



Technical Assistance for Increasing Resilience of the Education System to Climate Change in Saint Lucia and Antigua & Barbuda

Project Roll-out Report

Submitted to

Climate Technology Centre and Network
United Nations Industrial Development Organization

By



ECMC

1st Flr. Marie-Colette Building | #9 Lawjanv Crescent | Rodney Bay Commercial Blvd.
P O Box RB 2446 | Rodney Bay Post Office | Gros Islet | LC01 401 | Saint Lucia
t: 758-453-2093 | e: ecmc@candw.lc | w: www.ecmcstlucia.com



Document Information

Document permissions:	Confidential - Client and its funding agencies
Project number:	20501
Project name	Increasing Resilience of the Education System to Climate Change in Antigua and Barbuda
Report Title:	Project Roll-out Report
Report number	20501.110-01
Version number:	V01Draft
Client:	United Nations Industrial Development Organization

Document History

Version No.	Date	Description	Distributed to	
			Name	Position
V01Draft	August 16, 2021	Project Roll-out Report	Ramiro Salinas	Liaison for Latin America and the Caribbean
			Aymen Ahmed	Procurement Officer
			Kristian Panganiban	Procurement Services Division



Contents

1.0	Introduction	1
1.1	Background	1
1.2	Context.....	2
2.0	The Road Map	2
2.1	The Road Map – A Living Process	2
2.2	Key Elements of the Road Map.....	4
2.3	Proposed Stakeholders	5
2.4	Roadmap Process.....	6
3.0	Roadmap Activities	7
3.1	Present Project Report to Key Agencies and Stakeholders in Pilot Countries.....	7
3.2	Present Findings to Beneficiary Groups.....	7
3.3	Present the Project Report to Political Directorate of Countries in Pilot Phase.....	7
3.4	Build Capacity in Project Schools	7
3.5	Mobilize Political Commitment for Expansion of the Project at the Sub-Regional Level.....	7
3.6	Refine Project Resources to Facilitate Project Implementation	8
3.7	Enhance the Efficacy of the Project	8
3.8	Promote Continuity of the Project.....	8
3.9	Prepare Post-disaster Business Continuity Guidelines	9
3.10	Present Findings to the OECS Commission	9
3.11	Retraining and Retooling of Construction Artisans.....	9
3.12	Promote Development of Disaster Vulnerability Assessment Guidelines for Educational Facilities	10
3.13	Promoting DRRE in the Education System.....	10
3.14	Prepare Project Infographic.....	12
4.0	Priority and Timelines	14
5.0	References	15

Appendices

Appendix 1 - Sample Infographic




Abbreviations

CSS	Comprehensive School Safety
CTCN	Climate Technology Centre and Network
DRR	Disaster Risk Reduction
DRRE	Disaster Risk Reduction Education
DVA	Disaster Vulnerability Assessment
ME	Ministry of Education
MSD	Ministry of Sustainable Development
NDE	National Designated Entity
SIDS	Small Island Development States
TA	Technical Assistance
UNIDO	United Nations Industrial Development Organization



The Consulting Team

This report was prepared by the Consultant (ECMC) with input from a team of experts as listed below:

Name	Company	Role
Key Consultants:		
Egbert Louis	ECMC	Senior Advisor and Team Leader
Alison King	Individual Expert	Climate Change Vulnerability and Disaster Risks Assessment Expert
 HR Wallingford Working with water	HR. Wallingford	Climate Change Specialist
Marie-Terese Louis	ECMC	Senior Structural Engineer
Josean Ghirawoo	ECMC	Junior Civil Engineer
Dr. Marietta Edward	Individual Expert	National Strategies (Policies and Plans) Development Expert
Dr. Ezra Jn Baptiste	Individual Expert	Gender and Environmental & Social Risks and Impacts Expert
Contributing Consultants:		
Theresa Alexander-Louis	ECMC	Social Sector Specialist
John C. Francis	John C. Francis and Associates	Mechanical Engineer – Fire Safety Expert



1.0 Introduction

The vulnerability of Small Island Development States (SIDS) to climate-related shocks is likely to increase unless their education sectors improve their capacity to anticipate, prepare, adapt, and become more resilient to such events. In particular, some of the public schools designated as emergency shelters in Saint Lucia and Antigua and Barbuda are considered inadequate in terms of their structural condition to withstand a Category 5 Hurricane as well as ensuring minimum disruption to the populations' education systems. Therefore, there is a need for a new approach to increase the resilience of these schools as emergency shelters for the communities. This need has resulted in the consultancy for a technical assessment to establish possible options for retrofitting the schools to improve their resilience to climate change.

This report presents Deliverable 5.1 – A Road Map for Roll-out and Recommendations for Upscaling and Replication of the outputs of this project – *“Increasing Resilience of the Education System to Climate Change in Saint Lucia and Antigua and Barbuda”*. This road map highlights the processes and routes essential for facilitating the acceptance, adoption and, in some cases, the adaptation of the findings and recommendations made.

In designing the road map, ECMC adopted some of the approaches promoted under the Global Program for Safer Schools by the Global Facility for Disaster Reduction and Recovery (2014). Through the project's mandate, and by extension, the road map, promoting the findings of the consultancy on a national basis; encouraging the OECS Commission to be a key stakeholder; and promoting the formulation or adoption of guidelines, are considered an absolute imperative for upscaling and replicating the project's outcomes.

1.1 Background

The Climate Technology Centre and Network (CTCN) is the operational arm of the United Nations Framework Convention on Climate Change (UNFCCC) Technology Mechanism and hosted by the United Nations Environment Programme (UNEP) in collaboration with the United Nations Industrial Development Organization (UNIDO) and supported by eleven partner institutions with expertise in climate technologies.

The mission of the CTCN is to promote accelerated deployment and transfer of climate technologies at the request of developing countries for energy-efficient, low-carbon, and climate-resilient development. The requests for Technical Assistance (TA) were submitted to the CTCN by the National Designated Entity (NDE) of Antigua and Barbuda and Saint Lucia.

The main aim of the CTCN technical assistance/consultancy is to enable the two SIDS to strategically assess the climate risk and related negative impacts to their educational system. The intention is to also appraise improvement measures that will allow both governments to remove technology barriers and deploy specific adaptation technology solutions in preparation of a project proposal to be submitted to the Adaptation Fund.

In the case of Saint Lucia, twelve schools were selected for investigation. However, at the time of award of the consultancy, Antigua and Barbuda, had not selected the schools to be considered. Discussions during the consultancy suggested that twenty-eight schools were being considered by the Government of Antigua and Barbuda.



1.2 Context

It is critical that the plan to roll out the project to schools within the two pilot SIDS (Saint Lucia and Antigua/Barbuda) and into the wider OECS region promotes efficiency and continuity. Due to the differences which may exist in countries across the sub-region, such as the structure of the education systems, administrative arrangements, local environmental risks and governmental priorities, the roll-out plan would need to respond to individual country contexts and needs. One of the key steps in obtaining support for public sector projects is ensuring that key agents and stakeholders at all levels are informed of the benefits of the associated interventions. Within the education sector, principals and teachers possess a high level of autonomy in the performance of their work; therefore, their understanding of and support for government-led interventions are critical.

2.0 The Road Map

The road map is a strategic plan to realise one of the main objectives of the consultancy; which is to facilitate upscaling and replication of the project and its outcomes. The road map focuses on the sub-region of the Organisation of Eastern Caribbean States. It outlines the steps and processes which will be required to achieve the goal of acceptance, upscaling and replication of the project and its outcomes.

This section of the Report presents the philosophy of a road map, defines the elements involved and the critical group of stakeholders that must be targeted.

2.1 The Road Map – A Living Process

The formation of the roadmap has been based on the philosophy that once accepted it will need to be considered as a “living” document which will be continually upgraded as it is being implemented. While it has been shown that effective road-mapping is best achieved through extensive stakeholder engagement, it was difficult to adopt this approach given the challenges in coordinating stakeholder discussions during the midst of the Coronavirus Pandemic. Notwithstanding, the acceptance of the methodologies used in Saint Lucia by the NDE of Antigua and Barbuda, is in itself, an adoption and replication of the methodology and processes developed under the project for the former.

Although best practice suggest that road maps should be updated every two to five years, due to the manner in which this one has been developed, it is recommended that the road map be updated within six months after its delivery. This approach will allow for the type of participation which would facilitate the effectiveness of the roadmap and engage the stakeholders, which should have been involved in its development.

To ensure completeness of the roadmap, several documents were reviewed. One of these documents was the UNESCO’s Comprehensive School Safety (CSS) philosophy/framework (Figure 1), which is based on a multi-hazard risk assessment. Notably, the Project, “*Increasing resilience of the education system to climate change in Saint Lucia and Antigua & Barbuda*” is also based on a multi-hazard risk assessment as the foundation of the evaluation of the twelve schools, which is the focus of the consultancy. Additionally, two of the three Pillars (Safe Learning Facilities and Risk Reduction and Resilience Education depicted in Figure 1) of the CSS, are considered to be critical aspects of the Project.

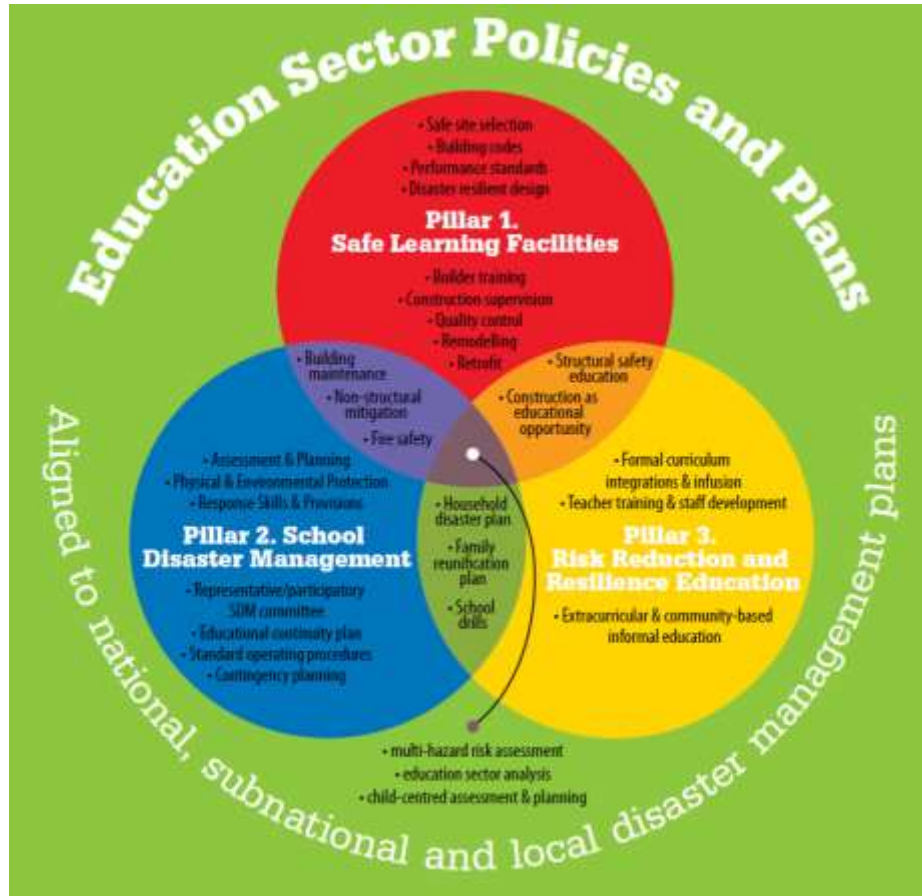


Figure 1 - The Three Pillars of Comprehensive School Safety

Given the existence of national emergency organisations in Saint Lucia, Antigua and Barbuda and all the countries in the region, coupled with the use of the schools as emergency shelters, it should not be a major challenge to incorporate the third pillar – School Disaster Management – as part of the proposed roadmap. In Saint Lucia, the principals are the designated shelter managers, once a school is so categorised. Therefore, adoption of the three pillars of CSS is considered one of the action items for the road map, as Disaster Management could be included in the replication of the Project.



2.2 Key Elements of the Road Map

The five elements which comprise the proposed road map, together with the methodology used to develop the document are depicted in Figure 2. A general overview of each of the elements in relation to this consultancy is presented as follows:

1. **Goals** – That the project and its methodology will be adopted by all of the OECS countries within five years. Specific to these goals would be the adoption of maintenance and sustainability programmes and a formalization of Disaster Risk Reduction Education (DRRE) as part of the schools’ curriculum throughout this sub-region;
2. **Milestones** – That the approach would be adopted in its totality in Antigua and Barbuda simultaneously with Saint Lucia. Adoption and replication within the other OECS countries will be within five years of acceptance of the roadmap by the UNIDO/CTCN and the Saint Lucia NDE;

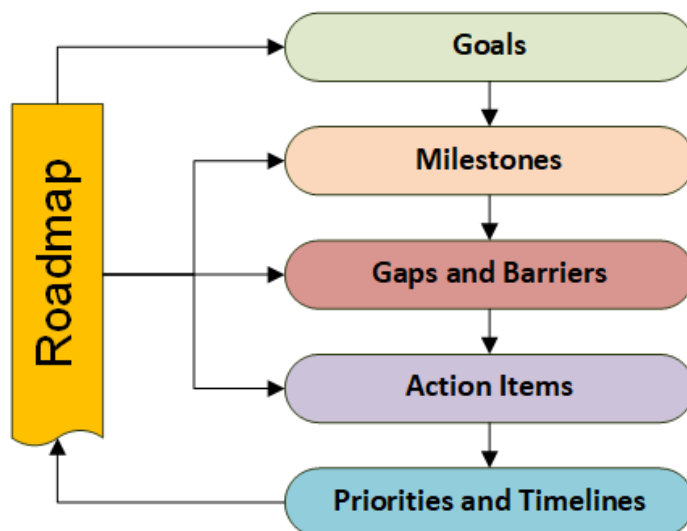


Figure 2 - Elements and Logic of Roadmap

3. **Gaps and Barriers** – Understanding and then accepting the need for the performance requirements stipulated by building codes are considered major barriers to the implementation of resilient practices for structures. The notion that code-responsive measures are more expensive will need to be addressed, as even key stakeholders may be resistant, with the viewpoint that the construction cost of capital projects could increase. Mindsets will need to be changed as adopting the outcomes would mean deviating from the “construction as usual” thinking. Therefore, the retraining and retooling of construction artisans and professionals to a lesser extent is a likely barrier which must be addressed;
4. **Action Items** – Based on the observations made during the inspection of the schools, and issues raised at the stakeholder consultations, there appear to be several actions that could be implemented to achieve the goals of the road map. The following are the actions that are considered absolute imperatives:
 - i. Present project report to key agencies and stakeholders in pilot countries
 - ii. Present findings to beneficiary groups
 - iii. Present the project report to political directorate of countries in pilot phase
 - iv. Build capacity in project schools
 - v. Mobilize political commitment for expansion of the project at the sub-regional level
 - vi. Refine project resources to facilitate project implementation
 - vii. Enhance the efficacy of the project
 - viii. Promote continuity of the project



- ix. Promote DRRE in the education system
 - x. Prepare post-disaster business continuity guidelines
 - xi. Present findings to the OECS Commission
 - xii. Retraining and retooling of construction artisans
 - xiii. Promote development of disaster vulnerability assessment guidelines for educational facilities
 - xiv. Prepare project infographic
5. **Priorities and Timelines** – Out of the 14 actions listed above, there are a few which should be implemented immediately on acceptance of the road map. Three such activities are aggressive stakeholder consultations, mobilising political commitment, and presenting findings to the OECS Commission.

As to the timing, there needs to be a two-stage approach. The first should be consultations with key stakeholders within six months of acceptance of the road map. The second would be implementation of a refined road map within a project horizon of five years.

2.3 Proposed Stakeholders

As identified earlier, the most effective roadmaps are developed through extensive dialogue with key stakeholders, throughout its design and implementation stages. With the lack of adequate stakeholder consultations prior to development of the road map and, given the recommendation to refine it within six months of submission, the following are the critical stakeholders to be involved:

- National Designated Entities from the two participating countries;
- Representative of the OECS Commission;
- The political directorate;
- School principals, teachers and their associations;
- Government decision-makers and policy personnel in the ministries, environment, natural resources, education, finance, economic development and infrastructure;
- Senior officers from the Development Control Authorities;
- Construction and technology associations;
- Non-governmental organisations involved in environment, climate change and resilient construction;
- Utility companies.



2.4 Roadmap Process

The proposed road map process is presented in Figure 3. It sets out the flow intended in achieving the goal of a roadmap which is accepted, continually monitored and adjusted as and when necessary. Figure 3 identifies the stages involved in developing the road map and the level of consultation which could be facilitated as part of the consultancy.

It should be noted that two phases of the process have been omitted in Figure 3. It is usual for the planning and preparation, and visioning to be included in the process graphic, but in the context of this document, it was not necessary to identify these. Importantly, two critical points need to be highlighted; a draft roadmap should be reviewed by the NDEs of Saint Lucia and Antigua and Barbuda, and continual monitoring of the implementation is a necessity so as to undertake changes to the document.

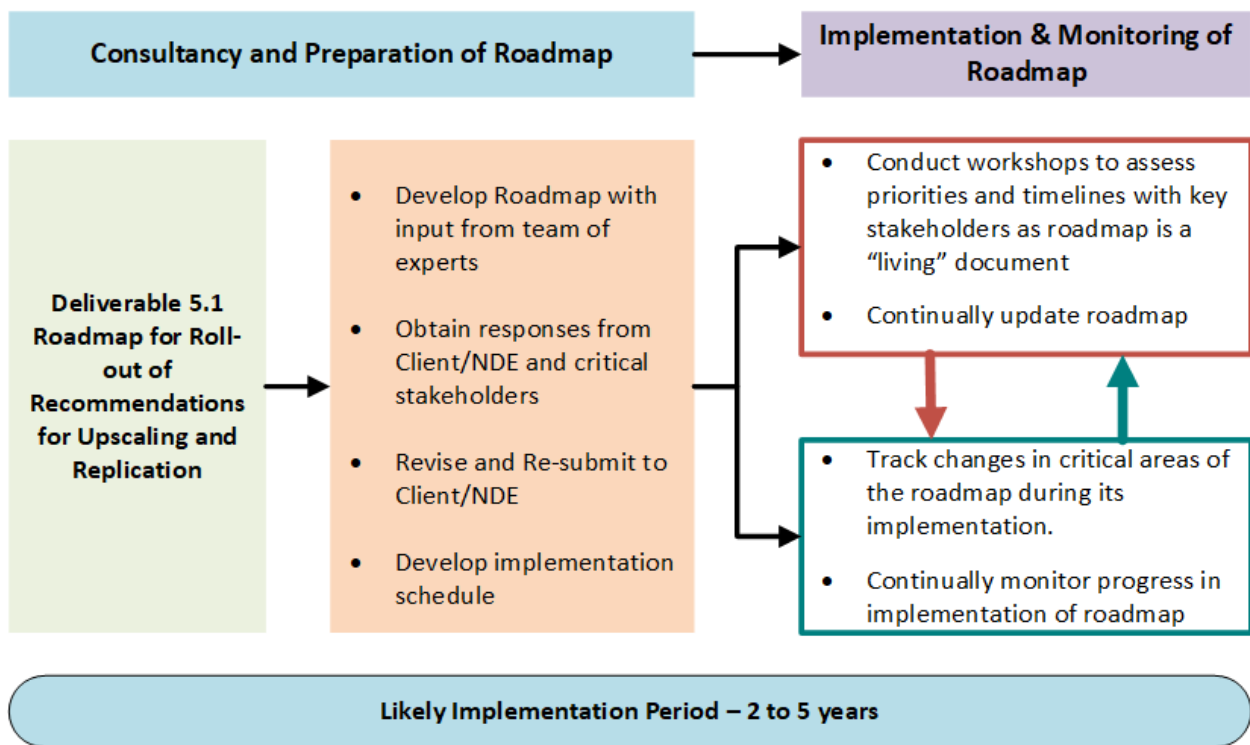


Figure 3 – Schematic of Roadmap Process

It can be assumed that the NDEs would be the owners and become responsible for the promotion of the roadmap within their countries. However, for roll-out within the OECS territories or the wider Caribbean, this responsibility will have to be handled by a regional organization. Therefore, it may be appropriate for the roadmap to be owned by the UNIDO/CTCN, the employer under the consultancy. The early involvement and consequential partnership would be an asset to the roll-out of the roadmap.



3.0 Roadmap Activities

To assist in upscaling and replicating the project and its outcomes, several approaches and fourteen action items were developed to achieve the goal of the road map. These action items, which have also taken into consideration potential gaps and barriers, are detailed below:

3.1 Present Project Report to Key Agencies and Stakeholders in Pilot Countries

On completion of the first phase of the project, the report will be presented to the leadership and technical staff of Ministry of Education and Ministry of Sustainable Development (ME & MSD) as well as other relevant ministries and the agencies responsible for coordinating disaster response in Saint Lucia. The findings and recommendations contained in the report will provide the information necessary to guide deliberations leading to an inter-agency position on the adoption of the project beyond the pilot schools.

3.2 Present Findings to Beneficiary Groups

Commitment for the project will be further cemented when the participating schools, communities and community groups are informed of the lessons learned, findings and recommendations contained in the report. It is therefore important that this information is easily accessible and comprehensible. The Consultant firm will develop a reader friendly version of the Project Report for pilot schools as well as for other community stakeholders and stakeholder agencies. The reader friendly version will be distributed for use in district wide consultations with stakeholders and beneficiary groups. In addition, the reader-friendly version will be used as a means of disseminating information about the project beyond the pilot schools and communities.

3.3 Present the Project Report to Political Directorate of Countries in Pilot Phase

Expanding the project to other schools would require the support of the political directorate. Very often public sector projects fail to move beyond the pilot phase once the funding, particularly from external sources, ends. Therefore, the commitment of the policy directors to prioritize the implementation of the project is critical to its expansion within and across the countries in the sub-region. In this regard, the Consultant firm will present the project findings and recommendations to the Cabinet of Ministers and members of the opposition in the pilot countries.

3.4 Build Capacity in Project Schools

Once the decision is made to expand the project, pilot schools will be designated as ‘model’ climate-resilient schools that can be used to (i) showcase the scope and impact of the project interventions and (ii) facilitate the transfer of knowledge to other schools and communities through the use of the cascading approach. ‘Model’ schools would need to be provided with the requisite resources and training that would allow them to demonstrate best practices in increasing school-based resilience to disasters and climate change.

3.5 Mobilize Political Commitment for Expansion of the Project at the Sub-Regional Level

As the body responsible for coordinating educational and other developmental interventions at the sub-regional level, the OECS Commission could play a central role in facilitating the replication of the project across the sub-region. The Consultant firm will present the findings, recommendations and lessons learned from the implementation of the pilot phase to the Commission to gain support for the replication of the project beyond the pilot schools and countries. The role of the OECS Commission



would be to liaise with the OECS heads of state to seek their endorsement for including the project as part of the Commission's disaster resilient schools agenda and work plan.

3.6 Refine Project Resources to Facilitate Project Implementation

Replication of the project within and across sub-regional territories should be easily facilitated through the use of existing capacities, knowledge gained and resources/material obtained from the activities undertaken throughout the initial implementation process. This would require the refinement of key tools and procedures that were used during project implementation. Out of the process of refinement, a generic model for implementation of the project in the OECS Region will be developed. In addition, a toolkit containing the refined templates, tools and procedures will be developed for future project implementation across the OECS. With regard to the instructional component of the project, the toolkit will include a teacher resource handbook to assist schools in implementing disaster risk education as part of their teaching/learning programme.

3.7 Enhance the Efficacy of the Project

To improve the overall effectiveness of the Project, it is necessary to ensure that it is situated within a sound and cohesive plan that covers all aspects of school safety. Such a plan should be consonant with the Comprehensive School Safety Framework¹, promulgated by UNESCO, to guide climate adaptation and resilience building interventions in education systems. In its present form, the Increasing Resilience of the Education System in St Lucia and Antigua/Barbuda Project addresses only two of the three pillars of the CSS Framework: (i) Safe School Facilities and (ii) DRRE. The third pillar, i.e. Safe School Management is not currently included in the project framework and its omission may weaken the overall effectiveness of the interventions undertaken under Pillars One and Two. Therefore, the scope of the project must be broadened to include activities that result in a plan/framework for addressing Safe School Management.

3.8 Promote Continuity of the Project

Actions must be taken to ensure that the project is not viewed or treated as a stand-alone measure, separated from other educational priorities. To promote continuity, the Increasing Resilience of the Education System in St Lucia and Antigua/Barbuda Project needs to be located within a coherent policy agenda that dovetails with climate change and disaster risk reduction (DRR) related policies of other line ministries. As such, TA will be needed to support OECS governments in developing a coherent Country Action Plan for School Safety that operationalizes each country's plan for mainstreaming DRR and resilience to climate change in public planning. The plan will streamline and synchronize the major country-level interventions and actions that are geared towards increasing resilience of the education system to climate change. Importantly, the Country Action Plan for School Safety must include each government's policy position and plan for incorporating DRRE in the instructional programme based on the recommendations contained in the 'Framework for Including DRRE in the School Curriculum'.

¹ Comprehensive School Safety - Working towards a global framework for climate-smart disaster risk reduction, bridging development and humanitarian action in the education sector. March 2013;
http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/SC/pdf/Comprehensive_school_safety.pdf



3.9 Prepare Post-disaster Business Continuity Guidelines

In Saint Lucia and the OECS, most schools double up as community facilities and are often considered as shelters. Thus, an increase in the resilience of the education system to climate change must consider the concept of “Business Continuity” and ensure that the buildings are ready for use as a shelter, even before the passage of the disaster. This, therefore, means that the PAHO Smart Hospital² concept will need to be used, whereby the school buildings will have to be made both “Safe + Green”. With safe being satisfied through the resilience of the structural designs which would be reflected in the performance specifications for the buildings, several “green” concepts (listed in Box 1) will be adopted as part of the post-disaster business continuity guidelines.

Box 1: Green Concepts Checklist

- Establishing the shelter capacity of each school;
- Deciding on the daily consumption demands per occupant of the shelter;
- The use of adequately sized potable and rainwater tanks to allow for at least one week of full capacity occupation;
- Using solar pumps for pumping the stored water to the supply lines;
- Use of an adequately and legally sized photovoltaic power system for the schools;
- Recommendation for the use of low-flush water cisterns during the design and retrofitting stages of the schools.

3.10 Present Findings to the OECS Commission

As a means of increasing buy-in, it will be prudent to share the findings of the project with the OECS Commission (based in Saint Lucia) and invite its participation as a key stakeholder in the consultations. The OECS has in recent times awarded consultancies for the *Development of Design Guidelines for Disaster-Resilient Schools in the OECS*. Therefore, once this project is presented and accepted as supplementation of its works already commenced, the Commission could become joint owners, promote the project, and participate in the replication and upgrade of the findings, regionally. Therefore, joint ownership of the roadmap by the UNIDO/CTCN, the NDE, and the OECS Commission, should be strongly considered for its goals to be accomplished within the proposed timeframe.

3.11 Retraining and Retooling of Construction Artisans

Accomplishing the overall goals of the roadmap is best achieved through complete buy-in, particularly by the direct implementors in the construction sector. While policies and systems can be established to ensure the concept of disaster resilient construction is practiced nationally and regionally, technical personnel within the construction industry will need to be retrained and retooled. Anecdotal evidence has shown that contractors and their artisans encounter major challenges in adopting practices and complying with requirements of building codes and implementing retrofitting details.

Indeed, a study published by PAHO suggests that the maximum 3-second gust wind speed measured in the Commonwealth of Dominica during Hurricane Maria was 165 miles per hour (mph). However, the 700-year return period 3-second gust wind speed for use with ASCE-7-10 for Category II (residential) buildings is 159 mph, un-factored (i.e. the design wind speed as specified in the OECS Building Code 2015). When factored for climate as is a requirement of the OECS Building Code 2015, the speed increases to 179 mph. Based on these findings, it appears that the extent of the damage in Dominica as a consequence of the 2017 Hurricane Maria, may also be associated with a general non-compliance with the requirements of the OECS Building Code 2015.



Therefore; as part of the adoption and replication of the project and its outcomes, the following are required:

- The OECS Building Code should be made mandatory and legislated within the sub-region;
- There should be regular training of artisans, architects, contractors, engineers, physical planning officers and other construction personnel in the OECS Building Code and the Guidelines, and in the retrofitting of structures;
- OECS Building Code and the Guidelines should be included in the curriculum of all technical and vocational schools within the sub-region.

3.12 Promote Development of Disaster Vulnerability Assessment Guidelines for Educational Facilities

Any guidelines for the education sector should start from the premise that a Disaster Vulnerability Assessment (DVA) is an ongoing process for identifying and collectively prioritising the critical risks to each school and its immovable property. The automatic response is the designing of a system of accountability with measurable and appropriate activities with well-established timelines to address all identified and corroborated critical risks. In so doing, there are three key principles as pictorially depicted in Figure 4.

The devastating effects of recent hurricanes (Harvey, Irma, and Maria) pointed to the extreme vulnerability of the education sector and the effect on schooling. Based on first-hand reports, some of the damage could have been mitigated through some basic means such as simple construction detailing and national adoption of appropriate building codes and standards.

The DVA guidelines will therefore be based on the checklist in Box 2 and are expected to develop the processes to be adopted to ultimately produce climate resilient school designs to withstand the variabilities of extreme weather, increased wind speeds, and updated seismicity information. The guidelines will need to stress the need for community participation in the teams which will identify the critical hazards affecting any chosen school site.

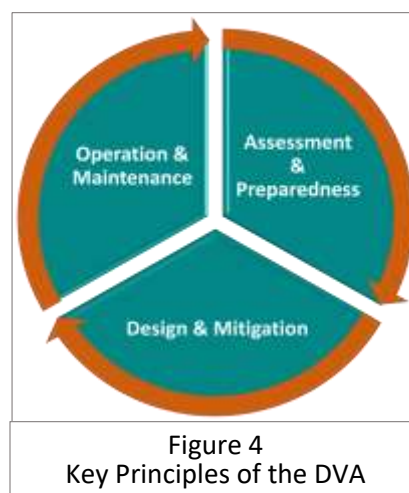


Figure 4
Key Principles of the DVA

Box 2: DVA Process & Checklist

- Set up a DVA team comprising stakeholders, community members and engineers;
- Identify all relevant vulnerabilities which may impact the school – population, location capital resources, and micro-climatic conditions;
- Establish the level of risk of the individual sites against the shortlist of critical hazards;
- Collate findings to advise an appropriate plan of action and outline specifications for design of each school or per zone.

3.13 Promoting DRRE in the Education System

Consistent with the process of curriculum development processes, the formal inclusion of DRRE in the primary and secondary school curricula of the OECS countries would require extensive consultation. Firstly, it will be necessary to engage the political directorate, educational and other relevant authorities to ascertain their individual or collective position on the matter. Secondly, it is critical that key stakeholders and beneficiaries of the proposed DRRE curriculum are consulted to garner support for the instructional programme.



3.13.1 Mobilize Support from Key Agencies

It is imperative that the policy directors and technical personnel of the ME & MSD be informed of the rationale for and steps to be taken in including DRR in the school curriculum. Therefore, it will be necessary to present them with the recommendations contained within the 'Framework for the Including DRRE in the School Curriculum' and to seek a policy position from the heads of the relevant line ministries in individual OECS territories on the way forward.

Once the decision to include DRRE is taken, the process will fall within the cycle of curriculum review. It is important to note that OECS countries may be at various points in the curriculum review cycle. This may have an impact on the feasibility of coordinating the development of a DRRE curriculum at the sub-regional level. However, at the local school level, principals and teachers who are interested in incorporating DRR competencies in their instruction can do so outside the process of formal curriculum review.

3.13.2 Consult with the OECS Commission on the Recommendations

Based on its extensive experience in coordinating curriculum reform at the sub-regional level, the OECS Commission will be presented with the recommendations contained in the proposed Framework Document. Importantly, the Commission's guidance will be needed to determine the most effective approach for operationalizing the inclusion of DRRE in the school curricula across regional territories. Most critically, the Commission's support is needed to lobby regional governments to include DRRE as part of the schools' formal curriculum review and development process.

3.13.3 Mobilize Support for DRRE from Key Stakeholders

It is imperative that support for including DRRE in the school curriculum be obtained from the key stakeholders (principals, teachers, curriculum specialists, safety officers, education officers, sustainable development officers, parents, students, community groups and disaster response agencies). In this regard, a series of consultations will be held with these stakeholder groups to highlight the nature of DRRE and the benefits to be gained from increasing children's capacity to respond effectively to disaster risk and climate change. The recommendations contained in the Framework Document will be used to focus discussions during consultations.

3.13.4 Develop Scope and Sequence Charts for DRRE

Once the decision is taken to include DRRE as part of the instructional programme for schools in the OECS, either officially through formal curriculum/module development or unofficially, on a school-by-school basis, it is critical that the relevant technical personnel in the Ministry of Education use the information contained in the proposed Framework (for Including DRRE in the School Curriculum) to undertake the development of the scope and sequence charts. These charts will serve as the foundation upon which the DRRE curriculum will be developed. Outside the process of formal curriculum review, the scope and sequence charts will be used by principals and teachers to plan instruction and extra-curricular activities in their schools.

3.13.5 Provide Training and Resources for Teachers

The success of the curriculum will be dependent in large measure, on the ability of teachers to implement it. In this regard, both pre and in-service teacher training programmes will need to be in place to prepare all teachers to deliver the DRRE curriculum. A course in DRRE



would need to be included in the preparation programmes of teachers in training at colleges across the sub-region. Similarly, continuous professional development programmes should be in place to provide classroom teachers with the competencies to implement the DRRE curriculum. Principals and teachers who have decided to include DRRE in their instructional programme outside the formal curriculum development process will be provided with the necessary guidance and teaching/learning material for effective implementation.

3.13.6 Dissemination of DRR Messages

Disseminating information about hazards and climate change in communities and in the general public is a key component of DRRE. Therefore, it is important to provide schools with the resources for multi-media public awareness campaigns in their communities. These public awareness campaigns will be student-driven and as such, children will need to be trained in crafting effective DRR messages.

3.14 Prepare Project Infographic

Using an appropriate project infographic in the format of a chart is another action to be utilized as part of the roadmap. The infographic will have three levels of information, namely; Project Scope, Main Outcomes, and Mitigation Actions. Within the resultant nine cells in the chart (a format of which is illustrated in Figure 5), summary information and graphics will be included to present the findings and recommendations which would be promoted through the roadmap. Level one – Project Scope – is considered extremely important as it is meant to distill critical aspects of the terms of reference and present them to the stakeholders in a simplified and unambiguous manner.



Project Scope

Climate Vulnerability Assessment & Ranking of 12 Schools

- Rapid Climate Vulnerability Assessment of 12 Schools
- Hazard (Drought, Floods, Landslide, Wind & Sea Level Rise) assessment
- Stakeholder Consultations
- Brief profile for each school
- Adaptive capacity of each school and area
- Ranking of schools based on climate vulnerability assessment

Technical Assessment of Schools & Disaster Risk Resilience Education

- Condition Assessment of physical assets
- Stakeholder consultations & focus group discussions
- Retrofit measures & technology options
- Cost-effectiveness of the measures and options
- Maintenance & Sustainability plans for schools
- Capacity Gaps & Needs Assessment Report
- Disaster Risk Resilience Education
- Roadmap for roll out & replication of project within OECS

Environmental & Social Impact Assessment (ESIA)

- ESIA of proposed retrofit & technology options
- Environmental & Social Management Plan
- Stakeholder consultations
- Consultations Report

Main Outputs

Hazard Assessment of Schools



Overall Ranking of Schools

No	School	Score				Overall Ranking
		Average Hazard	Physical Condition	Adaptive Capacity	Cost	
1	Ant Marie Infant	0.4	0.25	0.25	0.15	4
2	Ant Marie Primary	2.4	0.25	0.25	0.15	8
3	Belata Combined	2.4	0.50	0.50	0.80	2
4	Brown primary	2.2	0.50	0.20	2.90	7
5	Corbett Secondary	1.8	0.25	0.15	2.50	12
6	Stonewatch Combined	1.8	0.50	0.25	2.65	9
7	Pond Assau Combined	2.0	0.25	0.15	3.58	11
8	Marshall Primary	2.2	0.33	0.33	3.88	6
9	Patterson Combined	2.4	0.27	0.15	3.00	5
10	Sullivan Combined	3.0	0.25	0.25	3.58	7
11	Wickham Infant	3.0	0.29	0.25	2.62	10
12	Wickham Primary	3.4	0.30	0.25	3.45	1

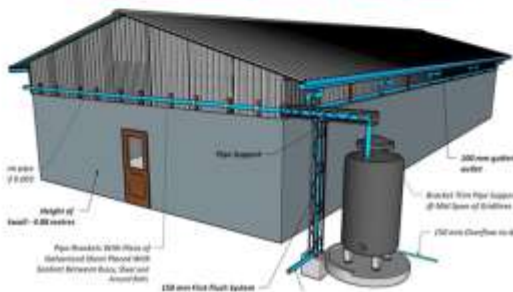
Retrofit Measures & Technology Options

Category	Item No.	Mitigation Measure
Structural Reinforcing of both elements and the whole structure	1	Repair and/or remove strength of concrete columns
	2	Repair cracks in reinforced concrete floor slab surface
	3	Repair cracks to control the walls and structural elements
	4	Repair beams and columns with epoxy grouting and bracing using
	5	Underlaid floor deck and repair supports with structural deflection
	6	Allow the existing raft to rest on the structural beams and columns, applying a rust inhibitor and repainting
	7	Reconstruct severely damaged foundation walls, strip and repair footings for the wallway
	8	Replacement of metal gutters and roofing
	9	Demolish and reconstruct entire school store
	10	Rebuild the severely damaged foundation walls / strip and spread footings
	11	Floor Construction Introducing additional supports to repair damaged floor
	12	Under take detailed structural condition assessment of the school before a disaster strikes
Retrofit and repairs to roof structure	1	Allow for existing deteriorated sections or part of the floor joists
	2	Install additional fasteners at every trough or in the over, rise, ridge and/or edge of gable ends for the resistance of hurricane force winds
	3	Allow for supply and replacement of damaged sections of roof gutters
4	Make up repairs on concrete roof and apply waterproofing membrane	
5	Remove and reconstruct entire roof frame system	
6	Secure roof deck and replace roof covering using 22 sheets as a minimum	

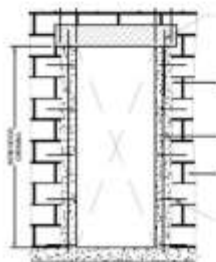
Brief School Profile

School Name	Site Name	Sub-Category	Year
Ant Marie Primary	Ant Marie	Primary	2005
Belata Combined	Belata	Primary/Secondary	1985
Brown primary	Brown	Primary	1985
Corbett Secondary	Corbett	Secondary	1985
Stonewatch Combined	Stonewatch	Primary/Secondary	1985
Pond Assau Combined	Pond Assau	Primary/Secondary	1985
Marshall Primary	Marshall	Primary	1985
Patterson Combined	Patterson	Primary/Secondary	1985
Sullivan Combined	Sullivan	Primary/Secondary	1985
Wickham Infant	Wickham	Infant	1985
Wickham Primary	Wickham	Primary	1985

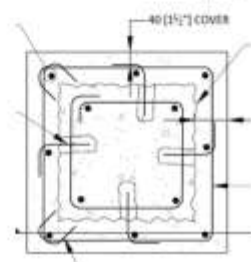
Rainwater Harvesting with first flush system



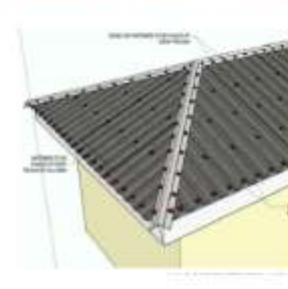
Retrofit door opening for hurricane force winds



Concrete Jacketing of column to increase capacity



Retrofitting roof with more screws



Roof Mounted Photovoltaic system



Figure 5 – Project Infographic Chart (See Appendix 1)



4.0 Priority and Timelines

While all fourteen action items are considered critical and important to the implementation of the roadmap and replication of the project together with its outcomes, the following three are considered most important:

- Present Project Report to Key Agencies and Stakeholders in Pilot Countries
- Mobilize Political Commitment for Expansion of the Project at the Sub-Regional Level
- Present Findings to the OECS Commission

These three action items must be undertaken as soon as the roadmap has been accepted by UNIDO/CTCN and the NDE. Early collaboration with the OECS Commission is crucial as it has the infrastructure and the structure to facilitate mobilization of the sub-regional politicians. Once these three most important actions are implemented within the first six months, then the roadmap should be refined and rolled out within the sub-region.



5.0 References

International Energy Agency; Energy Technology Roadmaps a Guide to Development and Implementation; 2014 Edition

<https://sustainabledevelopment.un.org/content/documents/21079TechnologyRoadmapAguidetodevelopmentandimplementation.pdf>

Comprehensive School Safety - Working towards a global framework for climate-smart disaster risk reduction, bridging development and humanitarian action in the education sector. March 2013;

http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/SC/pdf/Comprehensive_school_safety.pdf

International Bank for Reconstruction and Development / The World Bank; Roadmap for Safer and Resilient Schools - Guidance Note V2; 2019

https://gpsw.worldbank.org/sites/gpsw/files/2019-10/RSRS_confedition.pdf

D. D'Ayala, A. Meslem, D. Vamvatsikos, K. Porter, T. Rossetto and V. Silva; Guidelines for Analytical Vulnerability Assessment of Low/Mid-Rise Buildings – Version 1.0; August 1, 2015.

<https://storage.globalquakemodel.org/media/publication/GEM-GC-VLM-AVALMGuidelines-201412v01.pdf>

Global Program for Safer Schools by the Global Facility for Disaster Reduction and Recovery, 2014;

<https://gpsw.worldbank.org/>



Appendix 1 – Sample Infographic

Climate Vulnerability Assessment & Ranking of 12 Schools

- Rapid Climate Vulnerability Assessment of 12 Schools
- Hazard (Drought, Floods, Landslide, Wind & Sea Level Rise) assessment
- Stakeholder Consultations
- Brief profile for each school
- Adaptive capacity of each school and area
- Ranking of schools based on climate vulnerability assessment

Technical Assessment of Schools & Disaster Risk Resilience Education

- Condition Assessment of physical assets
- Stakeholder consultations & focus group discussions
- Retrofit measures & technology options
- Cost-effectiveness of the measures and options
- Maintenance & Sustainability plans for schools
- Capacity Gaps & Needs Assessment Report
- Disaster Risk Resilience Education
- Roadmap for roll out & replication of project within OECS

Environmental & Social Impact Assessment (ESIA)

- ESIA of proposed retrofit & technology options
- Environmental & Social Management Plan
- Stakeholder consultations
- Consultations Report

Hazard Assessment of Schools

School	Landslide	Fluvial flooding	Wind speed	Drought	Sea level rise	Average Score	Average hazard rank
Ave Maria Infant	1	3	3	1	3	2.6	3
Ave Maria Primary	1	3	3	1	3	2.6	3
Balata Combined	3	3	2	2	1	2.6	3
Bexon Primary	3	3	1	1	1	2.2	7
Corinth Secondary	1	3	3	1	1	1.8	11
Desruisseaux Combined	1	1	4	2	1	1.8	11
Fond Assau Combined	1	1	4	3	1	2	9
Micoud Primary	3	1	4	2	1	2.2	7
Patience Combined	3	1	4	3	1	2.4	6
Saltibus Combined	3	1	4	4	1	3	2
Vieux-Fort Infant	1	3	4	1	1	2	9
Vieux-Fort Primary	1	3	4	3	3	3.6	1

Overall Ranking of Schools

No	School	Average Hazard	Rating Inverse of			Overall Ranking
			Physical Condition	Adaptive Capacity	Total	
1	Ave Maria Infant	2.6	0.25	0.25	3.10	4
2	Ave Maria Primary	2.6	0.25	0.25	3.10	4
3	Balata Combined	2.6	0.50	0.50	3.60	2
4	Bexon primary	2.2	0.50	0.20	2.90	7
5	Corinth Secondary	1.8	0.25	0.33	2.38	12
6	Desruisseaux Combined	1.8	0.50	0.33	2.63	9
7	Fond Assau Combined	2.0	0.25	0.33	2.58	11
8	Micoud Primary	2.2	0.33	0.33	2.86	8
9	Patience Combined	2.4	0.27	0.33	3.00	6
10	Saltibus Combined	3.0	0.25	0.33	3.58	3
11	Vieux Fort Infant	2.0	0.29	0.33	2.62	10
12	Vieux Fort Primary	3.6	0.50	0.33	4.43	1

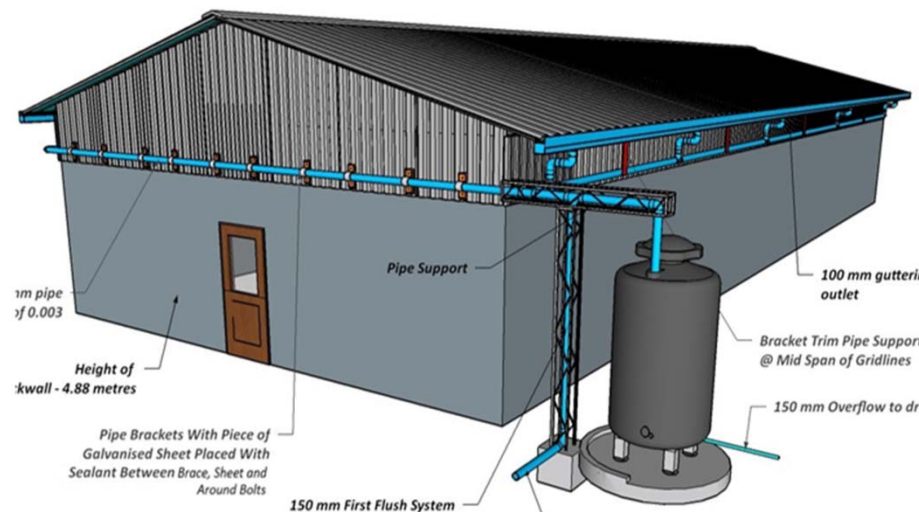
Retrofit Measures & Technology Options

Summary Interventions	Sub No.	Mitigation Measures
Structural Retrofitting of both elements and the whole structure	1	Repair and increase strength of concrete columns
	2	Repair cracks in reinforced concrete floor slab surface
	3	Repair cracks in concrete walls and structural elements
	4	Repair beams and columns with heavy spalling and honeycombing
	5	Undertake design check and retrofit beams with excessive deflection
	6	Allow for scaling off the rust on the structural beams and columns, applying a rust inhibitor and repainting
	7	Reconstruct severely damaged foundation walls, strip and spread footings for the walkway
	8	Replacement of metal purlins and roofing
	9	Demolish and reconstruct entire school Block
	10	Retrofit the severely damaged foundation walls / strip and spread footings.
	11	Floor Construction- Introducing additional supports to repair damaged floor
	12	Undertake detailed structural condition assessment of Bexon school before zoning as disaster shelter
Retrofit and repairs to roof structure	1	Allow for replacing deteriorated sections or all of the fascia boards
	2	Install additional fasteners at every trough at the eaves, hips, ridges and edges of gable roofs for the resistance of hurricane force winds.
	3	Allow for supply and replacement of damaged sections of roof gutters
	4	Make up slopes on concrete roofs and apply waterproofing membrane
	5	Remove and reconstruct entire roof truss system
	6	Securing roof deck and replace roof covering gauge 24 sheets as a minimum

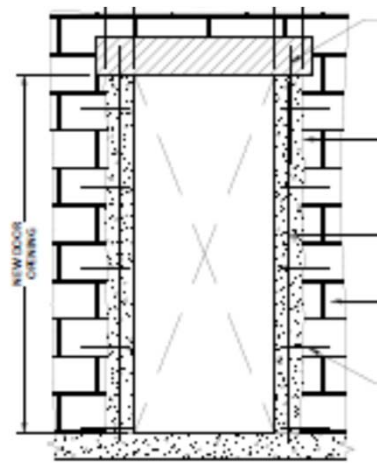
Brief School Profile

School Name:	Ave Maria Primary	Risk Category:	RCIV
Type of School:	Primary	Occupancy Group:	Group A: Public Buildings
School Address:	Corner of Broglie & Brazil Street, Castries	No. of Occupants:	529
Latitude:	14°00'31.73" N	Year Built:	1901
Longitude:	60°59'19.39" W	Year(s) Renovated:	Within last 8 years
Use:	School & Emergency Shelter	Original Design Code:	Unknown
Date of Building Condition Assessment Visit:	September 9, 2020	Date of Fire Safety Assessment Visit:	December 8, 2020
School Description:	No. of Buildings on the School Compound:	3	
	Shape of Buildings:	Two rectangular buildings forming an L-shape and a stand-alone rectangular building	
	School Layout:	The L-shaped building has two floors which houses classrooms. The ground floor houses a sick bay, office and home economics room. The rectangular building houses a canteen.	
Climate Vulnerability:	Landslides	No or low	The school is situated on flat land and not near the base of a hill
	Fluvial Flooding	High	The school is located in an area which is known to flood from heavy rains
	Hurricanes/ Wind Speeds	Moderate	The school is in a fairly open area and surrounded by buildings which act as wind barriers
	Drought	Low	The school is located in an area which faces few water issues
	Sea-Level Rise	Moderate	The school location floods easily and is in relatively close proximity to the sea
Preliminary Cost Estimate (USD)	\$ 330,000.00		

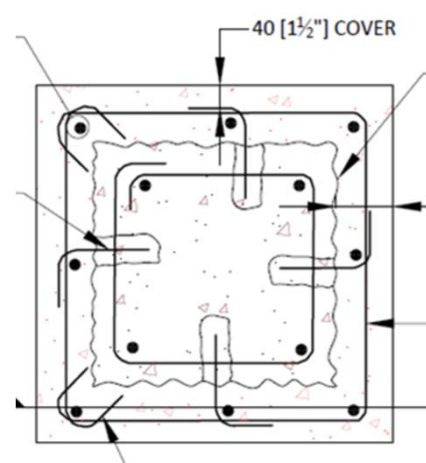
Rainwater Harvesting with first flush system



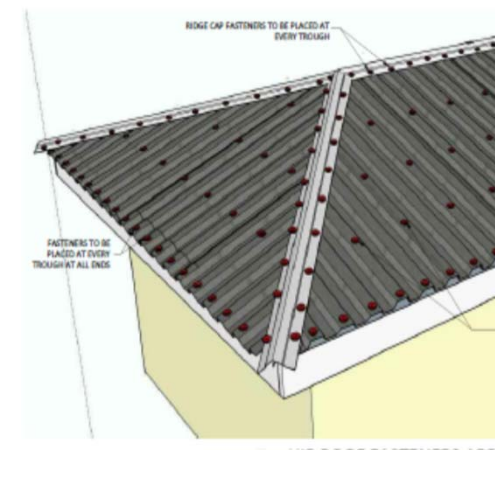
Retrofit door opening for hurricane force winds



Concrete Jacketing of column to increase capacity



Retrofitting roof with more screws



Roof Mounted Photovoltaic system

