlined in the procurement plan were prepared. The bidding documents were created for the supply of all the materials required to complete the project, the surveying of the power line route, the planting of the poles and anchors, the framing of structures and stringing of conductors. These were determined as necessary and cost effective to be outsourced. Request for bids were published for supply of materials and the execution of work. In the case of the materials to be supplied the procurement method was International Competitive Bidding (ICB). Therefore, request for bids had to be advertised in a

globally circulated publication. The procurement method used for the execution of work was National Competitive Bidding (NCB). The request for bids was advertised and placed in a locally circulated publication. An evaluation committee was established comprising of individuals of varying relevant expertise within the company. The bids received were evaluated by the committee based on established criteria. An evaluation report was prepared depicting the bids submitted and the successful bidder. Bidders were informed of the results and the contract awarded to the successful bidders. These guideline are considered to be effective and suitable for BEL and funding agencies.

4.2.10.4 Monitoring and controlling process.

The procurement guidelines derived from the BEL's Purchasing and Stores department, or from the IFI was used to facilitate the procurement process. The agreement made between BEL and its vendors were monitored for adherence to scope and quality. Where the amendments to these agreements were necessary, approvals were sought, and when granted, changes were implemented. The vendor's performance was evaluated to ensure compliance with the agreement made. The status of the agreements once documented were reported in the weekly meetings. These reports include the number of agreements, their value, amendments and any payments made.

4.2.10.5 Closing Process.

All contractual agreement and purchase order were closed. Where services in the case of contractual agreement, and goods in the case of purchase orders were satisfactorily completed, they were closed. In some instances closure simply required a completion certificate and final payment immediately following verification of agreed upon goods or services delivery. In other instances a retention clause was included in the terms and condition of the contract. Where this occurred the retention period expired, and the goods and services provided were satisfactory before the

payment of the retained amount. Agreements were also closed by termination. Termination was executed when there was a breach of the terms and conditions of the agreement.

4.2.11 Project stakeholder management.

4.2.11.1 Initiating process.

The identification of all stakeholders for the distribution power line projects was not done in the initiating process of the project. The major stakeholders were identified. These stakeholders were sponsors, recipients or directly involved in the project. Other stakeholders of perceived lesser importance were not identified or taken into account. A more comprehensive stakeholder register should be prepared.

4.2.11.2 Planning process.

The planning for stakeholder management was dependent on the policies and procedures of BEL and rules of engagement prescribed by the IFIs. Communication protocol and BEL's Manuals of Authority were relied on to ascertain the responsible individual to engage stakeholders. Another component of planning stakeholder management was the visibility aspect of the project. A plan was devised to determine how awareness of the project could have been raised among interested and benefitting parties. A detailed stakeholder management plan would have provided guidance with engagement of stakeholders.

4.2.11.3 Executing process.

The engagement of stakeholders were such that the timeframe needed for a response or action was adequate. The project schedule relied on the timely engagement of stakeholders who could have potentially delayed or derail the project. Interaction and communication with stakeholders of lesser impact on the project occurred when the need presented itself.

4.2.11.4 Monitoring and controlling process.

There was little emphasis placed on the monitoring of the stakeholder relationship. In the weekly project meetings, the engagement of stakeholders were discussed. Outstanding issues were raised and upcoming requirements tabled. The visibility plan was audited to determine what percentage of the plan was completed. A full audit of the project communication would be more effective in determining areas for improvement.

4.2.11.5 Proposed flow chart.

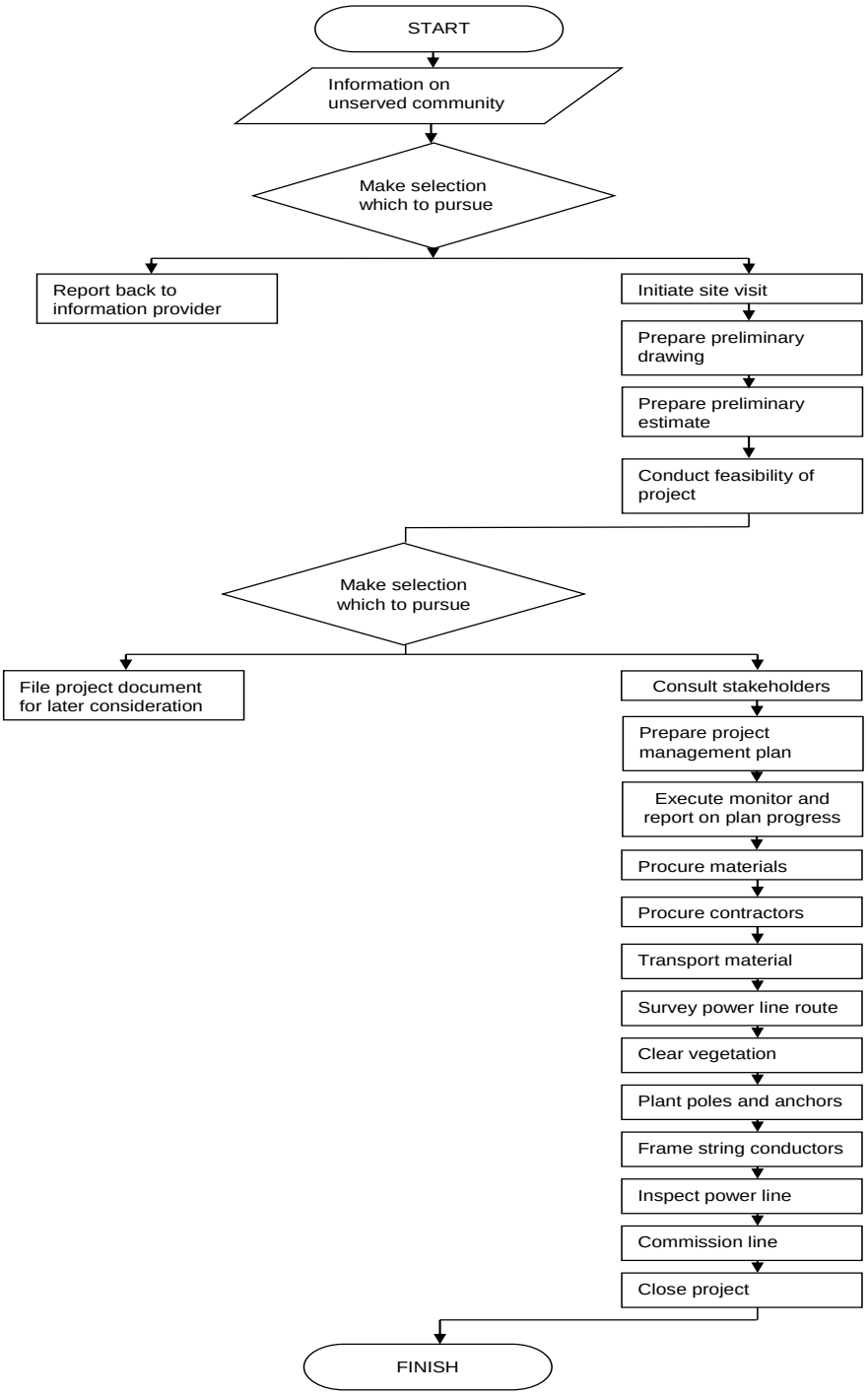


Figure 9: Proposed flow chart

4.3 Topic related to specific objective 3: The creation of project management templates.

4.3.1 Methodology used.

4.3.1.1 Analytical method.

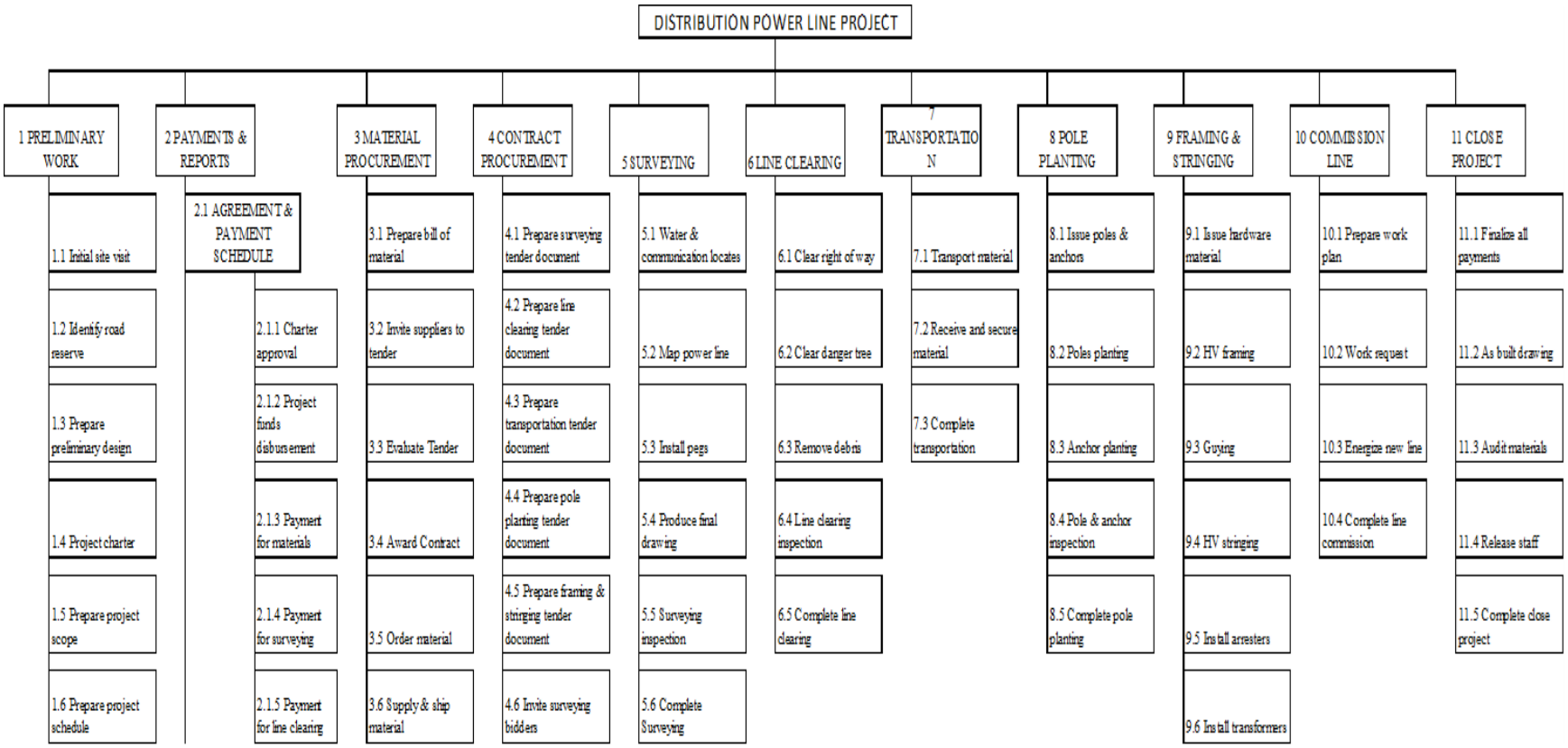
A full review of the Distribution Power Line projects was conducted. Archived information was readily available for review upon request. The projects encapsulated all the project management knowledge areas, and they would require the requisite baseline and plans. Baselines in the form of schedule, scope and cost were a standard feature for all projects. What was lacking were the various project management plans with the exception of procurement plans. The procurement plans utilized were provided by the IFI.

4.3.1.2 Applied Method.

Despite not having clear project management plans, BEL's policies and procedures guided the activities of the project team. To draft project management plans, existing policies and procedures served as guides. With the information gathered from the policies, the plans were created based on outlines displayed in PMBOK Guide® fifth edition. The procurement plan prepared was hybrid of IFI procurement guidelines and BEL's purchasing policies and procedures.

4.3.2 Baseline.

4.3.2.1 Scope baseline.



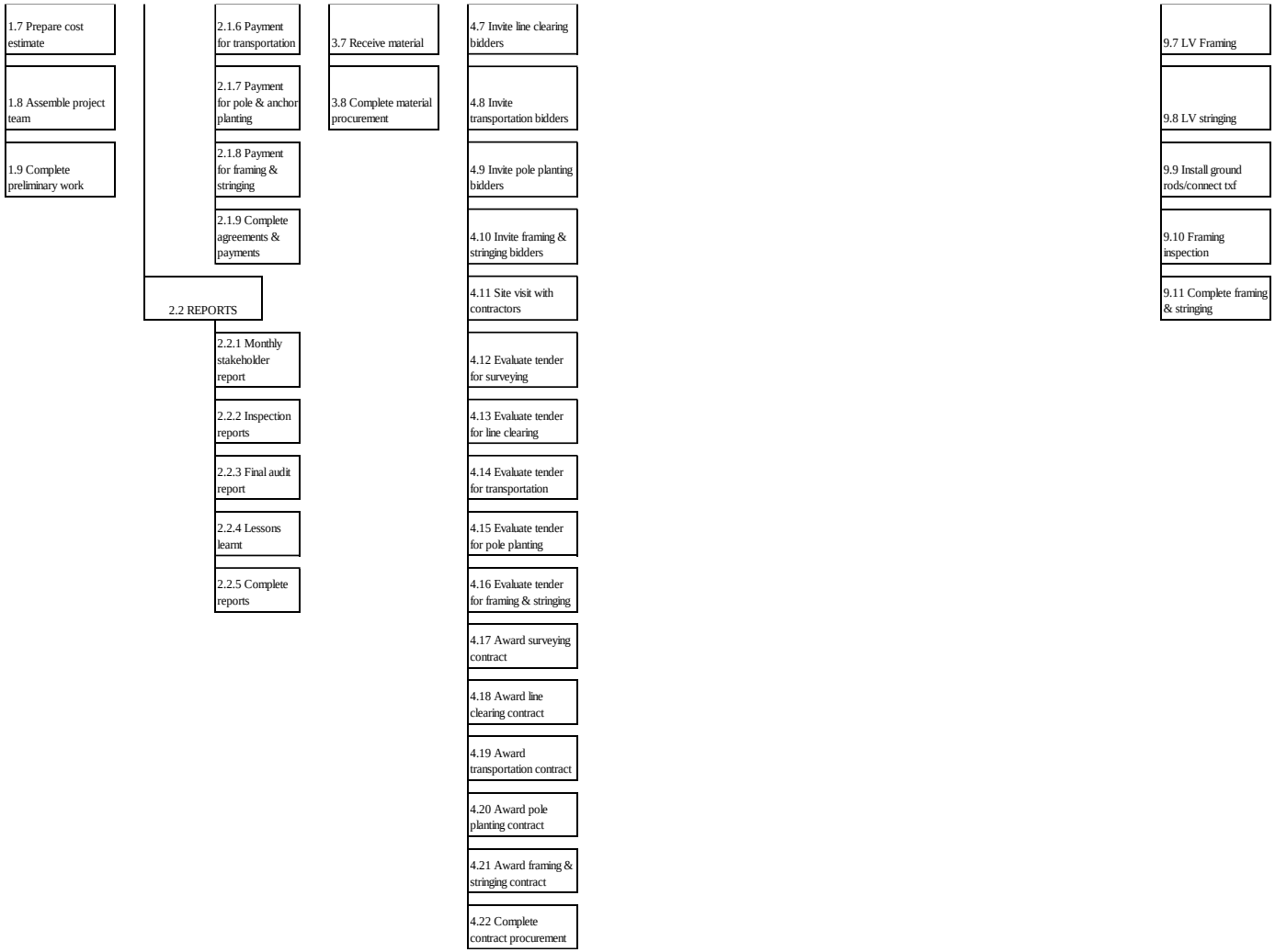


Figure 10 WBS-Distribution Power Line

Table 30

WBS Dictionary

WBS Dictionary

Project Name:
Project Manager:
Date:
Version:

WBS code	Activity	Activity Description	Owner	Resources	Cost	Time Days	Accepted by
0	DISTRIBUTION POWER LINE PROJECT				**$245,620.20**	**238**	
1	PRELIMINARY WORK				**$12,300.20**	**37**	
1.1	Initial site visit	View the terrain and accessibility.	Technician 2	Vehicle	$1,419.00	3	Senior Technician
1.2	Identify road reserve	Determine route of the line.	Senior Technician	Ministry of Natural Resources	$3,005.20	8	Project Engineer
1.3	Prepare preliminary design	Draw a project layout of project.	Senior Technician	Computer hardware & software	$1,012.00	5	Project Engineer
1.4	Project charter	Authorize the existence of the project.	Project Manager	Computer hardware & software	$1,760.00	5	Senior Manager
1.5	Prepare project scope	Draft processes required to ensure all the required is included.	Project Manager	Computer hardware & software	$1,056.00	3	Senior Manager
1.6	Prepare project schedule	Define activities required to complete the project.	Project Engineer	Computer hardware & software	$1,232.00	5	Project Manager
1.7	Prepare cost estimate	Put costing to project based on plan.	Project Manager	Computer hardware & software	$1,056.00	3	Senior Manager
1.8	Assemble project team	Put team together based on skill set and requirement	Project Manager	HR department, Media houses	$1,760.00	5	Senior Manager
1.9	Complete preliminary work	Finalize preliminary work.	Project Manager	Computer hardware & software	$0.00	0	Senior Manager
2	PAYMENTS & REPORTS				**$32,163.60**	**233**	
2.1	AGREEMENT & PAYMENT SCHEDULE				**$5,518.80**	**153**	
2.1.1	Charter approval	Receive charter approval from sponsor.	Senior Manager	Computer hardware & software	$924.00	2	Sponsor
2.1.2	Project funds disbursement	Receive funds for sponsors to execute work	Senior Manager	Finance department	$924.00	2	Sponsor
2.1.3	Payment for materials	Provide payment for materials received.	Finance Officer	Finance, and Purchasing & stores department	$772.80	4	Project Manager

WBS Dictionary

Project Name:
Project Manager:
Date:
Version:

WBS code	Activity	Activity Description	Owner	Resources	Cost	Time Days	Accepted by
2.1.4	Payment for surveying	Provide payment for completed surveying contract.	Finance Officer	Finance, and Purchasing & stores department	$579.60	3	Project Manager
2.1.5	Payment for line clearing	Provide payment for completed line clearing contract.	Finance Officer	Finance, and Purchasing & stores department	$579.60	3	Project Manager
2.1.6	Payment for transportation	Provide payment for completed transportation contracts.	Finance Officer	Finance, and Purchasing & stores department	$579.60	3	Project Manager
2.1.7	Payment for pole & anchor planting	Provide payment for completed pole & anchor planting contract.	Finance Officer	Finance, and Purchasing & stores department	$579.60	3	Project Manager
2.1.8	Payment for framing & stringing	Provide payment for completed framing & stringing contract.	Finance Officer	Finance, and Purchasing & stores department	$579.60	3	Project Manager
2.1.9	Complete agreements & payments	Finalize all contracts	Project Manager	Computer hardware & software	$0.00	0	Senior Manager
2.2	REPORTS				**$26,644.80**	**233**	
2.2.1	Monthly stakeholder report	Prepare project status report			**$10,584.00**	**220**	
2.2.1.1	Monthly stakeholder report 1	Prepare project status report	Project Manager	Computer hardware & software	$1,008.00	3	Senior Manager
2.2.1.2	Monthly stakeholder report 2	Prepare project status report	Project Manager	Computer hardware & software	$1,008.00	3	Senior Manager
2.2.1.3	Monthly stakeholder report 3	Prepare project status report	Project Manager	Computer hardware & software	$1,008.00	3	Senior Manager
2.2.1.4	Monthly stakeholder report 4	Prepare project status report	Project Manager	Computer hardware & software	$1,008.00	3	Senior Manager
2.2.1.5	Monthly stakeholder report 5	Prepare project status report	Project Manager	Computer hardware & software	$1,008.00	3	Senior Manager
2.2.1.6	Monthly stakeholder report 6	Prepare project status report	Project Manager	Computer hardware & software	$1,008.00	3	Senior Manager
2.2.1.7	Monthly stakeholder report 7	Prepare project status report	Project Manager	Computer hardware & software	$1,008.00	3	Senior Manager
2.2.1.8	Monthly stakeholder report 8	Prepare project status report	Project Manager	Computer hardware & software	$1,008.00	3	Senior Manager
2.2.1.9	Monthly stakeholder report 9	Prepare project status report	Project Manager	Computer hardware & software	$1,008.00	3	Senior Manager
2.2.1.10	Monthly stakeholder report 10	Prepare project status report	Project Manager	Computer hardware & software	$1,008.00	3	Senior Manager
2.2.1.11	Monthly stakeholder report 11	Prepare project status report	Project Manager	Computer hardware & software	$504.00	3	Senior Manager
2.2.2	Inspection reports	Prepare and provide inspect report	Project Engineer	Computer hardware & software	$3,292.80	14	Project Manager
2.2.3	Final audit report	Prepare final project audit report	Project Manager	Computer hardware & software	$504.00	5	Senior Manager

WBS Dictionary

Project Name:
Project Manager:
Date:
Version:

WBS code	Activity	Activity Description	Owner	Resources	Cost	Time Days	Accepted by
2.2.4	Lessons learnt	Document the lessons learnt as project progress.	Project Manager	Computer hardware & software	$1,680.00	17	Senior Manager
2.2.5	Complete reports	Finalize all reports	Project Manager	Computer hardware & software	$0.00	0	Senior Manager
3	MATERIAL PROCUREMENT				**$121,220.40**	**79**	
3.1	Prepare bill of material	List of materials needed for the project.	Senior Technician	Purchasing & Store department	$772.80	4	Project Engineer
3.2	Invite suppliers to tender	Send material to suppliers for quote.	Procurement Officer	Purchasing & Store department	$772.80	20	Project Manager
3.3	Evaluate Tender	Find best possible supplier with ability to meet cost and time requirements.	Procurement Officer	Purchasing & Store department	$483.00	5	Project Manager
3.4	Award Contract	Give contract to the selected supplier.	Project Manager	Purchasing & Store department	$168.00	1	
3.5	Order material	Place order by means of contract.	Procurement Officer	Purchasing & Store department	$193.20	1	Project Manager
3.6	Supply & ship material	Supplier will prepare and deliver materials.	Procurement Officer	Supplier, poles, conductor and hardware	$115,500.00	40	Project Manager
3.7	Receive material	Material will be received by project team.	Senior Technician	Transporter, Purchasing & Store department	$3,330.60	8	Project Engineer
3.8	Complete material procurement	Finalize the procurement of all materials.	Procurement Officer	Computer hardware & software	$0.00	0	Project Manager
4	CONTRACT PROCUREMENT				**$8,106.00**	**30**	
4.1	Prepare surveying tender document	Compile tender document with scope and terms for the surveying.	Project Engineer	Purchasing & Store department	$705.60	3	Project Manager
4.2	Prepare line clearing tender document	Compile tender document with scope and terms for the line construction.	Project Engineer	Purchasing & Store department	$705.60	3	Project Manager
4.3	Prepare transportation tender document	Compile tender document with scope and terms for the transportation.	Project Engineer	Purchasing & Store department	$705.60	3	Project Manager
4.4	Prepare pole planting tender document	Compile tender document with scope and terms for the pole & anchor Planting.	Project Engineer	Purchasing & Store department	$705.60	3	Project Manager

WBS Dictionary

Project Name:
Project Manager:
Date:
Version:

WBS code	Activity	Activity Description	Owner	Resources	Cost	Time Days	Accepted by
4.5	Prepare framing & stringing tender document	Compile tender document with scope and terms for the framing & stringing.	Project Engineer	Purchasing & Store department	$705.60	3	Project Manager
4.6	Invite surveying bidders	Send tender document to competent surveyor contractor.	Procurement Officer	Purchasing & Store department	$193.20	2	Project Manager
4.7	Invite line clearing bidders	Send tender document to competent line clearing contractor.	Procurement Officer	Purchasing & Store department	$193.20	2	Project Manager
4.8	Invite transportation bidders	Send tender document to competent transporter contract.	Procurement Officer	Purchasing & Store department	$193.20	2	Project Manager
4.9	Invite pole planting bidders	Send tender document to competent pole planting contractor	Procurement Officer	Purchasing & Store department	$193.20	2	Project Manager
4.1	Invite framing & stringing bidders	Send tender document to competent framing contractors.	Procurement Officer	Purchasing & Store department	$193.20	2	Project Manager
4.11	Site visit with contractors		Senior Technician	Purchasing & Store department	$966.00	5	Project Engineer
4.12	Evaluate tender for surveying	Find the best possible surveyor with the ability to meet the cost and time requirements.	Procurement Officer	Purchasing & Store department	$193.20	2	Project Manager
4.13	Evaluate tender for line clearing	Find the best possible line clearing contractor with the ability to meet the cost and time requirements.	Procurement Officer	Purchasing & Store department	$193.20	2	Project Manager
4.14	Evaluate tender for transportation	Find the best possible transporter with the ability to meet the cost and time requirements.	Procurement Officer	Purchasing & Store department	$193.20	2	Project Manager
4.15	Evaluate tender for pole planting	Find the best possible pole planting contractor with the ability to meet the cost and time requirements.	Procurement Officer	Purchasing & Store department	$193.20	2	Project Manager
4.16	Evaluate tender for framing & stringing	Find the best possible framing contactor with the ability to meet the cost and time requirements.	Procurement Officer	Purchasing & Store department	$193.20	2	Project Manager
4.17	Award surveying contract	Give contract to the selected surveyor.	Project Manager	Purchasing & Store department	$336.00	1	Senior Manager
4.18	Award line clearing contract	Give contract to the selected line clearing contractor.	Project Manager	Purchasing & Store department	$336.00	1	Senior Manager

WBS Dictionary

Project Name:
Project Manager:
Date:
Version:

WBS code	Activity	Activity Description	Owner	Resources	Cost	Time Days	Accepted by
4.19	Award transportation contract	Give contract to the selected transporter.	Project Manager	Purchasing & Store department	$336.00	1	Senior Manager
4.2	Award pole planting contract	Give contract to the selected pole planting contractor.	Project Manager	Purchasing & Store department	$336.00	1	Senior Manager
4.21	Award framing & stringing contract	Give contract to the selected framing contractor.	Project Manager	Purchasing & Store department	$336.00	1	Senior Manager
4.22	Complete contract procurement	Finalize contact procurement	Procurement Officer	Computer hardware & software	$0.00	0	Project Manager
5	SURVEYING				**$12,482.80**	**22**	
5.1	Water & communication locates	Get information from water and communication company of asset location	Technician 2	Communication and water company	$1,452.00	3	Project Engineer
5.2	Map power line	Find the best possible route and extent of the proposed power line.	Senior Technician	Surveying contractor	$5,500.00	8	Project Engineer
5.3	Install pegs	Stake the location of the poles and anchors.	Senior Technician	Surveying contractor	$1,100.00	9	Project Engineer
5.4	Produce final drawing	Drawing and coordinates of pole infrastructure.	Senior Technician	Surveying contractor	$880.00	5	Project Engineer
5.5	Surveying inspection	Verify the completion and quality of surveying work.	Senior Technician	Vehicle	$3,550.80	2	Project Engineer
5.6	Complete Surveying	Finalize surveying work	Project Engineer	Computer hardware & software	$0.00	0	Project Manager
6	LINE CLEARING				**$6,479.00**	**19**	
6.1	Clear right of way	Clear vegetation from the rout of power line right of way.	Technician 2	Surveying contractor	$2,200.00	10	Project Engineer
6.2	Clear danger tree	Clear danger trees from the rout of power line right of way.	Technician 2	Surveying contractor	$1,320.00	4	Project Engineer
6.3	Remove debris	Chart away debris from the work site.	Technician 2	Surveying contractor	$440.00	2	Project Engineer
6.4	Line clearing inspection	Verify the completion and quality of line clearing work.	Technician 2	Vehicle	$2,519.00	3	Project Engineer
6.5	Complete line clearing	Finalize line clearing work	Senior Technician	Computer hardware & software	$0.00	0	Project Engineer
7	TRANSPORTATION				**$5,209.60**	**10**	

WBS Dictionary

Project Name:
Project Manager:
Date:
Version:

WBS code	Activity	Activity Description	Owner	Resources	Cost	Time Days	Accepted by
7.1	Transport material	Transport materials to respective project site.	Procurement Officer	Transporter, materials	$4,400.00	6	Project Manager
7.2	Receive and secure material	Receive and house all the materials before distribution.	Senior Technician	Transporter, materials	$809.60	4	Project Engineer
7.3	Complete transportation	Finalize material transportation	Senior Technician	Computer hardware & software	$0.00	0	Project Engineer
8	POLE PLANTING				**$14,671.80**	**32**	
8.1	Issue poles & anchors	The contractors will take possession of poles & anchors.	Technician 2	Poles, anchors	$660.00	5	Project Engineer
8.2	Poles planting	The contractor will plant poles to the specifications prescribed.	Senior Technician	Pole planting contractor, poles	$7,700.00	25	Project Engineer
8.3	Anchor planting	The contractor will plant anchors to the specification prescribed.	Senior Technician	Pole planting contractor, anchor	$1,430.00	20	Project Engineer
8.4	Pole & anchor inspection	Verify the completion and quality of pole planting work.	Project Engineer	Vehicle	$4,881.80	2	Project Manager
8.5	Complete pole planting	Finalize pole and anchor planting work	Project Engineer	Computer hardware & software	$0.00	0	Project Manager
9	FRAMING & STRINGING				**$13,824.80**	**40**	
9.1	Issue hardware material	The contractors will take possession of framing materials.	Technician 2	Conductors, transformers, hardware	$660.00	5	Project Engineer
9.2	HV framing	Install all the hardware for the pole structure.	Senior Technician	Framing contractor, hardware	$2,860.00	10	Project Engineer
9.3	Guying	Install guys to support tensioned conductors.	Senior Technician	Framing contractor, hardware	$308.00	4	Project Engineer
9.4	HV stringing	String and tension the high voltage conductors.	Senior Technician	Framing contractor, conductor	$2,200.00	8	Project Engineer
9.5	Install arresters	Install arresters to protect the power line.	Senior Technician	Framing contractor, hardware	$440.00	1	Project Engineer
9.6	Install transformers	The power transformer will be installed to provide power to residence.	Senior Technician	Framing contractor, hardware, transformer	$440.00	2	Project Engineer
9.7	LV Framing	Install hardware for the supply of power to residence.	Senior Technician	Framing contractor, hardware	$770.00	5	Project Engineer
9.8	LV stringing	String and tension conductors for the supply of power to residence.	Senior Technician	Framing contractor, conductor	$990.00	6	Project Engineer

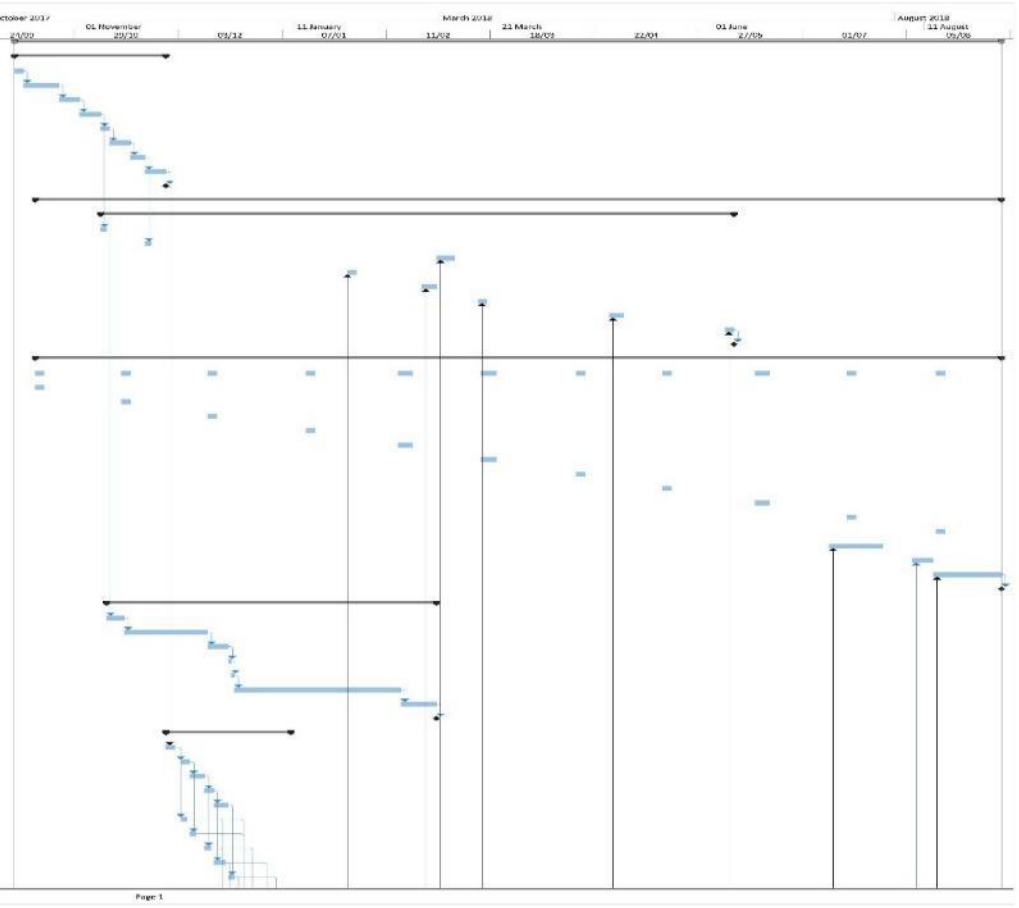
WBS Dictionary

Project Name:
Project Manager:
Date:
Version:

WBS code	Activity	Activity Description	Owner	Resources	Cost	Time Days	Accepted by
9.9	Install ground rods/connect txf	Provide electrical connection for transformers	Senior Technician	Framing contractor, hardware	$330.00	1	Project Engineer
9.1	Framing inspection	Verify the completion and quality of framing work.	Project Engineer	Vehicle, distribution standards	$4,826.80	2	Project Manager
9.11	Complete framing & stringing	Finalize framing and stringing work	Project Engineer	Computer hardware & software	$0.00	0	Project Manager
10	COMMISSION LINE				**$12,298.00**	**25**	
10.1	Prepare work plan	Design method of sectionalize to energizing the new area.	Senior Technician	Computer hardware & software	$2,024.00	10	Project Engineer
10.2	Work request	Place a request to the dispatching department to work on the power system.	Senior Technician	Energy supply department	$1,012.00	5	Project Engineer
10.3	Energize new line	Select date to execute the work and energize the newly built line.	Project Engineer	Energy supply department	$9,262.00	5	Project Manager
10.4	Complete line commission	Finalize energizing of line.	Project Engineer	Computer hardware & software	$0.00	0	Project Manager
11	CLOSE PROJECT				**$6,864.00**	**25**	
11.1	Finalize all payments	Provide payment for all outstanding commitments	Finance Officer	Finance department	$2,024.00	10	Project Manager
11.2	As built drawing	Update drawings to reflect the as built line construction	Senior Technician	Computer hardware & software	$1,012.00	5	Project Engineer
11.3	Audit materials	Compare the use of materials to those ordered.	Project Engineer	Computer hardware & software	$3,300.00	5	Project Manager
11.4	Release staff	Assist with the exit of all team members as the project closes.	Project Manager	HR department	$528.00	5	Project Manager
11.5	Complete close project	Finalize all project activity	Project Manager	Computer hardware & software	$0.00	0	Project Manager

4.3.2.2 Schedule baseline.

ID	WBS	Task Name	Duration	Start	Finish
0	0	**DISTRIBUTION POWER LINE PROJECT**	**238 days**	**Mon 09/10/17**	**Wed 05/09/18**
1	1	**PRELIMINARY WORK**	**37 days**	**Mon 09/10/17**	**Tue 28/11/17**
2	1.1	Initial site visit	3 days	Mon 09/10/17	Wed 11/10/17
3	1.2	Identify road reserve	8 days	Thu 12/10/17	Mon 23/10/17
4	1.3	Prepare preliminary design	5 days	Tue 24/10/17	Mon 30/10/17
5	1.4	Project charter	5 days	Tue 31/10/17	Mon 06/11/17
6	1.5	Prepare project scope	3 days	Tue 07/11/17	Thu 09/11/17
7	1.6	Prepare project schedule	5 days	Fri 10/11/17	Thu 16/11/17
8	1.7	Prepare cost estimate	3 days	Fri 17/11/17	Tue 21/11/17
9	1.8	Assemble project team	5 days	Wed 22/11/17	Tue 28/11/17
10	1.9	Complete preliminary work	0 days	Tue 28/11/17	Tue 28/11/17
11	2	**PAYMENTS & REPORTS**	**233 days**	**Mon 16/10/17**	**Wed 05/09/18**
12	2.1	**AGREEMENT & PAYMENT**	**153 days**	**Tue 07/11/17**	**Thu 07/06/18**
13	2.1.1	Charter approval	2 days	Tue 07/11/17	Wed 08/11/17
14	2.1.2	Project funds disbursement	2 days	Wed 22/11/17	Thu 23/11/17
15	2.1.3	Payment for materials	4 days	Wed 28/02/18	Mon 05/03/18
16	2.1.4	Payment for surveying	3 days	Mon 29/01/18	Wed 31/01/18
17	2.1.5	Payment for line clearing	3 days	Fri 23/02/18	Tue 27/02/18
18	2.1.6	Payment for transportation	3 days	Wed 14/03/18	Fri 16/03/18
19	2.1.7	Payment for pole & anchor planting	3 days	Fri 27/04/18	Tue 01/05/18
20	2.1.8	Payment for framing & stringing	3 days	Tue 05/06/18	Thu 07/06/18
21	2.1.9	Complete agreements & payments	0 days	Thu 07/06/18	Thu 07/06/18
22	2.2	**REPORTS**	**233 days**	**Mon 16/10/17**	**Wed 05/09/18**
23	2.2.1	**Monthly stakeholder report**	**220 days**	**Mon 16/10/17**	**Fri 17/08/18**
24	2.2.1.1	Monthly stakeholder report 1	3 days	Mon 16/10/17	Wed 18/10/17
25	2.2.1.2	Monthly stakeholder report 2	3 days	Tue 14/11/17	Thu 16/11/17
26	2.2.1.3	Monthly stakeholder report 3	3 days	Wed 13/12/17	Fri 15/12/17
27	2.2.1.4	Monthly stakeholder report 4	3 days	Mon 15/01/18	Wed 17/01/18
28	2.2.1.5	Monthly stakeholder report 5	3 days	Thu 15/02/18	Mon 19/02/18
29	2.2.1.6	Monthly stakeholder report 6	3 days	Thu 15/03/18	Mon 19/03/18
30	2.2.1.7	Monthly stakeholder report 7	3 days	Mon 16/04/18	Wed 18/04/18
31	2.2.1.8	Monthly stakeholder report 8	3 days	Tue 15/05/18	Thu 17/05/18
32	2.2.1.9	Monthly stakeholder report 9	3 days	Fri 15/06/18	Tue 19/06/18
33	2.2.1.10	Monthly stakeholder report 10	3 days	Mon 16/07/18	Wed 18/07/18
34	2.2.1.11	Monthly stakeholder report 11	3 days	Wed 15/08/18	Fri 17/08/18
35	2.2.2	Inspection reports	14 days	Tue 10/07/18	Fri 27/07/18
36	2.2.3	Final audit report	5 days	Tue 07/08/18	Mon 13/08/18
37	2.2.4	Lessons learnt	17 days	Tue 14/08/18	Wed 05/09/18
38	2.2.5	Complete reports	0 days	Wed 05/09/18	Wed 05/09/18
39	3	**MATERIAL PROCUREMENT**	**79 days**	**Thu 09/11/17**	**Tue 27/02/18**
40	3.1	Prepare bill of material	4 days	Thu 09/11/17	Tue 14/11/17
41	3.2	Invite suppliers to tender	20 days	Wed 15/11/17	Tue 12/12/17
42	3.3	Evaluate Tender	5 days	Wed 13/12/17	Tue 19/12/17
43	3.4	Award Contract	1 day	Wed 20/12/17	Wed 20/12/17
44	3.5	Order material	1 day	Thu 21/12/17	Thu 21/12/17
45	3.6	Supply & ship material	40 days	Fri 22/12/17	Thu 15/02/18
46	3.7	Receive material	8 days	Fri 16/02/18	Tue 27/02/18
47	3.8	Complete material procurement	0 days	Tue 27/02/18	Tue 27/02/18
48	4	**CONTRACT PROCUREMENT**	**30 days**	**Wed 29/11/17**	**Tue 09/01/18**
49	4.1	Prepare surveying tender document	3 days	Wed 29/11/17	Fri 01/12/17
50	4.2	Prepare line clearing tender document	3 days	Mon 04/12/17	Wed 06/12/17
51	4.3	Prepare transportation tender document	3 days	Thu 07/12/17	Mon 11/12/17
52	4.4	Prepare pole planting tender document	3 days	Tue 12/12/17	Thu 14/12/17
53	4.5	Prepare framing & stringing tender	3 days	Fri 15/12/17	Tue 19/12/17
54	4.6	Invite surveying bidders	2 days	Mon 04/12/17	Tue 05/12/17
55	4.7	Invite line clearing bidders	2 days	Thu 07/12/17	Fri 08/12/17
56	4.8	Invite transportation bidders	2 days	Tue 12/12/17	Wed 13/12/17
57	4.9	Invite pole planting bidders	2 days	Fri 15/12/17	Mon 18/12/17
58	4.10	Invite framing & stringing bidders	2 days	Wed 20/12/17	Thu 21/12/17



ID	WBS	Task Name	Duration	Start	Finish
59	4.11	Site visit with contractors	5 days	Mon 18/12/17	Fri 22/12/17
60	4.12	Evaluate tender for surveying	2 days	Mon 25/12/17	Tue 26/12/17
61	4.13	Evaluate tender for line clearing	2 days	Mon 25/12/17	Tue 26/12/17
62	4.14	Evaluate tender for transportation	2 days	Thu 28/12/17	Fri 29/12/17
63	4.15	Evaluate tender for pole planting	2 days	Tue 02/01/18	Wed 03/01/18
64	4.16	Evaluate tender for framing & stringing	2 days	Fri 05/01/18	Mon 08/01/18
65	4.17	Award surveying contract	1 day	Wed 27/12/17	Wed 27/12/17
66	4.18	Award line clearing contract	1 day	Thu 28/12/17	Thu 28/12/17
67	4.19	Award transportation contract	1 day	Mon 01/01/18	Mon 01/01/18
68	4.20	Award pole planting contract	1 day	Thu 04/01/18	Thu 04/01/18
69	4.21	Award framing & stringing contract	1 day	Tue 09/01/18	Tue 09/01/18
70	4.22	Complete contract procurement	0 days	Tue 09/01/18	Tue 09/01/18
71	**5**	**SURVEYING**	**22 days**	**Thu 28/12/17**	**Fri 26/01/18**
72	5.1	Water & communication locates	3 days	Thu 28/12/17	Mon 01/01/18
73	5.2	Map power line	8 days	Tue 02/01/18	Thu 11/01/18
74	5.3	Install pegs	9 days	Fri 05/01/18	Wed 17/01/18
75	5.4	Produce final drawing	5 days	Thu 18/01/18	Wed 24/01/18
76	5.5	Surveying inspection	2 days	Thu 25/01/18	Fri 26/01/18
77	5.6	Complete Surveying	0 days	Fri 26/01/18	Fri 26/01/18
78	**6**	**LINE CLEARING**	**19 days**	**Mon 29/01/18**	**Thu 22/02/18**
79	6.1	Clear right of way	10 days	Mon 29/01/18	Fri 09/02/18
80	6.2	Clear danger tree	4 days	Mon 12/02/18	Thu 15/02/18
81	6.3	Remove debris	2 days	Fri 16/02/18	Mon 19/02/18
82	6.4	Line clearing inspection	3 days	Tue 20/02/18	Thu 22/02/18
83	6.5	Complete line clearing	0 days	Thu 22/02/18	Thu 22/02/18
84	**7**	**TRANSPORTATION**	**10 days**	**Wed 28/02/18**	**Tue 13/03/18**
85	7.1	Transport material	6 days	Wed 28/02/18	Wed 07/03/18
86	7.2	Receive and secure material	4 days	Thu 08/03/18	Tue 13/03/18
87	7.3	Complete transportation	0 days	Tue 13/03/18	Tue 13/03/18
88	**8**	**POLE PLANTING**	**32 days**	**Wed 14/03/18**	**Thu 26/04/18**
89	8.1	Issue poles & anchors	5 days	Wed 14/03/18	Tue 20/03/18
90	8.2	Poles planting	25 days	Wed 21/03/18	Tue 24/04/18
91	8.3	Anchor planting	20 days	Wed 28/03/18	Tue 24/04/18
92	8.4	Pole & anchor inspection	2 days	Wed 25/04/18	Thu 26/04/18
93	8.5	Complete pole planting	0 days	Thu 26/04/18	Thu 26/04/18
94	**9**	**FRAMING & STRINGING**	**40 days**	**Tue 10/04/18**	**Mon 04/06/18**
95	9.1	Issue hardware material	5 days	Tue 10/04/18	Mon 16/04/18
96	9.2	HV framing	10 days	Tue 17/04/18	Mon 30/04/18
97	9.3	Guying	4 days	Wed 25/04/18	Mon 30/04/18
98	9.4	HV stringing	8 days	Tue 01/05/18	Thu 10/05/18
99	9.5	Install arresters	1 day	Fri 11/05/18	Fri 11/05/18
100	9.6	Install transformers	2 days	Mon 14/05/18	Tue 15/05/18
101	9.7	LV Framing	5 days	Wed 16/05/18	Tue 22/05/18
102	9.8	LV stringing	6 days	Wed 23/05/18	Wed 30/05/18
103	9.9	Install ground rods/connect txf	1 day	Thu 31/05/18	Thu 31/05/18
104	9.10	Framing inspection	2 days	Fri 01/06/18	Mon 04/06/18
105	9.11	Complete framing & stringing	0 days	Mon 04/06/18	Mon 04/06/18
106	**10**	**COMMISSION LINE**	**25 days**	**Tue 05/06/18**	**Mon 09/07/18**
107	10.1	Prepare work plan	10 days	Tue 05/06/18	Mon 18/06/18
108	10.2	Work request	5 days	Tue 19/06/18	Mon 25/06/18
109	10.3	Energize new line	5 days	Tue 03/07/18	Mon 09/07/18
110	10.4	Complete line commission	0 days	Mon 09/07/18	Mon 09/07/18
111	**11**	**CLOSE PROJECT**	**25 days**	**Tue 10/07/18**	**Mon 13/08/18**
112	11.1	Finalize all payments	10 days	Tue 10/07/18	Mon 23/07/18
113	11.2	As built drawing	5 days	Tue 24/07/18	Mon 30/07/18
114	11.3	Audit materials	5 days	Tue 31/07/18	Mon 06/08/18
115	11.4	Release staff	5 days	Tue 07/08/18	Mon 13/08/18
116	11.5	Complete close project	0 days	Mon 13/08/18	Mon 13/08/18

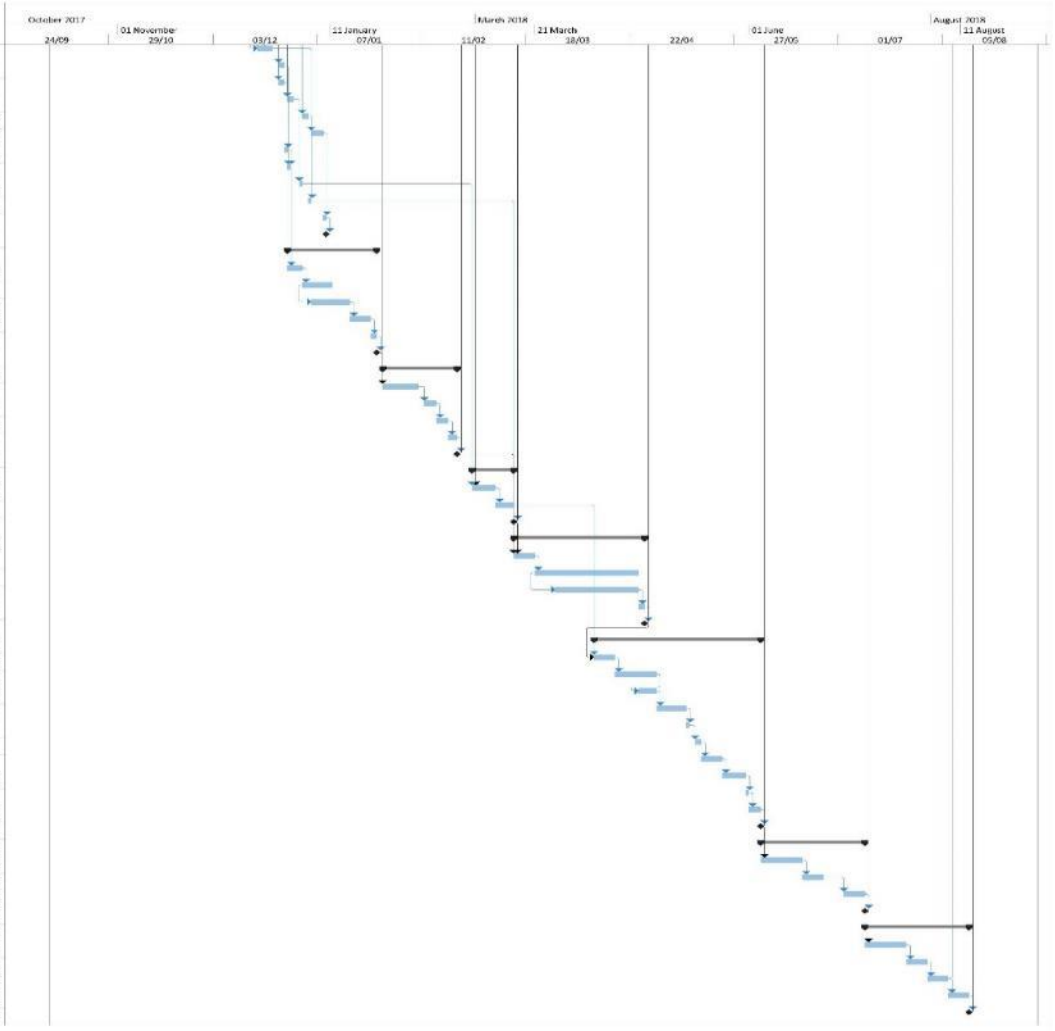


Figure 11: Schedule Baseline

4.3.2.3 Cost baseline.

Table 31

Cost baseline

Cost Baseline **Project Name:** **Project Manager:** **Date:** **Version:**						
WBS Code	**Activity Cost Estimate**	**Activity Cost Estimate**	**Activity Contingency Reserve**	**Work Package Cost Estimate**	**Contingency Reserve**	**Cost Baseline**
0	DISTRIBUTION POWER LINE PROJECT	**$220,202.00**	**$15,338.20**	**$245,620.20**	**$24,562.02**	**$270,182.22**
1	PRELIMINARY WORK	**$11,182.00**	**$1,118.20**	**$12,300.20**	**$1,230.02**	**$13,530.22**
1.1	Initial site visit	$1,290.00	$129.00	$1,419.00		
1.2	Identify road reserve	$2,732.00	$273.20	$3,005.20		
1.3	Prepare preliminary design	$920.00	$92.00	$1,012.00		
1.4	Project charter	$1,600.00	$160.00	$1,760.00		
1.5	Prepare project scope	$960.00	$96.00	$1,056.00		
1.6	Prepare project schedule	$1,120.00	$112.00	$1,232.00		
1.7	Prepare cost estimate	$960.00	$96.00	$1,056.00		
1.8	Assemble project team	$1,600.00	$160.00	$1,760.00		
1.9	Complete preliminary work	$0.00	$0.00	$0.00		
2	PAYMENTS & REPORTS	**$20,552.00**	**$1,531.60**	**$32,163.60**	**$3,216.36**	**$35,379.96**
2.1	AGREEMENT & PAYMENT SCHEDULE	**$5,256.00**	**$262.80**	**$5,518.80**		

Cost Baseline

Project Name:
Project Manager:
Date:
Version:

WBS Code	Activity Cost Estimate	Activity Cost Estimate	Activity Contingency Reserve	Work Package Cost Estimate	Contingency Reserve	Cost Baseline
2.1.1	Charter approval	$880.00	$44.00	$924.00		
2.1.2	Project funds disbursement	$880.00	$44.00	$924.00		
2.1.3	Payment for materials	$736.00	$36.80	$772.80		
2.1.4	Payment for surveying	$552.00	$27.60	$579.60		
2.1.5	Payment for line clearing	$552.00	$27.60	$579.60		
2.1.6	Payment for transportation	$552.00	$27.60	$579.60		
2.1.7	Payment for pole & anchor planting	$552.00	$27.60	$579.60		
2.1.8	Payment for framing & stringing	$552.00	$27.60	$579.60		
2.1.9	Complete agreements & payments	$0.00	$0.00	$0.00		
2.2	REPORTS	**$15,296.00**	**$1,268.80**	**$26,644.80**	**$2,664.48**	**$29,309.28**
2.2.1	Monthly stakeholder report	**$10,080.00**	**$504.00**	**$10,584.00**		
2.2.1.1	Monthly stakeholder report 1	$960.00	$48.00	$1,008.00		
2.2.1.2	Monthly stakeholder report 2	$960.00	$48.00	$1,008.00		
2.2.1.3	Monthly stakeholder report 3	$960.00	$48.00	$1,008.00		
2.2.1.4	Monthly stakeholder report 4	$960.00	$48.00	$1,008.00		
2.2.1.5	Monthly stakeholder report 5	$960.00	$48.00	$1,008.00		
2.2.1.6	Monthly stakeholder report 6	$960.00	$48.00	$1,008.00		
2.2.1.7	Monthly stakeholder report 7	$960.00	$48.00	$1,008.00		

Cost Baseline

Project Name:
Project Manager:
Date:
Version:

WBS Code	Activity Cost Estimate	Activity Cost Estimate	Activity Contingency Reserve	Work Package Cost Estimate	Contingency Reserve	Cost Baseline
2.2.1.8	Monthly stakeholder report 8	$960.00	$48.00	$1,008.00		
2.2.1.9	Monthly stakeholder report 9	$960.00	$48.00	$1,008.00		
2.2.1.10	Monthly stakeholder report 10	$960.00	$48.00	$1,008.00		
2.2.1.11	Monthly stakeholder report 11	$480.00	$24.00	$504.00		
2.2.2	Inspection reports	$3,136.00	$156.80	$3,292.80		
2.2.3	Final audit report	$480.00	$24.00	$504.00		
2.2.4	Lessons learnt	$1,600.00	$80.00	$1,680.00		
2.2.5	Complete reports	$0.00	$0.00	$0.00		
3	MATERIAL PROCUREMENT	**$115,448.00**	**$5,772.40**	**$121,220.40**	**$12,122.04**	**$133,342.44**
3.1	Prepare bill of material	$736.00	$36.80	$772.80		
3.2	Invite suppliers to tender	$736.00	$36.80	$772.80		
3.3	Evaluate Tender	$460.00	$23.00	$483.00		
3.4	Award Contract	$160.00	$8.00	$168.00		
3.5	Order material	$184.00	$9.20	$193.20		
3.6	Supply & ship material	$110,000.00	$5,500.00	$115,500.00		
3.7	Receive material	$3,172.00	$158.60	$3,330.60		
3.8	Complete material procurement	$0.00	$0.00	$0.00		
4	CONTRACT PROCUREMENT	**$7,720.00**	**$386.00**	**$8,106.00**	**$810.60**	**$8,916.60**

Cost Baseline

Project Name:
Project Manager:
Date:
Version:

WBS Code	Activity Cost Estimate	Activity Cost Estimate	Activity Contingency Reserve	Work Package Cost Estimate	Contingency Reserve	Cost Baseline
4.1	Prepare surveying tender document	$672.00	$33.60	$705.60		
4.2	Prepare line clearing tender document	$672.00	$33.60	$705.60		
4.3	Prepare transportation tender document	$672.00	$33.60	$705.60		
4.4	Prepare pole planting tender document	$672.00	$33.60	$705.60		
4.5	Prepare framing & stringing tender document	$672.00	$33.60	$705.60		
4.6	Invite surveying bidders	$184.00	$9.20	$193.20		
4.7	Invite line clearing bidders	$184.00	$9.20	$193.20		
4.8	Invite transportation bidders	$184.00	$9.20	$193.20		
4.9	Invite pole planting bidders	$184.00	$9.20	$193.20		
4.1	Invite framing & stringing bidders	$184.00	$9.20	$193.20		
4.11	Site visit with contractors	$920.00	$46.00	$966.00		
4.12	Evaluate tender for surveying	$184.00	$9.20	$193.20		
4.13	Evaluate tender for line clearing	$184.00	$9.20	$193.20		
4.14	Evaluate tender for transportation	$184.00	$9.20	$193.20		
4.15	Evaluate tender for pole planting	$184.00	$9.20	$193.20		
4.16	Evaluate tender for framing & stringing	$184.00	$9.20	$193.20		
4.17	Award surveying contract	$320.00	$16.00	$336.00		
4.18	Award line clearing contract	$320.00	$16.00	$336.00		

Cost Baseline

Project Name:
Project Manager:
Date:
Version:

WBS Code	Activity Cost Estimate	Activity Cost Estimate	Activity Contingency Reserve	Work Package Cost Estimate	Contingency Reserve	Cost Baseline
4.19	Award transportation contract	$320.00	$16.00	$336.00		
4.2	Award pole planting contract	$320.00	$16.00	$336.00		
4.21	Award framing & stringing contract	$320.00	$16.00	$336.00		
4.22	Complete contract procurement	$0.00	$0.00	$0.00		
5	SURVEYING	**$11,348.00**	**$1,134.80**	**$12,482.80**	**$1,248.28**	**$13,731.08**
5.1	Water & communication locates	$1,320.00	$132.00	$1,452.00		
5.2	Map power line	$5,000.00	$500.00	$5,500.00		
5.3	Install pegs	$1,000.00	$100.00	$1,100.00		
5.4	Produce final drawing	$800.00	$80.00	$880.00		
5.5	Surveying inspection	$3,228.00	$322.80	$3,550.80		
5.6	Complete Surveying	$0.00	$0.00	$0.00		
6	LINE CLEARING	**$5,890.00**	**$589.00**	**$6,479.00**	**$647.90**	**$7,126.90**
6.1	Clear right of way	$2,000.00	$200.00	$2,200.00		
6.2	Clear danger tree	$1,200.00	$120.00	$1,320.00		
6.3	Remove debris	$400.00	$40.00	$440.00		
6.4	Line clearing inspection	$2,290.00	$229.00	$2,519.00		
6.5	Complete line clearing	$0.00	$0.00	$0.00		
7	TRANSPORTATION	**$4,736.00**	**$473.60**	**$5,209.60**	**$520.96**	**$5,730.56**

Cost Baseline

Project Name:
Project Manager:
Date:
Version:

WBS Code	Activity Cost Estimate	Activity Cost Estimate	Activity Contingency Reserve	Work Package Cost Estimate	Contingency Reserve	Cost Baseline
7.1	Transport material	$4,000.00	$400.00	$4,400.00		
7.2	Receive and secure material	$736.00	$73.60	$809.60		
7.3	Complete transportation	$0.00	$0.00	$0.00		
8	POLE PLANTING	**$13,338.00**	**$1,333.80**	**$14,671.80**	**$1,467.18**	**$16,138.98**
8.1	Issue poles & anchors	$600.00	$60.00	$660.00		
8.2	Poles planting	$7,000.00	$700.00	$7,700.00		
8.3	Anchor planting	$1,300.00	$130.00	$1,430.00		
8.4	Pole & anchor inspection	$4,438.00	$443.80	$4,881.80		
8.5	Complete pole planting	$0.00	$0.00	$0.00		
9	FRAMING & STRINGING	**$12,568.00**	**$1,256.80**	**$13,824.80**	**$1,382.48**	**$15,207.28**
9.1	Issue hardware material	$600.00	$60.00	$660.00		
9.2	HV framing	$2,600.00	$260.00	$2,860.00		
9.3	Guying	$280.00	$28.00	$308.00		
9.4	HV stringing	$2,000.00	$200.00	$2,200.00		
9.5	Install arresters	$400.00	$40.00	$440.00		
9.6	Install transformers	$400.00	$40.00	$440.00		
9.7	LV Framing	$700.00	$70.00	$770.00		
9.8	LV stringing	$900.00	$90.00	$990.00		

Cost Baseline

Project Name:
Project Manager:
Date:
Version:

WBS Code	Activity Cost Estimate	Activity Cost Estimate	Activity Contingency Reserve	Work Package Cost Estimate	Contingency Reserve	Cost Baseline
9.9	Install ground rods/connect txf	$300.00	$30.00	$330.00		
9.1	Framing inspection	$4,388.00	$438.80	$4,826.80		
9.11	Complete framing & stringing	$0.00	$0.00	$0.00		
10	COMMISSION LINE	**$11,180.00**	**$1,118.00**	**$12,298.00**	**$1,229.80**	**$13,527.80**
10.1	Prepare work plan	$1,840.00	$184.00	$2,024.00		
10.2	Work request	$920.00	$92.00	$1,012.00		
10.3	Energize new line	$8,420.00	$842.00	$9,262.00		
10.4	Complete line commission	$0.00	$0.00	$0.00		
11	CLOSE PROJECT	**$6,240.00**	**$624.00**	**$6,864.00**	**$686.40**	**$7,550.40**
11.1	Finalize all payments	$1,840.00	$184.00	$2,024.00		
11.2	As built drawing	$920.00	$92.00	$1,012.00		
11.3	Audit materials	$3,000.00	$300.00	$3,300.00		
11.4	Release staff	$480.00	$48.00	$528.00		
11.5	Complete close project	$0.00	$0.00	$0.00		

4.3.3 Plans.

4.3.3.1 Scope Management Plan.

Project Name:

Project Manager:

Date:

Version:

Introduction

This document serves as guide to determine how scope will be defined, developed, monitored, controlled and verified.

Preparing Project Scope Statement

The project scope statement is an outline of the nature of work that was to be executed. In the first instance the project was general and provided the basic information. At the earlier stages of the project this is acceptable. As the project moved into the planning phase the scope statement needed to be expanded and detailed. The more expansive scope would include pertinent information for stakeholders. A more detailed understanding of the methods to be utilized to the complete the project, and the sheer magnitude of the project. The scope statement might have been updated on several occasions as a result of approved changes. When changes occurred, it was imperative that the most current version of the scope statement was circulated to all stakeholders.

Creating Work Breakdown Structure

The project team under the leadership of the Project Manager would look closely at the project deliverables from the approved scope. The project deliverables were

fragmented into work packages. The work packages were fragmented into activities. The activities were required on the smallest scale to complete the project. The decomposition of the deliverables, work packages and activities must have been such that a correlation could have been made. The experience of the project team, and similar WBS on past project would have ensured that the newly created WBS was practical and understandable.

Approve and Maintain WBS

The completed WBS would be submitted to the Senior Manager for his review. The Senior Manager would review the document and any question or concerns that might have arisen would be posed to the Project Manager. Clarifications or amendments were to be provided in an expeditious manner for further review. When the WBS received the Senior Manager's approval, the project team utilized the document in the creation of other plans. The WBS would need revision as time progressed. However, revisions required the approval of the Senior Manager.

Acceptance of Deliverables

The Project Manager's designate would certify the successful completion of project deliverables. This would be based on established criteria and the quality assurance measures in place. The Project Manager would verify the completion of project deliverables. The completion was reported to the Senior Manager for acceptance and approval. Where other agencies were involved a report on the project deliverables completion was provided.

Managing Change Request to Scope Statement

Deviations and changes are a steady staple for any project. Where changes occurred that would impact the scope statement, a formal change request was required to be submitted to the Senior Manager. The Senior Manager was

responsible for the scope statement and ensured it remained in line with project. The decision to approve or disapprove any change request rested in the seat of the Senior Manager. Where request were disapproved, the requesting party was informed and the documentation filled. Where the request was approved, the requesting party was informed and the scope statement updated.

4.3.3.2 Requirement Management Plan.

Project Name:

Project Manager:

Date:

Version:

Introduction

This document serves as guide to determine how requirements will be analysed, documented and managed.

Requirement Processes

Plan: The requirements are identified based on the activities requirement, stakeholders' role and the resources needed for the project. They encompassed all facets of the project. These requirement were crucial to the project success, and were needed to meet the objectives of the influential stakeholders. While many requirements were identified, those of significant importance were listed for special consideration and attention. The requirements would bear an impact on the cost, schedule and scope of the project.

Track: Equipped with the requirement listed, the monitoring, controlling and tracking were the responsibility of the Project Manager. The Project Manager was to utilize the most current version of the requirement management plan that was approved by the Senior Manager. The requirements listed were time sensitive, and the delay or neglect in addressing them could have impacted the project schedule and cost. The requirements of the project were to be met in a timely fashion, and pre-emptive measures were to be taken to expedite or ensure a smooth transition to completion.

Report: Periodic reports indicating completed and upcoming requirements as the project progressed were submitted the Senior Manager. Where delays or changes were approved the information was recorded and reported. The reports provided insight into the achievement of the requirement and contribution of stakeholders and resources.

Configuration Management Activities

The Project Manager was responsible to determine which requirement would be impacted by the changes made to the project or changing of external factors. Once the requirements were identified, the manner in which they were to be initially managed was reviewed. The requirement management plan associated with the identified requirement were amended to reflect the approved changes or new realities facing the project. These requirement changes were forwarded to the Senior Manager for vetting and approval. Where approval was granted the requirement management plan was updated and shared with the relevant stakeholders. Where approval was not granted the previously approved version of requirement management plan would remain as the current plan.

Requirement Prioritization

Item	Major Requirements	Priority
1	Review the project proposal presented and provide the guaranteed funding in a timely manner.	High
2	Ensure that project is executed in line with established or agreed guidelines.	High
3	Receive monthly project updates.	High
4	Liaise with funding and implementing partners.	Medium
5	Impact the lives of as many community residence as the project permits.	High
6	Represent the company's interest in all power line extensions.	High
7	Support the project manager to execute the project efficiently and effectively.	High
8	Weekly briefing on project progress.	Medium
9	Coordinate, manage and control project activities and resources.	High
10	Disseminate information to the wider company and other stakeholders when called upon.	Medium
11	Grant access to the community and support the project.	High
12	Share with community members what is expected for the duration of the project.	Medium
13	Provide leadership and direction for the project.	High
14	Review and manage changes as they occur.	High
15	To successfully and satisfactorily complete the surveying of the power line route.	High
16	Be informed of commencement, inspections and project completion meetings.	High
17	To successfully and satisfactorily complete the clearing and removal of vegetation from the power line route.	High
18	To successfully and satisfactorily complete the framing of structures, stringing of conductors and installation of hardware.	High
19	To successfully and satisfactorily complete the provision of project materials.	High
20	Be informed of order placement, shipping and receipt of materials.	High
21	To successfully and satisfactorily complete the planting of poles and anchors.	High
22	A favourable review of expansion projects.	Medium
23	Be informed of project commencement and completion meetings.	Medium
24	Grant approval to utilize the utility corridor along the road.	High
25	Grant approval to construct power lines, and provide mitigation measures where the impact to the environment is great and can be avoided.	High
26	Provide assistance in facilitating access to national lands, and granting easement where necessary.	High

Table 32: Requirement Prioritization

Table 33

Traceability Matrix

Requirement	Category	Stakeholder	Project Activities
Review the project proposal presented and provide the guaranteed funding in a timely manner.	- Business requirement	- International financing Institution - BEL's Top Management	1.4 Project charter 2.1.1 Charter approval 2.1.2 Project funds disbursement
Ensure that project is executed in line with established or agreed guidelines.	- Business requirement	- International financing Institution - BEL's Top Management	1.5 Prepare project scope 1.6 Prepare project schedule 1.7 Prepare cost estimate
Receive monthly project updates.	- Stakeholder requirement	- International financing Institution - Government of Belize - BEL's Top Management - BEL - Benefitting community - Senior Manager	2.2.1 Monthly stakeholder report
Liaise with funding and implementing partners.	- Business requirement	- Government of Belize - Senior Manager	1.4 Project charter 10.3 Energize new line
Impact the lives of as many community residence as the project permits.	- Stakeholder requirement	- Government of Belize - Senior Manager	1.3 Prepare preliminary design 4.6 Invite surveying bidders 4.7 Invite line clearing bidders 4.8 Invite transportation bidders 4.9 Invite pole planting bidders 5.5 Surveying inspection 4.1 Invite framing & stringing bidders 10.3 Energize new line
Represent the company's interest in all power line extensions.	- Business requirement	- BEL's Top Management	1.4 Project charter
Support the project manager to execute the project efficiently and effectively.	- Solution requirement	- Project team	1.1 Initial site visit 1.2 Identify road reserve 1.3 Prepare preliminary design 3.1 Prepare bill of material

Requirement	Category	Stakeholder	Project Activities
			4.1 Prepare surveying tender document 4.2 Prepare line clearing tender document 4.3 Prepare transportation tender document 4.4 Prepare pole planting tender document 4.5 Prepare framing & stringing tender document 5.1 Water & communication locates 11.2 As built drawing
Weekly briefing on project progress.	- Solution requirement	- Project team - Project Manager	2.2.2 Inspection reports 4.11 Site visit with contractors
Coordinate, manage and control project activities and resources.	- Solution requirement	- Project Manager	1.8 Assemble project team 2.1.3 Payment for materials 2.1.4 Payment for surveying 2.1.5 Payment for line clearing 2.1.6 Payment for transportation 2.1.7 Payment for pole & anchor planting 2.1.8 Payment for framing & stringing 10.1 Prepare work plan 10.2 Work request 11.1 Finalize all payments
Disseminate information to the wider company and other stakeholders when called upon.	- Stakeholder requirement	- Belize Electricity Limited	3.2 Invite suppliers to tender 4.6 Invite surveying bidders 4.7 Invite line clearing bidders 4.8 Invite transportation bidders 4.9 Invite pole planting bidders 5.5 Surveying inspection 4.1 Invite framing & stringing bidders
Grant access to the community and support the project.	- Solution requirement	- Benefitting community	4.11 Site visit with contractors
Share with community members what is expected for the duration of the project.	- Stakeholder requirement	- Benefitting community	5.2 Map power line 6.1 Clear right of way 7.2 Receive and secure material

Requirement	Category	Stakeholder	Project Activities
			8.1 Issue poles & anchors 9.1 Issue hardware material 10.3 Energize new line
Provide leadership and direction for the project.	- Business requirement	- Senior Manager	1.4 Project charter 1.8 Assemble project team 2.2.3 Final audit report 2.2.4 Lessons learnt 11.3 Audit materials 11.4 Release staff
Review and manage changes as they occur.	- Solution requirement	- Senior Manager	2.2.2 Inspection reports
To successfully and satisfactorily complete the surveying of the power line route.	- Solution requirement	- Surveying contractor	4.12 Evaluate tender for surveying 5.2 Map power line 5.3 Install pegs 5.4 Produce final drawing 5.5 Surveying inspection
Be informed of commencement, inspections and project completion meetings.	- Solution requirement	- Surveying contractor - Line clearing contractor - Framing & stringing contractor -Pole planting contractor	4.17 Award surveying contract 4.18 Award line clearing contract 4.19 Award transportation contract 4.20 Award pole planting contract 4.21 Award framing & stringing contract
To successfully and satisfactorily complete the clearing and removal of vegetation from the power line route.	- Solution requirement	- Line clearing contractor	4.13 Evaluate tender for line clearing 6.1 Clear right of way 6.2 Clear danger tree 6.3 Remove debris 6.4 Line clearing inspection
To successfully and satisfactorily complete the framing of structures, stringing of conductors and installation of hardware.	- Solution requirement	- Framing & stringing contractor	4.14 Evaluate tender for transportation 4.16 Evaluate tender for framing & stringing 7.1 Transport material 7.2 Receive and secure material 9.1 Issue hardware material 9.2 HV framing 9.3 Guying

Requirement	Category	Stakeholder	Project Activities
			9.4 HV stringing 9.5 Install arresters 9.6 Install transformers 9.7 LV Framing 9.8 LV stringing 9.9 Install ground rods/connect txf 9.10 Framing inspection
To successfully and satisfactorily complete the provision of project materials.	- Solution requirement	- Material supplier	3.6 Supply & ship material
Be informed of order placement, shipping and receipt of materials.	- Solution requirement	- Material supplier	3.3 Evaluate Tender for material supply 3.4 Award Contract for material supply 3.5 Order material 3.7 Receive material
To successfully and satisfactorily complete the planting of poles and anchors.	- Solution requirement	- Pole planting contractor	4.14 Evaluate tender for transportation 4.15 Evaluate tender for pole planting 7.1 Transport material 7.2 Receive and secure material 8.1 Issue poles & anchors 8.2 Poles planting 8.3 Anchor planting 8.4 Pole & anchor inspection
A favourable review of expansion projects.	- Stakeholder requirement	- Public Utilities Commission	2.1.1 Charter approval
Be informed of project commencement and completion meetings.	- Stakeholder requirement	- Public Utilities Commission - Ministry of Works - Department of Environment - Ministry of Lands	1.4 Project charter 10.3 Energize new line
Grant approval to utilize the utility corridor along the road.	- Solution requirement	- Ministry of Works	5.1 Water & communication locates 5.2 Map power line
Grant approval to construct power lines, and provide mitigation measures where	- Solution requirement	- Department of Environment	5.1 Water & communication locates 6.1 Clear right of way

Requirement	Category	Stakeholder	Project Activities
the impact to the environment is great and can be avoided.			6.2 Clear danger tree
Provide assistance in facilitating access to national lands, and granting easement where necessary.	- Solution requirement	- Ministry of Lands	5.2 Map power line

4.3.3.3 Schedule Management Plan.

Project Name:

Project Manager:

Date:

Version:

Introduction

This document serves as guide to create the project model through the analysis of the time, resources and relationship of the activities required to complete the project.

Project Schedule model development

The schedule method utilized is the critical path method (CPM). Microsoft project has been the project management tool of choice for the BEL. While rolling wave planning is utilized, the similarities to past distribution power line projects provides iteration that will be helpful. The project information is inputted into the program. The program affords the flexibility to compress the project schedule should the need present itself. Crashing and fast tracking are techniques that can be employed to achieve the compression objective. The project information is derived from the WBS, activity listing, resource assignment, durations, constraints and dependencies.

Level of accuracy

The accuracy of the project estimate is dependent on the method utilized. For distribution line construction there are historical information at BEL's disposal to provide fairly accurate estimates. In addition to the information obtained from past projects and the advice for experienced staff, a three point estimating technique is employed. The most likely duration, the optimistic duration and the pessimistic duration for each activity given resources available and identified external impacting factors is determined. This data

using triangular distribution will provide the estimated duration (Estimated duration = (optimistic duration + most likely duration + pessimistic duration) / 3.

Units of measure

There are several unit of measures used by the project team to properly quantify and estimate activities duration. The list of the units of measurement is provided with their definition.

- Days – The measurement of duration for each activity is in days. Given the length of project, days was considered an accurate and practical unit of measurement. The activities identified to properly execute the project generally are or in excess of a day.
- Each – Itemized activities and materials are measured as each. Countable activities in the project are indicated and measured as each.
- Feet – When measuring the conductors utilized on the project, feet is a standard unit of measurement.
- Miles – The measurement of distance of the power line is quantified in miles. Activities related to the full length of the power line, such as surveying, is measured in miles.
- Acres – The area of right of way required for the distribution power line is measured in acres. Activities related to the area required for clearance beneath the distribution power line, such as vegetation management, is measured in acres.
- Bzd Dollars – The currency used to measure the cost of project activities is Belize dollars. All costing must be maintained in Belize dollars for consistency.
- Pounds – The weight of materials for the distribution power line is measured in pounds. The standard measurement for weight in country is pounds, and this is utilized for consistency.
- Gallons – The unit of measurement for liquids used for the distribution power line is gallons.

- Cubic Yards – The unit of measurement for volume used for the distribution power line is cubic yards. The imported backfill utilized in the construction of the power line is one such item that is measured in cubic yards.

Project schedule model maintenance

Utilizing the guidelines in the schedule management plan, the schedule baseline is prepared and maintained during the life of the project. To ensure the project schedule model is updated and its integrity remains intact, there must be adherence to these process.

- The project schedule model to be used is approved by the Senior Manager.
- The project schedule model is used to create the schedule baseline.
- The Project Manager or his designate is responsible for to amend the project schedule model based on approved project changes.
- The Project Manager or his designate is responsible for the update of project progress and its impact on related activities in the project schedule model.
- The Project Manager or his designate provides updated and current project schedule weekly for project team briefings and monthly project reports.

Control thresholds

As the project schedule is monitored and traced, there is will discrepancies between planned and actual schedule. These variances will cause a rippling effect and require changes to the project schedule. These variances occur frequently and in various magnitude. While major and notable changes require the approval of the Senior Manager, negligible changes can be made at the discretion of the Project Manager. Where variances increase or decrease the project completion date by 3% of the duration, the Senior Manager need only be informed.

Rules of performance measurement

The performance of the project is indicated and highlighted in the monthly project progress report. The key schedule performance indicators in the project report are the percentage of the project completed and the variance in project duration.

The percentage completed is recorded as the cumulative percentage completion of all the project activities. Each project activity is monitored, tacked and the measured in percentage completed. The percentage completed of the activity is recorded in Microsoft project. The total project progress is calculated based on the information inputted and represented as a percentage.

The schedule variance is used to identify where the project is in relation to the schedule baseline. This information will create some insight into the project trajectory. The projected completion date can be determined given the current schedule and the baseline schedule. The activities completed will be recorded indicating the start date and finish date. The comparison will be made with the current baseline. Future activities and their estimated duration will be placed along with the actual completed activities to estimate project completion date.

Reporting formats

Reporting on project schedule will be conducted weekly in the project team meeting and monthly for stakeholder report. The schedule report for the project team weekly meetings will be informal and for the benefit of the team. This aids the project team as they plan weekly activities to maintain the current project baseline. The monthly report is high level and formal. The monthly report provides a snap shot of the project and its progress. The reports includes a Gantt chart and completion table. The Gantt chart will display the baseline schedule and the actual schedule. The completion table will provide information on the activities and the percentage completed.

4.3.3.4 Cost Management Plan.

Project Name:

Project Manager:

Date:

Version:

Introduction

This document serves as guide to determine how the project cost will be planned, monitored and controlled for the life of the project.

Unit of measure

There are several unit of measures used by the project team to properly quantify and estimate activities cost. The list of the units of measurement is provided with their definition.

- Hours – Some members of the project team are paid on hourly bases and the time they work is recorded as such.
- Days – The measurement of duration for each activity is in days. Given the length of project, days was considered an accurate and practical unit of measurement. The activities identified to properly execute the project generally are or in excess of a day.
- Each – Itemized activities and materials are measured as each. Countable activities in the project are indicated and measured as each.
- Feet – When measuring the conductors utilized on the project, feet is a standard unit of measurement.

- Miles – The measurement of distance of the power line is quantified in miles. Activities related to the full length of the power line, such as surveying, is measured in miles.
- Acres – The area of right of way required for the distribution power line is measured in acres. Activities related to the area required for clearance beneath the distribution power line, such as vegetation management, is measured in acres.
- Bzd Dollars – The currency used to measure the cost of project activities is Belize dollars. All costing must be maintained in Belize dollars for consistency.
- Pounds – The weight of materials for the distribution power line is measured in pounds. The standard measurement for weight in country is pounds, and this is utilized for consistency.
- Gallons – The unit of measurement for liquids used for the distribution power line is gallons.
- Cubic Yards – The unit of measurement for volume used for the distribution power line is cubic yards. The imported backfill utilized in the construction of the power line is one such item that is measured in cubic yards.

Level of Precision

The cost of each activity is determined by the value of resources required. All activity cost estimate will be rounded to the nearest Belize dollar cent. The activity cost estimate in the thousands would be written for example as $ 4,550.39.

Level of accuracy

The estimated cost is obtained by the utilization of parametric estimating. Given the frequency and historical data on such projects, this estimating method has proven effective. As the project progresses there will be approved changes and external environmental changes that will impact the cost of the project. There is an acceptable

level of tolerance of -10% < +10% for each estimated activity cost. This tolerance allows the Project Manager to operate within his authority. Any deviation outside the parameters of the expressed tolerance must be approved by the Senior Manager. In instances of excess, a 10% project contingency reserve is consulted for available funds.

Organizational procedures links

Each activity is cost based on the duration and the resources required. The activity cost and schedule provides the information needed to budget and control cost. The accounting software being utilized at BEL is Microsoft Dynamic GP. Each distribution power line project is assigned a project number. The project number will be allocated with the project budget approved by the Senior Manager. All accounting transactions are recorded within this project number. Transactions are entered in standard BEL established cost categories which carry budgetary allocation as well. Cost categories utilized by the distribution power line projects are listed.

Table 34

BEL Project cost category

Cost Category Number	Cost Category Type	Cost Category Description
111	Contact / Payables	All contract payments and invoice payments made related to the project.
310	Inventory budget	All materials required for the project are purchased, stored in inventory, released upon request and post upon receipt.
500	Regular time salaries	Salaries paid to project team members and other employees for normal working hours.
501	Overtime salaries	Salaries paid to project team members and other employees for overtime at time and half.
502	Double time salaries	Salaries paid to project team members and other employees for overtime at double time.
524	Morning/midday meal subsistence	$14.00 subsistence is granted to project team members and employees, working away from their assign post, for morning and midday meals.
539	Evening meal subsistence	$15.00 subsistence is granted to project team members and employees, working away from their assign post, for evening meals.
533	Mileage	Project team members and employees are compensated for the use of their personal vehicle executing project matter at $1.10 per mile.
551	Hotel accommodation	Where project are remote for the main office the need for overnight stays are unavoidable. In such instances hotel accommodation is required.
736	Vehicle usage	BEL vehicles are utilized to advance the project, and when this occurs a nominal fee of $80.00 per day for pick-up trucks and $160.00 per day for aerial device bucket truck.

The expenditures of the project is report under one of the cost category indicated. To properly control cost each expenditure will have to be linked to the activity that it impacts. A reconciliation must be carried out to ensure that all expenditures are accounted for and are properly allocated.

Control thresholds

As the project cost is monitored and traced, there is will discrepancies between planned and actual cost. These variances will cause a rippling effect and require changes to the project cost. These variances occur frequently and in various magnitude. While major and notable changes require the approval of the Senior Manager, negligible changes can be made at the discretion of the Project Manager. Where variances increase or decrease the cost of any activity by 10% of the activity cost estimate, the Senior Manager need only be informed.

Rules of performance

The performance of the project is indicated and highlighted in the monthly project progress report. The key cost performance indicators in the project report are budget report and expenditure verification. The budget report will display the current project budget and matching actual cost. The variances that will be displayed for internal purposes via the weekly briefing are those with the BEL cost categories and actual cost. The variances displayed on the budget report for the monthly project progress report are with the activities and actual cost. Expenditure verification will ensure that all recorded cost are related and eligible. All related project cost transaction must be reported. Each cost transaction must be assigned to the respective activity and cost category.

Reporting formats

Reporting on project cost will be conducted weekly in the project team meeting and monthly for stakeholder report. The cost report for the project team weekly meetings will be informal and for the benefit of the team. This aids the project team as they plan weekly activities to maintain the current cost baseline and operate within the budget constraints. The monthly report is high level and formal. The monthly report provides a snap shot of the budget, expenditures and commitments. The reports includes budget variances and expenditure verification. The budget variances will display the fiscal management of the project at the time of the report. The expenditure verification is to ensure that all allocated cost are project related and eligible.

4.3.3.5 Quality Management Plan.

Project Name:

Project Manager:

Date:

Version:

Introduction

This document serves as guide to determine how the project will maintain the quality required by the project sponsors.

Tools

Check sheets – BEL has a standard work procedures for the work required for power line construction. In addition, there are check list for the contracted work. The areas that checked and measured are identified and listed. Acceptable tolerance level for activities under the contact is rated. When inspections are conducted the defects are identified and documented.

Flowchart – Given the frequency of distribution power line construction project, and the manner in which BEL has established processes, the formulation of a flow chart easily prepared. The work required to complete the project requires the assistance of the several department within BEL. Each department is guided in its operation by their policies and procedures. The policies and procedures of each interactive department aids in preparing the flowchart for the processes involved.

Inspection – The inspection of contracted work are scheduled on a timely based on the progress on contracted work. The inspection will be conducted by the responsible project team member, and in presence of the contractor. With the assistance of the check sheet, specific areas of quality is inspected for defects. The contractor is rated on the completed

inspection, and where major defects are identified they are instructed to conduct rework. Following any rework another inspection is required until the work is considered satisfactory.

Table 35

Quality Assurance Plan

WBS	Requirements	Specification	Assurance Activity	Schedule	Owners
1.4 2.1.1 2.1.2	Review the project proposal presented and provide the guaranteed funding in a timely manner.	The project charter will be presented to sponsors.	Ensure requested information is provided and response date set.	Prior to the start of the project	Senior Manager
1.5 1.6 1.7	Ensure that project is executed in line with established or agreed guidelines.	Formal audit report from the internal auditing department or external auditing firm at least once.	Auditing of the project and adherence to policies.	Established audit report period at end of the project	Senior Manager
2.2.1	Receive monthly project updates.	Provide monthly report displaying cost and schedule variances.	Ensure delivery and receipt of the monthly report by stakeholders.	End of each month in the life of project	Project Manager
1.4 10.3	Liaise with funding and implementing partners.	Provide information within 3 days	Provide timely response to project related in enquiry.	Upon request	Senior Manager
1.3 4.1 4.6 4.7 4.8 4.9 5.5 10.3	Impact the lives of as many community residences as the project permits.	Reach the most possible customers with least investment.	Assess the numbers of customers impacted by the project.	Before and after project	Project Manager
1.4	Represent the company's interest in all power line extensions.	BEL will be obligated to fulfil certain responsibilities as it relates to other stakeholders.	The review and signing contracts, and ensuring the terms and conditions are upheld.	When required	Senior Manager

WBS	Requirements	Specification	Assurance Activity	Schedule	Owners
1.1 1.2 1.3 4.1 4.2 4.3 4.4 4.5 5.1 11.2	Support the project manager to execute the project efficiently and effectively.	In addition to the responsibility assign, seek opportunities to expedite to project.	Execute the request of the Project Manager timely.	Daily	Project Manager
2.2.2 4.11	Weekly briefing on project progress.	Meet with project team once a week to project progress, any changes, plans and upcoming activities.	Invite project team, schedule and minute meetings.	Every Monday morning	Project Manager
1.8 2.1.3 2.1.5 2.1.6 2.1.7 2.1.8 10.2 11.1	Coordinate, manage and control project activities and resources.	All activities should be completed on schedule or within acceptable tolerance.	Ensure resources are in place and constantly monitor deliverables.	Daily	Project Manager
3.2 4.1 4.6 4.7 4.8 4.9 5.5	Disseminate information to the wider company and other stakeholders when called upon.	Prepare publications and press releases.	Dissemination of information communication medium.	At established milestones in the project	Project Manager

WBS	Requirements	Specification	Assurance Activity	Schedule	Owners
4.11	Grant access to the community and support the project.	To proceed with the project the support of the community is required.	Seek support and approval from the local authority.	Prior to commencing execution	Project Engineer
5.2 6.1 7.2 8.1 9.1 10.3	Share with community members what is expected for the duration of the project.	A clear understanding of the project complete with full scope and possible impact during construction.	Meet with local authority, and disclose the extent.	Prior to commencing execution	Project Engineer
1.4 1.8 2.2.3 11.3 11.4	Provide leadership and direction for the project.	The project must be steered and lead in the direction that was proposed and agreed upon.	Provide advice and direction to the project manager and team.	Daily	Senior Manager
2.2.2	Review and manage changes as they occur.	The perceived need for change may occur, and request submitted. Response should follow within 4 working days.	After reviewing change request, grant or deny approval on its merit.	When change request are presented.	Senior Manager
4.12 5.2 5.3 5.4 5.5	To successfully and satisfactorily complete the surveying of the power line route.	Identify and stake location of poles and anchors. Produce plans of power line location. The work should be completed within the agreed period.	Inspect, verify and certify the work was successfully completed to an acceptable quality.	Upon completion of contracted work	Senior Technician
4.17 4.18 4.19 4.20 4.21	Be informed of commencement, inspections and project completion meetings.	The selected contractor will need to be apprised of the scheduled activity within his responsibility.	Brief the successful bidder and award contract.	After the selection of the contractor	Accounting Clerk-Procurement Service

WBS	Requirements	Specification	Assurance Activity	Schedule	Owners
4.13 6.1 6.2 6.3 6.4	To successfully and satisfactorily complete the clearing and removal of vegetation from the power line route.	Clear vegetation and remove debris from power line route for ease of access to the work location. The work should be completed within the agreed time frame.	Inspect, verify and certify the work was successfully completed to an acceptable quality.	Upon completion of contracted work	Senior Technician
4.14 4.16 7.1 7.2 9.1 9.2 9.3 9.4 9.5 9.6 9.7 9.8 9.9 9.10	To successfully and satisfactorily complete the framing of structures, stringing of conductors and installation of hardware.	The installation of all hardware needed to complete power line and commission. The work should be completed within the agreed time frame.	Inspect, verify and certify the work was successfully completed to an acceptable quality.	Upon completion of contracted work	Senior Technician
3.6	To successfully and satisfactorily complete the provision of project materials.	The materials order for the project should be delivered within the agreed upon lead-time.	Receive and verify that materials are as specified, of requested quantity and free of damage.	Upon receipt of materials	Finance Clerk – Finance Service
3.3 3.4 3.5 3.7	Be informed of order placement, shipping and receipt of materials.	The selected supplier will need to be apprised of the schedule for material delivery.	Brief the successful bidder and award contract.	After the selection of the supplier	Accounting Clerk-Procurement Service

WBS	Requirements	Specification	Assurance Activity	Schedule	Owners
4.14 4.15 7.1 7.2 8.1 8.2 8.3 8.4	To successfully and satisfactorily complete the planting of poles and anchors.	Plant poles and anchors in the location indicated by the surveyor. The work should be completed within the agreed time frame.	Inspect, verify and certify the work was successfully completed to an acceptable quality.	Upon completion of contracted work	Senior Technician
2.1.1	A favourable review of expansion projects.	Information on the size and cost of the project must be provided along with the number of potential customers.	Present project proposal	Prior to proposal request	Senior Manager
1.4 10.3	Be informed of project commencement and completion meetings.	Schedule activities based on resources available, and provide realist timeframes.	Provides dates as indicated in the schedule where dates change inform stakeholders.	After project has been approved	Administrator Technical Service
5.1 5.2	Grant approval to utilize the utility corridor along the road.	A copy of infrastructure plan and location on the roads are kept so as not impede future development.	Provide maps and plans along with formal request.	After project has been approved	Project Engineer
5.1 6.1 6.2	Grant approval to construct power lines, and provide mitigation measures where the impact to the environment is great and can be avoided.	An environmental assessment of the project is conducted to determine feasibility.	Ensure and monitor the execution of mitigation measures.	After project has been approved	Project Engineer
5.2	Provide assistance in facilitating access to	The use of national land and private land is	Ensure the resolution of all land issues.	During surveying	Project Engineer

WBS	Requirements	Specification	Assurance Activity	Schedule	Owners
	national lands, and granting easement where necessary.	unavoidable in power line construction.			

Monitoring quality assurance

Meeting the requirements of the stakeholders is a measure of project success. The progress of activities must be monitored, recorded and tracked. The objective of monitoring is to display conformance to the quality assurance plan. Frequent monitoring, as recurring item in weekly project meetings, will highlight areas for improvement, implementation of preventative measures, and enhance inspection. Given the historical information on distribution power line projects, some deliverables have been identified for improvement and outlined in the improvement plan. Constant supervision of the project will allow for instituting of preventative action in various processes. The inspection of the processes will be determine if the guidelines in place were adhered to, and if deliverables are within the prescribed tolerance.

4.3.3.6 Process Improvement Plan.

Project Name:

Project Manager:

Date:

Version:

Introduction

This document serves as guide to determine how the project cost will be planned, monitored and controlled for the life of the project.

Process boundaries

Procure materials:

Start – The procurement of materials starts when the bill of materials have been sent to tender, and successful supplier is selected. Terms of material delivery made, and the purchase order submitted.

End – The procurement of materials end when all materials have been received, and payment to the supplier and subsidiary charges made.

Input – Bill of materials for the project is an input to the process.

Output – All materials required to execute the project is a process output.

Process owner – The process owner is the Project Manager.

Stakeholders – Stakeholder involved in the process are Material Suppliers, Senior Manager, Belize Electricity Limited, The Government of Belize and Project Team.

Procure contractors:

Start – The procurement of services required to execute construction of the project starts when designs are finalized, and material delivery dates established.

End – The procurement of services end when all services contracted have been paid and the contract closed.

Input – Project designs and materials for construction are inputs to the process.

Output – Successful completion of contracted services are process outputs.

Process owner – The process owner is the Project Manager.

Stakeholders - Stakeholder involved in the process are Benefiting community, Surveying contractor, Line clearing contractor, Pole planting contractor, Framing & stringing contractor, Senior Manager, Belize Electricity Limited and Project Team.

Plant poles and anchors:

Start – The plant poles and anchors process starts when the pole planting contractor is selected and contract awarded. The surveying and line clearing would have to be completed. The location of the poles identified and poles at a location accessible to the contractor.

End – The plant poles and anchors process ends when all the poles required are planted in the indicated position to specification and numbered.

Input – Poles and anchors, clearance to plant and equipment required are inputs for the plant poles and anchor process.

Output – Planted poles and anchors, and identifying numbers of poles are output of the plant poles and anchors process.

Process owner – Senior Technician

Stakeholders – Pole planting contractor, Project Manager, Ministry of work, Benefitting community and Belize Electricity Limited.

Frame structure and install hardware:

Start – The frame & string conductor process starts when the framing & stringing contractor is selected and contract awarded. The poles should be planted and a plan of the power line issued.

End – The frame & string conductor process ends when the power line has been strung and tension. All hardware installed and power line is ready for commissioning.

Input – Designs, and erected poles are inputs of the frame & string conductor process.

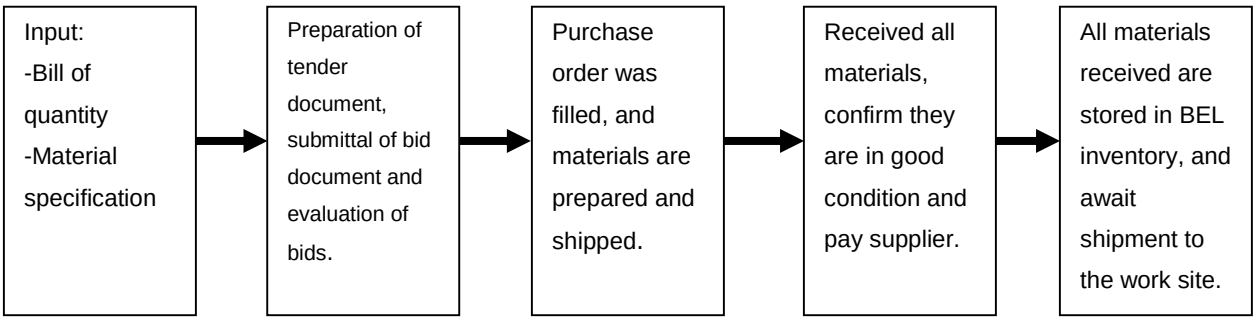
Output – Completed distribution power line is an output of the framing & stringing conductor process.

Process owner – The process owner is the Senior Technician.

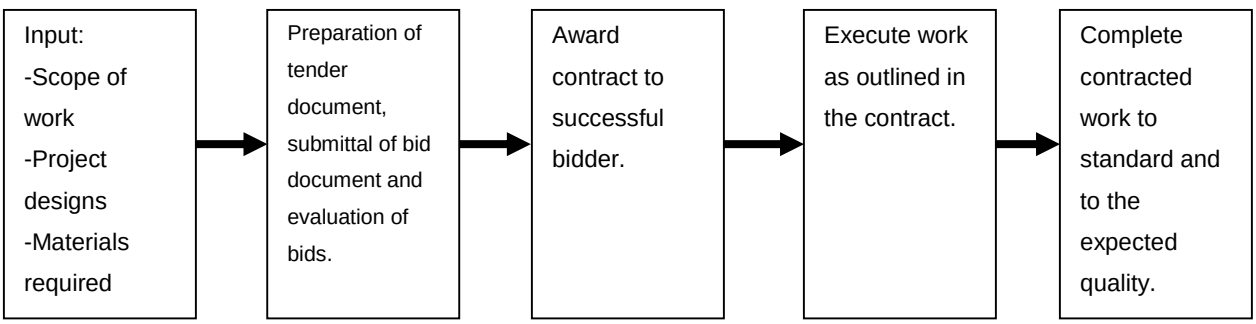
Stakeholder - Pole planting contractor, Project Manager, Benefitting community and Belize Electricity Limited.

Process configuration

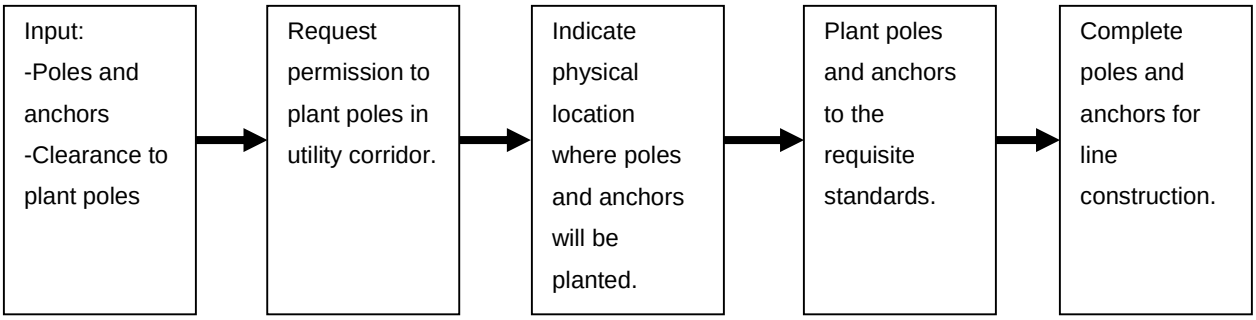
Procure materials



Procure Contracts



Plan poles and anchors



Frame structure and install hardware

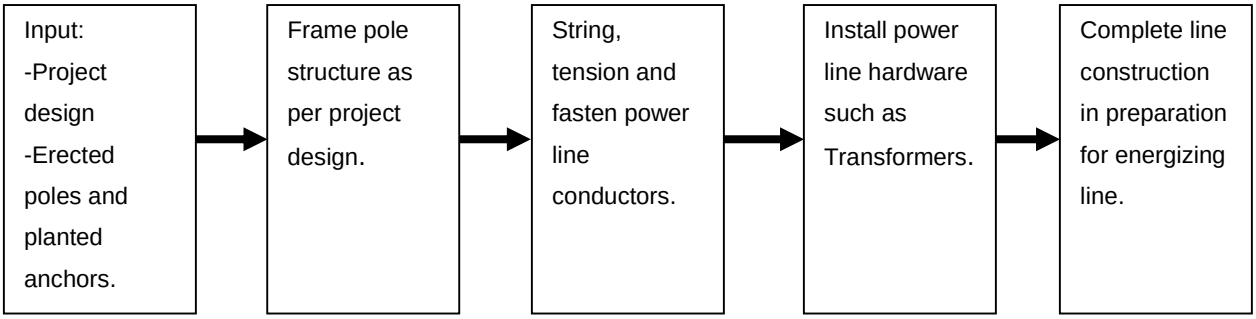


Figure 12 Process Configuration

Table 36

Process metrics

Procure materials

Process Metrics	Control Limit
Material delivery lead time	Plus/minus 21 days of delivery date
Shipping and handling damage	Plus/minus 5% of material value

Procure Contracts

Process Metrics	Control Limit
Bidder's response	3 or more response
Scope variance	Plus/minus 10% of impact on material value
Cost variance	Plus/minus 5% of material value

Plan poles and anchors

Process Metrics	Control Limit
Process delivery lead time	Plus/minus 14 days of delivery date
Material waste	Plus/minus 5% of material value
Acceptable quality tolerance	No less than 60% on evaluation

Frame structure and install hardware

Process Metrics	Control Limit
Process delivery lead time	Plus/minus 14 days of delivery date
Material waste	Plus/minus 10% of material value
Acceptable quality tolerance	No less than 60% on evaluation

Table 37

Target for Improved performance

Procure materials

Process Metrics	Current Control Limit	Target Control Limit
Material delivery lead time	Plus/minus 30 days of delivery date	Plus/minus 21 days of delivery date
Shipping and handling damage	Plus/minus 5% of material value	Plus/minus 3% of material value

Procure Contracts

Process Metrics	Current Control Limit	Target Control Limit
Bidder's response	3 or more response	5 or more response
Scope variance	Plus/minus 10% of impact on material value	Plus/minus 6% of impact on material value
Cost variance	Plus/minus 5% of material value	Plus/minus 3% of material value

Plan poles and anchors

Process Metrics	Current Control Limit	Target Control Limit
Process delivery lead time	Plus/minus 14 days of delivery date	Plus/minus 7 days of delivery date
Material waste	Plus/minus 5% of material value	Plus/minus 3% of material value

Acceptable quality tolerance	No less than 60% on evaluation	No less than 75% on evaluation

Frame structure and install hardware

Process Metrics	**Current Control Limit**	**Target Control Limit**
Process delivery lead time	Plus/minus 14 days of delivery date	Plus/minus 7 days of delivery date
Material waste	Plus/minus 10% of material value	Plus/minus 7% of material value
Acceptable quality tolerance	No less than 60% on evaluation	No less than 75% on evaluation

4.3.3.7 Human Resource Management Plan.

Project Name:

Project Manager:

Date:

Version:

Introduction

Roles and responsibility

Role: **SENIOR MANAGER**

Authority:

- Final approval on selected project team.
- Award contracts less than $1,000,000.00.
- Approve contract payment less than $1,000,000.00.
- Termination of employment and contracts.
- Grant team members leave of absence.
- Approve team member salaries and contract payments.
- Commission newly constructed power line.
- Approve request change request within 10% of budget.
- Request approval for change exceeding 10% of budget.

Responsibility:

- The overall management of the project.
- Ensure the project is delivered on time and within budget

Competency:

- Excellent problem solving skills
- The ability to communicate effectively
- The ability to manage conflicts
- The ability to inspire and motivate the team

Roles: **ADMINSTRATOR TECHNICAL SERVICE**

Authority:

- Make purchase for office supplies.

Responsibility:

- Disseminate information coming from the desk of the Senior Manager to relevant stakeholders.
- Ensure the administrative need of the project team, as instructed by the Senior Manager, is met.

Competency:

- Excellent practical knowledge of Microsoft Office Suite
- Proficient in written and spoken English
- Possess time management skills
- Excellent customer service skills, and interacts professionally with clients and associates at all times.

Role: **PROJECT MANAGER**

Authority:

- Assemble project team.
- Award contracts less than $250,000.00.
- Approve payment less than $250,000.00
- Request approval for payment greater than $250,000.00.
- Request termination of employment and contracts.
- Request team member salaries and contract payments.
- Approve design and estimates.

Responsibility:

- Prepare monthly report to stakeholders of the project.
- Provide assistance with the evaluation of bids.
- Award all successful bidders for the material and labour contracts.
- Approve bill of material and order materials.
- Coordinate and manage project team efforts.
- Assign work packages to project team members.
- Manage the commissioning of the completed power line.

Competency:

- Possess effective communication skills.
- Possess leadership and interpersonal skills.
- Possess organization skills.

- Ability to negotiate and mange conflicts.
- Proficient in Microsoft office suite.

Role: **PROJECT COORDINATOR**

Authority:

- Assemble project team.
- Award contracts less than $250,000.00.
- Approve payment less than $250,000.00
- Request approval for payment greater than $250,000.00.
- Request termination of employment and contracts.
- Request team member salaries and contract payments.
- Approve design and estimates.

Responsibility:

- Prepare monthly report to stakeholders of the project.
- Provide assistance with the evaluation of bids.
- Award all successful bidders for the material and labour contracts.
- Approve bill of material and order materials.
- Coordinate and manage project team efforts.
- Assign work packages to project team members.
- Manage the commissioning of the completed power line.

Competency:

- Must possess effective communication skills.
- Possess leadership and interpersonal skills.
- Possess organization skills.
- Ability to negotiate and mange conflicts.
- Proficient in Microsoft office suite.

Role: **ACCOUNTING CLERK – PROUCREMENT SERVICE**

Authority:

- Establish an approved contractor listing.
- Conduct evaluation proceedings.
- Select successful bidder based on established criteria.

Responsibility:

- Ensure the adherence of the established method of procurement.
- Prepare the tender document of material for international bidding.
- Evaluate the tender bids received for labour of the surveying and line construction.

Competency:

- Must be proficient in written and spoken English.
- Should possess experience in Chain Management
- Must be proficient in Microsoft office suite.
- Must be skillful in the art of negotiation.

- Must possess analytical Skills

Role: **FINANCE CLERK – FINANCE SERVICE**

Authority:

- Facilitate the processing of approved payments.

Responsibility:

- Prepare the budget forecast for the project.
- Manage the project expenditure and budget.

Competency:

- Knowledge and experience in Financial Management and auditing
- Experience using an accounting software (Microsoft Dynamic GP)
- Must be proficient in Microsoft office suite.
- Proficient in written and spoken English.

Roles: **PROJECT ENGINEER**

Authority:

- Request approval for design and estimate of power line.
- Request approval to commission completed power line.
- Verify the work being carried out by line clearing, surveying, pole planting and framing & stringing contractors.

Responsibility:

- Establish the best possible power line route.
- Prepare the preliminary design and estimate for the project.
- Prepare the tender document for the surveying and line construction.
- Produce final drawing of the as built power line.
- Prepare work request and work plan in preparation for commissioning of the power line.

Competency:

- Effective Communication Skills
- Trained in Installation of Power Plants
- Possess background in Land Survey
- Knowledge of relevant safety practices to prevent injuries and damage to property.
- Knowledge of engineering application and technology required for line construction.

Roles: **PROJECT SUPERVISOR**

Authority:

- Request approval for design and estimate of power line.
- Request approval to commission completed power line.
- Verify the work being carried out by line clearing, surveying, pole planting and framing & stringing contractors.

Responsibility:

- Establish the best possible power line route.
- Prepare the preliminary design and estimate for the project.
- Prepare the tender document for the surveying and line construction.
- Produce final drawing of the as built power line.
- Prepare work request and work plan in preparation for commissioning of the power line.

Competency:

- Effective Communication Skills
- Trained in Installation of Power Plants
- Possess background in Land Survey
- Knowledge of relevant safety practices to prevent injuries and damage to property.
- Knowledge of work methods associated with construction of the power line.

Role: **TRAINEE ENGINEER**

Authority:

- Request materials from inventory.
- Certify work being carried out for surveying, line clearing and line construction

Responsibility:

- Prepare the bill of materials for the project.

- Ensure all arrangements are made to conduct visits to the work site.
- Issue materials to the contractors.
- Manage and supervise the surveying and clearing of the power line route.
- Manage and supervise the pole and anchor planting.
- Manage and supervise the line construction and ensure work is satisfactorily completed.

Competency:

- Trained in Installation of Power Plants
- Possess background in Land Survey
- Knowledge of relevant safety practices to prevent injuries and damage to property.
- Knowledge of work methods associated with construction of the power line.
- Knowledge of engineering application and technology required for line construction.

Role: **SENIOR TECHNICIAN**

Authority:

- Request materials from inventory.
- Certify work being carried out for surveying, line clearing and line construction

Responsibility:

- Prepare the bill of materials for the project.

- Ensure all arrangements are made to conduct visits to the work site.
- Issue materials to the contractors.
- Manage and supervise the surveying and clearing of the power line route.
- Manage and supervise the pole and anchor planting.
- Manage and supervise the line construction and ensure work is satisfactorily completed.

Competency:

- Trained in Installation of Power Plants
- Possess background in Land Survey
- Knowledge of relevant safety practices to prevent injuries and damage to property.
- Knowledge of work methods associated with construction of the power line.
- teams

Department Organization chart

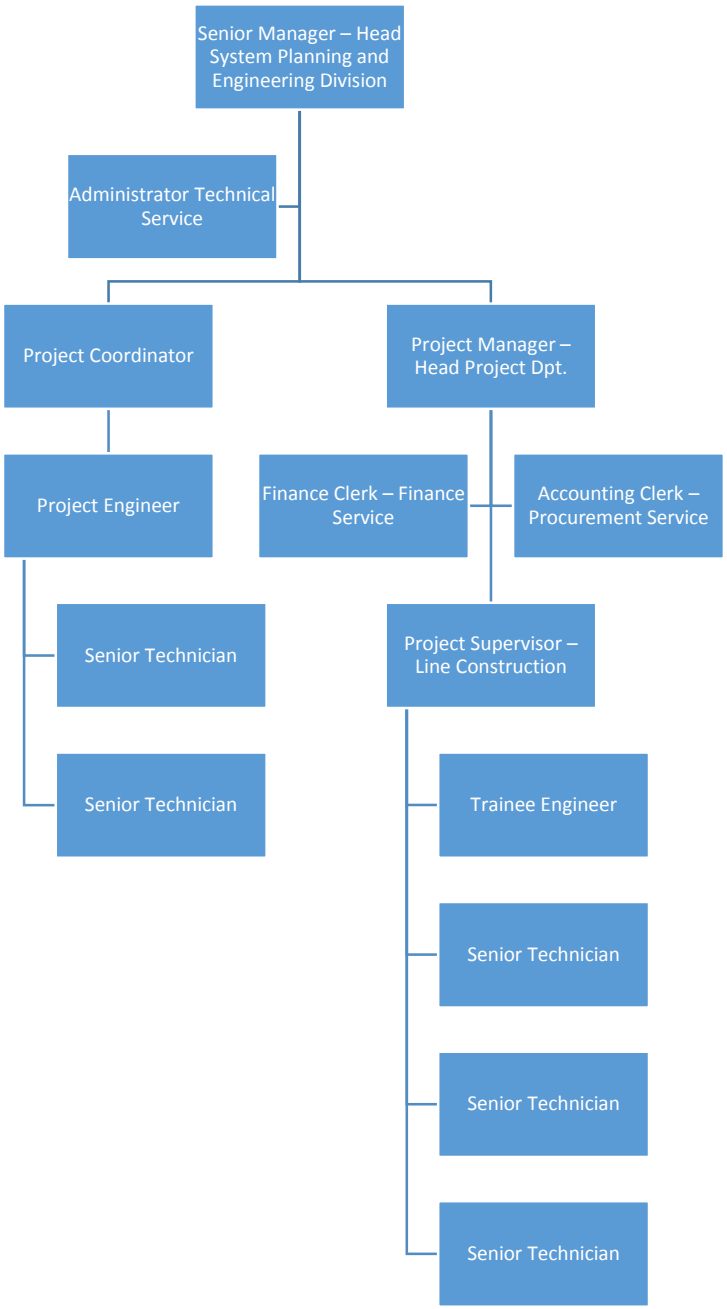


Figure 13: Project Department Organizational Chart

Staff management plan

Staff Acquisition

All major distribution power line extension conducted by BEL is spearheaded by the engineering department. The project team assembled is generally comprised of individuals within the department. The Senior Manager is ultimately responsible for all project undertaken within the department. The Administrator Technical Service provides assistance to Senior Manager on all departmental matters. Similarly assistance will be provided on distribution power line project. Projects are managed by the Project Coordinator and Project Manager, and sub-projects are managed by the Project Engineer and Project Supervisor. Project Manager is permanent position, but the Project Coordinator position is a contracted position. The Project Coordinator position is filled by the HR Department to provide assistance on IFI projects. The candidate is sought externally with the required criteria for the post. The Financial Clerk – Financial Service is stationed within the department, but reports to and is a conduit to the Finance Department. The Accounting Clerk – Procurement Service is stationed within the department, but reports to and is a conduit to the Purchasing & Stores Department. The Project Engineer, Project Supervisor, Trainee Engineer and Senior Technicians are all members of the Project Department and are selected to work on projects.

Resource Calendars

The staff members that have been assigned to the project will be responsible for the certain activities within project. The time and date the project team members are expected to engage in project activities are recorded. This information is represented graphically in a histogram. The resources calendar will display the when project team members will be needed and the duration. This information will allow for temporary secondment to the other projects during off period.

Table 38

Resource calendar

	08/10/2017	15/10/2017	22/10/2017	29/10/2017	05/11/2017	12/11/2017	19/11/2017	26/11/2017	03/12/2017	10/12/2017	17/12/2017	24/12/2017	31/12/2017	07/01/2018	14/01/2018	21/01/2018	28/01/2018	04/02/2018	11/02/2018	18/02/2018	25/02/2018	04/03/2018	11/03/2018	18/03/2018	25/03/2018	01/04/2018	08/04/2018	15/04/2018	22/04/2018	29/04/2018	06/05/2018	13/05/2018	20/05/2018	27/05/2018	03/06/2018	10/06/2018	17/06/2018	24/06/2018	01/07/2018	08/07/2018	15/07/2018	22/07/2018	29/07/2018	05/08/2018	Total Hours
Project Manager		24		32	32	32	40	16		24	4	16	16	8	24				16	8			16	8				24				24		8	8	8	16				24			19.2	**447.2**
Senior Manager					16		16																																					**32**
Office Administrator					16		16																																					**32**
Accounting Clerk - Procurement Service						4.8	8	8	24	27.2	24	24	12	4							0																							**136**
Finance Clerk - Finance Service																	24			8	40	8	24					8	16				24					32	40	8			**232**
Project Engineer					8	32		24	40	40	16					0												16						0				32	40	40	40	32	8	**368**
Senior Technician 1	16	40	40	8	16	16					40					16			8	40	16	16	16						16					8	40	40	40	8				32	40	8	**520**
Senior Technician 2	24											16	8							24			24	16			32	8																	**152**
Grand Total	**40**	**64**	**40**	**40**	**88**	**84.8**	**80**	**48**	**64**	**91.2**	**84**	**56**	**36**	**12**	**24**	**16**	**24**	**0**	**24**	**80**	**56**	**24**	**80**	**24**	**0**	**0**	**32**	**32**	**40**	**16**	**0**	**24**	**0**	**16**	**72**	**48**	**56**	**8**	**32**	**72**	**104**	**80**	**72**	**35.2**	**1,919.2**

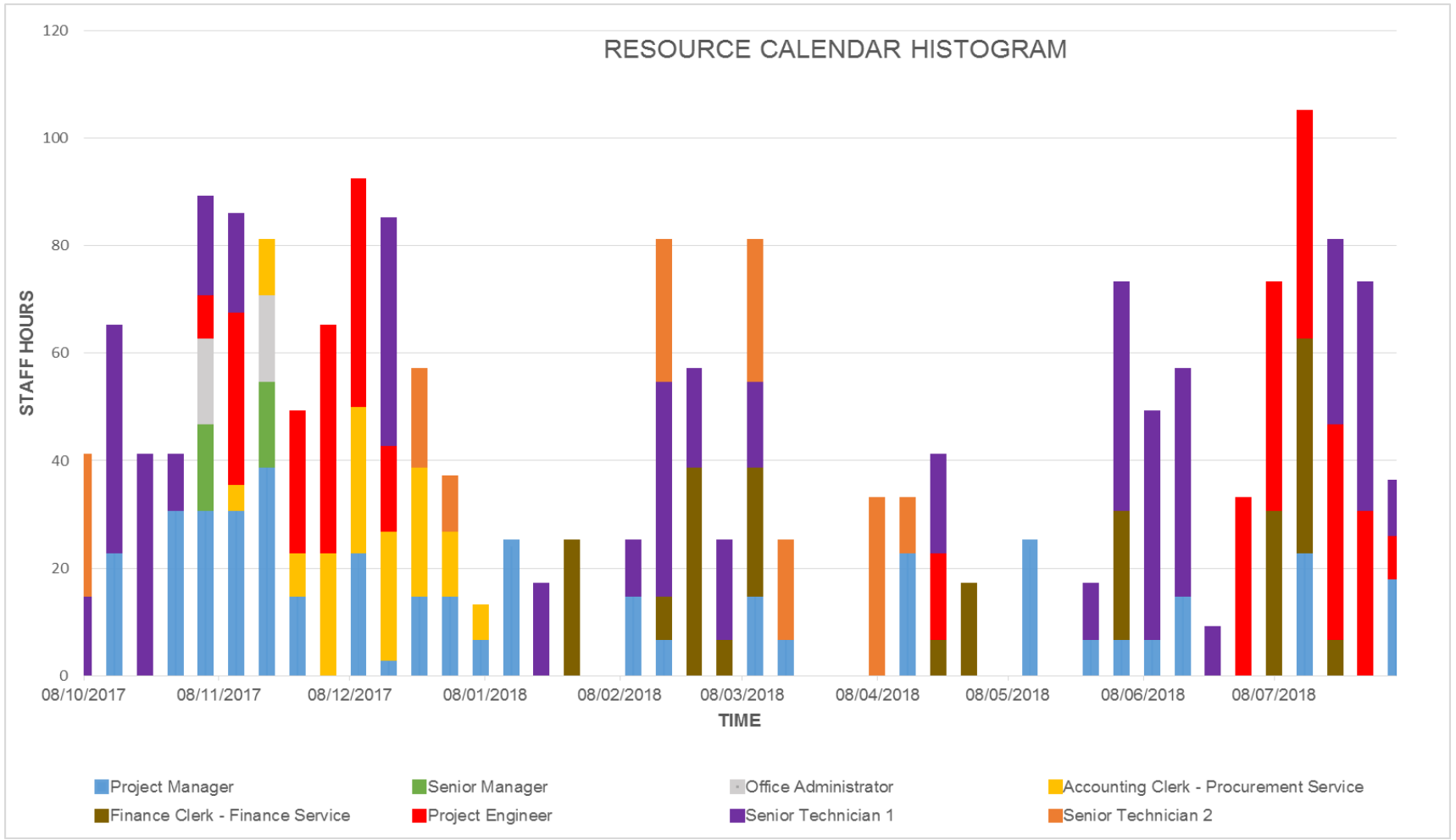


Figure 14: Resource Histogram

Staff Release Plan

Once the distribution power line is commissioned and the project is closed, the power line becomes the responsibility of the Transmission and Distribution Department. The Transmission and Distribution Department is responsible for the operating and maintaining of the power line. The project team members in the employ of BEL be assigned to other projects. In the case of contracted employees, where their assistance is not required on future project, the contract will run its course or be terminated.

Training Needs

Existing and long standing staff would have a received training via the HR Department and possess institutional knowledge from past experiences. New staff and contracted employees will require orientation to BEL and requisite training deemed critical to the project success. The HR Department is responsible for the employee development and training required to achieve such. The training needs of the project team is sited by the Senior Manager who informs the HR Department for action.

Recognition and Rewards

To keep the team motivated and energized the Project Manager has to take the time to understand the organization's culture and get to know each member of the team on a personal level. This will ensure the method of rewarding them is impactful. As most of the project team are employees, the HR Department can be consulted on recognition and rewards program for staff. Other creative methods can also be employed. Single out specific task that were exceptionally done, and publicly praise responsible team members in department meetings. Provide team-building activities for project team.

Compliance

Labour Law of the Land: The project must operate in compliance with the labour law of the land. The HR Department must carry out a comprehensive review and understanding

of the said law. The Project Department must make all efforts to ensure there are no infractions. Where unresolved labour issues appear the labour office must be consulted to provide guidance or mediation as the case may be.

HR Policy: The Company's Human Resource Department guidelines and policies will be utilized and enforced. The policies will speak directly to acquisition and retention of staff, these policies cannot be in conflict with the labour law of the land. Where such conflict occurs the law of the land supersedes. The project team will be expected to adhere to these guidelines and policies. The Senior Manager or his delegate will maintain an open line of communication with the Human Resource Department to ensure compliance.

Collective Bargaining Agreement: The most current Collective Bargaining Agreement made between the Union and the organization will be a guiding document. The staff employees will benefit from the terms and conditions agreed to in the Collective Bargaining Agreement. The Senior Manager or his delegate will maintain an open line of communication with the Human Resource Department to ensure compliance.

Safety

The health and safety of project team members is essential, and through the efforts of the Health and Safety Department remains paramount. The project team develops a safety Plan that specifically addresses the risks associated with site preparation, line construction, commissioning of power lines and its potential hazards to workers and the community. This project's safety plan goal is to eradicate or at the very least significantly reduce the number of incidents. BEL insist on a culture of safety, and maintains a high standard through continued education.

4.3.3.8 Communication Management Plan.

Project Name:

Project Manager:

Date:

Version:

Introduction

This document serves as a guide to determine the manner and method to be utilized to properly communicate with stakeholders.

Communication Management Approach

The project manager with the assistance and guide of the Public Relations (PR) Department will establish the approach consisting of a communication model that will be most efficient and effective given the constraints. The communication type, medium, frequency, audience and owners of the communication is outlined in the communication matrix. The communication management approach is hinged on the highly technical nature of the project and the stakeholders involved. The communication will be tailored to the stakeholder's requirements.

Communication Management Constraints

The communication management plan is subject to constraints. The communication constraints should be identified during the project's planning phase. Every effort must be taken to ensure all constraints are managed effectively to achieve project success. The constraints identified for Distribution Power Line project are:

Financial - Project's budget allocated for communication. The cost of hardware, software, equipment and marketing related to the project must remain within the allocated budget.

Time – To be effective communication must be timely and coincide with project activities.

Types of technology – The communication tools used must be effective and efficient. The tools used will be based on compatibility with the telecommunication provider.

Compliance – Being complicit with internal policies, regulations and legislations that pertains to communications.

Type of Communication

The types of communication utilized in distribution power line project are formal written, informal written, formal verbal and informal verbal. The communication formats for the respective types are listed below.

Formal Written: Correspondence letters, Emails, Press releases, Registered mails and Documents (proposal, Guidelines, Change request, management plans, reports, etc.)

Informal Written: Social media postings, Emails, Short message service (SMS), Internet relay chat

Formal Verbal: Meetings, Speech and Presentation

Informal Verbal: Meetings, Telephone conversation and Voice messages

Channel of Communication

The channel of communication utilized in Distribution Power Line project are formal communication channel, informal communication channel and unofficial communication channel. The communication formats for the respective channels are listed below.

Formal communication channel: Email, Telephone, Teleconference, CB radio, Video conference, Radio, Television, Face to face

Informal communication channel: Email, Telephone, CB radio, Face to face

Unofficial communication channel: Social media, Email, Telephone, CB radio, Face to face

Communication Methods

The communication methods identified were derived from consultation with the stakeholders.

Interactive communication will be conducted in accordance with BEL's communication guidelines. Meeting and video conferencing will adhere to prescribed meeting guidelines.

Push communication will be conducted in accordance with the company's communication guidelines. The PR Department will be responsible for all press releases, radio and television ads. The Senior Manager will be responsible for all correspondence letters, and the Project Manager will be responsible for all meetings, status report and financial report.

Pull communication will be conducted in accordance with the company's communication guidelines. The PR Department will be responsible for social media postings and updating BEL's web page and BEL's intranet site.

Communication Technologies

In order to ensure that information is transmitted both externally and internally seamless, the requisite communication tools are necessary. BEL will utilize traditional and new technologies to execute the BEL's communication plan; asynchronous and synchronous communication techniques will be used via the Internet. Devices used will be the like of mobile phones, computer, laptops, two way radios and projectors.

Communication Escalation Process

Communication matters that may arise such as issues, conflict, misunderstandings or disputes must be addressed systematically. The nature of the communication matters determines the manner in which they are handled. Communication matters arising that

will have a low impact on the project should be resolved among project team in accordance with the communication matrix and company's communication guidelines. Where no resolution can be made the matter will then go to the Project Manager and if needs be to the Senior Manager. The project manager in accordance with the communication matrix and company's communication guidelines should resolve communication matters arising that would have a medium impact on the project. Where no resolution can be made the matter will be then go to the Senior Manager. The Senior Manager in accordance with the communication matrix and company's communication guidelines should resolve communication matters arising that would have a high impact on the project.

Table 39

Communication Budget

WHAT TO COMMUNICATE	COST
Conceptualizing the project	$ 800.00
Project proposal	$ 800.00
Acceptance of proposal	$ 400.00
Terms and condition of funding	$ 400.00
Staffing of project team	$ 300.00
Project team roles and responsibility	$ 300.00
Project publicity	$ 3,000.00
Project deliverables	$ 800.00
Commencement of project	$ 2,000.00
Budget forecast	$ 600.00
Expenditure report	$ 600.00
Project status	$ 600.00
Procurement Guidelines	$ 300.00
Change request	$ 500.00
Change approval / Change rejection	$ 500.00
Project completion	$ 2,000.00
Lesson learnt	$ 300.00
TOTAL	**$ 14,200.00**

Table 40

COMMUNICATION MATRIX

What needs to be communicated	Objective of communication	Communication Type	Format	Medium	Frequency	Audience	Owner
Conceptualizing the project	Introduce the project concept and determine if there would be interest.	Informal written, formal written and informal verbal	Electronic document and conversation	Email and telephone	Once	International financing Institution Government of Belize	BEL's Top Management
Project proposal	Formal request for the funding of the project and approval of the project charter.	Formal written	Electronic document and printed document	Email, and registered mail	Once	International financing Institution BEL's Top Management Project team Government of Belize	Senior Manager
Acceptance of proposal	Granting approval of the project as outlined in the proposal.	Formal written	Electronic document and printed document	Email and registered mail	Once	BEL's Top Management Government of Belize	International financing institution
Terms and condition of funding	Outline the manner in which the funding agency expects the project to be handled.	Formal written	Electronic document and printed document	Email and registered mail	Once	BEL's Top Management Government of Belize	International financing institution
		Formal verbal	Meeting	Face to face	As Needed	Project team	

What needs to be communicated	Objective of communication	Communication Type	Format	Medium	Frequency	Audience	Owner
Staffing of project team	Identifying the project team members.					Project Manager	Senior Manager
Project team roles and responsibility	Inform the project team and key stakeholders of the individual responsibility of the team.	Formal verbal and formal written	Meeting	Face to face	As Needed	Senior Manager Government of Belize International financing Institution Project team	Project Manager
Project publicity	Publicise the project for the benefit of all stakeholders. The benefiting community is large and high coverage is required.	Formal written, informal written, informal verbal and formal verbal	Press release, conversations, internet relay chat and postings	Social media, telephone, radio, chat room and television	As Needed	Senior Manager Government of Belize International financing Institution Project team Public Utilities Commission Ministry of Works Department of Environment Ministry of Lands Benefitting Community	Belize Electricity Limited
Project deliverables	Inform what the project deliverables are and the schedule start and completion date.	Formal written and formal verbal	Kick off meeting, electronic document, conversations,	Face to face, telephone, email, chat room, CB	As Needed	Senior Manager Government of Belize International financing Institution Project team	Project Manager

What needs to be communicated	Objective of communication	Communication Type	Format	Medium	Frequency	Audience	Owner
			SMS, Internet relay chat, discussion boards and printed document	radio and hard copy		Farming & stringing contractor Belize electricity Limited Benefitting Community Surveying contractor Pole Planting Contractor Line clearing contractor Material suppliers	
Commencement of project	Indicate the start of the project so relevant stakeholder can anticipate their upcoming role.	Formal written, informal written and formal verbal	Kick off meeting, press release, posting, printed document, conversations, SMS, internet relay chat and electronic document	Social media, radio, television, face to face, Telephone, email, chat room and hard copy	Once	Senior Manager Government of Belize International financing Institution Project team Public Utilities Commission Ministry of Works Department of Environment Ministry of Lands Benefitting Community	Belize Electricity Limited
Budget forecast	Indicate how the project funds will be spent and during which period.	Formal written and formal verbal	Meeting, printed document and electronic document	Face to face, email and hard copy	Weekly	Senior Manager Government of Belize International financing Institution Project team Change control board	Project Manager

What needs to be communicated	Objective of communication	Communication Type	Format	Medium	Frequency	Audience	Owner
Expenditure report	Report how the project funds were spent.	Formal written and formal verbal	Meeting, printed document and electronic document	Face to face, email and hard copy	Weekly	Senior Manager Government of Belize International financing Institution Project team Change control board	Project Manager
Project status	Report on the status of the project by indicating what deliverables were completed and which ones have started.	Formal written and formal verbal	Meeting, printed document and electronic document	Face to face, email and hard copy	Weekly	BEL's Top Management Government of Belize International financing Institution Project team Change control board Belize electricity Limited Benefitting Community	Project Manager
Procurement Guidelines	Inform all relevant stakeholders of the manner in which the procurement should be carried out.	Formal written	Printed document and electronic document	Email and hard copy	Once	Senior Manager Government of Belize Project Manager Project team Change control board Material suppliers Surveying contractor Pole Planting Contractor	Belize electricity Limited
Change request		Formal written			As Needed	Senior Manager	

What needs to be communicated	Objective of communication	Communication Type	Format	Medium	Frequency	Audience	Owner
	Make request for changes to the scope, time or budget.		Printed document and electronic document	Email and hard copy		Project team BEL's Top Management Government of Belize International financing Institution	Project Manager
Change approval / Change rejection	Provide response to change request.	Formal written	Printed document and electronic document	Email and hard copy	As Needed	Project team BEL's Top Management Government of Belize Project Manager International financing Institution	Senior Manager
Project completion	Indicate the start of the project so relevant stakeholder can anticipate their upcoming role.	Formal written, informal written, informal verbal and formal verbal	Close out meeting, press release, posting, printed document, conversations, SMS, internet relay chat and electronic document	Social media, radio, television, face to face, email, telephone, chat room and hard copy	Once	BEL's Top Management Government of Belize International financing Institution Project team Senior Manager Public Utilities Commission Ministry of Works Department of Environment Ministry of Lands Benefitting Community	Belize Electricity Limited
Lesson learnt		Formal written			Once	Senior Manager	

What needs to be communicated	Objective of communication	Communication Type	Format	Medium	Frequency	Audience	Owner
	Highlighting what went right and what can be improved.		Printed document and electronic document	Email and hard copy		Project team Belize electricity Limited	Project Manager

Communication Flowchart

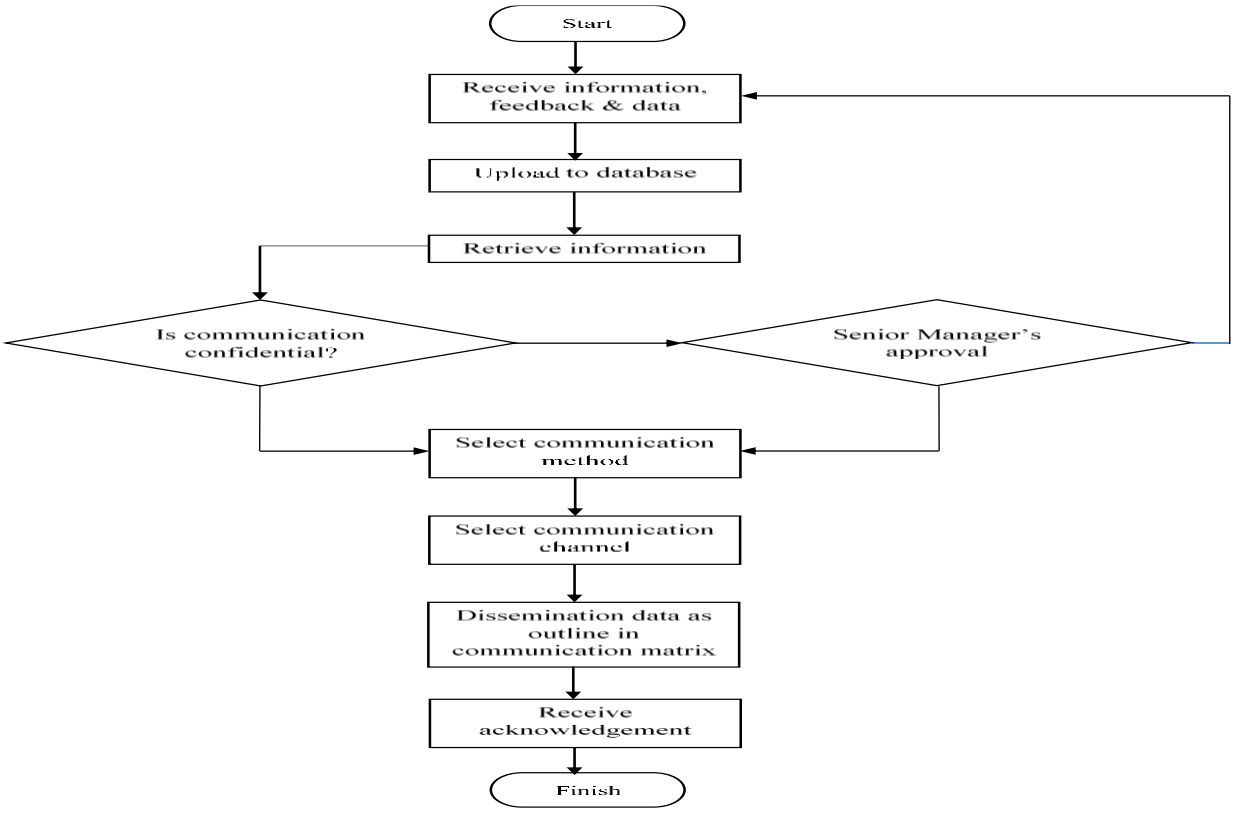


Figure 15: Communication Flowchart

Method for Maintenance of Plan

The communication management plan is caters for the collection, storage and dissemination of the information. It must also ensure that credible and reliable information is delivered timely to relevant stakeholders. As the dynamics of the project changes so to must the communication plan. Changes to plan must vetted and approved by the Senior Manager. The activities are monitored, traced and recorded in the plan. Completed and upcoming communication activities are reported in weekly meetings and monthly reporting.

4.3.3.9 Risk Management Plan.

Project Name:

Project Manager:

Date:

Version:

Introduction

This document serves as a guide to determine what risk management action should be taken to address risk facing the project.

Methodology

Planning project is not an exact science, and all eventualities are cannot be included in the planning process. These uncertainties are considered risk. The risk can be either be known or unknown. A plan is devised to determine how the risk will be identified, measure their impact on the project, quantitatively analyse their magnitude, select strategy, create plan and track performance. The risks are classed by categories, and the responsibility of identifying risk associated with the categories falls on project team members selected. Scales are established to measure the possibility of risk occurrence, probability, and the effect the realized risk will have on the project, impact. With aid of the scales, the risks identified undergo quantitative analysis to ascertain where the greatest threats or opportunities lie. Depending on the severity of the risk, a strategy will be selected. Based on the strategy selected a plan of action is formulated. The information will be inputted into a risk register for consultation and action.

Table 41

Role, Responsibility and Budget

Role	Responsibility	Cost
Senior Manager	-Identify risks associated with resource, industry standard and legislation. -Analyze, prioritize and provide strategies for risks identified.	$800.00
Project Manager	-Identify risks associated with communication, equipment and plant, environmental and customer. -Analyze, prioritize and provide strategies for risks identified. -Monitor and track risk, and the effectiveness of mitigation measures.	$1,200.00
Project Engineer	-Identify risks associated with weather condition, scope and material specification. -Analyze, prioritize and provide strategies for risks identified.	$600.00
Financial Clerk – Finance Service	-Identify risks associated with budgeting. -Analyze, prioritize and provide strategies for risks identified.	$500.00
Accounting Clerk – Procurement Service	-Identify risks associated with contractors and suppliers. -Analyze, prioritize and provide strategies for risks identified.	$500.00
Senior Technician	-Identify risks associated with quality controls. -Analyze, prioritize and provide strategies for risks identified.	$400.00
GRAND TOTAL		**$ 4,000.00**

Timing

The risk management plan and risk register should be completed during the planning phase of the project. The risk management will be a standard item in weekly project team meetings. The risk management plan and risk register should be revisited when a change to the project is granted. New risk can appear and existing risk can disappear. When risks become issues, the plan and risk register will require updating.

Risk Categories

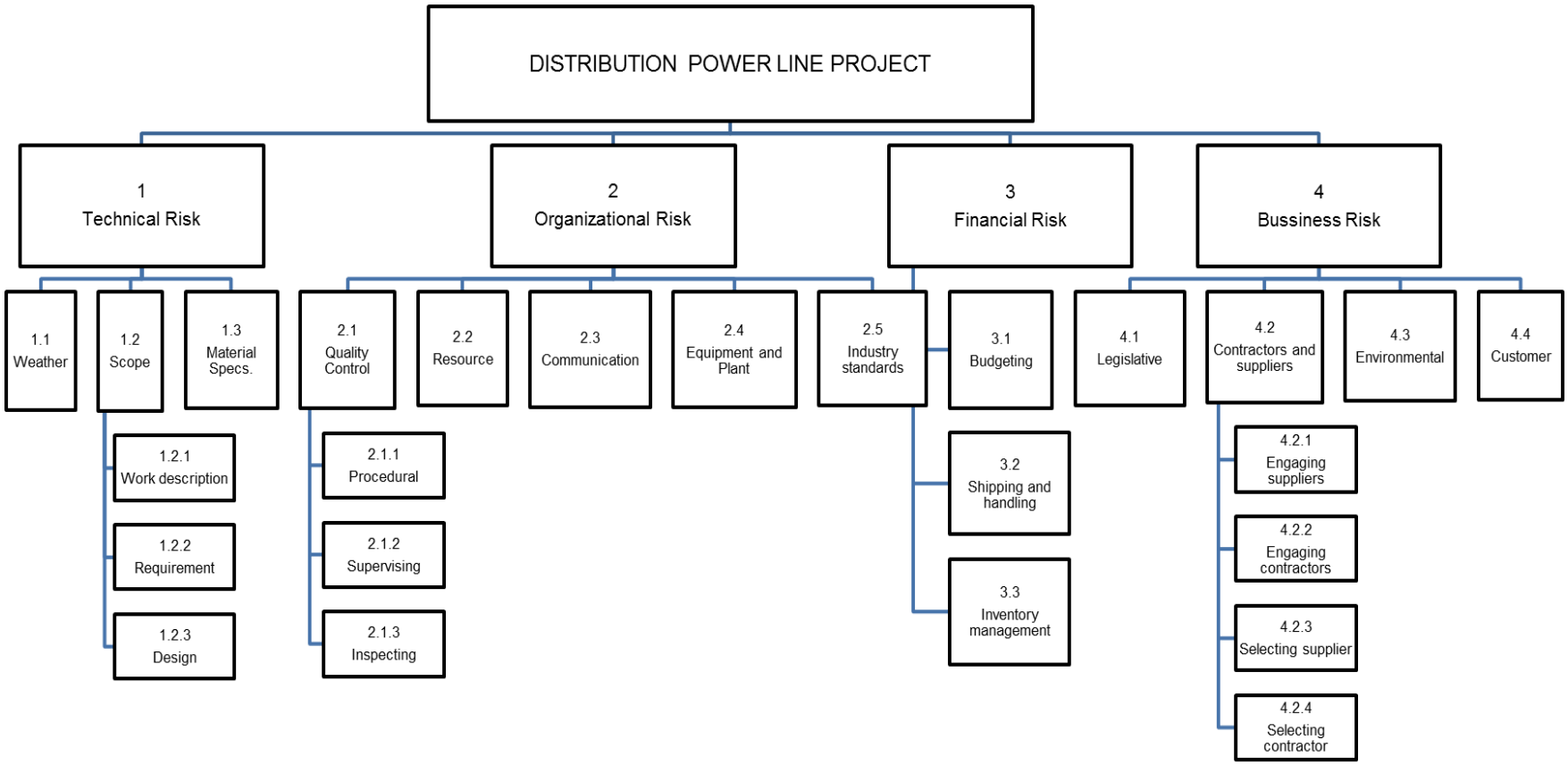


Figure 16: Risk categories

Definitions of Risk and Impact

Probability	Probability Categories Definition	Probability Definitions
0.90	Highly likely	>90% chance of occurrence
0.70	Likely	70%-89% chance of occurrence
0.50	Even chance	50%-69% chance of occurrence
0.30	Unlikely	30%-49% chance of occurrence
0.10	Highly unlikely	<30% chance of occurrence

Figure 17: Definitions of risk and impact

Probability and Impact Matrix

Probability and Impact Matrix										
Probability	**Threats**					**Opportunities**				
1	0.05	0.1	0.2	0.4	0.8	0.8	0.4	0.2	0.1	0.05
0.90	0.045	0.09	0.18	0.36	0.72	0.72	0.36	0.18	0.09	0.045
0.70	0.035	0.07	0.14	0.28	0.56	0.56	0.28	0.14	0.07	0.035
0.50	0.025	0.05	0.1	0.2	0.4	0.4	0.2	0.1	0.05	0.025
0.30	0.015	0.03	0.06	0.12	0.24	0.24	0.12	0.06	0.03	0.015
0.10	0.005	0.01	0.02	0.04	0.08	0.08	0.04	0.02	0.01	0.005
0	0	0	0	0	0	0	0	0	0	0
	0.05	0.10	0.20	0.40	0.80	0.80	0.40	0.20	0.10	0.05
	Very Low	Low	Moderate	High	Very high	Very high	High	Moderate	Low	Very Low
Legend:	Low risk			Moderate risk			High risk			

Figure 18: Probability and Impact Matrix

Impact Scale

Defined Conditions for Impact Scales on Major Project Risk										
Project Risk Category	**Negative Impact Scale**					**Positive Impact Scale**				
	Very Low	**Low**	**Moderate**	**High**	**Very high**	**Very high**	**High**	**Moderate**	**Low**	**Very Low**
	0.05	**0.10**	**0.20**	**0.40**	**0.80**	**0.80**	**0.40**	**0.20**	**0.10**	**0.05**
Technical risk	Little flaws on the finished power line	Some flaws on the finished power line	Disruption of power supply to existing customer	Potential harm to property or life	Catastrophic failure of power system	Improve power line system performance	New cost saving and innovative technologies developed	Implementing new advancement	Completed as designed and meeting industry standards	Completed and meeting industry standards
Organisation risk	Utilization of some establish policies and procedure	Limited compliance with established policies and procedure	Repeated ignoring of culture and established policies	Improper use of assets and resources	Ineffective use of assets and resources	Improve processes, efficiencies and effectiveness	Impact productivity	Motive staff and adapt positive culture	Enhance staff knowledge	Exposure to new challenges
Financial risk	Insignificant cost increase	< 8% cost increase	9%-15% cost increase	16%-20% cost increase	>21% cost increase	>21% cost reduction	16%-20% cost reduction	9%-15% cost reduction	<8% cost reduction	Insignificant cost reduction
Business risk	Complete project slightly over time and budget	Complete project slightly over time and budget with reduced scope	Complete project over time and budget with reduced scope	Complete project over time and budget with significant reduced scope	Terminate project without completing	Complete project under time and budget with increase scope	Complete project on time and under budget with increase scope	Complete project on budget and under time with increase scope	Complete project on time and on budget with increase scope	Complete project on time and on budget

Figure 19: Defined Conditions for Impact Scales on Major Project Risk

Table 42

Risk Register

Risk Register **Project Name:** **Project Manager:** **Date:** **Version:**											
RBS Code	**Risk**	**Risk Description**	**Consequence**	**Probability**	**Impact**	**P x I**	**Trigger**	**Owner**	**Strategy**	**Cost**	**Tracking**
Technical Risk											
1.1	Weather										
1.2.1	Scope - Work description										
1.2.2	Scope - Requirement										
1.2.3	Scope - Design										

1.3	Material Specs.										
Organizational Risk											
2.1.1	Quality Control - Procedural										
2.1.2	Quality Control - Supervising										
2.1.3	Quality Control - Inspecting										
2.2	Resource										
2.3	Communication										
2.4	Equipment and Plant										
2.5	Industry standards										
Financial Risk											
3.1	Budgeting										
3.3	Shipping and handling										

3.2	Inventory management										
Business Risk											
4.1	Legislative										
4.2.1	Engage suppliers										
4.2.2	Engaging contractors										
4.2.3	Selecting supplier										
4.2.4	Selecting contactor										
4.3	Environmental										
4.4	Customer										

Reporting Formats

Reporting on project risk will be conducted weekly in the project team meetings. The risk register will be presented to raise awareness among the project team. The risk register will display all the risks that warrant closer attention. These risks will be labelled with their respective code, cause, consequence, probability, impact, rating, trigger, person responsible, strategy to employ, and cost. Risk that is realized becomes an issue, and may have financial implication on the contingency reserve. Where this occur approval must be sought from the Senior Manager.

Tracking

The risk activities identified in the risk register will be included in the project schedule. Risk activities will be tracked similarly to all project activities. Resources and a time line should be in place the activities. Updates on the activities will be provided in the weekly project team meetings.

4.3.3.10 Procurement Management Plan.

Project Name:

Project Manager:

Date:

Version:

Introduction

This document serves as a guide to determine transparent and effective methods to receive goods and service. It encompasses conducting, controlling and closing procurement for the distribution power line projects.

Procurement Method

Procurement will be conducted for the goods and works associated with the successful completion of the distribution power line project. Goods are the materials needed for the project that require outsourcing. These goods are separated into four categories; poles, conductors, hardware and transformers. Wooden poles are of three standard height; 30', 40' and 45'. The conductors are the wires and cables need for the primary line and secondary line. The hardware is the components to frame the poles to receive the conductors. The transformers are the devices that need to step down voltage for consumption. The work required for the project that require outsourcing is separated into four category; surveying, line clearing, pole planting and framing & stringing. The quantity of the materials is dependent on the magnitude of the project. The surveying is the establishment and staking of power line route. Line clearing is the removal of vegetation from the power line route. Pole planting is the erection of poles and planting of anchors. Farming & stringing is the placement of conductors and hardware for commissioning of the power line.

All procurement activities related to distribution power line project will be carried out in accordance with the policies and guidelines of the Purchasing and Stores department. Where funding is received from an IFI their general procurement guidelines would accompany. Where inconsistency in procurement methods occur the contract between the parties would stipulate the prevailing guidelines.

International Competitive Bidding (ICB)

The materials required for distribution power line construction are not manufactured locally. Given this reality, ICB will be required to obtain the materials for the project. Funding agencies may stipulate thresholds for ICB. The steps required to complete the ICB process are as follows:

1. Prepare bidding documents complete with terms & condition, bill of quantity and material specification. The document should be review and approved by the Senior Manager.
2. Advertise in global wide circulated publications to attract as much bidders as possible.
3. Issue bidding documents to interested parties that are capable of providing the materials required.
4. Established evaluation committee will receive all submitted bids.
5. Bidding documents received are opened on a predetermined time and date.
6. Evaluation committee will conduct evaluation of bids based on criteria and rating score.
7. Notify bidders of evaluation outcome.
8. Prepare purchase order for successful bidder.
9. Ensure agreed upon delivery dates are met.

10. Receive and accept materials.
11. Confirm payment of invoice received.

National Competitive Bidding (NCB)

Any goods that can be purchased locally, and the works required for the project are procured via NCB. The nature and scope of work are consistently executed by local contractors. Funding agencies may stipulate thresholds for NCB. The steps required to complete the NCB process are as follows:

1. Prepare bidding documents complete with terms & condition, bill of quantity and scope of work. The document should be review and approved by the Project Manager.
2. Advertise in locally circulated publications to attract as much bidders as possible.
3. Issue bidding documents to interested parties that are capable of providing the materials required.
4. Established evaluation committee will receive all submitted bids.
5. Bidding documents received are opened on a predetermined time and date.
6. Evaluation committee will conduct evaluation of bids based on criteria and rating score.
7. Notify bidders of evaluation outcome.
8. Prepare and award contract for successful bidder.
9. Ensure agreed upon contract completion dates are met.
10. Certify satisfactory and successful completion of contract.
11. Confirm payment of invoices received.

Single Source selection (SSS)

Special provisions are made in extraordinary cases where a single source is willing or capable of fulfilling a contract. Funding agencies may stipulate thresholds for SSS. The steps required to complete the SSS process are as follows:

1. Prepare bidding document and cost estimate of goods of service required. Provide the name of single source and justification for the selection. The document should be review and approved by the Senior Manager.
2. Invite single source to submit a bid.
3. An evaluation committee will review and compare the submitted bid.
4. Negotiate and come to terms with single selected source.
5. Prepare and award contract for
6. Ensure agreed upon contract completion dates are met.
7. Certify satisfactory and successful completion of contract.
8. Confirm payment of invoices received.

Type of Contracts

Procurement contracts for goods required for the distribution power line project are in the form of purchase orders. The Purchase and Stores department is responsible for the issuing of the purchase order. A list of materials with the agreed upon specifications along with the desired quantity is forwarded to the successful supplier.

Procurement contracts for works required to execute the distribution power line project are firm fixed price contracts. BEL’s Purchase and Stores department utilizes a standard service contracts to successful bidders. Once contractually bound both parties must adhere to the agreed upon price barring any deviation to scope of work. There are outline purchasing policies that govern amendment to the contract as they arise.

Managing Procurement

Predetermined inspection and audit dates are scheduled for the all contracted work within project. The information gathered from the inspection and audit will be documented and reported. Contract payments made for the satisfactory completion of work will be recorded in the Microsoft GP. The reports will include completed work and payments made against contracted amount.

4.3.3.11 Stakeholder Management Plan.

Project Name:

Project Manager:

Date:

Version:

Introduction

This document serves as a guide to determine how to effectively engage stakeholders and identify the management strategies required.

Table 43

Engagement levels of stakeholders

Stakeholders	Unaware	Resistant	Neutral	Supportive	Leading
International financing Institution				D C	
Government of Belize				D C	
BEL's Top Management				D C	
Project team					D C
Project Manager					D C
Belize Electricity Limited			C	D	
Benefitting community			C	D	
Senior Manager					D C
Surveying contractor				D C	
Line clearing contractor				D C	
Farming & stringing contractor				D C	
Material suppliers				D C	
Pole Planting contractor				D C	
Public Utilities Commission				D C	
Ministry of Works	C		D		
Department of Environment	C		D		
Ministry of Lands	C		D		
LEGEND: C – Current Engagement D – Desired Engagement					

Scope and Impact of Change to Stakeholders

As the project progresses there may be changes to the scope of the project. These changes will have a rippling impact on the project management plan. When these changes occur the stakeholder management plan is revisited. Given the new reality, stakeholders classification may change, their requirement and expectation would also be affected. Utilizing expert judgement, where these changes impact the stakeholder management plan, updates will be provided.

Stakeholder Communication Requirements

International financing Institution

The communication with the IFI will be formal and in English. The IFI will would provide the funding for the project and as such would receive communication on the project charter. A formal proposal for funds will be submitted to the IFI. The receipt of funds disbursed by the IFI must be acknowledge and the IFI must be formally informed of such. IFI will be informed of project schedule and project deliverables. Project and expenditure reports will be provided to the IFI on a timely basis. Depending on the nature of the of IFI involvement on the project, change request will be forwarded for approval.

Government of Belize

The communication with Government of Belize, through the office of Economic Development and Energy, will be formal and in English. Government of Belize of Belize will be appraised of the project from the conceptual stage, and progress made with the IFI in the securing of funding. Government of Belize will also be informed of communications with the Ministry of Work, Department of Environment and Ministry of Lands.

BEL’s Top Management

The communication with BEL’s Top Management will be formal, informal and in English. Top Management comprise of the senior managers and the CEO. Top Management is responsible for, and must be informed of all communication with influential stakeholders.

Project team

The communication with the project team will be formal, informal and in English. The administration of the project and coordinating of resources will done collectively by the team. The instruction for the project team will come from the Project Manager. All communication on scope, deliverables, cost and schedules among other project information must be shared timely with the project team. Where changes are approved the project team must also be informed promptly.

Project Manager

The communication with the Project Manager will be formal, informal and in English. The Project Manager is responsible for the entire project. The preparing, reviewing and validating of project information falls within his purview. The selection of information recipients and dissemination of project progress, reports and change request among other project information is also carried out by the project manager. To effectively do his job the project manager requires all project related information to be funnelled through his office.

Belize Electricity Limited

The communication with and among BEL staff will be formal, informal and in English. Information will be shared companywide on the project progress periodically. The company via its various departments will be contribute when called upon to assist with project progress. The communication requirements of stakeholders these

department are engaged with must be received. BEL's established policies and guidelines will outline in great part how the project executed. Their infrastructure and resources will be utilized to achieve the successful completion of the project.

Benefitting community

The communication with the benefiting community will be formal, in English and the indigenous language of the community. The benefiting community must be informed of the plan to construct distribution power line. The project schedule, any inconvenience the residence may face during the construction of the project. Information on the hazards, and safety measures when living and operation near power lines will be share. The method and requirement for connecting customers will also be shared.

Senior Manager

The communication with the Senior Manager will be formal, informal and in English. The Senior Manager will be a conduit to Top Management and IFI for the Project Manager. The Senior Manager will receive all project reports and regular briefing on the project. All change application must be sent to Senior Manager. Where the Senior Manager does not have the authority to approve or disapprove, the request is escalated to the authorized party.

Surveying contractor

The communication with the Surveying contractor will be formal and in English. The surveying contractor will be responsible for the establishing the power line route. The Surveying contractor will be informed of BEL's interest to undertake the work, and be provided with bidding documents. The surveyor will be informed of his successful bid, and be awarded the contract to complete the work. He/she will need the scope of the project, BEL's distribution standards. Payment certificate will be created on

work completed, and completion certificate upon the satisfactory completion of the work.

Farming & stringing contractor

The communication with the framing & stringing contractor will be formal and in English. The framing & stringing contractor will be responsible for framing pole structures, stringing conductors and installation of hardware. The framing & stringing contractor will be informed of BEL's interest to undertake the work, and be provided with bidding documents. The framing & stringing contractor will be informed of his successful bid, and be awarded the contract to complete the work. He/she will need the scope of the project, BEL's distribution standards. Payment certificate will be created on work completed, and completion certificate upon the satisfactory completion of the work.

Material suppliers

The communication with the material supplier will be formal and in English. The material supplier will be responsible for supply of all project materials. The material supplier will be informed of BEL's interest to acquire materials need to complete the work, and be provided with bidding documents. The material supplier will be informed of their successful bid, and be awarded the contract to complete the work. They will need the material list, bill of quantities and product specifications. Payments on invoice received will be processed upon the satisfactory delivery on all project materials.

Pole Planting contractor

The communication with the pole planting contractor will be formal and in English. The pole planting contractor will be responsible for planting all poles and anchors. The pole planting contractor will be informed of BEL's interest to undertake the work,

and be provided with bidding documents. The pole planting contractor will be informed of his successful bid, and be awarded the contract to complete the work. He/she will need the scope of the project, BEL's distribution standards. Payment certificate will be created on work completed, and completion certificate upon the satisfactory completion of the work.

Public Utilities Commission

The communication with the pole planting contractor will be formal and in English. The PUC is the regulatory body of BEL, and as such should be kept informed of investments made by the company. The size of the company's assets and impact on customers.

Ministry of Works

The communication with the Ministry of Works contractor will be formal and in English. The Ministry of Work is responsible of the country's road ways. Within these road ways lie the utility reserve where power line poles are to be planted. Request to utilize the utility reserve will be placed with the Ministry of Work. They should be informed of the commencement and completion of the project. Where the proposed route may conflict with plans of the Ministry the project team will be informed of required adjustments.

Department of Environment

The communication with the Department of Environment will be formal and in English. The Department of Environment is responsible for ensuring that all project within the country are environmentally sound. Distribution power line extensions while having minimal impact must be reviewed. The DOE should be informed of the intension to construct lines and be provided with the preliminary plans.

Ministry of Lands

The communication with the Ministry of Lands will be formal and in English. The Ministry of Lands is responsible for all activities related to and impacting lands in the country. They should be informed on the desire to construct distribution power lines. Where the use of national lands is required, the Ministry will be informed and approval is requested. Where the easements are required, the Ministry will be informed and facilitation of the process is requested.

Method of Updating Stakeholder Management Plan

The Project Manager is responsible to determine which stakeholders will be impacted by the changes made to the project or changing of external factors. Once the stakeholders are identified, the manner in which they were to be initially managed is reviewed. The stakeholder management plan associated with the identified stakeholders are amended to reflect the approved changes or new realities facing the project. These changes are forwarded to the Senior Manager for vetting and approval. Where approval is granted the stakeholder management plan is updated and shared with the relevant stakeholders. Where approval is not granted the previously approved version of stakeholder management plan will remain as the current plan.

4.4 Topic related to specific objective 4: The creation of an implementation strategy.

4.4.1 Methodology used.

4.4.1.1 Analytical method.

A closer look at the entire company structured was carried out. Specific responsibilities are delineated and assigned to respective departments or units. In the operations aspect of BEL this structure is efficient and there is seldom confusion on the responsible department. The nature of projects was different and required constant assistance from other department. While the projects being researched fell under the purview of Project Department, other departments within BEL had their role to play.

4.4.1.2 Applied method.

A clear understanding of the roles of each department was gathered through discussions with the project team and department heads. The department roles within the organization and specifically on the distribution power line projects. An appreciation for the challenges they have faced in the past, and remedy they have implemented or suggested.

4.4.2 Implementation.

BEL is a progressive company that recognizes the dynamic environment in which it operates. There is constant effort to remain abreast with new effective technologies and methodologies. In some instances, BEL is the pioneer in the country of Belize. BEL’s primary business is the distribution of power to customers. With a customer

base of 90,635 customer accounts, the operation to maintain quality service to these customer accounts requires serious focus and attention. BEL Annual Report 2016 states, $32.9 million Belize dollars was spent on operating expenses. To better serve existing customers, and add new customers to the grid, expansion project are required. BEL Annual Report 2016 states, $38.9 million Belize dollars was spent on capital expenses of which 44% was for system expansion and 24% for reliability. These figures gives some insight into the need to have proper standardize project management processes in place. BEL made steps in the right direction with the move of the influence of organizational structures on project from a weak matrix organization to a strong matrix organization. The organization structure in the Project Department is conducive for efficient and fluid project management. While areas for improvement have been sited based on information gathered from research conducted, the Senior Manager still needs to review the document and initiate the implementation process.

4.4.2.1 Create committee

The implementation of the proposed templates and processes will affect existing processes in place. Varying departments are authorized to manage these processes. The impact must be realized and brought to the forefront so measures can be taken to ensure a smooth transition if changes are to be made. A committee is to be assembled to review the document, identify processes for improvement, prioritize process improvement and develop an action plan. The Project Management Process Implementation Committee should comprised of seven members. Two members from the Project Department, one member from the Purchase & Store Department, one member from the Finance Department, one member from the Information & Communications Systems, one member from the Safety Health & Environment Unit and one member from the Internal Audit Department. The members selected for the Project Management Process Implementation Committee must hold a position at or above Level 4 within the

organization. Level 4 and above positions are Engineers, Superintendents, Head of Departments and Top Management. The diversity on the Project Management Process Implementation Committee will aid in providing fluidity in process transaction.

4.4.2.2 Review document

The document will be reviewed and the project plan template scrutinized for compatibility with existing systems and process. The research was based on processes in place at the time. However, new processes may be in place and improvement to processes in the pipeline. These existing and proposed improvements to processes should be considered when reviewing the document.

4.4.2.3 Identify processes for improvement

Following a thorough review of the document, identify the recommended improvement to processes. Taken into consideration are processes implemented since the drafting of this document, and existing proposals. These processes are reviewed and compared with current process flow. The availability of resources and ability to execute the proposed improvement must also be considered. The processes that will be affected, and the enhancement needed should be listed.

4.4.2.4 Prioritize process improvement

The proposed process improvements must be prioritized and ranked. The incorporating of the improved processes will take time, and may have their detractors. The roll out of the improved processes should be systematic and smooth. Assess each process improvement for the required staffing, equipment, hardware and software. Create criteria to determine the benefit, cost and impact of each process. The ranking of the process improvement will be based on the criteria evaluation conducted.

4.4.2.5 Develop action plan

The Project Management Process Implementation Committee will determine what process improvement to pursue, and. Provide a clear outline of the requirements necessary to complete the proposed process improvement. Clearly articulate the desired impact of each improved processes with current performance and projected performance. After a thorough assessment of the process improvement to implement, present to top management for vetting and approval. Should approval be granted, a schedule of activities is prepared. This schedule will be based and sequenced on the prioritized listing. A comprehensive project management plan to execute should be drafted.

5 CONCLUSIONS

The general objective was “To develop a methodology that will ensure consistency in the procedures and practices to select, execute, manage and close projects in Belize Electricity Limited for the improved management of Distribution Power Line projects.” Four specific objectives were determined to achieve the general objective. The specific objectives presented key activities that were undertaken to meet the objectives. In the past, BEL has displayed its commitment to improving and enhancing processed, so a serious look at the document is anticipated.

1. The first specific objective focused on the analysis of current project management processes. It was clear that BEL had a structure in place to execute their project. The structure had some component of conventional project management practices. However, there were other areas that were lacking. The collaborating with IFIs compelled BEL to improve on some of its project management processes. Some improvement lasted the life of the collaboration, but others were incorporated into the company’s standard processes. In addition newly implemented processes, there are also those that are under review and may be implemented as well. It is safe to say that BEL has a firm foundation and ideally positioned to transition to standard project management practices.

2. The second specific objective compared current and standard project management processes. The project management processes as stated by the PMBOK Guide® are listed, and the activities conducted under the distribution power line projects indicated. In some instances, the activities are sufficient to satisfy the project management processes. In other instances, improvement is required for BEL’s current process to align with best project management practices.

3. The third specific objective was the creation of project management templates. The Distribution Line Extension project are similar in nature and standardized templates can be used. Currently baselines were utilized, and there were no project management plans with the exception of procurement management plan. The company's processes were used in lieu of the project management plans. A clear project management plan will provide the guidance that is necessary for the proper execution of the project.

4. The fourth specific objective was the creation of an implementation strategy. The improvements identified will enhance the management and increase the effectiveness of the projects. To have that desired results, the improvement must first be but in place. This cannot be done arbitrary. Proper internal infrastructure must be in place. A clear understanding of that infrastructure should be determined, and cost versus the benefit analyzed. Where the urgency to apply improvements presents itself, steps should be made for quick facilitation. Once tabled by the Project Management Process Implementation Committee, these measures can only be implemented with encouragement and approval from top management.

6 RECOMMENDATIONS

BEL has a record of being willing and receptive to the implementation of improvement to processes. With project predominantly based in the project department, the Senior Manager in charge of the department would be fittest to oversee the implementation of project process improvement. The monitoring and tracking of process improvements can take place in the department under the supervision of the Senior Manager.

1. After analyzing the current project management processes, the practices were identified and documented. The activities under this specific objective should not be relegated only to this document. As improvement to the project management practices is introduces, it may alter existing practices, or not have the desired effect. The committee should conduct analysis on a frequent basis to determine how effective projects are being managed.

2. To align current with standard project management processes an adequate source document is required. The PMBOK Guide® fifth edition outlines best project management practices and categorized by processes and knowledge areas. Project Management Institute (PMI) publications on updated best practices should remain as a guide to BEL. The committee should be remain abreast of the most current project management best practices, and continue to align with BEL's current project management practices.

3. Several project management plan templates were created. The templates that were devised in this document, once implemented, should be measured for efficiency. The proposed templates should remain subject to change based on the realities of the specific project. However, where consistent and standardize information in these templates have proven lacking, review and table update for

consideration. Updates can be provided by the project team members, but vetted by the committee and approved by the Senior Manager.

4. With the creation of an implementation strategy and a governing committee, the execution can be carried out with relative ease. Top management and specifically the Senior Manager – Head System Planning and Engineering Division is to take responsibility for establishing and receiving reports for the Project Management Process Implementation Committee. The committee should not be dissolved after the reviewing and implementation of processes in this document. Improvement is ongoing and processes requires revisiting.

7 BIBLIOGRAPHY

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8 APPENDICES

8.1 Appendix 1: FGP Charter

PROJECT CHARTER	
Date	**Project Name:**
26th June 2017	Proposal of a methodology for Improving project management of distribution power line expansions in Belize Electricity Limited.
Knowledge Areas / Processes	**Applicacion Area (Sector / Activity)**
Knowledge areas: Integration, Scope, Time, Cost, Quality, Human Resource, Communication, Risk, Procurement and Stakeholder **Process groups:** Initiation and Planning	Construction – Building overhead distribution power lines.
Start date	**Finish date**
26th June 2017	14th January 2017
Project Objectives (general and specific)	
General objective: To develop a methodology that will ensure consistency in the procedures and practices to select, execute, manage and close projects in Belize Electricity Limited for the improved management of Distribution Power Line projects. Specific objectives: 1 To analyze current project management practices used to select, execute, manage and close Distribution Power Line projects to determine the company's current position. 2 To create project management templates to be used in the management of projects by Belize Electricity Limited to enhance the management of Distribution Power Line projects.	

3 To create project management templates to be used in the management of projects by Belize Electricity Limited to enhance the management of Distribution Power Line projects.

4 To create an implementation strategy for the successful implementation of the methodology to provide a seamless transition of best project management practices.

Project purpose or justification (merit and expected results)

Belize Electricity Limited embarks on distribution power line extension annually to meet the country's growing demand. A project unit was recently established to tackle these projects. However, within the unit one team is responsible for the company funded Distribution Line Expansion and another for externally funded projects. The project management practice that was already in place continued in the project unit.

The processes in use lack some project management best practices. A review of the processes with an intent to improve will highlight weaknesses in the processes and indicate where project management best practices can be implimented. The project efficiency and general management of project should improve significantly.

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

A proposal for a methodology outlining best project management practices that can be incorporated in the processes to complete Distribution Line Expansion projects. A comprehensive review of the current processes will be presented. The proposal will utilize the project management processes from the PMBOK Guide® Fifth Edition to create management plans and enhance existing plans. Provide a strategy to successfully implement the project management best practice identified.

Assumptions

It is assumed that Belize Electricity Limited will grant permission to execute the proposal of a methodology.

It is assumed that all pertinent information can be readily sourced.

It is assumed that interviews with key staff members can be conducted timely.

It is assumed that the department Senior Manager will grant the use of confidential information.

Constraints

TIME:

The time frame to complete the Final Graduation Project as imposed by UCI.

Time that would be allowed by Belize Electricity Limited to conduct interviews with staff.

COST:

Budget to conduct visits and meetings.

Budget for administrative expense to cover printing of documents, stationaries, telephone, data charges etc..

SCOPE:

While small distribution extensions are done by the operations department, the methodology will focus on major Distribution Line Expansions carried out by the project department.

Preliminary risks

If all the relevant information is not received, the methodology might not capture an accurate picture, impacting the scope of the project.

If proposal formulated is not compelling and succint, the proposal might be ambigious, impacting the quality of the document.

Budget

$875.00 usd

Milestones and dates

Milestone	Start date	End date
Graduation seminar - Introduction	26/06/2017	02/07/2017
Graduation seminar – Chapter 1	03/07/2017	09/07/2017
Graduation seminar – Chapter 2	10/07/2017	16/07/2017
Graduation seminar – Chapter 3	17/07/2017	23/07/2017
Graduation seminar – Final Evaluation	24/07/2017	30/07/2017
Tutoring process	12/08/2017	12/10/2017
Revision and grading process	13/10/2017	17/11/2017
Adjustments	09/06/2017	19/12/2017
Defend document	18/11/2017	14/01/2018

Relevant historical information

Belize Electricity Limited is the sole lincensed distributor of electricity in the country of Belize. As of 2016, it has 315 employees, a total asset of $545 million bzd, and serves 90,635 customers accounts. Belize Electricity Board was first established in 1950 by Government of Belize of Belize, and provided generated power to the city and major towns. It was privatized in 1992 and renamed. Massive expansion of the grid took place, and is continuing to meet the country;s demand. As communities in the country of Belize emerge and evolve, the need for Distribution Line Expansion remains a constant.

No documentation of previous work or similar effort related to the project was found.

Stakeholders

Direct stakeholders:

Engineering Department Senior Manager

Engineering Department Project Manager

Engineering Department Project Coordinator

Engineering Department Superintendent

Project Manager

Tutor

Readers

Examining Committee

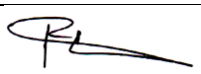
Academic Director

Course Lecturers

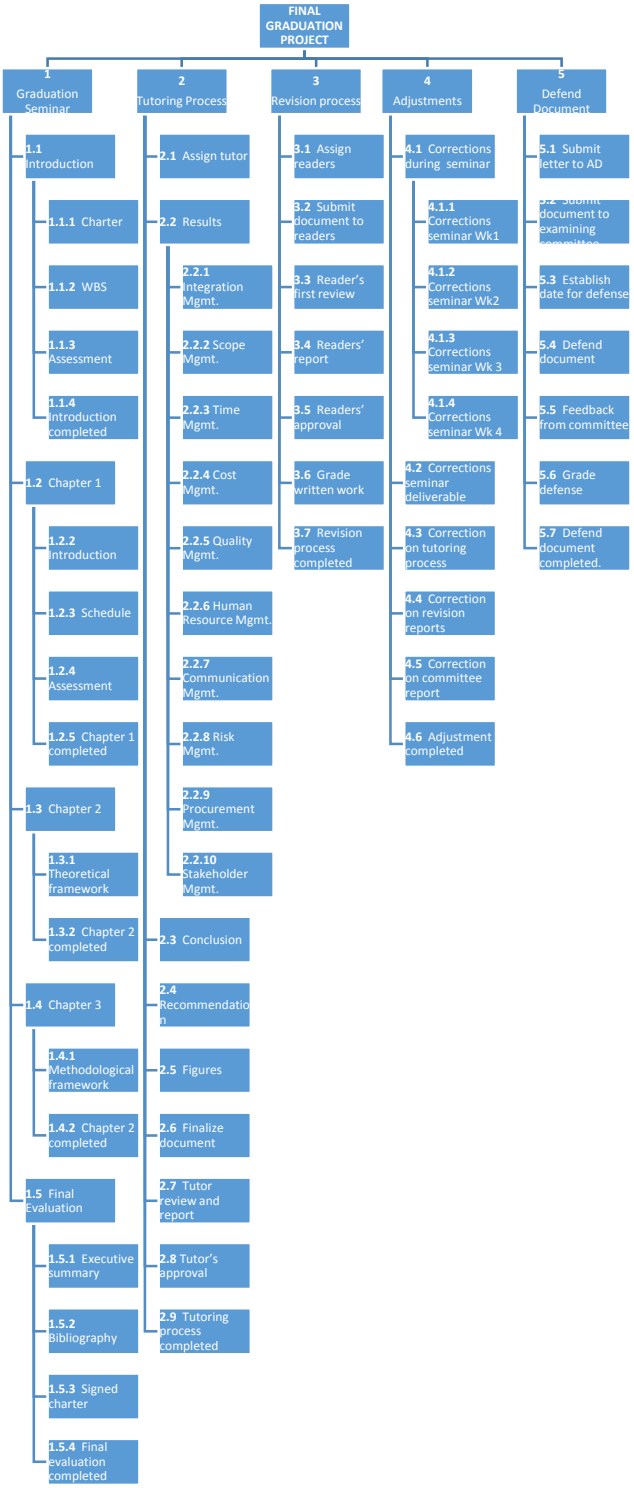
Indirect stakeholders:

Customer Service Department

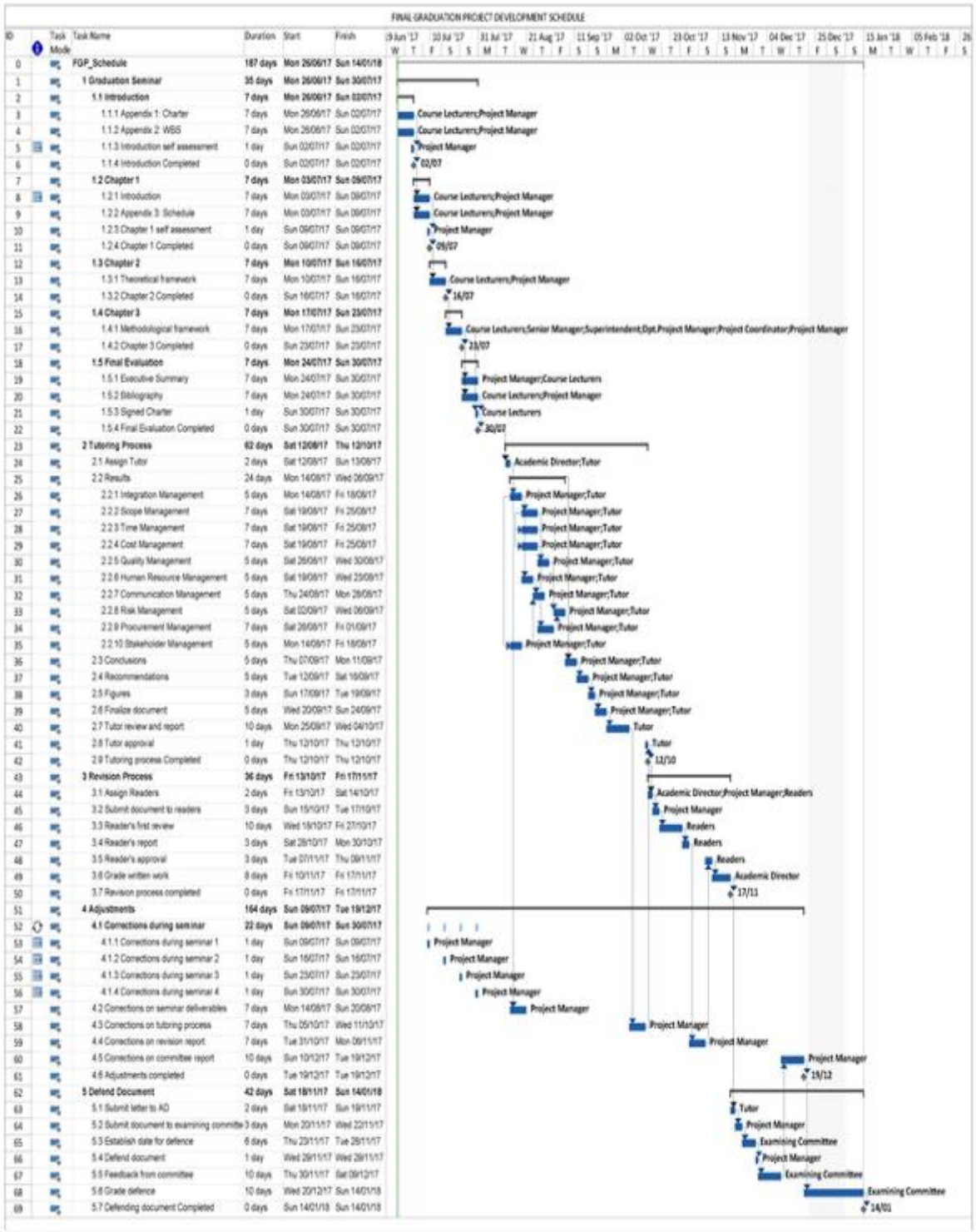
Operations Department

Project Manager: **Ralph Nunez**	**Signature:** 
Authorized by: **Carlos Berenes Mena**	**Signature:**

8.2 Appendix 2: FGP WBS



8.3 Appendix 3: FGP Schedule



8.4 Appendix 4: Revision Dictum

Israel Gonzalez
Belmopan City
Belize
Central America

22nd November 2017

Universidad Para La Cooperacion Internacional
Calle 35
San Jose, 10101
Costa Rica
Central America

To whom it may concern

Ref: Dictum and proof of Philological Corrections

I have reviewed and confirmed that Ralph Eugene Nuñez have made corrections to *"Proposal of a Methodology for Improving Project Management of Distribution Power Line Expansions in Belize Electricity Limited."*

The final graduation project is to be submitted in partial fulfillment of the requirements for the Masters in Project Management (MPM) Degree from Universidad Para La Cooperacion International (UCI).

Given the changes made to the document, I am of the opinion that grammar, sentence construction and general structure are acceptable.

Regards,

Israel Gonzalez

University of North Florida

has conferred on

Israel Trinidad González

the degree

Master of Education

and all the rights and privileges thereunto appertaining.
In Witness Whereof, this diploma, duly signed, has
been issued and the seal of the University affixed.

Issued by the Board of Regents upon the recommendation of the Faculty of the College of Education and Human Services at Jacksonville, Florida, this thirty-first day of July, A.D., 1998.

Governor

UNIVERSITY OF NORTH FLORIDA

Interim President

DEGREE

RESUME

ISRAEL GONZALEZ

ticovan61@yahoo.com

601- 8219

Objective

To assist in the development of the human resources of Belize.

Skills

I am excellent at dealing with people, at problem solving and working as part of a team.

EXPERIENCE

PRINCIPAL – BELMOPAN COMPREHENSIVE
From 2014 - 2016
Responsible for the overall administration of 1200 students and 76 staff personnel. This included supervision, recruitment and evaluation of two vice principals, 60 teachers, and 16 ancillary staff. In addition, reported to the Board of Management and the Ministry of Education.

VICE PRINCIPAL – BELMOPAN COMPREHENSIVE
2005 - 2014
Responsible for student affairs which included discipline, counseling, dealing with parents, preparing schedules, summer courses and handling all CXC protocols. In addition, assisted with the supervision and evaluation of staff. Was acting Principal on three occasions when the institution had no principal.

LECTURER – UNIVERSITY OF BELIZE
1999 – 2002
Courses included: Critical Writing and Research; British and American Literature, College English.

TEACHER – E.P. YORKE HIGH SCHOOL
1991 – 1999
Taught English and Literature at CXC level

EDUCATION

MASTER IN EDUCATION 1998
University of North Florida
GPA: 3.88
Course work included educational leadership, curriculum development and literature courses including Greek, British and American literature.

B.A. ENGLISH EDUCATION (SECONDARY) 1991
University College of Belize

8.5 Appendix 5: Company's Letter of Consent

BELIZE **ELECTRICITY** LIMITED
2 ½ Miles Philip Goldson Highway | P.O. Box 327
Belize City, Belize C.A.
Telephone: 501.227.0954 | Fax: 501.223.0891

27nd November 2017

Universidad Para La Cooperacion Internacional
Calle 35
San Jose, 10101
Costa Rica
Central America
To whom it may concern

Ref: "No Objection to Submission and Publication of "*Proposal of a Methodology for Improving Project Management of Distribution Power Line Expansions in Belize Electricity Limited*"

I have reviewed the paper titled "*Proposal of a Methodology for Improving Project Management of Distribution Power Line Expansions in Belize Electricity Limited*" as prepared for Mr. Ralph Eugene Nuñez in relation to his pursuit of a Masters in Project Management (MPM) Degree from Universidad Para La Cooperacion International (UCI).

I have no objection to the submission and publication of this paper, and I hereby certify that as the Senior Manager, System Planning & Engineering of Belize Electricity Limited (BEL) I have the authority to make this statement.

Sincerely

Mr. Derek Davis
Senior Manager
System Planning & Engineering
Belize Electricity Limited

Web: www.bel.com.bz Email: info@bel.com.bz Toll Free: 0.800.235.2273