Ministry of Education, Guyana

Government of the Co-operative
Republic of Guyana

Policy Document

School's Facilities Policy

Design & Maintenancy Policy and Standards for Secondary Education Facilities

C SECTION:

Policy, Planning & Maintenance of Education Facilities

- * Maintenance Policy for Education Facilities
- * Criteria framework for identification of construction & Maintenance
- * Maintenance Standards & Guidelines for Education Facilities

November 10, 2023

Government of Guyana

Ministry of Education

26 Brickdam, Stabroek. Georgetown, Guyana

SCHOOLS' FACILITIES STRATEGY

Design & Maintenance Policy and Standards for Secondary Education Facilities

A	**SECTION**	National Policy for Schools' Infrastructure Development and Maintenance
B	**SECTION:**	Technical Standards for Design and Maintenance of Education Facilities ▪ Non-Academic Education Standards for Secondary Schools ▪ Design Framework and Strategy ▪ Technical Standards of Building Characteristics and Utilities
C	**SECTION**	Policy, Planning & Maintenance of Education Facilities ▪ Maintenance Policy for Education Facilities ▪ Criteria framework for identification of construction & Maintenance ▪ Maintenance Standards & Guidelines for Education Facilities

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SECTION C

Policy, Planning & Maintenance of Education Facilities

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- Criteria framework for identification of construction & Maintenance
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INTRODUCTION

The Chief Education Officer
Ministry of Education

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ACRONYMS AND ABBREVIATIONS

ADA	American Disability Standards for Accessible design 2010. Internationally recognized standards for design for persons with disabilities.
AC	Air Condition [Split or Wall Unit]
BS	British Standards
CARICOM	Caribbean Community
CC	Climate change.
CDC	Civil Defense Commission [Guyana].
CDEMA	Caribbean Disaster Emergency Management Agency.
CH	Ceiling Height
Dorms	Dormitory
DEO	District Education Officer
DCEO	Deputy Chief Education Office [Secondary]
DWG.	Drawing
DRM	Disaster risk management
GEA	Guyana Energy Agency
GFS	Guyana Fire Service
GoG	Government of Guyana
GL&SC	Guyana Lands and Surveys Commission.
GYD	Guyanese Dollar.
IBC	International Building Code
MOH	Ministry of Health
MOPW	Ministry of Public Works
MoE	Ministry of Education
MoE-HFLE	Ministry of Education – Health, Family life Education Department
NCRED	National Centre of Educational Resources Development
NDCs	Neighbourhood Democratic Councils
QA/QC	Quality Assurance / Quality Control management system.
RDC	Regional Democratic Council
REDO	Regional Education Officer
SDMP	School Disaster Management Plan
sf./ ft2 or sq.ft	Square Foot
UNICEF	United Nations International Children's Emergency Fund

1.0 DRAFT POLICY FOR MAINTENANCE OF EDUCATION FACILITIES

1.1 Background

1.1.1 Introduction

The maintenance of educational building facilities is essential to fostering a safe, conducive, and productive learning environment for students and staff. The Ministry of Education is committed to ensuring the proper upkeep and maintenance of all educational building facilities under its jurisdiction, as outlined in this policy statement.

1.1.2 Purpose

The purpose of this policy is to establish a framework for the systematic and efficient maintenance of education building facilities, ensuring their longevity, improve their energy efficiency, safety, and functionality. It also aims to allocate resources effectively and prioritize maintenance activities provide and maintain, a safe and comfortable teaching and learning environment.

1.1.3 Scope

This policy applies to all Secondary Education Building facilities owned and operated by The Ministry of Education. It encompasses all physical aspects of these facilities, including but not limited to equipment, classrooms, laboratories, libraries, offices, restrooms, common areas, and outdoor spaces.

1.1.4 Aims of the policy

- Ensure that all education building facilities are safe and healthy for students and staff
- Maintain education building facilities in good condition to extend their useful life
- Minimize disruptions to teaching and learning activities due to facility maintenance issues
- Provide a cost-effective approach to facility maintenance

1. 2 POLICY STATEMENT

It is our commitment to ensure that our facilities are well-maintained, safe, and efficient for their intended purpose, while minimizing operational disruptions. We believe that the quality of the physical learning environment is a key factor in the provision of high-quality and effective teaching.

The Policy places the child at the centre of a holistic learning and teaching environment with key dimensions. These dimensions are firmly embedded within these standards with the aim of creating an enabling physical environment fit for every child's education.

1.3 Standards for Maintenance of Education Facilities

The Ministry of Education has established the following standards for the maintenance of education buildings:

1.3.1 Baseline Policy Standard

The Baseline policy declare the following standards as the target objectives

a) Standard A
*"A school **SHALL** have appropriate, sufficient and secure, well maintained buildings"*

b) Standard B
*"A school **SHALL** be kept as a healthy, clean, secure and learner protecting environment."*

c) Standard C
*"Maintenance inspection and monitoring **SHALL** be done on a diligent and regular manner by qualified technical officials, Routine and Preventive maintenance tasks shall be performed on a regular basis. All repairs and replacements must be made with high-quality materials and workmanship."*

1.4 Objectives of Policy

The objectives of this policy and strategy maintenance document are as follows:

a) Ensure that education facilities are safe, comfortable and provide conducive learning environments. Preserve and enhance the functionality of school facilities with strategic improvements in space, facilities and resources. A well-maintained school environment can help to improve student attendance, concentration, and achievement.

b) Protect the capital investment in education buildings. This includes maintaining buildings and grounds in a way that prevents premature deterioration and extends the lifespan of assets.

c) Ensure the safety and health of students, staff, and visitors. This includes maintaining buildings and grounds in a condition that is free from hazards, such as trip hazards, electrical hazards, and mold growth.

d) Use high-quality materials and construction practices when making repairs or renovations. This can help to extend the lifespan of buildings and reduce the need for future maintenance.

e) Reducing operation and maintenance cost of education buildings. inclusive of energy consumption, by improvement in efficiency and quality of buildings and systems therein.

f) **Incorporating sustainable design principles into maintenance and renovation projects and** Making buildings more accessible to students and staff with disabilities.

g) Train and equip maintenance technical and administrative staff with the skills and tools they need to do their jobs effectively.

2.0 STRATEGY for a Maintenance System

The overarching strategy for developing a maintenance system for education buildings should be holistic and proactive, with the primary goal of preventing problems before they arise. The system should be tailored to the specific requirements of the district or school, and should take into consideration the age and condition of the buildings, the available budget, and the accessibility of qualified maintenance staff.

a) **Special Management Unit**
Establish a national school facilities maintenance program. This program would be responsible for developing and implementing maintenance plans for all schools in the country.

b) **Maintenance Plan**
Develop and implement a comprehensive school facilities maintenance plan. This plan should include a preventive maintenance schedule, a corrective maintenance process, and a capital improvement plan. The preventive maintenance schedule should outline the routine tasks that need to be performed to keep school facilities in good condition. The corrective maintenance process should outline how to respond to and repair damage to school facilities.

c) **Capital Plan**
The capital improvement plan should outline the major upgrades that need to be made to school facilities over time. Allocate sufficient resources to the school facilities maintenance program. This includes funding for trained technical staff, equipment, and materials.

d) **Facility Condition Assessment**
Maintenance planning commences with as assessment of condition and needs.

- Undertake an update and comprehensive assessment of all education buildings by Region. Create an inventory of all buildings, including their age, size, usage, and condition. Maintain an up-to-date inventory of all school facilities, including their condition, age, and required maintenance

- Identify critical areas that need attention, such as structural integrity, electrical systems, space adequacy, plumbing, roofing, and fire and safety systems.

- Conduct feasibility studies for future facility improvements and expansion.
- Prioritize maintenance and renovation projects based on need and available resources

e) **Prioritization and Budgeting**:
Prioritize maintenance tasks based on the assessment findings. Focus on critical areas that affect the learning environment, health and safety.

f) **Long Term Plan**
Develop a long-term budget plan that includes both routine maintenance and capital improvement projects. Ensure that the budget is realistic and sustainable.

g) **Maintenance Schedule**:
Develop a maintenance schedule that identify category of needs and priorities.
Implement a preventive maintenance program to address potential issues before they become major problems.

Table 1: Maintenance Strategy

Management Strategy	Action	Indicators	Anticipated Results
Preventive Maintenance	Develop a preventive maintenance schedule for all school facilities.	Number of preventive maintenance tasks completed on schedule.	School facilities are in good condition and require fewer corrective maintenance tasks.
Corrective Maintenance	Establish a process for reporting and responding to corrective maintenance requests.	Number of corrective maintenance requests resolved within a target timeframe.	School facilities are in good working order and any problems are addressed promptly.
Capital Improvements	Develop a capital improvement plan for all school facilities.	Number of capital improvement projects completed on schedule and within budget.	School facilities are upgraded to meet current and future needs.
Staffing and Training	Hire and train qualified maintenance staff.	Number of maintenance staff with the required training and certifications.	Maintenance staff are able to effectively maintain all aspects of school facilities.
Budgeting	Establish a budget for facilities maintenance.	Percentage of the school district's budget allocated to facilities maintenance.	Adequate funding is available to maintain all school facilities.
Technology	Use technology to improve the efficiency and effectiveness of facilities maintenance.	Number of school facilities using computer-aided maintenance management systems (CMMS) or other digital tools.	Maintenance tasks are completed more efficiently and effectively.

3.0 IMPLIMENTATION of The Maintenance System

A system is necessary for implementation of maintenance, to ensure that this is done with an organized management framework. A work plan can help to break down the implementation process into manageable steps, with clear timelines and responsibilities. This can help to avoid delays and ensure that the system is implemented on time and within budget.

3.1 Organization Framework

3.1. Training of Personnel

Invest in training programs for in-house maintenance staff to enhance their skills and keep them up to date with industry best practices.

3.1.2 Capital improvement:

This involves making long-term investments in school facilities, such as new roofs, improved durable floor finish, improved ventilation, durable construction materials and sanitary fittings and site security.

This involves making major upgrades to facilities to improve their condition or functionality.

- Establish a system for reporting routine maintenance requests.
- Implement a system for reporting and tracking corrective maintenance requests.
- Respond to reported issues promptly, categorizing them by severity and priority.
- Ensure that repairs are completed efficiently and to a high standard.
- Track system performance and retain records.

3.1.3 Safety and Compliance:

Regularly inspect the buildings for compliance with safety codes and regulations. Address any violations promptly. Conduct fire drills and safety training for staff and students to ensure they are prepared for emergencies.

3.1.4 Energy Efficiency and Sustainability:

Implement energy-efficient practices, such as LED lighting, insulation upgrades, water conservation, and waste reduction initiatives to reduce operating costs and environmental impact. Consider renewable energy sources, such as solar panels, to power the buildings.

3.1.5 Technology Integration:

Implement a Computerized Maintenance Management System (CMMS) to streamline maintenance processes, track work orders, manage inventory, and analyze maintenance data for informed decision-making.
Leverage technology for predictive maintenance, utilizing sensors and analytics to anticipate potential issues and plan proactive maintenance measures.

3.1.6 Documentation and Reporting:

Maintain detailed records of all maintenance activities, including work orders, inspections, and repairs.
Generate regular reports on the condition of each building, maintenance costs, and the status of ongoing projects.

1.1.7 Community Engagement:

Involve parents, teachers, and students in the maintenance process. Encourage them to report maintenance issues and provide feedback on the learning environment.

Consider organizing open-house events to showcase the maintenance efforts and build community support.

1.1.8 Long-Term Planning:

- Develop a long-term maintenance plan that outlines facility upgrades, renovations, and major maintenance projects over a multi-year period.
- Align long-term plans with the Ministry of Education strategic goals and budget projections to ensure a sustainable and well-maintained facility infrastructure.

1.1.9 Continuous Improvement:

Regularly review and adjust the maintenance strategy based on feedback, changes in building usage, and evolving technology. Seek input from stakeholders to ensure that the maintenance strategy remains aligned with the institution's goals.

By following this comprehensive maintenance strategy, education buildings can provide a safe, comfortable, and conducive environment for learning while maximizing the longevity of the infrastructure and minimizing operational costs. Monitor and evaluate the school facilities maintenance program on a regular basis. This will help to ensure that the program is meeting its goals and objectives, and that it is being implemented effectively.

3.2 Development of Work Plan

The development of a work plan for the implementation of a maintenance system for schools is a complex and challenging undertaking, but it is essential for ensuring the long-term viability, efficiency, and effectiveness of such a system. A well-crafted work plan will provide a blueprint for implementation, outlining the specific steps that need to be taken, the resources that will be required, and the timelines that must be met.

There are several reasons why a work plan is essential for the successful implementation of a school maintenance system:

a) To ensure alignment with strategic goals. The work plan should be aligned with the school district's strategic goals for maintenance and facilities management. This will help to ensure that the system is designed to meet the specific needs of the district and its students.

b) To promote coordination and collaboration. The work plan should involve input from all relevant stakeholders, including school administrators, teachers, staff, students, parents, and community members. This will help to promote coordination and collaboration during the implementation process and ensure that the system meets the needs of all users.

c) To manage resources effectively. The work plan should identify the resources that will be required to implement and maintain the system, including staffing, funding, and equipment. This will help to ensure that the system is implemented in a cost-effective and sustainable manner.

d) To mitigate risks and challenges. The work plan should identify and assess potential risks and challenges to implementation. This will allow for the development of mitigation strategies and contingency plans.

e) To track progress and measure results. The work plan should establish metrics for tracking progress and measuring the results of the implementation process. This will help to identify areas where improvement is needed and ensure that the system is meeting its intended goals.

f) In addition to the general reasons listed above, there are several specific needs that a work plan for the implementation of a school maintenance system can address:
g) Identifying and prioritizing maintenance needs. The work plan should include a process for identifying and prioritizing maintenance needs. This will help to ensure that the most important tasks are addressed first and that resources are allocated efficiently.
h) Developing maintenance procedures and standards. The work plan should include the development of clear and concise maintenance procedures and standards. This will help to ensure that maintenance tasks are performed consistently and to a high standard.

i) Establishing a maintenance schedule. The work plan should establish a realistic schedule for performing all of the maintenance tasks that have been identified. This schedule should be developed taking into account the availability of resources, the needs of the school, and the impact on students and staff.
j) Implementing a maintenance management system. The work plan should include the implementation of a maintenance management system to track work orders, assign tasks, and monitor progress. This will help to ensure that maintenance tasks are completed on time and within budget.

k) Training staff and users. The work plan should include a plan for training staff and users on the new maintenance system. This will help to ensure that the system is used effectively and efficiently.
l) By developing and implementing a comprehensive work plan, school districts can increase their chances of success in implementing a new maintenance system. A well-crafted work plan will help to ensure that the system is aligned with strategic goals, resources are managed effectively, risks and challenges are mitigated, and progress and results are tracked and measured.

Table 2: Action Plan for Facilities Maintenance

Action	Indicators	Anticipated Result
Develop and implement a comprehensive facilities maintenance plan.	Percentage of facilities with maintenance plans in place, Percentage of maintenance tasks completed on time and on budget	Reduced maintenance costs, Improved condition of facilities
Hire and train qualified maintenance staff.	Number of maintenance staff with relevant training and certifications, Percentage of maintenance staff who receive ongoing training	Improved quality of maintenance work, Reduced downtime for facilities
Establish a budget for facilities maintenance.	Percentage of budget allocated to facilities maintenance, Percentage of budget spent on preventive maintenance	Reduced need for corrective maintenance, Extended lifespan of facilities
Regularly inspect and assess the condition of school facilities.	Number of facility inspections conducted annually, Percentage of inspections that identify potential problems	Reduced number of emergency repairs, Improved condition of facilities

Keep accurate records of all maintenance work performed.	Percentage of maintenance tasks with completed work orders, Percentage of maintenance records that are accurate and up-to-date	Improved ability to track maintenance costs and trends, Improved ability to plan for future maintenance needs
Use technology to improve the efficiency and effectiveness of facilities maintenance.	Percentage of facilities using computer-aided maintenance management systems (CMMS) or other digital tools, Percentage of maintenance tasks that are scheduled and tracked using technology	Reduced time spent on administrative tasks, Improved efficiency of maintenance workforce
Involve stakeholders in the facilities maintenance process.	Number of stakeholder meetings held annually, Percentage of stakeholder feedback that is incorporated into facilities maintenance plans	Increased awareness of facilities maintenance needs, Improved support for facilities maintenance initiatives

4.0 CRITERIA FOR DECISION FORMULATION

CRITERIA FOR DECISION MAKING

FRAMEWORK FOR THE DECISION PROCESS
to ascertain if to renovated an Existing School or opt for construction of a new Building

- Retain and Maintain School
  Criteria for decision-making with regards to maintenance AN EXISTING SCHOOL

- Replace with A New School Facility
  Criteria for decision-making with regards to the decision to DEMOLISH AND REPLACE THE SCHOOL BUILDINGS or BUILD on a new nearby site.

4.1 Criteria Framework

The decision-making process for whether to maintain an existing school building or build a new facility involves considering various factors to ensure the best use of resources and the long-term benefit to the educational institution and its students.

4.1.1 FRAMEWORK FOR THE DECISION PROCESS

to **ascertain if to Renovated an Existing School or opt for construction of a new Building**

a) Existing Building Condition Assessment:
Evaluate the current condition of the existing school building [age, physical condition, rate of deterioration, site condition, vulnerability and environmental conditions as wind, light / sound].
Review the facilities structural integrity, safety, compliance with building codes, and the cost of necessary repairs and renovations. The Existing building may not provide the required quality spaces for new academic programmes and technologies integration.

b) Cost Analysis
Compare the cost of renovating and maintaining the existing building to the cost of constructing a new one. This analysis should include both short-term and long-term costs, such as construction expenses, ongoing maintenance, and energy efficiency. Consider if the cost to maintenance the building is high and challenging.

c) Educational Needs
Assess whether the existing facility can adequately support the educational programs and services required by the school programmes. Consider factors such as classroom space, technology infrastructure, accessibility, and specialized facilities (e.g., science labs, sports facilities).

d) Safety and Code Compliance
Ensure that the building complies with current safety codes, accessibility regulations, and environmental standards. Upgrading an old building to meet these requirements may be costly.

e) Future Growth and Flexibility
Consider the school projected enrollment growth and future needs. A new building might offer more flexibility for accommodating changes in enrollment or educational program requirements.

f) Community and Stakeholder Input
Seek input from the community, parents, teachers, and other stakeholders to gauge their preferences and priorities regarding the school facility. Their perspectives can inform the decision-making process.

g) Energy Efficiency and Sustainability
Assess the energy efficiency and sustainability of both options. New buildings can often incorporate modern energy-saving technologies and green building practices, which may result in long-term cost savings.

h) Timeline and Disruption
Consider the timeline for construction or renovation. Building a new school may take longer and disrupt education for a more extended period compared to renovating an existing facility.

i) Historical and Cultural Value
If the existing building has historical or cultural significance, its preservation may be a priority, even if it requires additional investment.

j) Funding Availability:
Evaluate the availability of funding sources, such as grants, bonds, or tax revenues, to support either option. Ensure that the chosen approach aligns with the available budget.

k) Local Zoning and Regulations:
Be aware of local zoning regulations and land-use restrictions that may impact the decision. These regulations can affect the feasibility of building a new facility.

l) Life Cycle Cost Analysis:
Perform a life cycle cost analysis, taking into account maintenance, operational costs, and expected lifespan for both options.

m) Architectural and Aesthetic Considerations:
Take into account the architectural design and aesthetic appeal of the school, recognizing their influence on the learning environment and community perception.

n) Return on Investment (ROI):
Calculate the expected ROI for both options, considering potential benefits such as increased enrollment, improved educational outcomes, and community support.

o) Risk Assessment:
Conduct a risk assessment to identify potential risks associated with each option, such as unforeseen issues during renovation or construction.

p) Long-Term Vision:
Consider the school district's long-term vision and educational goals. The chosen option should align with the Ministry's strategic plan and educational objectives.

q) Environmental Impact:
Assess the environmental impact of both options, including factors like site location, energy consumption, and waste generation.

Ultimately, the decision should be based on a careful weighing of these criteria, and it may involve trade-offs between factors like cost, educational needs, and community preferences. Engaging with experts in architecture, engineering, and education planning can also provide valuable insights to inform the decision-making process.

4.2 Criteria for Decision Making

4.2.1 WHEN TO Retain and Maintain an existing school facilities

<u>RETAIN, MAINTAIN and upgrade the existing building, with the following guideline</u>.

The following guideline presents a framework for the decision making with respect to the need for school facilities retention and maintenance rather than construction of new buildings.

a) Physical facilities' condition:
When the existing building is in good condition. If the school building is still structurally sound and meets all current safety standards, there is no need to replace it.

- The existing building can be upgraded, modify and extended to meet new academic spatial needs, technology integration and updated codes and standards.
- The facilities can be modified and upgraded to mitigate hazards, quality improvement, classrooms space, additional facilities etc. to meet the codes and standards.

b) Location
When the existing building is located in a convenient location. If the school building is located in a convenient location, such as near public transportation or major roads, it should be retained. Moving the school to a new location would be disruptive to students and staff.

c) Land Availability
When no nearby land is available for construction of a new school with the school catchment area. This is often applicable in Urban [town/populated] areas. The time and disruption factors for demolition and building of new school on the existing site is extended and not temporary alternative is available.

d) Economics
When the existing building is affordable to maintain. If the cost of maintaining the existing school building is less than the cost of building a new school, it should be retained. Building a new school can be very expensive, so it is important to consider all of the costs involved before making a decision.

e) Cultural Significance
When the existing building is historically significant. If the school building is old and has historical significance, it should be preserved. This is especially true if the building is a contributing factor to the character of the neighborhood

f) Local Community
When the community supports retaining the existing building. If the community is strongly in favor of retaining the existing school building, their wishes should be respected. The school should be a place where students and staff feel welcome and supported, so it is important to listen to the needs of the community.

Ultimately, the decision of whether to retain the existing school building or build a new school is a complex one that should be made on a case-by-case basis. There are many factors to consider, such as the condition of the building, its historical significance, its location, its affordability, and the preference of the community.

EVALUATION MATRIX – GUIDE TO DECISION MAAKING

Table 3: Framework Matrix for Review of The Existing Education Facility with Respect To Adequacy.

	Category	Component	**MUST** meet the overall compliance percentage (%)	Actual evaluated Compliance percentage and required action		
Item No.	Compliance Heading	List of Sub-sections [refer to tables 4,5 and 6 for details]	Acceptable range	**ACTION – A** Less than the acceptable range	**ACTION –B** Less than the acceptable range	**Comment**
A	Safety - Facilities	Structural safety of Building foundation, structure, walls, floor and roofs.	100-95% *IF the acceptable range cannot be achieved with action A – take action B*	Correct and improved by Modifications, re-construction / rehab./ remodel works to affected areas.	Demolish & replace facilities or affected sections. *If action A is deemed to be [a] uneconomical [b] scale of defect is vast [c] defect is aggregated with failure in several other categories.*	
B	Safety – External Threats	Safety and protection from natural and man made hazards.	100-95% *IF the acceptable range cannot be achieved with action A – take action B*	Correct and improved by Modifications, re-construction / rehab./ remodel works to affected areas.	Demolish & replace facilities or affected sections. *If action A is deemed to be [a] uneconomical [b] scale of defect is vast [c] defect is aggregated with failure in several other categories.*	This include frequent flooding of site and buildings, close proximity to ocean/river / major water body.
C	Condition of Physical assets	Use Table #6 For OVERALL grading of the building condition	80% benchmark *IF the acceptable range cannot be achieved with action A – take action B*	Correct and improved by Modifications, re-construction / rehab./ remodel works to affected areas.	Evaluation result is below 35% compliance	*Unfit for human Occupation & used as an education facility; Should be abandoned and demolished.*

D	FACILITIES – environment & quality of space	All spaces shall be of the required quality; internal temperature, humidity, ventilation, daylight, acoustics, dust free, safe and secure for a learning environment. • Temperature in Classroom 20degC – 27deg.C. Maximum is 30degC, • Relative Humidity level in Education Facilities should be kept at 50% min. to Max. 70%, • Sound Level 35-40dB • Lighting Level [refer to non-academic norms – Section B	100-95% Learning cannot occur in a hot, humid and poorly lit space that is affected by high noise level. Hence this requirement is mandatory and the level of acceptable range is small.	Correct and improved by Modifications, re-construction / rehab./ remodel works to affected areas. [refer to non-academic norms – Section B, 2.4 EV Standards. *IF the acceptable range cannot be achieved with action A – take action B*	Demolish & replace facilities or affected sections. *If action A is deemed to be [a] uneconomical [b] scale of defect is vast [c] defect is aggregated with failure in several other categories.*	The deviation from the recommended environmental parameters constitutes a fundamental breach of human comfort and prevents the occurrence of learning – which is the purpose of a school facility. Compliance is critical
E	FACILITIES - Teaching and learning Space	The school has the required functional spaces to the recommended space/ratio and the necessary facilities for the grade of school. This includes: number of classroom, library, laboratories, workshops, toilet facilities, sick bay, support administration functional spaces etc. [ref. to Non-Academic Standards section [Section B] for all requirements].	100-85% Learning cannot occur in a hot, humid and poorly lit space affected by high noise level. Hence this requirement is mandatory and the level of acceptable range is small.	Correct and improved by Modifications, re-construction / rehab./ remodel works to affected areas. [refer to non-academic norms – Section B, 2.4 EV Standards. *IF the acceptable range cannot be achieved with action A – take action B*	Demolish & replace facilities or affected sections.	The action taken is dependent on the specific areas affected and the existing constraints that exist to Action A or B
F	Access	Access to school facilities is established inclusive of access for Wheelchairs, students with mobility challenges etc. Allowance of ramps, doors and smooth floor surface to allow disable person's access to majority [at least 50%] of facilities.	100-85%	Correct and improved by Modifications, re-construction / rehab./ remodel works to affected areas. [refer to non-academic norms –	Demolish & replace facilities or affected sections. *If action A is deemed to be [a] uneconomical [b] scale of defect is vast [c] defect is aggregated with*	The action taken is dependent on the specific areas affected and the existing constraints that exist to Action A or B

		Required rails, guards, eliminate hazards in travel and dwelling spaces such as holes in floors and walls etc. Safety of school compound [security], fence etc. for access		Section B, 2.4 EV Standards. *IF the acceptable range cannot be achieved with action A – take action B*	*failure in several other categories.*	
G	Toilet Sanitation & Water	• Separate girls, boys and staff facilities with at least one [1] disabled WC according to ratio. • Adequate water facility for sanitation. • 13 gals or 50 liters / per student / per day [secondary school] • 8 gals or 30 liters / per student / per day [Primary school] • 3-5 days of water storage facility in tanks, allow for 10% leakage and water system loss. • General washing [hand wash] water provisions as 2.5 gals or 10L per student / per day. • Shower facility of schools with recreation facilities. • Toilets' stalls should be properly lit, safe and afford privacy and safety for girls and boys. • Toilets and water system is of the required number, type and in good working condition.	100-85% A Minimum compliance is mandatory. At Lest 85% of the toilets must be operational A minimum of 85% of the water requirements must be met.	Correct and improved by Modifications, re-construction / rehab./ remodel works to affected areas. *IF the acceptable range cannot be achieved with action A – take action B*	Demolish & replace facilities or affected sections. *If action A is deemed to be [a] uneconomical [b] scale of defect is vast [c] defect is aggregated with failure in several other categories.*	Sanitation facilities is school is a major deficiency in most education facilities – it is necessary to set a high benchmark to ensure compliance.
H	Furnishing and Utilities	• Furniture is maintained and structurally safe for use. • School has adequate number and type of furniture. • Adequate number and type of furniture for staff	85% benchmark	Correct and improved Provide all necessary furnishing and utilities	Demolish / discard old furnish that are deemed to be unsafe and unsound.	

		• First Aid Kit. Minimum one full set maintained for every 100 students in the school, • Sanitary toilet paper, • Female sanitation items.				
J	Fire Safety Systems	• Comprehensive fire alarm system that include – hard wired smoke detectors, notifier, strobe-horn, pull box, bell etc. • Fire exit signs with emergency lighting with exit travel diagrams, • Fire extinguishers and sand buckets, • Safety fire doors with view panel and push bars, • All schools should install a fire hose stand pipe system with adequate water storage and • Staff training and drills	100-95% Mandatory	Correct and improved	No action here	All these factors are correctable. Where fire hose stand pipe is challenging, a basic system can be considered. Adequate storage water must be available on site at all time.
K	Site and Compound	Adequate • security [fence and lighting], • site drainage, • Recreation Space or access to recreation space nearby, • Protection from flooding. • Solid waste disposal	80% benchmark	Correct and improved	Where flooding and drainage problems source are external – which has major effect on the school compound – the school should be located	Assess if other compliance factors are combined
L	Power and Internet Access	• All facilities shall have access to electricity [where possible / feasible] • Allow power infrastructure are designed and installed to NEC standards. • ave internet access and connectivity [where possible / feasible]	60-80% benchmark Solar power to be considered where there is no power supply grid.	Correct and improved	No action here	All these factors are correctable.

M	Sustainable Features	• Recommend the facilities have necessary "green" features, • Solar Plant, • Rainwater harvesting, • Allow for natural lighting into space [not direct sun-light].	20-30% benchmark	Correct and improved	No action here	All these factors can be achieved by design.

RESULTS' MATRIX

EVALUATION MATRIX – GUIDE TO DECISION MAAKING

Table 4: Results Matrix - Facilities' Evaluation Matrix

Item No.	Compliance Subject	Compliance Percentage REQURIED	Mandatory	Necessary	Recommended	% Achieved Compliance
A	Safety - Facilities	100-95%	🟥			
B	Safety – External Threats	100-95%	🟥			
C	Condition of Physical assets	80% benchmark		🟦		
D	FACILITIES –environment & quality of space	100-95%	🟥			
E	FACILITIES - Teaching and learning Space	100-85%		🟦		
F	Access	100-85%		🟦		
G	Toilet Sanitation & Water	100-85%		🟦		
H	Furnishing and Utilities	85% benchmark		🟦		
I	Fire Safety Systems	100-95%	🟥			
J	Site and Compound	80% benchmark		🟦		
K	Power and Internet Access	60-80% benchmark		🟦	🟨	
L	Sustainable Features	20-30% benchmark			🟨	

4.2.2 Replace the Existing School with New Building Facilities

Criteria for decision-making with regards to the decision to REPLACE THE SCHOOL with new Facilities.

Generally, a new school can be constructed on the existing site where land space is available, or the existing buildings are demolished and replaced, which will require temporary relocation of the school's education programmes. When the latter is challenging, a nearby site may also be considered for the new school building, to mitigate lengthy disruption of the school programmes.

The following guideline presents a framework for the decision making with respect to the need for facilities replacement rather than retention and maintenance of the existing.

a) Safety: If the existing school building is not safe for students and staff, it may need to be demolished. This could be due to structural problems, such as a cracked foundation or leaky roof, or to environmental hazards, natural hazards vulnerability such as flooding.

b) Condition: If the existing school building is in poor condition and would be too expensive to renovate, it may be more cost-effective to demolish it and build a new one. This could be due to age, neglect, or damage from natural disasters.

c) Needs: If the existing school building does not meet the needs of the students and staff, it may need to be replaced. This could be due to changes in the curriculum, technology, or special education programs.

d) Location: If the existing school building is in a poor location, such as a noisy, crime vulnerability or polluted area, it may need to be demolished and rebuilt in a better location. This could also be necessary if the school is overcrowded and there is no room to expand.

e) Community support: If the community supports demolishing the existing school building and opt for a new building. For reasons of preference to a more modern and efficient building, or because they want a school building that is more reflective of the community's values.

f) Funding: If Education department has funding to build a new school building, it may decide to demolish the existing building and build a new one. This could be done to improve the quality of education for students or to reduce the cost of maintenance and repairs on the existing building.

g) Space: If the existing school building is too small for the number of students who attend the school / cannot be extended or modified, it may need to be demolished and replaced with a larger building. This could be due to population growth or changes in the school catchment boundaries.

h) Sustainability: If the existing school building is not energy-efficient or sustainable, it may be demolished and replaced with a new building that is more sustainable. This could help the school district save money on energy costs and reduce its environmental impact.

The decision of whether to demolish an existing school building and replace it with a new one is a complex one that must be made on a case-by-case basis. There is no one-size-fits-all answer. The decision should be made based on the specific needs of the school district and the community.

5.0 Maintenance Standards & Guidelines for Education Facilities

5.1 Education Facilities' Maintenance Standards

This document outlines the Education Facilities' maintenance condition standards which are expected to be meet by all Secondary schools in Guyana.

Through this document, the Ministry of Education seeks to establish baseline standard of acceptability and provides practical framework guidance on how to evaluate and achieve these.

As Guyana continues to develop at a rapid rate, it is acknowledged that improvement of education facilities quality and condition is an ongoing process. Thus, through this document the Ministry of Education establishes the minimum standards, as a MUST or SHALL and simultaneously offers best practice guidelines through the use of terminologies such as SHOULD and MAY.

5.1.1 Terminology definitions

MUST or SHALL	States the minimum requirement of accommodation and its quality and maintenance condition.
SHOULD	Gives guidance on spaces and quality that is encouraged which is in line with best practice.
MAY or RECOMMENDED	Gives good practice guidance on spaces and qualities identified as beneficial if resources are available.

5.1.2 Target Groups

These standards and guidelines have been commissioned by the Ministry of Education to harmonise our understanding of what an acceptable school infrastructure is.

The targeted groups include; Ministry's academic and management staff, Regional Officials (RDCs), International agencies, NGOs, School community, PTA, Private sector, building professionals and contractors.

This document is to be referenced by all who are involved in the planning, monitoring, designing, procuring, constructing and maintenance of school infrastructures.

5.2 CATEGORIZATION GRADING OF FACILITIES

Common assessment tools are helpful to be used to gain an objective understanding of the situation of infrastructures this information when made available to all administrative levels can become vital for an accurate and targeted planning and monitoring exercise. Grading of school facilities maintenance condition are made here in accordance to the standards outlined in this document.

This grading rank of numbers 1-5, is a tool to assess the current condition of each school. Grade Rank #2, is the baseline standard set to be achieved, for the purpose of incremental progress and monitoring the standard. This table no. 1 must be used conjunction with table no.5 and 6.

Education buildings should be maintained at a level of at **least 80%.** This means that at least 80% of the building's systems and components should be in good condition and operating properly. [IFMA, ASHRAE and several other facilities condition standards] THIS IS REFER TO AS THE BENCH MARK GRADE.

All education buildings should be maintained at a high level to ensure the safety and health of students and staff, provide a comfortable and productive learning environment, and ensure the efficient operation of the building and its equipment. The Table below outlines a grading system and establishes the benchmark that all education facilities should strive to achieve.

Table 5: Grading of Facilities based on physical condition

GRADE RANK	**RATING**	**DESCRIPTION**	Achieve the minimum space / working facilities & maintenance condition	Essential Education Facility Requirement [refer to Table #6 for index]
Grade 1	Very Good Condition	Above Standard	100-95%	Meet 100-95% Tags. A,B,C,D,E,F,G,H,J, K & L
Grade 2	Good Condition	**BENCH MARK STANDARD** Facility fit to carry out effective Education with some maintenance / renovation needs.	94-80% ALL BUILDINGS SHOULD MEET THIS GRADE	MUST MEET 80% Tags. A,B,C,D,E,F,G,H,J, K & L
Grade 3	Fair / Moderate Condition	Facility fit to carry out basic educational activity with urgent needs	80-60%	Meets minimum of 60% Tags. A,B,C,D,E,F,G,H,J, K & L
Grade 4	Poor Condition	Facility fit for basic human Critical intervention necessary. Prudent monitoring is necessary.	59-35%	Meets minimum of 35% Tags. A,B,C,D,E,F,G,H,J, K & L
Grade 5	Very Poor / Deplorable	Unfit for human Occupation & used as an education facility; Should be abandoned and demolished.	Below 35%	Below 35%

In addition to Table #7 – that describes the CRITERIA FRAMEWORK for MAINTENANCE CONDITION GRADING SYSTEM, This table presents the minimum requirement for a school facility. This is in recognition of the reality, that some schools lack essential facilities, spatial requirement and essential utilities, even they maybe partially or adequately maintained to the minimum base standard.

Table 6: Essential Requirements for a School

Tag No.	**Subject**	**Refer to Non-Academic Standards section [Section B] for requirement details.**
A	Safe and Secure	• Safe facility inclusive of all buildings [Structural safety of foundations, building structure, floor, walls, roof], • Safety of school compound [security], fence etc. • Secure environment for learning and teaching from internal and external threats, • Safety and protection from natural and man made hazards.
B	Space environment / quality of space	• All spaces shall be of the required quality; internal temperature, humidity, ventilation, daylight, acoustics, dust free, safe and secure for a learning environment.
C	Teaching and Learning Space	• The school has the required spaces and facilities for the grade of school. • This includes: number of classroom, library, laboratories, workshops, toilet facilities, sick bay, support administration functional spaces etc. [ref. to Non-Academic Standards section [Section B] for all requirements].
D	Access	• Access to school facilities is established inclusive of access for Wheelchairs, students with mobility challenges etc. Allowance of ramps, doors and smooth floor surface to allow disable person's access to majority [at least 50%] of facilities. • Required rails, guards, eliminate hazards in travel and dwelling spaces such as holes in floors and walls etc. • Safety of school compound [security], fence etc. for access
E	Toilet Sanitation & Water	• Separate girls, boys and staff facilities with at least one [1] disabled WC according to ratio. • Adequate water facility for sanitation. *13 gals or 50 liters / per student / per day [secondary school]* *8 gals or 30 liters / per student / per day [Primary school]* *3-5 days of water storage facility in tanks, allow for 10% leakage and water system loss.* • General washing [hand wash] water provisions as 2.5 gals or 10L per student / per day. • Shower facility of schools with recreation facilities. • Toilets' stalls should be properly lit, safe and afford privacy and safety for girls and boys.

		• Toilets and water system is of the required number, type and in good working condition.
F	Staff Facilities	• Adequate working space for teachers and non-academic staff • Safety and security for staff members. • All spaces shall be of the required quality; internal temperature, humidity, ventilation, daylight, acoustics, waterproof and dust free safe and secure working environment. • Adequate administration space, kitchen, and toilet facilities for staff.
G	School Furniture	• Furniture is maintained and structurally safe for use. • School has adequate number and type of furniture. • Adequate number and type of furniture for staff
H	Facilities	• First Aid Kit. Minimum one full set maintained for every 100 students in the school, • Sanitary toilet paper, • Female sanitation items.
J	Site and Compound	Adequate • security [fence and lighting], • site drainage, • Recreation Space or access to recreation space nearby, • Protection from flooding.
K	Disposal	Solid waste disposal [holding bay / incinerator/ containers etc]
L	Power and Internet Access	All facilities shall have access to electricity [where possible / feasible] to NEC standards, Have internet access and connectivity [where possible / feasible]
M	Sustainable Features	• Recommend the facilities have necessary “green” features, • Solar Plant, • Rainwater harvesting, • Allow for natural lighting into space [not direct sun-light].

Maintenance Condition Grading System for Education Building Assets

Table 7: Maintenance Condition Grading System for Education Building Assets

<table>
<tr><td></td><td colspan="5">CRITERIA FRAMEWORK / MATRIX
MAINTENANCE CONDITION GRADING SYSTEM FOR EDUCATION BUILDING ASSETS
<i>Source: Guided by the Standards Document - International Infrastructure Management Manual 2020, NAMS Group.</i></td></tr>
<tr><td></td><td colspan="5">Condition Grading System for Building Assets</td></tr>
<tr><td>GRADE RANK</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr>
<tr><td>RATING</td><td>Very Good Condition</td><td>Good Condition</td><td>Fair / Moderate Condition</td><td>Poor Condition</td><td>Very Poor Condition</td></tr>
<tr><td>Estimated Building life has expired
<i>[see notes 1, & 3 below]</i></td><td>Up to 10% of the building life span has elapsed.</td><td>Between 11-30% of the building life span has elapsed.</td><td>31-60% of the building life span has elapsed.
<i>[see notes 1, & 3 below]</i></td><td>61-75% of the building life span has elapsed.
<i>[see notes 1, & 3 below]</i></td><td>75-100% of the building life span has elapsed.
<i>[see notes 1, & 3 below]</i></td></tr>
<tr><td><i>RATING STANDARD MoE</i></td><td><i>ABOVE STANDARD</i></td><td><i>BASELINE STANDARD</i>
<i>Facility fit to carry out effective education with some maintenance / renovation needs.</i></td><td><i>BELOW STANDARD</i>
<i>Facility fit to carry out basic educational activity with urgent maintenance needs</i></td><td><i>BELOW STANDAD</i>
<i>Facility fit for basic human Occupation with critical intervention necessary. Prudent monitoring is necessary.</i></td><td><i>UNFIT AS A FACILITY</i>
<i>Unfit for human Occupation;</i>
<i>Should be abandoned and demolished.</i></td></tr>
<tr><td>1.0 Structure</td><td>Sound structure
Walls
Floor
Roof
Foundation
Columns and Beams
No structural defect is observed.</td><td>The building has a functionally sound structure at 98%.

Due to the age the building, minor cracks and other structural defects may appear – that required monitoring over time. <i>With particular reference</i></td><td>Adequate structure, some evidence of foundation movement, minor cracking.

Less than 5% of the building structural elements [timber and concrete / structural steel] displays signs of defects / failure.

Collapse / structural failure is not predicted. Discomfort of users is noted.

This shall include walls, floors, roofs, foundations structural condition.</td><td>Structure major emerging problems and concern is held for the integrity of the structure. Safety is compromised. <i>A building structure is deemed to be of paramount importance for safety.</i>
<table><tr><th>%</th><th>Element condition</th></tr><tr><td><i>5 to 30</i></td><td><i>or less: of foundation failures, as displayed in excessive settlement, cracks, heaving etc.</i></td></tr><tr><td><i>5 to 15</i></td><td><i>or less: of columns / beams – super structure displays visible signs of failures,</i></td></tr></table></td><td>Structure has serious problems and concern is held for the integrity of the structure. Safety is compromised. <i>Eminent collapsed [less than 3 years] is assumed. A building structure is deemed to be of paramount importance for safety.</i>
<table><tr><th>%</th><th>Element condition</th></tr><tr><td><i>30</i></td><td><i>or more: of foundation failures, as displayed in excessive settlement, cracks, heaving etc.</i></td></tr></table></td></tr>
</table>

		to foundations and roof structure.	*[see notes 1, & 3 below]*	*5 to 25 or less of floor is mis-aligned and unstable and progressive increases,* *5 to 30 or less of timber floors and walls [where exist] displays signs of excessive wearing, dry-rot/fungus attach, warping, dimension instability, aging, opening joints etc.,* *5 to 30 or less of timber frames [where exist] being part of the structure – display above signs,* *Roof structure – displays excessive signs of bending / distortion as visually verified. Timber roof structure displays timber deterioration signs,* *Original roof is poorly designed and can be collapsed in the event of a moderate wind hazard,* *5 to 25 Site Flooding routinely affects the building foundations* *5 to 25 General Building structure was poorly design/ constructed as evidenced by cracking, dis-integration, budging etc.*	*15 or more: of columns / beams – super structure displays visible signs of failures,* *25 or more of floor is mis-aligned and unstable and progressive increases,* *30 Or more of timber floors and walls [where exist] displays signs of excessive wearing, dry-rot/fungus attach, warping, dimension instability, aging, opening joints etc.,* *30 or more of timber frames [where exist] being part of the structure – display above signs,* *Roof structure – displays excessive signs of bending / distortion as visually verified. Timber roof structure displays timber deterioration signs,* *Original roof is poorly designed and can be collapsed in the event of a moderate wind hazard,* *25 Site Flooding routinely affects the building foundations* *25 General Building structure was poorly design/ constructed as evidenced by cracking, dis-integration, budging etc.*
2.0 External Enclosure	Walls and roof [enclosure] are in excellent condition, true to line and level. No evidence of deterioration / defects. *Less than 1% of the building enclosure is in a poor condition – this includes external walls and roofs.* *No compromise to users safety, convenience and health.*	Showing minor wear and tear and minor deterioration of surfaces. *Less than 5% of the building enclosure is in a poor condition – this includes external walls and roofs.* *Minor compromise to users convenience and health.*	Enclosure [walls/roof]. Appearance affected by cracking, termite / fungus presence, staining, weather deterioration / visible signs of deterioration damages. In need of maintenance or section renewal. *Less than 15% of the building enclosure is in a sub-standard condition – this includes external walls and roofs.* *Resulted is some compromise in safety, users comfort / convenience and health.*	Enclosure [walls/roof] is damaged, weakened or displaced. Appearance affected by cracking, termite / fungus presence, staining, weather deterioration / visible signs of deterioration damages. In need of heavy maintenance or section renewal. *15-60% of the building enclosure is in a sub-standard condition – this includes external walls and roofs.* *Resulted is compromise in safety, users comfort /convenience and health.*	Enclosure [walls/roof] is badly damaged or weakened. Major signs of cracking, termite / fungus presence, staining, weather deterioration / visible signs of deterioration damage. *More than 60% of the building enclosure is in a sub-standard condition – this includes external walls and roofs.* *Resulted is compromise in safety, convenience and health of occupants.*

<table>
<tr>
<td>3.0
Internal fixed Elements
[Internal walls, floors, ceiling, finishes etc]</td>
<td>Internal walls, floors, ceiling, finishes etc are in excellent condition, true to line and level. No evidence of deterioration / defects.

<u>Less than 1%</u> of the Internal elements are in poor condition – this includes internal walls, floors, ceiling etc. No compromise to users convenience and health.</td>
<td>Showing minor wear and tear and minor deterioration of surfaces.

<u>Less than 5%</u> of the Internal elements are in poor condition – this includes internal walls, floors, ceiling, finishes etc. No compromise to users convenience and health.</td>
<td>Appearance affected by minor cracking, staining, or minor leakage, some dampness or mildew. Minor damage to wall/ceiling finishes.

<u>Less than 15%</u> of the building internal elements is in a sub-standard condition – this includes internal walls, floors, ceiling, finishes etc.

<u>Some elements</u> or sections need replacement.
Resulted is some compromise in safety, users comfort / convenience and health.</td>
<td>Internal Elements [Internal walls, floors, ceiling, finishes] are damaged, weakened or displaced. Appearance affected by cracking, termite / fungus presence, staining, weather deterioration / visible signs of deterioration damages. In need of heavy maintenance or section renewal.

<u>15-60%</u> of the building internal elements is in a sub-standard condition – this includes internal walls, floors, ceiling, finishes etc.

Most finishes / elements are in poor quality and in need of replacement.

Resulted is compromise in safety, users comfort /convenience and health</td>
<td>Internal Elements [Internal walls, floors, ceiling, finishes] are badly damaged or weakened. Major signs cracking, termite / fungus presence, staining, weather deterioration / visible signs of deterioration damage.

<u>More than 60%</u> of the building Internal elements are in a sub-standard condition – this includes external walls and roofs.

Resulted is compromise in safety, convenience and health of occupants.</td>
</tr>
<tr>
<td>4.0
Services</td>
<td>All components operable and well maintained.

Well secured and operational, sound of function and appearance.

Fittings – are of good quality and functioning well.</td>
<td>All components operable.

Water / power and sewer systems are working appropriately.

Fittings – are of good quality operational and functional, minor wear and tear.</td>
<td>Occasional outages, breakdowns or blockages. Increased maintenance required. Less than 1 day per month.
Fittings – poor quality / wrong type [<20%] Generally operational. Minor breakage
<table>
<tr><td colspan="3">Hygiene</td></tr>
<tr><td>Toilets</td><td>5-30%</td><td>Not working / inoperable.</td></tr>
<tr><td>Faucets / taps</td><td>5-30%</td><td>Not working / inoperable.</td></tr>
<tr><td>Water</td><td>5-30%</td><td>Of water needs is available</td></tr>
<tr><td colspan="3">Sewer</td></tr>
<tr><td>Sewer Pipes & Tanks</td><td>Occasional problems</td><td>Blockage/ overspill/ odour</td></tr>
<tr><td>Pipes</td><td>No Broken</td><td></td></tr>
<tr><td colspan="3">Electrical System</td></tr>
<tr><td>Fittings</td><td>10-30%</td><td>Not working</td></tr>
<tr><td>Circuits</td><td>General More than 1%</td><td>Cables – undersized
Old Cables
Exposed Cables</td></tr>
</table>
</td>
<td>Failures of plumbing electrical and mechanical components common place.
Fittings – poor quality / wrong type [<30%]
Fittings of poor quality and appearance, often inoperable and damaged.
<table>
<tr><td colspan="3">Hygiene</td></tr>
<tr><td>Toilets</td><td>30- 50%</td><td>Not working / inoperable.</td></tr>
<tr><td>Faucets / taps</td><td>30- 50%</td><td>Not working / inoperable.</td></tr>
<tr><td>Water</td><td>30- 50%</td><td>Of water needs is available</td></tr>
<tr><td colspan="3">Sewer</td></tr>
<tr><td>Sewer Pipes & Tanks</td><td>Partially not work</td><td>Blockage/ overspill/ odour</td></tr>
<tr><td>Tanks</td><td>Below drainage level</td><td>Regular Backflow and overspill</td></tr>
<tr><td>Pipes</td><td>Broken</td><td></td></tr>
<tr><td colspan="3">Electrical System</td></tr>
<tr><td>Fittings</td><td>30-50%</td><td>Not working</td></tr>
</table>
</td>
<td>Plumbing electrical and mechanical components are unsafe or inoperable.
Fittings – poor quality / wrong type [<75%]
Most are inoperable or damaged
<table>
<tr><td colspan="3">Hygiene</td></tr>
<tr><td>Toilets</td><td>More than 50%</td><td>Not working / inoperable.</td></tr>
<tr><td>Faucets / taps</td><td>More than 50%</td><td>Not working / inoperable.</td></tr>
<tr><td>Water</td><td>Less than 50%</td><td>Of water needs is available</td></tr>
<tr><td colspan="3">Sewer</td></tr>
<tr><td>Sewer Pipes & Tanks</td><td>Not work</td><td>Blockage/ overspill/ odour</td></tr>
<tr><td>Tanks</td><td>Below drainage level</td><td>Regular Backflow and overspill</td></tr>
<tr><td>Pipes</td><td>Broken</td><td></td></tr>
<tr><td colspan="3">Electrical System</td></tr>
<tr><td>Fittings</td><td>More than 50%</td><td>Not working</td></tr>
<tr><td>Circuits</td><td>General More than 10%</td><td>Cables – undersized
Old Cables
Exposed Cables</td></tr>
</table>
</td>
</tr>
</table>

<table>
<tr>
<td></td>
<td></td>
<td></td>
<td><table><tr><td></td><td>Unsafe / inoperable.</td><td></td></tr><tr><td>Mains</td><td>OK</td><td>OK</td></tr></table></td>
<td><table><tr><td>Circuits</td><td>General
More than 5%
Unsafe / inoperable.</td><td>Cables – undersized
Old Cables
Exposed Cables</td></tr><tr><td>Mains</td><td>General
All
Unsafe</td><td>Exposed
Undersized to needs</td></tr></table></td>
<td><table><tr><td></td><td>Unsafe / inoperable.</td><td></td></tr><tr><td>Mains</td><td>General
All
Unsafe</td><td>Exposed
Undersized to needs</td></tr></table></td>
</tr>
<tr>
<td>5.0
SITE</td>
<td>Condition is 100-95% maintained and safe.
• All sections of the site are adequately maintained and kept.
• Site Is drainage established & maintained.
• Site is well illuminated and fenced.
• Open spaces are level, free of hazards and low kept vegetation. Site is safe of recreation purposes.</td>
<td>Condition is 80-94% maintained and safe.
• In need to some maintenance and attention.
• All sections are in good keep with some improvement.
• Site Is drainage established & maintained.
• Site is well illuminated and fenced – but in want of minor works.
• Open spaces are level, free of hazards and low kept vegetation. Site is safe of recreation purposes.</td>
<td>Condition is 80-60% maintained and in need to significant improvements, maintenance.

With respect to land level, site drainage, fence, lighting, upkeep of vegetation, landscape works, pavements, etc.

Condition of the site affects full use of the site.</td>
<td>Condition is 59-35% maintained and in need to Major improvements and maintenance.

With respect to land level, site drainage, fence, lighting, upkeep of vegetation, landscape works, pavements, etc.

Condition of the site affects the use of the site.

Site maybe fully or partially unsafe for children.</td>
<td>Condition is less than 35% maintained and in need to Major improvements and maintenance.

With respect to land level, site drainage, fence, lighting, upkeep of vegetation, landscape works, pavements, etc.

Condition of the site affects the use of the site.

The site is 65% unsafe for children.</td>
</tr>
<tr>
<td>6.0
FURNITURE</td>
<td>100-95% achieved.

All furniture is maintained and structurally safe for use.</td>
<td>80% min. achieved

All furniture is maintained and structurally safe for use.</td>
<td>Condition is 80-60% maintained and in need to significant improvements, maintenance.

20% Inadequate condition, number and type of furniture.</td>
<td>Condition is 60-50%. That is more than ½ of the furniture number is poor, unsafe – which need urgent maintenance / replacement.</td>
<td>More than 60% of the furniture is poor.

That is more than 60% of the furniture number is poor, unsafe – which need urgent maintenance / replacement.</td>
</tr>
</table>

	School has adequate number and type of furniture.	School has adequate number and type of furniture.			The school function is disrupted with unsafe and inadequate furniture provisions.
8.0 Maintenance	Well maintained and clean.	Increased maintenance inspection required.	Regular and programmed maintenance inspections essential. Management of maintenance is necessary.	Frequent maintenance inspections essential. Short term element replacement/rehabilitation.	Minimum life expectancy, requiring urgent rehabilitation or replacement.
Users [Students & Teachers]	No major users' complaints and concerns.	Deterioration causes minimal influence on occupational uses. Occasional users' concerns.	Some deterioration beginning to be reflected in minor restrictions on operational uses. Frequent users' concerns.	Regular users' complaints and expressed discomfort and concerns.	Generally, unsuitable for use.

Note 1:
Estimated Building life is

- *60-75 years old [concrete building].*
- *50 years old [predominately timber framed / walls]*
- *Age of a building is directly related to structural safety, rate of deterioration etc. refer to section on Life expectancy of Buildings [Under Maintenance].*

The nominal design life of buildings is generally considered to be around 60 years [BS 7543], It must be emphasized that "design life" is relative and an imprecise entity. This is influenced by a variety of factors of quality of the original construction, the environment in which the building is located, and the quality and degree of maintenance carried out. (see report section on Design Life of Infrastructures]

Note 2:
Special assessment must be done on raised timber floors and beams in timber buildings. Initial quality of construction and building materials often compromises the life space and structural integrity of the building structure.

Note 3:
Building aging and deterioration is contingent on the location of the building and exposure to weather elements, proximity of water bodies, routine maintenance frequency etc.

6.0 MAINTENANCE IN CONTEXT

6.1 BUILDING MAINTENANCE

Perception, definition and categories

6.1.1 The Perception of Maintenance

The built environment expresses in physical form the complex social and economic factors giving structure and life to a community[1]. The condition and quality of buildings reflect public pride or indifference, the level of prosperity in the area, social values and behavior, which combine to give a community its unique character.

In essence, buildings and public infrastructures are essentially a reflection of the character of a country. There can be little doubt that dilapidated and poorly maintained buildings reflect a decaying environment, depressed quality of life and contribute in some measure to antisocial behavior.

Maintenance work *"possesses little glamour, is unlikely to attract very much attention and is frequently regarded as unproductive".*[2] Traditionally, building maintenance is a labour intensive activity and its operation processes are not noticeable and not attractive

Maintenance is unappealing as it is often undetected and after the mammoth tasks of planning, implementing and spending, it delivers nothing new and goes unnoticed. This perhaps, explains the reason why most developments are focused on new projects and not maintenance.

6.1.2 Maintenance defined

Maintenance is defined as: a combination of all technical and associated administrative actions during the service life to retain a building or infrastructure, or its parts, in a state in which it can perform its required functions [BS 7543].[3] In the context of this report, maintenance shall include furnishing and equipment. The emphasis in the definition is on retention and restoration for users' benefit and safety, which lie at the core of maintenance purpose.

It can be concluded that maintenance activities [on public buildings] other than day-to-day, ad-hoc or emergency work are mostly of an aesthetic [face-lift] or cleaning nature aimed at hiding the damning signs of neglect, or to appease the call for maintenance. This is a reflection of the general comprehension of maintenance in communities and by the majority maintenance planning and technical officials.

This is a clear indication, that maintenance is misunderstood which is further compounded by lack of standards and benchmarks.

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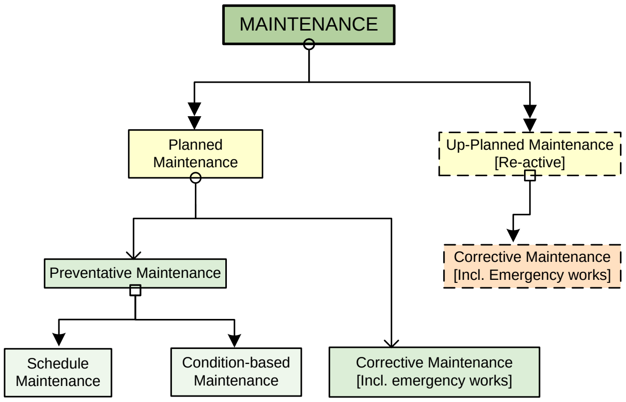
[1] *Paul Wordsworth, Lee's Building Maintenance Management.*

[2] *Seeley, I.H., 1987, Building Maintenance, Second Edition*

[3] *BS 7543 in 1993 (BSI, 1993)*

6.1.3 Classification of Maintenance

Maintenance classification is essential for identification of required response within a window of time. It can essentially be strategic [long term] or tactical based on assessed needs and unforeseen demand. By category, maintenance is sub-divided into seven sub-sections as outlined in BS:3811:-



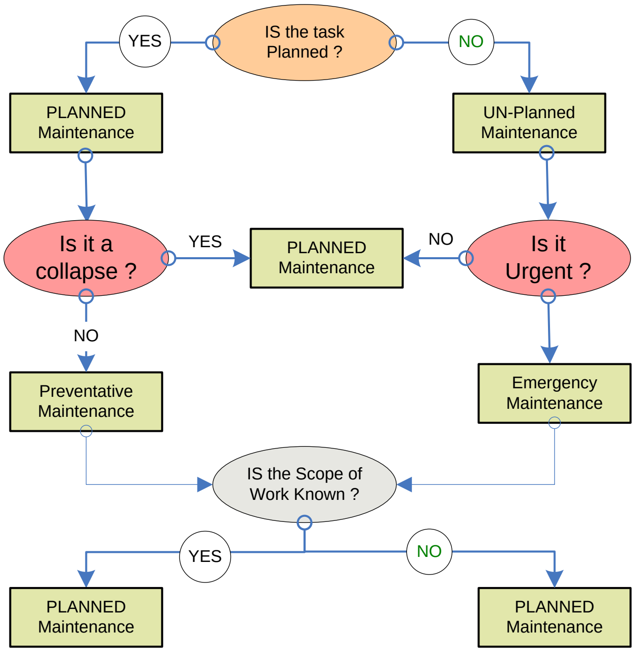
Types of Maintenance [BS 3811]

Planned maintenance [undertaken with organized efforts and forethought], *Unplanned maintenance* [ad-hoc in absence of planning],

Preventative maintenance [undertaken at specific intervals to arrest emerging defects], *Corrective maintenance* [done in response to failures],

Emergency maintenance [in response to urgent need, *Condition-based maintenance* [based on known condition] and *schedule maintenance* [undertaken at fixed intervals – eg. equipment]

Field inspection and verification will determine if the maintenance is scheduled or not, and thus determine the type of maintenance required and trigger a sequence of activities. The diagram below outlines this process.



Decision Based Types of Maintenance

Preventative Maintenance refers to maintenance efforts made to prevent or arrest a defect or maintenance situation from occurring. The term was adapted from the mechanical / automotive industry for example where oil change and servicing are necessary to avoid breakdown of plant and equipment.

With respect to buildings and other infrastructures, preventative maintenance, refers to the maintenance requirements at specific periods to mitigate future and predictable deterioration. Example, painting of timber walls to prevent rotting, cleaning of gutters to avoid blockage. Preventative maintenance is normally done at specific intervals [3-5 years] and is worthwhile if it is cost effective, meet client's policy standards and will reduce long term costs.

Routine maintenance refers to periodical and frequent maintenance that addresses the effects of wear and tear of building fabric and component. It is done frequently / at regular intervals depending on need and condition of the asset [1-2 times per year]. Routine cleaning necessary to maintain the performance of the building is not classified as routine maintenance [BS:8210]

6.2 Why Maintenance is needed - causes of Building deterioration

6.2.1 Deterioration

Entropy [measure of disorder] occurs in all physical things and systems, and dis-integration and degradation of all physical things is inevitable over time. All physical items age and eventually disintegrate as the natural order of the world. An element can fail as a result of *a defect* [unexpected early failure due to faculty design, manufacture, installation or maintenance] or *normal wear and tear.*

6.2.3 Causes of Deterioration

All infrastructures start to deteriorate from the moment they are completed, and maintenance commences to retain good condition. The process of gradual deterioration is inevitable, but the rate of deterioration can be regulated by maintenance.

All elements used in construction have design lifespans, during which time they can be expected to deteriorate to reach the end of their expected life. The anticipated lifespans can be achieved on normal conditions or reduced by negative effects as noted below:

a) **Maintenance**: Lack and inappropriate levels of maintenance and incorrect identification of defects and remedial works

b) **Reasonable wear and tear**: Natural process of deterioration with time, level of use and exposure

c) **User activities**: Misuse and or deliberate acts of vandalism

d) **Construction methods and quality**: Poor quality of construction method and use of materials

e) **Faulty design**: Inappropriate detailing, lack of knowledge, failure to use design standards and consider specific requirement and communication of requirements.

f) **Low Cost**: Deliberate decision to use low cost materials and components. Client dismiss the need to consider maintenance and durability in the design brief.

g) **Environmental Conditions:** such as the effects of climate change.

h) **Effects of climate change** on the building fabric and it environment.

6.3 Issues affecting Maintenance

Inherent problems with maintenance planning and management

Because it is difficult to quantify the cost of deferred maintenance and neglect, maintenance work has always been subjected to budget cuts, as reflected by the condition of many infrastructures in the Caribbean.

The lack of accurate current information on building conditions and maintenance requirements are the main reasons why maintenance budget allocations are insufficient. If the condition of the building is unknown, the maintenance requirements, cost and timing of the work is also unknown.

As a result, maintenance budgets are dominated by contingency provisions for day-to-day and emergency unplanned maintenance, replacements or repairs and are, therefore, normally based on the previous financial year's maintenance expenditure with an allowance for inflation and some renovations. If there are any funds left, preventative maintenance may be considered.

Governments and budget planners know that maintenance budgets are in general not very accurate and maintenance departments usually over-estimate funding requirements during the preparation of budgets in anticipation of budget cuts. Under these circumstances, it is very difficult to defend maintenance budgets effectively against budget cuts and they easily fall prey to cuts during times of financial hardship.

Fundamentally, the approach of Government agencies is reactive and not pro-active. The approach is to fix problems that are visible not to prevent or avoid problems.

6.4 Factors determining Maintenance Performance

Several key factors affecting maintenance performance and execution of Education facilities are discussed below: -

1.5.1 Skills, expertise and experiences for maintenance

Human capital in the form of skills, expertise, knowledge, experiences etc, is an important factor influencing the execution and sustainability of maintenance. Efficient execution of maintenance jobs requires availability of competent skills, expertise with the experience of handling those functions which include – identify: Technical requirement of maintenance, doing the actual maintenance work required, procurement and supervision etc.

1.5.2 Maintenance plans and schedules

Design and execution of maintenance plans and schedules are critical to the efficient maintenance of facilities. The excellent maintenance performance in advanced countries is because of the design and subsequent execution of plans and schedules for maintenance. Conversely, it is often argued that the generally poor maintenance performance in many developing countries is explained, partly at least, by the absence of clear and good maintenance plans and schedules

1.5.3 Motivation for maintenance personnel

An attractive and adequate incentive package and system given to those who handle maintenance jobs is an important factor determining the quality of maintenance provided. Maintenance activities often go unrecognized although the efforts are much greater than for new construction.

1.5.4 Attitudes towards maintenance

Cultural attitude and norms affect the entire systems of maintenance with particular reference to Caribbean countries [discussed elsewhere]

7.0 MAINTENANCE STANDARDS

7.1 Introduction

A standard can be "an object, quality or measure serving as a basis, example, or principle to which others conform or should conform"[4].

In the context of this assignment, A *Maintenance standard can refer to the target and quality of performance to which a given infrastructure must retain and conform to*. The establishment of an appropriate base standard for maintenance is key to maintenance planning and establishment of a baseline for achievement.

Standards are relative and are normally influenced by prevailing political, legal, financial, cultural and policy conditions. They also change over time and often influence by legislation / policies [eg. access for persons with disabilities], quality & performance, aesthetics and clients' preferences.

Since there is no measure of a maintenance standard for buildings, a set of criteria can be established and define a general standard for acceptance. This is complicated further as persons in varying background differ in their perception of what constitutes an acceptable standard from their view point.

The absence of maintenance standards is the core reason why education facilities are lacking maintenance across Guyana.

Since there is no measure of what is an "acceptable" standard, a baseline can be derived, based on the Ministry's acceptable level of condition as outlined in this document [pending approval].

Standards for maintenance need to be realistic and achievable in the context of the developing status of Guyana in the context of challenges and resources availability. There need to be a balance between need, resource and capability.

7.2 Standards and Performance

The criteria for standards for maintenance can be designed within a general framework of performance and functional requirements. The objective is to retain and keep in good operational level throughout the building life:

Quality of Internal Space

- Structural stability – freedom from collapse
- Protection form the external environment – adverse climate, noise, pollution
- Adequate natural light and air – maintenance of ventilation and light through openings

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[4] *Wordsworth Paul, " Lees' Building Maintenance Management", 4th edition, Wiley Blackwell, 2001, Pg.46*

- Adequate space available for users – avoid overcrowding, space usage
- Adequate access, security, signage, circulation etc. – maintenance of controls, ease of use

Quality of Services

- Adequate sanitation and water facilities – a key role of maintenance to maintain working conditions, sanitation & health etc.
- Adequate power, site drainage, waste collection etc.

General

- Health & Safety – maintenance for provision of a healthy environment and reduce risks.
- Retention of aesthetic and presentation of building – necessary to "lift the spirits, retain cultural value and image etc.
- Comfort to users – maintenance to allow the "feel" of comfort by retaining the finishes, color etc.
- Users' defined – maintenance to consider users' priorities.
- General Environmental Conditions.

Table 8: Standards for Overall Maintenance Conditions

STANDARDS FOR OVERALL MAINTENANCE CONDITIONS		
	Facility Standards	**Maintenance and Operations Criteria**
1	Safety	Buildings should be maintained to create a safe and comfortable environment that is free of environmental hazards and occupational risks for all users.
2	Sanitation	Buildings shall be cleaned on a daily basis to promote public health and ensure sanitary conditions, especially in key functional spaces, rest rooms, laboratories, cafeterias, kitchens, locker rooms, and other areas prone to germs, bacteria, and disease.
3	Security	Facilities shall be maintained in such a manner to protect users, staff and visitors, property, and equipment from harassment, vandalism, theft, intrusion, and natural disasters.
4	Functional Performance	Maintenance and operations activities shall ensure that buildings, their site, and equipment facilitate the process and function in an economical and efficient manner.
5	Physical Condition	Maintenance and operations activities shall ensure that all buildings, components, and equipment are sound, in good serviceable condition, and otherwise in good working order.
6	Appearance	Buildings should be maintained to achieve the desired level of appearance specified in the maintenance policy and defined by maintenance standards.

Most developed countries have maintenance and property standards by-laws as an enforceable regulation governing existing structures and buildings. These standards and laws are constructed to secure its expressed intent, which is to ensure public health, safety and welfare insofar as they are affected by the continued occupancy and maintenance of structures and its environment/site.

The International Code Council (ICC) published the *International Property Maintenance Code as* a comprehensive set of regulations for existing buildings. These standards are founded on the principles that the code should adequately protect public health, safety and welfare; not unnecessarily increase construction costs;
Not restrict the use of new materials, productions or methods of construction; and does not give preferential treatment to particular types or classes of materials, products or methods of construction.

7.3 Levels of Maintenance Standards

The level of maintenance standards being considered for Education Buildings shall require some deliberation and consultations with stakeholders [GoG, Ministry of Finance, Education, Local Gov't RDC etc]. The desired level of maintenance standard is influence by what is achievable in consideration of the constraints driven by geographical challenges, availability of quality materials, skill technical personnel, affordability, capacity etc.

A progressive development scale can be considered for levels of maintenance conditions, for which MoE can develop a working plan for progressive development.

- Lowest Level [Minimum Standards] – achievable within 3-5 years
- Middle Level [Comfortable standards] – achievable within 6-15 years
- High Standards [Best levels of achievement] – achievable within 16-30years

7.4 The Minimum Maintenance Standard

The condition of a physical Building / asset can be gauged objectively in respect of functional suitability, operational needs, physical condition, health and safety requirements and the requirements of law. The maintenance policy of the Ministry of Education has specify the (minimum) baseline standard to which the education facilities should be maintained. Setting this policy may be done at a higher management level in the light of other competing demands such as finance and the value and the utility of the asset.

The lower threshold of acceptability will be determined by health and safety requirements. If these standards cannot be sustained, some remedial action to restore the asset to an acceptable condition is required. The minimum maintenance standard, together with the importance of the asset, provides basis to establish the repairs or remedial action required during a given period.

7.5 Maintenance Condition Monitoring

The required method of measuring compliance of buildings to maintenance standards is by undertaking condition surveys, which may be concerned with one of several types of survey assessments.

- Cursory inspections, broad-brush appraisals and evaluations
- Structural condition surveys
- Whole surveys for maintenance planning programme
- Detailed survey to allow for prioritization of maintenance activities
- Survey to assess users' needs and responses
- Failure surveys

Maintenance condition monitoring and surveys are observed deficiencies in maintenance of physical spaces, services, site and environment and the maintenance management system of buildings. The assessment of maintenance management may not be included in the survey, if the administration is done by a different agency. The key assessment sections of a condition survey are: -

a) The General Visual Condition of the asset - which is represented by the physical condition with respect to cleanliness, functioning of components such as doors, windows, site condition and services.

b) Technical Maintenance levels – include the functional and serviceability levels & Performance Deficiencies, which are represented by the maintenance status of services, structure, furnishing, site and all major elements of the facility.

c) The level of maintenance management - with respect to planning, scheduling, reporting, response time to maintenance need and monitoring of cost.

A benchmark maintenance monitoring standard is provided on Table 5: Maintenance Condition Grading System for Education Building Assets

8.0 DESIGN LIFE OF INFRASTRUCTURES

8.1 Introduction – Basis for maintenance financial planning

Infrastructures are investments made by Governments in partnership with funding agencies. With proper management of this investment, returns may endure for many decades, but failure to recognize the continuing costs of ownership can lead to premature loss of services and deterioration of the infrastructure and high maintenance and operation costs.

Some materials and building systems are particularly reliable or durable and repay their higher initial costs with savings in future operation and maintenance efforts. Other materials or systems may be selected because their lower initial costs meet the limits of available construction budgets and, with proper use, are likely to deliver entirely satisfactory service.

In practice, defining and controlling the life-cycle costs of infrastructures are difficult. The future behavior of materials and systems is uncertain, as are the future uses of the building, the environmental conditions to which it may be exposed, and the financial and economic conditions that influence relationships between present and future costs. Effects of Climate change, natural disasters, poor construction practices, budgetary constraints and level of maintenance care affect life-cycle cost.

Budgeting for the maintenance and repair of assets is crucial for Guyana. Budget requests should be based on hard data clearing showing the purpose for which the requested funding will be used. It should contain sufficient details to clearly support the functional objectives and be able to withstand critical analyses. Budgets should be based on measurable performance criteria and planned workloads. It is no longer sufficient to request last year's allocation plus an additional percentage to cover inflation or other cost growth.

Budgeting must be based on an analysis of the functions to be performed, identifying the quantities of work to be performed, with details on unit prices, labor costs, transportation, materials, special contracts, and all other aspects which show how the funds will be spent. Performance budgeting for maintenance and repairs require a comprehensive database including; building identification numbers, function, size of facility in square feet, age of facility, specific project data (scope and estimated cost) for contract work, and work priority information.

Without a structured approach, budget submissions cannot be readily analyzed or reviewed, and financial allocations become a matter of negotiation based on prior year allocations.

8.2 Life Expectancy

In the design and maintenance of buildings – a comprehensive understanding of “design life” i.e. the duration that a component [such as door, toilet set, light bulb] is estimated to survive in good usable condition.

Life expectancy of any given item is a function of numerous factors. The Standard (nominal) Design Life of a given System Assembly/Component is defined as the projected service life measured from the date of installation to the date of replacement. Designers and maintenance planners are required to balance this Design Life with the expected Service Life, that is, the point at which the item no longer serves its purpose and must be replaced.
Some manufacturers have data which indicates a range of years of service that might be expected from their products. The location and environment of the system/component and its relationship with other system/components will also affect replacement life and should be taken into account when considering the subject.

The numbers listed [in table 9] are based on industry standards. Design life is an estimated number only and will vary based on maintenance frequency and system use. DOE, USA MANUAL CAS

8.3 Durability of Buildings and Building Elements, Products and Components

In order to predict the durability and the possible overall life of buildings, several factors need to be considered. Predicting durability is not an exact science, but a risk based approach to consideration of failure and acceptable service life. Predictions of the durability of buildings have to take into account the variability of operating conditions, environment, workmanship, the quality and frequency of maintenance.

Requirements for durability vary from project to project and from one asset to another. Requirements can be related to intended use, to the financing of a project and to scheduling/carrying out periods of maintenance, repair or replacement of a building or its parts. Very durable, long lasting construction is usually more expensive and might restrict the design to a limited range of materials. Consequently, a long design life is likely to increase the initial cost of the project, but not necessarily the life cycle cost, and can limit the design solutions that meet the brief.

8.4 DESIGN LIFE of Buildings

The nominal design life of buildings is generally considered to be around 60 years [BS 7543:1992], It must be emphasized that “design life” is relative and an imprecise entity. This is because it depends on a variety of factors of quality of the original construction, the environment in which the building is located, and the quality and degree of maintenance carried out.

It must be appreciated that these factors can vary, not only from building to building, but even within a given building. For example, (i) The quality of the substructure, superstructure and even roof structure in a building; (ii) the environment a building is subjected to will vary from external elements to internal elements and also from seaward side to landward side (if it is near the coast); and

(iii) different building elements may receive different degrees of maintenance, depending on accessibility for maintenance.

It is the normal requirement for the client to provide an indication or specify the design life of the building / infrastructure in the design brief. Design life categories for parts are given in Table 9.

An example of reference service lives for specific building types is given in Table 9. Life categories for components are given in table 11.

Table 9: Categories of design life

Category description	Life	Typical examples
Short-term	Shorter life than the building and readily replaceable	Door actuators and motors, taps.
Replaceable	Shorter life than the building and replacement can be envisioned at design stage	Most floor finishes and services installation components
Maintainable	Lasts, with periodic treatment, for the life of the building	Most external cladding, doors and windows
Lifelong	Lasts for the life of the building	Foundations and main structural elements

The below table provides a recommended design life for buildings that can be applicable to Education facilities which was adapted from BS 7543 [Roads and water system sub-projects are addressed in later section].

The effect of climate change and natural disasters were not factored in the design life of buildings, as no data is available on its effect.

Table 10: Recommended Design Life for Buildings

Category	Description	Building life	Example
Short life	Exposed small Structures / buildings constructed of more than 75% TIMBER	5-10 years	Exposed Vendor stalls, sports stands, benab, bicycle sheds, bus stops etc.
Short life	Temporary buildings - Timber	10 years	Post disaster shelter, temporary classrooms, low income board housing etc.
Medium life	Good Timber Buildings	30 years	Good Timber constructed *buildings [School, Health Centres in Hinterland location etc.]*

Normal Life	Durable concrete buildings	60 years	Concrete construction buildings under normal climatic conditions. *School, Markets, Health Centre etc.*
Long Life	High grade concrete, stone buildings	120 years	Buildings of national importance such as Parliament Bldgs., Museums, Libraries etc.
Very Long Life	Solid stone / granite etc.	More than 120 years	National monuments

When designers [consultants] are provide with a clear statement of requirements for durability they are more likely to be able to specify appropriately for all parts of a building and avoid disappointments where, for instance, components require early replacement.

8.5 Ensuring Durability

Detailed design procedures for ensuring durability are not given in any reputable standard. Durability refers to the capability of a building or its parts to perform a function over a specified period of time. The table below recommends an example of procedures, including communication for quality assurance, for the design, Construction, operation and maintenance of the structure during its service life, and for the investigation of damage due to degradation. The actual procedures, however, depend on local practice and type of facility.

Table 11: Example of procedures and lines of communications for ensuring durability [ISO 13823:2008]

Stage/activity	Procedures	Communication by	Action by
Design for durability (designer/consultant)	1) Establish design life of structure 2) Identify components likely to deteriorate during the design life of the structure, and design for access for inspection, maintenance, repair/replace and ease of construction. 3) Establish the design life and target probability of failure for these components 4) Select materials with appropriate properties and avoid contact between incompatible materials. 5) Detail to reduce agent accumulation 6) Make service-life predictions 7) Prepare life-cycle cost/assessment and, if necessary, revise the design. 8) Prepare a plan for inspection, maintenance, repair and replacement. 9) Prepare a plan for quality control during construction.	Client designers Contractors, Suppliers Designer contractor Owner/user designer	To designer Designer Designer Designer Designer Contractor
Construction (contractor)	1) Review design (document review) and incorporate acceptable changes. 2) Inspection and review of proposed changes by designer	designer	contractor Designer

<table>
<tr><td></td><td>3) Ensure interaction of trades for ease of construction
4) Ensure protection of components during construction</td><td>TOR.to
designer
designer
designer</td><td>contractor
contractor</td></tr>
<tr><td>Maintenance and operation (owner/user)</td><td>1) Facility operations to control environmental influences inside (e.g. humidity, temperature) and outside (e.g. road salt) the facility
2) Implementation of maintenance plan, records
3) Cleaning, repair and replacement
4) Inspections to verify or alter maintenance schedule</td><td>Client
Investigator
Investigator</td><td>Owner / maintenance manager</td></tr>
<tr><td>Investigation of damage (investigator)</td><td>1) Assessment to determine cause of degradation
2) Monitoring and testing
3) Recommendations
4) Feedback for future practice</td><td>Owner
Owner
Owner
Profession</td><td>Investigator</td></tr>
<tr><td colspan="4">*General Notes to Table*

To achieve the design life of a structure or a repair work, all details and components shall be designed for that life, with or without planned maintenance and repair; otherwise a replacement shall be planned and prepared for.

There are a variety of measures that may be used to increase the service life, including selection of materials, providing barriers (e.g. zinc, special paints, anodic protection, and preservative treatment of wood), detailing to minimize time of wetness where exposure to environmental action is unavoidable.

Procedures for considering impacts to the environment (for sustainability) in the design of structures for durability are contained in ISO 15686-6.

It is strongly recommended to prepare a maintenance/repair/replacement plan for the structure, including all the assumptions made in the design phase, for example the requirement for preventive maintenance such as inspection and cleaning to reduce cumulative damage, inspection, maintenance and repair of the structure, along with the protective and sheltering measures and replacement.

Since the construction is very important for ensuring durability, it is recommended to prepare a plan for the quality control of the most important activities in construction, for example site inspection during construction by the designer, check of concrete cover, etc.</td></tr>
</table>

8.6 Standard System Design Life Table of Building Materials and Components

Understanding and access to information of durability and service life of building components are critical for maintenance planning and budgeting.

Component failure is a function of time, use and exposure. Life expectancy of any given item is a function of numerous factors. The Standard (nominal) Design Life of a given System Assembly/Component is defined as the projected service life measured from the date of installation to the date of replacement.

The task of the designer is to balance this Design Life with the expected Service Life, that is, the point at which the item no longer serves its purpose and must be replaced. Manufacturers frequently publish data on products service life which are usually based on testing and historic data.

The location and environment of the system/component and its relationship with other system/components will also affect replacement life and should be taken into account when considering the subject.
The numbers listed are based on industry standards where possible and if no standards are available a best guess estimate based on past experience has been used. Design life is an estimated number only and will vary based on maintenance frequency and system use.

The table below, was adopted from the Department of Energy, Condition Assessment Survey Design and Inspection Standards Manuals USA

Table 12: Design life of building components typically found in / on Education Facilities / Government Buildings.

No.	Section	Item	Service life [years]	Percentage to be replaced
1	**Foundation**			
		Raft Concrete Slab Foundation	200	100
		Cast-in-place concrete footings	200	100
		Cast-in-place Concrete foundation walls	150	100
		Wood pile foundations [treated]	100	100
		Concrete block foundation walls	100	100
	For reference	Precast concrete piles, square	150	100
		Excavation [backfilling]	50	100
2	**Sub-structure**			
		Slab on Grade 4”thk.	50	100
		Column – treated wood	50	100
		Column – untreated wood	30	100
		Column - Cast-in-place concrete	75	100
		Column - Steel "H" section	75	100
		Precast concrete piles, square	75	100
3	**Super-Structure**			
		Steel structural frame (includes columns, beams, girders, trusses, spandrels, bracing, and fireproofing)	75	100

		Reinforced concrete structural frame (includes columns, beams, and miscellaneous frame elements)	75	100
		Wood structural frame (includes posts, girts, plates, studs, girders, and built-up beams)	50	100
4	**Internal Structural Walls**			
		Interior concrete block load-bearing walls	60	100
		Interior brick load-bearing walls	75	100
		Interior concrete load-bearing walls	75	100
		Interior wood load-bearing walls	50	100
5	**Floor Slabs**			
		Reinforced concrete floor slabs (includes slab and beams)	50	100
		Structural wood framing (includes sheathing, joists, beams, etc.)	40	100
		Corrugated metal deck with light weight concrete topping	50	100
		Poured-in-place concrete over form boards	40	100
6	**Stairs**			
		Precast concrete	50	100
		Steel pan type, filled with concrete	40	100
		Steel tread and riser	40	100
		Prefabricated steel form filled with concrete	50	100
		Steel framed, precast concrete treads, and risers	40	100
7	**Exterior Closure**			
		Masonry veneer: 4" brick and 4" block	75	100
		Stucco on metal studs:	35	100
		Cast-in-place 8" concrete wall	200	100
		Concrete block (standard) 8" wall	150	100
		Plywood siding, texture 1-11 with wood studs	30	100
		Storm proof louvers, galvanized steel	15	100
		Cast-in-place concrete	75	100
		Precast concrete	75	100
		Brick masonry	75	100
		Concrete unit masonry	60	100
		Stone	75	100
		Wood	30	100
		Metal panels	40	100
		Glass Panels	40	100
		Exterior gypsum board including metal hangers	12	100
		Fixed glazing, frame, hardware	40	100
		Operable glazing, frame, hardware	35	100
		Ceramic tile facing or panel	50	100
		Stone facing or panel	75	100
		Hollow metal door, frame, hardware	40	100
		Solid-core wood door	40	100
8	**Roofing**			

		Asphalt & gravel built-up membrane roofing, 4 ply-15# felt	20	100
		Galvanized steel sheet metal	30	100
		Shingles – asphalt / wood	20	100
		Tiles – clay, metal and concrete	40	100
		Gutters and downspouts, Scuppers, drains	20	100
9	**Interior Finishes and Construction**			
		Brick partitions, exposed	100	100
		Concrete block partitions lightweight, exposed	100	100
		Drywall partitions, metal or wood studs	25	100
		Hardwood veneer folding partitions	25	100
		Metal baked-enamel toilet partition: frame, door, and hardware	25	100
		Painted plywood toilet partition: frame, door, and hardware	20	100
		Wood railing and handrail	25	100
		Walls - timber	25	100
		Concrete block	40	100
		Hollow metal door and frame, hardware	30	100
		Hollow-core wood door with metal frame, hardware	20	100
		Solid-core wood door with metal frame, hardware	30	100
		Hollow core wood door with wood frame, hardware	20	100
		Solid-core wood door with wood frame, hardware	30	100
		Interior paint on masonry	10	100
		Interior paint on plaster	7	100
		Interior paint on drywall	7	100
		Wood veneer, stain, or varnish	40	100
		Ceramic tile, glazed / unglazed	25	100
		Resilient vinyl tile, 1/8 inch thick	20	100
		Carpeting, standard acrylic or nylon	12	100
		Ceramic tile, glazed with trim, organic	25	100
		Quarry tile with 3/4 inch Portland cement bed	30	100
		Terrazzo, 2 1/2 - 3 inches thick	50	100
		Brick, unglazed pavers	35	100
		Acoustical tile, exposed 2x4 foot grid with hangers	10	100
10	**Mechanical**			
		PIPE & PIPE FITTINGS, Black steel pipe, schedule 40, 1/2-8"	30	100
		VALVES. Bronze gate valves, 3/8-1"	15	100
		Cast iron flat square-top floor drains, 3-5"outlet	40	100
		WATER CLOSETS. Floor-mounted water closets, wash-down, and siphon jet types	35	100
		URINALS. Pedestal-type urinals, wash-down, and siphon jet types	35	100

		LAVATORIES. Vitreous china, wall-hung lavatory, 20 x 18"	35	100
		Sink - Plastic, high back, single sink	15	100
		PIPE & FITTINGS. VALVES: Gate, butterfly, plug et.al	20 15	100
		PUMPS. Horizontal split case type :3 x 2 1/2", 1 1/2 hp	20	100
		AC equipment [general average]	15-20	100
		Concrete tanks	30	100
		Underground piping	35	100
		Piping (Potable Water)	30	20
		Piping, Gravity (Sewage)	30	20
		Piping, Pressure (Stormwater)	30	20
		Septic Tanks (Sewer)	35	
11	**Electrical**			
		Circuit breakers, fixed type, below 600V, all sizes	20	100
		Transformers, dry type, 0-750 kVA, below 600V	30	100
		Circuit breakers, fixed type, all sizes, above 600V	20	100
		Cable, thermoplastic, above 600V	life	
		Fluorescent interior lighting fixtures, 2 each, 40W tubes (20,000 burning hours)	20	100
		Low-pressure sodium vapor lighting fixtures, 100W	20	100
12	**Utility Support Structures**			
		Precast concrete poles	75	100
		Wood poles	25	100
		Concrete support pads	50	100
13	**Paving Roadways/Walkways**			
		Curb	40	100
		Walkway	20	100
		Roadway - Asphalt	15	100
		Concrete	25	100
		Gravel	2	100
14	**Bridges**			
		APPROACHES: Pavement, asphalt	15	100
		Pavement, concrete	25	100
		Guide railing, concrete	25	100
15	**Deck Elements**			
		Curbs, concrete	40	100
		Railings/parapets, concrete	25	100
		Sidewalks/fascias, concrete	25	100
		Wearing surface, asphalt	15	100
		Wearing surface, concrete	25	100
16	**General**			
		Bridges (concrete – for Walking)	75	100
		Cables, Above Ground (Fire Alarm)	40	100
		Cables, Above Ground (Voice/Data)	40	100
		Cables, Under Ground (Fire Alarm)	20	100

		Dams	75	100
		Fencing (Security)	25	100
		Wells (Potable Water)	35	100

9.0 MAINTENANCE OF FURNISHING & EQUIPMENT

Facilities' furniture maintenance is often broken or lacking entirely. Research[5] suggests that these conditions have a significant negative impact on whether children attend and complete school and whether teachers show up for work.

The most common type of classroom furniture in schools is the traditional one-piece, two- or three-seater desk and bench model built of solid wood or of a combination of wood and tubular steel.

The timber furniture generally has a life span of 5-7 years and are easily maintained with local skills and labour. However, the required method and details are not available to communities and often poor repair methods are employed.

The laminate, polypropylene and plastic composite types are imported and are impossible to repair. However, they are durable and present an improved working and hygienic surface. Beneficiaries indicated that some minor maintenance are done by the line ministries and replaced when maintenance is not possible. It is assumed that the durable imported furniture are preferred by users, despite being expensive and difficult to maintain.

Furniture are damaged by vandalism, routine movement and regular use. Some Developing countries introduced furniture made of concrete that is virtually impervious to vandalism or theft, or models that are
Anchored in the concrete floor. However, the design and immobility of the furniture is poorly suited to modern classroom teaching strategies, such as group work and multi-grade teaching.

Maintenance of furnishing was not found to be lacking in SPs reviewed, probably since most of the SPs furnishing were relatively new at the time of review. However, there are concerns that this aspect of maintenance is being neglected and furniture are being replaced rather that maintained.

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[5] *Theunynck Serge, School Construction Strategies for Universal Primary Education in Africa, The World bank 2009*

10.0 MAINTENANCE & THE ENVIRONMENT

10.1 Environmental Maintenance Standards

An environmental maintenance standard is a broad set of guidelines that is designed to regulate the effects of human activity on the environment. It can either be used to limit changes in the environment or to specify a preferred condition.

Standards are usually voluntary and outline in a generic manner environmental best practice in the management of a particular activity or outcome. There are guidelines or rules designed for repeated use to achieve a desired outcome. The objectives of environmental maintenance standards are to: -

- outline the minimum basic requirements,
- minimize risk
- determine the type and frequency of inspections,
- describe maintenance procedures
- create a checklist for maintenance activities
- avoid negative impacts on human health and the environment
- improve or protect environmental quality

The purpose of developing environmental maintenance standards for buildings is to outline targets and guidelines detailing how to achieve a clean, safe and environmentally friendly facility. Good maintenance management promotes good environmental practice by increasing the lifespan of the building and reducing energy and resource use. Some key environmental standards that should be considered include: -

- Environmental Education
- General Appearance
- Grounds
- Building (Exterior and Interior)
- Environment
- Waste Management
- Energy Conservation
- Water Management

Environmental Education

All users of the facility should be encouraged to practice conservation and wise use of the facility in order to enhance cleanliness and visual appearance, reduce operational costs, extend the useful life of the facility and help the environment. Training should be done at least once per year.

Grounds

Every effort should be made to keep the grounds visually pleasing. Where practical, low maintenance vegetation or alternatives should be used to reduce the costs of maintenance.

Building (Exterior and Interior)

Every effort should be made to keep the facility visually pleasing by cleaning and washing.
Defects should be reported to the relevant authority as soon as possible.

Environment

Use and storage of hazardous chemicals should be carefully regulated. All cleaning chemicals and insecticides must be stored in a locked storage area.

Waste Management

Where possible solid waste should be reduced and reused e.g. buying school materials in bulk to reduce amount of packaging to be disposed of.

Waste should be buried not burned, if the necessary waste disposal facilities do not exist.

Energy Conservation

The use of alternative or renewable sources of energy should be encouraged where practical.
The use of energy conservation techniques or fixtures should be encouraged e.g. compact fluorescent lights and using artificial lighting only when necessary.

Water Management

Water conservation techniques should be practiced whenever possible e.g. leaking taps should be changed as soon as possible.

10.2 Environmental Performance

Environmental performance is the relationship between an organization and the environment. It evaluates the past performance, background and reputation of the organisation against detailed and measured environmental objectives. The environmental performance of an organisation is improved when the environmental aspects (element or characteristic) of an activity or the services provided are appropriately managed and regulated to increase environmental benefits and decrease adverse environmental impacts. It is measured by comparing results of an activity or service provided with environmental objectives and policies.

10.3 Measuring Environmental Performance

Environmental Performance is measured to provide information to managers and stakeholders on the status of an organization regarding impacts of their activities on the environment. Understanding environmental performance encourages a sense of personal ownership, a stronger sense of accountability and can motivate changes in behaviour.

Additional benefits of measuring environmental performance include:

- The creation of feedback mechanisms that allow for better management decisions thereby increasing beneficial environmental impacts.
- Better understanding and progress toward sustainability and environmental goals
- More effective resource use
- More efficient waste management
- Simpler environmental reporting e.g. regulatory – environmental permits

Table 13: Environmental Maintenance Checklist

Environmental Maintenance Checklist

Note: This checklist is intended for general use and may not be exhaustive. Modifications and changes may be necessary to suit individual projects or to address specific environmental concerns	No:
	Date:
Name of Facility: ______________________	Key
	Satisfactory:
Inspector:	Requires Action:

General		Condition	Location	Comments
1	Is the exterior of the facility generally clean and visually pleasing?			
2	Is the interior of the facility generally clean and visually pleasing?			
3	Are there any tripping hazards			
Grounds				
1	Is there an overgrowth of vegetation in the compound?			
2	Is there pooling of water in the compound?			
3	Is there adequate drainage infrastructure in or around the compound?			
4	Are there any signs of soil subsidence or sinking of the building?			
Building - Exterior				
1	Are there any signs of flooding on the exterior walls?			
2	Is there any evidence of leaky gutters or downspouts?			
3	Is there any peeling of paint or building discoloration?			
Building - Interior				
1	Is there any evidence of mold or mildew in the building?			
2	Are any areas of the building dark?			
3	Are classrooms/user spaces comfortably cool?			
4	Does the air feel musty/stuffy?			
5	Is there any sign of water damage in the building?			
Environment				

1	Is there any evidence of termite infestation in the building?			
2	Is there any evidence of bat infestation in the building?			
3	Are there any chemicals such as insecticides stored on site?			
4	Are chemicals properly labelled and stored?			
General		Condition	Location	Comments
Waste Management				
1	Is the site kept clean and tidy (free of debris and litter)?			
2	Is solid waste properly disposed of?			
3	Are washroom areas clean?			
4	Are food preparation areas clean?			
Energy Conservation				
1	Have any alternative or renewable sources of energy been installed e.g. solar panels			
2	Are any energy conservation methods employed such as the use of compact fluorescent lights?			
3	Is there any evidence of the use of natural lighting ?			
Water Management				
1	Is the facility adequately supplied with water?			
2	Is there any evidence of leakage or wastage of water?			
3	Are any water treatment practices employed?			

10.4 Environmental Performance Indicators

Performance Indicators are the tools used for measuring the consequences of an organisation's operations and activities. They provide a quantifiable way of measuring the impacts on the environment by:

- Summarising data gathered into useful information that allows for monitoring, reporting and improved decision making.
- Providing information for stakeholders and other interested parties to have a better understanding of an organisation and its environmental efforts.
- Providing information that helps the integration of environmental policies into planning at the national and local government levels. There are many management systems and frameworks for measuring and evaluating the environmental performance of an organization or its activities. The most popular management systems are those set out by the International Organisation for Standardization (ISO). The ISO sets out environmental management standards specifically the ISO 14000 series that include requirements and guidelines covering everything from environmental communication to the measurement of GHG emissions reduction (ISO, 2013). The Environmental Performance Index (EPI) offers an evaluation system across categories include environmental, public health and ecosystem vitality with 25 Key Performance Indicators (KPI) (Yale University 2013). For the purposes of this report, only the ISO and the ISO 14000 family of international standards will be considered.

12.0 MAINTENANCE & CLIMATE CHANGE

12.1 GENERAL

Consideration for maintenance of infrastructures starts at the design and planning stage. Climate change and the changing environment present a substantial risk to the functionality and lifespan of new and existing infrastructure, its users, owners and operators. The environmental effects will have increasingly negative impacts on the built environment and could potentially result in decreased lifespans and usability and higher operating and maintenance costs.

If environmental impacts are considered in the design and planning stages, then infrastructural development is more likely to be long lived. The siting and design of new infrastructure should reduce vulnerability to climate change and other environmental impacts. However, in many cases, as a result of socio-economic conditions and limitations, development may occur in areas that are at risk to the impacts of climate change.

The main design considerations that may be affected by climate change and other environmental impacts are

- Location
- Site Layout
- Buildings
- Ventilation and Cooling
- Drainage
- Water
- Outdoor spaces

12.1.2 Location

Any location selected will have a potential risk for flooding, this risk could increase over time due to the impacts of climate change – specifically rising sea levels, changing rainfall patterns and more intense storm events. Some areas may be more at risk of subsidence as a result of increasing temperatures. Changing rainfall patterns and extreme storm events can increase the risk of landslides and erosion.

To reduce potential environmental impacts when choosing the location of a new development, the following should be considered

- The use of ground floor space for flood compatible uses e.g. Car parking
- Raising the ground floor above predicted/estimated flood levels.
- The use of flood prevention/mitigation techniques such as bund walls or higher road systems
- Building new buildings with foundations between 0.7-3.5m deep where practical (this is dependent on soil type, proximity, size and species of adjacent trees)
- The use of retaining structures on slopes and/or planting deep-rooted vegetation where appropriate

12.1.3 Site Layout

Development of a site will change the way an area drains or floods through the placement of buildings and changes in permeability of land surfaces, subsidence and erosion can also be affected by development.

To reduce the environmental impacts when designing the layout of a new development, the following should be considered

- the use of ground floor space for flood compatible uses e.g. car parking
- Raising the ground floor above predicted/estimated flood levels.
- the use of flood prevention/mitigation techniques such as bund walls or higher road systems
- building new infrastructure with foundations between 0.7-3.5m deep where practical (this is dependent on soil type, proximity, size and species of adjacent trees)
- Green or living roofs can be reducing operating costs, absorb rainfall and provide useable outdoor spaces.
- The use of retaining structures on slopes and/or planting deep-rooted vegetation where appropriate
- The retention of existing trees which will provide shade and could reduce soil erosion.

12.1.4 Buildings

Infrastructural development can be affected by rising temperatures, erosion and increasing wind speeds. The effects of climate change on wind speed are still uncertain but it is expected that speeds may be higher in the future and therefore structures particularly tall ones may need to be strengthened. Soil erosion and ground movement can affect the structural integrity of buildings and higher temperatures may raise operating costs or decrease the usability of infrastructure.

To reduce the environmental impacts when developing building design, the following should be considered: -

- Greater floor-to-ceiling heights will trap hot air above the heads of persons using the room which will make the room cooler
- Use of natural ventilation and cooling techniques suitable for the intended use and occupancy should be considered in the design stage.
- The use of building materials that are suitable for the climate, the intended use and will perform adequately through the lifetime of the building e.g. MDF should not be used where there is a possibility of flooding.
- the use of innovative construction methods suitable for existing and predicted weather conditions
- Green or living roofs can reduce operating costs, absorb rainfall and provide useable outdoor spaces.
- The use of renewable energies when practical to reduce the use of carbon-based energy

12.1.5 Ventilation and Cooling

All infrastructure should be designed to make the best possible use of natural ventilation, predicted increases in temperature are expected to directly impact the influence of natural ventilation and may even cause an increase in internal temperatures during heat waves. To reduce any impacts that may affect ventilation and cooling, the following should be considered

- Greater floor-to-ceiling heights will trap hot air above the heads of persons using the room which will make room cooler
- Use of natural ventilation and cooling techniques suitable for the intended use and occupancy should be considered in the design stage.
- The use of screens and external shading to reduce internal temperatures
- The use of renewable energies for cooling and ventilation when practical to reduce the use of carbon-based energy.

12.1.6 Drainage

Development of a site and new infrastructure can reduce effective drainage by reducing the area of permeable surfaces thereby increasing surface run-off and reducing the amount of water penetrating the ground surface. To reduce the impacts of infrastructure development on drainage of a site, the following should be considered

- Green or living roofs can be reducing operating costs, absorb rainfall and provide useable outdoor spaces.
- Increasing the size of guttering and down-pipes to cope with increased rainfall
- The use of spouts so that water can be thrown clear of buildings and storm drains on the ground
- Rainwater harvesting
- The use of alternative pavement materials – permeable and porous pavements to allow for more ground penetration
- The use of storm water tanks in high risk areas

12.1.7 Water

Water is a key resource which can potentially become limited through natural phenomenon e.g. El Nino, or as a result of climate change. The availability of water resources may become more restricted as rainfall patterns change and temperatures increase.

To reduce the impacts of climate change that may affect the availability of water resources the following should be considered

- the use of water meters where practical
- the use of low-flush toilets and water efficient showers
- rainwater harvesting for laundry, flushing toilets and irrigation
- the use of energy and water efficient devices – washing machines and dishwashers

12.1.8 Outdoor Spaces

As global populations become more health conscious and rising global temperatures there is more demand for outdoor spaces for recreational purposes.

When designing new infrastructure, intended use and occupancy of the surrounding outdoor spaces should also be considered. Key factors should include

- The ratio of permeable vs impermeable surfaces, hard wearing natural surfaces are needed in high traffic areas to reduce damage to the natural environment e.g. soil erosion and permeable surfaces are also important to reduce run off.
- The use of natural shade which will provide shade for buildings, and users of the space.
- choosing hardy long-lived vegetation suitable to the existing climate

12.2 Climate change impacts on buildings and their technical services

The typical life span of a building is estimated to be from around 60 years, thus the implications of different climate change scenarios on buildings should be considered in advance to enable the country to adapt to these changes in the future. Most studies on effect of Climate change on buildings, focused on analyzing the climate change effects on energy consumption, electricity and related greenhouse gas emissions.

12.3 Climate change impacts on building sustainability and indoor environmental quality

Climatic variability has led to physical damage to building structures. Buildings are exposed to faster degradation and damage due to the increase in wind speed, level of precipitation, long exposure to sun and temperature changes.

The sustainability of building envelopes was badly affected by the increases in driving rain quantities and the frequency of intense weather events, which increase the buildings' maintenance costs. Studies indicate that the cost of repairing damaged buildings due to the increase in wind speeds by 6%.

Higher wind velocity, increase in precipitation and frequent temperature changes could weaken the buildings' structure, loosen the roofing, and cause damage to the cladding, overhead electric and telephone connections. Wind driven rain in combination with increased in precipitation and wind loads amplified the weathering of buildings.

Typically, older buildings are more vulnerable to wind damage and there are incidents where abrupt climate change is responsible for the collapse of old buildings.

The undesirable impacts of wet materials on the quality of indoor air and the ensuing health problems affect buildings including dampness and moisture might accumulate in the building's structure through leaks in the roof, windows or piping, or due to the insufficient ventilation or moisture from the ground, which penetrates the building's structure by capillary movement. Long exposure to mold can lead to other respiratory problems. The particles from the air, which accumulate in the building, could affect the lungs and heart health.

Other phenomena such as heat waves has led to the increased in usage of air conditioners, which produce a cycle of additional energy consumption and contribute to global warming even further.

Extended exposure to Ultraviolet (UV) radiation will also damage the building materials, such as plastics, paint and coatings such as specific hydrophobic coatings, rubber products, wood and paper. Moreover, escalating amounts of plastic usage in building construction will also add to the plastic degradation problems. Higher temperatures in combination with longer exposure to UV radiation may also expedite the degradation of roofing materials as roof materials are exposed to wind, rain, sunlight and temperature swings.

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TERMINOLOGY & DEFINATIONS

An alphabetical listing of all defined terms included in this document. the meaning is applicable throughout the Standards. Standards and Codes are technical documents and every word, term and punctuation mark can impact the meaning of the code & standard text and the intended results.

General: Unless otherwise expressly stated, the following words and terms shall, for the purposes of this code, have the meanings shown in this chapter.

Interchangeability. Words used in the present tense include the future; words stated in the masculine gender include the feminine and neuter; the singular number includes the plural and the plural, the singular.

Terms defined in other codes. Where terms are not defined in this code and are defined in the *International Energy Conservation Code*, *International Fuel Gas Code*, *International Fire Code*, *International Mechanical Code* or *International Plumbing Code,* such terms shall have the meanings ascribed to them as in those codes.

Terms not defined. Where terms are not defined through the methods authorized by this section, such terms shall have ordinarily accepted meanings such as the context implies.

GENERAL TERMINOLOGY

comply with	Meet one or more specifications of this standard.
if … then	Denotes a specification that applies only when the conditions described are present.
may	Denotes an option or alternative.
shall	Denotes a mandatory specification or requirement.
should	Denotes an advisory specification or recommendation

DEFINITION

ACCESSIBLE

Describes a site, building, facility or portion thereof that complies with this standard.

ADAPTABLE

The ability of a certain building space or element, such as kitchen counters, sinks, and grab bars, to be added or altered so as to accommodate the needs of individuals with or without disabilities or to accommodate the needs of persons with different types or degrees of disabilities.

Architectural design

Design of the physical appearance, spatial layout, aesthetic features, fittings and fixtures and style of buildings and grounds. Generally speaking, architectural design must be integrated with engineering design to ensure structural integrity and safety standards are met.

Asset Management

A systematised approach to ensuring that assets such as school buildings, grounds and associated spaces are maintained in such a way as to protect their longevity, functionality, integrity and appearance. Asset management co-ordinates a database of assets with scheduled regular inspections of these to ensure that a program of remedial works, repairs or replacement is undertaken.

Area Measurement

Room or Module Areas. Room or module area will be measured net within the inside surfaces of main enclosing walls and partitions

Ancillary Rooms

Ancillary spaces that are less than 400 ft2, such as seminar rooms, storage rooms, workrooms, and elementary cloakrooms, shall be measured as part of the main instructional space only when directly accessible from that space. Seminar rooms 40 m2 and larger shall be measured as instructional space, regardless of access.

Bandwidth:

Example ratings for bandwidth amount: 33.6 KBPS or under; 56 KBPS; 128 KBPS; 256 KBPS; 512 KBPS; 768 KBPS (.5 T1); 1.544 MBPS (T1); Ethernet; DS(1) or higher.

BUILDING.

Any structure used or intended for supporting or sheltering any use or occupancy, consisting of a wall, roof and floor or any of them, or a structural system serving the function thereof. Some Standards limits the definition of a building as an enclosed structure of an area greater than 10m2.

CLASSROOM [General]

A classroom for a secondary school is an established room in a school building where students in grades 7 to11 are provided with education instructions and related education activities. In some designated school, classrooms for secondary school will include students of grades 12&13 [for CAPE].

It is a space where students can learn and grow academically, socially, and emotionally. Secondary school classrooms typically accommodate 20-30 students, and are furnished with desks and chairs for students, as well as a teacher's desk and chair. Classrooms may also have other furniture, such as bookshelves, cabinets, and storage units.

Technology integration: Classrooms should be equipped with the latest technology to support teaching and learning. For example, whiteboards, projectors, and computers can be used to deliver engaging and interactive lessons. Student-centered environment: Classrooms should be designed to promote student-centered learning. This means that the classroom should be arranged in a way that allows students to move around freely and collaborate with each other. It is also important to create a classroom environment where students feel safe and respected. Overall, a secondary school classroom should be a space where students can learn and grow to their fullest potential. It should be a place where students feel safe, supported, and challenged.

Computer Infrastructure

covers both devices and cabling. Devices supporting technology in schools include specialized equipment (such as switches, routers, modems, or codecs) that link computers or video hardware to networks. Infrastructure also refers to cabling, whether wire, fiber optic, or coaxial. In newer systems, links between computers are wireless, in which case infrastructure refers to receivers and transmitters.

Connection types:

Refers to the kind of link between a computer and external networking resources. Example of connection types: dial-up via modem; wired LAN and router; wireless LAN and router; cable modem; satellite/modem hybrid link; full satellite (two-way) link.

CORRIDOR.

An enclosed exit access component that defines and provides a path of egress travel to an exit. A hallway is a corridor.

Climate change (CC):

The Inter-Governmental Panel on Climate Change (IPCC) defines climate change as: “a change in the state of the climate that can be identified (e.g. by using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forcing, or to persistent anthropogenic changes in the composition of the atmosphere or in land use”.

Contingency planning:

A management process that analyses specific potential events or emerging situations that might threaten society or the environment and establishes arrangements in advance to enable timely, effective and appropriate responses to such events and situations.

Critical Facilities

The primary physical structures, technical facilities and systems, which are socially, Economically or operationally essential to the functioning of a society or community, both in routine circumstances and in the extreme circumstances of an emergency.

Design according to best national practices

Incorporating engineering and architecture, standard Bills of Quantity, specifications and contract documents in the design to meet the Guyana Building code and standards.

Disability:

means a physical or mental impairment caused by the limitations of the body structure or of one or more bodily functions that restrict the abili8ty to perform ordinary day-to-day activities (Laws of Guyana. Chp.36.05. 2010).

DORMITORY:

A dormitory (originated from the Latin word dormitorium), often abbreviated to dorm, is a building primarily providing sleeping and residential quarters, with shared bathroom facilities for large numbers of unrelated people such as boarding school, high school, college or university students. Related words are: Hall of Residence [for university students], Hostel [for students, travellers or workers], barracks [military terms]

DWELLING.

A building that contains one or two *dwelling units* used, intended or designed to be used, rented, leased, let or hired out to be occupied for living purposes.

DWELLING UNIT.

A single unit providing complete, independent living facilities for one or more persons, including permanent provisions for living, sleeping, eating, cooking and sanitation.

DIRECT ACCESS.

A path of travel from a space to an immediately adjacent space through an opening in the common wall between the two spaces.

Disaster:

A serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources.

Disaster risk:

The potential disaster losses, in lives, health status, livelihoods, assets and services, which could occur to a particular community or a society over some specified future time period.

Disaster risk management:

The systematic process of using administrative directives, organizations, and operational skills and capacities to implement strategies, policies and improved coping capacities in order to lessen the adverse impacts of hazards and the possibility of disaster.

Disaster risk reduction:

The concept and practice of reducing disaster risks through systematic efforts to analyze and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events.

Early warning system:

The set of capacities needed to generate and disseminate timely and meaningful warning information to enable individuals, communities and organizations threatened by a hazard to prepare and to act appropriately and in sufficient time to reduce the possibility of harm or loss

Engineering design (Civil and Structural)

Calculation of the size and material composition of construction members such as beams, columns, trusses, footings, retaining walls, concrete slabs, road surfaces and so on and integrating these members into a composite structure such as a bridge, building, tower, dam, motorway, etc. Engineering design, overseeing of design processes and project management of engineered structures must be undertaken by degree qualified, experienced engineers.

Environmental best practices

Promotion of practical, inexpensive ways to sort waste and to dispose of it thoughtfully, to refrain from lighting fires in school grounds, to prevent water pooling and ponding, to prevent septic waste from entering ground water, streams and rivers, to prevent erosion and sediment runoff from construction sites, gardens and to manage reforestation projects etc.

Emergency Voice/Alarm Communications:

Dedicated manual or *automatic* facilities for originating and distributing voice instructions, as well as alert and evacuation signals pertaining to a fire emergency, to the occupants of a building.

EXISTING STRUCTURE.

A structure erected prior to the date of adoption of the appropriate code, or one for which a legal building *permit* has been issued. For application of provisions in *flood hazard areas*, an existing structure is any building or structure for which the start of construction commenced before the effective date of the community's first flood plain management code, ordinance or standard.

EXIT.

That portion of a *means of egress* system between the *exit access* and the *exit discharge* or *public way*. Exit components include exterior exit doors at the *level of exit discharge*, *interior exit stairways* and *ramps*, *exit passageways*, *exterior exit stairways* and *ramps* and *horizontal exits*.

EXIT ACCESS.

That portion of a *means of egress* system that leads from any occupied portion of a building or structure to an *exit*.

EXTERIOR WALL.

A wall, bearing or non-bearing, that is used as an enclosing wall for a building, other than a *fire wall*, and that has a slope of 60 degrees (1.05 rad) or greater with the horizontal plane.

FACILITY.

All or any portion of buildings, structures, *site* improvements, elements and pedestrian or vehicular routes located on a *site*.

FENESTRATION.
Skylights, roof windows, vertical windows (fixed or moveable), opaque doors, glazed doors, glazed block and combination opaque/glazed doors. Fenestration includes products with glass and non-glass glazing materials.

FIRE ALARM SYSTEM.
A system or portion of a combination system consisting of components and circuits arranged to monitor and annunciate the status of *fire alarm* or *supervisory signal-initiating device*s and to initiate the appropriate response to those signals.

FIRE AREA.
The aggregate floor area enclosed and bounded by *fire walls*, *fire barriers*, *exterior walls* or *horizontal assemblies* of a building. Areas of the building not provided with surrounding walls shall be included in the fire area if such areas are included within the horizontal projection of the roof or floor next above.

FIRE DOOR. The door component of a *fire door assembly*.

FIRE RESISTANCE.
That property of materials or their assemblies that prevents or retards the passage of excessive heat, hot gases or flames under conditions of use.

FIRE WALL.
A fire-resistance-rated wall having protected openings, which restricts the spread of fire and extends continuously from the foundation to or through the roof, with sufficient structural stability under fire conditions to allow collapse of construction on either side without collapse of the wall.

Fit for purpose
Designed and built to respond to the varying and agreed needs of major stakeholders and the specific physical conditions of the location. The designation ‘fit for purpose’ applies differently to the differing education sub sectors. Infrastructure needs and requirements that may be fit for purpose meet the baseline expectation for the intended purpose. The Standard Drawings and Specifications define and illustrate the criteria of ‘fit for purpose’.

FLAMMABLE LIQUEFIED GAS.
A liquefied compressed gas which, under a charged pressure, is partially liquid at a temperature of 68°F (20°C) and which is flammable.

FLOOD or FLOODING.
A general and temporary condition of partial or complete inundation of normally dry land from:

1. The overflow of inland or tidal waters.
2. The unusual and rapid accumulation or runoff of surface waters from any source.

GENDER:
Gender refers to social, behavioral, and cultural attributes, expectations, and norms associated with being male or female.

Gross Area
The gross area of a building floor is defined as the floor area within the inside of the exterior walls, plus a standard allowance calculated by multiplying the building perimeter (measured at the interior face) times 150 mm.
The following area calculations shall be included in the definition of facility gross floor area:

- stair openings, measured at the first floor, including stairs to rooftop penthouses, elevator and duct shafts measured at each floor, mezzanines including access stairs, mechanical and electrical spaces, including all penthouse, basement and mezzanine locations (service spaces to be identified separately) , galleries and suspended walkways, including access stairs AND all other usable or accessible floor areas.

- Excluded areas from the calculations are as follows: industrial education storage mezzanines / crawl spaces or service tunnels / elementary covered play areas / industrial education covered work areas.

HABITABLE SPACE.

A space in a building for living, sleeping, eating or cooking. Bathrooms, toilet rooms, closets, halls, storage or utility spaces and similar areas are not considered habitable spaces.

HANDRAIL.

A horizontal or sloping rail intended for grasping by the hand for guidance or support. HOT KITCHEN. Refers to the enclosed space where cooking or baking is done.

Houseparent [HP]

A male and female [often husband & wife] who are in charge of male & female residents [boys and girls] and living in the boarding school dormitory. In the Local [MoE] context, the Houseparent attend to the management and affairs of the male & female occupants including general security and compliance with code of conduct and provide some parental support.

Hazard:

A dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage.

Maintenance

Monitoring, inspecting and taking care of assets on a regular basis to maintain the safety, functionality, quality, integrity and appearance of the specific infrastructure. Maintenance can include mowing, tree trimming, painting, cleaning, adjusting, lubricating, stripping rust, removing mould and so on.

Minimum standards

Standards developed and approved by the Ministry of Education, National Bureau of Standards and reference and inclusive of applicable international codes and standards [IBC, NFPA, ASHREE etc.] in accordance with nationally accepted practices for engineering, architecture, safety, environment, hygiene and disaster management and risk reduction standards. Minimum standard is so named and titled in each of the document referenced.

Mitigation:

The lessening or limitation of the adverse impacts of hazards and related disasters. National platform for disaster risk reduction: A generic term for national mechanisms for coordination and policy guidance on disaster risk reduction that are multi-sectoral and interdisciplinary in nature, with public, private and civil society participation involving all concerned entities within a country.

INFRASTRUCTURE

Applies to physical components of the built environment including buildings, fittings and fixtures, water supply and sanitation facilities, earthworks, ground works comprising sporting facilities, pathways, play and recreation areas, roadways, parking areas, fences and other outdoor fixtures.

INTUMESCENT FIRE-RESISTANT COATINGS.

Thin film liquid mixture applied to substrates by brush, roller, spray or trowel which expands into a protective foamed layer to provide fire-resistant protection of the substrates when exposed to flame or intense heat.

LOADS.

Forces or other actions that result from the weight of building materials, occupants and their possessions, environmental effects, differential movement and restrained dimensional changes. Permanent loads are those loads in which variations over time are rare or of small magnitude, such as *dead loads*.

MASONRY UNIT. *Brick*, tile, stone, glass block or concrete block conforming to the requirements

MORTAR.

A mixture consisting of cementitious materials, fine aggregates, water, with or without admixtures, that is used to construct unit masonry assemblies.

OCCUPANT LOAD. The number of persons for which the *means of egress* of a building or portion thereof is designed.

OCCUPIABLE SPACE.

A room or enclosed space designed for human occupancy in which individuals congregate for amusement, educational or similar purposes or in which occupants are engaged at labor, and which is equipped with *means of egress* and light and *ventilation* facilities meeting the requirements of this code.

OPEN-ENDED CORRIDOR.

An interior corridor that is open on each end and connects to an exterior *stairway* or *ramp* at each end with no intervening doors or separation from the corridor.

PANIC HARDWARE.

A door-latching assembly incorporating a device that releases the latch upon the application of a force in the direction of egress travel. See "Fire exit hardware."

PERSON.

An individual, heirs, executors, administrators or assigns, and also includes a firm, partnership or corporation, its or their successors or assigns, or the agent of any of the aforesaid.

People with Disabilities

People who have mental or physical impairments that adversely affect their ability to carry out everyday activities on a substantial, long-term basis. These impairments can be visible or invisible. Disabilities can affect a person's mobility, manual dexterity, physical coordination, continence, ability to lift or carry objects, speech, hearing, eyesight, memory, and ability to concentrate, learn, or understand. Around 15% of the global population has some sort of disability, and prevalence is higher in developing countries (WHO, 2011).

POLICY

Policy is a deliberate system of guidelines to guide decisions and achieve rational outcomes. It is a statement of intent and is implemented as a procedure or protocol. Policies are generally adopted by a governance body within an organization. Policies can assist in both subjective and objective decision making. A policy is a course of action or a set of principles that is adopted or proposed by a government, party, business, or individual.

Preparedness:

The knowledge and capacities developed by governments, professional response and recovery organizations, communities and individuals to effectively anticipate, respond to, and recover from, the impacts of likely, imminent or current hazard events or conditions.

Prevention: The outright avoidance of adverse impacts of hazards and related disasters.

Project Management

A systematic approach to monitoring and controlling a project. Project management requires that careful planning, assessment and undertaking of all aspects of a project be done. This involves analysis, monitoring and controlling the project's scope, cost, timeline, quality, risk, procurement, communications and human resource (HR) functions and integrating them into a seamless management process

Quality standards

Architectural design, construction quality, safety, access to safe and clean water, hygiene and fits for education purposes.

Rehabilitation

Replacement of worn, damaged, dangerous, obsolete, insanitary, dirty or unfit-for-purpose buildings by new works that may include painting, replacing worn parts, replacing wiring, plumbing and so on. Rehabilitation work usually concerns a whole structure, rather than an individual fixture or fitting and frequently involves a programme of works that may include both new work and repair work.

ROOF VENTILATION.

The natural or mechanical process of supplying conditioned or unconditioned air to, or removing such air from, *attics,* cathedral ceilings or other enclosed spaces over which a *roof assembly* is installed.

Resilience:

The ability of a system, community or society exposed to hazards to resist, absorb, accommodate to an recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions.

Response:

The provision of emergency services and public assistance during or immediately after a disaster in order to save lives, reduce health impacts, ensure public safety and meet the basic subsistence needs of the people affected.

Risk:

The combination of the probability of an event and its negative consequences. A risk is the chance of something happening that will have a negative effect. The level of risk reflects: the likelihood of the unwanted event and the potential consequences of the unwanted event.

Risk identification:

A thorough understanding of existing vulnerabilities, including their location and severity, is critical for the development and prioritization of investment programs and activities for hazard risk management. As the level of vulnerability can increase, or decline, with the aging of existing facilities and with new growth, determining underlying causes make it possible to eliminate or reduce new vulnerabilities as communities, countries and the region as a whole develop. A broad range of activities contributes to the identification and understanding of natural hazard risk: hazard data collection and mapping, vulnerability assessment, risk assessment and post-disaster assessment.

Risk assessment:

A methodology to determine the nature and extent of risk by analyzing potential hazards and evaluating existing conditions of vulnerability that together could potentially harm exposed people, property, services, livelihoods and the environment on which they depend.

R**isk management**:

The systematic approach and practice of managing uncertainty to minimize potential harm and loss.

Risk Reduction:

Risk reduction activities are designed to mitigate damage from hazard events. These activities address existing vulnerability through such measures as retrofit, strengthening and relocation. cations taken to reduce future vulnerability, such as the implementation and enforcement of building standards, environmental protection measures, land use planning that recognizes hazard zones and resource management practices, will provide significant benefits over the long term.

Risk reduction measures should lead to "safer" growth, rather than a further accumulation of vulnerability. However, they should always complement activities to safeguard individuals and resources exposed to existing vulnerabilities. Risk reduction measures can be directed towards physical, social and environmental vulnerability.

Retrofitting:

Reinforcement or upgrading of existing structures to become more resistant and resilient to the damaging effects of hazards.

Repair

Restoring or replacing broken or damaged items, including fixtures, fittings, timber boards, electrical wiring, concrete pathways and soon. Repair work can form part of rehabilitation works. Repairs to structural members such as timber, concrete or steel beams or columns, retaining walls and other should only be done under the supervision of qualified, experienced engineers. Repairs to electrical fittings, specialist plumbing fittings and so on should only be done by qualified trades' personnel.

Sanitation

Measures used to contain and control organic and inorganic waste products including sewage, grey water and stagnant water or runoff. These facilities usually comprise latrines, wash basins, bathing facilities as well as drainage and storage systems such as septic tanks, sewer lines, transpiration beds, waste pipes, guttering, soakage pits, drainage channels and sub-soil drain lines.

School

An institution that is registered with the Ministry of Education to provide education following the rules and regulations of the Ministry of Education

School community

All stakeholders who have an interest in, or whose interests are directly affected by, a school. They include the principal or manager, teachers, students, school board, PTA, parents, guardians, grandparents and ancillary staff.

School infrastructure

All infrastructure belonging to schools (see definition above) such as classrooms, offices, libraries, storages, special workshops, laboratories, dormitories, toilets, recreation areas, accommodation facilities etc.

Stages

Stage areas are generally included as part of the main space served such as drama, physical education, or multi-purpose space. For example, a stage in a drama room would be included in the area of the drama module. Small stages which exist in many elementary gymnasiums, that are too small to be used for physical education, may be included as design space. If a stage is being used for some other purpose for example, storage, the space should be included under function of its current use.

Student or Pupil

A "Student or Pupil " means a person who is a registered student of, and is pursuing a course of study on a full-time basis at an educational institution managed or approved by The Ministry of Education

Sex: The biological categories of male, female, and intersex to which humans belong, based on sex characteristics and chromosomes.

SMOKE ALARM.

A single- or multiple-station alarm responsive to smoke. See “Multiple-station smoke alarm” and “Single-station smoke alarm.”

SMOKE DETECTOR. A *listed* device that senses visible or invisible particles of combustion.

STAIR. A change in elevation, consisting of one or more risers.

STAIRWAY.

One or more *flights* of *stairs*, either exterior or interior, with the necessary landings and platforms connecting them, to form a continuous and uninterrupted passage from one level to another.

Structural measures:

Any physical construction to reduce or avoid possible impacts of hazards, or application of engineering techniques to achieve hazard-resistance and resilience in structures or systems.

Sustainable development:

Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Standard:

A standard is a set of technical definitions, specifications, and guidelines. They function as instructions for designers, planners, managers and builders. A standard speaks about the materials, process, designs, structure, etc. In brief, standards guide how to do something.

Standards are usually created by individual companies, organizations or countries. They are not legalized. A standard develops into a code when it is adopted by a set of government bodies and gets legalized. Some examples of standards include ASTM International standards, and ISO standard.

Voluntary standards are a body of information guidelines, established by a private-sector body and made available to persons or organizations, to use.

Industry standards are a body of information guidelines, norms and a set of criteria within an industry relating to the standard functioning and carrying out of operations in their respective fields of production. In other words, it is the generally accepted requirements followed by the members of an industry.

Mandatory standards – a mandatory standard requires compliance because of a government statute or regulation (discussed below), an organization internal policy or contractual requirement. Failure to comply with a mandatory standard’s guidelines can cause legal repercussions**.**

Difference between a CODE and a STANDARD

Standards and codes refer to the definitions and guidelines that specify or clarify technical procedures and their requirements. The main difference between code and standard is that standard is a *set of technical definitions, specifications, and guidelines* whereas code is a model a set of rules that knowledgeable people recommend for others to follow. It is not a law, but can be adopted into law**.**

Codes are generally accepted sets of rules that tell you what you need to do but it doesn’t explain how it should be done**. Standards** provide the “how to” of executing codes and tends be a more detailed elaboration, the nuts and bolts of meeting a code. **Specifications**, unlike codes or standards, outline the requirements of a specific company or product. **Regulations**, which can incorporate codes and standards, are mandated by a government body and required, by law, to be complied with.

Vulnerability:

The characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard.

Vulnerability assessment.

Vulnerability assessments are systematic examinations of building elements, facilities, population groups or components of the economy to identify features that are susceptible to damage from the effects of natural hazards. Vulnerability is a function of the prevalent hazards and the characteristics and quantity of resources or populations exposed to their effects; it can have social, economic, physical and environmental components.

WATER-RESISTIVE BARRIER.

A material behind an *exterior wall covering* that is intended to resist liquid water that has penetrated behind the exterior covering from further intruding into the *exterior wall* assembly.

ZONE.

A defined area within the protected premises. A zone can define an area from which a signal can be received, an area to which a signal can be sent or an area in which a form of control can be executed.