June 7, 2021

PRESIDENT RODRIGO ROA DUTERTE
Malacañang
Manila

THROUGH: **EXECUTIVE SECRETARY SALVADOR C. MEDIALDEA**

SECRETARY WENDEL E. AVISADO
Department of Budget and Management

SUBJECT: **PROPOSED CONSTRUCTION OF HIGH-RISE SCHOOL BUILDINGS: A SOLUTION TO THE PROBLEM OF CLASSROOM SHORTAGE IN MEGA CITIES**

Dear **Mr. President:**

May we respectfully endorse the following Aide Memoire from the Office of the Undersecretary for Administration on the Construction of High-Rise School Buildings.

In brief, the proposed project aims to solve the perennial problem of classroom shortage in highly urbanized areas – a fitting country project that will form part of the administration's legacy program.

We are requesting that the amount of six billion pesos (P6,000,000,000) for the establishment of at least ten (10) high rise school buildings be included in the 2022 DepEd budget to commence this legacy program.

For the President's review, consideration, and approval.

Thank you very much.

Very truly yours,

LEONOR MAGTOLIS BRIONES
Secretary

Copy furnished:

Senate President Vicente C. Sotto III
Speaker Lord Allan Jay Q. Velasco

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Republika ng Pilipinas
Kagawaran ng Edukasyon
Tanggapan ng Pangalawang Kalihim

AIDE MEMOIRE
26 May 2021

CONSTRUCTION OF HIGH-RISE SCHOOL BUILDINGS: A SOLUTION TO THE PROBLEM OF CLASSROOM SHORTAGE IN MEGA CITIES

12 storey, 60 classrooms

Office of the Undersecretary for Administration (OUA)
[Administrative Service (AS), Information and Communications Technology Service (ICTS), Disaster Risk Reduction and Management Service (DRRMS), Bureau of Learner Support Services (BLSS), Baguio Teachers Camp (BTC), Central Security & Safety Office (CSSO)]

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I. RATIONALE

The Department of Education (DepEd) has analyzed the classroom requirements based on the latest classroom inventory and enrollment data of schools along with the standard parameters for the computation of requirements by the DepEd Planning Service. **To date, a total of 123,994 classrooms are still needed to be constructed in all public elementary and secondary schools with remaining classroom requirements.** As shown in the table below, Region IV-A (CALABARZON), National Capital Region (NCR), Region III (Central Luzon), and Region VII (Central Visayas) are the top regions with the highest classroom shortages.

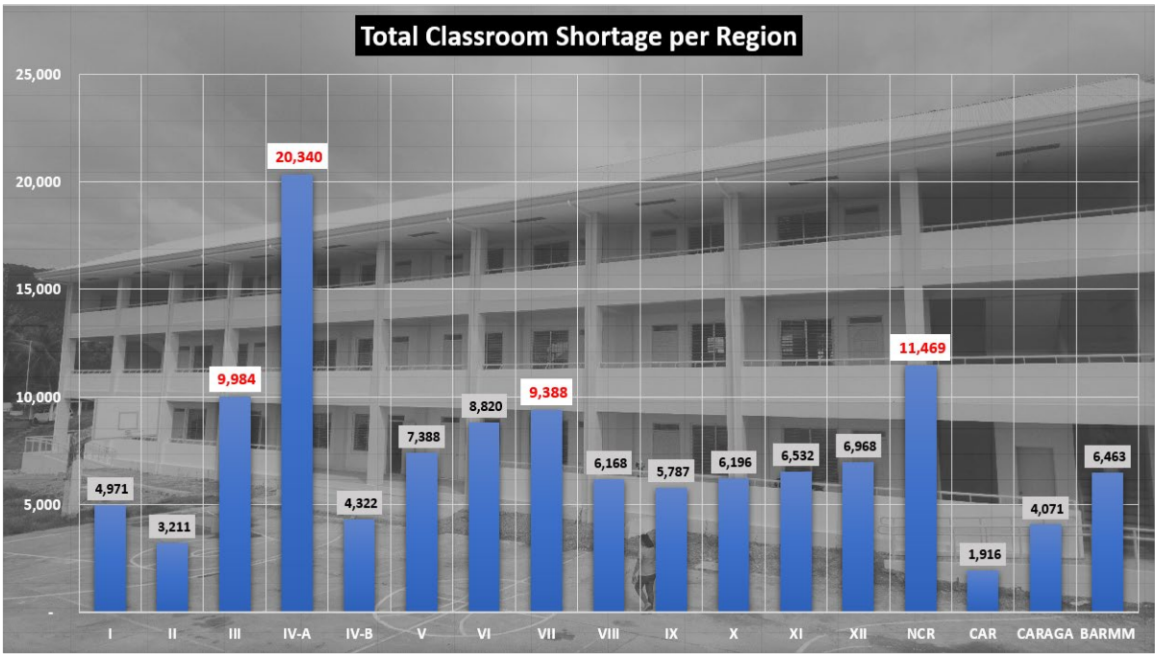

Figure 1. Instructional Rooms, Enrollment, and Shortage per Region

REGION	TOTAL INVENTORY OF INSTRUCTIONAL ROOMS	TOTAL ENROLLMENT (S.Y. 2020-2021)	TOTAL SHORTAGE
IV-A	73,707	3,001,046	20,340
NCR	47,544	2,033,357	11,469
III	76,071	2,398,697	9,984
VII	57,306	1,756,315	9,388
VI	67,752	1,851,269	8,820
V	54,224	1,524,579	7,388
XII	32,589	1,126,342	6,968
XI	34,946	1,139,798	6,532
BARMM	18,346	755,105	6,463
X	35,336	1,134,113	6,196
VIII	49,503	1,188,432	6,168
IX	31,686	949,974	5,787
I	46,742	1,141,711	4,971
IV-B	29,280	812,891	4,322
CARAGA	25,159	718,020	4,071
II	33,188	819,237	3,211
CAR	17,010	356,535	1,916
Grand Total	730,389	22,707,421	123,994

Table 1. Instructional Rooms, Enrollment, and Shortage per Region

The top regions mentioned above have the most cities or municipalities that are classified as highly urbanized. These areas have large populations mainly due to being sites of business centers in the country where employment or business opportunities are high, and therefore where many people choose to reside. This is the reason why the school-age population is also high in these areas, resulting in high enrollment rates in schools within their scope.

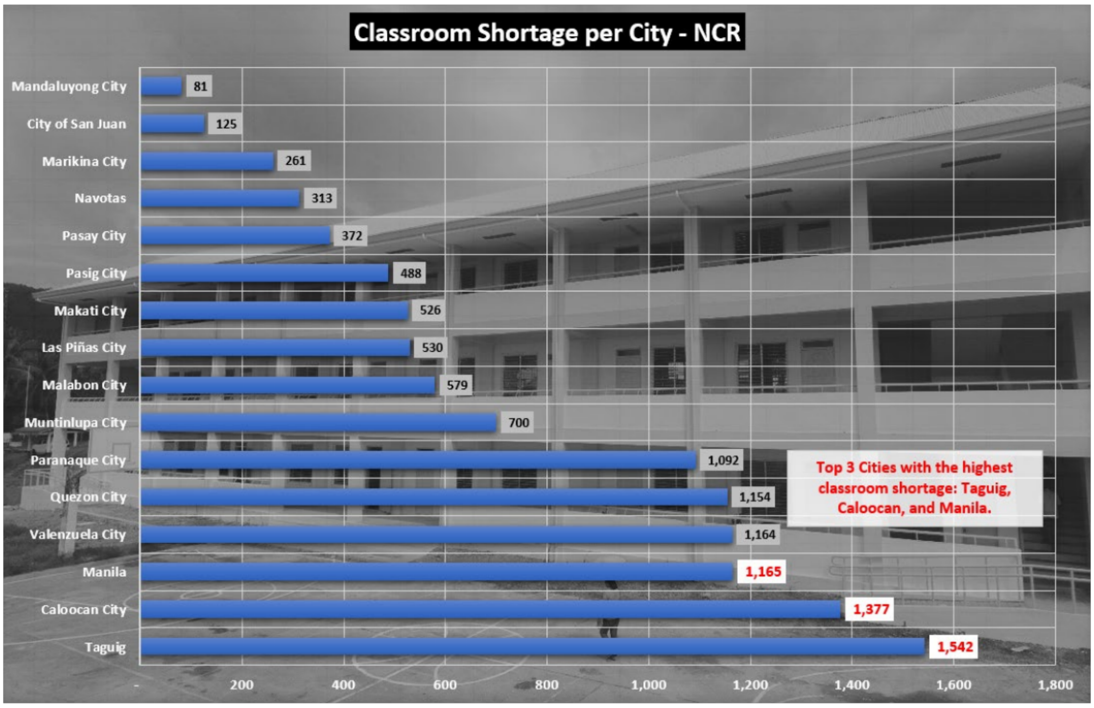

Figure 2. Classroom shortage per City in NCR

The graph above and table below show the distribution of the classroom shortage in NCR and Region IV-A. As shown in the tables, Taguig and Rizal have the highest number of classroom shortage in NCR and Region IV-A respectively.

National Capital Region			
DIVISION	**TOTAL INVENTORY OF INSTRUCTIONAL ROOMS**	**TOTAL ENROLLMENT (S.Y. 2020-2021)**	**TOTAL SHORTAGE**
Taguig	2,240	144,089	1,542
Caloocan City	5,844	268,763	1,377
Manila	6,695	255,673	1,165
Valenzuela City	2,125	120,545	1,164
Quezon City	11,282	409,049	1,154
Paranaque City	1,849	104,162	1,092
Muntinlupa City	1,448	80,391	700
Malabon City	1,478	74,068	579
Las Piñas City	2,121	99,767	530
Makati City	1,619	77,582	526
Pasig City	3,618	136,969	488
Pasay City	1,737	62,369	372
Navotas	1,227	49,863	313
Marikina City	2,147	81,433	261
City of San Juan	342	12,256	125
Mandaluyong City	1,772	56,378	81
Total	47,544	2,033,357	11,469

Table 2. Classroom shortage per City in Region IV-A

Table 3. Classroom shortage per City in Region IV-A

Region IV-A			
DIVISION	TOTAL INVENTORY OF INSTRUCTIONAL ROOMS	TOTAL ENROLLMENT (S.Y. 2020-2021)	TOTAL SHORTAGE
Rizal	8,093	434,487	3,654
Cavite	7,755	364,362	3,010
Batangas	11,531	399,383	2,599
Antipolo City	2,276	165,728	2,047
Quezon	14,117	421,722	1,750
Laguna	7,397	267,426	1,358
Dasmarinas City	1,970	115,581	1,210
Calamba City	2,021	100,318	770
General Trias City	1,162	69,253	587
Imus City	1,530	80,486	587
Bacoor City	2,068	89,294	469
Sta. Rosa City	1,150	57,495	436
Binan City	1,520	58,759	306
Lipa City	2,468	71,409	292
San Pablo City	1,559	57,629	288
Cabuyao City	1,262	57,269	260
Lucena City	1,286	52,974	224
Batangas City	2,104	59,357	180
Tayabas City	706	21,301	131
Tanauan City	1,142	39,102	104
Cavite City	590	17,711	78
Total	73,707	3,001,046	20,340

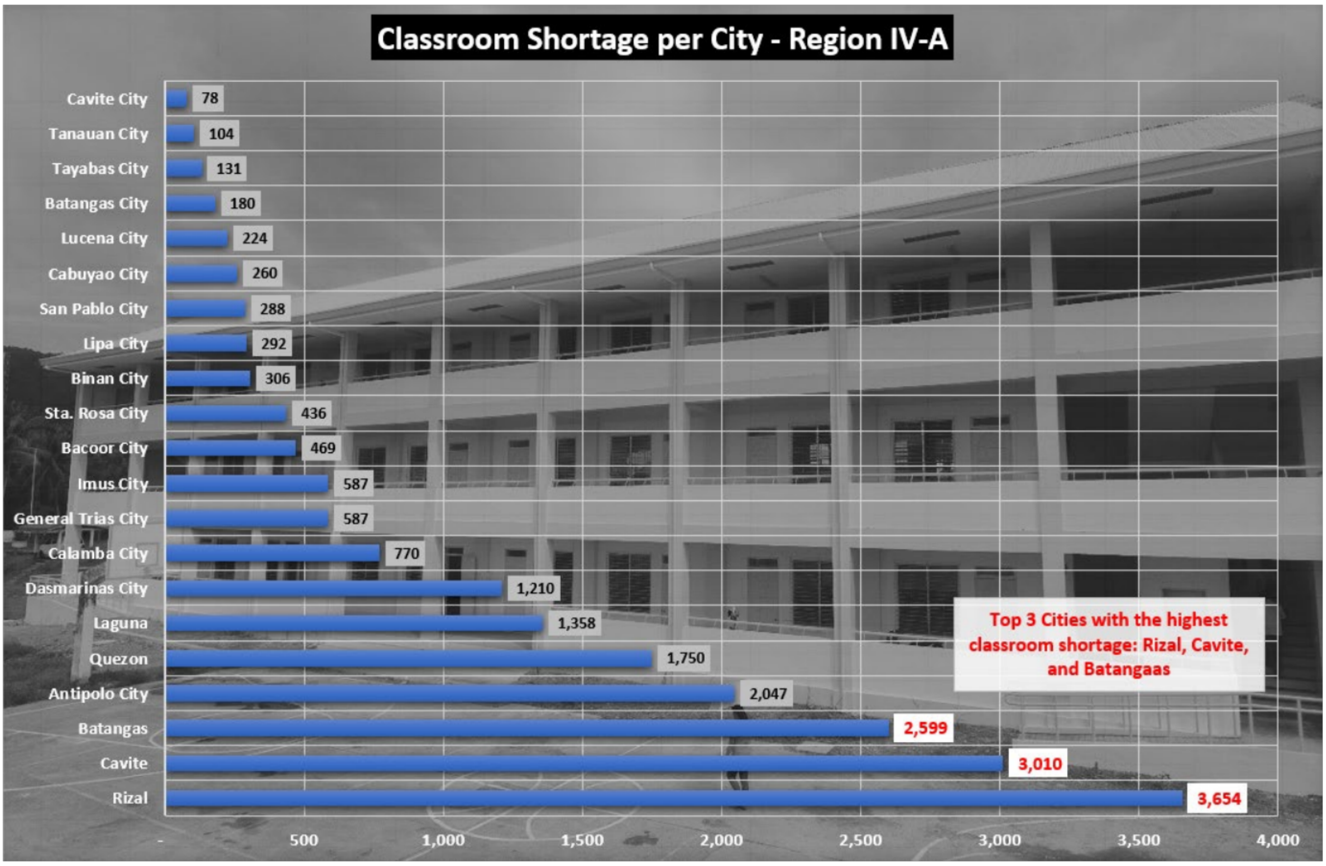

Figure 4. Classroom shortage per City in Region IV-A

Recently, neighboring regions of the National Capital Region (NCR) were made into relocation areas. Displaced families from places where infrastructure developments are ongoing were moved to identified relocation areas in Regions III and IV-A, contributing to an increase in the school-age population in the said regions.

Schools from these areas have become congested as their existing facilities are no longer sufficient to cover the increasing requirements of the growing population of learners. Another challenge is that even if the national government has been prioritizing the construction of school buildings in its annual budget**, the limited or lack of buildable space in schools located in these highly urbanized areas has not allowed the programming and construction of school building projects**.

II. SITE ACQUISITION ISSUES

In the effort to address the classroom shortage in the National Capital Region, Regions III, IV-A, and VII, the Department has been acquiring additional school sites in these regions for the past five years.

From 2016 to 2020, a total of only 15 new school sites were acquired through the Department's Site Acquisition Funds. However, while there are still funds for the purpose, albeit totally insufficient, DepEd is finding it difficult to look for sites that can be acquired. This is mainly due to the following:

1. no more available sites;
2. cost of sites in urban areas is too high and the site acquisition budget provided is not enough; and
3. if there are available sites, land owners are unwilling to sell their property to DepEd because of the lower commercial value.

At this juncture, it is worthy to mention **that the annual appropriation** of P65,000,000 (from 2017 to 2021, saved from 2016 and 2019 where increases were provided**) for Improvement and Acquisition of School Sites is meager and wanting—not even enough to cover the Titling of school sites.** It seems that in the distribution of tasks and mandates, land acquisition falls under Local Government Units, and through donations of private groups and/or individuals,

Acquisition of School Sites from 2016 to 2021	
GAA 2016	76,120,000 PHP
GAA 2017	65,000,000 PHP
GAA 2018	65,000,000 PHP
GAA 2019	150,000,000 PHP
GAA 2020	65,000,000 PHP
GAA 2021	65,000,000 PHP

Table 4 Annual Appropriation of DepEd for School Siter Acquisition

practically leaving DepEd with no say on the locations, nor the freedom to exercise prudence in choosing hazard-free areas.

III. ADDRESSING THE CLASSROOM REQUIREMENTS

In order to determine the direction and proper action in addressing the classroom issues in these specific regions, a series of consultations were conducted with Regional Directors, school leaders, and other counterparts within the Department. Two ideas were presented:

A. <u>Transporting Learners to other nearby schools or to schools to be constructed in neighboring towns/cities with large buildable spaces</u>

This concept is about balancing the volume of learners that a school caters to. If a certain school has a large volume of learners that it can no longer accommodate, **other learners can be referred to other nearby schools that are open and can still accept and cater to additional learners**.

New school buildings may be constructed in neighboring cities or towns that have schools with large buildable areas. Learners will be bused in from their residence to these schools.

However, this will require the full support and assistance of local government units (LGUs). Parents have to be informed about the proposal and assured that their children will be safe while being transported to and from the assigned nearby school. Assistance from LGUs will be sought for the provision of transportation for the learners.

B. <u>Construction of High-Rise School Buildings</u>

The first idea presented may be considered an option for the different regions, depending upon the approval of their various stakeholders. However, it is not the most practical solution to address the problem of classroom shortage. Thus, **the concept of constructing high-rise school buildings was formed. Given the limited sites available for schools to acquire and build on, this concept is the most acceptable solution, provided that sufficient budget is available for the purpose.** Likewise, assistance from the LGUs shall be sought for the maintenance of the structure once it is completed.

IV. CONCEPT OF HIGH-RISE SCHOOL BUILDING DESIGNS

The proposed medium to high-rise school building design is **intended to be constructed in highly urbanized areas where there is dense population but limited land areas for development.**

The proposal will have varied designs ranging from at **least 5 floors to as high as 12 floors, or even higher**. The number of floors will depend on the required classroom needs of the school, the available building space, the type of soil, and the **projected enrollment population for the next 15 to 25 years**.

5 storey, 25 classrooms

The new school building design takes into account the effects of climate change and global warming as it introduces **green and sustainable tropical design principles** to mitigate the negative effects to our environment. Passive cooling, site adaptation, and building layout to comply with the ideal **"East-West" orientation** will be given utmost importance to avoid dependence on artificial means of ventilating the building.

Compliant with National Building Code requirements and other laws pertaining to structural stability, fire safety, vertical conveyance, and utility requirements, the new school building design is meant to address school requirements for both academic and non-academic facilities.

Below are some salient design features for the high-rise school buildings:

12 storey, 32 classrooms, 8 workshops

A. Green Sustainable Design

1. Passive Cooling approach – window openings shall be oriented to North and South, to reduce heat penetrating the building interiors.
2. Maximized Daylighting and Natural Ventilation – natural light and wind will be allowed to enter the corridors on each floor. High windows will be installed along the walls fronting corridors to allow cross air ventilation as well as natural lighting in the corridor area.
3. Water Efficiency
    a. Use of Water Efficient Sanitary Fixtures – through water-saving toilet fixtures
    b. Rainwater Harvesting System – rainwater from roofs will be collected and re-used as gray water for toilet flushing, cleaning, and maintenance purposes
4. Energy Efficiency

a. Use of Energy Efficient Lighting Fixtures (LED) – to reduce power consumption but still achieve required room illumination levels

b. Use of Renewable Energy/Photovoltaic cells (Solar Panels) – maximize the use of solar panels at roofs

5. Use of locally available building materials – commercially available construction materials to be used

6. Flood Mitigation

    a. Elevated Ground Floor – to avoid flood waters from entering the ground floor level in flood-prone areas.

B. Building Design

The high-rise school building design will promote Heritage Architecture by incorporating the architectural features of Gabaldon School Buildings of collonaded and arched entrance porticos.

Perspective: Colonnaded Portico (inspired by Gabaldon School Buildings)

C. Accessibility for the Handicapped

The design will be compliant with B.P. 344 or the Act to Enhance the Mobility of Disabled Persons by the provision of ramps, PWD toilets, elevators with Braille Elevator Signage System for the blind and visually impaired. Tactile Guide Pathways as floors tiles shall also be introduced.

D. Safety

All balconies shall have vertical metal tubular elements as a safety feature to avoid students from falling or jumping from the ledges.

E. Typhoon Resiliency

Roll-up Shutters shall be provided at all corridor and balcony openings to serve as storm guard during super typhoons. Roof framing of the covered deck shall apply tested and proven installation details to ensure that roofing sheets are not detached or blown away from its roof framing at the height of super typhoons.

Perspective: Corridors

F. Ancillary Systems

The buildings shall have a central clock and bell system, central public address/intercom system, CCTV system and Wi-Fi system.

G. Vertical Conveyance System

The buildings shall have an efficient elevator system with “persons per lift” (ppl) capacities ranging from 15, 17, 20, 24 ppl at various speeds ranging from 60, 90, 105, 120, 150 meters per minute, depending on the specific building height and the number of students/faculty/admin personnel to transport during peak hours of the day.

H. Structural System

The design shall be compliant with the latest/amended structural code with respect to earthquake, typhoon, and other disaster mitigation.

General Structural Design Features

1. Value Engineered Structure

2. Earthquake Resistant Structure Design (Resisting Magnitude 8.0;

Intensity 9 Earthquake)

2.1 Special Moment Frame Joints using Ultra-High-Performance Concrete (UHPC);
2.2 Lightweight Aggregates / High Strength Post-Tensioned Floor System;
2.3 Shear Wall using Ultra-High-Performance Concrete (UHPC);
2.4 Earthquake Resistant Foundation

3. Windproof Engineering Design
   3.1 Wind Load Velocity = 310 KPH;
   3.2 High-Performance Roof System Design

I. Air Conditioning and Ventilation Systems

1. Air conditioning system will use variable refrigerant volume (VRV) that can provide good indoor temperature control and at the same time provide an efficient cooling system.

2. To save on energy, heat recovery ventilation shall be used to reduce the cooling load requirement of fresh air.

Perspective: Elevator Lobby

J. Fire Protection Systems

1. The design of the sprinkler piping shall be through hydraulic calculation that will result to an efficient piping system that can deliver the required sprinkler water flow with optimum size of pipes.

2. Fire Exits Stairs are equipped with stair pressurization system in compliance to the National Fire Code of the Philippines.

K. Electrical System

Complete analysis and design of all electrical components of the building, to make sure that these are in accordance with the latest practice and application of electrical engineering and following the Philippine Electrical Code (PEC), NATIONAL ELECTRICAL CODE (NEC), and Building Standards, including but not limited to:

1. Electrical Services
    a. High voltage/Low voltage transformation
    b. Power Installation
    c. Standby power supply, including generator
    d. Back of the house lighting system
    e. Power supply for specialist lighting areas

2. Low Voltage and Ancillary Services
    a. Cable trunking system for telephone and data
    b. Cable trunking system for fire alarm system, including CCTV surveillance,
    c. Clock distribution system

3. Coordination with utility providers for inputs to design and finalize connection of electrical system

Perspective: Covered Multi-Purpose Area (Top Floor)

L. Plumbing System

Complete analysis and design of all electrical components of the building, to make sure that these are in accordance with the latest practice and application of the INTERNATIONAL PLUMBING CODE, UNIFORM PLUMBING CODE, NATIONAL BUILDING CODE, and the AMERICAN SOCIETY OF PLUMBING ENGINEERS (ASPE), including but not limited to:

1. Water supply shall be from city water district distribution water line; cistern storage capacity shall be good for one (1) day.
2. Elevated water tank shall be provided at roof deck. Transfer pumps shall be used to deliver water from the cistern to the elevated water tank.
3. Water for each unit shall be tapped from water downfeed pipes connected to the elevated water tank. Top 2 floors shall utilize hydro-pneumatic pumping system to provide constant water pressure.
4. Pressure-reducing valve shall be strategically located to avoid excessive pressure on plumbing fixtures.
5. Pipe insulation shall be provided for all exposed pipes.
6. Grease trap and water filter shall be provided where necessary.
7. Sewer shall be collected through several soil stacks, discharged to the Septic tank, and then discharged to the local main sewer drainage line.
8. All fixtures shall be vented with proper vent stack thru roof (VSTR).
9. Sewer and vent pipe sizing shall be designed using fixture unit (FU) method.
10. Roof drain and deck drain shall pass through several downspouts and discharged to the central collector tanks for reuse.
11. Downspout/Drainage pipe sizing shall be designed using 8 in/hr rainfall intensity.
12. Condensate drain from A/C unit shall be tapped to separate downspouts.
13. Trenches shall be provided at ramps to collect storm water.
14. All pumps shall be connected to emergency power.
15. All exposed plumbing pipes shall be painted in accordance with universal standard color coding.

V. GENERAL CONSTRUCTION METHODOLOGY OF HIGH-RISE SCHOOL BUILDINGS

The advantage of having a small building footprint for the new high-rise school building is that **during implementation, only a few existing buildings will be affected depending on where it will be located within the school campus.**

Demolishing fewer existing buildings to give way to new construction will be advantageous to the school as classes will not be disrupted and may still be held in the remaining school buildings unaffected by the construction. There will be less dislocation of students and faculty, and to compensate for the affected buildings, the school may choose to do limited double shifts of classes until the new high-rise building is completed and turned over to the school.

VI. PRIORITY CITIES AND TOWNS

Below are the Top 10 target areas with classroom shortage for High-Rise School Buildings. The Top 9 cities have more that 1,000 classroom shortage except Rodriguez, Rizal with 898.

CITY/TOWN	CLASSROOM SHORTAGE
1. Antipolo City	2,047
2. Davao City	1,826
3. Taguig City	1,488
4. Caloocan City	1,377
5. Zamboanga City	1,351
6. Dasmariñas City	1,210
7. Valenzuela City	1,164
8. Quezon City	1,154
9. Parañaque City	1,092
10. Rodriguez, Rizal	898

Table 5 Top 10 Cities/Towns having the highest number of classroom shortage

VII. ESTIMATED BUDGET

Assuming that each priority city and town will be constructing one 12-story 60-classroom building, **the estimated construction cost of one high-rise is P600,000,000.00** or a total required budget allocation **of P6 billion for the 10 cities and towns** *(Please see Enclosure*).

Under the proposed project, the national government may construct one high rise building, while the target LGU will also construct another high-rise building of the same design. Additionally, **it is expected that the LGU will shoulder the maintenance of the high-rise building.**

Other LGUs with resources/funds for the construction of high-rise school buildings are encouraged and enjoined to do so in order to solve their classroom shortage even if they fall below the 1,000 level.

VIII. RECOMMENDATIONS

The project is proposed to be implemented **under the Multi-Year Contractual Authority (MYCA)** since construction of this type of high-rise school building will definitely take more than a year to complete.

It is strongly suggested that this project **immediately commence in 2022 as part of the Legacy Program of President Rodrigo Roa Duterte by appropriating at least 6 billion pesos** to implement the project.

All **LGUs willing to partner with the national government and all other basic education stakeholders are welcome and encouraged to join** this noble endeavor.

It is also suggested that **an appropriate Public-Private Partnership (PPP) for School Infrastructure Project (PSIP) be designed for high-rise school buildings to enable the private sector to participate** in solving the perennial problem of classroom shortage, provided the same designs shall be adopted and implemented.

Amid shifting demographics and the changing needs of the times, it is with urgency and great optimism and that this proposal for the construction of high-rise school buildings is presented.

With singleness of purpose we can hopefully, as one nation, timely address and overcome the recurring shortage of classrooms — leaving a legacy to our Filipino learners and advance Basic Education in the country.

For the consideration and approval of the Secretary.

KAGAWARAN NG EDUKASYON

ALAIN DEL B. PASCUA
Undersecretary

Enclosures:

1) Standard Floor Plans
- *5 storey, 19 classrooms, 3 workshops*
- *12 storey, 42 classrooms, 9 workshops*
- *5 storey, 25 classrooms*
- *12 storey, 60 classrooms*

2) Cost Plan
- *Small Footprint All Classrooms*
- *Big Footprint All Classrooms*
- *Small Footprint Classrooms with Workshops*
- *Big Footprint Classrooms with Workshops*

Republika ng Pilipinas
Kagawaran ng Edukasyon
Tanggapan ng Pangalawang Kalihim

AIDE MEMOIRE
25 May 2021

UPGRADING OF SCHOOL BUILDING DESIGNS TO CONFORM WITH THE CHANGING ENVIRONMENT AND BUILDING REQUIREMENTS OF SCHOOLS

Introduction

The Philippines belongs to the Pacific Ring of fire where many earthquakes and volcanic eruptions occur. Moreover, its geographic location along the West Pacific—considered the world's busiest typhoon belt—makes it prone to tropical cyclones or typhoons, or an average of 20 typhoons experienced yearly. To date, earthquakes, volcanic eruptions, and typhoons have become more frequent and with greater magnitude and intensity.

I. Rationale

In the inventory records of school facilities in all public elementary and secondary schools nationwide, various school building types exist from as early as 1900. Most of these were built over 25 years ago, and many are more than 40 years old. Needless to say, these old structures, particularly those constructed from 1901 to 1994, no longer conform to the latest Philippine building codes and laws (National Building Code, Architectural Code, Fire Code, Accessibility Law, and the National Structural Code).

Under the said codes, School Buildings or School Facilities are classified as "Essential Structures"—the same category as Hospitals—which are necessary for response and recovery during times of emergencies and disasters. A sad reality, and contrary to the mandate of ensuring learning continuity, school buildings and facilities are often used as evacuation centers or some other purpose.

Inspection of school structures show different school building designs, adapted to the culture, time period, and response to changing climate and new requirements. Designs also vary depending on fund source—LGU, private donations, Overseas Development Assistance (ODA) projects, or the national government, through the

Office of the Undersecretary for Administration (OUA)
[Administrative Service (AS), Information and Communications Technology Service (ICTS), Disaster Risk Reduction and Management Service (DRRMS), Bureau of Learner Support Services (BLSS), Baguio Teachers Camp (BTC), Central Security & Safety Office (CSSO)]

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Department of Education. Accordingly, there are different architectural designs, color scheme, and materials used in the implementation of the project.

Over time, the objective in the construction of school buildings remains the same, which is to provide safe, secure, and conducive learning structures and spaces for our school children, that can withstand strong earthquakes and super typhoons and which conform to international standards.

II. Minimum Performance and Standard Specifications for School Buildings

This is the reason why the Department of Education issued DepEd Order No. 64, s. 2017 on the *Establishment of the Minimum Performance and Standard Specifications for DepEd School Buildings,* and DepEd Order No. 6, s. 2021 on the *Re-Establishment of Minimum Performance and Standard Specifications for DepEd School Buildings Using Alternative Construction Materials.*

The objective of these issuances is to provide uniform school building designs and features regardless of fund source implementation. It also aims to direct the construction of well-designed school buildings that consider: 1) anthropometrics, ergonomics, thermal comfort, proper and adequate illumination, ventilation, acoustics, and color; 2) compliance with latest building codes, laws, and regulations; 3) contribute to improved learner performance; 4) make a lasting impression on the community with regard to the importance of education.

III. Revision of the Standard School Building Designs (highlighting changes made from 2016 to 2021)

In previous years, school building designs had limited variations and were mostly single and two-story structures. Starting 2012, the Department established additional school building designs, to include three-story and four-story buildings to give greater impact in addressing classroom requirements, given the limited buildable spaces in schools. To date, DepEd, through the Department of Public Works and Highways (DPWH), has been implementing a total of 32 standard school building designs from single, two-story, three-story, and four-story.

In 2014, a thorough review of school building designs was made in partnership with the DPWH–Bureau of Designs (DPWH-BOD) and the Japan International Cooperation Agency (JICA). A study was made on the common damages suffered by school buildings during the onslaught of Super Typhoon Yolanda in the last quarter of 2013. These included roofing and roofing frames, doors and windows of school buildings. The study resulted in the creation of a variety of standard school building designs that can be adapted to different school locations around the country following the zoning categories in the National Building Code of the Philippines. This paved the way for *"Calamity-Resilient School Building Designs."*

- The first set of designs is for areas under Zone 1 or those located in the Eastern Seaboard, which are usually visited by strong typhoons, with design consideration for Wind Velocity of up to 340kph, and up to Magnitude 8-9 earthquakes;

- The second set of designs is for areas under Zones 2 and 3, with design consideration for Wind Velocity of up to 270kph, and up to Magnitude 8-9 earthquakes.

The development of school building designs progressed and continued from 2018 to the present to address changes in environmental conditions and requirements of learners.

The table below shows the chronology of changes that were made from the original 2014 *Calamity Resilient School Building Designs* to the 2020 *Modified Calamity-Resilient School Building Designs and to the 2021 Proposed Changes.*

DESIGN DEVELOPMENT OF THE CALAMITY-RESILIENT SCHOOL BUILDING					
Components	**Calamity Resilient Design (2014-2016)**	**Upgraded Calamity-Resilient Design (2017-2018)**	**Modified DepEd-DPWH Design (2019-2020)**	**Proposed Modified DepEd-DPWH Design (2021) NEW**	**Rationale/ Benefits of the Design Change**
I. CLASSROOM SIZE	7.0 meters x 9.0 meters				**Area is spacious enough for 40-50 learners for a conducive learning environment.**
II. ARCHITECTURAL FEATURES					
WIDTH OF STAIRWELL	4.50 meters	5.00 meters			**Wider stairwell and staircases allow safer and easier movement of learners between floors and faster egress during emergencies.**
WINDOWS	Glass jalousie at front & rear	Glass jalousie at front & steel casement window at rear		Awning type windows at front with a height of 1.80 meters from window sill to finish floor, and at rear with a height of 0.90 meters from window sill to finish floor	**Awning type windows provide full perimeter pressure seal, reduce external noise, and provide better insulation, making them ideal for high wind locations. High window placement is useful for allowing natural light and air, even during rainy days, while at the same time maximizing and maintaining privacy and preventing visual distractions to students during class hours. Glass jalousies and holders break easily.**

DESIGN DEVELOPMENT OF THE CALAMITY-RESILIENT SCHOOL BUILDING					
Components	**Calamity Resilient Design (2014-2016)**	**Upgraded Calamity-Resilient Design (2017-2018)**	**Modified DepEd-DPWH Design (2019-2020)**	**Proposed Modified DepEd-DPWH Design (2021) NEW**	**Rationale/ Benefits of the Design Change**
DOORS	Panel Doors			Panel Doors with ¼ thick fixed clear glass panels	**This will provide the visibility inside the classrooms as well as allowing the light to travel through the rooms.**
SECURITY GRILLES	None @ front	With security grilles @ front		With security grilles @ front and rear inside the classrooms	**Safety grilles protect learners from untoward incidents while safeguarding school property from vandals and classroom equipment from theft.**
ROOFING SHEET	0.40mm Thick Pre-painted Longspan Corrugated G.I. Sheet	0.40mm Basemetal Thick Pre-painted Longspan Corrugated G.I. Sheet		Roof Slab with metal decking	**Roof slabs are safer and more practical in the long run especially in areas frequented by typhoons. Concrete slabs prevent roofs from being blown away during strong typhoons.**
RIDGE ROLL	Ridge Roll, Pre-painted, 0.610m x 2.440m x 0.40mm thick	0.60mm Base metal thick Pre-formed Pre-painted G.I Ridge Roll Sheet		n/a	**Thicker ridge rolls prevent roofs from being blown away easily by strong typhoon winds.**
METAL FLASHING	0.4mm thick G.I pre-painted flashing	0.6mm Base metal thick G.I pre-painted flashing		n/a	**Thicker metal flashings provide better protection of building and roof from moisture and rain.**
CORRIDOR RAILINGS	4" (100mm) thick CHB Wall with Plain Cement Plaster Painted Finish		6" (150mm) thick Trapezoidal zocalo w/ Decorative Railings @ 1500mm Height		**Railings protect learners from accidental falls. These also provide unobstructed view of the corridor, and corridor activity can easily be seen/monitored from the ground.** **Railings permit good ventilation by allowing the free movement of air and light along corridors and classrooms.**
CORRIDOR RAILINGS AT GROUND FLOOR	4" (100mm) thick CHB Wall with Plain Cement Plaster Painted Finish		Concrete bench at 0.40 meter Top height		**Concrete benches provide seating area for learners and allow fast movement to designated safe grounds in case of emergencies.**

DESIGN DEVELOPMENT OF THE CALAMITY-RESILIENT SCHOOL BUILDING					
Components	**Calamity Resilient Design (2014-2016)**	**Upgraded Calamity-Resilient Design (2017-2018)**	**Modified DepEd-DPWH Design (2019-2020)**	**Proposed Modified DepEd-DPWH Design (2021) NEW**	**Rationale/ Benefits of the Design Change**
III. OTHER FEATURES					
TOILET	None	With toilet at each classroom for single story buildings		With common toilet at one end for single-story buildings	**Toilets at the end of buildings provide easy access to learner sanitation and hygiene; clustered toilet facilities are economical and easier to maintain.**
STORM SHUTTERS	None			With storm shutters	**Storm shutters block strong winds and flying debris caused by typhoons and prevent breaking of glass windows and damage to classroom property.**
UTILITY ROOM	None			With Utility room	**To serve as storage and stock room**
CANOPY AT MAIN ENTRANCE	None		Reinforced concrete canopy with plain cement plaster painted finish		**Roofed waiting area provide sun and rain protection for learners**
HANDWASHING FACILITIES	None		Handwashing facility attached at both ends of the building		**For basic health, hygiene and sanitation of learners.**
PARAPET	None		Reinforced concrete parapet with plain cement plaster painted finish		**To block strong typhoon winds and prevent damage to roofing.**
IV. PLUMBING					
PROVISION OF DRY STANDPIPE	No provision of Dry Standpipe for 2-story building	With Dry Standpipe for Multi-story (w/ automatic Sprinkler System – 3 story 9,12 & 15CL; 4 story 12, 16 & 20CL	With Dry Standpipe for Multi-story buildings		**Dry standpipes allow fast and easy suppression of fire in any floor of a school building. They do not require dragging long hose lengths up stairwells, thus clearing staircases of obstructions during evacuation.**
OVERHEAD WATER TANK	None	With Overhead Water Tank For Multi-story buildings			**To ensure that school buildings have enough water supply at all times for hygiene, sanitation, and other needs.**
	None	With modular septic tank			**Modular septic systems allow expansion of septic facilities as**

DESIGN DEVELOPMENT OF THE CALAMITY-RESILIENT SCHOOL BUILDING					
Components	**Calamity Resilient Design (2014-2016)**	**Upgraded Calamity-Resilient Design (2017-2018)**	**Modified DepEd-DPWH Design (2019-2020)**	**Proposed Modified DepEd-DPWH Design (2021) NEW**	**Rationale/ Benefits of the Design Change**
PROVISION OF MODULAR SEPTIC SYSTEM					**the need arises due to increase in users.**
V. ELECTRICAL					
				Adjustment of the electrical plans to reflect pump requirements	**Adjustment in electrical loading for water pumps prevent overloading of electricity that may cause fire.**
VI. STRUCTURAL					
WIND VELOCITY	250 KPH	270KPH and 340 KPH			**To withstand strong winds brought about by typhoons**

2014: Calamity-Resilient School Building Design

2018: Upgraded Calamity-Resilient Design

2019: Modified DepEd-DPWH Design

2020: Modified DepEd-DPWH Design

IV. Other Revisions Being Planned and Undertaken

In previous years, school building designs had limited variations and were mostly single and two-story structures. Starting 2012, the Department established additional school designs including three to four-story structures.

Since 2016, under the administration of President Rodrigo Roa Duterte and Education Secretary Leonor Magtolis Briones, the Department continues to study other design improvements that can be made with the existing school buildings designs discussed above. The recent strong Typhoon (ST Rolly) that hit the country in the last quarter of 2020, specifically the devastations it made in the province of Catanduanes where a large number of school buildings were totally or partially destroyed, has led to the following new proposals that will be submitted to the DPWH-BOD for consideration in revising and upgrading existing designs.

- **Replacement of the Roofing System of the School Building from regular roofing design to Roof Deck and/or Parapets** – The provision of roof deck system, particularly for multi-story school buildings, is more practical in the long run especially in areas frequented by typhoons or those that may experience ashfall from volcanic eruptions.

- **Provision of Storm Guards or Storm Shutters** for external and open portions of the school building – Storm shutters or guards installed at doors and windows of school buildings will block strong winds and flying debris caused by typhoons and prevent glass breakage or damage to property.

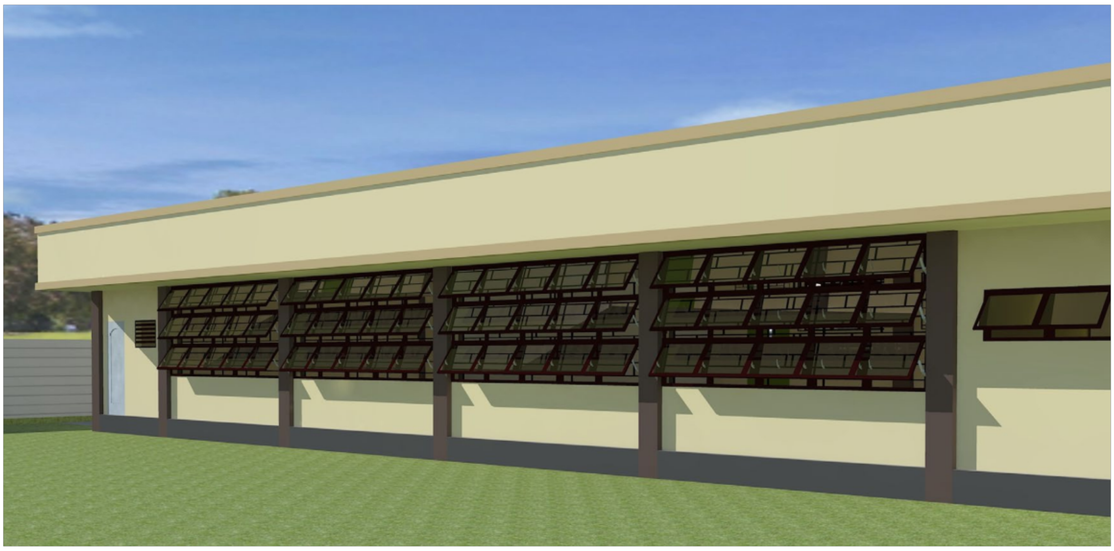
- **Replacement of Jalousie Windows with Awning Windows** – Awning windows provide full perimeter pressure seal, reduce external noise, and provide better insulation, making them ideal for high-wind locations. High window placement is useful in capturing natural light and ventilation, while maximizing and maintaining privacy at the same time.

  In January 2014, the Japan International Cooperation Agency (JICA) dispatched a Team of Experts to conduct a thorough investigation on the damages caused by the Magnitude 8 earthquake that hit Bohol Island in October 2013 as well as the devastation in Tacloban City and Leyte Provinces as a result of Typhoon Yolanda a month after. The Team visited government buildings, schools, and privately owned establishments. The findings on observed damages to school facilities was partly a result of strong winds able to penetrate school building interiors due to broken glass jalousie windows which are very vulnerable to strong winds and rain. Glass jalousie blades tend to bend when subjected to strong wind pressure; they are not water and air tight, and tend to break easily. The strength of the winds that enter the interiors passing through the damaged windows is equal to the wind pressure at the exterior at the height of a storm. This causes the ceiling to vibrate, eventually cave-in/collapse and subsequently push the roofing sheets outwards. These findings were evidenced by the damages documented by the Team. This report was submitted to DPWH as well as to DepEd Central Offices.

As a result of these findings, the Glass w/ Aluminum Frame Awning-type Window was introduced as a more effective alternative. The advantages of this type of window are as follows:

- Similar to the jalousie window, maximum light and wind ventilation is allowed to enter the interiors;
- During rainy and windy days, the angle of the operable window can be adjusted to an inclination that will still allow air to circulate but prevent rain from entering. It serves like a "media agua" or rooflet;
- If properly installed with metal flat bar supports along the peripheral aluminum framing, it is more rigid against strong winds during super typhoons as there are more aluminum framing to support the operable awning windows. It can therefore have a larger coverage of window opening;
- When fully closed, it is water and air tight as there are rubber gaskets at the periphery of the operable window to prevent water and air from penetrating;
- It is highly secured from burglars as there is a latch that locks the operable window tightly on its fixed frames.

To summarize, Awning-type Windows are far more advantageous for exterior use in DepEd School Buildings to achieve water and wind tightness as well as security. Steel grills are not required if Awning Type Windows are used in the DepEd School Buildings.



Instead of the regular glass jalousie windows along classroom walls fronting corridors, these will be replaced by solid masonry walls because there may be so much distractions along the corridors that can occur while classes are ongoing inside the classrooms. This will make the environment inside the instructional spaces more focused and conducive to learning. Instead, the following type of windows are recommended:

- Single-loaded Corridor Buildings - awning windows on aluminum frames as these windows need to be water and air tight against strong winds and rain during typhoons.
- Double-loaded Corridor Buildings - glass jalousie high windows on aluminum frames are preferred as they need not be water tight, are more economical but still serves its purpose.

For double-loaded corridors, high windows allow cross wind and natural light ventilation coming from the exterior windows of the classroom, to enter the corridors through these high windows.

In addition, all doors of the classrooms shall have wired glass view windows for proper supervision of activities going on inside the classroom, coming from the corridors as well as for safety reasons to prevent possible accidents when opening the doors from inside the classrooms, outward towards the corridor.

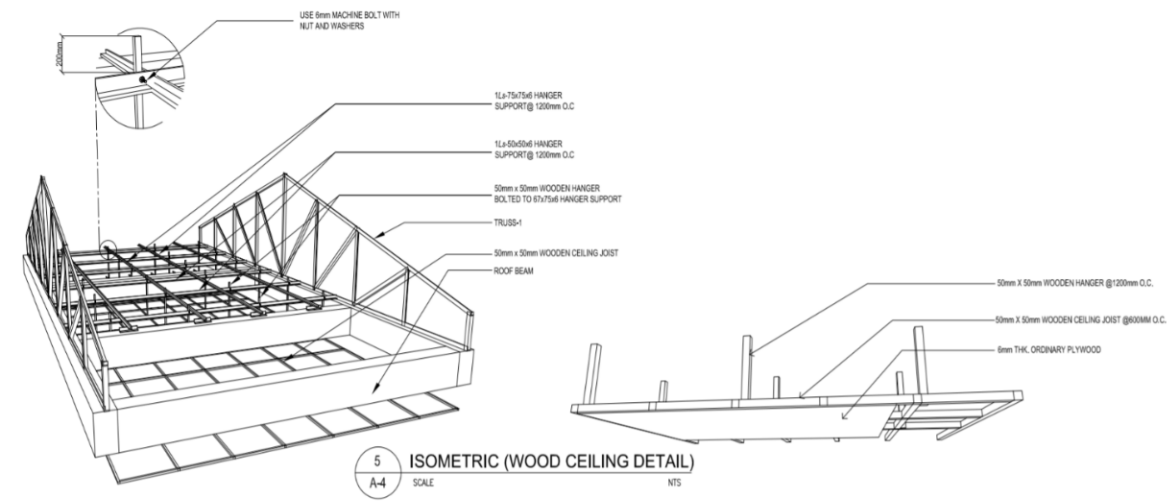
- **Use of area-specific designs** to consider localities prone to earthquakes, volcanic eruptions, strong typhoons, floods, high-road elevation, severe weather conditions, and others.

- **Applying Indigenous Peoples (IP) designs as accent** to schools in indigenous people's communities reflects the respect to the different cultures and traditions of IP communities. The design varies depending on the type of IP communities where an IP School is established. The color and the artwork design signifies different meanings like leadership and bravery, including how is it positioned or drawn on the school building.

- **Apply Value Engineering (cost comparison) if Retrofitting an existing structure is more cost-effective than constructing a New one.** (School buildings no longer code-compliant, and those more than 25 years old should already be replaced.)

- **Addressing collapsing ceilings -** The increasing number of incidents related to collapsed ceilings of school buildings have raised concerns on the safety of our learners and school personnel. Thus, in July 3, 2019, DepEd wrote and requested DPWH to do a thorough review of the current ceiling designs of the school buildings, and to include the material specifications and the methodology of construction.

  While the DPWH stands that there is no need to revise the design of the ceiling of the school buildings, the DepEd—giving top priority to the safety of its learners and school personnel—is in the direction of replacing existing ceilings of school buildings, specifically those that were constructed from 2014 onwards.



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A-4
ISOMETRIC (WOOD CEILING DETAIL)
SCALE NTS

In the implementation, the Department will be using conventional materials such as ordinary and marine plywood on wooden joists as shown in the drawings above.

- **Implementation: Specialized contracts in the construction of roofing systems of school buildings may be looked into, to include Extended warranty periods** that DepEd can call upon if defects/damages occur within the given period. Identification/classification of type of construction shall be issued on a specific type based on PD 1096, National Building Code of the Philippines, Section 401, which are Type IV and/or Type V that strictly follow the specified materials on the construction contract documents.

- **Accessibility within the school site -** School sites must be made accessible at all times. Thus, school sites must be improved in such a way that barriers like plant boxes are properly put in the right place and will not form as barrier during emergency evacuations. Likewise, site leveling and the provision of pathways and connections between buildings accessible by persons with disabilities (PWD) should also be considered.

  Accessibility also includes inter-connectivity of structures through the provision of connecting bridges. Provision of bridge structure may be also be included in the finalization of the Detailed Engineering Designs and Estimates for a particular school building project.

Sample of connecting bridge between School Buildings

- **Use of Renewable energy – solar panel setup at roof decks to energize entire building -** Part of the short and long term plan for the schools is the provision of Solar Panels for schools without access to electricity grid and the provision of Solar Panels as alternative source of energy for schools in order to lower its electrical consumptions and maximize its available MOOE for other school purposes instead of using it for payment of electrical bills.

Solar panel set up at roof decks extend the life of the roof as they protect the materials from the elements such as rain, direct sunlight, and debris.

- **Incorporation of ICT requirements in the construction, like cabling for school wide area network, etc. -** Wiring, cable requirements, and fixtures to make the classrooms internet ready will already be included in the construction of school buildings. This will allow classrooms to access the Public Education Network (PEN) once internet connection is available. The PEN will allow teachers and learners to easily access the DepEd Commons, DepEd Learning Management System, and DepEd TV in their respective classrooms making ICT Assisted Teaching and Learning a reality in the near future.

- **Use of Alternative Materials for Last Mile Schools -** DepEd Order No. 006, s. 2021 titled *"Re-Establishment of Minimum Performance Standards and Specifications (MPSS) for DepEd School Buildings Using the Alternative Construction Materials"* was released on February 8, 2021, paving the way for the faster building of Last Mile Schools (LMS) in areas where there is difficulty in the use of conventional type of construction materials.

Prototype of LMS Building Using Light Materials
constructed in Mabalacat Elementary School in Pampanga

- **Monitoring: Strengthened and close monitoring of projects should be implemented** to ensure the quality, safety, and integrity of the structures being constructed and/or repaired.

VII. Ancillary Facilities

Ancillary facilities are required facilities to support and ensure the primary function of efficiently operating a school. This includes libraries, canteen, administrative office, and others. The Education Facilities Division (EFD) of the department has developed the following standards for some types of ancillary structures.

a. ACCESS Buildings

The Administration and Climate Change Evacuation, Storage and Shelter (ACCESS) building is a two-story structure that is proposed to be built in flood-prone schools without existing multi-story buildings. The objective is to ensure that, in times of calamities, there will be a dedicated structure where all important properties and records of the school can be put for safekeeping. The Gabaldon theme of the ACCESS building emphasizes the role of facilities in promoting and advancing public education.

The Alternative Learning System Community Learning Center (ALS-CLC) School-Based CLC is also adopting the design of the ACCESS for its school-based CLCs, particularly because the building design is a stand-alone building with two levels and rooftop with space equivalent to four standard classrooms. Roof Deck instead of the regular roofing design is made for this to maximize the use of the structure given the limited space for the CLC hub. Other co-curricular activities can be conducted in this area and may also serve as emergency evacuation during calamities.

ACCESS Building
(Administration and Climate Change Evacuation, Storage and Shelter)

b. Independent or Stand-Alone Toilet and Handwashing Facilities

Standard Stand-Alone toilet and handwashing facilities were also made for the proposed construction of health-related facilities in schools in the new normal. Variations in designs were made to cater to the different situations of the schools in terms of the availability of water source. In the standard design, water storage tanks are incorporated, so schools without immediate available water source can stock water for hygiene purposes. Common design of handwashing facilities is shown below.

Stand-alone handwashing facility

Stand-alone Four (4) Seater Toilet

c. School Clinics

Another equally important school facility, especially at this time of Covid-19 pandemic, is the School Clinic. (In the initial implementation of this program, due to limited funds, the policy made was to repair or convert existing classroom to a school clinic.)

d. Parents' Hub

Parents' hub is a common area within the school compound where parents or guardians can stay while waiting for the school children. This is where the school administration can put up necessary announcements, notices, information, or updates that the parents or guardians need to know and be aware of.

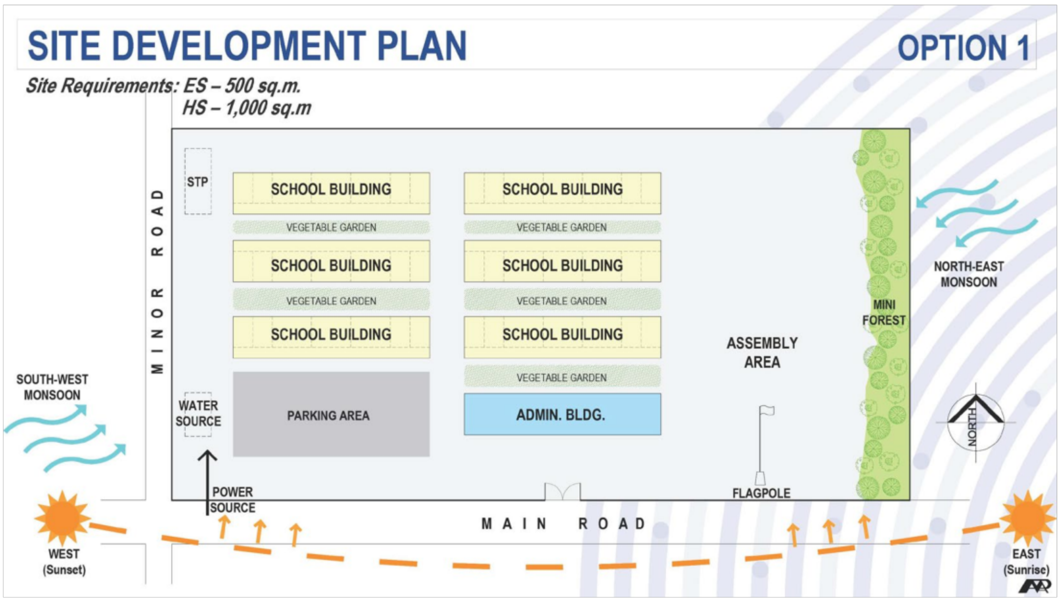
VIII. Land Development

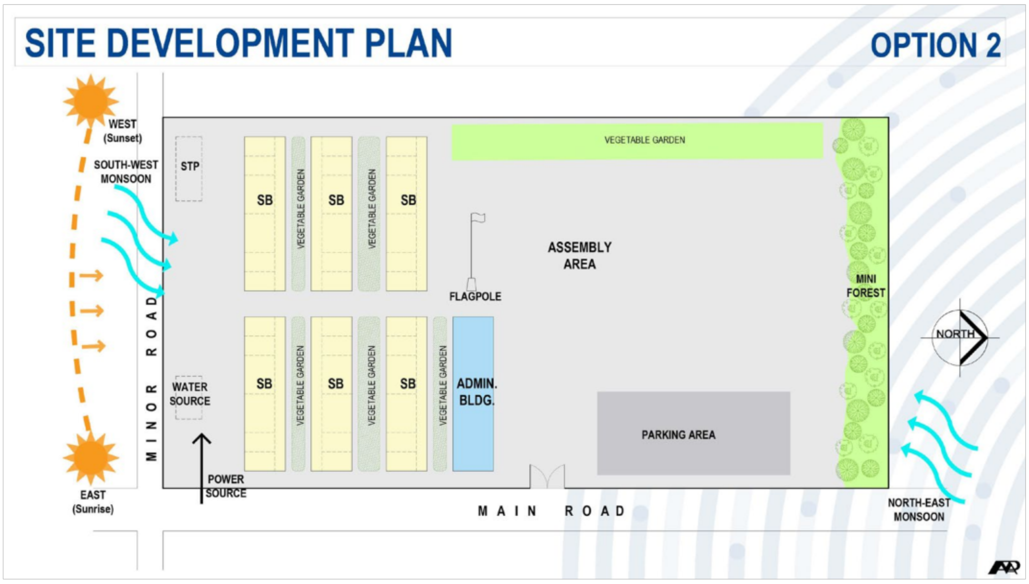
An important aspect to consider in the improvement of school facilities is Site Development. This will involve a thorough study of the condition of the school site and specific hazards that they are prone to so that necessary engineering interventions can be made.

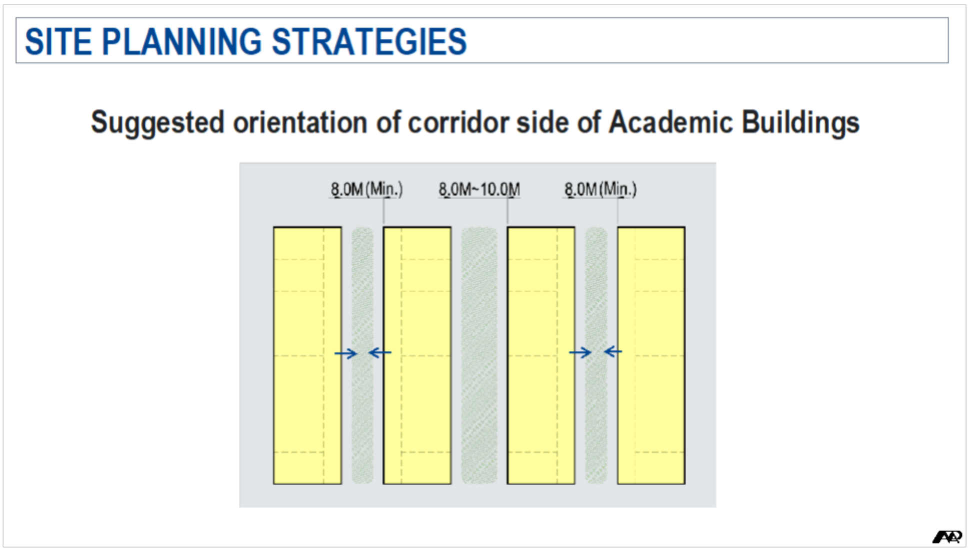
Site Planning Strategies / Design Principles

- Use Cellular/Grid patterns in relation to building dimensions and pedestrian movement/circulation.
- All buildings are ideally oriented; with openings (long sides of building) at North-South orientation and end walls (short sides of building) along East-West orientation.
- Instructional buildings (classrooms) are properly zoned.
- Utility distribution lines (water, power, sanitary) are very limited and therefore more economical and efficient.
- Water cisterns/Storage tanks to be centralized. This will provide limited/shorter runs and attain constant water pressure.
- Sewer lines are likewise limited to certain areas, increasing efficiency and minimizing possible pollution of the entire school grounds in case of leaks.
- Power lines are also limited to certain areas thus avoiding power losses and possible fire hazards.
- During Super Typhoons, the clustered buildings will help protect each other from strong winds and flying debris, limiting possible damage to school buildings.
- Provision of Storm Guards or Storm Shutters may be limited to buildings at periphery only.
- School Administrators can easily monitor and supervise entire operations as structures are clustered/closure together.
- Vegetable/Herb gardens may be alternated between buildings and necessary East-West sunlight will be unobstructed.
- Mini forests with sprawling trees—away from buildings—may be grown freely without causing damage to structures during super typhoons.
- Flagpoles are properly located so that during flag ceremonies, students are not subjected to sun glare.
- With clustered and properly situated structures, additional school buildings may be constructed for future expansion.

Minor disadvantages: Aesthetics may be sacrificed; ambient noise may be louder with buildings facing each other.


SITE DEVELOPMENT PLAN
OPTION 1
Site Requirements: ES – 500 sq.m.
HS – 1,000 sq.m
STP
SCHOOL BUILDING
VEGETABLE GARDEN
SCHOOL BUILDING
VEGETABLE GARDEN
SCHOOL BUILDING
VEGETABLE GARDEN
SCHOOL BUILDING
VEGETABLE GARDEN
SCHOOL BUILDING
SCHOOL BUILDING
VEGETABLE GARDEN
PARKING AREA
ADMIN. BLDG.
ASSEMBLY AREA
MINI FOREST
NORTH-EAST MONSOON
SOUTH-WEST MONSOON
NORTH
MINOR ROAD
WATER SOURCE
POWER SOURCE
FLAGPOLE
MAIN ROAD
WEST (Sunset)
EAST (Sunrise)


SITE DEVELOPMENT PLAN
OPTION 2
WEST (Sunset)
SOUTH-WEST MONSOON
STP
SB
VEGETABLE GARDEN
SB
VEGETABLE GARDEN
SB
VEGETABLE GARDEN
FLAGPOLE
ASSEMBLY AREA
MINI FOREST
NORTH
SB
VEGETABLE GARDEN
SB
VEGETABLE GARDEN
SB
VEGETABLE GARDEN
ADMIN. BLDG.
PARKING AREA
WATER SOURCE
POWER SOURCE
MINOR ROAD
EAST (Sunrise)
MAIN ROAD
NORTH-EAST MONSOON


SITE PLANNING STRATEGIES
Suggested orientation of corridor side of Academic Buildings
8.0M (Min.)
8.0M~10.0M
8.0M (Min.)

Sample arrangement of school buildings arranged along the perimeter line of the school property to maximize the open area at the center of the property for school activities.

Sample arrangement of school buildings arranged in rows following the suggested orientation.

NOTE: To develop effective site planning strategies for the various school campuses, the results of the ongoing preparation of School Site Development Plan should be carefully studied and analyzed to arrive at different site situations and develop an applicable planning strategy that may be most effective for a specific school campus.

In the Special Provision for the Basic Education Facilities Fund under the General Appropriations Act (GAA), site improvements listed below can be included in the preparation of the Detailed Engineering Designs for the School Building Program. In the case of the conduct of Soil Testing, a separate fund called Preliminary Detailed Engineering Fund (PDEF), a sub-component of the BEFF fund, is used for this activity.

a. **Soil Testing** – the conduct of soil testing before the construction of multi-story school buildings is mandatory as provided by the National Building Code of the Philippines. This is required to determine if the existing soil condition can carry the weight of the proposed school building or not, so that necessary adjustments in foundation design can be made during the finalization of the Detailed Engineering Designs.

b. Soil Slope Protection – Soil protection is necessary to prevent the erosion of soil that may put in danger the lives of the school populace, and destroy physical properties. The provision of soil protection is common in schools located in mountainous areas particularly in the Cordillera Region. In the conduct of assessment of schools for any school building program, soil protection, if necessary, should be incorporated in the preparation of the Program of Works.

c. Provision of drainage system and security fences

The common problem of schools that easily get flooded is the absence of a good drainage system within the school compound. The majority of schools nationwide have no existing proper drainage system. The Department of Environment and Natural Resources (DENR) has already called the attention of some schools, particularly in the National Capital Region (NCR) for violating proper solid waste management system. Thus, this should be seriously looked into by the different stakeholders in determining the necessary assistance that can be given to the schools.

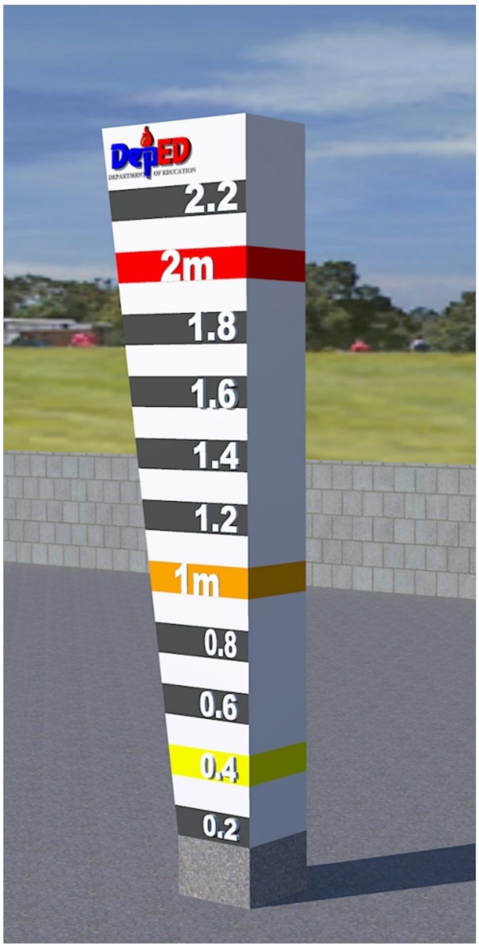
Standard Fence for Schools

e. Elevation of School Buildings

In the conduct of assessment of schools, engineers should be aware of the flood history of the school so that necessary site adaptation can be made such as elevating the school building at least one (1) meter higher that the flood history level or the construction of school buildings on stilts.

The devastations caused by the massive flooding in 2020 in the provinces of Cagayan and Isabela in the Cagayan Region led the Office of the Undersecretary for Administration (OUA) to construct a **flood marker** in all affected schools to serve as guide for engineers in evaluating the requirements of the school.

Standard Design of Flood Marker



IX. Mid- to High-Rise School Building Design

Currently on the Detailed Engineering Stage is the proposed Mid and High Rise School Buildings. The proposed school building design is intended to be constructed in highly urbanized areas where there is dense population but areas for development is limited. The proposed school building will also have a variation of design ranging from five floors to as high as twelve or more floors. This is targeted to be implemented starting CY2022.

The 5 to 12-story high-rise school buildings are proposed to be solutions to cities and towns that have high student population, high classrooms shortage (more than 1,000 classrooms still needed), but have very little or no buildable areas for school sites. These are the Local Government Units that have limited land area, very high cost of land assets which the LGU or the DepEd cannot afford to purchase, and have school sites that have used up all their buildable spaces.

The new school building design takes into consideration the effects of climate change and global warming, as it introduces green and sustainable tropical design principles to mitigate the negative effects to our environment. Passive cooling, site adaptation, and building layout to comply with the ideal "East-West" orientation will be given utmost importance to avoid dependence on artificial means of ventilating the building. Compliant with National Building Code requirements and other laws pertaining to structural stability, fire safety, vertical conveyance, and utility requirements, the new school building design is meant to address school requirements for both academic and non-academic facilities.

5 storey, 20 classrooms

12 storey, 42 classrooms, 9 workshops

(The Salient Points/Design Features of the High-Rise School Building are discussed in details in a separate Aide Memoire.)

Since 2016, the Department of Education has never stopped and continues to introduce and propose improvements to Basic Education Facilities—a lifelong quest and commitment—based on actual school visits and inspections, and adapted to constantly changing needs and times.

For the information of all concerned.

ALAIN DEL B. PASCUA
Undersecretary