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GPSS Global Program for Safer Schools – Dominican Republic

Executive Summary & Recommendations (English)

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Executive Summary

Introduction

The observations made in the country diagnosis report are the result of a field mission to the Dominican Republic (DR) undertaken over the course of six days, between 27 February and 5 March. The report is a revision of a document delivered by Arup consultants Jan-Peter Koppitz and Francisco Pavía. The field mission team also included Rafael Van Der Borght, World Bank team lead, Juan Carlos Atoche, World Bank Disaster Risk Management Specialist and Elena Rocio, World Bank Education Operations Officer.

This document provides an English translation of the executive summary of the GPSS Global Program for Safer School – Dominican Republic Technical Report, Issue 2, 20 October 2017 (in Spanish).

Objectives

The objective of this country diagnosis was to inform the World Bank's technical assistance in supporting the government of the Dominican Republic to develop an investment plan for the country's schools. This process included consultations with key stakeholders, document reviews and field visits to selected schools.

Key stakeholder groups included a wide range of government departments and private consultants involved in the development of school infrastructure. During the field mission, the team adopted the methodology outlined in the Roadmap for Safer Schools[1] to perform a diagnostic assessment of school infrastructure in the country. This encompasses the following steps related to how school infrastructure is planned, designed, constructed and operated:

1. Understanding the school infrastructure baseline;
2. Understanding the construction environment;
3. Understanding the financial environment

Following this, conclusions and recommendations were provided for the Technical Assistance program, which supports improvement programs for all infrastructure.

Background

The Dominican Republic is located in the central Caribbean on the island of Hispaniola, which it shares with Haiti. It has a population of 10.4 million inhabitants, and covers roughly 49,000km^2. Approximately 2.8 million students are currently enrolled in 6,500 public schools in the country. The fact that 70% of students study in only 30% of the schools suggests the need for more schools.

The majority of the country lies in an area of high seismic activity. Additionally, close to 60% of the country is vulnerable to natural hazards such as flooding and

[1] Available at: https://www.gfdrr.org/roadmap-for-safer-schools

landslides caused by tropical storms. In recent years, these risks have intensified due to climate change.

For these reasons, the Dominican government is working with the World Bank to improve school infrastructure. Targeted schools include those at risk of damage or collapse due to natural hazards that may result in unacceptable loses – including loss of life of students and teachers, direct economic losses and financial impact resulting from the interruption of education and community life. The Dominican government has defined its three main goals for school infrastructure improvement: Security + Accessibility + Sustainability. The Dominican government has established a national program – the National Program for School Buildings (PNEE) – that establishes a design template for future school construction. The PNEE integrates new recommendations to the seismic code and current information about seismic risk amongst other improvements in the design of school infrastructure.

To meet anticipated demand, the government has allocated a budget equivalent to 4% of the country's GDP for educational services and infrastructure. As part of this a new agency, the General Directorate for Building Rehabilitation (DIGRE) has been established to oversee the construction of new infrastructure, rehabilitation of existing schools, maintenance of all infrastructure.

According to the Ministry of Education (MINERD), the majority of the country's approximately 6,500 public schools currently have two or three student rotations or extended school days, and are still unable to meet student demand. This high demand drives the government's push for new schools, in order to offer students a complete school day. This provides an opportunity for implementing maintenance programs and improving the level of security of the school infrastructure. Currently, informal private schools cover a decreasing number of students, and demand for public schools is growing.

Key Findings

The government has recognised the vulnerability of existing buildings and delegated to DIGRE the responsibility of rehabilitating schools. An initial study in San Cristobal, a representative region of the country, identified that approximately half of all schools need improvements, while 16% were found to be at high levels of vulnerability. The DIGRE also plans to define new procurement contract terms for maintenance at the regional level.

The diagnosis corroborated these findings which suggest that the majority of school infrastructure is vulnerable due to poor design, construction type and/or state of maintenance. Typically, schools are constructed using reinforced concrete frames with concrete block masonry infill walls. The design of roofs, selection of materials and the connections between structure and façade walls can prove inadequate in resisting strong winds. The selection of the site, drainage and other civil works at times are insufficient to reduce the risk of flooding. Seismic events, although less frequent, present the greatest potential for damage to schools, including general interruptions to education and loss of life.

Best practices for seismic design, such as vertical regularity and the accommodation of structural movement joints between adjacent elements are

included in the PNEE, but other best design principles such as the elimination of short columns, reduction of non-structural weight and plan regularity still have not been included in the program.

The current program has yet to establish specific requirements for construction monitoring to ensure adequate construction quality and full implementation of best-practice seismic design. Additionally, without the participation of the private sector, there is currently no third party review nor international benchmarking of best practices. There are a large number of involved stakeholders in the sector of school infrastructure (see Figure 1). The new DIGRE directive will attempt to give clarity to this array of roles and responsibilities, because it is positioned to address a lack of clarity and coordination.

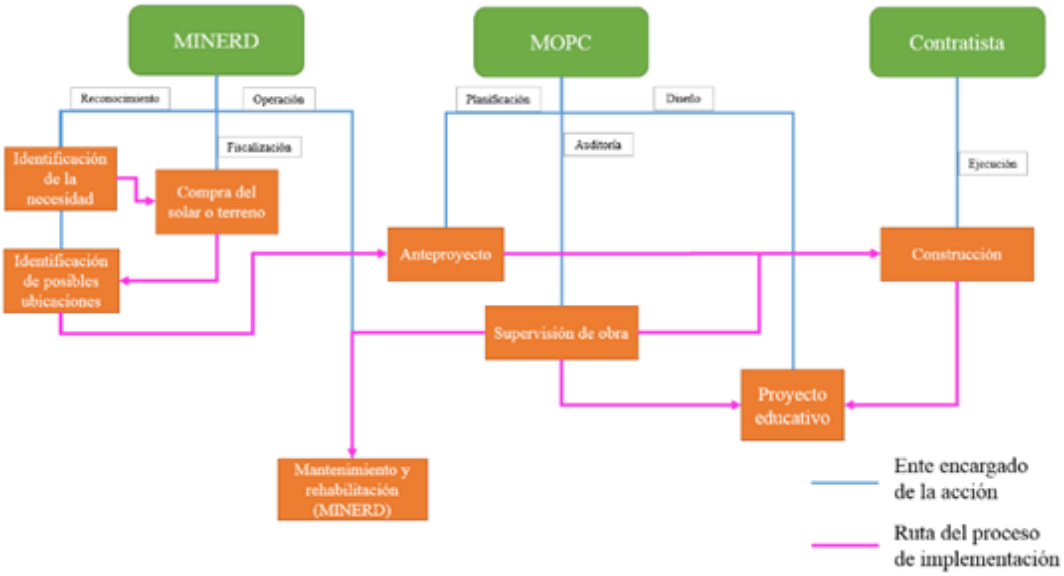

Figure 1. Roles and responsibilities in the implementation of school infrastructure

Current construction codes are based on codes used in the United States, and are generally robust and updated regularly. However, the correct use of these codes is not guaranteed during design and construction, and surveys indicate that some schools do not follow the code, probably due to insufficient quality control and due to a lack of third party review.

MINERD recognises the importance of insuring infrastructure in the medium-term, and since there is not currently an insurance system for school buildings, alternative viable solutions may entail private sector providers or public solutions such as special funds or bonds.

Recommendations and Next Steps

Photograph 1. Primary School *Profesoras Hermanas Bucarelly*, founded in 2015, is one of the new schools built after national investment levels increased after 2013.

Recently, education represents one of the greatest challenges to the Dominican Republic's social and economic development. As mentioned, the current plan (PNEE) predicts a pre-university education budget of 4% of GDP. Although in 2012 there was no investment in construction, growth or rehabilitation of school facilities, after 2013 this trend changed and investment increased. One of the new schools built is shown in Photograph 1.

The following recommendations (Figure 2) will help realise the objectives described by the Dominican government. These are listed in order of priority and refer to the steps described in the Roadmap for Safer Schools, where more detailed guidance and case studies from other countries can also be found.

GPSS Step	Item	Priority
Step 1	Review the National Program of School Buildings (PNEE)	Medium term
Step 1	Review Existing School Infrastructure Database	Short term
Step 1.2	Compile Detailed Information for School Infrastructure	Short term
Step 1.2	Consolidate School Infrastructure Database	Short term
Step 3.3	Insurance for School Infrastructure	Short / Medium term
Step 4	Carry out a Risk Analysis for Prioritising Interventions	Medium term
Step 5.1	Create Guidelines for Rehabilitation	Medium / Long term
Step 5.1	Rebuild High-Risk Buildings	Medium term
Step 5.2	Long Term School Infrastructure Plan	Medium term
Step 5.2	General Review of PNEE	Medium term
Step 5.2	Prepare Site Selection Guide	Medium term
Step 5.2	Review Model School Designs	Medium term
Step 5.2	Improve Quality Assurance Processes	Medium term
Step 5.2	Focus on Maintenance	Long term

Figure 2. Key recommendations

GPSS Step 1 – Review the National Program of School Buildings (PNEE)

Review the PNEE and include seismic design best-practices, including elimination of short columns, reduction of non-structural weight and plan regularity, which are not currently included in the program. Additionally, the process of implementation should be revised to define clear responsibilities and ensure a transparent design process, delivery of permits and construction monitoring.

This review will form the basis for recommendations GPSS Step 5.2 General Review of PNEE, described below.

GPSS Step 1 – Review Existing School Infrastructure Database

The official MOPC database is not the most complete and is not utilized by other government entities. Before continuing to develop and use the database, it should be reviewed and updated (refer to Step 1.2 recommendations below).

The roles and responsibilities for data management should be defined and agreed upon by all ministries involved in order to carry out the plans and directives described in this report.

GPSS Step 1.2 – Compile Data for Existing Infrastructure

Compiling this database will require collecting information through school surveys to capture data specific to each building. Data should describe non-structural elements (e.g. partitions, facades), architectural elements (e.g. canopies) and services. These surveys will inform the risk management plan and help prioritise the schools and investment interventions, as a decision-making tool for planning and analysing risk, and by incorporating threats from natural hazards into decisions regarding site selection and structural typology.

GPSS Step 1.2 – Consolidate an Inventory of Schools and Other Related Buildings

There are different databases related to different aspects of the educational infrastructure, including the ones from the MOPC, the MINERD's Department of Planning, and the National Office of Seismic Evaluation and Infrastructural Vulnerability (ONESVIE). In general, the attribute fields for each database describe different characteristic of school infrastructure, such as facility location, number of students, number of classrooms, etc. However, there is currently a lack of technical information related to relevant aspects for vulnerability evaluation, such as structural typology or natural hazard risks and local environmental context.

GPSS Step 3.3 – Insurance for School Infrastructure

Currently, there is no financial security scheme for existing schools or schools under construction. It is recommended that alternatives involving the private insurance sector be explored, or if this is too costly or difficult to implement, establishing contingency funds in the MINERD budget, which can be activated easily in the event of a natural disaster. In countries such as the United Kingdom, for instance, both mechanisms are utilized. An evaluation of current thinking and best practices used by the countries in the Caribbean and Latin American region should inform authorities about the best way of implementing such a program in the Dominican Republic.

GPSS Step 4 – Carry out a Risk Analysis for Prioritising Intervention

A risk analysis can be carried out using the existing database and the consolidated database, when ready. The efforts of this analysis will help identify major risks associated with school infrastructure and, ultimately, will help prioritise schools using available resources. This will allow the identification of schools in the highest level of risk and help determine which locations present the highest number of potential victims in the event of a disaster. The ultimate goal is to

identify which primary schools need to be addressed and how limited budget allocations can be made. A cost-benefit analysis of different rehabilitation and retrofitting options should be included as part of this analysis, which would inform which structures could be demolished and rebuilt. The analysis provides an evidence-based program to reduce major risks for program investments.

GPSS Step 5.1 – Create New Guidelines for Retrofitting and Rehabilitation

Because existing typologies do not vary much throughout the country, it is possible to develop generalised rehabilitation and retrofitting manuals. It is recommended that the Ministry of Education collaborate with international and local private sector partners to combine experience in school design with an understanding of local context. This focus will guarantee a high level of quality and adherence to international best practices nationwide. These guidelines should be applied by local engineering specialists and can encourage rapid local deployment.

The guideline document can also be shared with the private sector to inform work on non-public schools.

GPSS Step 5.1 – Reconstruction of High Risk Schools

Once risk from natural hazards have been detected, schools deemed to be at high risk should be rebuilt or relocated, with planning efforts initiated immediately and action realized as soon as possible (where possible, within one year). For example, Elementary School Las Mercedes was relocated once cracks in the structure were identified.

GPSS Step 5.2 – Long Term School Infrastructure Plan

A robust and consolidated plan based on the three goals of Security + Accessibility + Sustainability should be defined for all pre-university facilities, including Infant Integral Care Centres (CAIPI). The private sector may be enlisted, and the possibility of public-private partnerships can be explored for design, construction, operation, maintenance and finance roles. A high level of knowledge is necessary for this form of project administration, and a control system within MINERD should be established, as well as a transparent decision making process. Expanding the role of private sector firms may reduce MINERD's administrative role, which will allow it to focus on the quality of education.

At the same time, the MOPC will be able to concentrate on technical aspects and construction that improves the structural quality of future schools. This role will require an expansion of MOPC's technical capacity in building construction, and necessitate additional training and capacity building.

GPSS Step 5.2 - General Review of PNEE

The design process for schools should be reviewed thoroughly to ensure current norms and international best practice are incorporated into each phase of design and construction. This entails not only incorporating new thinking about seismic code, but also defining an implementation plan and quality control measures to ensure that final design realisation conforms to initial design intent.

It is also important that an update of PNEE guidelines is accompanied by robust strategies addressing implementation of new, local industry regulations.

This general revision, defining regulations and procedures, will establish an operating framework for detailed recommendations described later.

GPSS Step 5.2 – Review Model School Designs

After a more detailed review, it is possible to strengthen the process further, ensuring that design specifications are developed further for education infrastructure that consider potential threats posed by natural disasters. MOPC can develop feasibility studies and concept designs for schools, and can work with the private sector to take designs to a greater level of detail. Because MOPC deals with a large number of schools, it is improbable that all schools will be exactly the same. However, in all cases, technical parameters and technical supervision should be incorporated into all project phases.

Specifically, the safety of school infrastructure should be addressed in the design and construction phase, considered under the code to be essential to society and, in addition to guaranteeing the safety of students and teachers, should not suffer structural damage, or other damage that makes them inoperable in the case of extreme events.

It is also recommended that the PNEE incorporates flexibility to different architectural designs that may vary – for instance, in rural areas or areas of low density, where buildings may occupy a single floor, and use lightweight materials for walls and roofing.

Special attention should be paid to the design and detailing of non-structural elements (facades and partitions), which are often built with heavy, fragile materials such as brick or concrete. It is important to minimise the risk to school occupants by defining a special quality control process for these important elements.

Finally, the interaction between non-structural walls and seismic-resistant elements is key to the overall structural performance. The manner of fixing expansion joints between these walls and concrete frames should be better defined.

GPSS Step 5.2 – Develop a Site Selection Guide

With the new emphasis on land acquisition, it is important to ensure that new schools not be constructed in areas prone to natural hazards such as landslides, flooding, and torrential storms. For this, MINERD can lead site planning efforts that evaluate land acquisition for low-risk sites, based on previous hazard and risk studies, or on databases that already contain this information.

GPSS Step 5.2 – Improve Quality Assurance Processes

Clarify that responsibilities that currently fall to both MINERD and MOPC, and which are not clearly defined in practice, should be assumed by DIGRE. It is recommended that the monitoring during concept development, design and construction be done by independent consultants, without conflicts of interest,

ensuring that the design concept and criteria are not determined exclusively by MOPC. This will allow private sector knowledge, innovation and international best practices to be incorporated into the design process. It is recommended that responsibilities for implementation be separated from responsibilities for approval, with approval responsibilities transferred to a new independent government agency focused on school infrastructure.

GPSS Step 5.2 – Maintenance and Rehabilitation

The main improvement that the PNEE can make before 2020 is to include a rehabilitation and maintenance plan focusing on minor improvements to existing schools, and ensuring ongoing maintenance for new and existing schools. The plans and resulting database can be part of the new directive. These maintenance plans can help alleviate many of the non-structural risk elements for existing buildings. Maintenance costs are included in the PNEE's anticipated budget provision of 4% of GDP.