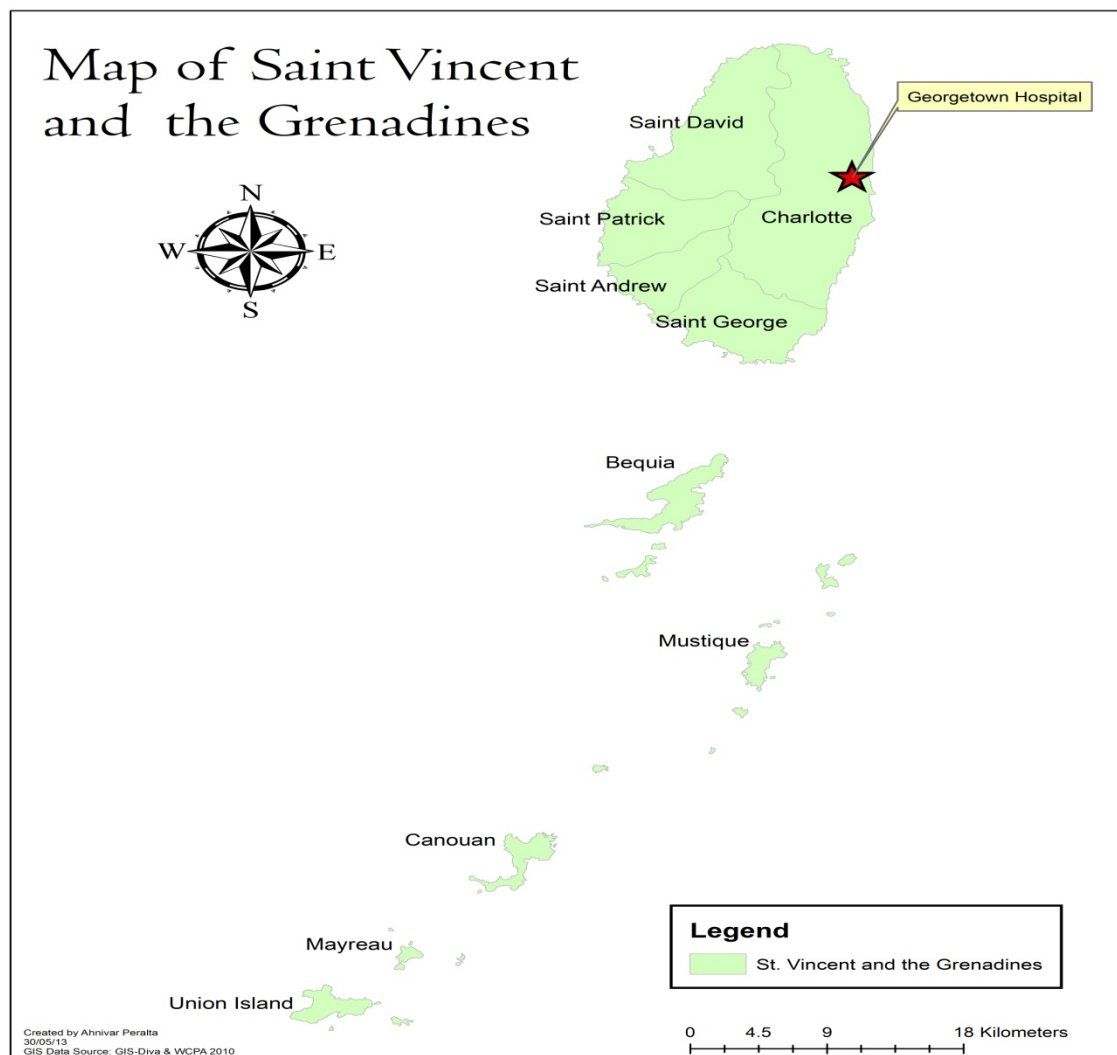


2013

An Economic Appraisal of a SMART Hospital



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Centre
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Introduction

This document presents an economic assessment for retrofitting the Georgetown Healthcare Facility in St. Vincent and the Grenadines. The retrofitted healthcare facility is being carried out under the SMART Hospital Project being funded by the United Kingdom's Department for International Development (UK-DFID). It is expected at the completion of the project the retrofitted health facility will have its structure and resilience enhanced to climate change and extreme weather events, such as categories 4 and 5 hurricanes and tropical depressions. The retrofitted roof has been designed to comply with ASCE 7-05 (as adjusted by the Caribbean Application Document prepared for PAHO by Tony Gibbs) using the wind speed developed as part of the PAHO-USAID study conducted by Peter Vickery of ARA in 2008. The retrofitted roof, therefore, is expected to comply with the strictest security standards against impact, resisting strong winds of up to 150mph and reducing the possibility of forced entry. The retrofitted hospital is also expected to improve the efficiency in water and energy consumption, fire safety, evacuation and security. Additionally, it is to be outfitted with an emergency energy source.

Currently, the hospital is in a dilapidated state, which affects the quality of health service provided. The current roofing of the structure leaks and is susceptible to storm and hurricane force winds. The hospital does not store and use water and energy efficiently as its facilities are outdated and faulty, leading in losses that increases its operating costs. Additionally, there exists no emergency power supply. Although these issues are priorities for the hospital, the government of St. Vincent and Grenadines is not currently in a position to undertake such works due to financial constraints.

The SMART Hospital retrofitting project proposed for St. Vincent and the Grenadines forms part of the Safe Hospitals Initiative in the Caribbean Programme that started in 2009 and is funded by the Department for International Development (DFID). The retrofitting will seek to address the priority issues of the hospital outlined above and as such it entails: (i) strengthening the infrastructure, such as roofing and ceiling, windows, doors, plumbing, electrical system, disposal and sanitation fixtures; (ii) install emergency power and renewable energy supply systems; (iii) facilitate compliance with safety and risk reduction standards on the island, and (iv) build staff awareness and enhance their capacity to serve more effectively and efficiently.

Intervention

The aim of this project is to retrofit the Georgetown Hospital such that it improves the conditions under which health care is provided and reducing the operation and maintenance costs of the hospital whilst simultaneously mitigating the adverse effects of extreme events, such as tropical storms and hurricanes, torrential rains and volcanic eruption.

The project is expected to meet the following objectives:

- Improve ventilation, security, safety, hygiene, accessibility, lighting, heating and cooling, health, sanitation, aesthetics and morale at the Hospital;
- Improve efficiency in water and energy consumption, which will save the Hospital monies that could be use to provide better health care service to the community;
- A retrofitted roofing infrastructure, which compiles with the strictest security standards against storms and hurricanes impact;
- Install a complete rainwater harvesting system and emergency energy supply system (generator and Solar Photo Voltaic, PV)
- Demonstrate how safe (Disaster Risk Reduction, DRR) and Green (environmentally friendly) components can be combined to create a SMART healthcare facility;
- Serve as an example for other public buildings, such as schools, health centres and governmental departments, and private buildings such as private residences and hotels.

Incremental Costs and Benefits

This section presents the total incremental costs and benefits of retrofitting the Georgetown Hospital. Table 1 provides a summary comparison between two options; the 'do nothing' option and retrofitting the Hospital (see Annex 2 for more details).

Table 1: Costs and Benefits of the SMART Hospital

Options	Costs/Issues	Benefits
Do nothing	<ul style="list-style-type: none"> ▪ The continued dilapidation of the hospital, which hinders its efficient operations. <ul style="list-style-type: none"> • Leaking roof • Fading, Peeling and moss/mold growth on the exterior walls • Water Damaged and worn floor finishes • Inefficient Ventilation, Hot water systems, Cooling systems and Water catchment • Inadequate water storage capacity and lack of water treatment • Lack of Fire/ Smoke Alarms, Emergency Lighting System, Emergency exit signage maps, Fire extinguishers and Handicap accessibility • Insufficient provision of shelter from the elements • Vulnerability to wind uplift and hurricane events • Water damage to wooden beams and supporting posts • Insufficient lighting of the ambulance area. • No public restroom facility for visitors. • Outdated power supply system and non-operational emergency power supply ▪ Building code is not resilient to climate change, climate variability and natural hazards 	
Retrofitting (Smart Hospital)	<ul style="list-style-type: none"> ▪ Capital cost of designing and retrofitting the Hospital ▪ Incremental maintenance cost 	<ul style="list-style-type: none"> ▪ Revised hospital design that can withstand greater natural hazards intensities. ▪ Minimized vulnerability to wind uplift of the roof and improved structural integrity of the hospital. ▪ Improved healthcare, reduced mortality and other social spill-off benefits. ▪ Eradicate leaking roof

- Implementation of an effective rainwater harvesting system.
- Improved roof bearing capacity such that it could accept the solar panels for the proposed Photo Voltaic (PV) system.
- Improved Hospital ventilation, security, safety, hygiene, accessibility, conservation, lighting, sanitation, aesthetics and morale.
- Reduced energy demand generally and from the national grid, and improved efficiency in the use and production of electricity.
- Enhanced hospital compliance to safety and risk reduction and staff awareness and development.
- The provision of a baseline from the project from which replication and policy recommendations can be drawn for incorporation into the building codes of St. Vincent and the Grenadines and the wider Caribbean.

To achieve the objective of the Smart Hospital, several areas of work are needed in the hospital. These are listed in Table 2 as well as the cost associated estimated cost for each area of work. These costs represent the initial cost of retrofitting the hospital. However, to sustain the characteristics of the Smart Hospital, future incremental maintenance and operational costs will be incurred.

Table 2: Shows the estimated cost of Retrofitting the Hospital

Items	Description	Cost (US\$)
1	Preliminaries	8866.67
2	Roof Renovations	38996.11
3	Windows	20747.04
4	Doors	28531.63
5	Plumbing and Sanitary Fixtures	24877.78
6	Electrical Works (Light and Power)	52951.85
7	Electrical Works (Emergency Power Supply)	20583.33
8	Electrical Works (Alternative Power Supply)	34374.07
9	Mechanical works	16373.70
10	Interior Furnishings	7461.85
11	Wall Finishes	8893.33

12	Floor Finishes	11583.70
13	Ceiling Finishes	8918.15
14	Code Compliance	11614.07
16	External Works	3024.44
17	New Main Entrance Covering	3007.78
Total Value Added Tax (VAT) 15%		45120.83
Grand Total Cost (including contingencies)		345926.35

Future incremental maintenance and operational costs to be incurred include (see Annex 1 for estimates associated with these activities):

- Building inspections
- Roof checks and maintenance
- Sanitation and safety checks
- Painting
- Administrative
- Insurance
- Labour
- Contingency

Cost-benefit Analysis: Findings

The section captures the findings of the Cost-benefit Analysis (CBA) of the project from a financial and an economic, social and environmental perspective.

Do Nothing

If nothing is done to renovate or retrofit the hospital, the hospital will continue to deteriorate. The estimated cost of doing nothing is based on the expected continued dilapidation of the hospital, which hinders its efficient operations, over the next 20 years.

Table 3: Risk to Hospital Tangible and Non-Tangible Assets

Risk of deteriorate and increase vulnerable to climate variability and climate change	Do Nothing		
	Short-term	Medium-term	Long-term

It is assumed that the cost of deterioration to the hospital is 5% per year of all tangible and non-tangible assets of the hospital.

Low			
Medium		X	
High		X	X

This 5% deterioration per year is related to the aesthetics, security and safe, user take up and fees and inefficient water and light consumption. Additionally, the hospital, as is, is vulnerable to climate variability and climate change as it is not equipped to deal with the potential impact of climate change and extreme events such as hurricanes.

Retrofitting Financial Analysis

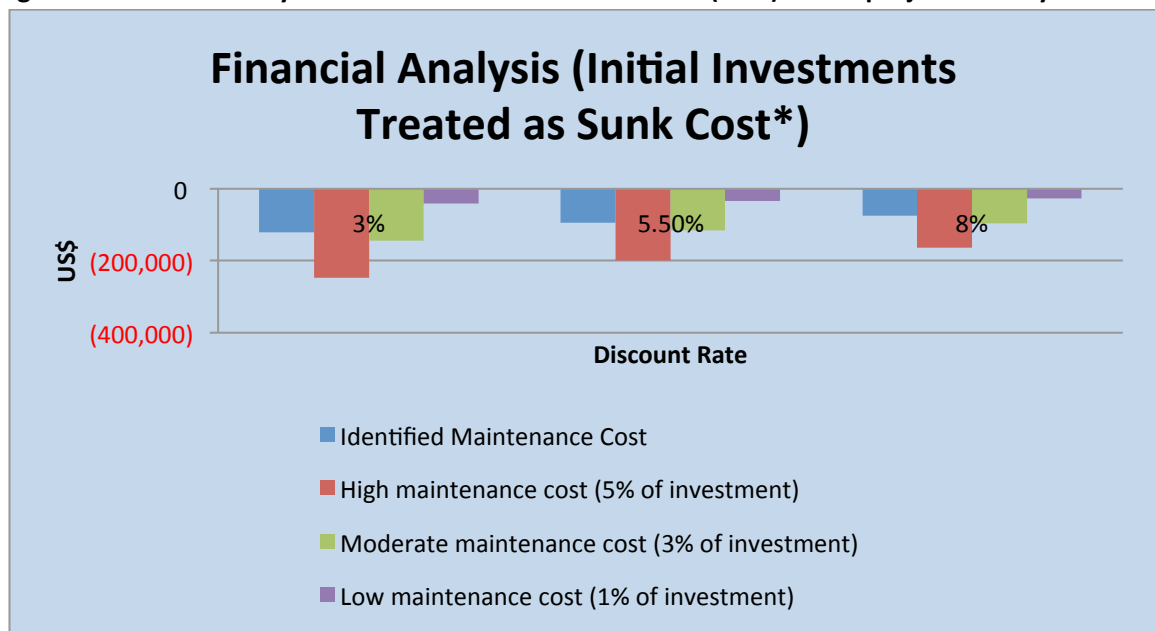
The financial analysis consists of recognizable monetary costs and benefits associated with the project implementation as well as its sustainability overtime. Three potential revenues sources, in the form of savings, were identified. These are namely savings from the efficient utilization of water, savings from rainwater harvested and savings from the efficiency in energy usage. This analysis assumes that the proposed works for the hospital could cause it to become 20% more efficient in water consumption and 10% more efficient in energy consumption. It is also assumed that the hospital could harvest about 200,000 gallons of rainwater each year. Due to the lack of data about user fees and the number of patients who would visit because of the new aesthetics, no assumption was made about the potential increase in the number of patients and revenue that could be generated.

Given the above identified revenue streams, from a financial point of view the project on average could see net losses of US\$1363 to US\$12,360 (2013 prices) per year for 20 years (see Figure 1). The extent of the losses will be dependent on the activities used to operate and maintain the facilities implemented under this project as well as the harnessing of further revenue streams. To financially sustain this project, ways must be found to minimize cost and generate funds. These could include:

- Revenue
 - User fees
 - Indirect taxes
 - Grant funding /donors
 - Fund raising ventures
 - Increased efficiency in water and energy consumption
- Cost

- Hire on a need basis
- Maximize the require length for checks and maintenance without compromising the utility afforded under this project.
- Utilize resources such as labour/skills efficiently

Figure 1: Financial Analysis: Cumulative Net Present Value (NPV) of the project for 20 years



*Initial investment is made to be equal to zero as from a financial point of view it cannot be recovery nor does it improve the financial outlook of the project.

Economic, Social and Environmental Analysis

In conducting the broader economic analysis some economic, social and environmental costs and benefits are identified and included. These are:

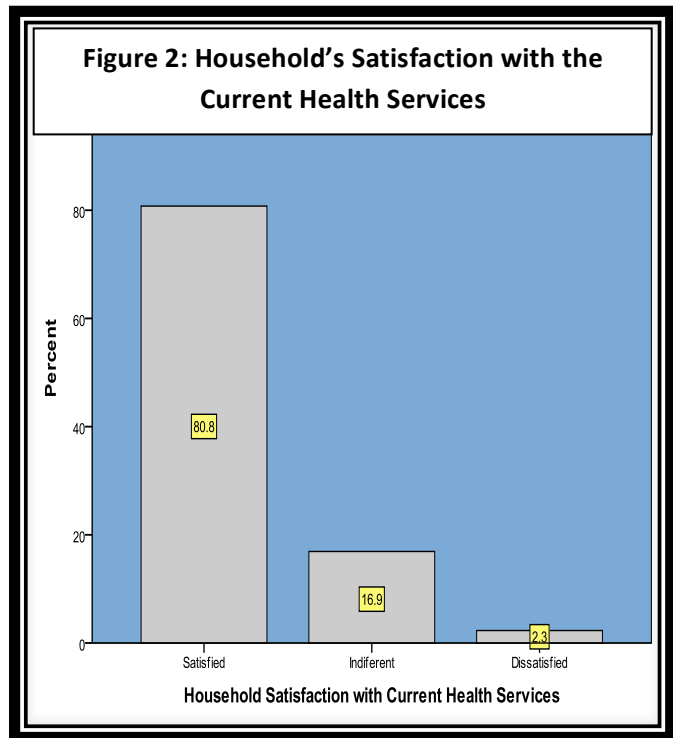
- The avoided transportation cost of patients who would travel from Georgetown to Kingstown to seek medical attention;
- The utility derived from the improved ventilation, security, safety, hygiene, accessibility, conservation, lighting, health, sanitation, aesthetics and morale;
- Lesson learnt from implementing such a building code and the possibility of replication for public buildings, hotels and schools.

Other benefits, not yet valued and included into the analysis, are net emissions and increased storage capacity.

Major Findings of the Willingness and Ability to Pay Survey

A willingness and ability to pay survey¹ was used to estimate the utility derived from retrofitting the hospital. The finding of the survey suggested that 80.8% of respondents were satisfied with the current health service, 16.9% were indifferent and 2.3% dissatisfied.

Despite majority of the respondents suggesting that they are satisfied with the current health service, when asked about their major concerns about the current health care provided, the following suite of responses followed:

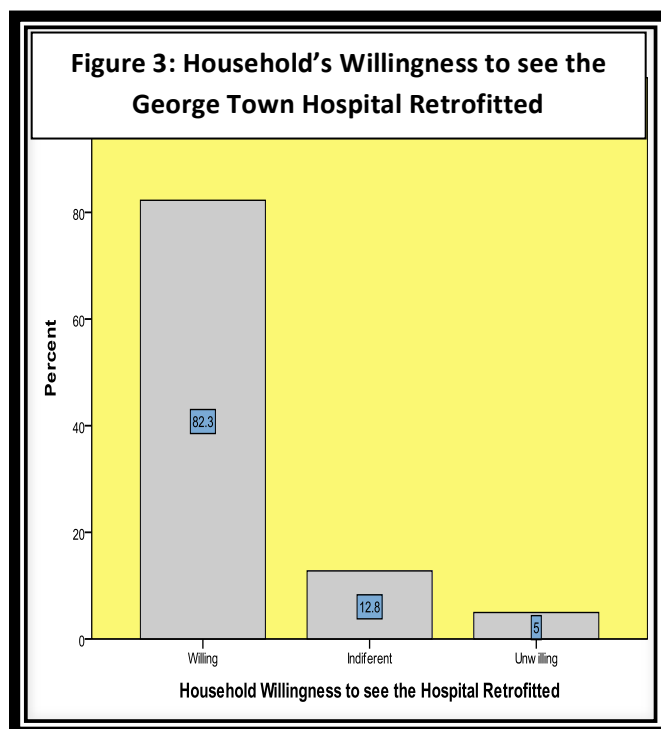


- The Hospital facilities needs urgent upgrading;
- There are inadequate supplies at the hospital;
- The facilities at the hospital are poorly kept and maintained;
- There is a lack of specialist care and the hospital is losing nurses and qualified health professionals;
- There is a lack of privacy with medical records and professionalism is lacking in handling clients;
- The Georgetown hospital should be improved to provide hospital care for persons on the windward side of island;
- Persons on the windward side of the island should not have to be transported to Milton Cato Hospital. They should be treated at Georgetown hospital but the facility there is in need of repairs, proper staff and equipment;
- Better distribution of medical staff is needed to ensure the availability of doctors at rural hospitals such as Georgetown. Improved facilities especially hospitals in Kingstown, Georgetown and Chateaubelair;

¹ See Annex 2 for results of the Willingness and Ability to pay survey.

- Key healthcare services are in Kingstown. Travels to Kingstown are too far and exhausting for sick people;
- Cost of healthcare is high;
- Accessibility to a doctor is sometimes a problem;
- Improved supplies, upgraded facilities and improved security needed for the hospital ;
- Accessibility to an ambulance is an issue.

See Annex 2 for a more detail summary of respondents main concerns about the hospital and quality of service offered at the hospital.



The survey further revealed that 82.3% wants to see the hospital retrofitted, 12.8% are indifferent and 5% unwilling to see the retrofit. It was also found that the average willingness to pay for health services was US\$56 and the average ability to pay was US\$60².

Discounting

In the context of climate change, the decision to invest in social and public projects, which are adaptation and mitigation strategies, are based on the prioritized needs of the society. Given the relevance of these strategies, great care must be taken when selecting the social discount rate, since the benefits of adaptation and mitigation strategies accrue over long periods of time and the choice of social discount rate can make a significant difference in whether the present value of an adaptation or mitigation strategy is positive or negative, or in other words, desirable or undesirable. Recognizing this, The Caribbean Community Climate Change Centre (CCCC) estimated benchmarks for the Social Rate of Time Preference (SRTTP) for selected Caribbean Countries.

² The average presented here is the 5% trimmed mean.

Although, the CCCCC has benchmarked these rates, further research is needed to provide more precise and robust measure. Ramsey's equation is the methodology used to estimate these SRTP. When using Ramsey's equation (Ramsey, 1928) to estimate the SRTP, a major component/parameter is the growth rate of the economies of the Caribbean as such more scenarios related to the potential impact of climate change on the growth rate of the economies is desired. Furthermore, research is also needed to understand if and how the social discount rate differs across projects as well as its evolution with uncertainty and over time.

Discount rates of 3%, 5.5% and 8% were used in this analysis. CCCCC estimated that the SRTP for St. Vincent and the Grenadines is 3.58%; however, sensitivity analysis suggested it could range from 3% to 8%. Given the estimated lower and upper bounds for the SRTP, the discount rate was applied using three scenarios: the lower bound, midpoint and upper bound. This, it is believed, better equip policy-makers to make an informed and reasoned decision.

Economic Appraisal

The economic value of the project is presented across four scenarios of utility, which is the capacity of a service to satisfy human want. The utility derived from the improved ventilation, security, safety, hygiene, accessibility, conservation, lighting, health, sanitation, aesthetics and morale is assumed as a percentage of household's willingness to pay (WTP) and ability to pay (ATP) for health services at the hospital (See Table 4).

Table 4: Values placed on Utility per Patient

Percentage	WTP (US\$)	ATP (US\$)
20%	12	11.2
30%	18	16.8
40%	30	28

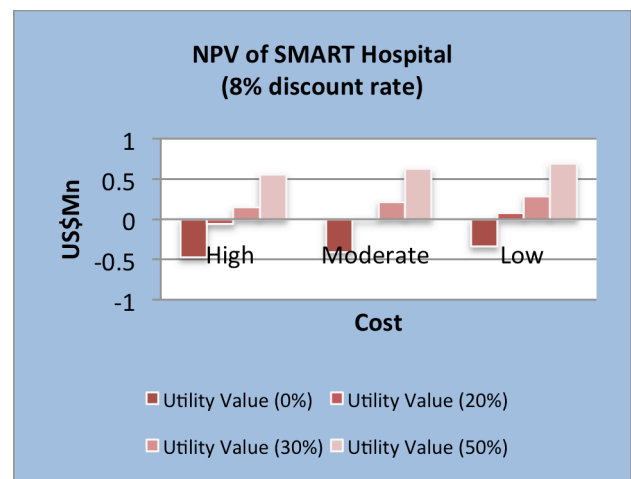
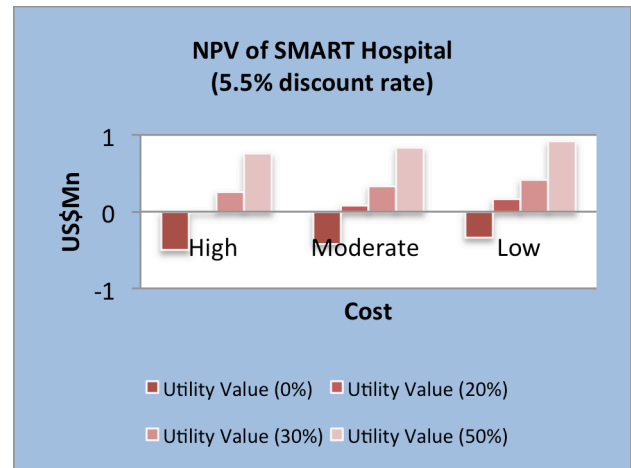
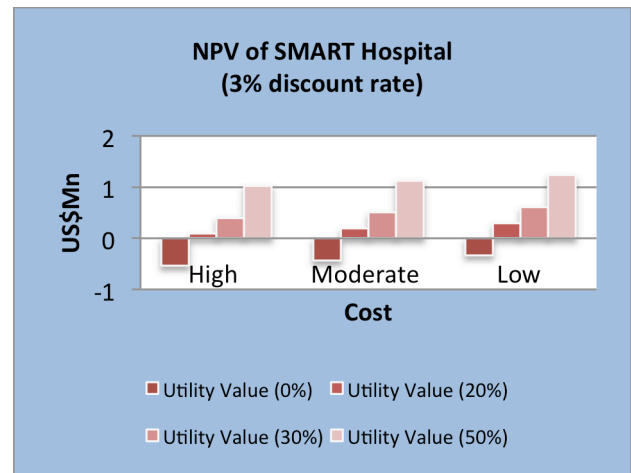
The project is found to have a positive NPV if the value utility per person is about 20% or more of the willingness and ability to pay for health services, which is greater than or equal to US\$11.2 and US\$12 per patient respectively (See Figure 4 and 5).

Sensitivity Analysis

The results of the CBA are sensitive to the assumptions regarding the value of the utility to be derived from those who use the hospital and costs associated with operating and maintaining the facilities implemented under this project.

- In this version of the analysis such utility is valued at 20%, 30% and 50% of the household’s willingness and ability to pay for health services (US\$11.20-12, US\$16.80-18 and US\$28-30 per person respectively). If the value is reduced below 20% of the household willingness and ability to pay for health services, the NPV of the project becomes negative across the three discount rates.
- The operations and maintenance cost also play a big role in determining the

Figure 4: ATP- Economic Analysis (Includes initial investment)



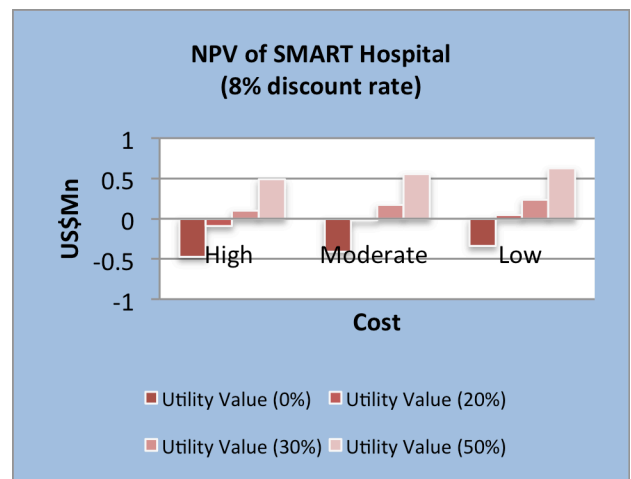
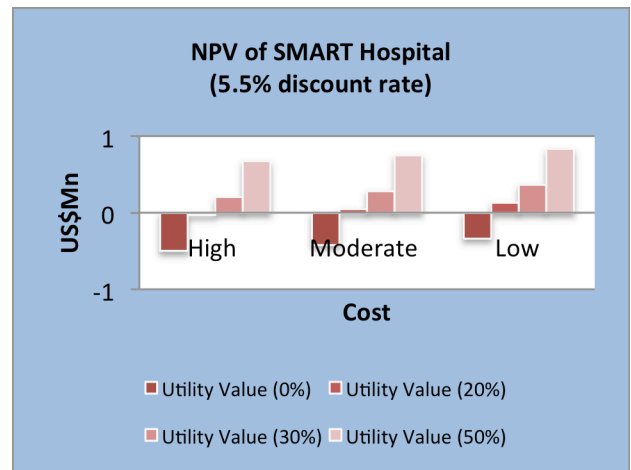
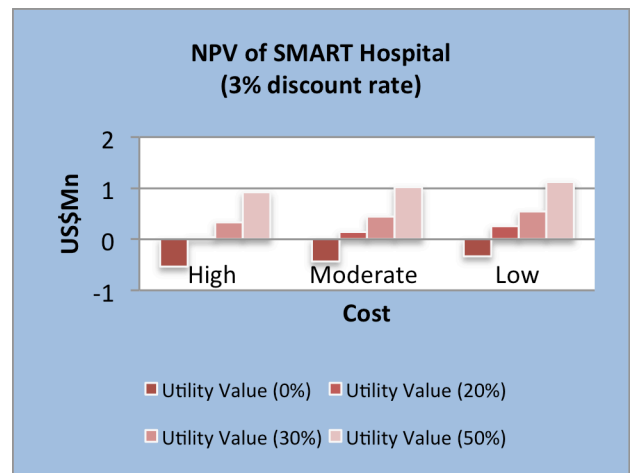
feasibility of this project. Increases in the operation and maintenance cost of the facilities implemented under this project could undermine the worthiness of the project; therefore, cost effective means must be found to maintain and operate the facilities.

Risk and Uncertainty

There risk and uncertainty associated with retrofitting the Georgetown Hospital are deep rooted within the following categories, these include:

- Extreme Events/Hurricanes - The retrofitting exercise is expected to be implemented in what is expected to be an active hurricane season (Hurricane Season 2013) as such setbacks could occur if the island of St. Vincent and the Grenadines are impacted;
- Human Resource Barriers - One of the biggest challenges thus far is in identifying the right skilled contractors to carry out the works as some techniques are new and others require contractors with good experience and knowledge in Disaster Risk Reduction (DRR) and Climate Change (CC);
- Delays/ Time Barriers - This is due mainly to delays in the tender process. The tender process has been long and

**Figure 5: WTP- Economic Analysis
(Includes initial investment)**



has resulted in a late start of the demonstration aspects. Many of the components outlined in the scope of works have to be sourced outside of the local project environment which can result in extended shipping times. Those that can be sourced locally have to be validated and examined closely to ensure that they meet the required specification and standards.

- Financial Barriers - The funding allocated for the demonstration component is specific and as such the scope of works had to be adjusted based on proposals received. The challenge here is ensuring maximum benefits and greatest impact from the limited allocations.
- Communication Barriers - Keeping all stakeholders involved and informed can be challenging as well as there are many players in the DRR and CC arena who must be part of the implementation and review process. Extensive administrative process within implementing agency contributed to delays.

Attribution to DFID

DFID contribution to this effort is one that is timely and greatly appreciated. Like many of the other CARICOM countries, St. Vincent and the Grenadines is constraint fiscally due to indebtedness. In 2012, St. Vincent and the Grenadines had debt to GPD of 65.7% of GDP³. Given the fiscal constraints of the government of St. Vincent and the Grenadines, the contribution by DFID is making it possible for this intervention. Beyond improving the functionality of the Hospital, this contribution is also important as it aids the region to grapple with the effects of climate change whilst embarking on development in a sustainable way.

Conclusion and Recommendation

Retrofitting the George Town hospital is more favorable than the do nothing option. Do nothing in the medium to long term put the hospital's assets, tangible and non-tangible, at a high risk of greater deteriorate and increase vulnerable to climate variability and climate change. Contrary, retrofitting the hospital in the short-term is the better option as it will result in a facility that is user and staff friendly with better ventilation, security, hygiene, accessibility, conservation, lighting, sanitation and aesthetics.

³ Eastern Caribbean Central Bank (2013). Retrieved on June 4, 2013, from: <http://www.eccb-centralbank.org/Statistics/>

However, the identified revenue streams from retrofitting the hospital in the form of savings from the efficiency utilization of water, savings from rainwater harvested and savings from the efficiency in energy usage, will not make the project financially sustainable over 20 years. It is therefore imperative that the cost of maintenance and operation is minimized and other sources of revenue schemes are identified to financially support the project over its lifespan.

From an economic, social and environmental perspective the project is desirable and it becomes even more desirable if the community (users and staff) derives significant utility from seeing the hospital retrofitted which includes improved ventilation, security, safety, hygiene, accessibility, conservation, lighting, health, sanitation, aesthetics and morale. Furthermore, this project presents a building code for St. Vincent and Grenadines that other public buildings, schools, hotels and other private building could adhere to.

Annex 1: Summary and Justification of Key Analytical Parameters Facts and Assumptions of the Model

- The initial cost to retrofit the Hospital is 350.000 USD.
- The model assumes a lifespan for the project of 20 years.
- All dollars are in US\$ 2013 prices and inflation is assumed to be zero over the 20 years.

Costs Assumptions

- Maintenance and replacement cost is assumed to be 1%, 3% and 5% of the initial investment. It is assumed that 1% represents a low cost maintenance initiative, 3% moderate cost and 5% high cost. Note that operational and administrative costs are separate and apart from the maintenance cost and are estimated as detailed below.
- An additional scenario (identified maintenance cost) is provided where values are estimated for expected maintenance activities such as painting, roof checks and repairs and other provisional expenditure associated with the maintenance of the building.
 - Painting is assumed to be done every ten (10) years at US\$60,000 per year.
 - Roof checks and minor repairs are assumed to be done annually at a cost of US\$1500 per year, starting in year two (2).
 - Other provisional maintenance expenditure assumed to be 0.5% of the initial investment.
 - Replacement cost related to door, windows, among other things is estimated to cost approximately US\$2500 every three (3) years, starting in year three (3). This is against the background that some doors and windows may have to be replaced after a hurricane has passed.
 - Fillers and treatment cost assumed to be US\$1000 per year.
- Administrative Cost - This is assumed to be 0.25% of the initial cost of retrofitting the hospital
- Insurance Cost - This is assumed to be 0.1% of the initial cost of retrofitting the hospital
- Labour Cost - It is assumed that one person will be hired to oversee the maintenance and upkeep (caretaker) of the SMART Hospital. This person is assumed to be paid US\$600 per month.
- Carbon emitted when the generator is used for emergency power (not measured and including in the analysis presented)
- Fuel needed of the generator (not measured and including in the analysis presented)

Benefits Assumptions

- The Ability and Willingness to pay Survey conducted on the island in 2013 revealed that several persons travelled to the Hospital in Kingston due to the dilapidated conditions among other things at Georgetown Hospital. One of many household comments

“Cost of health Care is a little high and sometimes we can’t get access to see a doctor. Accessibility to an ambulance is an issue. The condition of the building is awful. In need of much needed repair.”

If the Hospital is retrofitted it will save some clients having to travel from the Windward side to Kingstown Hospital. The average cost for transport from the windward side of the island to Kingston range from US\$2.22 to US\$3.70 (EC\$6 to EC\$10). It is assume that with the retrofitted Hospital, all other things constant, clientele could increase by 10%. Over the past 5 years admissions, casualties and nebulization average about 3500 patients per year.

- With the proposed plumbing works and installation of more water efficient faucets and shower heads, it is assumed that water consumption will decrease by about 30% per gallons/bed/day. For the period 2009-2011 the average water consumption was 5400 gallons per day. Note that this assumption ignores the potential increase in water demand due to the potential increase in the take up of the Hospital services.
- With proposed electrical work (light and power) which includes re-wiring and installing light bulbs, switches, breaker panels, surge protector and a transformer unit, it is assumed that energy efficiency will increase by 10% (assumed net result of intervention). The improved energy efficiency is valued at 10% of the current energy consumption and cost. The Hospital reportedly paid on average US\$1000 (EC\$2,700) per month.
- The Ability and Willingness to Pay Survey also revealed that clients were on average able and willing to pay to US\$60 and US\$56 (EC\$161 and EC\$151) respectively for improve health service per visit. (Check, questionnaire asked the question about cost per month but should have been cost per visit). It is assumed that 20%, 30% or 50% of the aforementioned valued is placed on the value placed on the utility to be derived from the improved ventilation, security, safety, hygiene, accessibility, lighting, health, sanitation, aesthetics and morale. This value is multiplied by the average number of visitor to hospital over the period 2009-2011.

- For the period 2009-2011 the average water consumption was 5400 gallons per day. It specified that in the project document that the storage tank(s) must hold at least 2 days supply of water. Assuming that a 10,000 gallon tank is installed and it is 'cycled' 20 times during the year, a total of 200,000 gallons would be used. This when priced at US\$0.007 (EC\$0.02) per gallon, which is going market rate, amounts to saving of US\$1,400.00 (EC\$3,780).
- The value of energy produced during the periods of block out and or a natural disaster is used to represent to benefits of having a emergency supply. Note that no premium is added onto this. (not measured and including in the analysis presented)
- Solar system. (not measured and including in the analysis presented)
- It is estimated that St. Vincent and the Grenadines is affected by hurricanes every 3.2 years and suffers a direct hit on average 23.5 years⁴. In 2010, Tomas, a category two hurricane, caused damages of US\$3.3 millions, with no reported death. In 2004, Ivan, a category one hurricane, caused damages amounting to U\$40million⁵. Included in these figures were damages to roads, houses, public buildings, schools, hospitals among other things. It is against this background that the assumption that 1% of US\$3.3 million could have been avoided if the hospital and other public buildings adapted this building code. This new building code developed and adapted for this project will also have far-reaching benefits if retrofitting the hospital serves as a pilot for public buildings, hotels and schools.

Note that this estimate grossly underestimates the value of the building code as it ignores the multiplier effects associated with the injection of money each year into the economy as well as the positive externality associated with the improved aesthetics.

⁴ Hurricane City , 2011. Retrieved on May 30, 2013, from: <http://www.hurricanecity.com/city/saintvincent.htm>

⁵ NOAA, 2013. Retrieved on May 30, 2013 from: <http://www.nhc.noaa.gov/2004ivan.shtml?>

Annex 2: Scope of Works and Technical Specifications

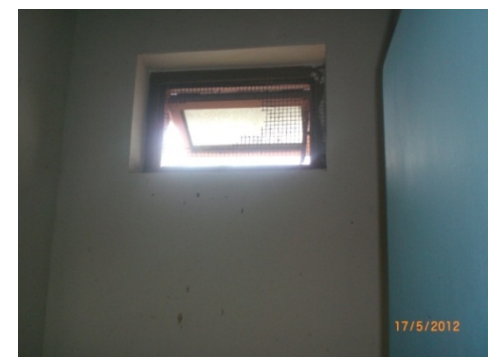
ITEM NO.	AREA/ROOM	ITEM DESCRIPTION (DEFECT, ISSUE)	SCOPE OF WORKS REQUIRED	COST BENEFIT
				PHOTOGRAPHS AS ATTACHED AS GUIDE
2	Roof Renovation Hospital Only	<p>Defect:</p> <ul style="list-style-type: none"> Corrosion and Leaking of the galvanize sheeting. The verandas and the main entry roof are very vulnerable to wind uplift. Water damage to fascia boards. <p>Issue:</p> <ul style="list-style-type: none"> The existing galvanize sheeting on the Hospital shows visible corrosion, wear and tear and water leaks through the joints of the existing tongue and groove ceiling. Roof has no felt/waterproofing layer. Gable roof design is not ideal for high wind/hurricane areas. The roof design has a high potential of wind uplift due to the large extension of the main roof structure over the verandas, at the gable ends and at the main entry roof. 	<p>Works Required:</p> <p>General</p> <ol style="list-style-type: none"> Remove all existing galvanize sheeting material to the main roof including the main entry drop roof section. Remove all hipped end roof sections with asphalt shingle coverings (4 sections total). Replace or make good any damages to the wood rafters and tongue and groove ceiling boards. Install new rafters between existing rafters, new girders to existing girders and construct new capping beam sections with concrete slab in place of the hipped end roof sections, as specified. (See Roof Plan drawings and Appendix for details). Minimize all overhangs to 12 inches, augment all gable ends and install a new guttering system as specified. Separate all main roof overhangs over verandas and install 3 no. new drop shed roof sections (See Roof Plan for details). Extend existing building ring beam and secure all end rafters as specified (See Roof Plan for details). Install felt/waterproofing membrane with treated 2x4 laths and secure to roof (See roof plan for details). Install new heavy gauge galvalume sheeting with corrosive proof fasteners and make good all necessary flashing connections. All galvalume sheeting, fasteners and flashing shall be factory painted with a light color (grey or white) reflective paint. <p>Specifications:</p> <ol style="list-style-type: none"> All roofing material installation shall be conducted in accordance to Manufacturers requirements and in strict compliance with the Local and International building regulations and guidelines. For water guttering system, use commercial grade PVCu Sovereign style guttering system 117 x 55mm (70 cm2); white with all downspouts, parts and fittings. For waterproofing membrane, use 30lb. self- adhesive waterproof felt on roof. For galvalume sheeting, use 24 gauge pre-painted, industrial profile Galvalume sheeting with matching fasteners and flashing. The choice of colour must be approved by Project Manager. 	<p>Benefit:</p> <ul style="list-style-type: none"> To address the roof leaking issues and water damages to the fascia board. To minimize the wind uplift vulnerability on the roof and improve its structural integrity. To ensure effective capture of rain water for use. To improve the roof's bearing capacity to accept the solar panels for the proposed Photo Voltaic (PV) system. The roof retrofit has been designed to comply with ASCE 7-05 (as adjusted by the Caribbean Application Document prepared for PAHO by Tony Gibbs) using the wind speed developed as part of the PAHO-USAID study conducted by Peter Vickery of ARA in 2008. Because of the function and age of the building, the 700-year wind speed has been used.








- e) For any roof painting works, check paints for suitability, and where possible use non-toxic acrylic based paints designed for exterior and roof use. Do not use paints containing lead, chromate, tar/bitumen, fungicides or other toxins as they may pose a health risk and/or may impart an unpleasant taste to the water; colour to be approved by Project Manager.
- f) Do not allow runoff water from the first rainfall to enter the storage tank. Instead it should be discarded or used for nondrinking purposes.
- g) See Appendix for Roof Structural retrofitting specifications.



ITEM NO.	AREA/ROOM	ITEM DESCRIPTION (DEFECT, ISSUE)	SCOPE OF WORKS REQUIRED	COST BENEFIT
				PHOTOGRAPHS AS ATTACHED AS GUIDE
3	Windows Hospital only	<p>Defect:</p> <ul style="list-style-type: none"> Inoperable, outdated and not secure. <p>Issue:</p> <ul style="list-style-type: none"> Most of the windows are wooden louvered windows that are water damaged and inoperable. Some of them are even missing louvers and have rusted wire screens as a security barrier. 	<p>Works Required:</p> <p>General</p> <ol style="list-style-type: none"> Remove all windows and transoms from the Hospital. Make good all openings and increase window sill height, as specified. Install Air Master Jalousie windows in all openings with transoms. All windows must be energy efficient, glazed and hurricane rated with security features (see window schedule for size, type and quantity). <p>Specifications:</p> <ol style="list-style-type: none"> All window installation shall be conducted in accordance to Manufacturers requirements and in strict compliance with the Local and International building regulations and guidelines. Air Master Aluminum and Glass Security Jalousie Windows 4" Master Guard 6063 T-5 Aluminum extrusions Polyurethane Powder Coating baked at 400°F after a cleaning and etching process. <ul style="list-style-type: none"> Weather-strip: Virgin vinyl at jambs. Wool pile at vents, head and sill. Glass: 1/4" clear, solex or bronze annealed. Typical Size: 12 blades, 58 3/4" in height x 30" in width each section. 2 sections per installation. Typical size: 3 blades, 16" height x 24" width for restrooms. Typ. Installation for main windows: Window sill height shall be raised 2'-0" above finish floor level (FFL) or as specified. Air Master Aluminum and Glass Continental Picture Windows Series Fourth Generation. 6063-T-5- Aluminum Extrusions 0.062" gauge. <ul style="list-style-type: none"> Finish - Polyurethane powder coating baked at 400 degrees F after a cleaning and etching process. Weather-stripping – virgin vinyl at perimeters of vent and at head, sill and frame jambs. Glass – 1/4" annealed glass or 5/16" Hurricane Resistant Glazed consisting of (2) 1/8" annealed glass and (1) 0.090" P.V. B interlayer. Perimeter frame corners cut at 45 degrees. Typical Size: 13" height x 60" in width for transoms or match to fit typical two (2) section window installation. 	<p>Benefit:</p> <ul style="list-style-type: none"> To improve the Hospital ventilation and provide an increase level of security. To increase the Hospitals resilience to hurricane disasters. Air Masters complies with the strictest security standard against impact, resisting strong winds of up-to 150mph and reducing the possibility of forced entry.



ITEM NO.	AREA/ROOM	ITEM DESCRIPTION (DEFECT, ISSUE)	SCOPE OF WORKS REQUIRED	COST BENEFIT
				PHOTOGRAPHS AS ATTACHED AS GUIDE
4	Doors: Interior and Exterior Hospital only	<p>Defect:</p> <ul style="list-style-type: none"> Exterior doors are damaged and lack sufficient security features Interior doors are damaged and lack hygienic features <p>Issue:</p> <ul style="list-style-type: none"> Most of the exterior doors are plantation style/wooden doors with fixed louvers that are ineffective against wind driven rain and debris and offer no level of security. Most of the interior doors and jambs, especially in the restroom areas, are water damaged and lack proper door knobs. 	<p>Works Required:</p> <p>General</p> <ol style="list-style-type: none"> Remove all interior and exterior doors and make good all openings. Install new exterior doors with fire rated exit doors with panic mechanism and glass sash (see door schedule for exterior door type and quantity). Install new interior doors with GRP hygienic fire rated doors equipped with anti-microbial door handles and fixtures (see door schedule for interior door type and quantity). Remove all bi-fold wooden louvered doors at the male, female and maternity wards with hurricane rated doors (See door schedule for door type and quantity). <p>Specifications:</p> <ol style="list-style-type: none"> All door installation shall be conducted in accordance to Manufacturers requirements and in strict compliance with the Local building regulations and guidelines. For all door specifications, see door schedule for information. 	<p>Benefit:</p> <ul style="list-style-type: none"> To improve the Hospitals protection from the elements accessibility and security. To improve the level of hygiene throughout the Hospitals. <p>Exterior Doors Of Hospital</p>  <p>Exterior Louvered Bi-fold Doors at the Hospital</p> 

ITEM NO.	AREA/ROOM	ITEM DESCRIPTION (DEFECT, ISSUE)	SCOPE OF WORKS REQUIRED	COST BENEFIT
				PHOTOGRAPHS AS ATTACHED AS GUIDE
5	Plumbing Works & Sanitary Fixtures Hospital only	Defect: <ul style="list-style-type: none"> • Most fixtures are leaky and outdated. • All sink traps are in bad shape and restrooms have no floor drains. • Most back-flush toilets are outdated and damaged. • Shower stalls are unusable and unfinished. Issue: <ul style="list-style-type: none"> • Most of the faucets and shower heads in the restrooms are constantly leaking. They have no proper shut off valves. All of the face basins have derelict sink traps. • The shower stalls are in disrepair and require repair. • Most of the toilets are outdated, back flush toilets and most of them are not flushing properly. • There are no urinals in the male restrooms. • There are no floor drains in the restrooms which most times flood due to the leaking faucets. 	Works Required: General <ol style="list-style-type: none"> All plumbing installations shall be conducted in accordance to the Manufacturers requirements and in strict compliance with the Local building regulations and guidelines. Restrooms <ol style="list-style-type: none"> Replace all face basins and faucets with wall mounted sinks in the restrooms as specified. Replace associated plumbing with aerated sink traps, fittings and shut-off valves as specified. Refurbish all cold water supply lines as specified with shut off valves. Reorganize bathroom plumbing to utilize both rainwater and potable water. Install floor drains to minimize flooding of the restrooms (see restroom drawings for locations and details). Replace all the existing toilets with commercial grade toilets and install urinal in male restroom as specified (see restroom drawings for details). Install new shower stalls (4 No.) as per drawing and make allowance for hot water supply and new water efficient fixtures as specified. Kitchen <ol style="list-style-type: none"> Remove all sink traps and replace with aerated sink traps, fittings, cleanouts and shut-off valves. Refurbish all sinks (2 No.) and make good all sink connections. Refurbish all cold and hot water supply lines as specified with shut off valves. Reorganize plumbing to utilize both rainwater and potable water. Install grease trap interceptor and connect to both kitchen sink outlets as specified. Sluice Room <ol style="list-style-type: none"> Remove all wall mounted faucets, water storage tanks, sluice sinks (1 No.) and traps with aerated sink traps, fittings and shut-off valves as specified. Install new sluice unit and make good all sink connections including 	Benefit: <ul style="list-style-type: none"> • The installation of new faucets, face basins, shower heads and PVC shut-off valves and pipe refurbishment will eliminate pipe leaks and water wastage. • The toilet upgrades will reduce blockages and promote water savings. • The re-organization of the plumbing will retain the facilities flexibility to have access to both potable and rain water in the event of water shortages. • It will improve the level of hygiene and venting of the pipes throughout the Hospital. <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Male Restroom</p>  </div> <div style="text-align: center;"> <p>Female Restroom</p>  </div> </div> <div style="text-align: center;"> <p>Condition of Back-flush Toilets in all restrooms</p>  </div>

traps, fittings, shut off valves and all other items required for the installation (see drawings for details and Manufacturing specifications for installation).

- c) Refurbish all cold and hot water supply lines with new shut off valves.
- d) Reorganize plumbing to utilize both rainwater and potable water.

Sterilization and Delivery Room

- a) Remove all sink traps and replace with aerated sink traps, fittings, cleanouts and shut-off valves.
- b) Refurbish sinks (1 No. per room) and make good all sink connections.
- c) Refurbish all cold and hot water supply lines as specified with new shut off valves.
- d) Reorganize plumbing to utilize both rainwater and potable water.

Casualty, Intensive Care and Nurse in charge Rooms

- a) Replace all counter mounted sinks with faucets (1 No. per room) and traps with aerated sink traps, fittings and shut-off valves.
- b) Install to new counters and make good all sink connections as specified.
- c) Refurbish all cold and hot water supply lines with new shut off valves.
- d) Reorganize plumbing to utilize both rainwater and potable water.

Male, Female and Maternity Wards

- a) Remove all existing sink traps and replace with aerated sink traps, fittings, cleanouts and shut-off valves.
- b) Replace all wall mounted sinks (1 No. per room) and make good all sink connections.
- c) Refurbish all cold and hot water supply lines with shut off valves.
- d) Reorganize plumbing to utilize both rainwater and potable water.

Laundry Room

- a) Refurbish existing wash basin and base and install new storage cabinets as specified in drawings.
- b) Replace all wall mounted sink faucets and sink traps with sink traps, fittings, cleanouts and new shut-off valves.
- c) Refurbish all cold water supply lines and install hot water supply lines as specified with shut-off valves.

Condition of Kitchen Sinks & Traps



Condition of Sluice Sink and trap



Sterilization Room



Delivery Room



Water Pump Housing

- a) Demolish and replace the water pump housing as specified in drawing with new the access door. Make good all electrical outlets and connections as per code and raise existing floor slab 6" min. above existing grade to minimize flooding of room.
- b) Re-organize all water lines and anchor to wall with identification tags.
- c) Disconnect all existing PVC pipe connections from existing water storage tanks and install new water pump and replace all PVC pipes, connections and shut-off valves.
- d) All public supply lines should be replaced if necessary and make good all PVC pipes, connections, shut-off valves and install new water pressure reducing valves as recommended.

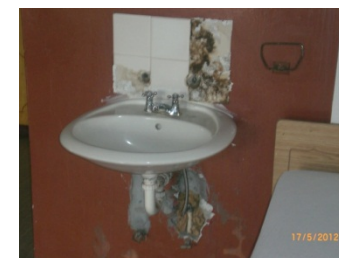
Specifications:

- a) For all restroom, shower stalls, plumbing fixtures, fittings and accessories, see Appendix and restroom drawings for details and further specifications.
- b) All toilets shall be American standard Yorkville FloWise Right Height EL Pressure-Assisted toilet 1.1 gpf/4.2 Lpf
- c) Male restroom urinal shall be American Standard Washbrook FloWise Universal Urinal.
- d) Male, Female, Maternity Patient restroom and all Ward sinks shall be American Standard Murro Universal Design Wall hung lavatory with Ever clean.
- e) Ambulance driver, Private room and Aux. staff restroom shall use American Standard Comrade Wall hung lavatory.
- f) Staff restroom shall use American Standard Cadet Ever clean oval countertop sink as specified.
- g) All sinks for the Casualty and Examination Room shall be an 18 gauge type 304, 18, 8 stainless steel sink. In addition, the sink faucet shall be a Concealed Ledgemount faucet with CuVerro Antimicrobial Cooper-Nickel Alloy. Both by Just Manufacturing Company.
- h) See drawings and Appendix for all other details and specifications.

Condition of Casualty, Intensive Care and Nurse i Charge Sinks and traps



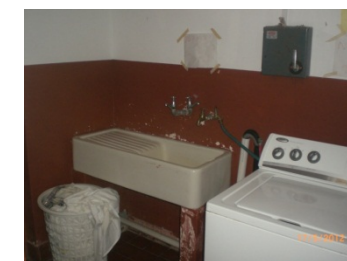
Condition of Sinks at the Ward Areas



Water Pump Housing





Laundry Room Wash Basin





ITEM NO.	AREA/ROOM	ITEM DESCRIPTION (DEFECT, ISSUE)	SCOPE OF WORKS REQUIRED	COST BENEFIT
				PHOTOGRAPHS AS ATTACHED AS GUIDE
6	<p>Electrical Works- Lights & Power</p> <p>(Lights- Interior and Exterior, Light switches, Receptacles, Breaker Panels, Emergency lights, Emergency Exit signs and Exhaust fans)</p> <p>Hospital only</p>	<p>Defect:</p> <ul style="list-style-type: none"> • Outdated breakers and breaker panels. • Non-operational/Insufficient lights, switches and electrical receptacles. • Exposed electrical wiring <p>Issue:</p> <ul style="list-style-type: none"> • Most of the electrical light fixtures are not working, outdated and rusted. • Some of the lights are insufficient and doesn't provide adequate light especially in areas where the ceiling is very high. • Some of the receptacles are inoperable and require GFCI rating based on their locations. • Some of the light switches are inoperable in some areas and others are located in inappropriate locations in relation to their corresponding light unit. • The perimeter lights are not adequate and needs to be placed in effective areas around the building. • The building electrical systems are outdated and require an overall upgrade including all wiring, grounds and electrical breakers. 	<p>Works Required:</p> <p>General</p> <ol style="list-style-type: none"> Conduct an overall electrical re-wiring of the building and make allowance for all works involved with cutting holes, chases, conduits and electrical services installations through and in roofs, floors and walls. Upgrade all electrical receptacles, lights, switches, breaker panels and wiring in areas as specified on the detailed electrical drawings. To include all fixtures, fittings, energy efficient bulbs and other specified accessories. Make provisions for Surge protection and a transformer unit if necessary. <p>Specifications:</p> <ol style="list-style-type: none"> All Electrical installations shall be in accordance to the Manufacturers specifications and in strict compliance with local and international building regulations and guidelines. All light bulbs and fixtures shall be used to accommodate T8 LED fluorescent tubular bulbs. (See electrical light drawings for fixture type, location and quantities). See electrical light drawings for other light bulb and fixture type specified. 	<p>Benefit:</p> <ul style="list-style-type: none"> • It will improve the poor lighting conditions and reduce energy demand. • It will improve the safety of the building and enhance the buildings level of security.








ITEM NO.	AREA/ROOM	ITEM DESCRIPTION (DEFECT, ISSUE)	SCOPE OF WORKS REQUIRED	COST BENEFIT
				PHOTOGRAPHS AS ATTACHED AS GUIDE
7	<p>Electrical Works – Emergency Power Supply</p> <p>Hospital and Clinic</p>	<p>Defect:</p> <ul style="list-style-type: none"> Non-operational and outdated <p>Issue:</p> <ul style="list-style-type: none"> There is no operational backup power supply that supports both the Hospital and the Clinic. 	<p>Works Required:</p> <p>General</p> <ol style="list-style-type: none"> Disconnect all electrical connections from the existing generator and make allowance for all necessary trenching, concrete surrounds, sand bed earthing support and all electrical service installations. Install and size new emergency backup generator capable of supplying both the Hospital and Clinic (To be sized based on the facilities energy consumption of 16.58 Kw). Retrofit/renovate the emergency generator housing to allow for better security and ventilation. To include replacing the exterior access doors, all interior lights, switches and receptacles. Also install exterior security lighting at entrance and rear of housing. <p>Note: Provisions should be made for only the Hospital/Clinic. The new Dialysis building should acquire its own emergency power supply.</p> <p>Specifications:</p> <ol style="list-style-type: none"> All Electrical installations shall be in accordance to the Manufacturers specifications and in strict compliance with local and international building regulations and guidelines. Automatic transfers switch (ATS) to be sized and compatible with new emergency generator. The exterior door shall be a fire rated metal door with fixed louvers to allow for ventilation and with heavy duty corrosion resistant handles, knobs and hinges. Size shall be 6’ wide x 7’-0” high. The interior lighting shall be 2 no energy efficient light bulbs with heat resistant industrial fixture covers. The exterior lighting shall entail motion sensor, double flood bulb security light fixtures with energy efficient bulbs at the main entrance and rear of the housing. To be mounted under corners of the roof overhang. Make allowance for a 4 ft. deep x 6” thick x length of the housing (at entrance) reinforced concrete slab on grade to prevent water and mud from entering the building. 	<p>Benefit:</p> <ul style="list-style-type: none"> To provide a reliable, back-up supply of electricity to both the Hospital/Clinic when the public supply and the PV system are down. To improve the level of ventilation and security features of the generator housing this will provide optimum operation of the generator and increase its life cycle. <p>Condition of the Emergency Generator & Housing</p>  



ITEM NO.	AREA/ROOM	ITEM DESCRIPTION (DEFECT, ISSUE)	SCOPE OF WORKS REQUIRED	COST BENEFIT
				PHOTOGRAPHS AS ATTACHED AS GUIDE
8	<p>Electrical Works – Alternate Power Supply</p> <p>Hospital and Clinic</p>	<p>Defect:</p> <ul style="list-style-type: none"> • Non-existent <p>Issue:</p> <ul style="list-style-type: none"> • The facility presently relies completely on electricity provided by VINLEC. 	<p>Works Required:</p> <p>General</p> <ol style="list-style-type: none"> Install a Photovoltaic system on the south facing roof of the Hospital. Both the Hospital/Clinic is on the same meter and the electricity usage from 2009 to 2011 and part of 2012 (see Energy consumption data in Appendix) As per calculations, the facility energy consumption is estimated at 16.58kw. System should be sized at 60-70% of its consumption Make provisions for lightning protection and equipment. <p>Note: To determine a cost benefit analysis for the PV system installation, the Meter that accommodates both the Hospital/Clinic has to remain. The New Dialysis building is</p> <p>Specifications:</p> <ol style="list-style-type: none"> All Solar Panel and Electrical installations for the PV system and Lightning protection and equipment shall be in accordance to the Manufacturers specifications and in strict compliance with local and international building regulations and guidelines. The size of the PV system should be at 60 - 70% capacity providing that the new retrofits will reduce the current estimated energy consumption. See roof drawings for the location of panels, roof access points and typical mounting details for panels. 	<p>Benefit:</p> <ul style="list-style-type: none"> • Solar energy can significantly reduce energy costs and contributions of greenhouse gases, toxic chemicals and pollutants to the atmosphere. The utilization of renewable energy will result in a 'greener' facility with a reduced carbon footprint.



ITEM NO.	AREA/ROOM	ITEM DESCRIPTION (DEFECT, ISSUE)	SCOPE OF WORKS REQUIRED	COST BENEFIT
				PHOTOGRAPHS AS ATTACHED AS GUIDE
9	<p>Mechanical Works – Ventilation, Hot water systems, Cooling systems and Water catchment</p> <p>Hospital</p>	<p>Defect:</p> <ul style="list-style-type: none"> • Non-operational • Inadequate water storage capacity. • Lack of water treatment <p>Issue:</p> <ul style="list-style-type: none"> • There is no hot water supply in the hospital. • There is only one air condition unit in the hospital delivery room which is not working and the room has no other means of ventilation. • The kitchen gets very hot during day especially when cooking. No proper ventilation to remove the heated air. • There is no capture of rain water. The existing 1,000 gallon capacity water tanks (rest on top of an abandoned cistern) are insufficient and are dependent on the potable water supply to refill them and provide water for both the Hospital and Clinic. 	<p>Works Required:</p> <p>General</p> <ol style="list-style-type: none"> Install electric water heaters and make allowance for pipe works, plumbing and electrical service installations through and in roofs, floors and walls. Install energy efficient split air condition units in rooms and areas as specified in the electrical light drawings. Make provisions for cutting holes, pipe works, ducts, plumbing and all electrical installations Install ceiling exhaust fans in the restrooms, sluice, and delivery rooms as specified in the electrical light drawings. Install an range hood extractor fan system over the existing stove in the kitchen, as specified. Make provisions for cutting holes, ducts and any electrical installations. Installation of commercial grade, energy efficient ceiling fans in designated areas as specified. Make provisions to allow for electrical installations through the roof and for railing system for high ceiling mounted fans. Install new water storage tanks with mounting hardware as specified. Make provisions for all plumbing works, the installation of a water filtration system and the extension of the existing cistern platform for increased water storage capacity. Install and size new water pump for both Hospital and Clinic (See water usage data in Appendix). <p>Note: To determine the project cost benefit analysis, the water meter must remain only for the Hospital and Clinic. The New Dialysis building must acquire its own water meter.</p> <p>Specifications:</p> <ol style="list-style-type: none"> All mechanical installations shall in accordance to the Manufacturers specifications and in strict compliance with local and international building regulations and guidelines. Air condition units shall be ductless, split units with SEER (Seasonal Energy Efficiency Ratio) of 13 or higher and appropriately sized (BTU) for designated rooms. The Electric water heaters shall be energy star rated with a capacity to cater for all showers and sinks. All exhaust fans shall be energy rated and specified as per electrical 	<p>Benefit:</p> <ul style="list-style-type: none"> • Hot water supply will help in the sterilization/cleaning of utensils, bed pans and other items within the facility. • Improved ventilation and the installation of cooling systems will improve patient/staff use satisfaction and also improve indoor air quality. • Allow for the use, collection and increased water storage capacity of rain water throughout the facilities and minimize the reliance of potable water supply. <p>Air condition unit in the Hospital delivery room with its only window blocked</p>  <p>Existing water tanks on top of an abandoned cistern</p> 



			<p>lighting drawing.</p> <ul style="list-style-type: none"> e) The range hood extractor fan to be installed shall be commercial grade, energy rated range hood to complement the existing stove. f) Relocate the existing gas line to stove new location as shown in drawings. g) All ceiling fans shall be commercial grade and energy star rated 52" model. h) Water Storage Tanks shall be fiberglass above ground water storage tank designed to store drinking water or collected rainwater. Manufactured with the resin that fits storage application and with added UV resistant gel-coating. Tank should be of Fiberglass Construction, Gel Coated in Two-Part Epoxy, UV Filtration Available for Safe Drinking Water, Dome Top with Little Site Preparation Required. Ensure that tank can hold at least 2 days worth of water calculated at: 250 - 400 gal/bed/day (see appendix and drawings for further specifications and details). i) Water filtration system shall be positioned filter system between storage tank and point of extraction to improve removal of fine particulate matter (including microbes) that will not be addressed by the screens. Filters may be simple charcoal and cotton filters, UV filters for similar. Filters with clear housings must be placed in a light-excluding cabinet as algae will eventually grow within the housing, reducing the effectiveness of the filter and degrading the quality of the water. Also, UV filters will require a power source and should not be used if chlorine will be used. 	
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ITEM NO.	AREA/ROOM	ITEM DESCRIPTION (DEFECT, ISSUE)	SCOPE OF WORKS REQUIRED	COST BENEFIT
				PHOTOGRAPHS AS ATTACHED AS GUIDE
10	Interior Furnishings Hospital	<p>Defect:</p> <ul style="list-style-type: none"> Damaged Non-hygienic Lack of storage capability <p>Issue:</p> <ul style="list-style-type: none"> Some of the countertops and cabinets in the kitchen, sluice, sterilization rooms etc. show signs of water damage and lack shelving and storage space. 	<p>Works Required:</p> <p>General</p> <ol style="list-style-type: none"> Remove and replace all countertops and cabinets in the Examination Room, Casualty Room, Sterilization Room and Sluice Room as specified in drawings. Refurbish and make good all existing countertop and cabinets in the Nurse-In charge Room and Kitchen as specified. Install new shelving racks in the newly located file /storage room as specified. Refurbish existing Nurses station counter with new Formica surface. Remove existing hanging bed screen curtains from all Wards and replace with new privacy beds screen curtains on tracks with hanging rails and hardware for its installation. Refurbish existing wall mounted headboards in all Wards with new Formica surface and make good all electrical installations of receptacles (220,110v) and over bed head light fixtures with switches. <p>Specifications:</p> <ol style="list-style-type: none"> All new and existing countertop surfaces shall be replaced with Corian type surfaces for Healthcare facilities (see drawings for dimensions and other specifications). All refurbish and new cabinet surfaces shall be replaced with Formica High Pressure Laminate (HPL) surfaces (see drawings for dimensions and other specifications). Shelving to be installed in the new file/storage room shall be heavy duty record and equipment storage racks (see drawings and appendix for specifications). Nurses station counter shall be refurbished with Formica High Pressure Laminate (HPL) surfaces (see drawings for dimensions and other specifications). Refurbish headboard for beds within all Wards shall be installed with Formica High Pressure Laminate (HPL) surfaces (see drawings for dimensions and other specifications). <p>All color scheme and pattern to be approved by Project Manager.</p>	<p>Benefit:</p> <ul style="list-style-type: none"> To improve the durability and hygiene of all countertops surfaces. To improve the rooms storage capacity. To improve the patients/staff satisfaction by providing more privacy and convenience. <div style="display: flex; flex-direction: column; align-items: center;">    </div>

ITEM NO.	AREA/ROOM	ITEM DESCRIPTION (DEFECT, ISSUE)	SCOPE OF WORKS REQUIRED	COST BENEFIT
				PHOTOGRAPHS AS ATTACHED AS GUIDE
11	<p>Wall Finishes- Exterior and Interior Walls of both the Clinic and Hospital.</p> <p>Hospital and Clinic</p>	<p>Defect:</p> <ul style="list-style-type: none"> Fading, Peeling and moss/mold growth on the exterior walls <p>Issue:</p> <ul style="list-style-type: none"> Due to the lack of a guttering system on the main roof of the buildings, there are areas where the exterior wall surfaces on the clinic and hospital are heavy with moss/mold growth and the fading/peeling of the paint on the exterior walls. 	<p>Works Required:</p> <ol style="list-style-type: none"> Scrape and/or power wash all exterior and interior wall surfaces with moss/mold removing solution prior to paint applications. Re-paint walls as specified with moss/mold resistant exterior primer and paint. <p>Specification:</p> <ol style="list-style-type: none"> All paint installations and disposal shall in accordance to the Manufacturers specifications and in strict compliance with local and international building regulations and guidelines. Use paints that meet all three of the following health requirements should be used: low VOCs, low biocides, and natural pigments. All exterior paints have fungicides, and low-biocide paints are not available for exteriors. The desired choice for exterior paint is one that has zinc oxide as the fungicide. Next best choices are zero to very low-VOC paints, acrylic or latex paints, and recycled water-based paint. Milk paint and natural paints are the first choice for commercially available interior paint. Avoid oil-based paints because of their high VOC content. Also, use light colored paints. The choice of color must be approved by the Project Manager. 	<p>Benefit:</p> <ul style="list-style-type: none"> To provide and maintain a healthier, moss/mold free use environment. Improve morale of staff and present a clean appearance to the public. It will also compliment the completion of the new dialysis building and enhance the aesthetics of both buildings. <p>East Facade Of Hospital</p>  <p>South Facade Of Clinic</p> 

ITEM NO.	AREA/ROOM	ITEM DESCRIPTION (DEFECT, ISSUE)	SCOPE OF WORKS REQUIRED	COST BENEFIT
				PHOTOGRAPHS AS ATTACHED AS GUIDE
12	Floor Finishes Hospital	<p>Defect:</p> <ul style="list-style-type: none"> Water Damaged and worn <p>Issue:</p> <ul style="list-style-type: none"> The flooring in the restrooms is water damaged and is in poor condition with mildew settling between the grout lines. The existing linoleum flooring is worn and has water settlement and damage underneath its sections. 	<p>Works Required:</p> <p>General</p> <ol style="list-style-type: none"> Remove all existing Linoleum floor surfaces and floor base vinyl strips. Make provision to remove excess adhesive from floors and power wash to clean (See drawings for locations). Replace all existing floor tiles in the restrooms, kitchen, store rooms, verandas and other designated areas with non-skid sustainable floor tiles. Make provisions to jack hammering tiles free from surfaces and make surface good for new application. Replace existing linoleum floor covering with higher grade linoleum sheets or tiles (See drawings for locations). <p>Specification:</p> <ol style="list-style-type: none"> All flooring installations shall in accordance to the Manufacturers specifications and in strict compliance with local and international building regulations and guidelines. Linoleum is a homogenous floor covering made primarily of natural ingredients that include linseed oil, rosin binders, wood flour, limestone and dry pigments which are mixed and then calendared onto a polyester backing to ensure optimum dimensional stability. They should meet the following: <ul style="list-style-type: none"> Static Load Limit: 1500 Pounds per square inch when tested in accordance with ASTM F 970-00, Standard Test Method for Static Load Limit. Slip Resistant Castor Resistant: Suitable for office chairs with castors Impact Sound Reduction: 6db when tested in accordance with ISO 20717-2 Resistant to Bacteria Fire Testing: Resists cigarette burns. Chemical Resistant Restrooms, kitchen, all verandas and other designated areas shall use anti-skid ceramic floor tiles especially in heavy traffic areas. The choice of color and pattern must be approved by the Project Manager. 	<p>Benefit:</p> <ul style="list-style-type: none"> Sustainable, recyclable, biodegradable product with anti microbial properties. Improves hygiene which is a top priority. <p>Water Damaged Floor in Hospital</p>  

ITEM NO.	AREA	ISSUE	SCOPE OF WORKS REQUIRED	COST BENEFIT
				PHOTOGRAPHS IF NECESSARY OR APPLICABLE
13	Ceiling Finishes Hospital	<p>Defect:</p> <ul style="list-style-type: none"> High ceilings; lack of accessibility to light fixtures Water/Mould damage Bat droppings on ceilings <p>Issues:</p> <ul style="list-style-type: none"> The high ceilings has diminished the potential radiation from the suspended lighting and the installation of proposed ceiling fans will limit its functionality and decrease ventilation throughout the ward spaces. Access to the lights and proposed fans for maintenance purposed will be difficult and unsafe. The low ceiling areas (restrooms and child birth/delivery room) has some water damage and has signs of mold/mildew growth. There is evidence of rodent (bat) infestation and droppings on tables and along the walls. This problem is minor in the Hospital but major in the kitchen area of the clinic. 	<p>Works Required:</p> <p>General</p> <ol style="list-style-type: none"> Install a drop ceiling mechanism where all lights, ceiling fans and other devises can be accessible (See reflective ceiling plan drawings for details). Replace all drop ceiling in areas as specified in reflective ceiling plans. Properly secure and enclose all openings (big or small) in the ceiling and exterminate any rodents or insects that are present in the building. <p>Specifications:</p> <ol style="list-style-type: none"> All ceiling finishes installations shall be in accordance to the Manufacturers specifications and in strict compliance with local and International building regulations and guidelines. In areas such as the Examination, Casualty, Sluice, Delivery Rooms and other designated areas shall use only National Gypsum Co. Gold Bond brand Grid stone Clean Room Gypsum ceiling panels. Fire rating by type and size shall be Type: 1/2" (12.7mm) Fire-shield G, 2' X 2'; UL G222. (see reflective ceiling drawings for further details) In the high ceiling areas where the existing with new wood rafter and ceiling boards are exposed, make good by treating wood and enhance stain finish. See reflective ceiling drawings for ceiling tile location and mounting details. 	<p>Benefit:</p> <ul style="list-style-type: none"> Improve lighting, functionality of the ceiling fans and ventilation through the spaces. Allow for ease of access to the overhead fixtures and devices during maintenance. Enhance and improve the longevity of the wood rafte and ceiling. Clean room ceiling tiles shall improve the sanitat condition and prevent particle contamination especially in clean room environments. <div style="text-align: right;">   </div>

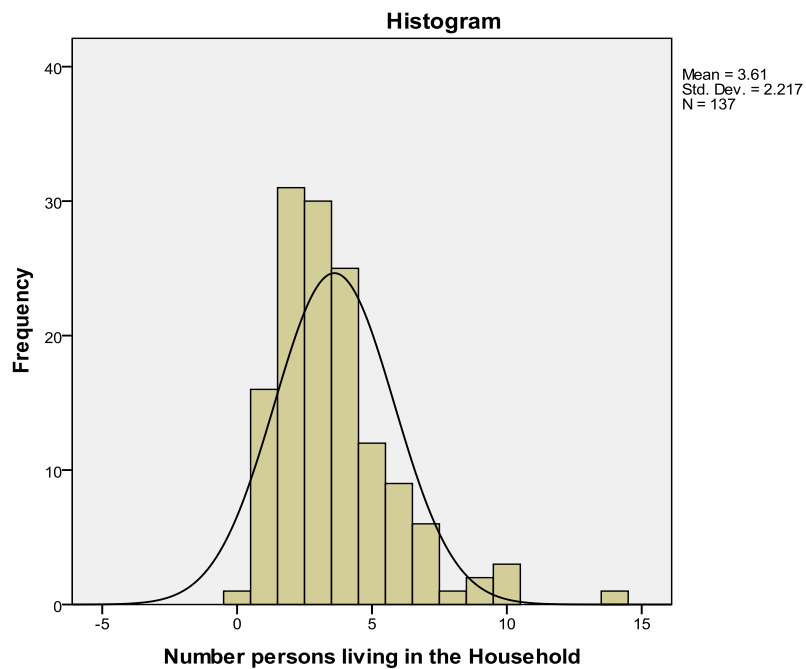
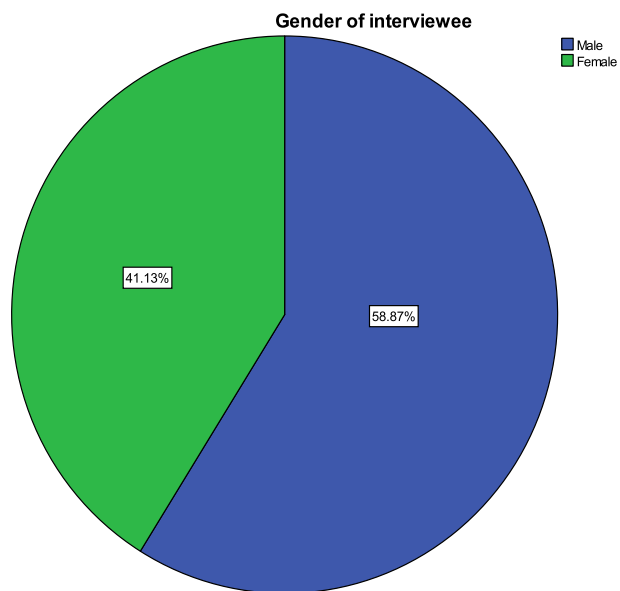
ITEM NO.	AREA	ISSUE	SCOPE OF WORKS REQUIRED	COST BENEFIT
				PHOTOGRAPHS IF NECESSARY OR APPLICABLE
14	<p>Code Compliance</p> <p>Fire/ Smoke Alarms, Emergency Lighting System, Emergency exit signage maps, Fire extinguishers and Handicap accessibility</p> <p>Hospital and Clinic</p>	<p>Defect:</p> <ul style="list-style-type: none"> No fire/smoke detectors and emergency lighting available. No emergency exit signage or maps Outdated and minimal fire extinguishers No handicap accessibility aids. <p>Issue:</p> <ul style="list-style-type: none"> There are no fire/smoke alarms in the kitchens, file rooms or any other room sensitive to fires for both the Hospital and Clinic. In the event of an emergency, power outage or backup generator failure, there are no emergency lights in the hospital and clinic. The staff members only have access to battery powered lanterns which are not reliable. The Hospital/Clinic is equipped with at least one handicap ramp access to the facilities. The ramps size meets code standards; however, it lacks handrails or guardrails. The ramps are also exposed to the elements and tend to get slippery when wet. The shower stalls and toilet areas are not handicap compliant. There are no grab bars within these areas. 	<p>Works Required:</p> <p>General</p> <ol style="list-style-type: none"> All Code Compliance installations shall be in accordance with the Manufacturer's instructions and in strict compliance with the local and international building regulations and guidelines. Install fire/smoke detectors in the kitchen, sterilization room, delivery room and other sensitive rooms prone to fire (See reflective ceiling plan for locations and details) Install Emergency Lights and exit signs in strategic locations as specified in the reflective ceiling/electrical light drawings. Install Evacuation maps as specified. To be provided to the Contractor by the Project Manager for installation. Contractor to provide evacuation map wall frames. Install fire extinguishers in strategic locations as specified. Install and make compliant the handicap ramps with a slip resistant surface to avoid slipping and sliding and handrails. Install grab bars within the shower stalls and toilet areas and install ADA compliant face basins within the restrooms as specified in the restroom detail drawings. <p>Specifications:</p> <ol style="list-style-type: none"> All Fire/Smoke detectors shall be wall or ceiling mounted, double sensor unit with hardwire and battery backup as specified. All Emergency Lighting and exit signs shall be LED lamp type rated units. The exit sign shall be green in colour. The Evacuation Map holders shall be glow in the dark with emergency map labeling. Size map to accommodate will be 11"x 17". All Fire extinguishers shall be ABC rated (multi-purpose) units with a 10 lb. capacity. Make provisions to outline all mounting locations with adequate signage. For electrical rooms, use 10 lb. capacity Carbon dioxide extinguishers. All grab bars are specified in the restroom drawings. All existing and proposed Handicap ramps surfaces shall be outfitted with ECO-TUFF Rubberized Non-Skid safety coating which has zero VOC and ultra tuff and waterproof. All Handicap ramp hand-rails size and design are specified in the drawing details. 	<p>Benefit:</p> <ul style="list-style-type: none"> This will enhance the level of fire safety throughout the buildings and maximize the fire/smoke detection. This will aid in providing adequate lighting in the event of any emergency scenario. To aid in the facilities compliance to safety and risk reduction and staff awareness and development. To aid in the facilities compliance to Handicap accessibility and safety.
				 

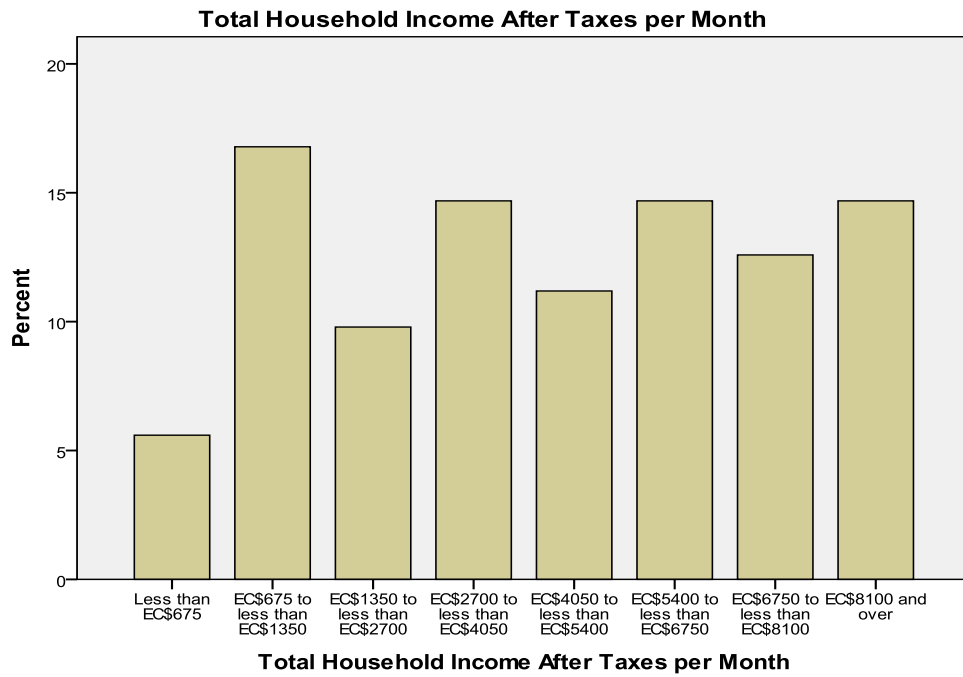
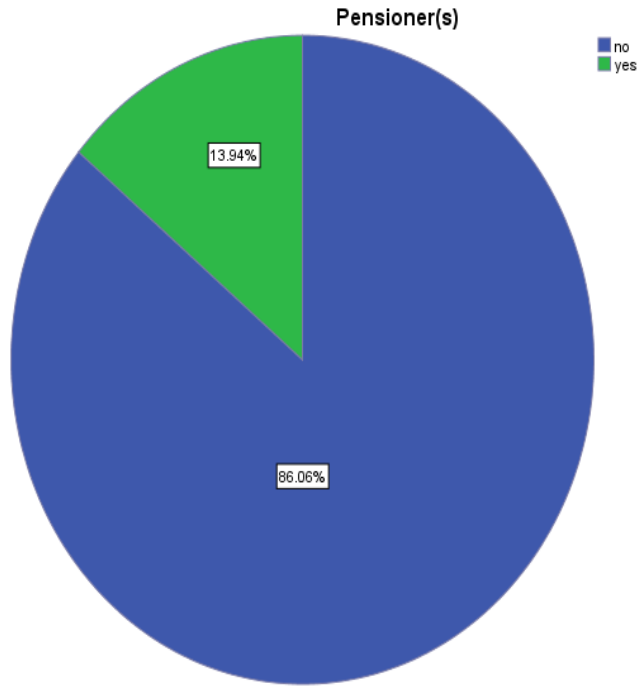
ITEM NO.	AREA/ROOM	ITEM DESCRIPTION (DEFECT, ISSUE)	SCOPE OF WORKS REQUIRED	COST BENEFIT	
				PHOTOGRAPHS AS ATTACHED AS GUIDE	
15	External Works- Concrete pavements and Curbs Hospital	Defect: <ul style="list-style-type: none"> Perimeter fence is damaged Level of security is not adequate. Issue: <ul style="list-style-type: none"> There is no safe means of accessibility to the building and 	Works Required: General <ul style="list-style-type: none"> Install concrete pavement along South side of building for ease of accessibility for maintenance and evacuation purposes (see drawings for location and details). Specifications: <ul style="list-style-type: none"> All installations shall in accordance to the drawing specifications and in strict compliance with local and international building regulations and guidelines. 	Benefit: <ul style="list-style-type: none"> This will improve accessibility to the building especially for maintenance and improve means of evacuation for patients and staff. 	
OPTIONAL WORK FOR CONSIDERATION					
ITEM NO.	AREA/ROOM	ITEM DESCRIPTION (DEFECT, ISSUE)	SCOPE OF WORKS REQUIRED	COST BENEFIT	
				PHOTOGRAPHS AS ATTACHED AS GUIDE	
16	Main entrance covering Hospital only	Defect: <ul style="list-style-type: none"> Insufficient sheltering from the elements Vulnerable to wind uplift and hurricane events Water damage to wooden beams and supporting posts Ambulance area lacks sufficient lighting. No public restroom facility for visitors. Issue: <ul style="list-style-type: none"> The existing main entrance doesn't provide sufficient shelter from the elements for visitors and importantly for Ambulance operations. The access ramp used by the Ambulance is exposed to the 	Works Required: General <ul style="list-style-type: none"> Remove existing roof covering over main entrance. Make good masonry works and remove fixed wooden louvers from adjoining wall. Install new concrete roof covering as detailed in drawings to include the realignment of the access ramp, public restroom facility for visitors and raised waiting area platform (see drawings for details). Specifications: <ul style="list-style-type: none"> Roof to be constructed from reinforced concrete as specified in drawings. All other installations in this area shall be conducted in accordance to Manufacturers requirements and in strict compliance with the Local and international building regulations and guidelines. 	Benefit: <ul style="list-style-type: none"> It will improve the safety and efficiency of the Hospital Ambulance To increase the Hospital's resilience to hurricane event and aid in the providing safe access to the main roof for any maintenance purposes. 	

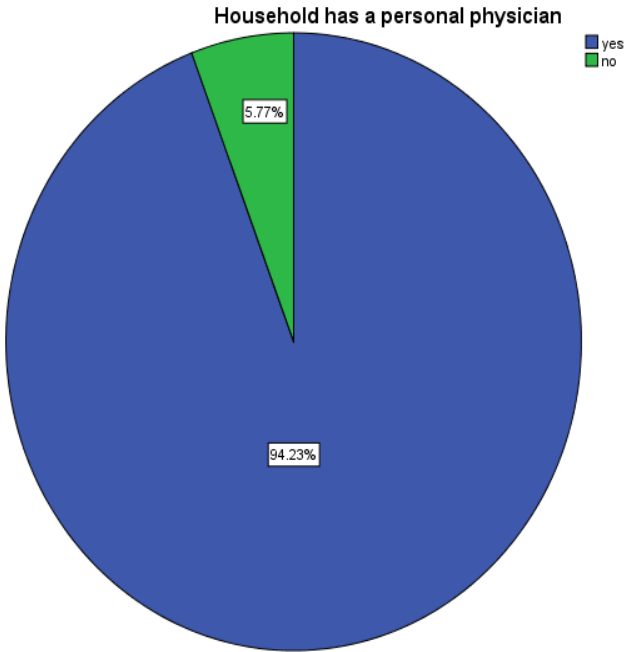


		<p>elements and needs to be relocated for ease of access.</p> <ul style="list-style-type: none">• The existing roof overhang is vulnerable to wind uplift and hurricane events		
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Annex 2: Some results from the willingness and ability to pay survey for Health Services, St Vincent and the Grenadines







How often does the household visit the Physician per year

Visits Per Year	Percent
1	58.2
2	14.5
3	7.3
4	18.2
12	1.8
Total	100.0

Main Concerns of Households in St. Vincent and the Grenadines
Better ambulance service
Far too little essential equipment available
Attention should be paid to upgrade the hospital Georgetown to ease patient load on Milton Cato hospital in Kingstown
Better maintained facilities
Better distribution of medical staff needed to ensure availability of doctors at rural hospitals such as Georgetown.
Improved facilities especially hospitals in Kingstown, Georgetown, Chateaubelair etc
Buildings need maintenance and upgrading
Clinics and hospitals need proper maintenance plans
Community health centre poorly maintained and under staffed
Condition of facilities limited services
Cost of health Care is a little high and sometimes we can't get access to see a doctor. Accessibility to an ambulance is an issue. The condition of the building is awful. In need of much needed repair.
Facilities at Georgetown hospital needs major upgrading, properly staffed and equipped to avoid patients having to go to Kingstown for everything
Facilities in Windward side need upgrading
Facilities need improving and more staff available
Facilities need urgent upgrading and availability of additional services and supplies
Facilities needed upgrading, more qualified staff needed to handle cases rather than sending them to town, new ambulance needed

Facilities should be upgraded to assist persons on windward side and avoid them having to go to Kingstown for treatment
Georgetown Hospital: sometimes Doctors not available on weekends, ambulance break down, no security
Government facilities need upgrading and proper plans for administering health care. A hospital exists at Georgetown yet patients have to travel to Kingstown. Ambulance constantly breaks down
Government facilities lack maintenance and upgrade plans, unavailability of specialist services
Hospital services too far from rural areas, Georgetown hospital cannot cover critical cases and is in poor state
Improved facilities needed
Improved supplies for hospital, upgraded facility needed, improved security-biggest concern
Improvements to facilities and services needed
Inadequate conditions of the facility
Insufficient medical staff, need properly maintained facilities
Insufficient specialty doctors
Insufficient staff, facility needs upgrading
Key Services in Kingstown. Georgetown hospital should be improved to provide hospital care for persons on windward side of island
Lack of adequate facilities, lack of specialized equipment, ambulance not functioning
Lack of facilities at Georgetown hospital, More specialist services, Doctors need to be dedicated at the facility, Hospital has to be developed to serve the new dialysis unit being built next door
Lack of human resources- insufficient doctors and nurses, long waiting lines
Lack of maintenance of the facilities, limits supplies and staff
Lack of maintenance, needs better ambulance, more staff needed, better equipment and services
Lack of maintenance, poor ambulance service
Lack of specialist care, condition of ambulance-one to service windward side and always breaking down lack of maintenance
Lack of specialist services
Lack of specialist services , everything concentrated in Kingstown nearly 2 hrs away, facilities need to be upgraded
Lack of specialized services and equipment , poor ambulance service
Lack of specialized services, lack of basic equipment at Georgetown, state of the facility in Georgetown
Leaking roofs, general state of the building, ambulance
Limited medication, facilities need upgrading, more staff needed
Limited service provided at Georgetown hospital. Facility needs major upgrading and staffed appropriately to Release burden from Milton Cato Hospital.
Limited services and equipment available
Limited services equipment and supplies at Georgetown hospital or district clinics
Limited services, poorly maintained facilities, long lines
Limited specialty services, poorly maintained Government facilities
Limited specialist services at Georgetown hospital, facility needs upgrading, more accessible medication to be provided

Limited specialist services in rural hospital and poor upkeep of rural hospital
Limited specialist services or equipment at Georgetown Hospital or other health facilities on windward side, poor maintenance plans for facilities
Limited staff and specialist services
Limited staff at health Centers, Poorly maintained hospitals
Limited staff/patient ratio. Staff overworked
Limited supplies and services, facilities need upgrading to serve the people better, more medical staff needed
Limited supplies, lacks appropriate layout and facilities for disabled persons, interviewee is in a wheel chair and lives close to hospital
Long drive to get specialist services. All major cases have to go to Kingstown. Georgetown should be upgraded
Long lines, limited services at clinics
Long lines, poorly maintained facilities , limited staff
Long waiting -limited resources
Long waiting lines
Long waiting lines, limited specialist services
Long waiting lines, poor maintenance of facilities
Long waiting lines, rural clinics and Georgetown hospital needs upgrading
Long waiting lines, too few staff. Buildings need upgrading
Long waiting period, lack of upgrades for facility, need for more specialist services at Georgetown Hosp, needs a New ambulance, persons on windward side should be able to get all medical treatment
Main functions concentrated in Kingstown more services needed at Georgetown hospital so we do not need to go to town for everything
Main hospital is in Kingstown. Georgetown is not equipped to handle severe cases. Facility needs upgrading
Major medical procedures have to be done overseas, need to improve Georgetown hospital
More concern about patient care, greater attention to examination, needs improved services at casualty, more specialist services
More staff needed
Need to be improved-facilities and services
Needs improved facilities and services
Needs more doctors and nurses in rural health care facilities
Needs more doctors presence at the hospital; more days needs to be added to their presence at facility
Needs upgrading, too many services confined to Kingstown
Not adequate availability of Doctors and ambulance services
inadequate equipment
Not enough bed or capacity at the clinics/ hospitals, Doctors or nurses not courteous; lack medical ethics, lack ambulance service, sometimes no ambulance available, sometimes lack of medication available
Not satisfied with conditions of the facility
Persons on windward side should not have to be transported to Milton Cato Hospital. They should be treated at Georgetown hospital but the facility there is in need of repairs , properly staffed and equipped

Poor conditions- needs upkeep
Poor maintenance, too far to go for complete treatment
Poor upkeep of facilities, lack of equipment, poor ambulance service
Poorly kept and maintained facilities, lack of specialty care, losing nurses and qualified health professionals
Lack of privacy of medical records and professionalism is lacking in handling clients
Services at Georgetown are limited due to condition of the building and too few staff and equipment
Slow service, shortage of medication
Sometimes Doctors are not available at health centers
Specialty cases have to be sent overseas , Public facilities are not well maintained especially the hospitals
Standards for maintain the facilities-too low, new ambulance needed, more specialized staff needed
Travels to Kingstown are too far and exhausting for sick people. George Town hospital needs upgrading.
Upgrades to facilities needed, Basic supplies not available, more equipment needed, rural health centers or the Georgetown hospital ambulance in poor condition. Security lacking at all facilities

Household's Maximum Willingness and Ability to Pay

			Statistic	Std. Error	
Maximum household would be ABLE to pay per month for improved health services	Mean		194.5113	23.24048	
	95% Confidence Interval for Mean	Lower Bound	148.5393		
		Upper Bound	240.4832		
	5% Trimmed Mean		160.9607		
	Median		100.0000		
	Variance		71835.934		
	Std. Deviation		268.02226		
	Minimum		5.00		
	Maximum		2500.00		
	Range		2495.00		
	Interquartile Range		250.00		
	Skewness		5.276		.210
	Kurtosis		41.372		.417
Maximum household would be WILLING to pay per month for improved health services	Mean		183.5714	22.71461	
	95% Confidence Interval for Mean	Lower Bound	138.6397		
		Upper Bound	228.5032		
	5% Trimmed Mean		151.0610		
	Median		100.0000		
	Variance		68621.807		
	Std. Deviation		261.95764		
	Minimum		5.00		
	Maximum		2500.00		
	Range		2495.00		
	Interquartile Range		260.00		
	Skewness		5.660		.210

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	Maximum		2500.00	
	Range		2495.00	
	Interquartile Range		260.00	
	Skewness		5.660	.210
	Kurtosis		46.357	.417