

# **INSULAR ABC'S INITIATIVE**

## **Phase III Task 1 Findings and Recommendations**

### **American Samoa**

October 2015



**US Army Corps  
of Engineers**  
Honolulu District



**Office of Insular Affairs**  
**US Department of Interior**



**HHF PLANNERS**  
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## Background

The US Office of Insular Affairs (OIA) Insular ABCs Initiative is a multi-phase effort being managed by the US Army Corps of Engineers, Honolulu District via its contractor, HHF Planners. It is a collaborative effort with Insular Governors focused on improving the physical conditions of Insular Area public schools (Commonwealth of Northern Marianas, Guam, American Samoa and the US Virgin Islands).

The project is now in its third and final phase focused on removing the Deferred Maintenance (DM) backlog identified in Phase II. Assessments and recommendations for school sites and buildings were divided amongst four disciplines:

- Architectural
- Structural
- Mechanical, Electrical, Plumbing, and Fire Alarm (MEPFA)
- Civil

The purpose of the Phase III investigation was to:

- Receive updated input from cognizant local agencies and other stakeholders related to school conditions and priorities
- Confirm and review DM work completed since the Phase II condition assessment (2013)
- Update condition assessments for elements of concern
- Evaluate new Health/Safety issues
- Discuss and review issues of particular concern with cognizant local agencies
- Gather information on issues/elements of concern to develop and refine project recommendations to be included in the Work Plan.

This report includes Phase III findings and recommendations for Architectural, Structural, and MEPFA building system conditions. Civil engineer findings and recommendations are addressed in a separate report.

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**ARCHITECTURAL SUMMARY REPORT  
AMERICAN SAMOA**  
October 2015

Prepared by:  
**Mason Architects, Inc.**

## I. PRIORITYZATION PRIOR TO PHASE 3 SITE VISIT

The Phase 2 survey produced ratings for various Architectural elements, as well as identification of Health and Safety issue. Prioritization of Architectural projects for Phase 3 was compiled from the results of the Phase 2 surveys, based on building element conditions and the potential hazards to building users. The order of priority for projects based on the Phase 2 observations were: conditions that pose an immediate hazard to the health and safety of the building occupants, conditions that if left unrepairs may cause damage to other building components or its contents, and other maintenance and repair projects. The table below shows the architectural elements found in the Phase 2 survey with Health and Safety concerns.

SCHOOL	BUILDING	HEALTH/SAFETY ELEMENT
Coleman Elementary School	23-Classroom/Admin	Exterior Stair construction
Fagaitua Elementary School	09-Classroom	Exterior Stair construction
Fagaitua Elementary School	09-Classroom	Tile & Covering - Vinyl
Fagaitua Elementary School	09-Classroom	Wood Doors - Double
Leone-Midkiff Elementary School	16-Classroom	Exterior Stair construction
Pavaiai Elementary School	03-Classroom	Exterior Stair construction
Tafuna Elementary School	02-Comp Lab/Storage	Tile & Covering - Vinyl
Tafuna Elementary School	05-Classroom	Exterior Stair construction
Tafuna Elementary School	08-Classroom	Overhead fan
Tafuna Elementary School	07-Classroom	Covered Walkways

## II. SUMMARY OF PHASE 3 MEETINGS AND SCHOOL VISITS

The purpose of the Phase 3 territory visits was to:

- Get input from DPW and other stakeholders
- Confirm and review DM work completed since the Phase 2 visits
- Update condition assessments of elements of concern
- Evaluate any new Health/Safety issues
- Discuss and review issues of particular concern to DPW
- Gather information on issues/elements of concern to develop project recommendations

Since the Phase 2 visits, the responsibility of building maintenance, repair, and construction at the American Samoa schools has shifted from the Department of Education to the Department of Public Works (DPW). The DPW has their Architectural and Engineering design section, as well as its own maintenance and construction staff. Larger projects, such as new classroom buildings, are designed by the DPW A&E staff, and then bid on and constructed by a contractor. Smaller projects, such as a bathroom building or repair work, is typically completed by the DPW construction staff. The school are divided into 5 districts, each with its own District Director for the maintenance staff.

Based on concerns developed during our Phase 2 survey, as well as additional concerns expressed by the DPW and stakeholders to the project team prior to or during the Phase 3 visit, the following schools were re-visited during the March 2015 visit:

- Alataua Elementary School
- Leone-Midkiff Elementary School
- Leone High School
- Siliaga Elementary School
- Pavaiai Elementary School
- Tafuna High School
- Tafuna Elementary School
- Manulele Elementary School
- Nuu'uli Polytech
- Coleman Elementary School
- Samoana High School
- Mt. Alava Elementary School
- Matafao Elementary School
- FagaituaHigh School
- Alofau Elementary School
- Laulii Elementary School

### III. OBSERVATIONS AND ADDITIONAL INFORMATION FROM PHASE 3 VISIT

#### TV EDUCATIONAL PROGRAM

Discussions with the American Samoa Historic Preservation Officer brought to light that the Fale-style buildings at many of the public schools were constructed in the 1960s as part of a significant event in American Samoa's history, which was an Educational TV project. In 1961 an article appeared in *Reader's Digest* by reporter Clarence Hall, who had visited American Samoa. His article, titled "*Samoa: America's Shame in the South Seas*," described the poor condition of buildings, utilities, and roadways, and accused the U.S. of neglect and apathy towards an important protectorate. As a result, President John F. Kennedy and the U.S. Congress appointed Mr. H. Rex Lee as Governor to the islands. Lee immediately began plans for a complete reformation of American Samoa, including the improvement of the educational system.

A Territory-wide educational system using television and experts as a means of instruction was implemented, and a budget of \$3,538,000 was approved for an initial three-channel television system and new consolidated village schools to allow the broadcast of lessons in elementary schools in remote villages. A television studio was built at Utulei (KVZK), a new power plant was constructed, and a 226-foot transmitting tower was constructed on Mt. Alava, near Pago Pago, with a tramway system to transport the technicians up to the transmitters. Twenty-two consolidated elementary schools of three to 24 rooms were constructed; these were built the Samoan *fale* style, with curved roofs, designed to be culturally sensitive and reflect the *fa'a Samoa* (the Samoan way of life) as well as to utilize the natural

environment. Very few of the villages had electricity, so power lines were installed for the televised educational program. This brought electricity to many villages for the first time.



There was world-wide interest in the Educational TV project, and the studios and schools were visited by individuals (including Lyndon B. Johnson and the First Lady) and teams from dozens of countries. Their reports ...probably exceeded everything that had been written about Samoa up until then. The program continued into the 1970s, until budgetary issues caused the end of the program.

The TV Education Television program improved the English language teaching and learning, improved structural design in the schools, brought technological expertise to the islands, as well as providing higher education goals. The historical significance of the *fale* school buildings is due to not only their Samoan-style design, but to this important educational program that dramatically changed teaching methods as well as having an immediate impact on everyday life in American Samoa.

(information above from KVZK Building National Register Nomination Form by Kathy Gordon-Cox and James Malae)

#### PHASE III SITE VISIT OBSERVATIONS

It was observed that some repair work had been completed since the Phase 2 visits. This consisted mostly roofing replacement, gutter and downspout replacement, window replacement, and other repairs. Several new buildings, either two-story classroom buildings or bathroom buildings, have been constructed. Many of the Health and Safety issues noted in Phase 2 were not specifically resurveyed during this visit as school visits were typically focused on larger issues, but repairs have been made to some of those H/S items.

Following is a summary of the schools visited and the issues noted at each school.

#### A. Alataua Elementary School

The FEMA buildings installed in 2009? Steel remain and are in use as classrooms. They have little window area for natural ventilation, however, so if the air conditioning stops working, the rooms become uncomfortable and are not able to be used.

The principal expressed the need for covered walkways for the students and staff.

The wood roof shakes on buildings 2-6 are deteriorating, and should be replaced in the near future. If asphalt shingles are used instead of wood shakes, roof insulation should also be installed, as the asphalt shingles do not provide as much thermal protection.

At Building 4, there is a make-shift gutter installed that appears unsafe.



Deteriorated wood shakes



Gutter at Building 4

#### B. Leone-Midkiff Elementary School

Building 1 is closed and is currently not in use, as the termite damage there has worsened. Damage is apparent in structural members as well as in roof sheathing, purlins, and other non-structural elements.



At Building 3, the concrete at the base of the metal railing posts is spalling in many locations. Some areas have been patched, but more remain and require patching. The spalled concrete at the rail post connections will allow the railing to become loose, which would be a safety hazard.



At Building 16, the missing handrail at the exterior stair, which was identified in Phase 2 as a safety hazard, is still missing.



The covered walkways have been repaired and appear to be functional and in good condition.



The new two-story classroom building that was under construction during the Phase 2 assessments is now complete and is in use. It appears to be quality construction and is functioning as intended.

#### C. Leone High School

Building 7, the cafeteria was reroofed in the summer of 2013, following the Phase 2 assessment survey. There are no longer roof leaks, and the ceiling was repaired in the kitchen area where the staff complained of rats entering the kitchen; they stated that they no longer have rat issues.

The covered walkways have received some repairs, but there are still some damaged wood members and deteriorated metal roofing that require replacement.



Building 3, previously used for ROTC, is currently not in use due to termite damaged wood floors. Staff said that the building previously had a concrete slab wood floor, and a wood floor was built on top to use the building as restroom (presumably to run the plumbing under the wood floor). It appears that the wood floor structure could be removed and the building reused with the concrete floor. There is some other deteriorated roofing and other elements, but nothing that couldn't be fairly easily repaired

or replaced if the school desires to use this building. There are two trees growing very close to the building that should be removed to prevent future damage.



New restrooms were constructed at one end of Building 1, the Gymnasium.



#### D. Siliaga Elementary School

Buildings 1, 2 and 3 were re-roofed in the summer of 2013. At Buildings 1 and 2, a reflective moisture barrier was installed in some areas to help with moisture and heat, but it does not appear to have been installed at the entire roof, and was not installed at Building 3. Some new exterior siding and interior finishes were also installed at Building 2.



#### E. Pavaiai Elementary School

The covered walkways (Building 2) have been repaired, with new wood trusses and new roofing.



The spalled concrete at the base of the metal railings at Building 3 have been repaired and some of the rusted portions of the rail were patched. There are some heavily rusted areas of the rail, but it is no

longer loose. Repairs are still needed at the rusted metal base of the railing at the stair between Buildings 3 and 4.



The unsafe wood stairs at Building 10 that were noted as a safety hazard in Phase 2 have been replaced with concrete steps.



A new restroom building is currently under construction by DPW staff on the east side of the campus.

#### F. Tafuna High School

Buildings 15 and 18 received new metal roofing, while only some panels were replaced on Building 17. The remaining panels are deteriorated and should be replaced in the near future. At buildings 17 and 18 the roofing was not extended to the end of the concrete rafters; additional roofing panels should be installed to entirely cover the rafters. This will help to protect the concrete rafters from moisture, and will give the building and the walkways more protection from the rain. Roofing insulation was not installed at any of these three buildings; future reroofing projects should include insulation to help reduce the temperature on the interior. Some of the windows and doors and screens were replaced at these three buildings.



These building still have extensive concrete spalling at the columns. Some concrete patch work was completed by a teacher, but this may need to be redone when other concrete repair work was done. See the structural report for an evaluation of this situation.

New corrugated metal roofing was also installed at Buildings 11, 12 and 13; a vapor barrier was installed, but no roof insulation.

Building 8 has two safety hazards: the concrete window sills are spalling, and pieces of concrete could fall down onto someone below. These sills need to be repaired and the amount of concrete coverage over the reinforcing bars should be increased to help prevent future spalling. Also, one of the wall-mounted A/C units supports is heavily deteriorated and the support and unit are in danger of falling.



#### G. Tafuna Elementary School

Building 2 is now not in use, and is planned for demolition in the summer of 2015.

Railing repairs were completed at Building 5, but more rusted locations at Building 5 and 9 still require repair, as do locations where the concrete is spalling at the base of the railing vertical posts. The joints of the metal railing at the ramp between Buildings 7 and 8 are very rusted and need repair. The railing at the bottom of the stair at Building 7 is rusted all the way through and is completely detached.

The spalling concrete at the walkway at Building 7 was patched and is no longer a safety hazard.



Building 8 still has very rusted ceiling fans, which are a safety hazard.



#### H. Manulele Elementary School

Some of the corrugated metal roofing panels at Building 4 are heavily rusted and should be replaced.

The metal railing at building 5 has rusted holes, which could cut someone and will eventually cause the loss of integrity of the railing, and should be repaired.



## I. Nuu'uli Polytech

Building 1 received numerous repairs, including new ceilings, windows, siding and lights. Some roofing was replaced, but the corrugated metal roofing on the back side of the building is still in bad shape and needs to be replaced. Some of the metal railings at the front entries have missing pieces and there are jagged rusted portions, which are a safety hazard.



Buildings 3, 6, 7 and 10 have received extensive repairs. At Building 6, only the concrete walls were retained and the rest of the building was completely rebuilt. Some of this work was done by an Adopt-a-School summer program in which DOE and ASPA repaired these buildings. The old siding still remains at the back of Building 7, and should be replaced.



#### J. Coleman Elementary School

Building 16 has received new roofing, windows and interior finishes. Building 8 has new flooring and exterior paint. Building 1 has new roofing, and 4" of concrete were poured on top of the existing floor to encase previous cracks. There are some new cracks at the walls, implying that settlement may still be occurring.

At the roof between buildings 21 and 22, the flashing was not properly installed, allowing water to leak it when it rains. New flashing should be installed to prevent future leaking.

At Building 23, the metal railing is very rusted in places and is loose. It is a safety hazard and should be repaired. Also, the concrete is spalling at the base of the handrail in some locations, and should be repaired.



Buildings 3 and 14 are currently under renovation.

## K. Samoana High School

Buildings 3 and 6, reportedly built by the Navy in the 1950s, are planned for demolition. Building 3 has already been partially gutted, but work was halted until the school year is completed. The building has been left wide open, and students are hanging out in the building, and even doing some cleanup. This is a serious safety hazard, with broken and jagged wood and metal elements, rusty elements, nails, glass, and many other dangerous elements that could injure someone. Loose members dangle precariously above and could easily fall. The building should be cordoned off and students and staff should not be allowed in or near it. At the time of this survey, the DPW staff was made aware of the situation and intended to inform the school Principal.



The concrete structures of these two buildings do not appear to be in bad condition and could easily be reused, but school staff stated that a new building was slated for construction in another location of the campus, and that demolition of these two buildings would allow more space for the track and for more natural ventilation.

The metal handrail at the stair in Building 1 is broken and rusted, and is a safety hazard. The top of the stair has no landing, which is also dangerous.



## L. Mt. Alava Elementary School

This school is about 20 years old; the roof covering over the exterior walkways was added about 5 years ago. At the joint between the end of the building rafters and the top of the walkway roof rafters, no flashing was installed, and the building roofing extends only a few inches past the end of the building rafters. Water often gets into this joint, pouring down on the walkway below. Metal flashing/roofing should be installed under the end of the building roofing, going at least 6" under the roofing, and extending at least 6" over the walkway roofing.



Buildings 1 and 2 need new roofing. The classrooms reportedly get hot, so whenever new roofing is installed, roof insulation should be added.

The coastal location of this school has caused the constant deterioration of the roofing connectors and window screens. Galvanized or stainless steel connectors and screens should be used.

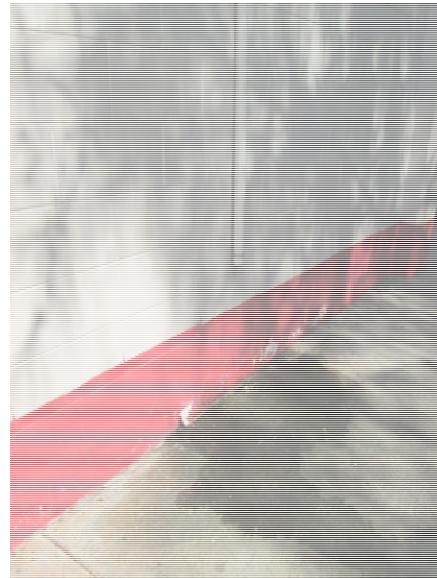
## M. Matafao Elementary School

Roofing repairs were done at building 16 recently, but there continues to be some leaking; this may be due to deteriorating fasteners. Building 17 received new roofing, windows, and flooring. Building 18 has been demolished. The roofing at Building 2 is in poor condition and should be replaced; the gluelam roof structure at building 2 is quite termite damaged.



## N. Fagaitua High School

Building 9 still has doors that open inward. On one side of the building the doors have a large concrete curb in front of the doors to keep water from getting in the building. This is an exit safety hazard, as exit doors should open out and should have panic hardware. There are also several A/C drains that pour water onto the side of the building, damaging the paint and concrete walls, and onto the sidewalk below, creating a potential slip hazard.



The solar water heating system on top of Building 6 appears to have a heavily deteriorated frame. This should be repaired if the system is still planned to be used.



A new two-story classroom building and a new restroom are being completed and will be put into use the next school year. This classroom building is a double-loaded design (classrooms on both sides of a central hallway), as the typical single-loaded building did not fit on the site.

#### O. Alofau Elementary School

Building 2 was demolished, and a restroom was put into the existing Building 10. New roofing was installed at Building 3. Building 4 was renovated and received new roofing, windows, and interior finishes.



#### P. Laulii Elementary School

Building 2 has a new gutter and downspout, but has no flooring and the windows are missing some jalousie panes, and the concrete floor at the exterior walkway is beginning to spall.



Building 3, the main office building, has received some new interior finishes and new windows on the north/addition side.



Builidng 4, the restroom, has new doors and screens, and has been repainted.

#### IV. PRIORTIZATION FOLLOWING PHASE III SITE VISITS

The table below provides a summary of Health and Safety issues identified in the Phase II and Phase III assessments. Where Phase II Health and Safety items were repaired/addressed, they were removed from the list. The Phase III assessments entailed rapid observations, and not all schools were visited nor were all buildings at each school re-surveyed. Some other safety issues not listed below may still exist.

SCHOOL	BUILDING	HEALTH/SAFETY ELEMENT
REMAING FROM PHASE II		
Coleman Elementary School	23-Classroom/Admin	Exterior Stair construction
Fagaitua Elementary School	09-Classroom	Wood Doors - Double
Fagaitua Elementary School	09-Classroom	Exterior Stair construction
Leone-Midkiff Elementary School	16-Classroom	Exterior Stair construction
Tafuna Elementary School	05-Classroom	Exterior Stair construction
Tafuna Elementary School	08-Classroom	Overhead fan
NEW FROM PHASE III		
Tafuna Elementary School	07 and 08 - Classrooms	Railings
Alataua Elementary School	04-Classroom	Gutter
Tafuna High School	08-Classroom	Spalls at window sills
Nuuuli Polytech School	01-Classroom	Railing at exterior walkway
Coleman Elementary School	023-Classroom	Railing at stair
Samoana High School	01-Classroom/Gym	Handrail and no landing
Samoana High School	03-Classroom	Demolition debris

## V. RECOMMENDED PROJECTS

Following are descriptions of Architectural Health and Safety Issues of prominent concern, as well as some other repair issues, along with recommended repair solutions.

These recommended projects are provided as a means to assist in accelerating the time to complete these projects by providing identification of prominent issues as well as suggested solutions.

### 1. Spalled or damaged concrete at railing base

Q. Location: Leone-Midkiff Elementary School, Building 3; Tafuna Elementary School, Building 5 & 9

The concrete at the stair and walkway at the base of the railing posts is spalling in several areas. This will eventually allow the railing to become loose, which is a safety hazard. The concrete should be repaired.



#### Recommended Scope of Work:

Where the concrete is spalling at the walkway or column:

- Remove all loose concrete
- Clean concrete and steel thoroughly
- Remove rust from any exposed steel and treat with a rust-preventing compound
- Pour new hydraulic concrete and make surface flush

For a spalled stair tread corner:

- Cut railing off at each base and remove railing
- Cut out the metal bases in concrete and remove all loose concrete
- Install new metal railing bases in concrete with hydraulic concrete. Locate new railing base further back from tread edge.
- Weld bases to railing such that railing is required height.

2. Rusted metal railings at concrete stairs/walkways/ramps

Location: Pavaiai Elementary School, Buildings 3 and 4; Tafuna Elementary School, Building 5 & 9; Manulele Elementary School, Building 5; Nuu'uli Polytech, Building 1; Coleman Elementary School, Building 23

The metal railings at the stairs and walkways are heavily rusted at the base; in some locations the connection to the concrete is completely gone.





#### Recommended Scope of Work:

Where railings are rusted at the base, the railing must be removed and a new metal railing base installed in the concrete.

- Cut railing off at each base and remove railing
- Cut out the metal bases in concrete and remove all loose concrete
- Install new metal railing bases in concrete with hydraulic concrete. Weld bases to railing such that railing is required height.

Where railings are rusted at horizontal portions or at pickets:

- Remove rusted metal and clean rail surface
- Weld railing as required to repair and ensure required strength

### 3. Spalling window sills

Location: Tafuna High School, Building 8

The concrete sills below the windows on the northeast side are spalling. This appears to be due to a lack of adequate concrete cover over the steel reinforcing bars; moisture has gotten to the steel bars, causing them to rust and expand, which then causes the concrete to spall. As this is occurring on the second floor windows as well as the first floor, it is a safety hazard due to the concrete falling from above.



**Recommended Scope of Work:**

- Remove entire concrete sill and steel reinforcing bar
- Clean concrete surface
- Install stainless steel nails into wall perpendicular to sill at 24" O.C.
- Attach fiberglass reinforcing bar to nails at center of sill (equal distance to bottom and top, equal distance to wall and outer edge)
- Pour new concrete sill

**4. Leaking exterior walkway roof**

Location: Mt. Alava Elementary School

This school is about 20 years old; the roof covering over the exterior walkways was added about 5 years ago. At the joint between the end of the building rafters and the top of the walkway roof rafters, no flashing was installed, and the building roofing extends only a few inches past the end of the building rafters. Water often gets into this joint, pouring down on the walkway below



**Recommended Scope of Work:**

- Flashing needs to be installed at the joint between the original roof and the new exterior walkway roof. Insert metal flashing at least 6" under the existing building roofing
- Bend metal flashing so that it curved down and then extends 6" over the walkway roofing.
- When buildings are reroofed, extend roofing further past the end of the rafters over the walkway roofing.

MECHANICAL, ELECTRICAL, PLUMBING, AND FIRE PROTECTION  
SUMMARY REPORT  
AMERICAN SAMOA  
October 2015

Prepared by:  
InSynergy Engineering, Inc.

## I. BACKGROUND AND SUMMARY OF PREVIOUS PHASE II ASSESSMENT

The initial physical assessment of all of the American Samoa schools was conducted in 2013 under Phase II of the ABC's Initiative. Based on these surveys, physical condition assessment ratings were compiled for the various MEP elements of each of the American Samoa public schools. The locations of particular types of concerns based on condition assessment data are summarized in the following table:

School	HVAC – Outside Air Provision	HVAC - Maintenance	HVAC - Equipment	Plumbing System	Plumbing Fixtures	Electrical System	Electrical Hazard	Interior Lighting	Exterior Lighting	Telecommunications/Data	Fire Alarm	Public Announcement (PA) System & Bell System	Total
A.P. Lutali Aunu'u ES	X	X	X	X	X	X	X	X	X	X	X	X	12
Afonotele ES	X	X	X	X	X		X	X	X		X	X	10
Alataua II ES	X	X	X			X	X	X	X		X	X	9
Alofau ES	X	X	X	X	X	X		X	X		X	X	10
Aua ES	X	X	X	X	X	X	X	X	X	X	X	X	12
Coleman ES	X	X	X	X	X	X	X	X	X		X	X	11
Faga'itua HS	X	X	X	X	X	X	X	X	X		X	X	11
Faleasao ES	X	X	X	X	X	X	X	X	X		X	X	11
Fitiuta ES	X	X	X	X	X	X	X	X	X		X	X	11
Lauli'i ES	X	X	X	X	X	X		X	X		X	X	10
Le'atele ES	X	X	X	X	X		X	X	X		X	X	10
Leone HS	X	X	X	X	X	X	X	X	X		X	X	11
Leone Midkiff ES	X	X	X	X	X	X	X	X	X	X	X	X	12
Lupelele ES	X	X	X	X	X	X	X	X	X	X	X	X	12
Manu'a HS	X	X	X	X	X	X	X	X	X		X	X	11
Manulele ES	X	X	X	X	X	X	X	X	X		X	X	11
Masefau ES				X	X			X	X		X	X	6
Matafao ES	X	X	X		X	X	X	X	X		X	X	10
Matatula ES	X	X	X		X	X	X	X	X		X	X	10
Mt. Alava ES	X	X	X	X	X	X	X	X	X		X	X	11
Nu'uuli Polytech HS	X	X	X	X	X	X	X	X	X		X	X	11
Olomoana ES	X	X	X	X	X	X	X	X	X		X	X	11
Olosega ES	X	X	X	X	X	X	X	X	X		X	X	11
Pavaia'i ES	X	X	X	X	X	X	X	X	X	X	X	X	12
Samoana HS	X	X	X	X	X	X	X	X	X		X	X	11
Siliaga ES	X	X	X	X	X	X	X	X	X		X	X	11
Tafuna ES	X	X	X	X	X	X	X	X	X		X	X	11
Tafuna HS	X	X	X	X	X	X	X	X	X		X	X	11
<b>Total</b>	<b>27</b>	<b>27</b>	<b>27</b>	<b>25</b>	<b>27</b>	<b>25</b>	<b>25</b>	<b>28</b>	<b>28</b>	<b>5</b>	<b>28</b>	<b>28</b>	<b>300</b>

The phase II assessment also identified the high priority of Health and Safety (H/S) items which pose an immediate hazard to the health and safety of the building occupants. H/S items are summarized in the table below:

System	Electrical						Water & Sanitation			Mechanical		Fire Protection	
Hazard	Shock	Fire	Falling	Shock, Fire	Evacuation	Shock	Health	Sanitation	Sanitation	Health	Indoor air Quality	Life safety	
Causes	Ungrounded enclosure	Undersized & No over-current protection conductors	Un-covered & Un-secured manhole	Deteriorated & corroded enclosure	Lack emergency illumination	Exposed un-insulated conductors	No hand wash nearby Cafeteria	Inadequate restroom and toilet fixtures	Inoperable septic system	No ventilation at restroom	Inoperable airconditioning system	No fire alarm and detection	Total
School				X			X	X		X		X	
A.P. Lutali Aunu'u ES							X			X		X	5
Afonotele ES							X			X		X	3
Alataua II ES	X					X		X		X		X	5
Alofa'u ES							X	X	X	X		X	5
Aua ES	X					X	X			X		X	5
Coleman ES				X		X	X			X		X	5
Faga'itua HS			X	X	X	X				X	X	X	7
Faleasao ES						X						X	2
Fititua ES	X					X		X		X		X	5
Lauli'i ES							X			X		X	3
Le'atele ES				X		X				X		X	5
Leone HS						X		X	X	X		X	5
Leone Midkiff ES						X		X	X	X		X	5
Lupelele ES						X		X		X		X	4
Manu'a HS						X		X		X		X	4
Manulele ES						X		X		X		X	4
Masefau ES							X			X		X	3
Matafao ES			X			X	X			X	X	X	6
Matatula ES	X					X	X			X		X	5
Mt. Alava ES	X		X	X			X			X		X	6
Nu'uuli Polytech HS				X		X			X	X		X	5
Olomoana ES				X		X	X	X		X		X	6
Olosega ES						X			X	X		X	5
Pavaia'i ES			X			X		X		X		X	5
Samoana HS			X	X	X		X	X		X			6
Siliaga ES			X			X			X			X	5
Tafuna ES						X			X			X	4
Tafuna HS					X		X		X		X	X	5
<b>Total</b>	<b>4</b>	<b>1</b>	<b>1</b>	<b>12</b>	<b>2</b>	<b>22</b>	<b>14</b>	<b>17</b>	<b>4</b>	<b>27</b>	<b>2</b>	<b>27</b>	<b>133</b>

## II. PHASE III SCOPE OF WORK AND FOLLOW-UP MEETINGS AND SCHOOL VISITS

The Phase III scope included refining and confirming the high priority mechanical, electrical, and plumbing (MEP) concerns from the Phase II assessments, coordinating these MEP priorities with needs from other disciplines at a building level and developing conceptual multidisciplinary projects that would allow some of the repair or replacement work to be grouped for more efficient implementation

As part of Phase III, additional field survey work was conducted from April 6 – 10, 2015. The purpose of the Phase III territory visits was to:

- Get input from the DOE and other stakeholders, including DPW, ASREC, ASPA, and the Fire Marshall
- Confirm and review DM work completed since the Phase II visits
- Update condition assessments of elements of concern

- Evaluate any new H/S issues
- Discuss and review issues of particular concern to the DOE
- Gather information on issues/elements of concern to develop project recommendations
- Review and update the energy audit assessment

Based on concerns developed during our Phase 2 survey, as well as additional concerns expressed by the DPW and stakeholders to the project team prior to or during the Phase III visit, the following schools were re-visited during the April 2015 visit:

- Alataua II Elementary School
- Leone Midkiff Elementary School
- Leone High School
- Siliaga Elementary School
- Pavaia'i Elementary School
- Tafuna High School
- Tafuna Elementary School
- Manulele Elementary School
- Nu'uuli Polytech High School
- Coleman Elementary School
- Samoana High School
- Mt. Alava Elementary School
- Matafao Elementary School
- Faga'itua High School
- Alofau Elementary School
- Lauli'i Elementary School

### III. OBSERVATIONS AND ADDITIONAL INFORMATION FROM PHASE III VISIT

A majority of the MEP DM items identified in Phase II have not been completed, including most of the high priority MEP H/S items.

One primary concern that was raised during the survey work was that most of the schools are not equipped with fire alarm systems as currently required under most building codes. This issue is muddled since American Samoa has not officially adopted an update to the 1967 UBC which is still officially on record as their building code. The new 2 story classroom building at Faga'itua High School was constructed in 2014. Its structural drawing was referenced to UBC 1997. UBC 1997 section 305.9 requires approved fire alarm system installation for Occupancy Group E with 50 or more occupants. This newly constructed classroom building has 8 classrooms, yet no fire alarm system was installed.

Moreover, another 2014 constructed 2 story at Leone Midkiff Elementary School, which has kitchen and cafeteria on the first and 4 classrooms on the second floor, did not have fire alarm system. However, it is believed that code officials have been requiring conformance to the 2003 IBC for new construction. Following the IBC 2003 requirements would make the addition of a fire alarm system for the schools a requirement. Based on these findings, and additional concerns raised by the fire department on this issue, the installation of new fire alarm systems for each of the schools has been elevated to a high priority MEP H/S item.

Some of the electrical service upgrades previously identified in our Phase II assessment were completed, while other service upgrades still need to be accomplished. The electrical service upgrade work in our MEP physical condition rating assessment was updated accordingly.

Some of the mechanical and plumbing system deficiencies previously identified in our Phase II assessment were completed, while other service upgrades still need to be accomplished. The mechanical and plumbing work in our MEP physical condition rating assessment has been updated accordingly.

Two general shelter deficiencies were noted:

1. No emergency shelter standby generator electrical power installation or hook up provision.
2. No provision of emergency shelter water supply for sanitation purpose during emergency conditions.

It is noted that retrofit projects for these items are not captured in the current DM cost estimates.

Additional Energy Conservation Measure (ECM) improvements were also completed as noted in the section covering the Energy Audit Assessment Update.

The following is a summary of the schools visited and the issues noted at each school:

#### A. Alataua II Elementary School

##### 1. Building 08

OIA Phase II survey found the septic tank and leaching field supporting the restrooms were out of service, causing sanitation and environmental issues. OIA Phase III survey found the septic tank and leaching field were repaired and the restroom was functioning satisfactorily.

##### 2. Fire alarm

OIA Phase II survey found no fire alarm system in the campus, and no fire alarm system was installed in OIA Phase III survey. This poses a safety hazard to the occupants. New fire alarm system should be provided throughout the campus.

##### 3. Electrical System

ASPA rewired service to the school and the grounding issue has been resolved.



#### B. Leone Midkiff Elementary School

##### 1. Fire alarm

OIA Phase II survey found no fire alarm system in the campus, and no fire alarm system was installed in OIA Phase III survey. Neither the new 2 story building constructed in 2014, which has kitchen and cafeteria on the first floor and 4 classrooms on the second floor, has fire alarm system. This poses a safety hazard to the occupants. New fire alarm system should be provided throughout the campus.

New 2 story building constructed in 2014 did not have fire alarm system. This building was constructed after OIA Phase II survey.



## 2. Electrical System

Building 02 – Newly renovated.  
Light fixtures are new



Building 01 – Under repair



Building 03 – Per ASPA, New meter enclosure is required.



New Building – Electrical Service



### C. Leone High School

#### 1. Fire alarm

OIA Phase II survey found no fire alarm system in the campus, and no fire alarm system was installed in OIA Phase III survey. This poses a safety hazard to the occupants. New fire alarm system should be provided throughout the campus.

#### 2. Electrical System

Building 16 – New ASPA Electrical Service and Equipment



Building 16 – Panelboard improperly covered



Building 07 – Lighting Repairs Completed



Building 01 – New ASPA Service, Old service equipment not removed



Building 10 – New panel improperly installed, height exceeds Code acceptable mounting height



#### D. Siliaga Elementary School

##### 1. Fire alarm

OIA Phase II survey found no fire alarm system in the campus, and no fire alarm system was installed in OIA Phase III survey. This poses a safety hazard to the occupants. New fire alarm system should be provided throughout the campus.

2. Electrical System

Building 02 – New ASPA Service



Building 02 – Ground wire exposed creating a tripping hazard



E. Pavaia'i Elementary School

1. Fire alarm

OIA Phase II survey found no fire alarm system in the campus, and no fire alarm system was installed in OIA Phase III survey. This poses a safety hazard to the occupants. New fire alarm system should be provided throughout the campus.

2. Electrical system

Building 10 – New ASPA Service Meter



## F. Tafuna High School

### 1. Building 03

OIA Phase II survey found some split type air conditioners were inoperable. Air conditioners were repaired and operational during OIA Phase III survey.



### 3. Building 08

OIA Phase II survey found some split type air conditioners were inoperable. Although air conditioners were repaired and operational during OIA Phase III survey, old condensing units remained on the exterior wall above walkway. The deteriorated equipment casing and supports should be removed to avoid falling objects. This situation is a safety hazard.

### 4. Fire alarm

OIA Phase II survey found no fire alarm system in the campus, and no fire alarm system was installed in OIA Phase III survey. This poses a safety hazard to the occupants. New fire alarm system should be provided throughout the campus.

## 5. Electrical System

### Building 01 – New Lighting Completed



Building 18 – Plywood structure placed around Electrical Service Equipment to secure access.

Equipment still missing covers



New Restroom Building - Lighting



## G. Tafuna Elementary School

### 1. Fire alarm

OIA Phase II survey found no fire alarm system in the campus, and no fire alarm system was installed in OIA Phase III survey. This poses a safety hazard to the occupants. New fire alarm system should be provided throughout the campus.

2. Electrical System

Building 07 – Lighting fixtures unchanged; replacement needed



Building 08 – New ASPA meter; panel cover needs to be replaced to code



H. Manulele Elementary School

1. Fire alarm

OIA Phase II survey found no fire alarm system in the campus, and no fire alarm system was installed in OIA Phase III survey. This poses a safety hazard to the occupants. New fire alarm system should be provided throughout the campus.

2. Electrical System

Building 04 – Broken/missing device covers replaced



Building 06 – Disconnect is original; replacement is needed



I. Nu'uuli Polytech High School

1. Fire alarm

OIA Phase II survey found no fire alarm system in the campus, and no fire alarm system was installed in OIA Phase III survey. This poses a safety hazard to the occupants. New fire alarm system should be provided throughout the campus.

2. Electrical System

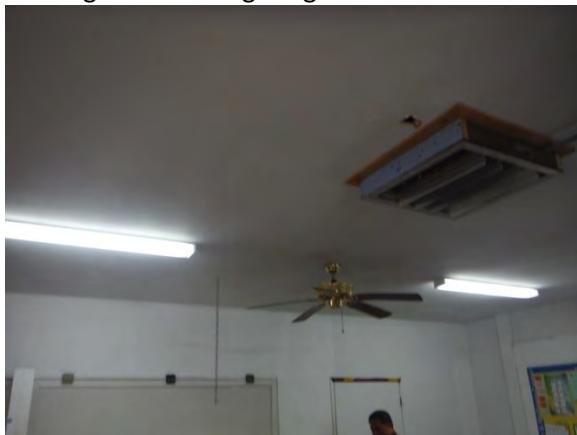
Building 01 – New ASPA service/meter



Building 03 – Newly enclosed classroom with new electrical



Building 06 – New Lighting



Building 07 – New ASPA Service, building has been newly renovated



J. Coleman Elementary School

1. Building 02

OIA Phase II survey found the restrooms were closed for repair. The restrooms were rehabilitated and reopened to students in OIA Phase III survey.



2. Fire alarm

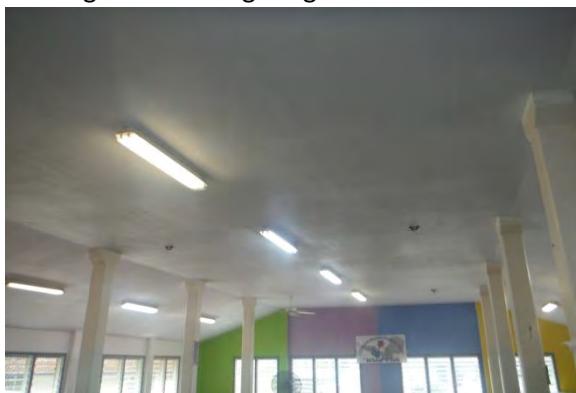
OIA Phase II survey found no fire alarm system in the campus, and no fire alarm system was installed in OIA Phase III survey. This poses a safety hazard to the occupants. New fire alarm system should be provided throughout the campus.

3. Electrical System

Building 16 – New ASPA Service/Meter



### Building 22 – New Lighting



### Samoana High School

#### 1. Fire alarm

OIA Phase II survey found no fire alarm system in the campus. OIA Phase III survey found that building 2 had one broken push station. No other fire alarm installation was obseerved at the campus. The school had no functional fire alarm system. This poses a safety hazard to the occupants. New fire alarm system should be provided throughout the campus.

#### 2. Electrical System

##### Building 03 – Currently being demolished



##### Building 09 – Lighting upgrade completed



K. Mt. Alava Elementary School

1. Building 06

OIA Phase II survey found incomplete and leaky plumbing fixtures in the restrooms. Restrooms were repaired and fully operational in OIA Phase III survey.



3. Fire alarm

OIA Phase II survey found no fire alarm system in the campus, and no fire alarm system was installed in OIA Phase III survey. This poses a safety hazard to the occupants. New fire alarm system should be provided throughout the campus.

4. Electrical System

Site – New electrical handhole covers



**Building 06 – Electrical Service Equipment is unchanged**



**Building 03 – New ASPA Electrical Service/Meter**



**L. Matafao Elementary School**

**1. Building 15**

OIA Phase III survey found the backflow preventer was installed side-ways and should be corrected in order to function properly.



2. Building 17

OIA Phase II survey found the air conditioners were inoperable causing poor indoor air quality.  
Air conditioners were repaired in OIA Phase III survey.



3. Fire alarm

OIA Phase II survey found no fire alarm system in the campus, and no fire alarm system was installed in OIA Phase III survey. This poses a safety hazard to the occupants. New fire alarm system should be provided throughout the campus.

4. Electrical System

Building 17 – Completely Renovated



Building 15 – Existing Overhead ASPA service needs repair



Building 14 – Location of Main Electrical Service. Needs to be relocated prior to demolition



M. Fagaitua High School

1. Building 10

OIA Phase II survey found incomplete and leaky plumbing fixtures in the restrooms. Restrooms were repaired and fully operational in OIA Phase III survey.



2. Building 07

OIA Phase III survey found electric hot water heater was not secured and pressure/ temperature relief valve was not piped properly and simply drained to floor. This poses a safety hazard to occupants and should be corrected.



##### 5. Fire alarm

OIA Phase II survey found no fire alarm system in the campus, and no fire alarm system was installed in OIA Phase III survey. Neither the new 2 story building constructed in 2014 consisted of 8 classrooms, has fire alarm system. This poses a safety hazard to the occupants. New fire alarm system should be provided throughout the campus.



##### 6. Electrical System

Building 07 – Lighting replacement complete



Building 08 – Currently under renovation



Building 09 – Electrical equipment cabinet is not secured exposing live electrical bussing



Building 06 – Newly constructed building with new ASPA Electrical Service



New Restroom Building - Lighting



## N. Alofau Elementary School

### 1. Building 02

OIA Phase II survey found the restroom building was deteriorated. It was demolished in OIA Phase III survey.



### 2. Building 04

OIA Phase II survey found the building was deteriorated and needed repair. The building was rehabilitated and used as a classroom in OIA Phase III survey.



### 3. Building 10

OIA Phase II survey found the gease trap was overflowing and continuously running-off to the walkway. This created both health and slipping hazard. Grease trap and drainage was repaired. Walkway was cleaned in OIA Phase III survey.



4. Fire alarm

OIA Phase II survey found no fire alarm system in the campus, and no fire alarm system was installed in OIA Phase III survey. This poses a safety hazard to the occupants. New fire alarm system should be provided throughout the campus.

5. Electrical System

Building 04 – Completely renovated



Building 03 – Lighting Repairs are ongoing



O. Lauli'i Elementary School

1. Building 03

OIA Phase II survey found some split air conditioners were inoperable causing poor indoor air quality. Air conditioners were repaired in OIA Phase III survey.



2. Building 04

OIA Phase II survey found defective plumbing fixtures. Plumbing fixtures were repaired adequately in OIA Phase III survey.



3. Fire alarm

OIA Phase II survey found no fire alarm system in the campus, and no fire alarm system was installed in OIA Phase III survey. This poses a safety hazard to the occupants. New fire alarm system should be provided throughout the campus.

4. Electrical System

Building 09 – Lighting replacement completed



Building 04 – Lighting repairs complete



#### IV. ADJUSTMENTS TO PRIORITIZATION FOLLOWING PHASE III SITE VISITS

While not all of the MEP Health and Safety issues noted in Phase II are known to have been repaired, the site visits in Phase III added some additional items to the list of MEP Health and Safety issues. Revisions to the MEP DM physical condition assessment scoring, and to the H/S list based on our Phase III follow-up work were made to the database and include:

1. Identified work complete so these items could be filtered from proposed DM projects
2. Revised some item condition ratings and corresponding DM
3. Changed the fire alarm installation work for the schools to a high priority H/S item.

Two items were identified as critical deficiencies, but are not accounted for in the DM database:

1. No provision for emergency shelter standby electrical power or hook up.
2. No provision to emergency shelter water supply for sanitation purpose during emergency conditions.

#### V. ENERGY AUDIT ASSESSMENT UPDATE FOR PHASE III

##### 1. Recap of Phase II Energy Audit Findings

The chart below (p. 20 in the Phase II report) provides an overview of the energy conservation measures (ECMs) that were initially recommended for American Samoa. At that time, the total annual savings was estimated at \$1.1 M (2013 dollars) at a total investment cost of \$9.1 M for the Primary ECMs that were recommended.

Energy Audit ECM Recommendations	Am. Samoa
<b>ECMs - Electric</b>	
New Solar Hot Water or Heat Recovery System	
Replace T12 Fixtures with T8 LED	
Replace T8 Fluorescent Lamps with T8 LED	
Programmable Thermostats for AC	
Roofmount 30-200 KW PV system	
Fix Supply Air Discharge Duct Leaks	
New Lighting Controls	
New VFDs/High Efficiency Booster Pump Motors	
New Heat Recovery/ Desuperheater System	
Insulate Non-insulated Roofs	
Replace AC Systems with High Efficiency Units	
Retrofit with Ultra Low Flow Plumbing Fixtures	
<b>Total Investment (\$M) - Primary ECMs</b>	\$9.1
<b>Simple Payback (years) - Primary ECMs</b>	8
<b>Investment Capitalization (years) - Primary ECMs</b>	8
<b>Dollar Savings (millions per year) - Primary ECMs</b>	\$1.1
<b>Percent Reduction in Utility Costs - Primary ECMs</b>	55%
ECM Recommended – Primary Recommendation	
ECM Recommended– Other, feasible if funding permits	
Not proposed	

## 2. Updated Phase II Energy Audit Analysis

Based on our follow-up survey, several ECM's have been implemented, primarily for replacing T-12 with T-8 lighting. Our updated analysis, which has been revised to reflect the implementation of T-8 lighting retrofits is summarized in the table below:

Energy Audit ECM Recommendations	Am. Samoa
<b>ECMs - Electric</b>	
New Solar Hot Water or Heat Recovery System	Green
Replace T12 Fixtures with T8 LED	NA
Replace T8 Fluorescent Lamps with T8 LED	Green
Programmable Thermostats for AC	Green
Roofmount 30-200 KW PV system	Blue
Fix Supply Air Discharge Duct Leaks	Green
New Lighting Controls	Green
New VFDs/High Efficiency Booster Pump Motors	Green
New Heat Recovery/ Desuperheater System	Light Gray
Insulate Non-insulated Roofs	Light Gray
Replace AC Systems with High Efficiency Units	Light Gray
Retrofit with Ultra Low Flow Plumbing Fixtures	Light Gray
<b>Total Investment (\$M) - Primary ECMs</b>	\$9.1
<b>Simple Payback (years) - Primary ECMs</b>	8
<b>Investment Capitalization (years) - Primary ECMs</b>	8
<b>Dollar Savings (millions per year) - Primary ECMs</b>	\$1.1
Percent Reduction in Utility Costs - Primary ECMs	55%
<b>Total Investment (\$M) - All Feasible ECMs</b>	\$12.3
<b>Simple Payback (years) - All Feasible ECMs</b>	10
<b>Investment Capitalization (years) - All Feasible ECMs</b>	10
<b>Dollar Savings (millions per year) - All Feasible ECMs</b>	\$1.2
<b>Percent Reduction in Utility Costs - All Feasible ECMs</b>	60%
	ECM Recommended – Primary Recommendation
	ECM Recommended– Other, feasible if funding permits
	Not proposed

The updated analysis, which includes the retrofit of the recently installed T-8 with LED linear lamps for an additional 30% improvement in energy efficiency for lighting, suggests that the implementation of the Primary ECM's will still be cost effective, with the total annual savings for all Primary ECM's totaling \$1.1 Million at a total investment cost of \$9.1 Million. The total annual savings including all additional feasible ECM's, including replacement of all of the air conditioning equipment with high efficiency units, and the replacement of all plumbing fixtures with low flow plumbing fixtures, would increase to \$1.2 Million at a total investment cost of \$12.3 Million. The implementation of these additional feasible ECM's would also have a significant positive impact on addressing the Deferred Maintenance (DM) for the replacement and maintenance on these items.

## VI. MECHANICAL / PLUMBING / ELECTRICAL PROJECT DESCRIPTIONS

Following are descriptions of Mechanical / Plumbing / Electrical Health and Safety Issues of prominent concern, as well as some other common repair issues, along with recommended repair solutions.

These recommended projects are provided as a means to assist in accelerating the time to complete these types of projects by providing identification of prominent issues as well as suggested solutions.

### 1) HVAC System

#### a) Air conditioning equipment:

Most schools at AS use unitary air conditioning systems including ductless split, ducted split and packaged air conditioners. When air conditioners are installed, the following recommendations should be considered.

Recommendations:

- EPA approved refrigerant, high efficiency system and corrosion protective coating air conditioning equipment should be used.
- Implement energy conservation programs such as temperature set back or turn off air conditioning based on school activity schedules. Programmable thermostats or centralized controls should be used.
- Placement of condensing units should consider maintenance accessibility, required operation clearance, acoustical impact to classrooms; minimize penetrations to building envelopes and typhoon protection.
- Metal supports with corrosion protective coating for AC equipment should be used.

Location: Lauli'i ES building 6, kitchen and Nu'uuli Polytechnic building 1, classroom – wooden AC equipment supports.



- Remove old air conditioning equipment and seal all unused penetrations.  
Location: Tafuna HS Building 8, Classroom / Office, had abandoned AC equipment on exterior wall over the walkway. AC equipment casing and supports were heavily corroded and posed hazards.



b) Indoor air quality:

Ventilation should conform to ASHRAE 62.1. Space comfort level should conform to ASHRAE 55.1. HVAC system deficiencies will cause poor indoor air quality, health hazards and damage to building elements and contents.

Location: Samoana HS building 02, Classroom

Air conditioner to science laboratory was down causing high room temperature and humidity.



Recommendations:

- Repair air conditioning deficiencies in timely manner. Repair water leaks and condensation as soon as possible.
- Maintain inadequate outside air and space comfort levels to the occupied spaces per ASHARE standards.

Location: Samoana HS building 02, Classroom – Interior toilets did not have exhaust system.  
Exhaust fans and ducts should be installed.

Recommendations:

- Repair air conditioning deficiencies in timely manner. Repair water leaks and condensation as soon as possible.

- Maintain inadequate outside air and space comfort levels to the occupied spaces per ASHARE standards.
- Provide exhaust system for interior toilet and toilet do not sufficient natural ventilation.

c) Condensate drain:

Location: Faga'itua HS building 5, office; building 9, classrooms - Condensate drains discharged to sidewalks causing slipping hazards.



Recommendations:

- Provide proper sized and sloped condensate drain lines to collect and convey the condensate drain. Minimum 1" (25 mm) diameter pipe and 2% slope are preferred. Provide clean out not more than 180 degree change in direction and 50 ft apart.
- Condensate drain should be discharged to dry well or indirect drain with P-trap to waste line.

2) Plumbing fixture and piping

Plumbing fixtures and piping should be maintained including leaky pipes and valves, defected and loosen fixtures and clogged waste line. Provide ADA fixtures to meet ADA requirement.

Location: Pavaia'i ES, building 21, restroom – water leak inside the pipe chase was not repaired. A hole was drilled on wall to relief the water leak inside the pipe chase.

Recommendations:

- Repair water leak and plumbing fixture as soon as possible.
- Keep inventory of parts and fixture. Use common model and local available products.
- Provide ADA fixtures to comply ADA requirement.



3) Hot water heater

Installation of hot water heater should be in accordance with IMC and National Electrical Code (NEC). Hot water heater should be secured. Temperature and pressure relief should be pipe to above floor.

Location: Faga'itua HS building 7 , Cafeteria – electric hot water heater was not secured. Temperature pressure relief valve was not pipe to above floor.



Recommendations:

- Install hot water heater in accordance with applicable codes and standards. Provide seismic restraints, relief valve piping and service clearance.

4) Grease interceptor

Waste water discharging oil and grease should have an approved grease interceptor prior connecting to the waste system. Grease interceptor should be designed and engineered for the application. Installation should be in accordance with codes and standards, and manufacturer installation requirement. Regularly maintenance and service the grease interceptor.

Location: Alataua ES building 3, kitchen – grease trap cover is not fully sealed.



Recommendations:

- Provide grease trap conforming to PDI G101 or equal or accepted by authority having jurisdiction.

5) Indirect waste connection

Indirect waste should be installed for food preparation and handling equipment including kitchen sink.

Location: Faga'itua HS building 7, kitchen – lack of indirect waste connection at kitchen sink



Recommendations:

- Install indirect waste at food preparation and handling equipment including kitchen sink and dishwasher. Indirect waste should be air gap or air break conforming to International Plumbing Code and requirement of authority having jurisdiction.

6) Pipe supports

Piping, and ducting and equipment should be proper to support and secured against the gravity, vibration, thrust, expansion and seismic loads.

Location: Nu'uuli Polytechnic building 06, Cafeteria.

Water supply pipe was not supported.



Recommendations:

- Use proper anchor, hanger and pipe support system, such as steel rod, ring hanger, clevis hanger, and trapeze hanger.
- Use corrosion resistant material and coating for pipes and supports at humid and corrosive environment.

7) Kitchen hood fire suppression systems

Where cooking hood suppression system is installed, the system should be installed and maintained in accordance with IMC and IFC, including ventilation system, fire suppression system and interlocks to associated systems such as fuel supply and fire alarm system. IFC requires automatic fire suppression system for Type I commercial cooking hood, which generates grease and smoke.

Location: Tafuna HS building 1, kitchen – cooking hood suppression system should be serviced.



Recommendations:

- Maintain automatic fire suppression system in accordance with NFPA standards and manufacturer's requirement.
- Install automatic fire suppression system to Type I cooking hood which creates grease and smoke, in accordance with IMC, IFC, fire department requirements and applicable codes and standards. Systems should be design, install and commissioning by qualified engineer and technician.

## 8) Fire Alarm Systems

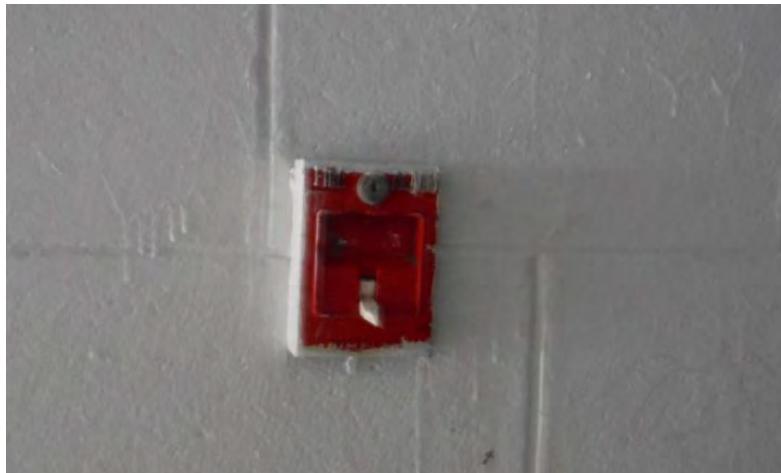
Location: All schools

Most of the America Samoa K-12 public schools do not have fire alarm or fire sprinkler system including two newly constructed school buildings at Leone Midkiff ES and Faga'itua HS. Few fire alarm systems were installed but systems are inoperable due to lack of service and maintenance. Fire Department wants fire alarm systems at all schools but it is lack of confirmation of that adopted model building codes to enforce.

Location: Tafuna HS building 1, kitchen – Pull station was taped. Fire alarm system was not serviced.



Location: Samoana HS building 2, classroom – Pull station was damaged. Fire alarm system was not services.



Location: Faga'itua HS building 9 – Lack of duct smoke detector to shut down air conditioner exceeding 2,000 CFM.



Recommendations:

- Install fire alarm system systems throughout K-12 schools. Consult with fire department the requirement of fire alarm systems.
- Install and maintain fire alarm system in accordance with NFPA 72. Consult with fire department for the required edition of NFPA 72.
- Fire alarm system should be designed and installed by qualified engineer and technician. System should have local support for parts and technical assistance and support.
- Create a fire alarm technical team within AS DPW and DOE to perform the trouble shooting, repair, maintenance and routine testing and certification.
- Conduct regular test and fire drill. Coordinate and invite fire department to participate fire test and fire drill.
- Establish fire safety awareness program to promote fire safety awareness to the staffs and occupants.

**STRUCTURAL SUMMARY REPORT  
AMERICAN SAMOA**  
October 2015

**Prepared by:  
Martin & Chock, Inc.**

## I. Prioritization of Structural Repairs Prior to Phase III Site Visits

A list of prioritization of repair projects was compiled based on the ratings of the Phase II building assessments. The Phase II Assessments entailed rapid observations of damage to non-concealed structural elements. At the top of the list are all buildings with structural damage identified as a life safety issue. Table 1 presents a summary of all building damage identified as a life safety concern prior to the Phase III site visits.

Following the life safety items, are Repair Priority Levels 1 through 5 which correspond to Damage Levels 1 through 5 (as assessed during the Phase II site visits). Priority Levels are numbered in order of descending priority (Repair Priority Level 1 being the highest priority) in the same manner that Damage Levels are numbered in descending order of damage (Damage Level 1 being the most severe damage). Since the life safety items for the Territory are few and have relatively low estimated repair costs associated with them, the next two levels of Repair Priority are also considered in this report. Table 2 summarizes all building damage identified as a Repair Priority Level 1 or 2 prior to the Phase III site visits.

	SCHOOL	BUILDING ID / DESCRIPTION	SAFETY ELEMENT
TUTUILA	Alofau Elementary School	04-Office/ECE	Wood Columns
	Leone Midkiff Elementary School	18-Covered Walkway	Steel Columns
	Manulele Elementary School	03-Admin/Library	CIP Column - Floor
	Matafao Elementary School	14-ECE	CIP Column - Floor
	Nu'uuli Polytech High School	10-Classroom	Wood/Flat or Pitched Roof
	Pavai'ai Elementary School	02-Covered Walkway	Wood Columns
	Siliaga Elementary School	07-Abandoned Classroom	Wood Beams, Wood Bearing Walls, Wood Joists
	Tafuna Elementary School	02-Comp Lab/Storage	Crawl Space
		12-Car Shelter	Wood Columns
		13-Classroom	CIP Column - Floor
		16-Classroom	CIP Column - Floor
		17-Classroom	CIP Column - Floor
		18-Classroom	CIP Column - Floor

Table 1 – Summary of Life Safety Items Prior to Phase III Site Visits

	SCHOOL	BUILDING ID / DESCRIPTION	ELEMENT
TUTUILA	Matafao Elementary School	18-ECE	Wood Roof Decking
	Siliaga Elementary School	07-Abandoned Classroom	Wood/Flat or Pitched Roof

Table 2 – Summary of Repair Priority Level 1 Items Prior to Phase III Site Visits

	SCHOOL	BUILDING ID / DESCRIPTION	ELEMENT
MANUA	Manu'a High School	03-Teacher Housing	Wood Bearing Walls
	Alataua II Elementary School	08-Restroom	Wood Roof Decking
	Alofau Elementary	02-Restroom	CIP Column - Floor
	Coleman Elementary School	08-Classroom 20-Classroom	Slab on Grade Wood/Flat or Pitched Roof
	Lauli'i Elementary School	08-Classroom	Reinforced Masonry Bearing Walls
	Matafao Elementary School	03-Classroom 14-ECE 18-ECE	Slab on Grade Wood/Flat or Pitched Roof Wood/Flat or Pitched Roof
	Nu'uuli Polytech High School	01=Admin/Classroom	Steel Columns
	Olomoana Elementary School	02-Classroom 03-Classroom	CIP Column - Floor Slab on Grade
	Pavaia'i Elementary School	02-Covered Walkway 09-Admin	Slab on Grade Wood Bearing Walls
	Samoana High School	03-Classroom	Wood/Flat or Pitched Roof
	Siliaga Elementary School	01-Library/Special ED 02-Comp Lab/Office	Wood Bearing Walls Wood Bearing Walls
		07-Abandoned Classroom	Crawl Space
TUTUILA	Tafuna Elementary School	07-Classroom 12-Car Shelter	CIP Beam & Slab Wood/Flat or Pitched Roof
	Tafuna High School	11-Classroom	CIP Column - Floor

Table 3 – Summary of Repair Priority Level 2 Items Prior to Phase III Site Visits

## II. Phase III Site Visits

The purpose of the Phase III site visits was to:

- Get input from the stakeholders in the Territory
- Evaluate new life safety issues that were not previously identified or conditions that were identified but need to be elevated to the highest level priority.
- Determine if the high priority conditions identified during Phase II have changed appreciably.
- Outline a scope of work for the health and safety items.

Based on the prioritization exercise performed by our office and input from stakeholders in the Territory, the following school buildings were visited during our April 2015 visit to all school districts on the island of Tutuila. New buildings are indicated in **bold** font for reference.

Tuesday, April 7, 2015 (Far West District)

1. Alataua II Elementary School Building 6
2. Leone Midkiff Elementary School Buildings 2, 3, 18, **19**, and **20**
3. Leone High School Buildings 1, 3, and 19
4. Siliaga Elementary School Buildings 1, 2, and 7
5. Pavai'ai Elementary Buildings 2, 9, 12, and **22**

Wednesday, April 8, 2015 (Mid West District)

6. Tafuna High School Buildings 8, 12, 13, 15, 16, 17, 18 and **24**
7. Tafuna Elementary School Buildings 2, 7, and 12
8. Manulele Elementary School Building 3
9. Nu'uuli Polytech High School Buildings 1, 3, 6, and 10

Thursday, April 9, 2015 (Central and Mid East Districts)

10. Coleman Elementary School Buildings 8, 16, 19, 20, and 21
11. Samoana High School Buildings 3
12. Matafao Elementary School Buildings 3, 14, 17 and 18
13. Mount Alava Elementary School Buildings 1, 2, and 7

Friday, April 10, 2015 (Mid East and Far East Districts)

14. Fagaitua High School Buildings 5, 6, 9, **12**, and **13**
15. Alofau Elementary School Buildings 2 and 4
16. Lauli'i Elementary School Building 8

### **III. General Observations and Additional Findings during Phase III Site Visits**

In general, it was observed that a great deal of repair and maintenance work had been performed since the 2013 Phase II site visits. Many buildings were completely renovated while many others were demolished. A good number of new buildings have also been constructed since 2013 (typically two-story reinforced concrete and masonry structures with wood-framed gable roofs)

In terms of items identified as life safety concerns during the Phase II site visits, not many were found to have been addressed. Note that the majority of the life safety items involve damaged concrete elements (slabs, beams, and columns with spalls and loss of cross section due to corrosion of reinforcing steel bars) and very little concrete repair work appears to have been performed in the past two years. The life safety items that were observed to have been addressed were those involving wood members which were typically repaired as part of comprehensive renovations/rehabilitations of entire buildings.

In the case of structural repairs of items not identified as a life safety concern, the majority of the repairs performed in the last two years involved carpentry work. Repairs included, but were not limited to, replacement of plywood sheathing and replacement of wood decking, battens, purlins, and rafters. This type of structural repair work typically corresponds to items assigned a Damage Level of 2 or 3 per the Phase II assessments. Work of this kind was usually observed at buildings that had undergone comprehensive renovation/rehabilitation of all building components.

With regard to new findings, it was found that concrete cracks and spalls that remain unaddressed have progressed and, in some cases, loose chunks of concrete have blown off leaving reinforcing bars exposed. Loss of cross section, particularly in columns, has worsened due to the increase in the size and quantity of the spalls. In some cases, the additional loss of cross section has now triggered a new health and safety flag.

The following narrative provides a detailed discussion of the findings at each of the buildings that were visited during the Phase III site visits. New life safety items are noted and described on a one to one basis.

## 1A. Alataua II Elementary School Building 6

Building 6 (Classroom Building) is a typical oval-shaped reinforced concrete and wood framed fale structure. During the 2013 Phase II site visit, the exterior slab-on-grade was observed to have cracks and spalls with exposed reinforcing at the edges. It does not appear to be any change in the condition between the 2013 Phase II and the 2015 Phase III site visits.

Phase II Site Visit (April 2013)



Phase III Site Visit (April 2015)



## 2A. Leone Midkiff Elementary Building 2 (Demolished)

At the time of the 2013 Phase II site visit, Building 2 was an open fale structure made up of long-span wood trusses on wood beams on log columns. During the 2015 Phase III site visit, the fale structure had been demolished and a new building constructed in its place (see Building 20).

Phase II Site Visit (March 2013)



## 2B. Leone Midkiff Elementary Building 3

Building 3 (Classroom Building) is a two-story building with a reinforced concrete (footings, columns, beams, and second floor slab) concrete masonry unit (exterior and interior walls), and wood (wood roof decking, purlins, and beams) superstructure. On one side of the building, structural steel pipe columns are used in between concrete columns to support the wood roof. It was observed during the 2015 Phase III site visit that one of the steel columns has experienced corrosion at the bottom near the base plate. The corrosion disintegrated the weld between the column and the base plate leaving approximately half of the column cross section exposed. In addition, the corrosion has resulted in a spall at the edge of the second floor slab.

Phase II Site Visit (March 2013)



Phase III Site Visit (March 2015)



## 2C. Leone Midkiff Elementary Building 18 (Covered Walkway)

The walkways connecting Buildings 1, 2 and 6 consist of a wood gable roof supported on square concrete masonry unit (CMU) columns. The roof is made up of metal roofing on wood battens on wood purlins. Every other purlin has a horizontal wood strut for lateral bracing. The CMU columns appear to be unreinforced and not grouted. During the 2013 Phase II site visit, one of the CMU columns was observed to be bent out of plane approximately at the joint between the fourth and fifth block course from the bottom. The kink made the CMU column unstable and was, therefore, noted as a life safety concern.

At the time of the 2015 Phase III site visit, the CMU column had been repaired by straightening all courses back into plumb. The column appeared to remain unreinforced and not grouted. The life safety flag has been removed for this item.

Phase II Site Visit (March 2013)



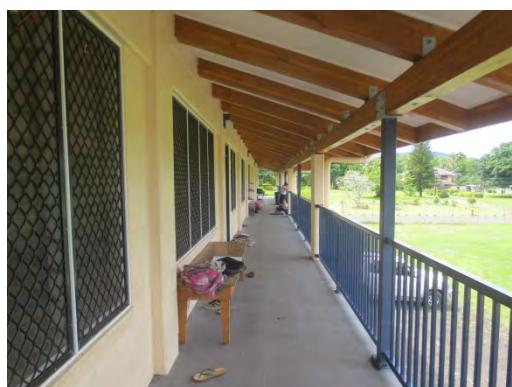
Phase III Site Visit (March 2015)



## 2D. Leone Midkiff Elementary Building 19 (New Building)

Building 19 (Classroom Building) is a new two-story building with a reinforced concrete (footings, columns, beams, and second floor slab), concrete masonry unit (exterior and interior walls), and wood (glulam roof beams) superstructure. All structural elements appeared to be in excellent condition. The building was reported to have been recently completed by New Zealand based Fletcher Pacific Construction. At the time of the visit, the building was occupied.

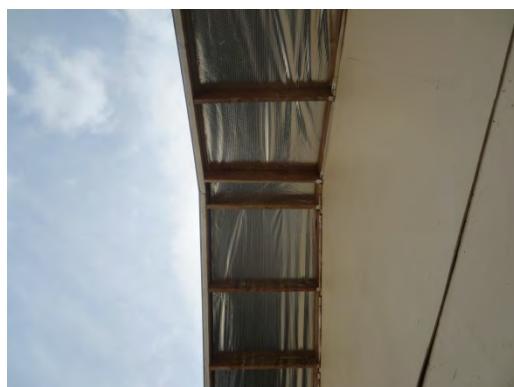
Phase III Site Visit (March 2015)



## 2E. Leone Midkiff Elementary Building 20 (New Building)

Building 20 is a new single-story classroom building constructed on the former site of Building 2. The building is rectangular in plan and has a gable roof framed with wood purlins over structural steel long span trusses (purlins are only exposed at the roof overhangs). Reinforced concrete frames at the perimeter of the building support the steel trusses. The concrete frames are infilled with a windows resting on a concrete masonry unit (CMU) sill. All structural elements were observed to be in excellent condition.

Phase III Site Visit (March 2015)



### 3A. Leone High School Building 1

Building 1 (Gymnasium) is a single-story structural steel and cold-formed steel framed structure with reinforced concrete foundations and slab-on-grade. The superstructure consists of cold-formed steel purlins over long-span structural steel rigid frames. In 2013, the structural elements were observed to be in overall good condition with only minor corrosion of the structural steel rigid frames and minor to moderate cracks in the slab-on-grade.

At the time of the 2015-site visit, the structure had just undergone a complete renovation. During the renovation, the structural steel members appeared to have been cleaned of corrosion and repainted. Repairs to the cracks in the slab-on-grade were also done. Lastly, two reinforced concrete and concrete masonry unit (CMU) structures were added to the east and west gable ends of the original building. The new addition on the east side of the building is one story only and houses a small weight room. On the west side of the building, in contrast, the addition is two stories and includes bathrooms and offices/work-out rooms. All structural elements were observed to be in excellent condition following the renovation.

Phase II Site Visit (March 2013)



Phase III Site Visit (March 2015)



Phase II Site Visit (March 2013)



Phase III Site Visit (March 2015)



### 3B. Leone High School Building 3

Building 3 (JROTC Building) is a circular-shaped reinforced concrete (columns and ring beams) and wood (stud walls and circular roof beams) framed false structure. In 2013, the building was occupied and used as classrooms. The building was found to be in overall fair condition mainly because of moderate termite and rot damage to the wood walls and beams. The slab-on-grade was also noted as uneven and settled.

During the 2015 site visit, the building had been abandoned. A wood framed raised floor exists over the slab-on-grade. This raised floor was found to be in detrimental condition with large portions either collapsed or intentionally removed. Hence, a health and safety flag has been issued for the damaged raised floor.

Phase II Site Visit (March 2013)



Phase III Site Visit (March 2015)



### 3C. Leone High School Building 19 (Covered Walkway)

The covered walkway running along the longitudinal axis of the campus from Building 1 to Building 12 is a reinforced concrete (columns) and wood (roof framing) structure. The roof of the walkway is typically constructed with four wood purlins spanning between column lines. The two purlins at the perimeter of the walkway are typically box-style beams. A pair of wood beams at each column line provides support for the purlins. Each pair of beams is connected to the sides of the columns via through bolting. Columns are typically eight inches square with foundations concealed below grade.

During the 2013 Phase II site visit, the walkway was found to be in overall fair condition. Some of the wood purlins were observed to have minor to moderate termite damage and/or wet rot. A concrete column was also found to have large cracks and spalls near the base. The metal roofing was missing along portions of the walkway.

In 2015, during the Phase III site visit, extensive repairs to the walkway were observed. The repairs included replacement of damaged or missing wood purlins and metal roofing. Albeit localized in terms of location and extent, some termite-damaged purlins were still observed. The damaged column observed in 2013 has not been repaired. This time around, three other concrete columns were observed to have moderate to severe cracks and spalls. In one case, the column has severe loss of cross section. This item has, therefore, been identified as a health and safety concern. The damage to these last three columns was inadvertently overseen during the 2013 assessment.

Phase II Site Visit (March 2013)



Phase III Site Visit (March 2015)



Phase II Site Visit (March 2013)



Phase III Site Visit (March 2015)



#### 4A. Siliaga Elementary Building 1

Building 1 (Classroom) is a single-story wood framed building with a gable roof. During the 2013 Phase II site visit, moderate to severe water damage was observed at the exterior wood siding. Water damage to the interior finish of the exterior walls was also observed. Due to the breach in the exterior envelope, damage to the perimeter structural wood bearing walls was determined to be very likely. At the time of the 2015 Phase III site visit, the building had undergone extensive renovation. The exterior siding had been repaired and/or replaced. It is unknown whether repairs to the wood bearing walls, if any were required, were performed. The perimeter walls appeared to be in excellent condition both from the exterior and from the interior.

Phase II Site Visit (March 2013)



Phase III Site Visit (March 2015)



#### 4B. Siliaga Elementary Building 2

Building 2 (Classroom) is a single-story wood framed building with a gable roof. During the 2013 Phase II site visit, moderate to severe water damage was observed at the exterior wood siding. Water damage to the interior finish of the exterior walls was also observed. Due to the breach in the exterior envelope, damage to the perimeter structural wood bearing walls was determined to be very likely. At the time of the 2015 Phase III site visit, the building had undergone extensive renovation. The exterior siding had been repaired and/or replaced. It is unknown whether repairs to the wood bearing walls, if any were required, were performed. The perimeter walls appeared to be in excellent condition both from the exterior and from the interior.

Phase II Site Visit (March 2013)



Phase III Site Visit (March 2015)



#### 4C. Siliaga Elementary Building 7

Building 7 is a single-story wood framed building. During the 2013 site visit, the building was identified as abandoned. Due to the overall decrepit condition of the structure (the floor joists and beams in particular), a life safety tag was assigned to the building. It was recommended that the building be demolished because of its detrimental condition its relatively low monetary value.

Two year later, the building is still abandoned and its condition has not changed. The recommendation that the building be demolished remains.

Phase II Site Visit (March 2013)



Phase III Site Visit (March 2015)



## 5A. Pavaia'i Elementary School Building 2 (Covered Walkway)

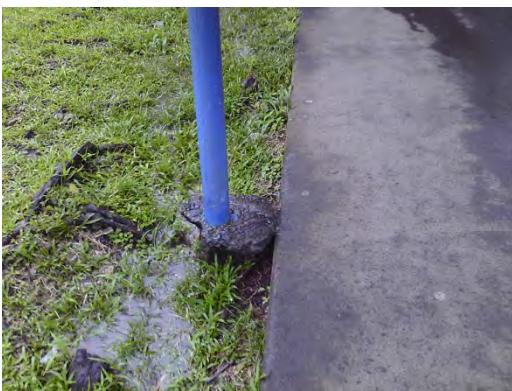
There are two walkways on campus: one connecting Buildings 3 and 4 and one connecting Buildings 13 through 20. Both walkways typically have wood framed roofs. Columns are wood, structural steel, or reinforced concrete. The variety in column materials results in a variety of, somewhat non-engineered and ad hoc, connections to the roof framing.

In 2013, the roofs at both walkways were observed to be in fair to poor condition. The wood beams, rafters, and battens exhibited extensive termite and wet rot damage. The columns were also found to be in detrimental condition, especially cases where the columns were made out of wood (this condition was typical of the walkway connecting Buildings 13 through 20). One wood column in particular was found near the point of collapse and was given a life safety tag. In the case of steel columns, the foundation was exposed and appeared to be just a blob of concrete completely above grade (this condition was more prominent on the walkway connecting Buildings 13 through 20).

Two years later, during the Phase III site visit, it was observed that the walkway connecting Buildings 13 through 20 had been renovated. The roof had been completely replaced with wood trusses supported on wood beams. The metal roofing appeared to be new as well. The original steel and concrete columns were retained and the wood columns, including the one that had triggered the health and safety tag, were replaced with new wood columns. A new concrete slab-on-grade was poured over the existing slab-on-grade effectively encapsulating some of the exposed foundation at the base of the steel columns. The connections between the new roof beams and the existing/new columns remain of many different types. In some cases, the connections appear incomplete, with missing fasteners, metal connectors, or other fittings.

The walkway connecting Buildings 3 and 4, in contrast, was only given a cosmetic makeover consisting of new metal roofing, paint, and the random replacement of few termite damaged wood members at the roof. The foundation at the base of the steel columns remains exposed at this walkway.

Phase II Site Visit (March 2013)



Phase III Site Visit (March 2015)



Phase II Site Visit (March 2013)



Phase III Site Visit (March 2015)



Phase II Site Visit (March 2013)

Phase III Site Visit (March 2015)

Phase II Site Visit (March 2013)



Phase III Site Visit (March 2015)



## 5B. Pavaia'i Elementary School Building 9

Building 9 (Administration/Library) is an oval-shaped reinforced concrete and wood framed fale structure. During the 2013 site visit, this two-story building (there is a partial mezzanine) was undergoing renovation. Minor to moderate termite damage was observed at the roof framing. Severe damage was found at the exterior wood walls.

The renovation of the building had been completed by 2015. The building currently houses a library, classrooms, storage rooms, and a server room. The structure was overall found to be in good conditions. Roof wood framing appeared to have been replaced where the damage was extensive. The exterior wood walls also appeared to be in good condition with only one bay exhibiting some termite damage.

Phase II Site Visit (March 2013)



Phase III Site Visit (March 2015)



## 5C. Pavaia'i Elementary School Building 12

Building 12 (Restroom) is a typical rectangular-shaped reinforced concrete and wood framed fale structure. During both the 2013 and 2015 site visits, two columns were observed to have spalls near the base. Reinforcing bars are exposed at both columns.

Phase II Site Visit (March 2013)



Phase III Site Visit (March 2015)



## 5D. Pavaia'i Elementary Scholl Building 22 (New Building)

Building 22 (Restroom) is a new building that was under construction during the 2015 Phase III site visit. The building is framed with concrete masonry unit (CMU) walls over reinforced concrete foundations concealed below grade.

Phase III Site Visit (March 2015)



## 6A. Tafuna Elementary School Building 8

Building 8 (Classroom) is a two-story building with a reinforced concrete (columns, walls, beams, and second floor slab) and steel (purlins and beams) superstructure. During the 2013 Phase II site visit, a small spall was observed at the top of the sill at one of the second floor windows. This spall was not identified as a health and safety concern due to its small size. In a similar fashion as the second floor, a complete portion of the sill at one first floor windows was found to have completely detached.

During the 2015 Phase III site visit, staff from the Department of Public Works indicated that spalls at the top of the window sills is a common occurrence on the east façade of the building. Upon observing the entire east façade of the building, it was found that spalls indeed exist consistently on top of the first and second floor window sills. In some instances where the spalls had progressed more extensively, the horizontal reinforcing bar in the sill is exposed. Observation of the spalls revealed that the horizontal reinforcing bar has absolutely no cover at the bottom and hence the spalls initiate easily and progress rapidly.

In the case of the second floor, the spalls at the sill constitute a health and safety hazard since loose fragments can detach and fall onto the building occupants below. The spalls with exposed reinforcing at the first floor also pose a health and safety concern since the bars can hurt a building occupant that leans or falls against the sill.

Phase II Site Visit (March 2013)



Phase III Site Visit (March 2015)



Phase III Site Visit (March 2015)



## 6B. Tafuna High School Building 11

Building 11 (Classroom Building) is a typical rectangular-shaped reinforced concrete and wood framed fale structure. It was mentioned by school officials and by Department of Public Works staff that the building was originally built by the US Navy and used as barracks. During the 2013 Phase II site visit, several concrete columns (8-inch square) were observed to have moderate to extensive cracking and spalling on their exterior face near the base. The spalls are more frequent and prominent on the south and east facing sides of the building. In some instances, the spalls had led to minor to moderate loss of column cross section.

During the 2015 Phase III site visit, it was observed that none of the columns had been repaired. The spalls have progressed and, in some cases, loose chunks of concrete have blown off leaving the reinforcing bars exposed. Loss of column cross section has also increased further and is now moderate in a few cases.

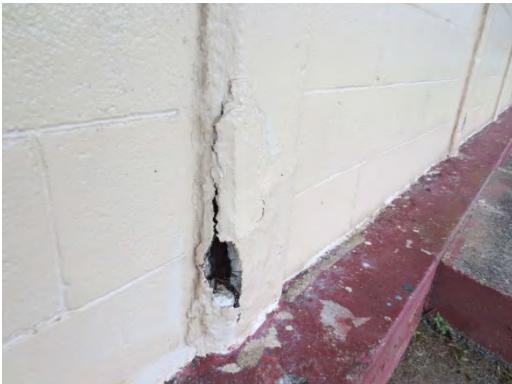
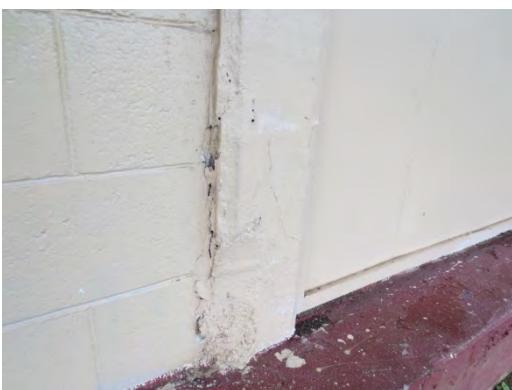
Phase II Site Visit (March 2013)



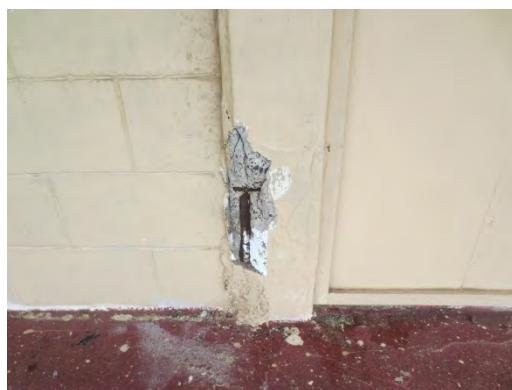
Phase III Site Visit (March 2015)



Phase II Site Visit (March 2013)



Phase III Site Visit (March 2015)



Phase II Site Visit (March 2013)



Phase III Site Visit (March 2015)



## 6C. Tafuna High School Building 13

Building 13 (Classroom Building) is a typical rectangular-shaped reinforced concrete and wood framed fale structure. It was mentioned by school officials and by Department of Public Works staff that the building was originally built by the US Navy and used as barracks. During the 2013 Phase II site visit, almost every concrete column (8-inch square) on the south facing side of the building was observed to have moderate to extensive cracking and spalling on their exterior face near the base. In some instances, the spalls had led to severe loss of column cross section. A life safety flag was, therefore, assigned to the damaged concrete columns.

During the 2015 Phase III site visit, it was observed that none of the columns had been repaired. The spalls have progressed and, in some cases, loose chunks of concrete have blown off leaving the reinforcing bars exposed. Loss of column cross section has also increased further to the point where more than 40% of the cross section has been lost. The health and safety tag remains effective for these damaged columns.

Phase II Site Visit (March 2013)



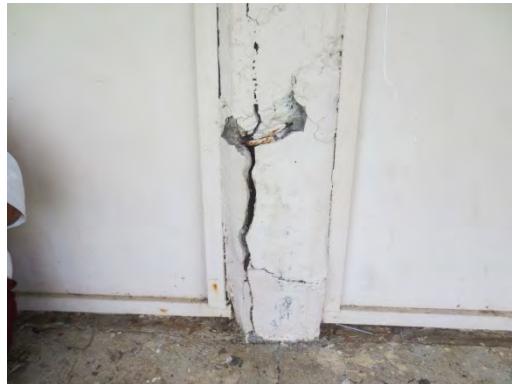
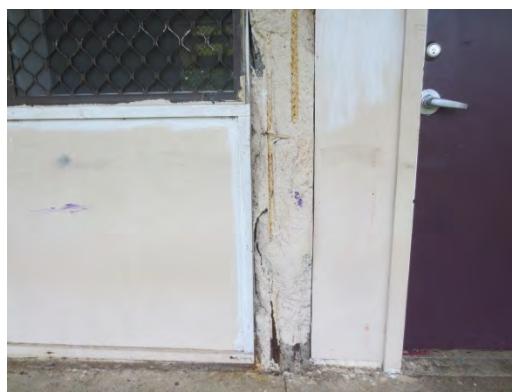
Phase III Site Visit (March 2015)



Phase II Site Visit (March 2013)



Phase III Site Visit (March 2015)



Phase II Site Visit (March 2013)



Phase III Site Visit (March 2015)



Phase II Site Visit (March 2013)



Phase III Site Visit (March 2015)



## 6D. Tafuna High School Building 15

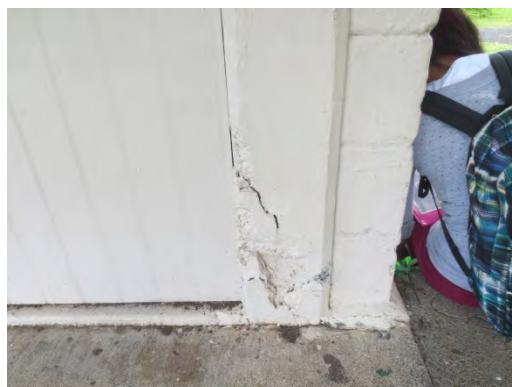
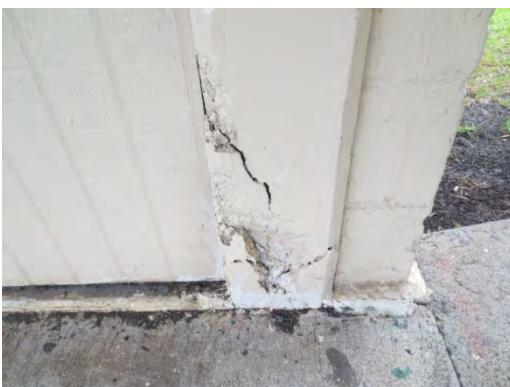
Building 15 (Classroom Building) is a typical rectangular-shaped reinforced concrete and wood framed fale structure (partial mezzanine exists in this building). It was mentioned by school officials and by Department of Public Works staff that the building was originally built by the US Navy and used as barracks. During the 2013 Phase II site visit, almost every concrete column (8-inch square) on the east facing side of the building was observed to have moderate to extensive cracking and spalling on their exterior face near the base. In some instances, the spalls had led to minor to moderate loss of column cross section.

During the 2015 Phase III site visit, it was observed that none of the columns had been repaired. The spalls appear to have progressed slightly but no major loose chunks of concrete have blown off leaving more reinforcing bars exposed. Increases in loss of column cross section were not evident at any of the columns in this building

Phase II Site Visit (March 2013)



Phase III Site Visit (March 2015)



Phase II Site Visit (March 2013)



Phase III Site Visit (March 2015)



Phase II Site Visit (March 2013)



Phase III Site Visit (March 2015)



## 6F. Tafuna High School Building 16

Building 16 (Classroom Building) is a typical rectangular-shaped reinforced concrete and wood framed fale structure. It was mentioned by school officials and by Department of Public Works staff that the building was originally built by the US Navy and used as barracks. During the 2013 Phase II site visit, almost every concrete column (8-inch square) on the east facing side of the building was observed to have moderate to extensive cracking and spalling on their exterior face near the base. In some instances, the spalls had led to severe loss of column cross section. A life safety flag was, therefore, assigned to the damaged concrete columns.

During the 2015 Phase III site visit, it was observed that none of the columns had been repaired. The spalls have progressed and, in some cases, loose chunks of concrete have blown off leaving the reinforcing bars exposed. Slight increases in loss of cross section were evident at several columns in this building. The health and safety tag remains effective for these damaged columns.

Phase II Site Visit (March 2013)



Phase III Site Visit (March 2015)



Phase II Site Visit (March 2013)



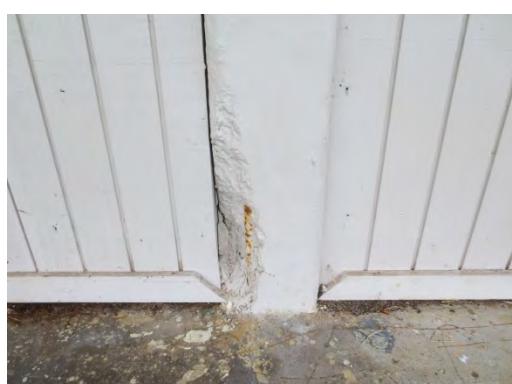
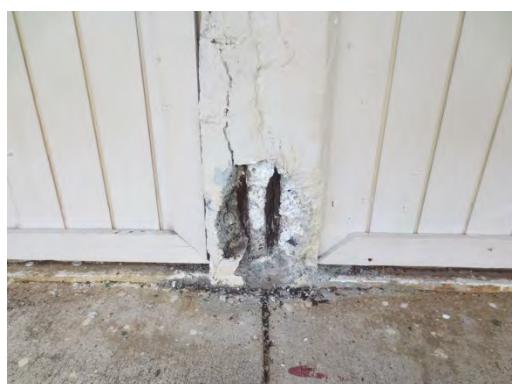
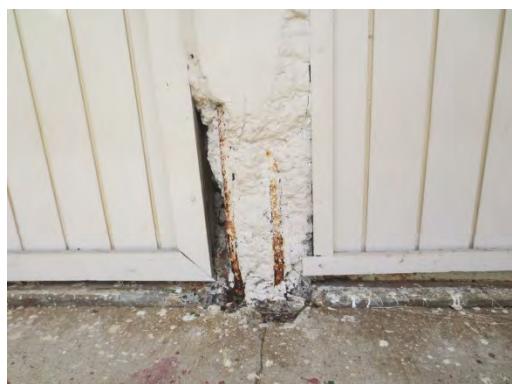
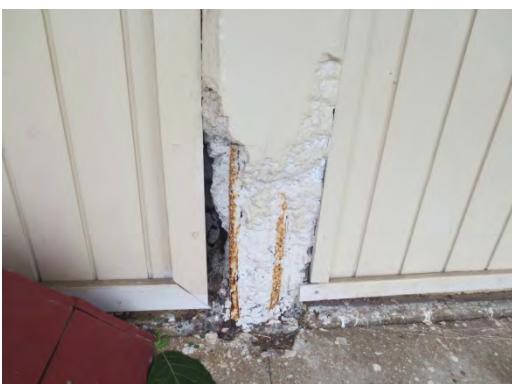
Phase III Site Visit (March 2015)



Phase II Site Visit (March 2013)



Phase III Site Visit (March 2015)



## 6G. Tafuna High School Building 17

Building 17 (Classroom Building) is a typical rectangular-shaped reinforced concrete and wood framed fale structure. It was mentioned by school officials and by Department of Public Works staff that the building was originally built by the US Navy and used as barracks. During the 2013 Phase II site visit, almost every concrete column (8-inch square) on the south facing side of the building was observed to have moderate to extensive cracking and spalling on their exterior face near the base. In some instances, the spalls had led to severe loss of column cross section. A life safety flag was, therefore, assigned to the damaged concrete columns.

During the 2015 Phase III site visit, it was observed that none of the columns had been repaired. The spalls have progressed and, in some cases, loose chunks of concrete have blown off leaving the reinforcing bars exposed. Loss of column cross section has also increased further to the point where more than 40% of the cross section has been lost. The health and safety tag remains effective for these damaged columns.

Phase II Site Visit (March 2013)



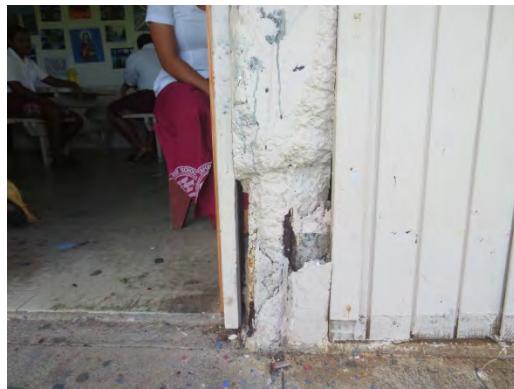
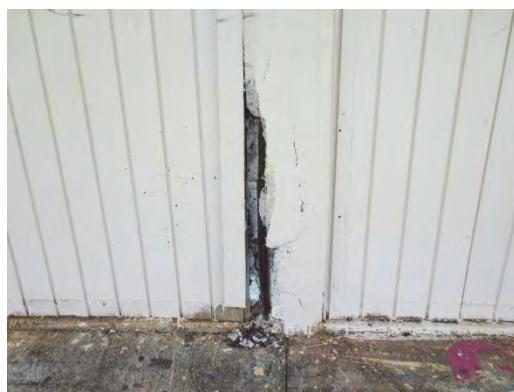
Phase III Site Visit (March 2015)



Phase II Site Visit (March 2013)



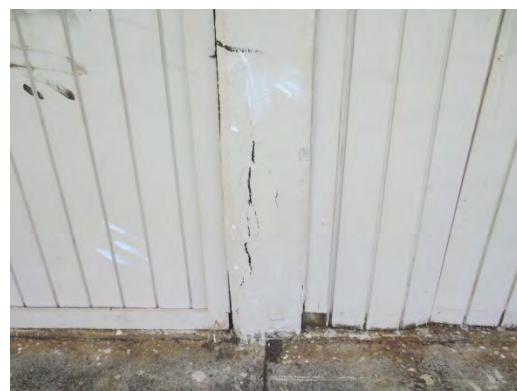
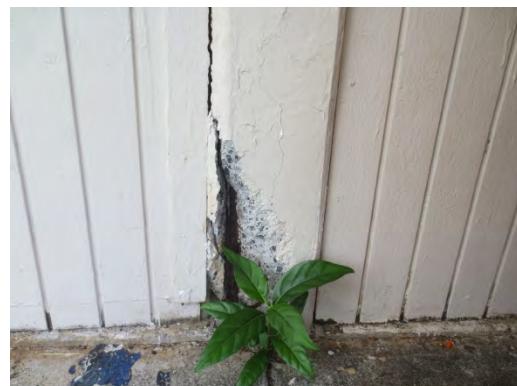
Phase III Site Visit (March 2015)



Phase II Site Visit (March 2013)



Phase III Site Visit (March 2015)



## 6H. Tafuna High School Building 18

Building 18 (Classroom Building) is a typical rectangular-shaped reinforced concrete and wood framed fale structure with a rectangular addition to its north. It was mentioned by school officials and by Department of Public Works staff that the building was originally built by the US Navy and used as barracks. During the 2013 Phase II site visit, almost every concrete column (8-inch square) on the south facing side of the building was observed to have moderate to extensive cracking and spalling at the exterior face near the base. The interior columns (once exterior columns before the addition on the north side of the building) were also found to have moderate so severe spalling along their height with large concentrations near the base. In some instances, the spalls had led to severe loss of column cross section. In a few cases, more than half of the column cross section was observed to have been compromised. A life safety flag was, therefore, assigned to the damaged concrete columns.

During the 2015 Phase III site visit, it was observed that none of the exterior columns had been repaired. The spalls have progressed and, in some cases, loose chunks of concrete have blown off leaving the reinforcing bars exposed. Loss of column cross section has also progressed. In the case of the interior columns (where the most severe loss of cross section was observed back in 2013), repairs appeared to have been performed. One of the teachers explained that as part of a class assignment, the students prepared a mortar and patched the damaged columns. The surface preparation carried on as well as the type of mortar used are not known. It is also unknown whether the damaged reinforcing bars were cleaned and/or replaced as required. Since the repair is evidently a non-engineered repair, the health and safety tag remains effective for these columns.

Phase II Site Visit (March 2013)



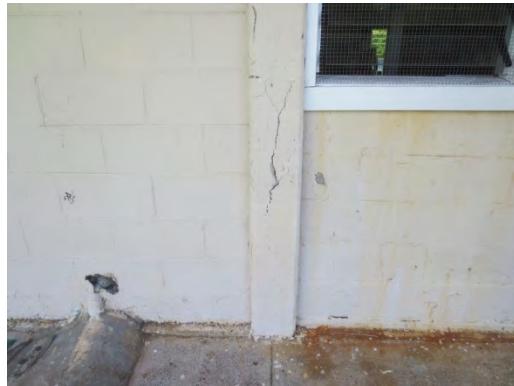
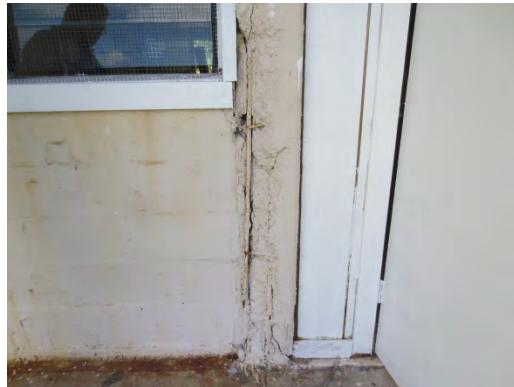
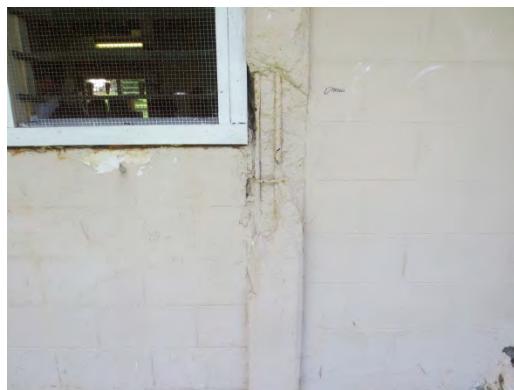
Phase III Site Visit (March 2015)



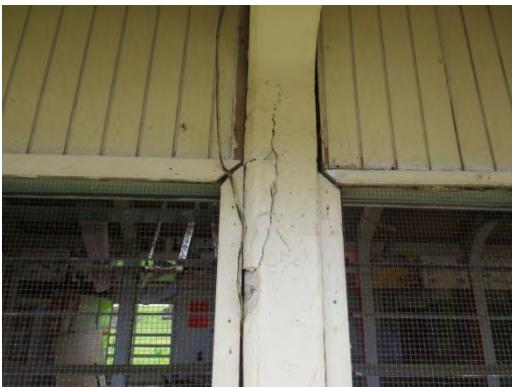
Phase II Site Visit (March 2013)



Phase III Site Visit (March 2015)



Phase II Site Visit (March 2013)



Phase III Site Visit (March 2015)



Phase II Site Visit (March 2013)



Phase III Site Visit (March 2015)



Phase II Site Visit (March 2013)



Phase III Site Visit (March 2015)



## 6J. Tafuna High School Building 24 (New Building)

Building 24 (Restroom Building) is a building recently completed on the lower campus at Tafuna High School. The single-story building is constructed with concrete masonry unit (CMU) interior and exterior walls and with a wood framed roof. Foundations are reinforced concrete and are concealed below grade. All structural elements were observed to be in excellent condition at the time of the Phase III visit.

Phase III Site Visit (March 2015)



## 7A. Tafuna Elementary School Building 2

Building 2 (Computer Lab/ Storage) is a wood framed single story building. During the 2013 site visit, the structure was found to be in fair to poor condition. The suspended floor framing (wood joists with wood decking) on the west portion (storage) of the building was severely damaged and partially collapsed. This item was identified as a life-safety concern. At the time of this visit, only the east portion (computer lab) of the building was occupied.

Two years later, during the Phase III site visit, this building was not occupied. Staff from the Department of Public Works (DPW) communicated that the building had been condemned and that it was scheduled for demolition in the short term. Its condition was, therefore, not assessed during this last site visit.

Phase II Site Visit (March 2013)



Phase III Site Visit (March 2015)



## 7B. Tafuna Elementary School Building 7

Building 7 (Classroom Building) is a two-story building with a reinforced concrete (footings, columns, beams, and second floor slab), concrete masonry unit (exterior and interior walls), and wood (timber roof trusses) superstructure. During the 2013 Phase II site visit, several elements were identified to be in poor condition. The second floor exterior slab had extensive and widespread cracks and spalls at the top. Reinforcing was exposed in the majority of the spalls. Spalls were also observed at the bottom of two of the second floor exterior concrete columns. At the second floor, the structural steel columns supporting the roof at the walkway were observed to exhibit moderate to severe corrosion near the base plate. The corrosion had resulted in spalls at the edge of the second floor slab.

During the 2015 Phase III site visit, it was verified that the spalls at the top of the second floor exterior slab had been repaired. The patches appeared to be properly adhered to the concrete substrate and no loose fragments or delaminated pieces of the patches were found. The material used for the patch repair work is not known. It is also unknown whether the exposed reinforcing bars were cleaned and/or replaced as required before the patches were installed.

The bottom cracks and spalls at the bottom of the second floor exterior concrete columns had not been repaired by the time of the 2015 site visit. The spalls appeared to have propagated further and in one case a chunk of concrete was observed to have detached leaving the column reinforcing exposed.

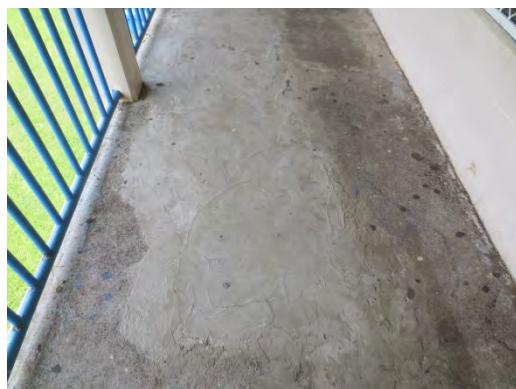
The corroded base plates at the bottom of the second floor exterior steel columns had not been repaired either. The extent of corrosion appeared to have progressed and loss of bearing area at the base of the column was evident. Cracks, and thus imminent spalls, were also observed on the edge of the slab near the base plate connection. The life safety flag, thus, has been added for the steel columns.

During this last site visit, it was also observed that some of the metal plate connectors at the roof wood beams are severely corroded. At one location in particular, parts of the metal plates that make up the connection have completely corroded away effectively rendering the connection useless for wind uplift.

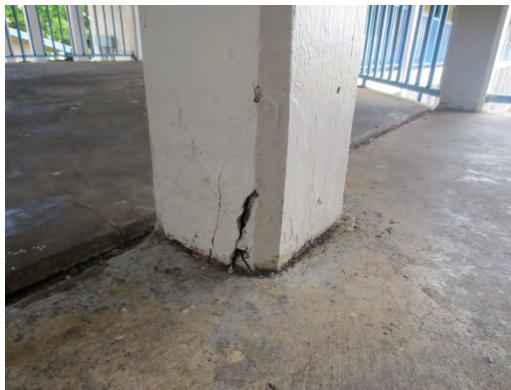
Phase II Site Visit (March 2013)



Phase III Site Visit (March 2015)



Phase II Site Visit (March 2013)



Phase III Site Visit (March 2015)



Phase II Site Visit (March 2013)



Phase III Site Visit (March 2015)



## 7C. Tafuna Elementary School Building 12

Building 12 is a wood framed carport. During the 2013 site visit, the structure was found to be in poor condition with severe termite and wet rot damage to the roof rafters and beams as well as their supporting columns. In a few cases, the columns had severe loss of cross section near the base and hence a life safety flag was raised.

Two years later, during the Phase III site visit, the carport structure is not in use anymore. The recommendation that the structure be demolished remains. Staff from the Department of Public Works (DPW) communicated that there is confusion about whether the structure is owned and/or maintained by Department of Education or by the Department of Parks and Recreation.

Phase II Site Visit (March 2013)



Phase III Site Visit (March 2015)



## 8A. Manulele Elementary School Building 3

Building 3 (Administration/Library Building) is a single-story building with a hip roof. The roof is framed with plywood sheathing spanning between wood purlins in turn spanning between long-span glulam beams. The glulam beams run across the short direction of the building and are supported on square reinforced concrete columns. The building envelope between the concrete columns consists of wood framed walls with exterior wood siding. During the 2013 Phase II site visit, moderate to severe cracks and spalls were observed at the bottom of four of the concrete columns. Three of the columns had open spalls with exposed reinforcing and one had a closed spall. In the case of the one of the columns with an open spall, a large portion of the cross section was observed to be lost. This column was, therefore, identified as a life safety item.

During the 2015 Phase III site visit, it was observed that a new reinforced concrete slab-on-grade apron had been poured around the building perimeter. The damaged columns had not been fixed and the spalls were in fact observed to have progressed and further exposing more of the column reinforcing bars as well as reducing the cross section of the column. The column with reduced cross section remains a life safety concern.

Phase II Site Visit (March 2013)



Phase III Site Visit (March 2015)



Phase II Site Visit (March 2013)



Phase III Site Visit (March 2015)



## 9A. Nu'uuli Polytech High School Building 1

Building 1 (Administration/Classroom Building) is a single-story wood-framed building with a hip roof. The roof is framed with metal decking over wood rafters. On the south side of the building, the roof overhangs to create a covered walkway for access to the offices/classrooms. The edge of this roof overhang is supported by flat-use wood beams supported on structural steel pipe columns. During the 2013 Phase II site visit, it was observed that at the top of the pipe columns, the connection plate to the wood beams is typically misaligned and missing some or all of the fasteners. At the bottom, the columns are buried in the ground together with a bell-shaped concrete footing. In some cases, the embedment of the column into the footing and/or the embedment of the footing into the ground appeared to be insufficient. The combination of inadequate connection/restraint at the top and bottom of the columns has led to the displacement and rotation of the columns away from their plumb line.

Two years later, during the Phase III site visit, the building appeared to have been repaired/remodeled (a soffit was added to the underside of the roof overhangs among other repairs). The pipe columns at the walkway, unfortunately, had not been repaired. It was also observed that one of the pipe columns has corroded away at the bottom, resulting in severe loss of cross section. A life safety tag, therefore, has been added to the pipe columns at the edge of the walkway roof.

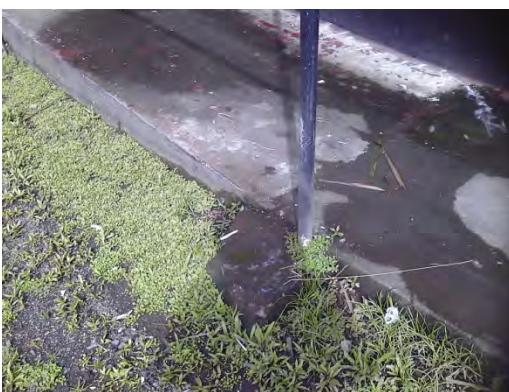
Phase II Site Visit (March 2013)



Phase III Site Visit (March 2015)



Phase II Site Visit (March 2013)



Phase III Site Visit (March 2015)



## 9B. Nu'uuli Polytech High School Building 3

Building 10 (Classroom Building) is a single-story wood-framed building with a gable roof. The roof is framed with metal decking over wood rafters. The building envelope consists of wood-framed walls with window and door openings. During the 2013 Phase II site visit, the building was found to be in overall fair condition.

Two years later, during the Phase III site visit, the building appeared to have been completely remodeled/repaired. All structural elements were found to be in excellent condition at the time of this last visit.

Phase II Site Visit (March 2013)



Phase III Site Visit (March 2015)



### 9C. Nu'uuli Polytech High School Building 6

Building 6 (Kitchen/Cafeteria Building) is a single-story wood-framed building with a gable roof. The roof is framed with metal decking over wood rafters. The building envelope consists of wood-framed walls with window and door openings. During the 2013 Phase II site visit, the building was found to be in overall fair condition.

Two years later, during the Phase III site visit, the building appeared to have been remodeled/repaired. The roof was entirely replaced over the kitchen area and the roof overhang was extended over the cafeteria area to provide an exterior dining area. All structural elements were found to be in excellent condition at the time of this last visit.

Phase II Site Visit (March 2013)



Phase III Site Visit (March 2015)



## 9D. Nu'uuli Polytech High School Building 10

Building 10 (Classroom Building) is a single-story building with a Dutch gable roof. The roof is framed with metal decking over wood rafters. The wood rafters are supported at several locations by wood king/queen posts that are in turn supported by ceiling joists. The building envelope consists of concrete masonry unit (CMU) walls with window and door openings. During the 2013 Phase II site visit, it was observed that the roof framing was in fair condition. Over a portion of the building, the space above the ceiling was used for light to heavy storage. The heavy storage loads had resulted in a failed ceiling joist that had been propped to prevent a portion of the ceiling from collapsing. Consequently, a life safety flag was raised for the roof members.

Two years later, during the Phase III site visit, the building appeared to have been remodeled/repaired. Although it was the interior of the building was inaccessible during this last site visit, the school principal confirmed that the roof members were repaired/replace as required. A quick look from through the window confirmed that a new hard ceiling now exists and thus storage above the ceiling appeared not to be possible anymore. Photographs of the interior where not taken due to the fined-mesh insect screen covering the windows. The life safety concern has therefore been addressed.

Phase II Site Visit (March 2013)



Phase III Site Visit (March 2015)



## 10A. Coleman Elementary School Building 8

Building 16 (Classroom Building) is a typical oval-shaped reinforced concrete and wood framed fale structure. During the 2013 Phase II site visit, the exterior slab-on-grade was observed to have cracks and spalls with exposed reinforcing at the edges. It does not appear to be any change in the condition between the 2013 Phase II and the 2015 Phase III site visits.

Phase III Site Visit (March 2015)



## 10B. Coleman Elementary School Building 16

Building 16 (Administration Building) is a typical rectangular-shaped reinforced concrete and wood framed fale structure. During the 2013 Phase II site visit, this building was observed to be in overall good structural condition.

During the 2015 Phase III site visit, the school principal mentioned that this building had recently undergone renovation. All structural elements were observed to be in excellent condition except for two concrete columns which were found to have moderate spalls near the base.

Phase III Site Visit (March 2015)



## 10C. Coleman Elementary School Building 19

Building 19 (Restroom Building) is a typical rectangular-shaped reinforced concrete and wood framed fale structure. This building was observed to be in overall good condition.

During the 2015 Phase III site visit, only one portion of the building was in use (teachers' restrooms). School and Department of Public Works personnel reported that the unused portion of the building (boys' restroom) will be soon renovated. It was observed that minor to moderate cracks and spalls exist at one of the concrete columns near the base.

Phase III Site Visit (March 2015)



## 10D. Coleman Elementary School Building 20

Building 20 (Classroom Building) is a single-story wood-framed building with a gable roof. The roof system consists of plywood sheathing over wood purlins (2x6 spaced at 3 ft. and braced with 2x4 battens at midspan) over wood rafters (4x spaced at 6 ft.) The rafters span between wood columns at the perimeter of the building and wood beams at the ridge of the roof. During the 2013 Phase II site visit, it was observed that some of the 2x6 purlins were split and sagging from their unusually large 3-ft spacing. At the time of the Phase II visit, it was recommended that the purlins be doubled up to increase their strength or that additional purlins be added to reduce their spacing.

Two years later during the 2015 Phase III site visit, the building appeared to have undergone remodeling and repair. Some of the sagging and split purlins had been replaced while some still remained in place.. No new purlins were added in between the existing purlins nor were the existing purlins doubled up to increase their strength.

Phase III Site Visit (March 2015)



## 10E. Coleman Elementary School Building 21

Building 21 (Kitchen Building) is a typical oval-shaped reinforced concrete and wood framed fale structure. During the 2015 Phase III site visit, the school principal reported that two concrete columns at this building were damaged. It was observed that two concrete columns indeed had cracks and spalls near the base. The damage to these two columns was inadvertently overseen during the 2013 Phase II site visit.

Phase III Site Visit (March 2015)



## 11A. Samoana High School Building 3

Building 20 (Classroom Building) is a two-story flat-roofed building of mixed construction. The superstructure consists of reinforced concrete frames in both the transverse and longitudinal directions of the building. Exterior and interior walls are concrete unit masonry (CMU) with openings for doors and windows. The second floor framing consists of a reinforced concrete slab at the exterior (walkway) and plywood sheathing over wood joists at the interior (classrooms). The roof framing consists of plywood sheathing over wood rafters between the concrete and wood beams. During the 2013 Phase II site visit, damage in the form of wet/dry rot was observed at the soffit of the roof overhang. The non-structural wood soffit was severely deteriorated and the rafters were exposed at several location. The rafters were also observed to be severely damaged.

During the 2015 Phase III site visit, the building was found to be partially demolished. School and Department of Public Works officials noted that demolition would re-start and be completed after the end of the school year. It was also mentioned that Buildings 3, 6 and 7 will be demolished and a new two-story building will be built on the current site of Building 7.

Phase III Site Visit (March 2015)



Phase III Site Visit (March 2015)



## 12A. Matafao Elementary School Building 3

Building 16 (Classroom Building) is a typical oval-shaped reinforced concrete and wood framed fale structure. During the 2013 Phase II site visit, the exterior slab-on-grade was observed to have cracks and spalls with exposed reinforcing at the edges. It does not appear to be any change in the condition between the 2013 Phase II and the 2015 Phase III site visits.

Phase III Site Visit (March 2015)

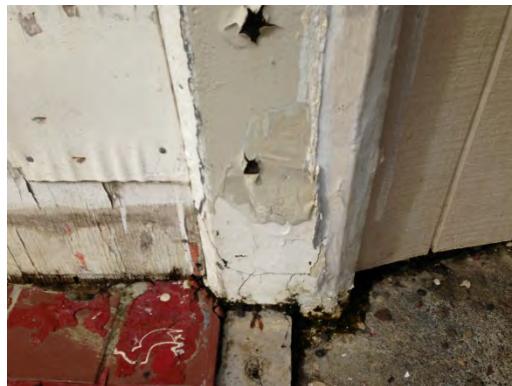


## 12B. Matafao Elementary School Building 14

Building 21 (Kitchen Building) is a typical oval-shaped reinforced concrete and wood framed fale structure. During the 2013 Phase II site visit, the building was found in overall poor condition. Several of the concrete columns had severe and extensive cracks and spalls near the bottom. Severe loss of cross section had occurred at three columns on the ocean facing side of the building. Three concrete columns, also on the ocean facing side of the building) were also observed to have severe cracks and spalls at the top, near the beam/column joint. A life safety flag was therefore assigned to these damaged concrete columns. Dry rot damage was also observed to the wood decking at the roof overhang.

During the 2015 Phase III site visit, the building was found to be partially condemned. School and Department of Public Works officials noted the structure has not been demolished because the main power connection point for the school campus is within this building (there is a small partitioned space with electrical equipment on the north side of the building). The damage to the concrete columns was still present and appeared to be more extensive this time around. Although the building is not in use, it needs to be accessed regularly for maintenance of the electrical equipment. Therefore, the life safety flag for the concrete columns remains in place.

### Phase III Site Visit (March 2015)



Phase III Site Visit (March 2015)



## 12C. Matafao Elementary School Building 17

Building 17 (Classroom Building) is a single-story building with a gable roof. The building superstructure consists of reinforced concrete frames (columns and beams) with concrete masonry unit (CMU) infill walls. The roof is framed in wood. During the 2013 Phase II site visit, the building was found to be in overall good structural condition.

During the 2015 Phase III site visit, the building was found to be completely renovated. Access to the interior was not possible during this last site visit. All structural members visible from the exterior appeared to be in excellent condition.

### Phase III Site Visit (March 2015)



## 12D. Matafao Elementary School Building 18 (Canopy)

Building 18 is a wood framed canopy located immediately adjacent to the west façade of Building 14 (Classroom). During the 2013 Phase II site visit, the canopy was found in overall poor condition. Dry rot damage was also observed to the wood decking at the roof (portions of the decking were warped and ongoing leakage was visible).

During the 2015 Phase III site visit, the building was found to be completely demolished.

Phase III Site Visit (March 2015)



### **13A. Mt. Alava Elementary School Building 1, 2, and 7**

Building 1, 2, and 7 (Classroom and Administration Buildings) are single-story buildings with a gable roof. The superstructures of the buildings consist of concrete masonry unit (CMU) exterior and interior walls and plywood sheathing over wood trusses at the roof. At the time of the 2013 Phase II site visit, the exposed structural elements on all three buildings were found to be in excellent condition.

By request of personnel from the Department of Public Works, a site visit to this school was made in 2015 to observe leaks and damaged roof members at the three buildings in question. It was found that a covered walkway exists on the front (and back in the case of Building 7) of these buildings. The roof of the walkway butts directly against the edge of the overhang in the building's roof. It is at this interface between structures that water infiltration occurs. In terms of structural, damage was for the most part observed at the edges of the buildings' roofs: minor to moderate wet rot at the plywood sheathing, at the fascia beam, and at the tips of the top chords of the trusses (top chords extend past the perimeter wall to frame the overhang). The walkway roof framing appeared to be in general good condition.

#### Phase III Site Visit (March 2015)

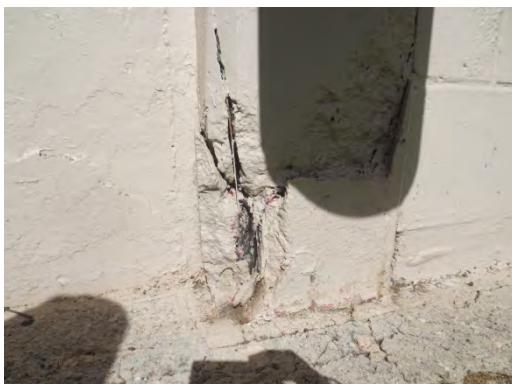


## 14A. Faga'itua High School Building 5

Building 5 (Administration/Classroom Building) is a single-story building with a gable roof. The building superstructure consists of reinforced concrete frames (columns and beams) with concrete masonry unit (CMU) or wood-framed infill walls. The roof is framed in wood. At the time of the 2013 Phase II site visit, minor to moderate spalls were found on a few of the concrete columns near the base.

During the 2015 Phase III site visit, it was verified that the spalls at the bottom of the columns had not been repaired. It appeared like the spalls have progress in size and extent and reinforcing was exposed in a few locations. In the case of a corner column, loss of cross section has further developed.

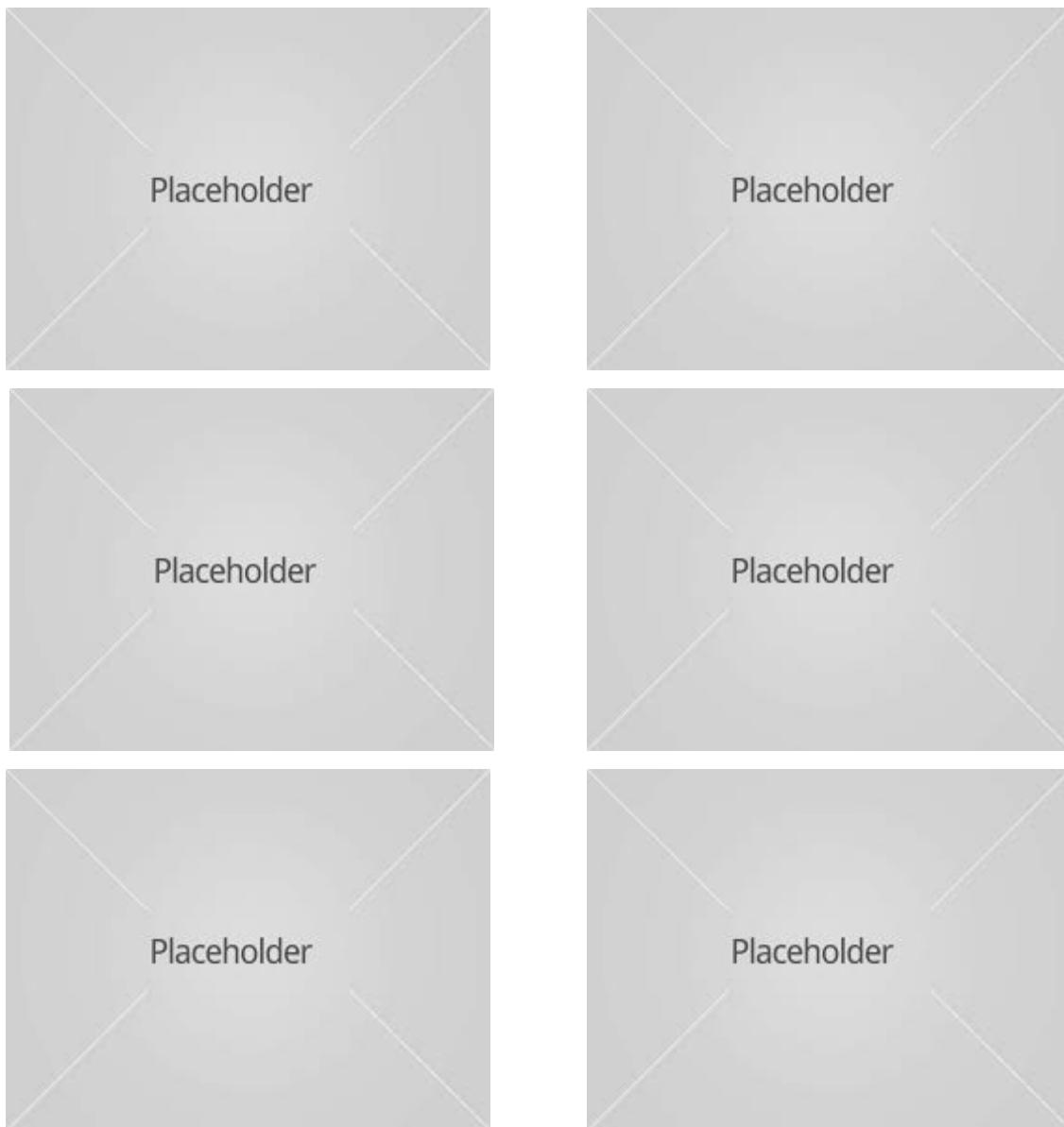
### Phase III Site Visit (March 2015)



#### 14B. Faga'itua High School Building 6 (Demolished)

At the time of the 2013 Phase II site visit, Building 6 was a single-story building with a gable roof. The building superstructure consisted of reinforced concrete frames (columns and beams) with concrete masonry unit (CMU) or wood-framed infill walls. The roof is framed with timber trusses spaced at 8 ft. on center. During the 2015 Phase III site visit, the building had been demolished and a new building constructed in its place (see Building 13).

Phase II Site Visit (March 2013)

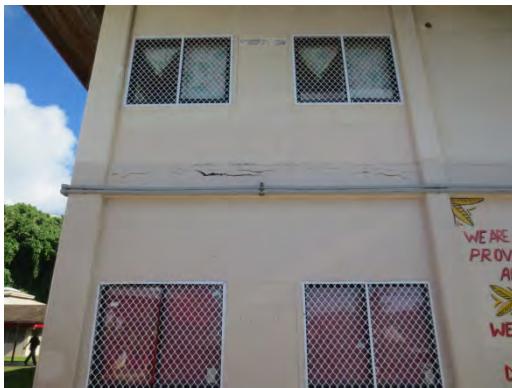


## 14C. Faga'itua High School Building 9

Building 9 (Classroom Building) is a two-story building with a gable roof. The building superstructure consists of reinforced concrete frames (columns and beams) with concrete masonry unit (CMU) infill walls. The second floor framing consists of a suspended reinforced concrete slab and the roof framing is made up of wood decking over heavy timber rafters and trusses. At the time of the 2013 Phase II site visit, moderate to severe spalls were found on the exterior face of the second floor concrete spandrel beams on the south and east faces of the building. The spalls vary in size and extent but are typically located on the top of the beam (the second floor exterior masonry wall is offset a few inches towards the interior).

During the 2015 Phase III site visit, a representative of the Department of Education raised concerns about spalls on the envelope of the building. A quick walk around the building revealed that the spalls on the exterior face of the second floor concrete spandrel beams had not been repaired since the 2013 site visit. These spalls constitute a falling hazard for the building occupants below. Hence, a life safety flag has now been given to the concrete beams in this building. The life safety flag was inadvertently omitted during the 2013 Phase II site visit.

Phase III Site Visit (March 2015)



Phase III Site Visit (March 2015)



#### **14D. Faga'itua High School Building 12 (New Building)**

Building 12 (Restroom Building) is a new single-story building located due east of Building 10. The building superstructure is constructed with reinforced concrete (footings and retaining walls), concrete masonry unit (exterior and interior walls), and wood (roof decking and rafters). All structural elements appeared to be in excellent condition at the time of the 2015 Phase III site visit. The building was reported by personnel from the Department of Public Works to have been recently completed. At the time of the visit, the building was occupied.

Phase III Site Visit (March 2015)



#### 14E. Faga'itua High School Building 13 (New Building)

Building 13 is a new two-story classroom building constructed on the former site of Building 6. The buildings superstructure is constructed with reinforced concrete (footings, columns, beams, and slabs), concrete masonry unit (exterior and interior walls), and wood (plywood decking, purlins, trusses). The building is a double-loaded corridor structure. All structural elements appeared to be in excellent condition at the time of the 2015 Phase III site visit. The building was not occupied at the time of the visit.

Phase III Site Visit (March 2015)



## 15A. Alofau Elementary School Building 2

Building 2 (Restroom Building) is a typical rectangular-shaped reinforced concrete and wood framed fale structure. During the 2013 Phase II site visit, several columns were observed to have moderate to severe spalls near the base near mid-height.

Two years later, during the Phase III site visit, the building had been completely demolished. At the time of the visit, no new structure had been built on the site of former Building 2.

Phase II Site Visit (March 2013)



Phase III Site Visit (March 2015)



## 15B. Alofau Elementary School Building 4

Building 4 (Classroom Building) is a single-story wood frame structure with a gable roof. The roof is framed by rafters supported by two king-posts in the middle of the structure. Exterior walls are framed in wood. At the time of the 2013 Phase II site visit, the building was ongoing renovation. It was observed that one of the two king posts supporting the roof had been cut near the bottom essentially leaving a large portion of the roof unsupported. A life safety flag was issued for the cut wood post and it was recommended that the post be spliced or replaced.

Two years later, during the Phase III site visit, the renovation of the building had been completed. The cut king post was reported by school officials and by Department of Public Works staff to have been replaced during after our 2013 site visit. The two king posts are now concealed within a partial height partition wall used as a room divider. It was, therefore, not possible to verify that the post was spliced or replaced. Nonetheless, the life safety flag will be removed since it is highly unlikely that the framing would have remained stable if the post was not replaced. All visible structural elements were found to be in excellent condition at the time of this last site visit.

Phase II Site Visit (March 2013)



Phase III Site Visit (March 2015)



Phase II Site Visit (March 2013)



Phase III Site Visit (March 2015)



## 16A. Lauli'i Elementary School Building 8

Building 8 (Classroom Building) is a typical oval-shaped reinforced concrete and wood framed fale structure. During the 2013 Phase II site visit, the top course of the exterior masonry wall was observed to have cracks and spalls. The damage had likely occurred because the walls are unreinforced and not grouted. It does not appear to be any change in the condition of the masonry walls between the 2013 Phase II and the 2015 Phase III site visits.

Phase III Site Visit (March 2015)



#### **IV. Summary of Abandoned/Condemned Buildings**

The following is a list of buildings that have either remained or become abandoned (not in use) or condemned (not safe for use) since the 2013 Phase II site visits. For reference, all abandoned or condemned building locations with identification numbers are indicated on the school campus maps in Appendix C at the end of this report.

1. Leone High School Building 3 (abandoned)
2. Siliaga Elementary School Building 7 (condemned)
3. Tafuna Elementary School Building 2 (condemned)
4. Tafuna Elementary School Building 12 (abandoned)
5. Matafao Elementary School Building 14 (abandoned)

#### **V. Summary of Demolished Buildings**

The following is a list of buildings that were observed to have been demolished since the 2013 Phase II site visits. For reference, all demolished building locations with identification numbers are indicated on the school campus maps in Appendix C at the end of this report.

1. Leone Midkiff Elementary School Building 2 (demolished)
2. Samoana High School Building 3 (Partially demolished)
3. Alofau Elementary School Building 2 (demolished)

#### **VI. Summary of New Buildings**

The following is a list of buildings that were observed to have been constructed since the 2013 Phase II site visits. For reference, all new building locations with identification numbers are indicated on the school campus maps in Appendix C at the end of this report.

1. Leone Midkiff Elementary School Building 19 (completed and occupied)
2. Leone Midkiff Elementary School Building 20 (completed and unoccupied)
3. Pavai'ai Elementary Building 22 (under construction)
4. Tafuna High School Building 24 (completed and occupied)
5. Fagaitua High School Building 12 (completed and occupied)
6. Fagaitua High School Building 13 (completed and unoccupied)

## VII. Prioritization of Structural Repairs After Phase III Site Visits

Table 4 below provides a summary of all building damage identified as a life safety concern per the Phase II and Phase III site visits. Note that the Phase II and Phase III assessments entailed rapid observations of damage to non-concealed structural elements and thus may not have captured all existing life safety issues.

Following the life safety items, Tables 5 and 6 summarize all building damage identified as a Repair Priority Level 1 or 2 per the Phase II and Phase III site visits.

SCHOOL	BUILDING ID / DESCRIPTION	ELEMENT
TUTUILA	Faga'itua High School	09-Classroom CIP Beam & Slab
	Leone High School	03-Abandoned JROTC Wood Beams
		19-Covered Walkway CIP Column - Floor
	Manulele Elementary School	03-Admin/Library CIP Column - Floor
	Matafao Elementary School	14-Abandoned ECE CIP Column - Floor
	Nu'uuli Polytech High School	01-Admin/Classroom Steel Columns
	Siliaga Elementary School	07-Abandoned Classroom Wood Beams, Wood Bearing Walls, Wood Joists
	Tafuna Elementary School	02-Abandoned Comp Lab/Storage Crawl Space
		07-Classroom Steel Columns
		12-Abandoned Car Shelter Wood Columns
AFAFA	Tafuna High School	08-Classroom Reinforced Masonry Walls
		13-Classroom CIP Column - Floor
		16-Classroom CIP Column - Floor
		17-Classroom CIP Column - Floor
		18-Classroom CIP Column - Floor

Table 4 – Summary of Life Safety Items After Phase III Site Visits

	SCHOOL	BUILDING ID / DESCRIPTION	ELEMENT
TUTUILA	Matafao Elementary School	18-ECE	Wood Roof Decking
	Siliaga Elementary School	07-Abandoned Classroom	Wood/Flat or Pitched Roof
	Tafuna High School	15-JROTC 0324	CIP Column - Floor

Table 5 – Summary of Repair Priority Level 1 Items After Phase III Site Visits

	SCHOOL	BUILDING ID / DESCRIPTION	ELEMENT
MANUA	Manu'a High School	03-Teacher Housing	Wood Bearing Walls
	Alataua II Elementary School	08-Restroom	Wood Roof Decking
	Coleman Elementary School	08-Classroom	Slab on Grade
TUTUILA	Faga'itua High School	05-Admin/Classroom	CIP Column - Floor
	Lauli'i Elementary School	08-Classroom	Reinforced Masonry Bearing Walls
	Matafao Elementary School	03-Classroom 14-Abandoned ECE 18-ECE	Slab on Grade Wood/Flat or Pitched Roof Wood/Flat or Pitched Roof
	Nu'uuli Polytech High School	01=Admin/Classroom	Steel Columns
	Olomoana Elementary School	02-Classroom 03-Classroom	CIP Column - Floor Slab on Grade
	Pavaia'i Elementary School	12-Restroom	Steel or concrete Frames without decking
	Siliaga Elementary School	07-Abandoned Classroom	Crawl Space
	Tafuna Elementary School	12-Abandoned Car Shelter	Wood/Flat or Pitched Roof
	Tafuna High School	11-Classroom	CIP Column - Floor

Table 6 – Summary of Repair Priority Level 2 Items After Phase III Site Visits

## **APPENDIX A**

### **RECOMMENDED SCOPE OF WORK FOR STRUCTURAL LIFE SAFETY ITEMS**

## **Summary of Existing Conditions and Recommended Scope of Work for Structural Life Safety Items**

A brief summary of existing conditions and a short description of recommended repair procedures is herein presented for all structural damage observed during the Phase II and Phase III site visits and identified as a life safety item. Photographic exhibits are also included to support the summary of existing conditions.

The summaries are formatted on a building-by-building basis. Where a life safety item is common to more than one building of similar construction and within the same school, the recommendations are applicable to all buildings listed in the summary.

The summaries are provided as a tool to assist the American Samoa Department of Education and Department of Public Works in determining scope, cost, and schedule when preparing requests for proposals for the design and execution of repair work. The summaries are not intended to be used directly as requests for proposals.

## **APPENDIX B**

### **SCHOOL CAMPUS MAPS WITH BUILDING IDENTIFICATION NUMBERS**



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**Helber Hastert & Fee****Alataua II Elementary School**

Date: 5/24/2013

0      50      100      200      300      3 - 93      400      500 Feet



**bing™**

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**Helber Hastert & Fee****Alofau Elementary School**

Date: 5/24/2013

0 50 100 200 3 - 94 300 400 500 Feet





Helber Hastert &amp; Fee

**Coleman Elementary School**

Date: 5/24/2013

0    50    100    200    300    3 - 95    400    500 Feet





**Helber Hastert & Fee**

## Faga'itua High School

Date: 5/24/2013

0    50    100    200    300    3 - 96    400    500 Feet



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**Helber Hastert & Fee****Lauli'i Elementary School**

Date: 5/24/2013

0 50 100 200 3 - 97 300 400 500 Feet





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**Helber Hastert & Fee****Leone High School**

Date: 5/24/2013

0 50 100 200 300 400 500 Feet





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**Helber Hastert & Fee****Leone Midkiff Elementary School**

Date: 5/24/2013

0 50 100 200 300 400 3 - 99 500 Feet





**Helber Hastert & Fee**

0 50 100 200 300 3 - 100 400 500 Feet

### Manulele Elementary School

Date: 5/24/2013





Source: Esri, i-cubed, USDA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGN, IGP, and the GIS User Community, © 2010 DigitalGlobe © 2010 GeoEye © 2013 Microsoft Corporation



**Helber Hastert & Fee**

**Matafao Elementary School**

Date: 5/24/2013



0 50 100 200 300 3 - 101 400 500 Feet



Source: Esri, i-cubed, USDA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGN, IGP, and the GIS User Community



**Helber Hastert & Fee**

### MT Alava Elementary School

Date: 5/24/2013

0 50 100 200 3 - 102 300 400 500 Feet





Source: Esri, i-cubed, USDA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGN, IGP, and the GIS User Community, © 2010 DigitalGlobe © 2010 GeoEye © 2013 Microsoft Corporation



**Helber Hastert & Fee**

## Nu'uuli Polytech High School

Date: 5/24/2013



0 50 100 200 300 3 - 103 400 500 Feet

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**Helber Hastert & Fee****Olomoana Elementary School**

Date: 5/24/2013

0 50 100 200 3 - 104 300 400 500 Feet





Helber Hastert &amp; Fee

**Pavaia'i Elementary School**

Date: 5/24/2013

0 50 100 200 300 400 3 - 105 500 Feet

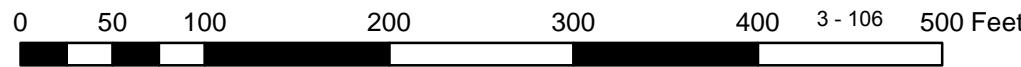




**Helber Hastert & Fee**

**Samoana High School**

Date: 5/24/2013





Source: Esri, i-cubed, USDA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGN, IGP, and the GIS User Community



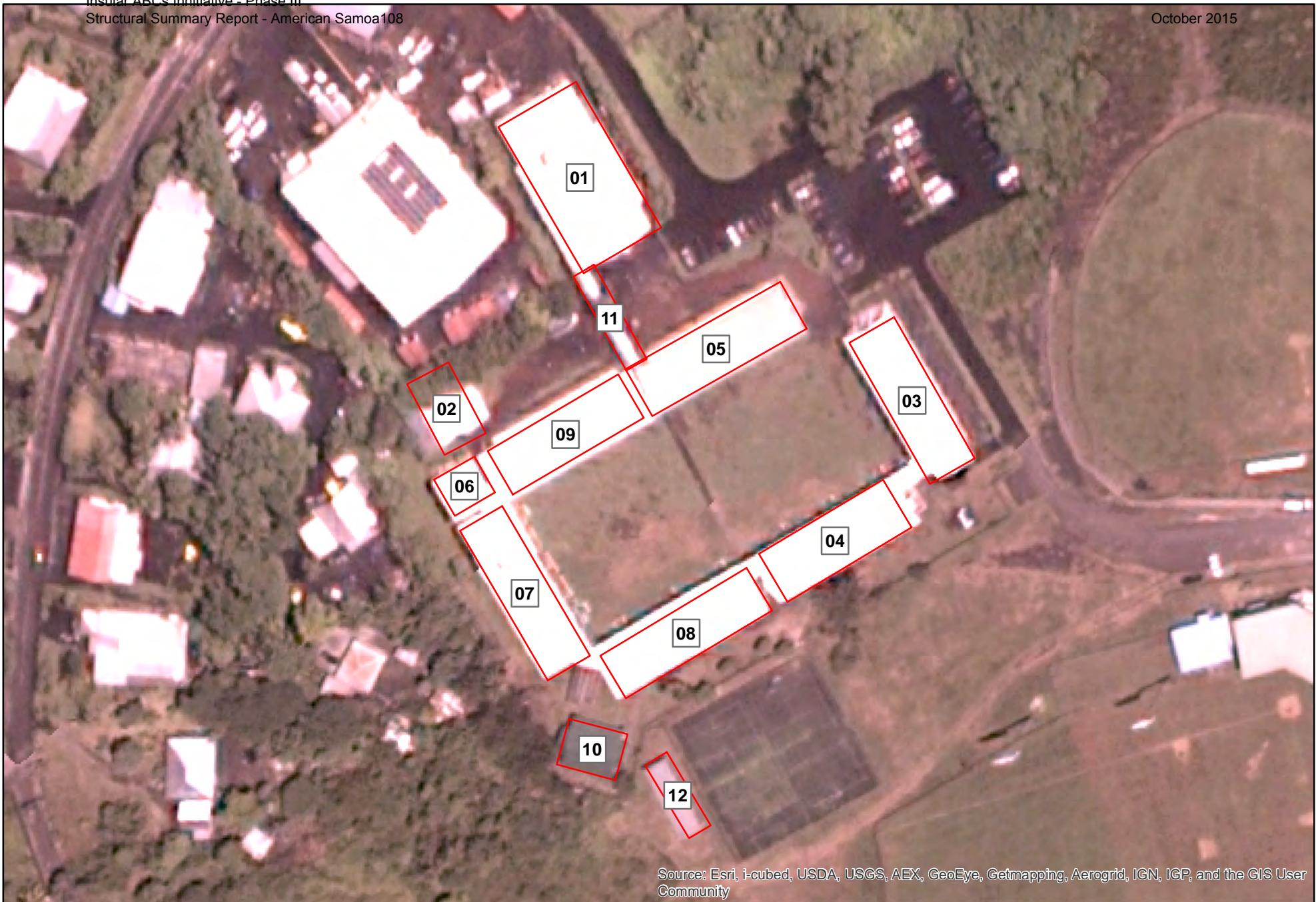
**Helber Hastert & Fee**

**Siliaga Elementary School**

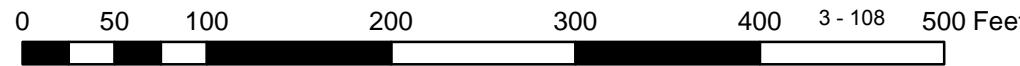
Date: 5/24/2013

0 50 100 200 3 - 107 300 400 500 Feet



**Helber Hastert & Fee****Tafuna Elementary School**

Date: 5/24/2013





**Helber Hastert & Fee**

## Tafuna High School

0 50 100 200 300 400 500 Feet

Date: 5/24/2013



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**Helber Hastert & Fee****Manu'a High School**

Date: 5/24/2013

0    50    100    200    300    3 - 110    400    500 Feet

