Insular ABCs

Insular Schools: Assessment
of Buildings and Classrooms

CONDITION ASSESSMENT REPORT
FOR GUAM PUBLIC SCHOOLS
Overview of Costs, Major and Common Issues, and Discipline-Specific Summaries

August 2021

US Army Corps of Engineers
Honolulu District

U.S. Department of the Interior
Office of Insular Affairs

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Acronyms and Abbreviations

ADA	American Disabilities Act
ADAAG	ADA Accessibility Guidelines
ARP	American Rescue Plan
CARES	Coronavirus Aid, Relief, and Economic Security
CIP	Capital Improvement Program/Project
DM	deferred maintenance
DST	Decision Support Tool
EAMS	Enterprise Asset Management System
FY	fiscal years
GDOE	Guam Department of Education
GFCI	Ground Fault Circuit Interrupter
IPEMA	International Play Equipment Manufacturers Association
M	Millions of dollars
MEPFP	Mechanical, Electrical, Plumbing, Fire Protection
SF	Square feet/foot

1. Insular Area Assessment Summary

1.1 Facility Condition Assessment Overview

This report serves as an update to the condition assessment information provided in 2013, as a part of "Phase 2" of the Insular ABCs Initiative that was conducted to identify investments needed to address deferred maintenance (DM) at public schools. The condition of eight "work activities" were assessed and include: Roofing, Exterior, Interiors, Structural, Mechanical, Electrical, Plumbing, and school grounds (Site) were assessed. This assessment identifies where major investments are needed; not precise scopes and cost estimates. The work activities that were assessed were aligned with specialists from four disciplines summarized in Table 1.

Table 1 - Insular ABCs team Members

Discipline	Company	Assessment Category
Structural	Martin & Chock, Inc.	Structure
Architectural	Mason Architects, Inc.	Exterior, Roofing, Interiors
MEP (Mechanical, Electrical, Plumbing)	InSynergy Engineering, Inc.	Mechanical (HVAC), Electrical, Plumbing, and Fire Protection
Civil	Okahara & Assoc.	Site

Guam public school assessments were conducted from May through June, 2021, and covered 34 GDOE schools excluding the six leased schools (because maintenance is the responsibility of the lessor), FQ Sanchez (closed), and JP Torres because the campus is not being used (classes moved to Southern HS).

Facility items inspected in 2013 were reassessed to identify changes:

1. Work completed/no remaining DM
2. Condition worsened due to natural aging (i.e., DM repair work is still needed but hasn't significantly worsened beyond what was captured in 2013)
3. Condition significantly worsened/accelerated deterioration—work order update required

The DM work orders were created for the main components of the facility inventory for the 34 GDOE owned and managed facilities, a total of about 11,000 DM items. About a third of DM items were repaired, about 6% of DM items significantly worsened, and about 58% of items worsened due to natural aging (see Figure 1).

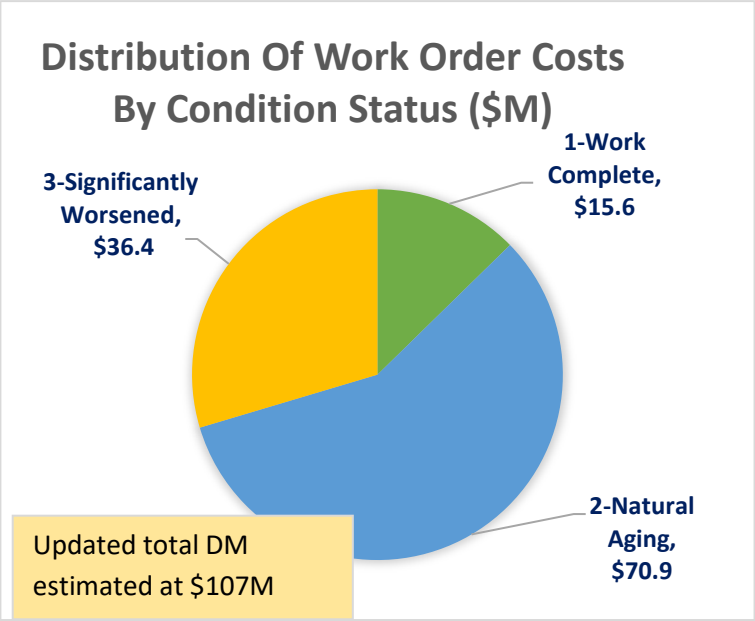

Figure 1 - Distribution of work order costs and percent or work order count by condition status

1.2 General Findings and Priorities

DM was categorized by Work Activity like the building systems used in 2013. Figure 2 shows the distribution of DM costs for each of these categories. The updated DM total is estimated to be about $107M.

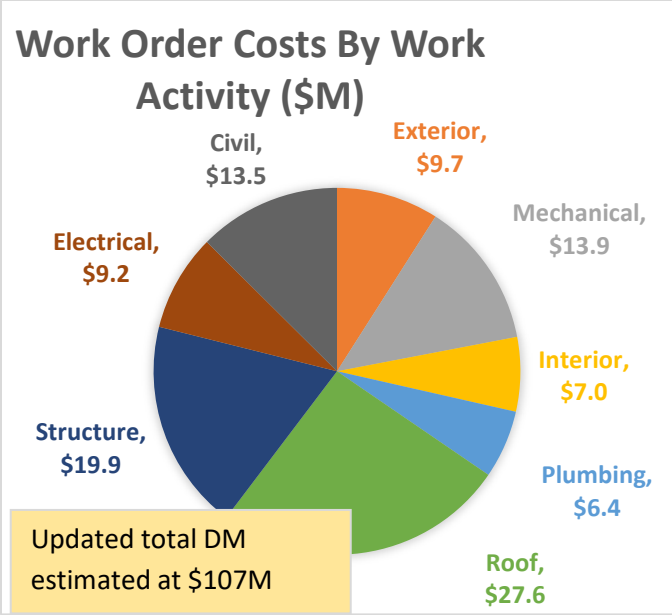

Figure 2 - Work order costs by work activity ($M)

The 2013 condition assessment estimated a total of $90M in DM for GDOE managed schools (this total also included FQ Sanchez and JP Torres that were assessed in 2021 because these campuses are not in use). About $15M of DM was identified as complete during the 2021 assessment. Clear and comprehensive data on investments made between 2013 and 2021 were not available but is assumed to be more than $15M, including several millions of dollars of American Recovery and Reinvestment Act funded repair projects around the time of the Phase 2 assessments. The current total underscores that DM continues to accrue and conditions for DM items that are not addressed in a timely manner continue to worsen over time.

For the 2021 assessment, priority categories were established for each discipline to help differentiate areas of concern (Table 2).

Table 2 - Priorities by Discipline and Functional Area

Discipline\ priority	1	2	3	4	5
Structural	Risk of failure and injury (life safety hazard)	No immediate safety hazard; continued deterioration will cause loss in structural capacity and life safety hazard	Minor structural imperfection, that has little current or projected future impact on the performance of the building		
Architectural	Injury risk	Risk of accelerated deterioration	Functional inadequacies	Requires monitoring	
Electrical	Arcing and major Injury risk	Minor injury risk	Exposed wires	Uncovered outlets or switches	Inadequate number of outlets
Mechanical	Inoperable or failing system				

Discipline\ priority	1	2	3	4	5
Fire Protection	Inoperable or failing system	Inadequate water pressure			
Plumbing	Leaking interior water lines	Broken fixtures			
Site/Civil	Injury risk	Inadequate site infrastructure	Site flooding risk potential	Inadequate emergency access	Non-compliant handicapped access

1.3 DM Distribution by Work Activity

GDOE indicated that immediate attention should focus on priority 1 and 2 items. As shown in Figure 1, about two thirds of DM identified in 2013 appears to have worsened due to natural aging (condition status 2) about 2,000 of which were categorized as priority 1 or 2 concerns. Indication of priority was required for all items that were identified as having significantly worsened or show signs of accelerated deterioration (condition status 3). The estimated DM cost for priority 1 and 2 items totals $70M and is shown by work activity in Figure 3.

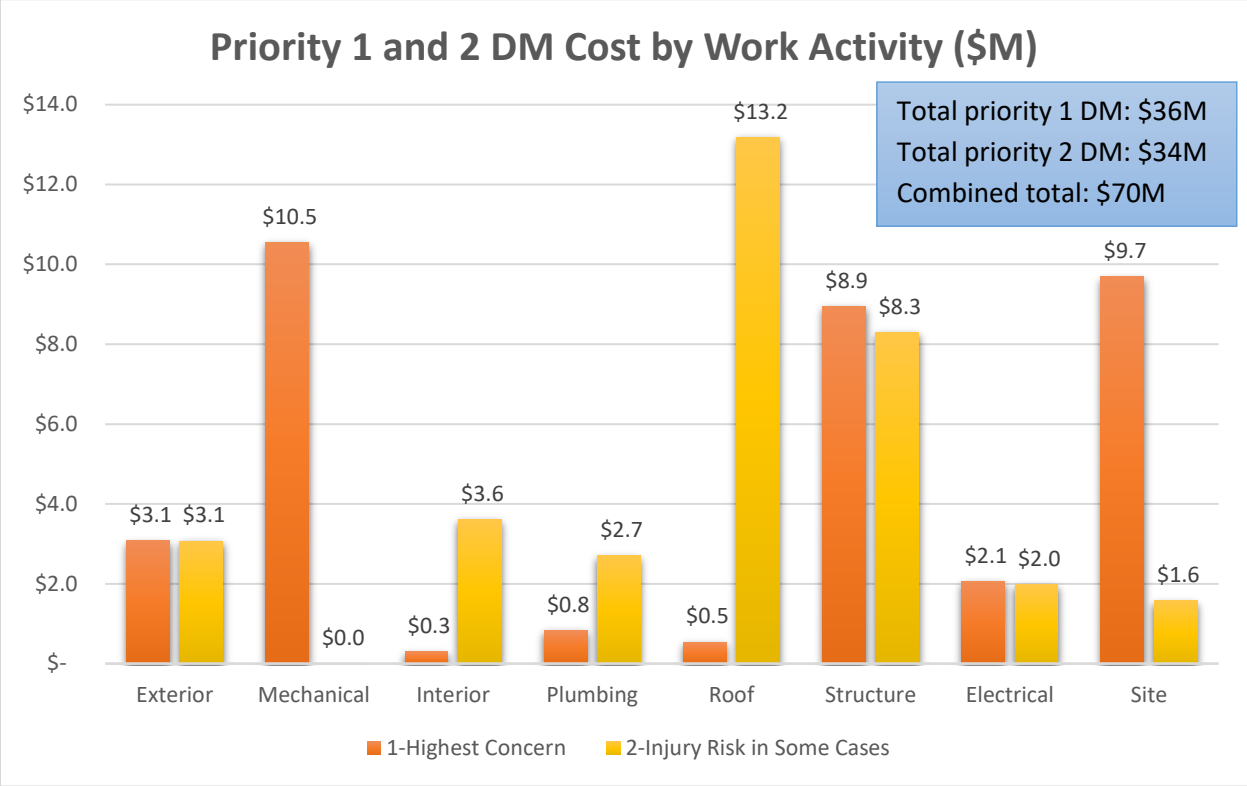

Figure 3 - Priority DM Cost by Work Activity ($M)

Roofing is a major concern because weather proofing protects all building elements. Many structural issues were associated with failed roofing material. Leaks that result from failed roofing also cause damage to architectural items, introduce additional moisture into mechanical systems, and can exacerbate corrosion of many elements, including electrical equipment. Indoor environmental quality issues (e.g., air quality) are also major concerns related to failed weather proofing because of increased moisture in classrooms and mildew and mold proliferation. Mechanical DM issues are a major concern because of the high heat in Guam and legal requirement per Public Law 28-45 that classroom temperatures not exceed 78 degrees Fahrenheit. Indoor moisture can cause deterioration of metal ducting and mold issues in ducting can go unobserved for years before these instances are visible. Major and common problems are summarized by discipline in Section 2. Additional information on specific priorities is provided by school in discipline-specific reports attached to this summary report:

- Attachment 1 – Structural Assessment Report
- Attachment 2 – Architectural Assessment Report
- Attachment 3 – Mechanical, Electrical, Plumbing, And Fire Protection Assessment Report
- Attachment 4 – Site Assessment Report

GDOE's facility master planning process was ongoing during the condition assessment process and provides additional analysis of DM needs regarding facility redevelopment plans that could have a substantial effect on the DM estimates provided in this report (e.g., demolishing several temporary structures that have high DM costs will significantly reduce the overall DM total). Ideally, GDOE staff will track DM needs and facility changes (e.g., demolition, redevelopment, major CIP upgrades) and maintain an accurate accounting of DM totals within the Enterprise Asset Management System (EAMS) and Decision Support Tool (DST) that GDOE recently adopted.

2. Major and Common Problems

2.1 Structural

Structural assessment included visual inspection of building design and load bearing elements including foundation, wall frame, vertical supports, lateral bracing, floor construction, and roof framing. Elements were assessed for condition in relation to designated function, adequacy of existing design with consideration for modern construction codes including wind and seismic resistance. Major and common problems for structural elements included:

1. Problems caused by water leaks
2. Parapet walls at risk of falling
3. Weatherproofing failure at Fast-track buildings
4. Inadequacy of materials or construction method for wood framed classroom buildings elevated on CMU piers
5. Short lifespan of refabricated metal buildings
6. Deterioration issues at covered walkways

Figure 4 - Agana Heights ES Buildings 1 and 3 beam spall

Problems caused by water leaks: The most common building type is defined by low-slope concrete roofs and reinforced concrete masonry walls. This building type generally performs well but issues arise if water proofing over the slab fails and allows water to seep through the concrete. Due to the higher porosity and higher chloride content of the coralline aggregate concrete that appears to have been used for these building, depending on how well the aggregate was washed initially, moisture penetration may lead to accelerated deterioration compared to other concrete types, especially corrosion of the reinforcing and spalling (fracturing) at the soffits (underside) of the slabs or beams. This issue is prevalent with concrete slab covered walkways as well. Spall repairs for these buildings have been done and generally appear to have been done well, but these repairs must be done in conjunction with addressing the root cause of the deterioration; that is any failed roofing. This deterioration can result in dangerous concrete debris falling in classrooms or from walkway roofs. Roofing material and application recommendations are addressed in the Architectural Assessment Summary report.

Figure 5 - P.C. Lujan ES Building 9 roof parapet - potential imminent collapse hazard

Parapet walls: There are a few cases where concrete buildings have an occupiable roof deck and precast concrete parapet panels have been used to provide a safety railing. In some cases, these parapet panels have a deteriorating connection to the slab below, making them highly susceptible to failure during a wind or seismic event. These are considered very unsafe and need to be addressed urgently, perhaps by simply removing the panels and any general access to the roof decks, or replacement with a new railing system. These conditions are known to occur at P.C. Lujan Elementary School Building 9 and Captain Price Elementary School Building 2. All similar conditions should be assessed for safety.

Fast-track buildings: The small prefabricated single-story gable roof concrete buildings (commonly referred to as fast-track buildings) are generally in good condition, and a durable building type. Cracks and spalls were observed commonly, particularly at the roof ridge joint between two roof slab segments, which leads to roof leaks if not properly roofed. The focus of repairs should not be on sealing the cracks at the roof, but in having a durable, waterproof roof ridge and joint covering, and roofing over the remainder of the roof that keeps the roof dry preventing moisture and additional chloride ingress. The roofing needs to be rated to resist uplift forces from extreme wind events.

Wood Framed Classroom Buildings Elevated on CMU Piers: In cases where the first floor is not adequately raised above grade, the floor framing is subject to dry rot. The commonly used metal or plywood siding do not hold up well long-term. The cladding of these buildings deteriorates quite quickly in Guam's environment. There is isolated but not widespread evidence of termite damage and rot where the roofing or siding has deteriorated. Some of the foundation anchorage issues were addressed with retrofits but most are not adequately anchored nor designed for high winds and are vulnerable to typhoons. When not adequately maintained, these buildings become irreparable very quickly. When they have reached end-of-service life it would be best to demolish them completely to avoid safety risks.

Figure 6 - Jose Rios MS B1 corroded steel floor joists and exterior beams

Prefabricated Metal Buildings: Not a commonly used building type but found at around one third of the schools. Older buildings show signs of severe superstructure damage. The steel cladding has a relatively limited lifespan and severe corrosion around the perimeter steel framing at the base of the first floor was consistently observed. The steel joists under the buildings are often also corroded due to moisture under the building and low ground clearance indicating that the elevation was too low to grade for this type of framing. Anchorage between the perimeter beams and the concrete footings is minimal or non-existent (i.e., not designed for long-term use). This is not a good building design for conditions in Guam.

Covered Walkways: The most significant structural issues at many schools were observed at covered walkways. Three basic structural walkway types included: wood framed, steel framed, and concrete. The wood framed and steel framed walkways tended to be in various states of deterioration. Damaged wood framing from rot or termites were commonly observed and pose safety issues. Steel framing exhibited corrosion at cold formed steel sections (collected and trapped water) and steel pipe columns that extend straight to the ground level rather than being elevated on concrete pedestals; corrosion was severe in various locations. Repairing these steel framing issues is not recommended because the corrosion would re-occur. Complete replacement with upgraded roof and framing design, appropriate for the atmospheric conditions and avoiding cold-formed sections, is recommended. The concrete framed walkways are generally in better condition, but they do still need both roofing and drainage to

Figure 7 - Oceanview MS Walkway (23) wood roof damage.

minimize deterioration due to water ingress into the concrete. Often some or both are inadequate and deterioration due to corrosion is observed.

Priority issues that warrant immediate attention or follow-on analysis for 57 items at 26 schools are discussed further in Attachment 1 – Structural Assessment Report.

2.2 Architectural

Assessment of architectural elements included observation of exterior enclosure and finishes (including windows and doors), roofing, gutters and downspouts, covered walkways, stairs, ramps, and interior finishes (including flooring, ceiling, walls/coverings, partitions, and interior doors). As with all disciplines, elements were assessed for condition in relation to designated function and adequacy of existing condition or design in consideration of modern construction codes and best practices. Major and common problems for architectural elements included:

1. Roofing issues on low-sloped roofs
2. Corrosion of corrugated steel roofing and non-galvanized fasteners
3. Abandoned equipment on roofs
4. Roof scuppers spilling on to walkways
5. Mildew on walls
6. Mold and indoor air quality
7. Delaminating wood doors, rusting steel doors, inoperable windows
8. Ramps, stairs, walkways, and railings

Low-sloped roofs: Blistering and failing roof membranes at low slope roofs were ubiquitous throughout the facility inventory. Inadequate slope causes rainwater to pond and leads to deterioration of the roofing material. This condition is typically compounded by clogged roof drains from plants and/or debris build up. Furthermore, acrylic roof membranes were used widely and are not acceptable for roofs that have ponding water.

Figure 8 - Roofing damage on low-slope roof

Recommendations include conducting regular visual inspection and maintenance or avoiding acrylic coatings on flat or low slope roofs that do not have regular maintenance. Use of an alternative roofing material for flat/low-sloped roofs, e.g., an 80-mil rolled TPO (light) or EDPM (dark) may be appropriate for roofs with few penetrations, or a 40-mil fluid applied polyurethane, or silicone may be appropriate for low slope roof with multiple penetrations.

Corrugated metal/non-galvanized steel: Corrugated steel roofing and non-galvanized steel fasteners have a high deterioration rate. Corrosion of fasteners and roof edges was observed frequently. These conditions contributed to roof-panel rusting and resultant leaks that led to failure of wood substrate and structure. Deteriorated wood substrates and metal roofs ultimately become safety hazards.

Recommendations: replace wood walkway roof structure with galvanized, painted structure. Replace corrugated steel roof with aluminum standing seam roof. Provide gutters, downspouts, and splash blocks. Good design examples to replicate include the new walkways at Agueda Johnston MS.

Figure 9 - Corrugated steel roofing rusting

Mildew on walls: A prevalence of mildew on exterior walls, and even more so at neglected 'back of school' walls was observed. As a part of regularly scheduled maintenance (frequency will depend on school-specific conditions but well executed painting should last several years) walls should be cleaned, striped, and painted with paint that includes a primer and mildewcide. The use of overhangs could help to reduce mildew on walls.

Mold and indoor air quality: Condensation on uninsulated walls, high humidity in classrooms, and potentially the lack of outside air is contributing to mold and mildew growth and poor indoor air quality throughout GDOE's school buildings. Recommendations for reducing mold in buildings include using paint with primer and mildewcide additive, cleaning walls with a bleach mixture, using mold resistant ceiling tiles, and exploring venting opportunities to improve indoor air quality. Refer to suggestions from mechanical team report.

Delaminating wood doors, rusting steel doors, inoperable windows: It is common that veneer wood doors delaminate. This was observed often at GDOE schools and accelerated delamination was observed at exposed elevations, or 'back' of buildings. Similarly, cheap replacement wood doors delaminate, rot, and become termite infested. Steel doors, frames, hardware, and closers are rusting and/or corroding. It is recommended that facility managers replace deteriorated doors with aluminum and/or FRP doors. Rusting hardware should be replaced with commercial grade, rust-inhibiting hardware. All replacement door handles should be commercial grade lever-type handles. Residential hardware should not be used.

Figure 10 - Delaminating wood door

Most windows were not operable or easily operable which limits fresh air possibilities when AC units fail. Inoperable window should be replaced. Considerations when selecting replacement windows: air flow, natural light, security, ease of operation, and maintenance.

Ramps, stairs, walkways, and railings: Uneven walkway surfaces as well as surfaces that get slippery from rainwater or AC condensate were observed, both of which create injury hazards and should be repaired to address these issues. Stairs were observed that were cracked, cracking, or missing nosing. Steep and uncovered ramps were also observed, along with railings that were rusted to an extent that could cause injury. Correction of these issues and installation of code-compliant railings are required.

Priority issues that warrant immediate attention or follow-on analysis for 57 items at 26 schools are discussed further in Attachment 2 – Architectural Assessment Report.

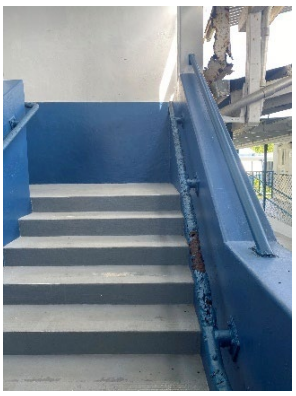

Figure 11 - Rusted railing

2.3 Mechanical, Electrical, Plumbing, Fire Protection (MEPFP)

The MEPFP assessment included visual inspection of mechanical elements (e.g., Air Conditioning), electrical elements including power distribution and branch wiring, lighting, and safety and communication systems (e.g., fire alarms), while plumbing elements include fixtures, fire suppression, and restroom fixtures. Elements are assessed in terms of their ability to serve intended function, general condition in relation to intended service life as well as for conditions that pose safety hazards. Major and common problems for MEPFP elements included:

1. Immediate safety hazards that need to be corrected
2. Required repairs or replacement of aging systems
3. Preventive maintenance and proper installation and removal for MEP systems
4. Outdoor air provision, ventilation, and building envelop improvements
5. Additional power outlets

Immediate safety hazards that need to be corrected: Some fire protection/alarm systems were observed to be inoperable. Fire protection systems and fire alarm systems require regular inspection, testing, and maintenance. Locations where impaired fire protection systems were observed and require replacement include: fire sprinkler system at Jose Rios Middle School and fire alarm system of Building 15 at Southern High School.

Relief valve of hot water heaters need to be piped to floor to prevent scalding (known locations include: Astumbo Elementary School, Carbullido Elementary School, Daniel Perez Elementary School, Finegayan Elementary School, LP Untalan Middle School, MU Lujan Elementary School, Machananao Elementary School, PC Lujan Elementary School, Building 7 at Southern High School).

Figure 12 - Jose Rios MS sprinkler pipe leaks; system is shut down.

Exposed live electrical conductors shall be protected and enclosed (Building 10 at Agueda Johnston Middle School).

Required repairs or replacement of aging systems/infrastructure/equipment: Clogged floor drains (mechanical room Building 5 at Southern High School) and leaky plumbing systems (Building 4 at Inarajan Elementary School, Building 9 at Jose Rios Middle School) require repairs, along with ceiling and walls that were damaged by water leaks.

Figure 13 - Astumbo ES corroded fire protection infrastructure

Electrical systems and capacity shall be evaluated to support the additional loads from air conditioning equipment and other school equipment.

Preventive maintenance and proper installation and removal for MEP systems: Most school MEP systems are operational. Preventive maintenance will reduce air-conditioning equipment break-down, such as land maintenance around the air-cooled condensing units, unclogged the condensate drainpipes, cleaning air filters. Mercury thermostats and abandoned air conditioning equipment shall be removed. Outdoor equipment shall have typhoon tie-downs.

Several instances were observed in which electrical rooms were being used for storage, which blocks access to electrical equipment and creates fire risks. Electrical rooms should be kept clean and working space with adequate clearance needs to be maintained. Exposed electrical and telecommunications wiring shall be covered and protected. Ground Fault Circuit Interrupter (GFCI) receptacles shall be provided by all sinks, lavatories, and outdoor electrical equipment shall be protected and maintained.

Exposed telecommunications wiring system shall be protected and installed inside conduits; locations where needed corrections were observed include along the roofs of Agueda Johnston Middle School and Jose Rios Middle School. Several public address and intercom systems are inadequate or inoperable. Inoperable and damaged receptacles and voice/data outlets shall be replaced.

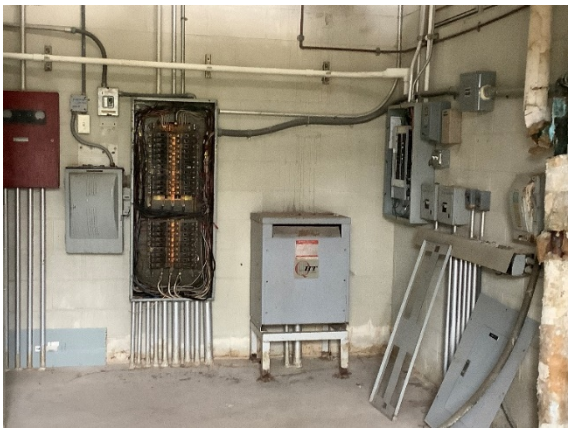

Figure 14 - Exposed panelboards with no cover plates at Agueda Johnston MS

Clogged floor drains (e.g., mechanical room Building 5 at Southern High School) and leaky plumbing systems (e.g., Building 4 at Inarajan Elementary School, Building 9 at Jose Rios Middle School) were identified as requiring repair (along with damaged ceiling and walls).

Outdoor air provision, ventilation, and building envelop improvements: The provision of outside air to classrooms is inadequate and should be addressed when replacing AC units. Some restrooms do not have mechanical ventilation; installation is required where absent. Improving the building envelope tightness and thermal resistance will reduce the energy cost. Improving daylighting to classrooms (e.g., replacing plexiglass covered jalousie louvers with double-pane windows) will improve student health, allow for fresh air provision, and potentially reduce energy costs because these windows can provide better sealing and installation than plexiglass over jalousie louvers.

Figure 15 - Closed louvers and mold from leaking condensate at Capt. Price ES

Classrooms using ductless split air conditioners should be required to have two sets of operational air conditioning due to low reliability and high maintenance requirements. This will ensure that if one system fails the other could be used to avoid disruptions to school operations.

Additional power outlets: Schools that were observed to require additional power outlets include: Captain Price Elementary School, George Washington High School, MU Lujan Elementary School, PC Lujan Elementary School, and Buildings 2 and 7 at Talofofo Elementary School.

Priority issues that warrant immediate attention or follow-on analysis are discussed further in Attachment 3 – Mechanical, Electrical, Plumbing, And Fire Protection Assessment Report.

2.4 Civil/Site

Assessment of site elements included observation of stormwater drainage, water, sewer, fire protection and emergency vehicle access conditions. Major and common problems for civil/site elements included:

1. Storm water drainage systems
2. Landscape maintenance
3. Playground equipment
4. Unpaved roadways, driveways, and fire access lanes
5. Undesignated parking areas
6. Fences
7. Drainage swales
8. Handicapped parking
9. Backflow preventers for potable water lines

Storm water drainage systems: Conditions and needs vary amongst schools. Generally, maintenance of drainage systems, retention basins, drainage ditches, rain gutters and downspouts, swales, and culverts is inadequate and additional attention in the short term and with regular frequency is required. General maintenance should include, but is not limited to:

Figure 16 - Storm drain clogged with vegetation and debris at Inarajan ES

a. Removal of debris from the drain inlets and outlets and flushing of drain lines.
b. Clearing and regrading of retention basins to remove silt and restore basins to original depth to ensure proper basin function.
c. Removal of debris and vegetation blocking pipes, regrading of surrounding areas to match bottom elevation of culverts and flushing of culverts to ensure proper culvert function.
d. Cleaning and regrading of existing swales and ditches to ensure proper function of swales and ditches.
e. Clearing and removal of debris from the rain gutters and downspouts. Repair and/or replace disconnected rain gutters and downspouts.

Landscape maintenance: Routine maintenance of school grounds must be provided on a routine basis to preserve the quality of the landscape and ensure effective site drainage as well as to provide a safe and healthy environment for the students and faculty (reference information available in the Grounds Maintenance Primer; HHF 2017). The following items of concern were noted and should be addressed:

Figure 17 - Girdled dead trees at Astumbo ES

a. Tree and/or tree stump removal that is blocking drainage ways or swales is necessary to prevent flooding or ponding.
b. Topdressing of topsoil and re-seeding to replace eroded grass areas.
c. The coconut rhinoceros beetles have damaged and killed numerous coconut palm trees throughout the school campuses leaving topless palm trunks standing. These dead palm trees will need to be removed before they fall and damage property or cause major injury or death.
d. There are trees and palms that were planted with a vehicle rubber tire around the base that restricts growth as the trees mature. Several have fallen because of this. All trees with tires around the truck will eventually die or topple over due to the unbalanced, top-heavy tree. Tires must be removed from tree trunks where present.
e. There are existing trees growing too close to buildings, fencing, drain inlets, utility lines and must be removed to avoid damage to facilities. Many of these trees were started from

windblown seeds that germinated and rooted naturally; these could have been removed as a part of landscape maintenance.

f. Large existing campus trees needs to be pruned annually by a licensed contractor with an experienced certified arborist to oversee the pruning of branches and roots.
g. Coconut palm trees needs to have the fruiting coconuts removed twice a year to prevent injury or death from falling coconuts.
h. Feral pigs in outlying school campuses have damaged playfields to the point that they are unusable in some cases. Repair and replacement fencing is needed to keep pigs out.
i. Trees are uplifting roadways and curbs as well as pedestrian walkways. Recommend rerouting pedestrian walkways away from trees in lieu of tree removal. Root pruning can be accomplished along roadway curbs. Appropriate root control barriers can be installed at the time of repairing. Root pruning to be supervised by a certified arborist.

Playground Equipment: Existing equipment is rusted and corroded beyond repair, and, in some cases, caution tape was placed around equipment to keep kids off. Protruding, sharp rusting metal can cause severe injuries. Recommend removal of such play equipment. Existing outdoor play areas at all elementary schools lack resilient play surfacing that meets industry standards for playground structures. These issues limit students' ability to play, which is known to be beneficial to students mental and physical health, and present safety risks (e.g., sharp metal; falls on the hard exposed coral outcrops). Existing equipment should be removed and replaced with age-appropriate play structures with resilient play surfacing that meets the safety guidelines from the IPEMA Certified (International Play Equipment Manufacturers Association and to ASTM F1292 for Impact Attenuation of Surface Systems) installed under and around playground equipment per safety standards for each product installed.

Figure 18 - Unusable playground equipment at Upi ES

Unpaved roadways, driveways, and fire access lanes: Numerous potholes were observed that need to be repaired; all weather surfacing should be installed for fire trucks and other emergency vehicles.

Undesignated parking areas: Various schools have undesignated parking areas (i.e., cars parked in grassed or dirt areas). During wet weather this creates ruts in the ground and affects site drainage. To avoid this situation, school staff should be limited to parking in designated areas only.

Fences: Almost all schools have fence lines that are rusting, damaged and/or overgrown with vegetation that needs to be cleared and the deteriorated and/or damaged fencing repaired or replaced.

Drainage swales: Design and construction of concrete drainage swales, culverts and drain inlets is needed for flood prone areas.

Handicapped parking: Some ramps exceed the 8.33% maximum running slope and 2% cross slopes for landing areas and some walkways were uneven due to uplift from tree roots or settling and would impede wheelchair use. Handicapped parking stalls and accessible routes are generally present at each school and warrant further verification of meeting the current Americans with Disabilities Act (ADA) Accessibility Guidelines (ADAAG).

Backflow preventers for potable water lines: Backflow preventers are required after water meters for all schools. Size to adhere to the dimensions specified by the Guam Administrative Rules and Regulations / Title 28 Public Utilities / Chapter 2. Guam Waterworks Authority / Article 1. Rates and Services.

Figure 19 - Broken fence overtaken by vegetation at Astumbo ES

Figure 20 - Debris-filled drainage swale at Simon Sanchez HS

Priority issues that warrant immediate attention or follow-on analysis are discussed further in Attachment 4 – Site Assessment Report.

3. School DM Totals

School DM costs per square foot (SF), to normalize school DM costs by school size, are shown in in Figure 4.

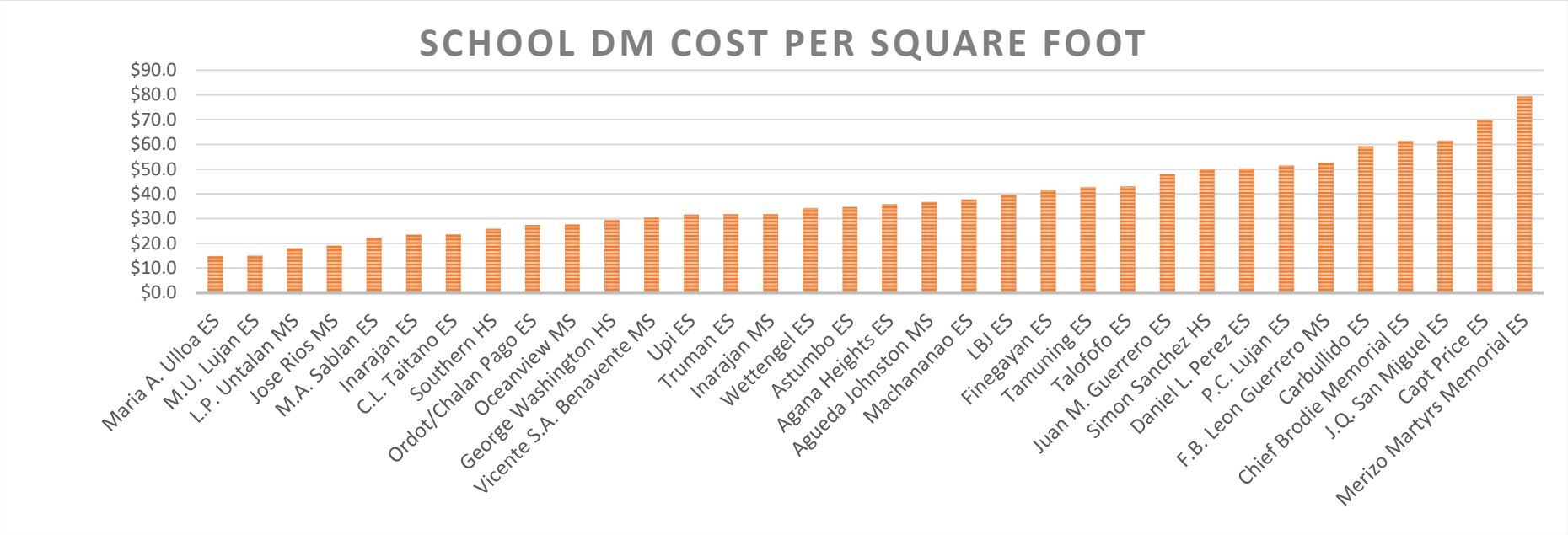

Figure 21 - School DM Cost per square foot

All DM by school and by work activity is shown in Table 3 (note: fire protection elements are included in electrical (e.g., alarms) and plumbing (e.g., suppression)). Many DM items could be addressed through regular maintenance activities, demolition of buildings that are past their economic useful lives, or CIP upgrades. The CIP recommendations made during GDOE's facility master planning process should be referenced for refined DM totals and facility needs.

Table 3 - All DM by School and by Work Activity (millions)

#	School Name	Structure	Roof	Interior	Exterior	Mechanical	Electrical	Plumbing	Site	Total
1	Agueda Johnston MS	$1.1	$1.2	$0.3	$0.1	$0.6	$0.5	$0.1	$0.1	**$4.1**
2	Astumbo ES	$0.1	$0.7	$0.1	$0.0	$0.3	$0.1	$0.2	$0.4	**$1.8**
3	C.L. Taitano ES	$0.1	$0.7	$0.1	$0.2	$0.4	$0.1	$0.1	$0.4	**$2.0**
4	Capt Price ES	$1.2	$1.4	$0.3	$0.3	$0.4	$0.1	$0.1	$0.5	**$4.3**
5	Carbullido ES	$0.2	$1.1	$0.1	$0.1	$0.3	$0.2	$0.4	$0.5	**$2.8**
6	Chief Brodie Memorial ES	$0.1	$1.4	$0.0	$0.5	$0.2	$0.1	$0.0	$0.4	**$2.7**
7	Daniel L. Perez ES	$0.7	$1.7	$0.1	$0.3	$0.3	$0.2	$0.1	$0.5	**$4.0**
8	F.B. Leon Guerrero MS	$3.4	$2.0	$0.5	$0.3	$1.1	$0.5	$0.2	$0.0	**$8.2**
9	Finegayan ES	$1.1	$1.3	$0.1	$0.0	$0.2	$0.0	$0.1	$0.5	**$3.3**
10	George Washington HS	$0.5	$1.4	$0.8	$0.9	$0.5	$0.7	$0.3	$0.1	**$5.2**
11	Agana Heights ES	$0.7	$0.1	$0.1	$0.1	$0.1	$0.1	$0.0	$0.4	**$1.6**
12	Inarajan ES	$0.1	$0.6	$0.1	$0.0	$0.1	$0.1	$0.0	$0.5	**$1.5**
13	Inarajan MS	$1.0	$0.1	$0.1	$0.5	$0.3	$0.4	$0.3	$0.2	**$2.8**
14	J.Q. San Miguel ES	$0.6	$1.2	$0.1	$0.2	$0.3	$0.2	$0.1	$0.4	**$3.2**
15	Jose Rios MS	$0.1	$0.0	$0.1	$0.4	$0.1	$0.2	$0.2	$0.2	**$1.3**
16	Juan M. Guerrero ES	$0.2	$1.8	$0.1	$0.2	$0.1	$0.2	$0.2	$0.4	**$3.2**
17	L.P. Untalan MS	$0.3	$0.3	$0.0	$0.1	$0.1	$0.1	$0.3	$0.0	**$1.3**
18	LBJ ES	$0.2	$0.2	$0.0	$0.0	$0.1	$0.1	$0.1	$0.5	**$1.1**
19	M.A. Sablan ES	$0.4	$0.1	$0.1	$0.1	$0.2	$0.2	$0.2	$0.4	**$1.8**
20	M.U. Lujan ES	$0.1	$0.0	$0.0	$0.0	$0.0	$0.3	$0.0	$0.4	**$0.8**
21	Machananao ES	$0.1	$0.5	$0.0	$0.0	$0.6	$0.0	$0.1	$0.4	**$1.7**
22	Maria A. Ulloa ES	$0.4	$0.0	$0.1	$0.0	$0.1	$0.4	$0.2	$0.4	**$1.6**
23	Merizo Martyrs Memorial ES	$0.7	$1.2	$0.0	$0.2	$0.1	$0.1	$0.1	$0.4	**$2.8**
24	Oceanview MS	$1.4	$0.2	$0.1	$0.1	$0.2	$0.2	$0.1	$0.0	**$2.5**
25	Ordot/Chalan Pago ES	$0.2	$0.3	$0.1	$0.0	$0.1	$0.0	$0.1	$0.6	**$1.4**
26	P.C. Lujan ES	$0.5	$0.7	$0.1	$0.5	$0.5	$0.2	$0.0	$0.4	**$2.9**
27	Simon Sanchez HS	$2.0	$0.9	$1.9	$0.7	$1.1	$0.6	$0.2	$0.1	**$7.4**

#	School Name	Structure	Roof	Interior	Exterior	Mechanical	Electrical	Plumbing	Site	Total
28	Southern HS	$0.9	$1.4	$1.3	$1.1	$3.9	$1.9	$1.3	$1.2	**$13.0**
29	Talofofo ES	$0.5	$0.0	$0.0	$0.0	$0.2	$0.1	$0.4	$0.4	**$1.6**
30	Tamuning ES	$0.1	$1.8	$0.0	$1.3	$0.1	$0.1	$0.3	$0.5	**$4.2**
31	Truman ES	$0.1	$0.1	$0.0	$0.0	$0.2	$0.2	$0.1	$0.9	**$1.6**
32	Upi ES	$0.2	$1.6	$0.1	$0.3	$0.1	$0.3	$0.0	$0.4	**$3.2**
33	Vicente S.A. Benavente MS	$0.8	$0.6	$0.2	$0.7	$0.4	$0.4	$0.2	$0.3	**$3.7**
34	Wettengel ES	$0.1	$0.8	$0.1	$0.1	$0.4	$0.3	$0.2	$0.5	**$2.6**
	Total	**$19.9**	**$27.6**	**$7.0**	**$9.7**	**$13.9**	**$9.2**	**$6.4**	**$13.5**	**$107.2**

4. Functional Adequacy Assessment Summary

The assessment team evaluated functional adequacy of school spaces during the rapid condition assessment to capture observations of the extent to which the spaces are able to support education functions. Room dimensions, light levels, acoustics, and flexibility of spaces were assessed. Flexibility of spaces considers the ability to use rooms in various ways and for various purposes to support changing pedagogical models (e.g., student centered learning).

Most classrooms were adequately sized with reasonable dimensions (i.e., comparable length and width, not overly long and narrow). Regardless, 20 of 34 schools (59 percent) had undersized classrooms in at least one building. Two schools had undersized classrooms in all buildings (J.M. Guerrero ES and Tamuning ES).

Light levels were typically adequate, but several areas were identified with inadequate natural light. Daylight is blocked in many cases by aluminum jalousie blinds that are inoperable or difficult to open, storm shutters that are perpetually closed and painted, or covered clearstory windows. The classroom learning environments would benefit from the integration of natural daylight.

Classrooms with acoustic ceiling tile generally had minimal acoustic concerns (though some schools with acoustic tile ceilings were significantly mildewed). Schools with concrete ceiling classrooms had more acoustical issues and some schools had acoustic concerns in some classroom buildings due to partial walls, with no insulation, or loud A/C equipment.

Most schools had a least a few classrooms that offered flexibility, including quad classrooms, duplex classrooms, classrooms with existing movable partitions or classrooms with interior doors between classrooms, outdoor courtyards, and under-utilized old shop classrooms.

A summary of functional adequacy observations by school is provided in Appendix A.

5. Existing Funding, Sources, and Capital Improvement Project Planning

The estimated DM backlog far exceeds historic ability to fund the required work, which is why so much DM currently exists throughout the inventory. Existing facility funding is provided via the respective annual fiscal year operational budget and legislative appropriations. A breakdown of the annual fiscal year operational budget, shown in millions of dollars (M), for fiscal years (FY) 2015-2020 is shown in Table 4.

Table 4 - GDOE annual fiscal year operational budgets for FY 2015-2020 (Source: GDOE Budget Office)

	FY 2015 (M)	FY 2016 (M)	FY 2017 (M)	FY 2018 (M)	FY 2019 (M)	FY 2020 (M)	Six Year Average (M)
Personnel Services	$3.9	$4.0	$3.6	$3.9	$4.5	$3.6	$3.9
Contractual Services	$3.3	$4.1	$3.8	$4.3	$5.3	$1.9	$3.8
Supplies & Materials	$0.3	$0.2	$0.5	$1.3	$1.9	$0.4	$0.8
Equipment	$0.0	$0.0	$0.0	$0.0	$0.1	$0.03	$0.0
Maintenance Budget	**$7.5**	**$8.3**	**$7.9**	**$9.5**	**$11.9**	**$5.9**	$8.5
Capital Outlay	$0.04	$0.0	$0.0	$0.0	$9.8	$0.0	$1.6
Total	**$7.5**	**$8.3**	**$7.9**	**$9.5**	**$21.7**	**$5.9**	$10.1

Table 4 shows substantial fluctuation in maintenance funding and capital outlay. Budget fluctuations can present challenges for sustaining an adequate maintenance program. The existing maintenance budget and funding needs are discussed further in the Preventive Maintenance Plan that was created for GDOE.

Costs that are currently being tracked include personnel services (i.e., maintenance staff), contractual services, and supplies and materials. GDOE is adding preventive maintenance to some repair and replacement projects (e.g., fire protection, AC units) and has contracted other preventive maintenance services, both of which are captured under contractual services. Capital outlay should address larger facility improvements (e.g., facility replacement, major renovation or expansion or new facilities) that may be required to address capacity needs or forgone facility deficiencies. Based on data received from GDOE, capital outlays appear to have been very limited over the past six years as noted in Table 2. Other typical sources of funds for major GDOE facility repair or replacement include Budget Act appropriations (e.g., FY2020 and FY2021 funds for projects) and funding from the Governor's Office (Department of the Interior (DOI) Discretionary Funds in addition to annual DOI CIP grants).

American Rescue Plan (APR) and Coronavirus Aid, Relief, and Economic Security (CARES) Act funding provide rare opportunities to resolve health and safety DM issues and transition to a preventive-maintenance-based approach to facility maintenance.

At the time this report was prepared GDOE had a facility master planning process underway that would capture information from the condition assessments and provide planning for capital improvement projects based on capacity analysis, needed facilities based on revised school standards, and addressing deferred maintenance, particularly for high priority health and safety concerns.

Appendix A – Summary of Functional Adequacy Observations by School

Color Coding:

Adequate	Issues Observed	Major Issues

#	School Name	Site ID	Room Dimensions	Light Levels	Acoustics	Flexibility of Spaces	Air Quality
1	Agana Heights ES	GU01014	Classrooms (CRs) too small: Bldg. 6 (32' x 24' = 768)				
2	Agueda Johnston MS	GU01002		Gym and Bldg. 11 have low natural light			
3	Astumbo ES	GU01003				Limited potential for flexible spaces	
4	C.L. Taitano ES	GU01005	CRs too small: Bldg. 6 (25' x 35' = 875)				
5	Capt Price ES	GU01006	CRs too small: Bldg. 14 (30' x 23' = 690) and Bldg. 10 (29x28=812)				
6	Carbullido ES	GU01007		All windows closed or boarded. No natural light, except at office			
7	Chief Brodie Memorial ES	GU01008	small CRs: Bldgs. 6, 7, 9, 11 (29x28=812) and Bldgs. 16, 17 (23x31=713)		Poor acoustics at Bldgs. w/ concrete ceilings		

#	School Name	Site ID	Room Dimensions	Light Levels	Acoustics	Flexibility of Spaces	Air Quality
8	Daniel L. Perez ES	GU01009		Painted clerestories, inoperable jalousies; closed storm shutters	Poor acoustics at Bldgs. w/ concrete ceilings	Limited potential for flexible spaces	
9	F.B. Leon Guerrero MS	GU01010	small CRs: Bldg. 10 (23x15.5=357); rooms split w/ plywood wall				
10	Finegayan ES	GU01012	small CRs: Bldgs. 22-27 (23x15.5=357); unused bldgs.	Both natural and electric light levels are low.		Adequate, except for Bldg. 6	Air quality concerns in Bldgs. 14-18
11	George Washington HS	GU01013	small CRs: Bldg. 8 (23x30=690); Bldgs. 1 and 19 (15x35=525)	Inadequate natural lighting			
12	Inarajan ES	GU01015					
13	Inarajan MS	GU01016		Poor natural light; windows mostly inoperable			
14	J.Q. San Miguel ES	GU01018	small CRs: Bldgs. 10, 11 (30x25=750)	Low natural light at most rooms due to inoperable jalousies			
15	Jose Rios MS	GU01020	small CRs: Bldgs. 3, 4, 5, 6 (23x32=736); Bldgs. 9		Poor acoustics at split classrooms		

#	School Name	Site ID	Room Dimensions	Light Levels	Acoustics	Flexibility of Spaces	Air Quality
			(20x24=480); Bldgs. 10, 11 (23x35=805)		(compounded with AC issues)		
16	Juan M. Guerrero ES	GU01021	small CRs: All Bldgs. (29x29=841)	Light levels are adequate, but lack natural light			
17	L.B.J. ES	GU01023		Light levels are adequate, but lack natural light			
18	L.P. Untalan MS	GU01022	small CRs: Bldg. 19 (34x25=850); Bldg. 14 (18x23=414); Bldg. 17 (17x17=289); Bldgs. 21, 22 (31x23=713)	Artificial light levels adequate, natural light levels low	Poor acoustics at concrete wall and concrete ceiling CRs		
19	M.A. Sablan ES	GU01025	small CRs: Fast track Bldgs. (23x32=736)	Natural lighting is poor; windows mostly inoperable.			
20	M.U. Lujan ES	GU01026		Natural lighting is poor, windows are mostly inoperable.			
21	Machananao ES	GU01027					
22	Maria A. Ulloa ES	GU01028	small CRs: Bldgs. 11, 13 (23x32=736)				

#	School Name	Site ID	Room Dimensions	Light Levels	Acoustics	Flexibility of Spaces	Air Quality
23	Merizo Martyrs Memorial ES	GU01029					
24	Oceanview MS	GU01030	small CRs: Bldgs. 12-22 (23x30=690)	Natural lighting is poor, windows are mostly inoperable.			
25	Ordot/Chalan Pago ES	GU01032	small CRs: all bldgs. (29x29=841)				
26	P.C. Lujan ES	GU01033	small CRs: Bldgs. 8 (23x31=713)	No or little natural day light. Most windows remain shut for security.			
27	Simon Sanchez HS	GU01034	small CRs: Bldgs. 6, 7·(23x33=759); Bldgs. 13, 14 (23x31=713); Bldg. 12·(23x27=621)			Limited potential for flexible spaces	
28	Southern HS	GU01035	small CRs: Bldgs. 2-5 (25x33=825); Bldg. 6 (26x34=884)				
29	Talofofo ES	GU01036	small CRs: portables and fast track bldgs. (23x32=736)			Limited potential for flexible spaces	
30	Tamuning ES	GU01037	small CRs: all Bldgs. (26x29=754)			Limited potential for flexible spaces	

#	School Name	Site ID	Room Dimensions	Light Levels	Acoustics	Flexibility of Spaces	Air Quality
31	Truman ES	GU01038	small CRs: Bldgs. 9, 10 (23x31=713)				
32	Upi ES	GU01039					
33	Vicente S.A. Benavente MS	GU01040					
34	Wettengel ES	GU01041		Use of natural light could be improved.			