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SMART II

Technical Standards for Retrofitting – a Guide

The Technical Standards for Retrofitting were prepared by Mr. Tony Gibbs (Barbados), on behalf of the Pan American Health Organization (2016).



1. Preambles

This document provides guidance on reasonable standards for the repair, alteration and strengthening of existing healthcare facilities which are the subject of the SMART-II project. They are not meant to be universally applicable for all retrofitting projects or for healthcare projects outside of the SMART-II project. This document encourages consistency in standards to be applied throughout the SMART-II project.

A large number of healthcare facilities do not comply with current desired standards. Full rehabilitation and upgrading to current standards is often cost-prohibitive. At the same time it is desirable to improve the facilities so that, as a minimum, the protection of life is achieved by compliance with basic safety standards. It is also the aim of the SMART-II project to achieve Category A rating in accordance with the PAHO Hospital Safety Index for those facilities chosen for retrofitting. Compromises and limitations are inevitable in a retrofitting project. Where these occur, they must be clearly articulated in the Design Team's Inception Report and Design Stage I submission.

To accomplish the desired objectives and to facilitate the retrofitting process, this Guide allows options for controlled departure from full compliance with current preferred standards which would be applicable to new construction, while maintaining basic levels for fire prevention and structural life safety features of the retrofitted building.

In addition to basic safety in order to protect life and limb, the current project aims to address:

- the ability of facilities to function when impacted by severe natural hazards;
- the "green" issues of mitigation of climate change and adaptation to climate change.

Because this Guide is not a mandatory and inflexible set of standards the word "should" is often used where "shall" would appear in a formal code or standard. When the word "should" is used every reasonable effort is expected to achieve the stated item. There are cases where "shall" is used. In those cases compromise is deemed to be not an acceptable response.

2. Reference Standards

The controlling reference standards for the SMART-II projects are:

- for Grenada, St Vincent & the Grenadines, St Lucia, Dominica – the 2015 edition of the OECS Building Code
- for Guyana – the National Building Codes published by the Guyana National Bureau of Standards
- principal reference for Guyana – the Caribbean Uniform Building Code (CUBiC)

- for Jamaica – the National Building Code of Jamaica (including the Jamaica Application Document for the International Building Code)
- for Belize – the Belize Building Standards
- for all countries – PAHO SMART Hospitals Toolkit

With respect to electrical wiring and installations, each country may have specific application documents to supplement the requirements in the standards documents listed above. Such country-specific requirements form part of the technical references for this project.

The above listed standards documents along with the following sections of the current Guide provide the technical bases for the SMART-II project.

3. Materials

Existing materials already in use in the facility which conform with requirements in effect at the time of their original use may be retained provided they do not pose a danger to life, safety or health.

New materials should comply with the standards articulated in this Guide.

4. Repairs

In general, a requirement to repair components of a building or structure does not, in itself, lead to the need to strengthen the component. However, the elimination of conditions deemed to be dangerous is required.

A building that has sustained structural damage to the vertical elements of its seismic-force-resisting system shall be specially evaluated. The results of the evaluation shall be the subject of a formal report to PAHO. If the evaluation establishes that the building, if simply repaired to its original state, would not comply with current standards, it should be strengthened to comply with the requirements of the codes referenced in this Guide for the load combinations of gravity, wind and earthquake.

Regardless of the level of damage to vertical elements of the wind-and-earthquake-force-resisting system, if substantial structural damage to gravity load-carrying components was caused primarily by wind or earthquake effects, then the building shall be specially evaluated with a formal report to PAHO.

Regardless of the extent of structural or non-structural damage, dangerous conditions should be eliminated. Regardless of the scope of repair, new structural members and connections used for repair, rehabilitation or strengthening shall comply with the detailed provisions for new buildings of similar structure, purpose and location.

Where the addition or replacement of roof coverings results in additional dead loads, structural components supporting such re-roofing shall comply with the gravity load requirements of the codes referenced in this Guide.



5. Alterations

Alterations should be such that the altered building or structure is no less conforming with the provisions of the referenced codes in this Guide than the existing building or structure was prior to alteration.

Any existing gravity load-bearing structural element for which an alteration causes an increase in gravity load of more than 5% shall be strengthened to carry the increased load in accordance with the requirements for new construction.

Where the alteration results in an irregularity or decreases the capacity for resisting earthquake or wind forces, the structure of the altered building should be shown to comply with the requirements for new construction.

Improvements to the seismic-force-resisting system of an existing structure, including the bracing or anchorage of existing non-structural elements should aim to achieve the following:

- New structural elements are detailed and connected to the existing structural elements in accordance with the requirements for new construction.
- New or relocated non-structural elements are detailed and connected to new or existing structural elements in accordance with the requirements for new construction.
- The alterations do not create a structural irregularity or make an existing irregularity more severe.

6. Additions

All additions to the existing facilities shall comply with the standards for new construction in accordance with the codes referenced in this Guide.

Any existing gravity load-bearing structural element for which an addition causes an increase in gravity load of more than 5% shall be strengthened to carry the increased load in accordance with the requirements for new construction.

The gravity load-bearing capacity of a structural element shall not be reduced unless in its reduced state it complies with the requirements for new construction.

As far as possible additions should be separated structurally from existing structures.

Where the addition is not structurally independent of the existing structure, the existing structure and its addition acting together as a single structure should be shown to meet the requirements for new construction.

7. Accessibility

A building which is required to be occupied during assessment or retrofitting should remain accessible during such operations.

Alterations should not reduce accessibility of a building, portion of a building or facility.



Alterations should aim to achieve the following:

- At least one accessible building entrance
- At least one accessible route from an accessible entrance to the primary function areas
- Appropriate signage
- Accessible parking
- At least one accessible passenger loading zone
- At least one accessible route connecting accessible parking and accessible passenger loading zone to accessible entrance

Where it is technically infeasible to alter existing toilet facilities to be accessible, an accessible or assisted-use toilet should be constructed and located on the same floor as the primary function areas of the existing facilities.

Where steeper slopes of ramps than allowed by the quoted standards in this Guide are necessitated by space limitations, the slopes of ramps in or providing access to existing buildings should be as follows:

- Steeper than 1:10 but not steeper than 1:8 – maximum rise 3 inches (75 mm)
- Steeper than 1:12 but not steeper than 1:10 – maximum rise 6 inches (150 mm)

Alterations should not reduce accessibility of a building, portion of a building or facility.

8. Electrical

Replacement of electrical receptacles shall comply with the requirements for new construction as described in the quoted standards in this Guide.

8.1 Receptacles

For replacement of non-grounding-type receptacles with grounding-type receptacles and if the branch circuits do not have an equipment grounding conductor in the branch circuitry, this condition shall be corrected in accordance with the applicable requirements as described in the quoted standards in this Guide.

Non-hospital-grade receptacles in patient bed locations shall be replaced with hospital grade receptacles in accordance with the applicable requirements as described in the quoted standards in this Guide.

All hospital-grade receptacles shall be Underwriters Laboratories (UL) Listed

8.2 LED Lamps

LED lamps shall comply with the performance standards in this guide. Test reports should be available upon request for the following:

- LM-79 Electrical & Photometric Testing
- LM-80 Lumen Maintenance
- TM-21 Lumen Depreciation Projections



Lamps shall be UL Listed and ballast-independent with no external drivers.

8.3 Photovoltaic Systems

Photovoltaic systems shall comply with the performance standards in this Guide.

Modules:

- UL 1703 listed
- International Electrotechnical Commission (IEC) 61215 standard for monocrystalline and polycrystalline photovoltaic modules.

Inverter:

- UL 1741 Listed

9. Plumbing

The maximum water consumption quantities for all replaced water closets shall be 1.6 gallons (6 litres) per flushing cycle if it is known that the sewerage can accommodate low-flow systems. Otherwise, such minimum-flush toilets could cause blockages.

A minimum storage capacity of 600 litres per bed per day. The PAHO recommendation is 3 days of storage. This can be used from either rain water harvesting and/or potable pipe-borne water.

10. Fire Escapes

New fire escapes for existing buildings should be permitted only where exterior stairs cannot be utilised due to lot lines limiting the stair size or due to the sidewalks, alleys or roads at ground level. New fire escapes should not incorporate ladders or access by windows.

11. Glass Replacement

The installation or replacement of glass shall be as required for new construction.

In high wind locations consideration shall be given to complying with Sections 2410-2415 of the Florida Building Code < <http://codes.iccsafe.org/Florida.html#2014> >. Reference should also be made to Appendix K of the OECS Building Code (2015) for guidance on the suitability of different types of glazing for different areas of facilities.

12. Unreinforced Masonry

With the exception of projects in Guyana, all masonry should be reinforced in order to be safe in earthquakes. Since this is very often not the case with existing buildings, the seismic strengthening of unreinforced masonry may be required in order to reduce the risk of death or injury.

The following construction information should be included in the plans when unreinforced masonry is to be strengthened:



- Dimensioned plans showing existing and proposed walls, the details of framing members, dimensioned openings in walls
- Dimensioned wall elevations, cracks and other damaged portions and condition of mortar joints
- Interior walls and ceilings and framing
- Connection details between walls and floors and roofs
- Information about previous repairs

