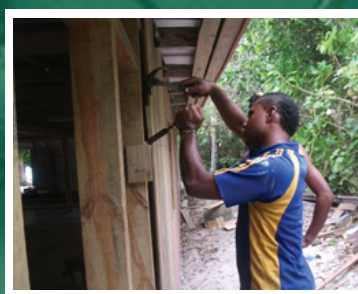


SCHOOL MAINTENANCE HANDBOOK



Ministry of Education Fiji 2015



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Foreword

The Ministry of Education recognises that it is through partnership and cooperation that Fiji has developed a strong and dynamic education system, which must be sustained.

I warmly welcome this publication which covers the importance of caring for school buildings and facilities. I have no doubt that it will become an invaluable reference manual for schools' management throughout the country. The publication of the school maintenance manual is timely as we now live in an era when property-owners have become increasingly conscious of the importance of routine maintenance and that deferred maintenance is a false economy. Remedial works will surely cost more in the 'long run' and the message of continuous maintenance is reinforced throughout the manual.

Furthermore, this publication comes at the right time when the Fiji Government has allocated all schools with appropriate funding from January 2014 where a percentage of the funding allocation will cater for minor improvement works in the schools.

I commend the hard work that has gone into the preparation of the maintenance manual and I applaud AQEP for the initiative to provide relevant maintenance knowledge for the schools' management. It is hoped that the maintenance manual will help our schools' management to acquire the appropriate technical knowledge and to enhance their skills and, above all, create an atmosphere in our schools that is conducive to the teaching and learning process.

A copy of the *School Maintenance Handbook* is provided for the management committee and the head teacher/principal of every school in Fiji. It is anticipated that committees and heads of schools will enable all staffs and parents to have open access to the valuable information contained in the publication.



Dr. Brij Lal
Permanent Secretary for Education.
February 2014

Statement from the Director - Asset Monitoring Unit

The formulation and publication of the School Maintenance Handbook speaks volumes of the Ministry of Education's commitment, in partnership with the Australian Government through the Access to Quality Education Program, in its endeavour to improve the status of teaching and learning in our schools through the provision of better and conducive learning environment.

This manual will surely be an asset to the school management boards, teachers and all stakeholders in the continuous improvement of the existing infrastructure in our schools.

The initiative by AQEP for such a manual is indeed acknowledged and appreciated as it augers well with the budgetary provisions in the new free education allocation by Government for periodic routine maintenance of school facilities.

The immense contribution from the Technical Working Group is also acknowledged.

It is hoped that this document will also enhance the knowledge and skills of our school committee and community in facilitating the needed maintenance and upgrading works in our schools, and thus create a culture of an on-going planned maintenance.

Vinaka.



Saimoni Waibuta
Director Asset Monitoring Unit
Ministry of Education

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Acronyms and Abbreviations

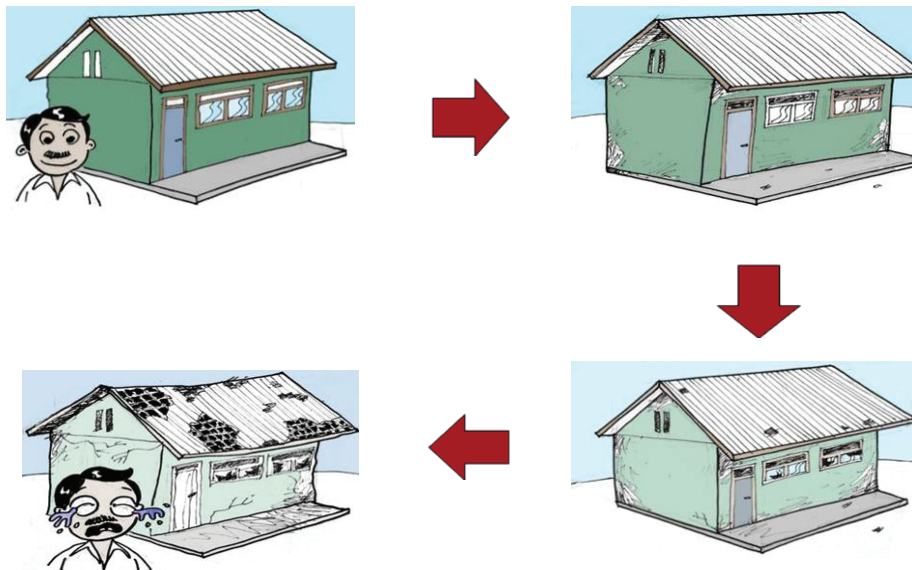
AMU	Assets Monitoring Unit
AQEP	Access to Quality Education Program
F - 7	Treated Fiji Pine Grading
HT	Head Teacher
MoE	Ministry of Education
PTA	Parents and Teachers Association
PVC	Poly Vinyl Chloride
SMC	School Management Committee
mm	Millimetres
X	Two lines intersecting forming the mark

1 INTRODUCTION

Building maintenance can be defined as a combination of technical and associated administrative actions to retain a building, or restore a building to a state where it can fulfill its required function satisfactorily. Each school should have a systematic and pro-active plan to prevent the need for significant repairs.

A school maintenance program is an organisational activity carried out by the school management committee in order to prolong the life expectancy of the school buildings, its furniture and equipment. To start a maintenance program in any school, the school management committee should engage sufficient staff members, and allocate sufficient budget for the maintenance of the school buildings to ensure that the building is safe and suitable for the teaching and learning activities.

A school maintenance program should ensure that the school building and facilities can function at its designed level during the normal life span of the school building. Every well maintained school building would last longer and provide a safer and healthier basis for the mental and physical development of children.



Picture 1: A school building without any maintenance will eventually look like this.

2 TYPES OF MAINTENANCE

There are two types of maintenance work for the school infrastructure: planned maintenance and unplanned maintenance.

2.1 Planned maintenance

Planned maintenance will be based primarily on a preventative approach, i.e. maintenance will be planned and carried out so as to avoid damage or further deterioration of the structure and fabric of the building. Planned maintenance should be organised and carried out with forethought, control and in accordance with the plan. The School Management Committee should adopt such a strategy in relation to the maintenance of the school infrastructure.

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A planned maintenance system involves inspections at regular intervals and demands significant input and commitment from the School Management Committee and the teachers. This will ultimately lead to a lower maintenance cost compared to an inspection system that is not planned.

Planned maintenance can be further classified into two sub-categories as follows:

- **Periodic maintenance.**

The periodic routine maintenance activities should be undertaken by the school maintenance committee every period of time (monthly, bimonthly, every three months, or yearly). The following are some examples of activities that can be undertaken by the school management committee: inspection of the roof members, ceiling members, wall members, floor members including the foundation; trimming of the trees, planting new flower hedges/vegetation and trees, trimming the lawn of the school and landscaping if necessary; garbage disposal (recycling, landfill and burning); checking the water levels in septic tanks and bailing if necessary; inspection of storm water down pipes, v-drains/open drains and main water ways; inspection of plumbing works from main water lines into the school compound, intake and stop valves/taps and repair if necessary; inspection of the school electrical system and repair or upgrade if necessary; inspection of wooden and steel structures/components and repair if necessary, deterioration caused by weathering, termites, rust and fungus etc.

Periodic maintenance is planned and requires some funding which could be collected through a school fundraising drive by the school management committee, parents and teachers association.

Periodic maintenance should include:

- a. Inspection of the ceiling for spot marks for water drops from roof leakages;
- b. Investigate and repair the source of leakage that causes spots marks on the ceiling;
- c. Inspection of the flooring for rotten members, remove and replace with new members;
- d. Inspection of all doors, windows and louvers and service accordingly;
- e. Lubrication of all hinges, locks and fixtures including the louvers with proper oil;
- f. Replacement of broken glass for windows, doors or louvers to ensure safety of the children;
- g. Inspection of the ablution blocks to ensure that all are functioning properly;
- h. Inspection of the hand washing vanity and ensure that all fixtures are tightened if necessary;
- i. Inspection of the classroom furniture, repair if necessary;
- j. Inspection of the playground furniture, repair if necessary;
- k. Inspection of the gutters and fixtures, repair if necessary;
- l. Inspection of the open storm water drains and the retaining wall, clean and repair if necessary;
- m. Inspection of the plumbing works, repair if necessary. e.g. water tanks, valves, taps and pipe lines; and
- n. Inspection of the electrical wiring yearly.

- **Routine or day-to-day maintenance,**

The routine maintenance consists of daily and weekly activities, e.g. cleaning of the open drains; garbage collection and distribution to the recycle bins/bunkers/incinerator; maintaining the vegetation to provide natural retaining wall for the slope; clearing of the gutters; cleaning of the ablution blocks and the floor of classrooms etc.

- a. Sweep all classrooms, teacher's rooms, library, special rooms and the verandas every

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- day and scrub & wash these rooms if necessary;
- b. Clear the furniture from the classrooms and wash the floor once a week;
- c. Wash the walls, windows and doors once a week. Remove all kinds of dirt that are generated by insects to avoid further deterioration;
- d. Lock all rooms at the end of each school day;
- e. Clean the toilets daily with brushes and make sure that there is enough water in the storage tank;
- f. Check all hand washing vanities fixtures and clear the drain pipes;
- g. Check all hinges, door locks and fixtures and lubricate with proper oil;
- h. The school compound grass/weeds trimming programme every day;
- i. Clean and clear the open drains in the school compound every day; and
- j. School garbage management – garbage distribution into the recycle pit/bunker daily and burning the rubbish in the incinerator once a week.

2.2 Unplanned maintenance

The alternative to planned maintenance is unplanned maintenance, which is primarily corrective in nature, i.e. maintenance work is carried out when defects are apparent. Such an approach is less satisfactory and maintenance becomes primarily a “fire-fighting” activity, i.e. maintenance is only carried out when major defects are obvious. In the best planned systems of preventative maintenance, the need for unscheduled emergency maintenance comes in handy.

In this case, the school maintenance committee should take immediate action to avoid further damage. If necessary the maintenance committee should advise the school management committee to seek for experts’ advice and obtain a reparation/rehabilitation plan of action with an estimated budget which could be used as a target for a fund raising activity or a proposal to donor agencies.

3. INSPECTION

A preliminary school building inspection needs to be conducted in order to prepare a school maintenance plan. The information gathered during the preliminary school building inspection would become the basis for the maintenance program/plan.

The inspection will start with simple observations of the inside and outside of the school by simply walking through the school complex with serious observation and following the checklist that could be utilised to determine which items require immediate attention and then match your recommendations in the corresponding table to determine what plan of action should be taken.

The school management committee and school maintenance committee should meet to discuss the purpose of the inspection and the instruments used for data collection. The inspection should be conducted routinely by technical personnel capable of identifying major deficiencies.

If a problem arises, adjustments in the school maintenance program may be necessary and a quick decision to be made for what corrective measures to be taken to remedy the problem.

It is recommended that a new inspection is carried out if a major change occurs to the school building, such as a hazardous event impacting on the school (e.g. flooding).

MAINTENANCE MANUAL FOR SCHOOLS IN FIJI

Table 1: Sample of Inspection Form - wooden building

School Name:		School Code:	
Building/Room:	Inspector's Name:		Date of Inspection:
Component	Condition	Location	Remarks
roofing cover			
purlins			
rafters			
braces			
fascia boards			
barge boards			
eaves battens			
<i>paint for above members</i>			
wall cover			
wall studs			
noggins			
braces			
door frames			
door			
door hardware			
window frame			
window sill			
window cover			
<i>paint for above members</i>			
floor cover			
floor joist			
floor bearer			
piles or poles			
<i>paint for above members</i>			
plumbing - water			
plumbing - sewer			
electrical fittings			
furniture - built ins			
Equipment/Appliances			

4. MANAGEMENT AND PLANNING

Every school management committee (SMC) is responsible for the maintenance of the school building. The school management committee should form a maintenance team/committee with clearly define duties and responsibilities. The school maintenance committee structure should include a general coordinator with a responsible team for every area of the school building. The general coordinator who could be the head teacher (HT), or a parent/teacher association (PTA) representatives will be responsible for, scheduling inspection activities to be carried out by the teams, collection of information, preparation of a school building analysis report, and preparing the annual school maintenance plan.

The school maintenance committee or team should be responsible for:

- Preparing of the annual maintenance plan;
- Undertaking regular maintenance that is urgently needed and when it is needed;
- Monitoring of maintenance activities at school;
- Undertaking routine infrastructure inspection at the end of each school term;
- Educating the community and the school children on the safe keep, cleanliness and maintenance of the school furniture and the school buildings;
- Keeping a full set of built drawings, technical specifications and the bill of quantities if available;
- Fostering the sense of belonging of children, teachers and the community in regards to school infrastructure; and
- Providing and keeping adequate maintenance tools in the school.

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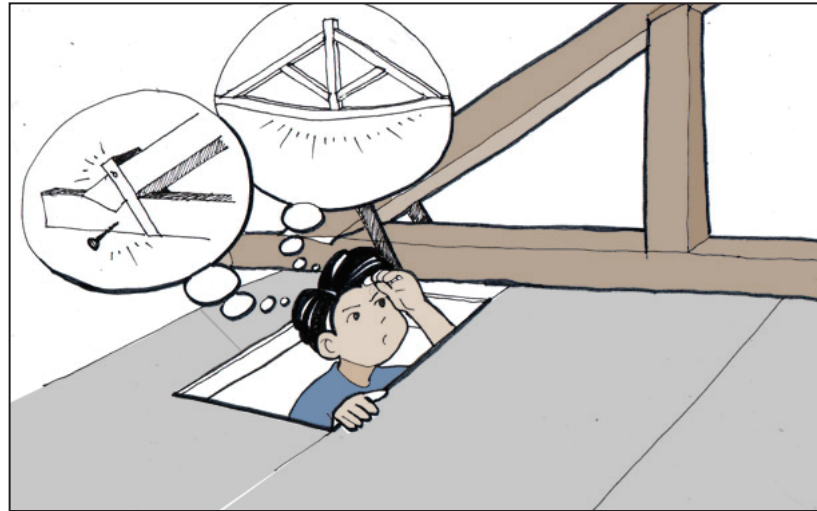
Table 2: Sample of Maintenance Plan Form

School Name:		School Code:		Date:					Period:	
No	Building/ Room	Type of work	Implementer	Frequency					Funding Required	Funding Source
				Daily	Weekly	Monthly	Yearly	Unplanned		

5. MAINTENANCE TECHNIQUES

5.1 Roof

The purpose of the roof is to protect the school building from rain, sun, and wind. A function of the roof is to keep water away from getting into the school building. The roof should be kept in a good shape as it is an important part of the building's waterproofing system.



Picture 2: Roof Inspection.

Common problems:

- roofing nails & screws are loose and rain water seeps through the nail & screw holes;
- ridge caps are not fully secured and rain water seeps under and into the ceiling;
- fascia boards are loose and pulling the gutters and causing water spills when it rains;
- rusted roofing iron sheets forms small cracks and pinholes and rainwater seeps through the cracks and the holes;
- corrosion caused by a chemical reaction when zincalume and galvanised material are connected;
- in a pitched roof, high winds might tear off roof shingles or sheets;
- in flat roofs rainwater can be impounded on them, gradually working its way through the school building below; and
- blocked gutters.

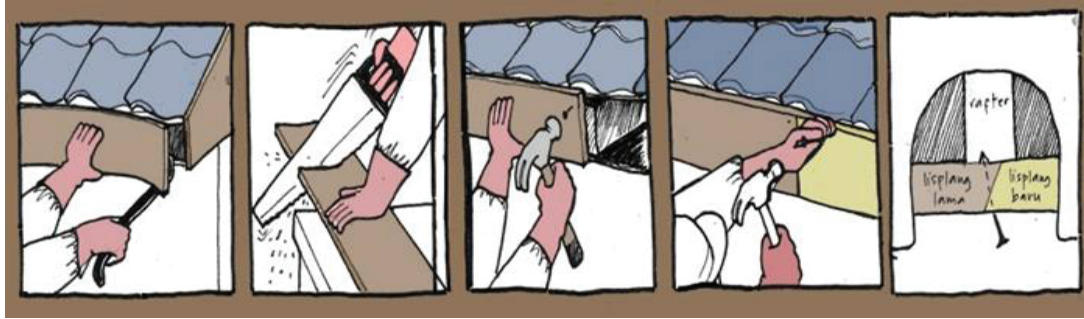
5.1.1 Fascia Boards

Fascia board is the horizontal board covering the edges of the rafters and the projecting eaves. The guttering is usually fixed on the fascia boards.

Common problems:

The exposed wooden parts could easily decay/rotten and the deterioration of the wood could spread to the other parts of the building if no proper maintenance to the exposed wooden parts is attended to.

Remedial measures:



Picture 3: Rotten end of the fascia board is removed. Splay joint is used at extension.

The rotten/weathered timbers should be removed and replaced with new timbers. All wooden surfaces should be cleaned with the steel brush, sand papered thoroughly and then apply a coat of primer and two finishing enamel paint coats.

It is recommended that periodic painting of the exposed wooden components of the building shall be done once every 4 years. Before the periodic painting is done, the wooden parts of the building should be wiped and cleaned properly.

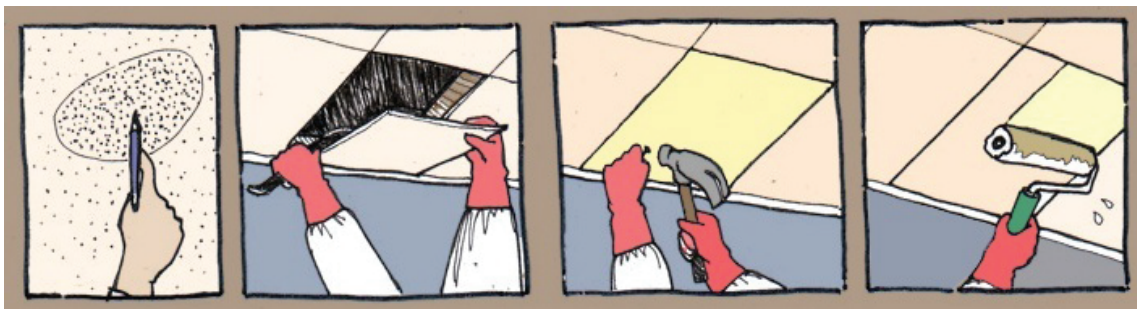
5.1.2 Ceiling

The ceiling consists of joists, top plates and battens are made of solid timber covered by plywood or asbestos free cement board. Every building requires at least one manhole for roof inspection when necessary as well as for ventilation purpose. The ceiling should be thoroughly cleaned with a long broom at least once in a month.

Common problems:

A leaking roof will show spot marks on the ceiling and it should be attended to immediately. The roof will not leak if there is a regular maintenance programme for the buildings.

Remedial measures:



Picture 4: Step by step process to repair damaged ceiling board.

When spots marks appears on the ceiling, it should be investigated by opening the ceiling and identify the source of water droppings. The leak should be identified and fixed immediately to avoid further damages. The water holes should be cleaned properly and sealed with the silicon sealer. After sealing the leakage, the ceiling should be sanded and re-painted with primer and the

two finishing coats using the same colour scheme of the ceiling. If the corrugated iron is beyond repair then it is advisable to replace with a new one.

5.1.3 Gutters and Down Pipes

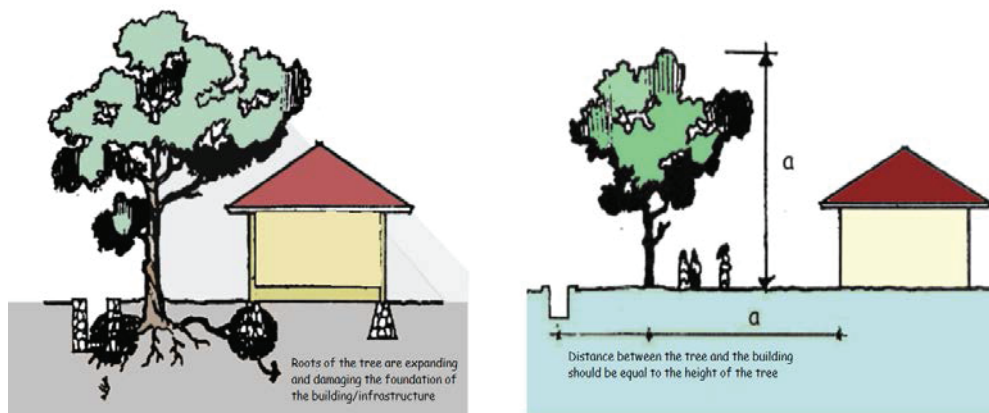
Gutters perform an important task channelling water away from the building. A good gutter system prevents damage to building siding, foundation, and landscaping.

Common defects:

- clogged down pipes/water overflow from the gutter.
- sagging gutter
- leaking gutter.

Remedial measures:

- Trees beside the buildings should be trimmed to avoid the falling leaves clogging the gutters. The accumulation of leaves, dirt and growing weeds in the gutters will stop the flow of water into the down pipe. The gutter clips can no longer hold the gutters in place when subjected to the immense weight of the leaves, dirt and weeds and the rain water.
- Gutters and down pipes should be periodically inspected and cleaned at least once per school term. Cleaning of the clogged gutters will prevent water overflow which can cause considerable damage to the fascia board, ceiling and walls of the building if it is not attended to immediately.
- If the fixtures of the gutters and down pipes are damaged, immediate repairs should be undertaken before the damage escalated which can cause further damage to other parts of the building. If the gutters and down pipes are rusted, then it should be cleaned with the steel brush to remove the rusted parts thoroughly and repainted with antirust (enamel paint containing zinc and chrome compound).
- Rehang sagging gutters begin by using a chalk line that follow the correct slope towards the down pipe. Remove the hanger near the sag and lift the gutter until it's flush with the chalk line. Reattached the hanger, replacing them if they are rusty or in a poor condition.



Picture 5: Roots of trees can cause serious damage to the building foundation and close concrete structures. The distance of any tree to the nearest building should be equal to its height.

5.1.4 Eaves Board

The eaves board should be periodically inspected to see that all fixtures are in a good condition and if any of the fixtures identified is loose, then immediate repairs should be under taken to avoid any further major repairs.

5.1.5 Locating and Repairing Leaks

Leaking roof indicators are shown in the pictures:



Picture 6: Leaking roof and marks on the ceiling.

When water spot marks appear on the ceiling, the school management should immediately attend to the problem and stop the leakage by following the steps as shown below:

- Step 1** - Open the ceiling to check the roof and identify the source of leakage;
- Step 2** - Use the flash band or roof & gutter silicone to seal the leakage;
- Step 3** - If the application of flash band or gutter silicone does not stop the leak then the roofing iron needs to be replaced; and
- Step 4** - The ceiling board then should be replaced and if the board is reused it should be sanded and re-painted with a primer coat and 2 finish coats using the same colour scheme used.



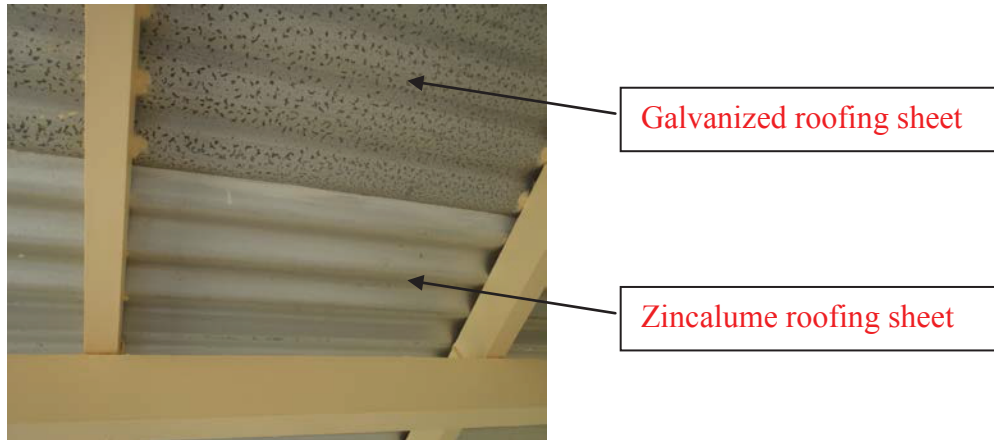
Picture 7: Application of flash bands and Silicon sealer on the roof.

5.1.6 Roof Sheet Maintenance and Painting

5.1.6.1 Materials

Galvanised and Zinalume are the two common roof cover materials used in Fiji. It is important to identify the right roofing material used in the school building before any maintenance/replacing of the roof cover sheets is undertaken. Do not place the zinalume and galvanised roof sheets together as the two materials will react against each other and will cause corrosion.

To differentiate between zincalume and galvanised can be very confusing and the only visible difference with galvanised roof cover is the large flake type pattern it has. For the purpose of identifying which type of roof cover is used on a building - inspect the underside of the roof cover through the manhole in the ceiling. The other way is to remove the roof sheets that need to be replaced and identify the type of material. Corroded strappings needed to be replaced and it is important that it is of the same material used on the roof.



Picture 8: Zincalume and galvanised roof sheet.

5.1.6.2 Roof Painting

The corrugated steel roofing iron sheets lifespan can be extended if it is well painted and it is not directly exposed to saltwater. The maintenance work should start with proper cleaning of the roof sheets so it is clean and free from dirt and rust. To clean the roof, first scrub and clean the roof with a steel brush and then lightly rub the surface down using a light sand paper then followed by the roof painting activity. The first coat of the metal primer with another two additional coats of acrylic gloss paint to the roof sheets. It is advisable to use a light coloured paint as this will reflect the heat.

How to clean a roof: Your budget and whatever materials are available to you will determine how you will clean your roof. Using a high pressure water blaster is one of the best ways to clean a roof, especially any roof with a rough surface. You can use a broom and hose but you will need some type of chemical to help remove the mould from within the pores of the surface. This is where high pressure is good; it does get into all those nooks and crannies.

A roof with a smooth surface such as galvanised roofing iron could be washed much easier with a broom, some detergent and a hose to wash it off after. High pressure is also good to use but it is not as important to use on smooth surfaces.

How to paint a roof: If you are painting a new iron roof, you will need to wash it first with a degreaser before you start painting, unless the roof is more than a year old and has weathered. This means that the oil from the fabrication has worn away and the iron has been slightly etched through weathering.

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With unpainted roofing iron you will need to prime it first with a suitable primer. This is also the case for any sheet metal that may have to be replaced on an existing roof. You will need to apply two coats of suitable paint, and the choice of colour is up to you but do remember lighter colours will reflect the heat and darker colours will absorb the heat. Water based paints can be used on iron roofs but all rust should be removed or it may appear again soon after painting.

Great care should be taken for any work that is carried out on the corrugated steel roof:

- The roof sheets are not very thick and may not take the weight of the worker on the roof so the crawl boards over the ridge of the roof must be used while workers are working on the roof.
- Use a claw hammer or the pinch bar for the removal of roofing nails supported on a piece of timber shaped to fit into the sheet corrugations. This will spread the load and prevent damage to the corrugated roof iron sheets. For removal of the roofing screws, always use the correct size spanner.
- Always make the fixation of the corrugated steel roof iron sheets through the top of the corrugations and always use roofing screws with plastic washers. If roofing screws are not available then use roofing nails with twisted shanks with a felt washer. If a fixing hole has been enlarged, silicone sealer can be used around the fixation area for water proofing purpose.



Picture 9: Removing roof nails.



Picture 10: Changing the roof sheets.

5.1.7. Vent Pipe

A Vent Pipe is the pipe fitted above a waste pipe or soil pipe that allows gas to escape from the system. A well function vent pipe would keep the building free from bad odour.

Common defects:

Small and large vent pipes are usually seen above the roof with no vent caps which are always overlooked without any attention given and is often clogged with debris, tree branches and leaves. Vent pipes above the roof should have end caps.

Remedial measures:

- Keep the protective hood (vent cap) on vent pipes;
- Clear the leaves and debris around the vents; and
- If the vent is totally broken, replace with a new pipe.

5.1.8 Flashing

The flashing is a flat sheet metal that is shaped to fill the gaps around the chimneys, vent pipes and under the valleys where two roof slopes meet. The gaps between the flashing and the chimneys and vent pipes should be sealed with the silicon sealer.

Common defects:

- a. Corroded flashing would form pinhole openings and metal fatigue that would pull the flashing away from the vents or other adjoining surface.
- b. The sealant used has dried out, cracking and falling off.

Remedial measures:

- Remove rusted old flashing and install a new piece.
- Tack the flashing carefully under the edges of the roof.
- Seal the pinholes and cracks with asphalt emulsion or chalking compound.

5.1.9 Roof and Roof Frame Structure

The roof frame structure consists of the roof truss system on which the roof sheets are screwed/nailed to. The roof truss system consists of rafters and purlins that are held in place by tie down/cyclone strappings.

Common defects:

- Corroded straps would cause failure under cyclonic wind conditions.
- Lack of nails per leg of the strap.
- Improper strapping technique.
- Dilapidated/rotten/termite invested timber would cause structural failure.
- Missing or damaged fastening materials.

Remedial measures:

- Remove rusted old straps and install new strap.
- Make sure there are a minimum of three nails per leg for purlin to rafter connection.
- Make sure the strapping is tightly fixed together with no room for movement in relation to uplift forces.
- Replace dilapidated/rotten/termite invested timber with new structural timber such as local hardwood or F7 pine timber.

5.2 Structure

The structure of a school building is the group of columns, beams, structural walls, floors, and roof structure. There are three common types of structure components in the school:

- Concrete
- Timber
- Light Steel.

For any sign of structural defects which is out of your hands, you should consult a structural engineer before you continue with any rehabilitation works.

The school management committee should keep the building structure clean, painted and free from “significant” disturbance. If the roof structure is of questionable status, the rectification of the structure has to be undertaken by skilled construction workers under the supervision of a prominent structural engineer.



Picture 11: Cleaning the column.

The structural engineer will supervise the reinforcements of the structure using temporary suspension to hold the structure in place to avoid total collapse of the roofing structure which could be a hazard to the children and the teachers.

5.3 Wall

A wall is an upright structure of masonry, wood, plaster, or other building material serving to enclose, divide, or protect an area, especially a vertical construction forming an inner partition or exterior siding of a building. There are three types of building walls in the school:

- Concrete wall
- Timber wall
- Sheet metal wall.

5.3.1. Concrete Wall

The routine maintenance of concrete walls includes cleaning of the surface from dust and insects' nests with the use of a broom or wet cloth. If there are permanent marks on the wall surface, it should be sanded and repainted with the normal painting procedures (primer, the undercoat and final coat).

Picture 12: Hairline cracks, structural and major cracks.



Hairline Cracks: replace old plaster with new plaster, proper curing, prime coating and final coating



Structural Cracks: involve expert to investigate the reason of the cracks and take proper actions



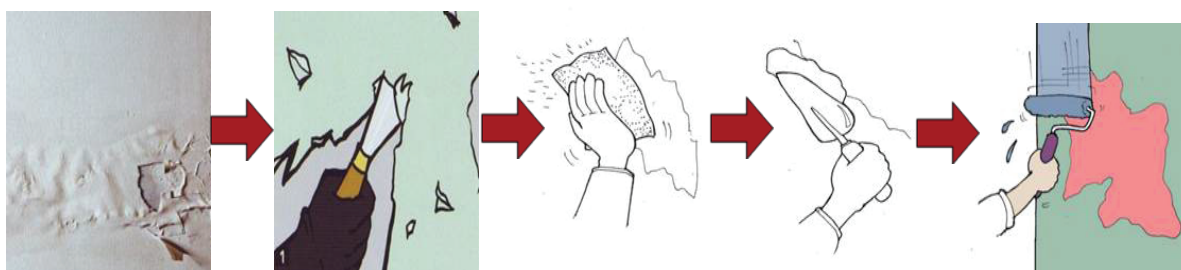
Segregation of concrete from re-bars and plaster from brick wall: involve the experts to take proper actions

Common defects:

A wall is a continuous vertical structure that encloses or divides an area. It can also be considered a building's skin that frames its skeleton. Over time the building skin will have cracks, peeled paint, and holes/big crack that can allow moisture and pests to get in.

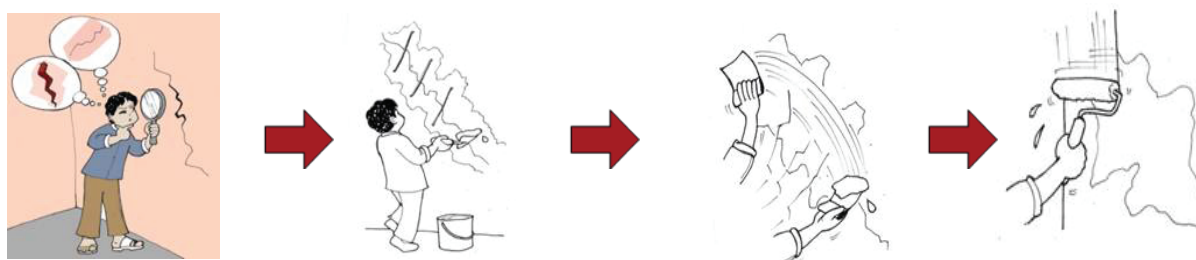
Remedial measures:

- (1) Hair line cracks - the wall plaster is made of cement and sand and in most cases there are "hairline cracks" that would appear within one or two years and it is caused by the seasonal weathering cycle. This kind of cracks is not structural therefore does not affect the strength of the building. Hence, it can be ignored as the yearly repainting of the walls would eradicate the crack visibility.
- (2) Peeled paint - if the original paint peels off the surface, then the first step to take is to clean the walls free from any segregated paint fraction and repaint with primer, and two coats of acrylic enamel paints, i.e. (a) Remove the peeled part of the wall surface, (b) clean the surface with wet cloth and sand paper, (c) patch with cement plaster, (d) put primer coat on dry surface and (e) repaint with acrylic enamel paint.



Picture 13: *Paint is ballooned. Shown is the process of reconditioning of the wall from removal of paint using a scrapper, application of the cement plaster, sanding the walls and painting stages – primer, first coat and the final coat.*

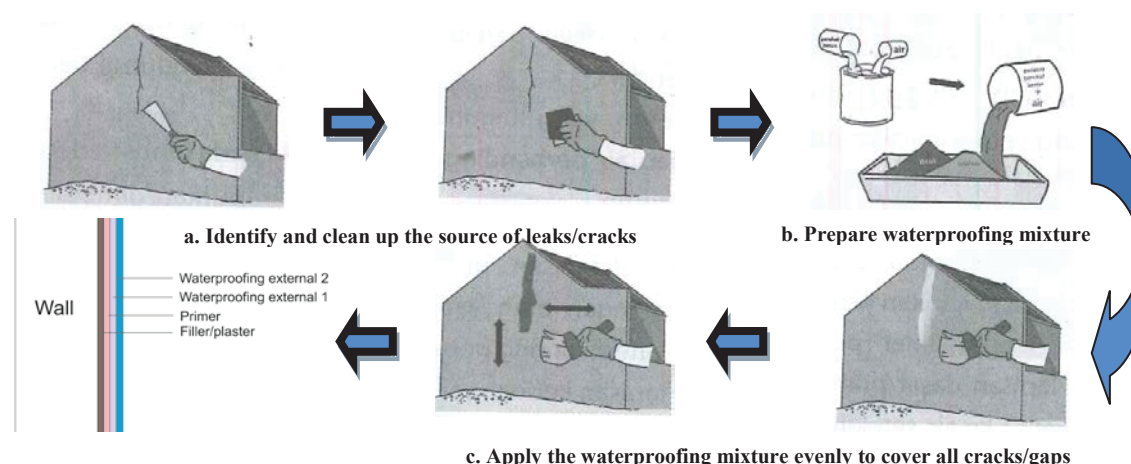
- (3) Structural (big) cracks - If the crack is considered as structural then it should be reinforced with the *chicken wire mesh* or steel bars <5mm diameter, patched with 1:3 ratio of cement plaster and finally repaint following the normal painting procedures (primer, first coat and final coat).



Picture 14: *Identifying the cracks and fill the cracks with plaster strengthened with chicken wire mesh or steel bars less than 5mm diameter, sandpaper the plaster and paint with 3 coats of paint (primer, first coat and final coat of paint).*

- (4) A concrete or timber wall that is moist or wet is a sign of water seepage through the wall. The presence of water can be caused by rain water seeping through the walls or leaking from the top floor or the roof. In this case immediate attention should be taken to stop the water leakage and prepare the walls for repainting.

Picture 15: Waterproofing of the concrete walls.



5.3.2. Wooden Wall

The wooden plank walls covers the external envelope and the internal partition that separate one room from another above the masonry walls below the roof beam. Basically wooden walls consist of wall framing which becomes a part of the door/window framing.

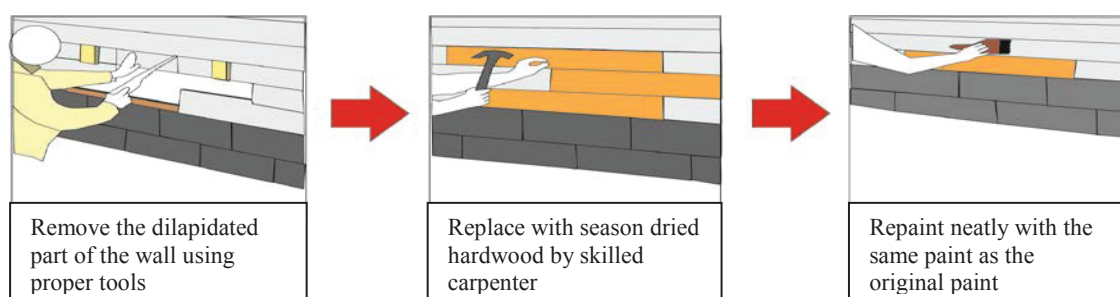
The external walls cladding shall be made of treated & dry pine wood (F7) or local hardwoods planks with 12 mm overlapping to provide for water seal purpose (weatherboards). The surface of the internal walls cladding (double wall) should be smooth to provide allowance for children to pin their art works on the inside of the walls and both wall claddings shall be fixed using wood screws.

Common defects:

Exposed wooden walls condition will deteriorate over time due to direct contact with sunlight, rainwater, and pests. This kind of defects would be shown in a form of rotten or dilapidated wall lining, peeled paint, and rough/rotten wall surface.

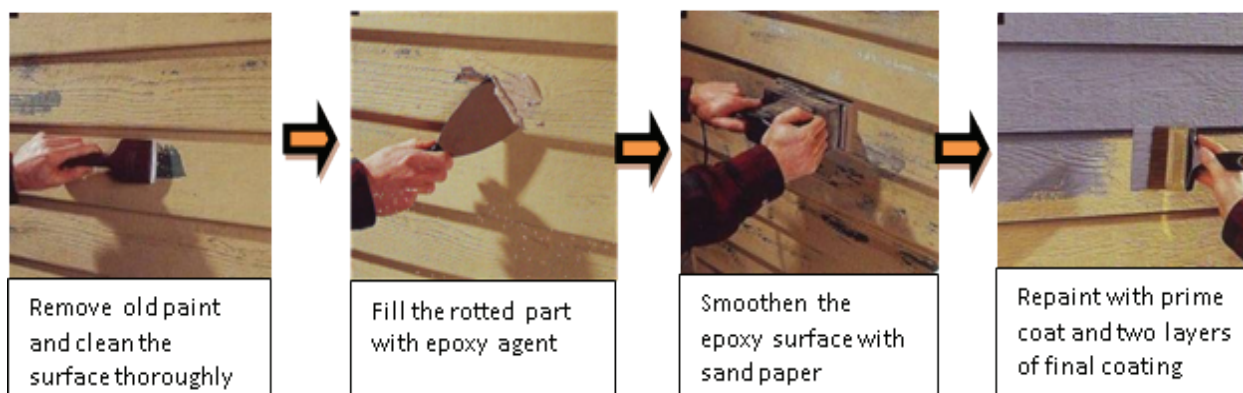
Remedial measures:

1. Remove and replace any wall cladding if it is rotten or dilapidated:



Picture 16: Replacing the rotten weatherboards and repainting.

2. Repair/repaint the dilapidated wall surface:






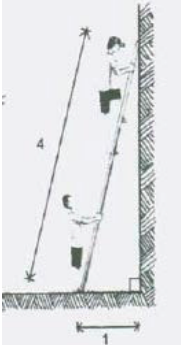
Picture 17: Repair of the surface of weatherboards and repainting.

5.3.3. Sheet Metal Wall

The sheet metal wall can be of flat sheet metal or corrugated iron sheets. Since all metals corrode, the primary problem in dealing with corrugated iron is attempting to slow down the rate of corrosion. The corrugated metal sheets lifespan can be extended if it is well painted and not exposed directly to water and salt. The maintenance work should start with proper cleaning of the metal sheets and then followed by painting activities. A double wall with light coloured paint will reflect the heat and keep the internal rooms cooler. Colour bond sheetmetal wall is recommended if the building is located close to the sea.

5.3.4 Some tips to improve the quality of painting

Table 3: Tips to improve quality of painting

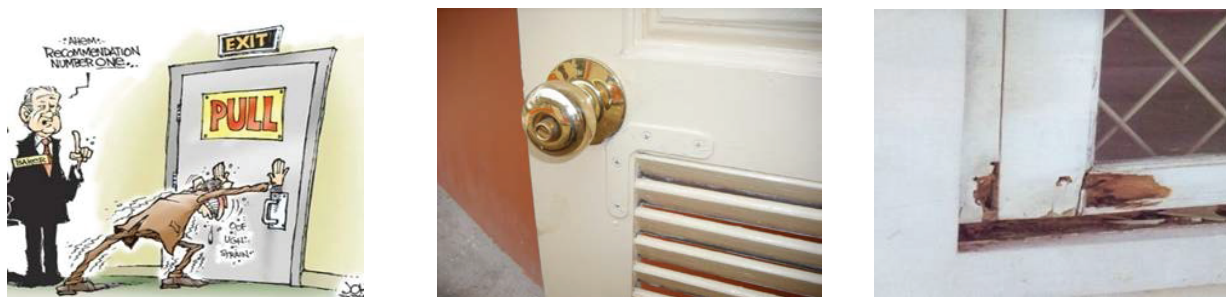
<ul style="list-style-type: none"> Don't paint on the existing paint which is already segregated from the original surface. 	<ul style="list-style-type: none"> Remove or clean the existing paint with sand paper to assure the new paint is attached to a solid surface. 
<ul style="list-style-type: none"> Don't broom the floor which would create turbulent of dust while painting. 	<ul style="list-style-type: none"> Clean the surface with water, brush and sand paper before painting 
<ul style="list-style-type: none"> Don't use the old brush for painting as it would minimize the quality of the paint. Use the right size of brush for painting to make it more efficient and effective. 	<ul style="list-style-type: none"> Remove nails or other unused fixtures from the surface before painting 
<ul style="list-style-type: none"> Don't mix the paint with other materials to assure better quality of the paint. Read and follow the user's instruction for painting and this is normally found in the label of the paint container or the brochures from the manufacturer. Do not paint during rainy days and in high humidity. The best time for painting is during sunny days. 	<ul style="list-style-type: none"> If the ladder needs to be used the slope ratio should not to be less than 1:4 to avoid the ladder falling backwards. 

5.4 Doors and Windows

Aluminium and timber are materials commonly used for doors and windows framing. Aluminium is rarely used in school windows and doors due to its cost. Timber is affordable and much cheaper and can be easily maintained and fixable. Doors and windows require regular inspection to keep them in working order.

Common defects:

- (a) Doors and windows should open and close easily
- (b) Routine checks for the hardware (hinges & door locks)
- (c) The doors & windows framing joints should be repainted constantly to be in good condition.



Picture 18: Inspection of the door/window frames and the hardware.

Remedial measures:

The school maintenance committee should conduct routine checks on the doors and windows and take immediate action and repair the damaged ones. Damaged hardware should be replaced and working ones should be well lubricated with proper oil.

5.4.1 Routine Maintenance of Door locks:

Common defects of the door locks:

- a. A jammed locking system and this happens when the mechanics inside the lock has corroded and lubrication has dried. To solve the problem, the locking system needs to be set free. First remove the corroded debris inside the lock and spray the locking system with lubrication oil.



Picture 19: Fixing a mortise lock.

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- b. Doors can open easily despite the locks being locked. This happens when the door locking pin cannot penetrate the hole. To solve the problem, the locking pin needs to penetrate the lock hole. First you should make sure that the locking mechanism is working and the door need to be checked that it fitted into the door opening well without gaps. If the door fitted well in the opening, then you should check that the lock can move forward and sticking out to fit into the locking hole. Adjustments of the locking system should be made so that the lock fitted well into the lock hole to hold the door when it is locked.
- c. The door leaf is subsided when the door becomes difficult to close or open. When the door leaf is subsided it should be taken off the hinges and fixed. The door shall be hanged with 3 pieces of brass hinges.



Picture 20: Fixing the door hinges.

5.4.2 Maintenance of Windows

Common defects of windows

- a. The window is hard to open
 - (1) First you should check the frame whether it is still square.
 - (2) The high moisture content will increase the size of the wooden window frame. The expanded part has to be reduced to its original size by removing the excess and repaint it following normal painting procedures.



Picture 21: Hanging windows.

- b. Corroded louver frames
 - (1) First you should check the frame if there if the mechanism still in a good condition or not (no serious rust/damaged)
 - (2) If there is no serious damage to the window frame mechanism then clean it properly and apply the lubricant to the moving parts.
 - (3) If there is a serious damage to the window frame mechanism then replaces it with the new one.
- c. Damaged louver frame and blade holders
 - (1) If the louver frame is broken then replace with a new frame.
 - (2) If the blade holder is broken then the whole frame should be replaced.



Picture 22: Corroded louvers frame.



Picture 23: Damaged louver holders.

- d. Loose louvers blades with metal blade holder
 - (1) First you should check the louver blades to identify the cause of the problem.
 - (2) If the holder is cracked/broken then it should be replaced with the new blade.
 - (3) If the blade is still in a good condition then the blade holder can be adjusted with a screw driver or pliers to properly hold the louver glass.

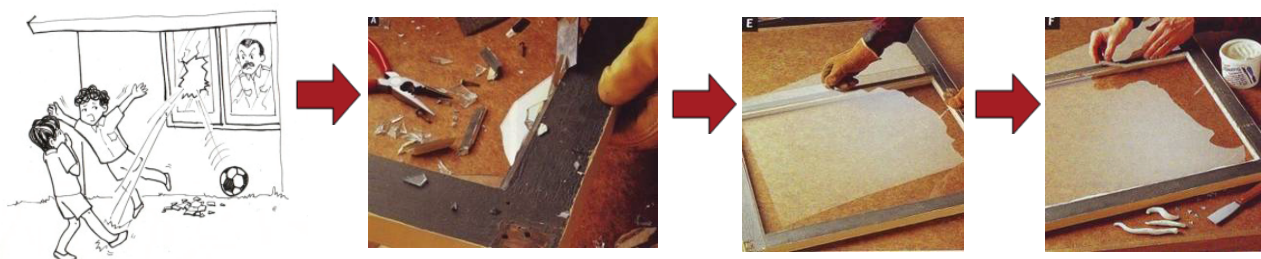
5.4.3 Replacing broken window glass

Teachers should take more care that children are kept well away from broken glass windows. If the glass of the window is broken then it should be removed and replaced immediately.

The following actions should be taken:

1. Take off the window from the window frame;
2. Remove the wooden cleat;
3. Remove the broken glass from the window frame;
4. Place the glass in the window frame;
5. Place the wooden cleats; and

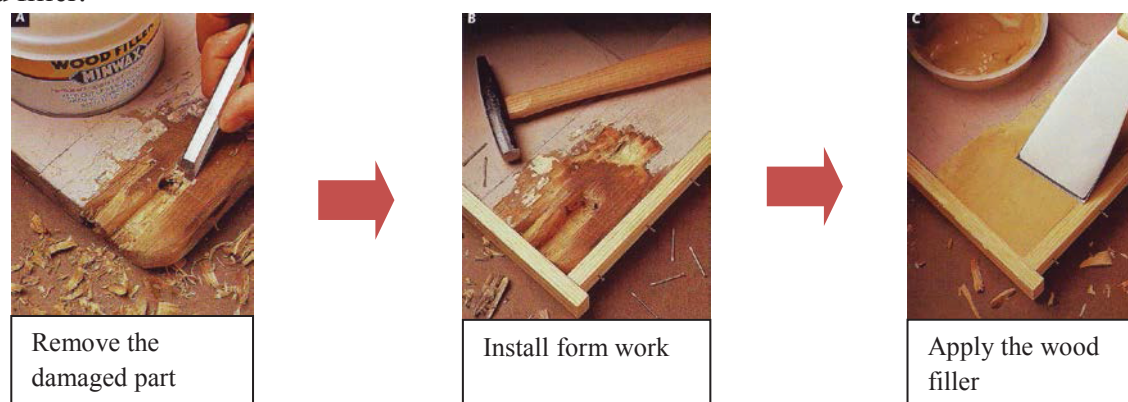
6. Paint the window frame to match with the existing windows.



Picture 24: Process of replacing broken window glass.

5.4.4 Replacing a dilapidated door/window frame

If the door/window frame is rotten then the rotten parts should be removed and replaced with proper treated timber pieces. If the rotten part is small then remove it and then fill the gaps with the wood filler.



Picture 25: Process of repairing a window or a door.

5.5 Floor

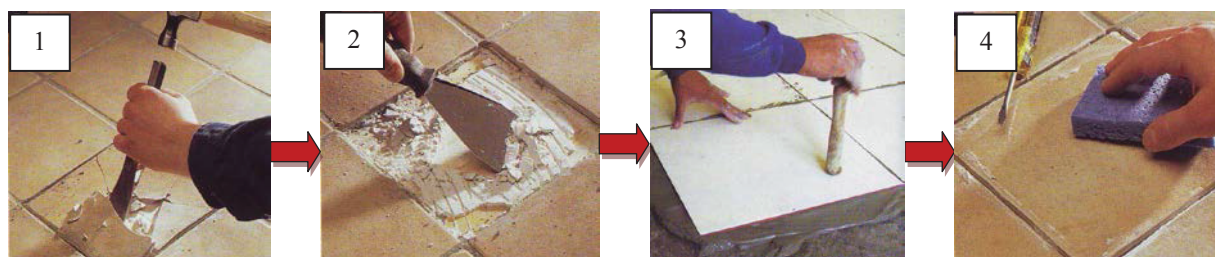
Floors in Fiji schools are normally made either of concrete (with tile or no tile) or timber. Concrete and timber floor require different kinds of maintenance.

5.5.1 Maintenance of Concrete Floor

- Always keep the floor clean and dry.
- The floor should be swept daily.
- Do not place acidic materials on concrete floor.
- Do not drag heavy things across the floor without protecting the concrete floor.
- Do not drive nails into the concrete floor.
- Patch the concrete floor as soon as any damage is identified to avoid escalation of the damage.
- If any damage on the concrete floor is identified, you should remove the segregated part of the concrete with a cold chisel and chip the concrete until the surface is rough, spray it with water and apply the final concrete plaster layer and smoothen it with cement powder.
- If the floor tiles are damaged, you should remove the damaged tiles and replace it with the same type of tiles.

5.5.2 Replacing a Ceramic Tile

If you are replacing one or two tiles, you will only need a small quantity of tile adhesive and source the same (size & colour) replacement tiles from the hardware suited to the job.



Picture 26: Process of tile replacement.

Implementation procedure:

Step 1

- Using a sharp cutting edge remove the grout around the damaged tile;
- Place an 'X' mark in the middle of the broken tile from corner to corner and using a nail set at the centre of the 'X' mark, tap with a hammer to loosen the cracked tile; and
- Using a sharpened cold chisel carefully chip out the broken tile piece by piece so that you remove all pieces but not denting the base concrete and adjacent tiles.

Step 2

- When all the tile pieces are removed, scrape out all remaining tile adhesive with the putty knife.

Step 3

- Using the putty knife 'butter' the back of the replacement tile with adhesive and position it where the old tile was set. Wipe away any adhesive that squishes up from beneath the tile; and
- Using a wooden dowel (to protect the surface of the new tile) tap the top of the new tile gently so that the tile is set in place and level with the existing surrounding tiles; and

Step 4

- Once the tile is set, fill the surrounding gaps with the grout and wipe any excess grout away with a damp sponge; and
- When the grout dries, apply a sealer according to given directions.

5.5.3 Replacing a Vinyl Tile

You must look in the hardware for the right tile to replace the damaged one. Source for the replacement tile from the hardware store and also get the right adhesive and solvent.

Procedure to replace vinyl tile:

- Place a towel over the damaged tile and using a medium hot iron or hair dryer, apply the appliance to the damaged tile until the vinyl tile (and underlying adhesive) is very warm and begins to soften and loose;

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- Using a putty knife remove the damaged tile by prying it up at one corner gradually and carefully pull it up and off (If you need to soften the vinyl tile more, lay it back down and apply more heat with the iron over the towel.);
- Let the adhesive to cool down, then scrape off the dry adhesive with the putty knife until the surface of the floor is smooth, clean and flat;
- Use the notched trowel for applying the adhesive to the flat sub floor. If any of adhesive settles on the adjacent tiles, you should clean them up with the solvent, according to the application directions;
- Position the replacement tile above the adhesive covering the opening and make sure that you have got the same pattern and it is placed in the right direction; and
- Setting the two adjacent edges of the new tile against the two adjacent tiles surrounding the portion to be replaced and make sure that the pattern matches. Press the tile into place.

If any adhesive comes up between the new tile and the adjacent ones, clean it with the solvent according to the given directions. Set the new tile in place and level with the surrounding pieces; if it's too low, pull it up and add more adhesive.

If it's too high, then press it down hard and clean up any excess adhesive that squishes up at the edges with the solvent. Do not walk on the floor until the repair dries completely.



Picture 27: Replacing vinyl tile.

5.5.4 Resurfacing the concrete floor

A concrete floor that has suffered surface damage but is structurally sound can be preserved by resurfacing. Resurfacing of the concrete floor involves the application of a thin layer of fresh concrete over an existing surface that has been damaged. At the beginning of this work the old surface must be cleaned thoroughly.



Picture 28: Resurfacing the concrete floor.

5.5.5 Repairing a small crack on the floor

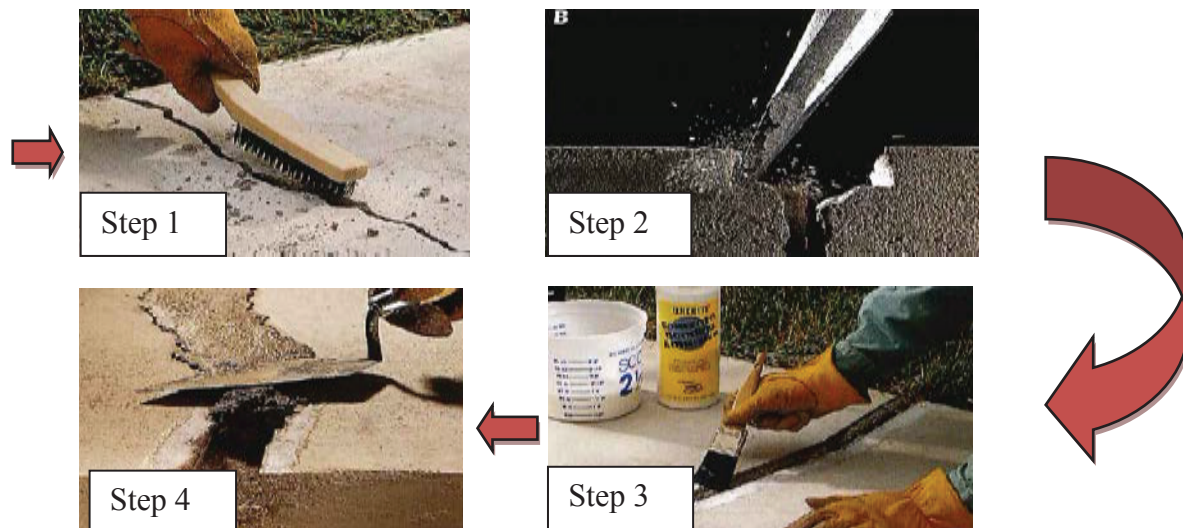
A concrete floor that has a cracked surface could be repaired by patching the crack with concrete compound. Below is the step by step repair process:

Step 1 - Clean any loose material from the crack thoroughly;

Step 2 - Use a cold chisel to widen the mouth of the crack and clear the crack;

Step 3 - Use a paint brush to apply a thin layer of adhesive (tile glue) to the area; and

Step 4 - Mix a concrete compound with 1: 2 ratio (cement: sand) and pour the mixture into the crack. Trowel the mixture into the crack until it even with the surface.



Picture 29: Repairing small cracks.

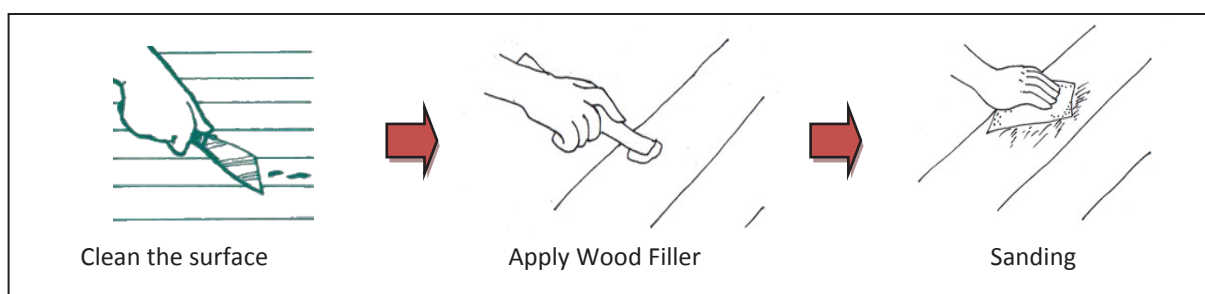
5.5.6 Maintenance of timber floors

- Sweep the floor clean with a broom;
- Keep all flammable materials away from the timber floor;
- Immediately repair or replace rotten timber lining;
- Do not drag heavy furniture on the floor to avoid scratch and damage to the floor surface;

- Structure for the timber floor has to be installed to as per the design. For example the floor joist, bearer, and post has the standard dimension which should be followed or the floor boards will start to spring or sag;
- Floor decking shall be provided with a safer support within acceptable deflections from the appropriate floor load. Floor boards shall be laid in straight parallel lines at right angles to the joists, with tongue fitted into grooves and cramped tightly together; and
- Floor lining shall be 20 mm thick and nailed at every floor joist junction according to best trade practices and good workmanship.

5.5.7 Patching scratches and small holes on the timber floor

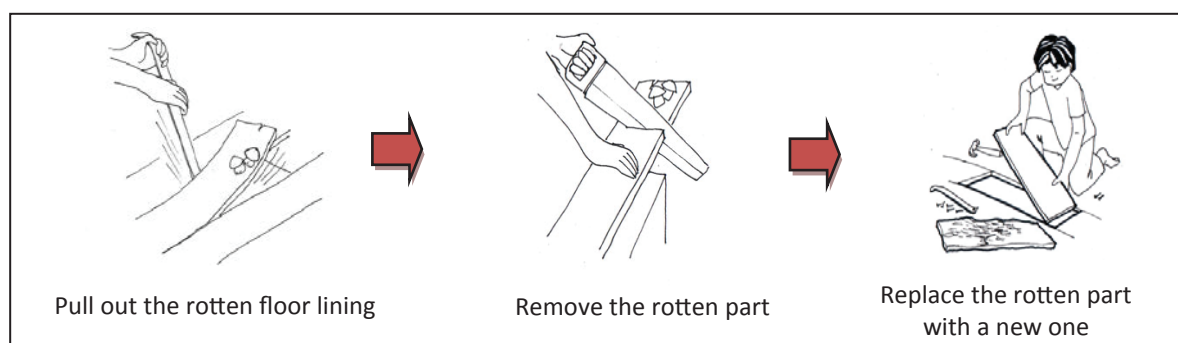
When the floor board is scratched or slightly damaged, it could be repaired with a latex wood patch. Patching compounds are available in various wood tones, so choose one that matches the colour of the existing floor. Clean the floor before applying the wood patch and scrape excess compound afterwards. Sand the patch with sand paper for smooth finish.



Picture 30: Patching small holes.

5.5.8 Replacing damaged floor boards

When floor boards are beyond repair, carefully cut them out and replace them with boards of the same width and thickness.



Picture 31: Replacing damaged floor boards.

5.6 Plumbing

Water and sanitation are fundamental to health and well-being of children in the school. Most of a school's plumbing has five major parts: water supply, water storage, fixture, waste collection, and septic system. Problems commonly occurred due to careless handling and storing of water and poor maintenance of the sanitation unit such as:

- a. Leaking water storage
- b. Pipes are blocked due to poor flashing and improper disposal of solid waste into the toilet, washing bins and floor drains
- c. Broken water tap (not functioning)
- d. Leaking pipes
- e. Leaking toilet
- f. Damaged toilet seat
- g. Septic tank is full.

5.6.1 Leaking water storage

There are three types of water storage tanks that commonly found in schools:

- 1. Concrete water tank
- 2. Fibreglass water tank
- 3. Plastic water tank (rotomould).

5.6.1.1 Concrete water tank

Step by step process to repair the leakage:

Step 1 - Identify the source of leakage

Step 2 - Clean the surface around the crack and patch it with a cement compound (1cement: 3 sand)

Step 3 - After the crack is sealed then apply a waterproofing coating for finishing.

Notes: Never leave the concrete water tank empty for too long as the concrete material could shrink when it is dry and it would create a crack in the water tank.

5.6.1.2 Fibreglass water tank

Smaller cracks could be fixed with fibreglass resin and if the crack is too large then it cannot be repaired.

5.6.1.3 Plastic water tank

If the water tank is damaged or cracked then it has to be replaced with a new one.

5.6.2 Toilet basin and the floor drains are blocks

- (a) Do not throw solid waste into the toilet bowl, basin or floor drains, always put them in the rubbish bins; and
- (b) Always flush the toilet after using it.



Picture 32: Maintaining floor drain and toilet basin.

5.6.3 Water tap broken

A regular inspection needs to be carried out by the school management to identify this problem immediately. Generally there are two types of water taps in schools: plastic tap and brass tap. Plastic taps cannot be repaired when it's broken and it has to be replaced. Below are the steps or processes for repairing a brass tap:

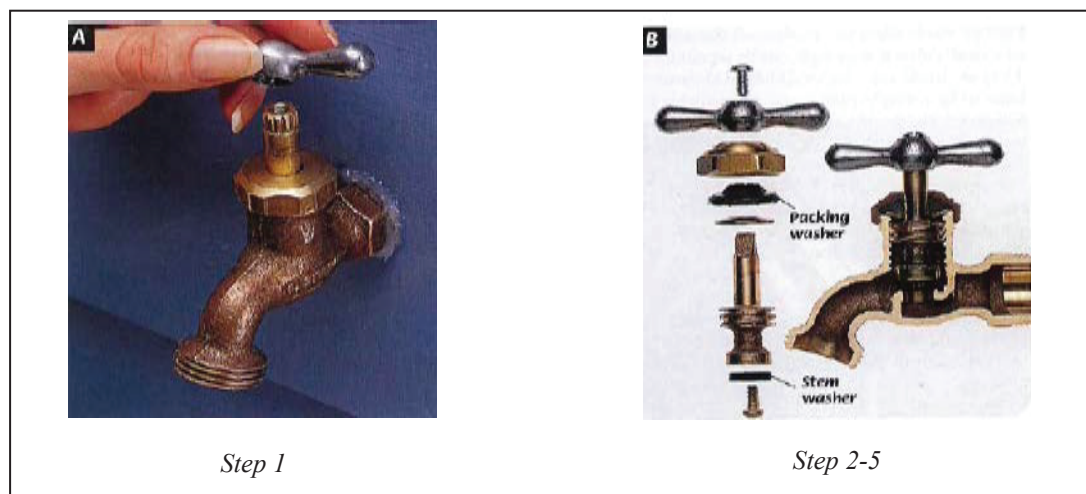
Step 1 - Remove the tap handle;

Step 2 - Unscrew the spindle and remove it from the valve body;

Step 3 - Remove the stem screw and the stem washer, replace the washer if it's worn out;

Step 4 - Coat the replacement stem washer and packing washer with heatproof grease; and

Step 5 - Reassemble the tap.



Picture 33: How to repair a brass tap.

5.6.4 Unclogging Sink Trap

Sink traps, especially for the ones in the bathrooms should be cleaned periodically. If it is too difficult to get rid of the build-up and clogs then use a plunger or plumbers snake to remove the clog. If the sink trap could not be repaired then it should be dismantled and replaced with a new one. Take the old trap with you to the hardware store to get the exact match.

Procedures for unclogging a sink trap:

Step 1 - Place a bucket under the trap;

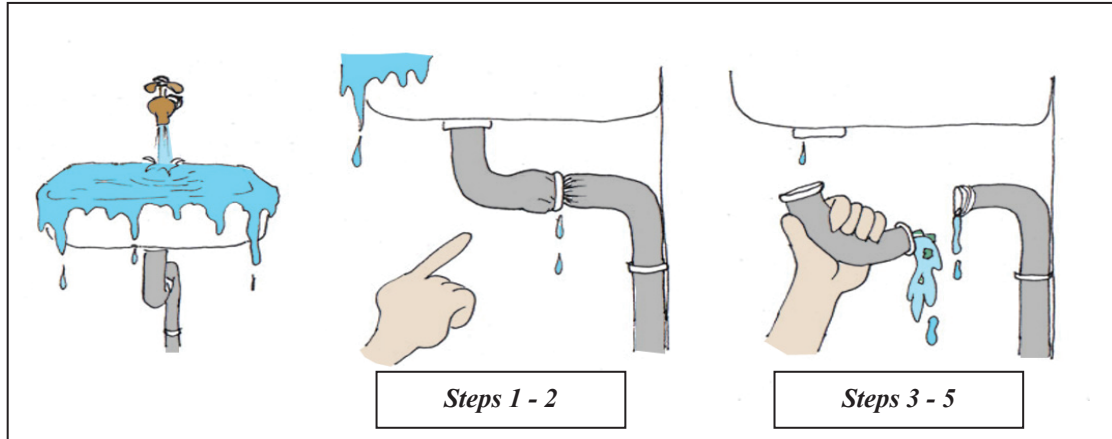
Step 2 - Loosen the slip nuts with groove - joint pliers, unscrew the sleeve nut by hand, and slide them away from the connection. Be sure to save the two washers that are part of the slip nut connection; you can reuse them with the new trap;

Step 3 - Pull off the trap;

Step 4 - Slide the two washers from the old trap onto the new trap, and fit the trap into place;

Step 5 - Secure the new trap to the drain lines with the slip nuts. Hand-tighten the nuts; and

Step 6 - Run the water in the sink and check for leaks. If you see a leak, tighten the slip nuts one quarter turn with the groove-joint pliers.



Picture 34: Unclogging Sink Trap.

5.6.5 Leaking pipe

Procedure to fix a leaking pipe:

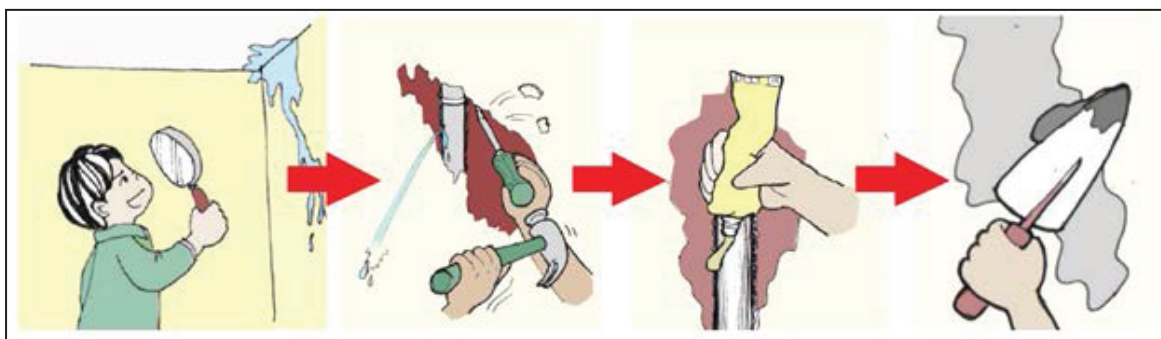
Step 1 - If the pipe is embedded in the wall, chip away the masonry wall until the pipe is reachable;

Step 2 - Cut out and clean the damaged part of the pipe which causes the leakage;

Step 3 - Replace the damaged pipe with a new pipe and the connection should be sealed with the appropriate sealer;

Step 4 - Patch the masonry wall until the hole is completely covered; and

Step 5 - Clean the concrete surface and prepare so it is smooth and repaint the wall using the normal painting procedures.



Picture 35: Repairing broken pipes inside the concrete wall.

5.6.6 Types of toilet pans

There are two main types of toilet pans, the S-pan and the P-pan. The main difference is the shape of the outlet from the toilet pans.

Type 1: S-pan Toilet:



The S-pan has its outlet that goes through the floor and all other fittings are the same as the P-pan.

Picture 36: S-pan Toilet.

Type 2: P-pan Toilet:



The P-pan has its outlet that goes through the wall of the toilet and all other fittings are the same as the S-pan.

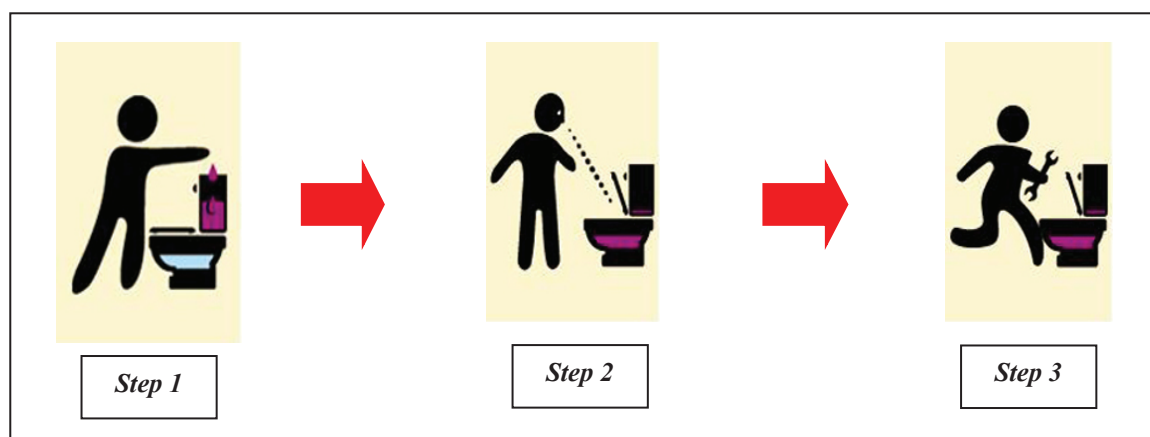
Picture 37: P-pan Toilet.

5.6.7 Checking a Toilet for Leaks

A toilet that leaks can cause major structural problems on the floor around the toilet and also in the ceiling of the room at the bottom level. If the leak is not attended to quickly then the damage will be extensive and gets to a point that the repair work will be very expensive.

Steps to take to check for toilet leaks:

- Step 1 - Pour several drops (8 to 10 drops) of food colouring into the toilet tank and wait for 20 Minutes;
- Step 2 - Look around the toilet unit for leaks or if there is a change in the water colour in the bowl then there is a leak in the toilet unit; and
- Step 3 - Repair the leak immediately.



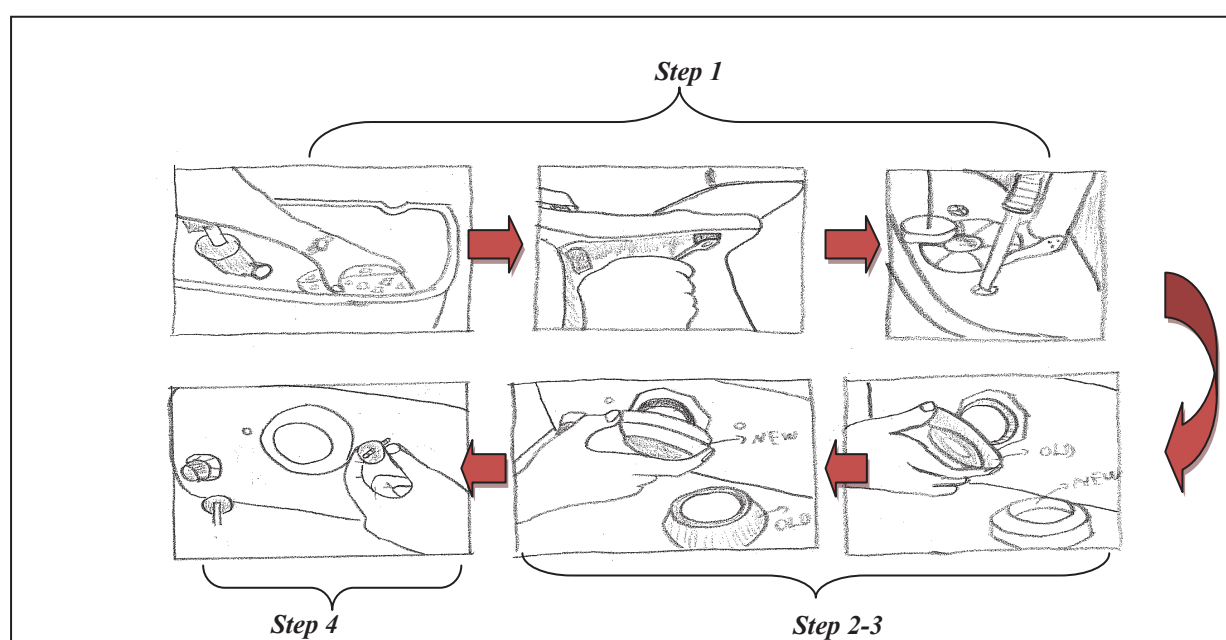
Picture 38: Checking for leaks in the Toilet.

5.6.8 Repairing a leaky toilet tank or cistern

First identify the source of water leaks before you close the stop cock key to the tank or cistern. The tank or cistern has to be completely dry before you proceed with any repairs.

The following are the step by step process to repair the leaky toilet tank or cistern:

- Step 1 - Using the sponge, dry the inside of the tank and with a flat-head screwdriver, loosen the steady bolt/screw that is holding the tank to the wall and loosen the nuts on the underside of the tank, using the adjustable wrench;
- Step 2 - Disconnect the tank from the bowl; pull out the tank bolts and gaskets and lay the water tank (cistern) down;
- Step 3 - Clean the washer and gasket or replace them if necessary; and
- Step 4 - Reinstall the tank on the bowl.

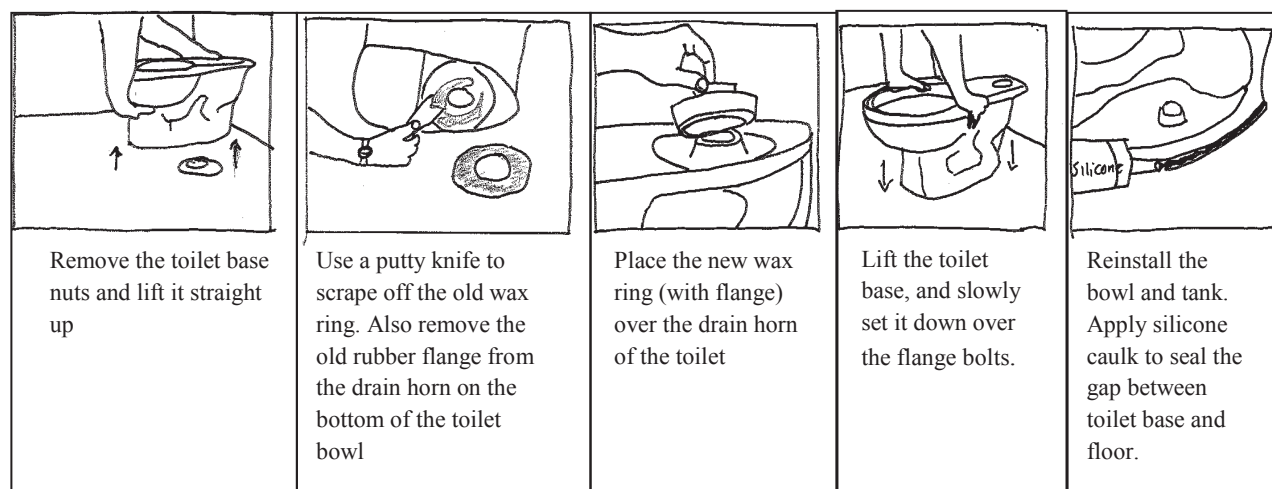


Picture 39: Repairing a leaking tank.

5.6.8 Repairing a Leaky Bowl

You need to plan ahead when you are about to repair a leaky toilet bowl because the toilet is out of commission for the entire time of the repair. This work involves removing the toilet tank (cistern) and base (bowl) with details as follow. Make sure that the water supply is off before removing the toilet tank (cistern).

5.6.9 Replacing a Toilet Seat



Picture 40: Repairing a leaking toilet bowl.

The toilet seat is made from ceramic material that can get damaged or crack easily, but for refurbishment purpose the goal is simply to freshen up the look of the toilet. Toilet seats come in different sizes with different brands of toilets. Take the measurements of the old seat to ensure that you get the correct size of the seat before you go to the hardware to purchase a new replacement.

Procedure to replace a toilet seat:

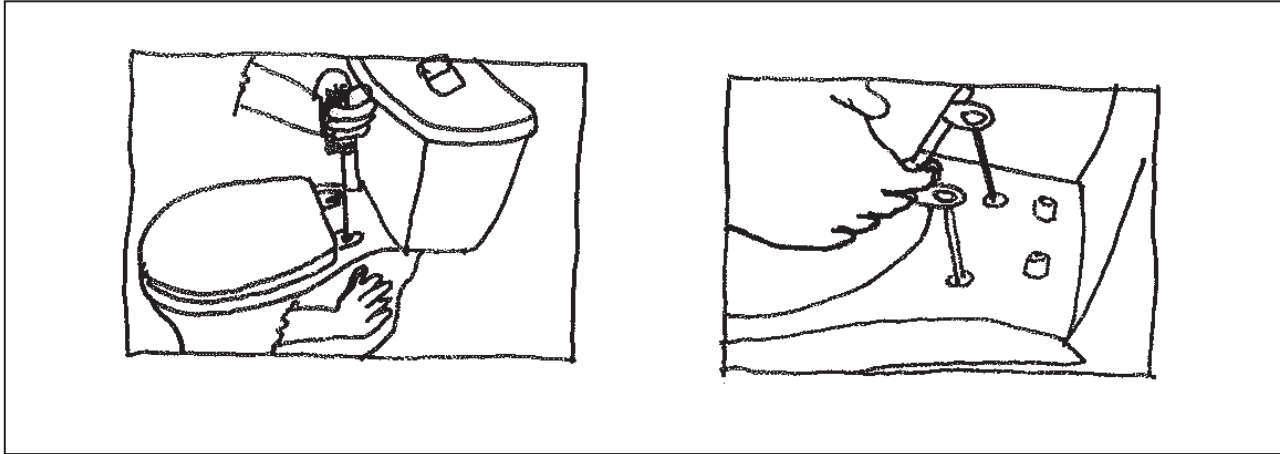
Step 1 – Pry open the bolt caps with a screwdriver;

Step 2 - Use the screwdriver and an adjustable wrench to remove the seat bolts, which secures the toilet seat to the base. With the adjustable wrench hold the nuts located on the underside of the seat and turn the bolt with the screwdriver. After you have removed the nuts, lift off the seat;

Step 3 - Align the bolt holes of the new seat with the holes of the toilet base. Push the anchor bolts through the holes, and then screw on the nuts from the underside of the bolts until they're hand tight; and

Step 4 - Centre the seat cover on the bowl opening and tighten the nuts using an adjustable wrench.

Don't over tighten the nuts - just go beyond snug is good enough.



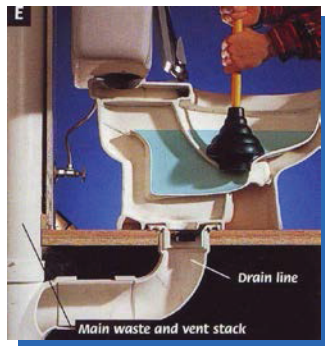
Picture 41: Changing the toilet seat.

5.6.10 Remove the clogs or the blocked toilets

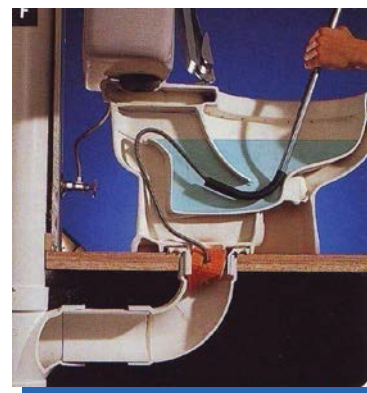
Most toilet clogs occur because an object is stuck inside the toilet trap. Use a flanged plunger or a closet auger to remove the clog.

How to use a flanged plunger – Place the cup of the plunger over the drain outlet opening and rapidly plunge up and down, 15 to 20 times.

How to use a closet auger – Place the auger bend in the bottom of the drain opening and push the auger cable into the trap. Crank the auger handle in a clockwise direction to push out any obstruction.



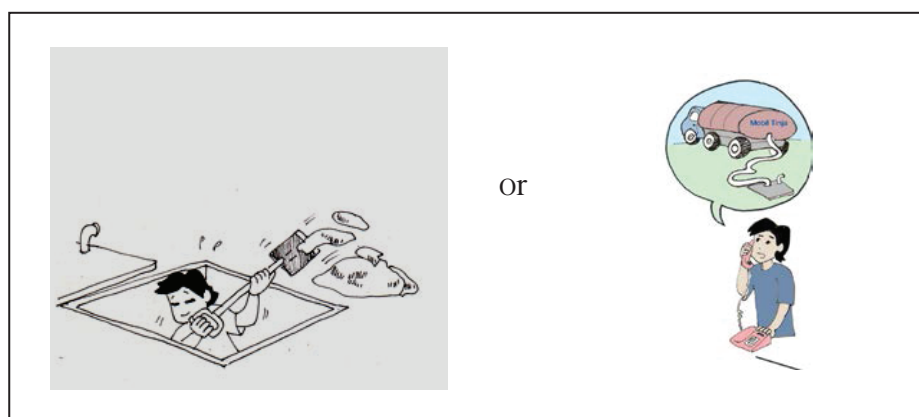
Picture 42: How to use a flanged plunger.



Picture 43: How to use a toilet auger.

5.6.11 Procedures to follow when the Septic Tank is full

- Step 1 - Open the man hole to check the condition of the septic tank;
- Step 2 - Bail the septic tank manually or call for professional help; and if the septic tank cannot be bailed then the school management should construct a new septic tank.



Picture 44: Options for bailing a septic tank.

5.6.12 Do's

- (1) Always fill the water jars in the toilet cubicles and also at the hand washing basin with sufficient clean water for flushing of the toilet and for the children to wash their hands.
- (2) Thoroughly clean the water tanks before the rainy season starts.
- (3) Close the taps at all water tanks after dispensing water.
- (4) Clean the toilet and the surroundings every day at the end of the school hours.
- (5) A sanitary bin should be placed in the female toilet cubicle.
- (6) Burn the garbage in the recycle yard once a week (before the weekend).
- (7) Remove the leach in the soak pit once a week (before the weekend).
- (8) Always keep the toilet door closed.

5.6.13 Don'ts

- (1) Do not store any other thing in the water tanks except rain water from guttering or water from a trustworthy source.
- (2) Do not throw anything into the Toilet Pan that will block the sewer pipe.
- (3) Do not let the rubbish overflowing the soak pit.

5.6.14 Miscellaneous

- (1) If the down pipe and connecting parts are leaking then it should be repaired immediately and the connection is glued with PVC glue.
- (2) If the toilet is blocked, open the inspection chamber and use a 6mm diameter steel bar to clear the blocked pipe from the toilet to the septic tank.
- (3) Drinking water should be treated to kill and remove dangerous bacteria in the water. One of the inexpensive ways to treat the drinking water is by bleaching the school water tank on a monthly basis or at least once a week during rainy season. The water tank should be cleaned properly in order for the bleach to be effective.

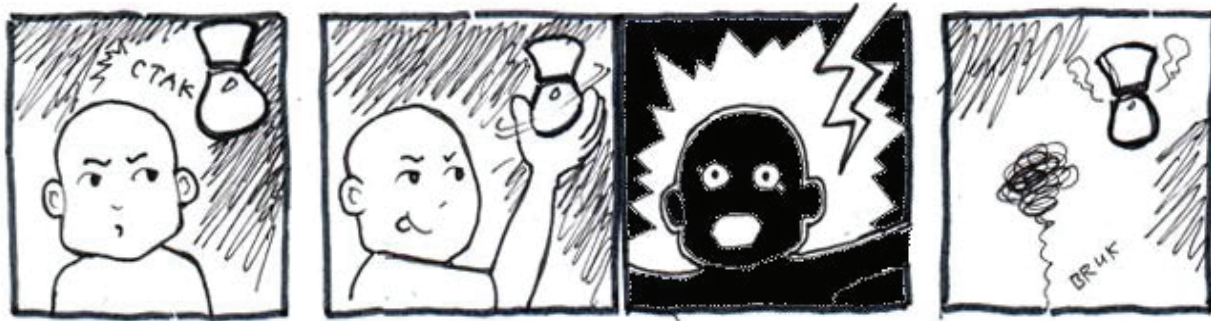
Water Volume	Regular Bleach
4.5 litres	3 Drops
23 litres	10 Drops or $\frac{1}{4}$ teaspoon
250 litres	2 teaspoons

450 litres	1 tablespoon
900 litres	2 tablespoon
2,300 litres	5 tablespoon
3,900 litres	10 tablespoon
4,500 litres	12 tablespoon

Table 4: Water volume and regular bleach proportion

5.7 Electrical

The installation of power supply, wiring, fittings and fixtures shall be carried out by a **certified electrician** as outlined in the school improvement plan and drawings and the requirement to satisfy the operation at the site and completion of the project. The school management should routinely inspect the condition of electrical fittings in the school building and immediately fix minor defects such as replacing worn out light bulbs, tightening the loose power switch and for any major electrical faults, the management should not attempt to fix but to inform the certified electrician to fix the electrical faults identified in the school.



Picture 45: Installation of new wiring should be done by a certified electrician.

The first picture below and on the left, shows three fluorescent tube lights, with the first one on the top is new which has a clear tube and the middle one with a little dark colour at the end and the bottom one has more black marks at the end of the tube. The last tube on the bottom has more black marks at the end of the tube indicating that the fluorescent tube needs to be replaced. The middle and right pictures shows how to remove and to install the fluorescent tubes. The pins at the ends of the tube should be in line and pushed to the ends through the slots and once the tube are in place of the tube holder you then should twist the tube to lock it into position in the holder.



Picture 46: Installation of tube lights.

5.7.1 Do's

- (1) Always check the generator capacity against the load from electrical appliances. Do not overload the generator.
- (2) Check the circuit breaker annually.

5.7.2 Don'ts

- (1) Do not overload the electrical system.
- (2) Do not connect a lot of electrical appliances at one power point.
- (3) Do not touch any bare wiring.

5.8 School Furniture.

The school furniture should be repaired if it is broken and it should be highlighted in the school policy that whoever intentionally damaged any school furniture should pay for the repairs. The rehabilitation of furniture should be a yearly exercise.



Picture 47: Picture of school furniture.

5.8.1 Do's

- (1) Keep a good inventory record of the school furniture that stated the condition of each unit.
- (2) Immediately repair the furniture when the damage occurred.

- (3) Keep the furniture clean and protect them from any contact with rain/flood water.

5.8.2 Don'ts

- (1) Do not buy any furniture that is not made from a durable material.
- (2) Do not vandalise the school furniture.

5.9 School compound consists of:

- playground and equipment
- drainage
- ramps and stairs
- retaining walls
- buildings
- fence
- trees, flowers and brushes

5.9.1 Do's

- (1) Plant protection trees along the perimeter of the school plot to be provided a windshield to reduce the wind load;
- (2) Plant bushes with strong roots to develop cohesion of the retaining action along the school perimeter;
- (3) Plant grass turfs on the school compound to reduce dust and improve the green lawn;
- (4) Provide decent organic fencing to prevent the school compound from animal penetration;
- (5) Provide a recycle yard and using organic material such as bamboo or betel nut trunks;
- (6) Regular cleaning the outflow of the drainage to prevent blockage;
- (7) Fill the whole school compound with earth and/or sand-silt mixture to prevent water standing which could damage the embankment of the school compound;
- (8) Provide space for crops garden for the children;
- (9) Always keep the school compound clear from dirt and animal waste;
- (10) Channel the stagnant water out from the school compound through pipes or drainage system; and
- (11) Always keep the earth filling (embankment) of the school compound stable to prevent soil erosion. Plant vetiver grass to prevent erosion from the embankment or slope.

5.9.2 Don'ts

- (1) Do not let animals like dogs, cows, horses, goats and pigs enter the school compound; and
- (2) Do not let the school children throw the rubbish inside the school compound e.g. plastic bags, food residue and other debris, the rubbish should be placed in the trash bins which should be provided all around the school compound and these should be emptied regularly.

5.9.3 School Compound Maintenance

- (1) If the fencing starts to weather or corroded; quickly repair the damaged parts and or replace with new parts;
- (2) If the masonry drainage is damaged; quickly repair with 1:3 cement mortar before the condition getting worse;

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- (3) The school head in consultation with the Parent's and Teachers' Association should include gardening activities as the extra-curricular activities which is part of the compulsory subject. The gardening activities will improve the vegetation in the school compound and also will be used as the educational gardening field;
- (4) Cover the compound with grass and flowers as much as possible by laying top soil with humus to enhance the cohesion of the soil. This should improve the compound fills up materials which will be protected from liquefaction and erosion;
- (5) The path way from the access road to the classrooms should be feasible by putting hard course, brick layer or lean concrete depends on funding availability so children and teachers can walk to the classroom without stepping on muddy soil;
- (6) Along with protection trees, dissent fencing and gate should be provided to prevent animals (e.g. goats, cows, horses, bulls) to enter the school compound. Furthermore the fence provides feasible clear demarcation of the school property which prevent unauthorised person to enter without permission;
- (7) Along with the pits, some recycle bins in the classroom and in the compound should be provided to allow children to place rubbish into these bins and these should be emptied and cleaned every day by placing the rubbish from the bins into the designated pits;
- (8) If there are leaks from the septic tank, then it should be drained into the soak pit or pond by using perforated PVC pipe with 4 inches diameter wrapped with palm fibber and rise hash embedded into sand and gravel bed. The top layer of the pond should be filled with earth so plants can grow. Periodic inspection of the perforated PVC pipe is required. If the perforated pipe is blocked then it should be clean immediately before the material that caused the blockage becomes solid and hard;
- (9) Regular inspection and cleaning of the drainage is required to avoid accumulation of dirt in the drains which can cause malfunction of the drainage system. If the drainage is damage or broken then it should be repaired immediately;
- (10) Trees in the school compound should be pruned regularly;
- (11) Grass within the school perimeter should be trimmed regularly;
- (12) School should promote recycling activities for the students such as reusing the plastic bottles, paper, and other recyclable materials; and
- (13) Playground and Sport Field.

Playground:

Teachers should raise the awareness on the sense of belonging of children. The school children have to take a good care of the playground and as soon as damages to the playground are identified, the School Maintenance Committee should repair it immediately before the damage escalates.

Sports Field

Whenever a site is sufficient to place a sports field, it should be utilised accordingly. The field should be prepared accordingly with 8 inches depth soil which should be mixed with silt/sand and spread on the surface of the sports filed prior to the planting of grass. The grass should be watered, freed from weed and trimmed regularly.

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LIST OF MAINTENANCE TOOL KIT

All schools should keep a list of tools for maintenance purpose. The following tools are recommended for maintenance purpose in the school:








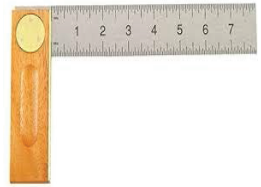












			
Shovel	Claw Hammer	Flat Trowel	Brick Laying Trowel
			
Crowbar	Combination pliers	Long nose pliers	Try Square
			
Hand saws	Putty Knives	Measuring tape	Screwdriver set
			
Ladder	Wheel barrow	Pipe wrench	G-cramps
			
Hand drill	Ratchet brace	Set of drill bits	Auger bits set

Table 5: Recommended hand tools for maintenance purpose in the school

			
Hand brooms	Brush and scoop	Mops and buckets	Hand brush
			
Long brush	Long floor scrubber	Toilet brush	Hand brush and scoop

Table 6: Recommended hand cleaning gear for cleaning in the school

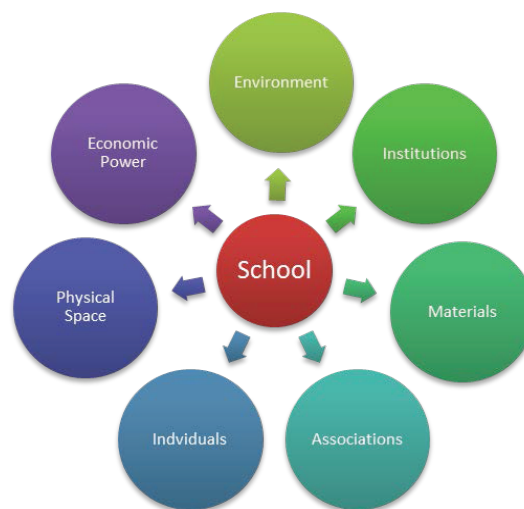
6. MANAGING MAINTENANCE WITH LIMITED RESOURCES

It can be difficult to stretch the school budget to meet all the costs associated with running a school. Therefore it is important that we consider the resources that exist in our community and use what is already available. Specifically for school maintenance the school management could develop a community resource map to identify and utilise the resources that are within the community. For example – do we need to buy a wheelbarrow or can we borrow one when we need it from someone in the community, do you have student at your school who has a parent who is an electrician – would he donate his time for small electrical repair?

In the formulation of a resource map, the school should consider the following:

- **Individuals** – every person in our community is valuable and has something to offer. The types of skills we may find are: tailoring, gardeners, painters, plumbers, electricians, engineers, carpenters and many more.
- **Associations** – these are local level associations that operate in your community. They include religious organisations, sporting organisations, youth groups, business associations.

- **Materials** – schools contain a wealth of materials such as gardening and cleaning equipment. Broader resources that are available in your community may include things such as brush cutter, tractor, left over building materials.
- **Economic power** – where funding is currently generated and provide potential sources of funding such as local business, fee free grant, fundraising, and school income generation activities.



Picture 48: Resource Diagram.

How to develop a Resource Map?

A window into my community

Start by defining your school community. It should, as a start, include everyone and everything that is within your school’s geographic zone. This is a community based on geography, but if you live in a larger area, think beyond geography and include any groups that could be included as a community of interest. This would mean anyone interested in education, or even more specifically anyone interested in the education offered in your school. This would include universities, former students, business houses, families of children that are too young to attend your school but may attend in future or in other words - anyone with an interest in primary education. These are just a few ideas to start off with. Similarly, you could also identify people that live outside your geographic community but could be part of your community of interest.

Imagine that you are sitting outside your community and looking in. What would you see? Use the “Window into my Community” template to develop an inventory of resources in your community. To start, get a few people together – teachers, SMC members, mothers’ club, students or some parents who are already active in the school. Using the “window into my community– template” start to list your assets or available resources, refer to the next page for an example of a resource map.

- **Materials and Equipment** - here you don’t need to be specific about numbers if you don’t already know. The purpose is not to spend time counting items in the community but you should be specific about the types of items. For example, tractors, lawn movers, brush cutters, gardening tool, bus, cars, horses, and seeds. Even if an item is broken but could be fixed, it should be included. Think broadly about what your school has and include all items.

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- Economic Power – how does your community currently generate money or goods? Cane farming, fishing, tourism, Business houses, be as specific as possible. What else is there in the community?
- Networks and Connections – Who do we know of within our community or who can we connect to? Some examples are – staff at the local hospital, social workers, NGOs, business people, influential people in the community, staff from other government departments, youth leaders, retired teachers, community groups, and sport teams. You need to think broadly about the people and organisations that you know who can help the school to achieve its goals. Are there skilled individuals or organisations in your area that have special skills that can help the poor community or specifically work with disadvantaged children? - The contacts of the individuals and groups of people who could offer their assistance to the school should be noted.
- Our most important asset is the people. Give consideration to all the people in your community - the elderly, youth leaders, the disadvantaged youth, and people that live in informal settlements camps or low cost housing. Look for **GIFTS OF THE HANDS** which are the skills that people have they can share with others, and that will help you achieve your school maintenance plan.

The resource map should be updated every time the school maintenance plan is updated. Not every maintenance challenge can be resolved with existing resources but it is more likely to be fixed if the maintenance is kept up to date and problems are not left to gradually degrade.

Examples of Resource Maps:

People with Gifts of the hands in my community:

- **Carpentry** – Gauna, Shiu, Semi and Govind Nair
- **Music/Art & Craft** – Kida, Munna, Seini, Jo Domoni/ Arieta Leba
- **Gardening** – SatishChand / Mosese Cagi / Sakiusa
- **Cooking/Baking** – Atelini, Leba and MohiniLata
- **Electrician** – Hirdesh, Selesitino, Faga, Halofaki and Anand
- **Sewing** – Melini, Lata / Angela Devi/ Savitri.

Networks and Connections People in our school know:

- Business Houses
- Police Department
- Ministry of Provincial Development
- Save the Children Fund
- Red Cross
- Saint Johns
- Church Organisations
- Rotary Clubs
- Old Scholars Network
- Army
- Police Department
- Fire Department

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Materials and Equipment available in the Community:

Ladders	Gardening Tools	Blocks/ bricks
Brush cutter	Screw Driver	Drill
Wheel Barrow	Saw	Paintbrushes
Seeds	Wood vice	Chain saw
Lawn mowers	Trowel	Sawn timbers

Economic Power – What the school is capable of:

- MoE – Fee free Grant
- School Levies
- Fundraising – Bazaar, Carnival, Bring and Buy, Mufti, Cent a vote, soli,
- PTA – subs from parents
- Mothers Club – Fundraising, community project/school project, student levy, individual subs, soli, willing free gift.
- Old Scholars, Local Business Companies, Tourist Resorts/Hotels, Rotary Clubs,
- School Garden
- Donation from Parents – fish, vegetables, handicrafts
- School Income generation projects or enterprise projects

Table 7: Examples of resource maps.

7. Budgeting for Maintenance Work in Schools

Budgeting knowledge is a very useful instrument for planning, controlling and directing one of the most important and vital resources of schools and that is money or cash. Cash management is so critical for all schools and without proper attention it can quickly make a healthy school unhealthy. Why is cash management so important? It is simply the lifeblood of any school or organisation. If the school or organisation does not manage its money well and does not pay its bills at the right time, then the other organisations will no longer deal with the school and soon the end of the school arrives quickly.

To assist the school management to plan for their building maintenance or the rehabilitation budget, two budgeting templates are provided for you in this manual: (1) for concrete building and the other one (2) for timber building.

MAINTENANCE MANUAL FOR SCHOOLS IN FIJI

(1) Concrete building template

School Building Assessment Form (Concrete)							
School Name:							
Building:							
Dimension:							
Key Observation:							
No	Building Component	Sub-Component	Coefficient	Building cost	Damage %	Cost = coef x building cost x %damage	Notes
1	Foundation	Foundation	0.1				
2	Floor	Plaster & Tiles	0.07				
3	Structure	Column and Beam	0.09				
		Plaster	0.02				
4	Wall	Bricks/concrete blocks	0.1				
		Plaster	0.04				
		Window hardware	0.02				
		Doors hardware fittings	0.03				
		Window & Door frame	0.03				
5	Ceiling	Ceiling frame	0.04				
		Ceiling board	0.03				
6	Roof	Roof Frame	0.07				
		Rafter & Fascia board	0.03				
		Eaves covering	0.02				
		Roof sheets	0.06				
		Cyclone fittings	0.03				
7	Utilities	Electricity installation	0.05				
		Water installation	0.02				
		other hardware	0.01				
		Drainage & Sewerage	0.02				
8	Finishing	Structure component pa	0.02				
		Ceiling paint	0.03				
		Wall paint	0.05				
		Door and Window paint	0.02				
Total			1				
Total repair/maintenance cost							

Table 8: Concrete building template

(2) Timber building template

SCHOOL BUILDING ASSESSMENT FORM (TIMBER)							
School Name:							
Building:							
Dimension:							
Key Observation:							
(Types of defects)							
No	Building Component	Sub-Component	Coefficient	Building cost	Damage %	Cost = coef x building cost x %damage	Notes
1	Foundation	Pile - concrete/pine pos	0.05				
		Foundation hardware	0.02				
2	Floor	Bearers	0.06				
		Floor joists	0.06				
		Floor covering	0.07				
		Floor hardware	0.02				
3	Structure	Studs & Noggins	0.07				
		Door & Window frames	0.05				
		Wall hardware	0.02				
4	Wall	weather boards	0.08				
		primer coat	0.02				
		Windows & fittings	0.02				
		Doors & fittings	0.02				
5	Roof	Roof Truss	0.07				
		Barge & Fascia boards	0.02				
		Eaves covering	0.02				
		Roof covering	0.06				
		Cyclone fittings &	0.02				
6	Ceiling	Ceiling frame	0.02				
		Ceiling covering	0.02				
7	Utilities	Electricity installation	0.04				
		Water installation	0.03				
		Other hardware	0.02				
		tiles & plaster	0.02				
		Drainage & sewerage	0.01				
8	Finishing	Roof paint	0.02				
		Ceiling paint	0.02				
		Wall paint	0.03				
		Door and Window paint	0.02				
Total			1				
Total repair/maintenance cost (%)							

Table 9: Timber building template

MAINTENANCE MANUAL FOR SCHOOLS IN FIJI

The maintenance cost can be calculated by filling out the templates above according to the type of building at the school.

Notes:

1. Building cost = Average cost for a new building as shown below (the Assets Monitoring Unit of the Ministry of Education can provide this information).

The average building costs based on the AMU standardised building drawing and specifications in 2013 are as follows:

- 1 concrete classroom = \$60,000
- 7 pan concrete ablution block = \$50,000
- 4 pan concrete ablution block = \$35,000
- 3 bedroom concrete teacher's quarters = \$75,000
- 2 bedroom concrete teacher's quarters = \$60,000
- 1 timber classroom = \$60,000
- 7 pan timber ablution block = \$50,000
- 4 pan timber ablution block = \$35,000
- 3 bedroom timber teacher's quarters = \$75,000
- 2 bedroom timber teacher's quarters = \$60,000

Please Note:

The average cost for a new building needs to be updated yearly to ensure the accuracy of the cost of the building materials, labour and equipment. The average cost of a new building will vary according to the location of the site:

- *Urban;*
- *Peri-urban;*
- *Rural;*
- *Remote; and*
- *Very remote.*

2. % Damage = the percentage of damaged area (i.e.: 50% damage = 0.5, 25% damage = 0.25)).
3. Cost = Coefficient x Building cost x % Damage
4. The total estimate cost of a building has included the building materials, labour cost and equipment.
5. The total cost of the renovation works will depend on the severity of the damage to the infrastructure. The higher the damage the higher will be the cost.