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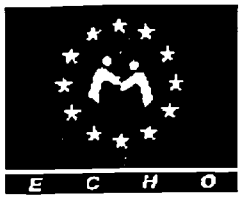
ABSTRACT

A manual provides guidelines for school maintenance activities for schools located in the Caribbean, and examines the organization of a maintenance program, the inspection process, and the maintenance plan. The assessment process is detailed and forms are provided for assessing school roofs, building exteriors and interiors, plumbing, electrical systems, and grounds. (Contains 17 references.) (GR)



Organization of American States

MAINTENANCE MANUAL FOR SCHOOL BUILDINGS IN THE CARIBBEAN

ORGANIZATION OF AMERICAN STATES
GENERAL SECRETARIAT
UNIT FOR SUSTAINABLE DEVELOPMENT AND ENVIRONMENT

OAS-ECHO Project to Reduce the Vulnerability of School Buildings to Natural Hazards

USAID-OAS Caribbean Disaster Mitigation Project

March 1998

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SCHOOL MAINTENANCE PROGRAMME

A school maintenance programme is an organizational activity carried out by the school community in order to prolong the life expectancy of school buildings, its furniture and equipment. In order to start a school maintenance programme the school building should meet a minimum standard of condition. Maintenance is a continuous operation to keep the school building, furniture, and equipment in the best form for normal use, and to ensure the use of the school building as a shelter in case of an emergency caused by natural hazard events. The school maintenance programme should be systematic and pro-active to prevent the need for repairs. It should have a sufficient staff and budget for proper maintenance.

A school maintenance programme should ensure that the school building can:

- Function at its designed level at all times.
- Function during the normal life span of the school building.
- Resist the effects of an extreme natural event like hurricanes, floods, and earthquakes, provided that the original design, construction, and materials were satisfactory for these demands.

The maintenance of the school building is a daily activity of the institution and its personnel. It is an important factor in the delivery of education. Usually, the education officer and the public works department are responsible for the maintenance of all school buildings and the physical plant. Beside that, the school community (administrative staff, teachers, students, and parents) should institute its own school maintenance programme.

The maintenance programme should be comprised of three basic components: organization, inspection, and maintenance plan.

This manual has been developed at the request of school personnel who need to have a school maintenance programme without the usual technical language and remarks that they would find bewildering. It is intended as an aid memoir for the school maintenance programme. Its main objective is to provide guidance to school personnel in preparing a detailed list of areas, spaces, materials, furniture, and equipment to be maintained as well as a list of defects to be corrected.

The principal may use the information gathered, with the help of this manual, to prepare annual estimates. The education officer, with the information provided, could plan maintenance activities and develop a detailed annual maintenance budget. A major repair or renovation project should be planned by the education officer based on the information provided by the principals, because these types of projects depend on budget availability. But normal maintenance and minor repairs can be carried out by the school personnel. They also require budget availability. Therefore, the school personnel should include school maintenance fund-raising activities as part of the school maintenance programme.

ORGANIZATION

The organizational structure of the school maintenance programme should clearly define duties and responsibilities, and should vary with the complexity of the school community. Avoiding large and complex structures is highly recommended. Principals, representatives from parent teacher associations, students, and any other school organizations should be responsible for establishing the school maintenance programme. The success of a school maintenance programme depends on the school community's ability to be organized and keep track of all activities included in the programme.

A school maintenance programme's basic organizational structure should include a general coordinator, a fund-raising coordinator, and a responsible team for every area of the school building.

The general coordinator, who could be the principal, or the parent/teacher association president, will be responsible for: scheduling inspection activities to be carried out by the teams, collecting information, preparing a school building analysis report, and preparing the annual school maintenance plan. The fund-raising coordinator will plan activities to raise funds to be used for day to day maintenance and minor repairs carried out by school personnel. It is recommended to assign a team for every area of the school to conduct an inspection on each part of the school building, accordingly with the classification provided in this manual.

SCHOOL MAINTENANCE PROGRAMME ORGANIZATIONAL STRUCTURE	
Name of school:	Date of inspection:
Name of community:	Name of person who filled out the form:
Area	Person Responsible
General Coordinator	
Fund-raising	
Structure team	
Roofing team	
Building exterior team	
Building interior team	
Plumbing team	
Electrical team	
Ground team	
Furniture and equipment team	

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 is the basis for the maintenance programme. The better the inspection, the better the programme. A school building analysis report should be prepared in order to summarize the inspection. The general coordinator and the person responsible for each team should have a meeting to discuss the purpose of the inspection and the instruments used for data collection.

Although the inspection should be conducted by technical personnel capable of identifying major deficiencies which may affect the normal activities in the school, the teams assigned to conduct the inspection, with the aid of this manual, may also perform the inspection. The preliminary inspection is intended to assist in the evaluation of the overall condition of the school building. The inspection should not be based only on observations of visible and apparent condition of the school building and its components at the time of inspection. It should be a continuous process in order to update the school maintenance programme. If a problem occurs, some adjustment in the school maintenance programme may be necessary, and decisions about what corrective measure to take for remedying the problem should be made. It is recommended that a new inspection be performed if a major change occurs to the school building, such as, when a hazardous event impacts the school.

The inspection will start with simple observations of the inside and outside of the school, simply walking around the interior and the exterior, looking at it carefully. Use the following checklist to determine which items require attention and then match the recommendations in the corresponding section to determine what action should be taken.

The checklists have been divided into sections based on the main components of the school building. Some items are difficult to classify because they are multipurpose in the building. In any case, common sense should be applied for the location of simple items. Preceding each checklist is a brief explanation of the area.

The areas of the school building are the following:

- Structure
- Roofing
- Building exterior
- Building interior
- Plumbing
- Electrical
- Grounds
- Furniture and equipment.

Helpful note: If the school building inspectors are not structural engineers or other professionals whose license authorizes the rendering of an opinion concerning the structural integrity of the school building or its other components, it is advisable to seek a professional opinion if major defects or concerns are noted in the preliminary inspection.

STRUCTURE

The structure of a school building is the group of columns, beams, structural walls, floors, and roof structure, and is its stability. Many school buildings have small cracks in concrete columns, beams, structural walls, and floors. In some cases, they are no cause for concern. Over time the school building settles and moves creating minute stresses at joints in materials that can cause small cracks to appear. In most cases, this is a normal part of the structure settling in its foundation. However, there are cases where other factors are at work, and the cracks are cause for concern and action. The key is to be able to tell the difference. Most times it should be left to a trained professional. If there is a major structural problem in the school building, it should be evaluated by a structural engineer, and the corresponding repairs should be made.

Fine, hairline cracks often appear in concrete floors. As a general rule, these are not cause for alarm. Most school building have concrete floors which are not part of the foundation, but are constructed separately. This is sometimes called a floating slab because it rests on a bed of gravel or sand, and moves slightly with changes in the bed, it floats. Very often that floating motion creates differential stresses in the slab itself, and the result is a hairline crack. The crack often appears where an opening has been cut into the slab, such as where a sump or steel column is located. Hairline cracks in a ground floor slab are common, and generally not serious. But there are exceptions: (A) if the cracks are more than 1/4" wide; (B) if they appear to be getting larger, or (C) if water is seeping through the cracks. These are clues that it is time to consult with a structural engineer or a similar professional.

Pay special attention to these aspects:

- Warping in columns, beams, structural walls, floors, and roof structure
- Rotting in wood structural components
- Rusting of metal structural components

Wood and metal structural components need repainting on a regular basis. Wood components should be examined for any cracking due to exposure to the elements. Cracks should be sealed with exterior caulk prior to painting. The bottom of wood columns should also be examined for open joints where water may enter. Under the base of the column is where rot is most likely to occur since wood will absorb water at the ends where the grain is exposed. If there are open joints, they should be sealed with caulking.

The roof's structural support system holds the roof in place, and holds it on when windstorms occur. The support structure may be purlins and rafters or it may be pre-engineered trusses. The purlins, rafters, and wall plates should be

free from rot and insect infestation. The drive screws should be fixed into solid material and should not be pulled out easily, and the wall plates should be secure to the walls by bolts. Some school buildings have a supporting structure for the roof made from trusses, engineered structures built of small dimensional lumber, which have great strength. Thus, a truss keeps its strength as long as each of its members is in its proper position, properly attached, and under no undue stress. But if a great deal of weight is placed on the bottom piece the chord can deflect, placing stress on the nodes which hold the trust pieces together, causing the bottom chord to deflect downward. Sections of a truss should never be cut or removed. The engineered structural balance inherent in the truss will be disturbed and the structural integrity of the roof can be severely compromised.

SCHOOL BUILDING STRUCTURE

Name of school:		Date of inspection:	
Name of community:		Name of person who filled out the form:	
Component	Conditions	Remarks	Location
Identify the specific item accordingly with a description. Leave blank if the item does not exist.	*Choose one.*	*If unsatisfactory, describe the problem.*	*Where is the unsatisfactory component located in the school building?*
	Satisfactory / *Not Satisfactory*		
Columns			
Beams			
Structural walls			
Ground floor			
Upper floor			
Roof structure			
Stairs			
General Remarks:			

ROOFING

The roof's job is to protect the school building from rain, sun, and wind. A function of the roof is to keep water from getting into the school building. It is a key part of the school building's waterproofing system, therefore, the roof should be kept in good shape. In a pitched roof, high winds might tear off roof shingles or sheets. This is directly related to how well-secured these parts are and if they are corroded or not. The ridge cap should be solidly fixed to the roof sheet so that it cannot be peeled off by the wind. In flat roofs rainwater can be impounded on them, gradually working its way through the school building below. They require a final covering to provide protection from the sun, wind and rain. Over time flat roofs lose their protective covering as they are exposed to sun, rain, and wind. This is how leaks start. Flat roofs are also susceptible to impounding of water when the drainage system is blocked. Impounded water can accelerate the deterioration of the protective covering, and can work its way into the school building. If there is standing water on a flat roof the day after a rain, it is a strong indication that the roof is

experiencing a major drainage problem.

A technique called flashing is used in roofing systems to help seal out water. Flashing is installed where two sections of roof come together, which is called a valley since the roof sections usually join at an angle. Flashing is also used where something penetrates through the roof line, such a vent pipe, or roof ventilation. Flashing is typically metal. Roofs commonly leak around the flashing. Over time, metal may corrode, form pinhole openings, develop metal fatigue, or pull away from the vent or other adjoining surface. If roofing cement has been used to seal the flashing, it can dry out and crack. Any of these conditions can create a leak. Good periodic maintenance of the roof includes an annual examination of the flashing.

Gutters need to be kept clean in order to function properly; leaves, debris, plant or tree droppings should be cleaned out regularly. Clogged gutters or down-spouts will not work, and water problems are invited into the school building if they are left that way. Also they should be examined for pinhole leaks or rusted sections that leak water. Gutter brackets should not be broken or rusted. Down-spout pipes, called leaders, should be intact, with no rust, holes, or broken sections. The rainwater should freely flow through the gutters and into the down-spouts. If not, the gutters may not be aligned correctly; they should slope toward the down-spout. Improper alignment should be corrected promptly, because it will defeat the purpose of the gutter system. Never allow water from down-spout to pour directly on a roof below. Connect upper storey down spouts to lower level gutters.

SCHOOL BUILDING ROOFING

Name of school:			Date of inspection:	
Name of community:			Name of person who filled out the form:	
Identify the specific item accordingly with a description. Leave blank if the item does not exist.	*Choose one.*		*If unsatisfactory, describe the problem.*	*Where is the unsatisfactory component located in the school building?*
	Satisfactory	*Not Satisfactory*		
Roof covering				
Flashing				
Gutters				
Down-spouts				
Flat roof protection				
Other				
General Remarks:				

BUILDING EXTERIOR

Most of the newer school buildings have exteriors planned to be as maintenance-free as possible. A newer school building may feature concrete block or brick walls with breeze and fashion blocks in some walls. But some school buildings may not be new, and the exterior may not be quite as maintenance-free. Even if new, the school building's exterior will still need a periodic maintenance programme to protect the materials. The specifics of the programme

will depend upon the materials used and their current condition. The biggest threats of the school building's exterior are water, wind, sun, and in areas near the coast, saltpeter.

A visual inspection of the exterior of the school building should be done to look for the changing conditions of the exterior walls and covering. It is important to look for peeling paint, missing mortar or caulking between masonry joints, cracks that have appeared since the last observations, mildew or mold that is now growing on walls, bushes and shrubs that now touch the school building's exterior. These are all clues that some maintenance action is needed. The exterior walls of the school building have to be kept clean and free of debris. Leaves and plant materials should be raked away from the walls so that any water that falls there will drain away, and not be retained where it might penetrate the walls and foundation. A semiannual exterior cleaning is an important step in the maintenance process.

In exterior brick, concrete block, or any masonry walls, the basic concerns are cracking and water intrusion. Water can affect masonry in a variety of ways. It can affect the mortar, a special kind of binding cement applied at joints to hold the individual pieces of masonry together. Over a period of time, water can erode the mortar, causing the original mortar mix to disintegrate. If there are cracks, there are more openings for water to enter. If there is a whitish film deposited on the face of the masonry, this is called efflorescence and is the result of dried mineral salts. Water in the masonry picks up minerals, and when the water meets the outside air it evaporates, leaving a residue of mineral salts. If there is mortar falling out of the joints, it's time for a touch-up process called tuck-pointing. Fresh mortar has to be put into those open joints, using a small triangular shaped trowel. Over time, problems may plague the wainscot, the external masonry wall covering. The paint over the wainscot may peel or flake away due to moisture. Wainscot can also crack due to settlement. Cracks must be filled to avoid water getting inside and causing further deterioration of the surface. The joint between the masonry portion of the exterior and any other material such as wood or metal trim on doors and window frames should be carefully checked. Because the materials are dissimilar, they have different rates and characteristics of expansion and contraction. This movement can open the joint even if it has been caulked, and that can allow water to enter. A high grade of exterior caulk should be use to seal the joints.

Wood siding walls may be planks or boards installed either vertically or horizontally. Wood shingles or panels are made of exterior grade plywood or other composite materials such as hardboard or wafer-board. Wood siding products are all vulnerable to water. Two simple rules apply to maintaining wood exteriors:

1. The wood must be kept coated with a protective film, either paint or stain with a wood preservative.
2. All joints and openings must be caulked to prevent water intrusion.

When the protective coating starts to wear, it loses its ability to shed water. The underlying wood becomes susceptible to water intrusion, then warping and rotting. Therefore, in the periodic stroll around the school building, look for peeling or flaking paint, or stains that have worn so thin that the wood grain is exposed and raised. Also look for open joints, however small, where water can penetrate; open joints pose problems even if the paint or stain coating itself is in prime condition. Action should be taken before wood rot sets in because if that occurs, the only course may be to tear off the rotted section and install new materials, which is always more expensive.

Typically, the maximum time interval for repainting or re-staining and applying waterproofing is seven to ten years for wood plank siding, or wood shingles; though it is better to plan on a five to a seven-year cycle. For other wood materials, it is much less. Exterior plywood must be checked each year and may need more frequent treatment. Particle board certainly will need touch-up every year to avoid warping and disintegration. Remember that exposed edges of any wood siding material, plank, shingle or panel, are the points where water is most likely to penetrate and cause problems. Those edges should be well sealed with paint and caulk.

If there are metal frames, doors, windows, and railings, the protective paint coating should be in good conditions, otherwise it will have rust and deteriorate. Wood doors, windows, railings and posts should be sanded and painted. Door and window hinges should be oiled at least annually.

SCHOOL BUILDING EXTERIOR				
Name of school:			Date of inspection:	
Name of community:			Name of person who filled out the form:	
Identify the specific item accordingly with a description. Leave blank if the item does not exist.	*Choose one.*		*If unsatisfactory, describe the problem.*	*Where is the unsatisfactory component located in the school building?*
	Satisfactory	*Not Satisfactory*		
Exterior walls				
Exterior windows				
Exterior doors				
Corridor railings and posts				
Other				
General Remarks:				

BUILDING INTERIOR

Besides paint, maintenance of interior masonry walls usually is minimal unless cracks --visible either on one side or both-- appear. Pay special attention to them and answer these questions:

- Which direction does the crack run?
- Is it horizontal, vertical or "stair step" along joint between blocks in the wall?

The horizontal crack generally is the most serious because it might indicate great pressure against the wall from the outside. A vertical crack, or one that is stair step, is likely caused by differential stress along the base of the wall. It may result from simple settlement of the school building on its foundations and footings. In other cases, water has gotten down far enough to soften the soil at the foundation base in one location, causing it to sag while the other part stays rigid. Upward stress movement can cause differential stress; hydrostatic pressure from water in particular soil groups, notably expansive clays. These clay formations can expand dramatically when wet, then they shrink when dry. It can be a bit like a battering ram against the foundation. If there is a hairline crack where the walls join other elements, just resealing and repainting ought to do the trick.

Windows should open and close easily. The operators on louvered windows should work properly. Glass windows should be completed, fitting the sheet of glass into the window frame.

Many interior doors are hollow-core. There is a skeleton of wood members inside with a thin veneer over it. They are light and less expensive but do not take much force to accidentally punch a hole in one. Sometimes a door starts to stick at a corner. This is typically due to some movement or settlement of the school building, causing the door frame to be out of plumb. If it is not serious, the door can be removed and the sticking edge planed down slightly to relieve the problem. On the other hand, if the door is sticking severely, and if any other doors or windows in the same area are sticking as well, they could be out of rack, which may indicate a more complex problem involving the school building's structural system. Potentially there has been substantial movement in the school building which should be

investigated.

On occasion, the ceiling may sag. This may be due to panels loosening, or if it has plaster, the plaster coats may be pulling away from the lath underneath. It may also be structural, such as an overloading of a ceiling joint or truss above. Or it could be water, a leak which is working its way behind and under the ceiling material and causing deterioration.

SCHOOL BUILDING INTERIOR				
Name of school:			Date of inspection:	
Name of community:			Name of person who filled out the form:	
Identify the specific item accordingly with the description. Leave blank if the item does not exist.	*Choose one.*		*If unsatisfactory, describe the problem.*	*Where is the unsatisfactory component located in the school building?*
	Satisfactory	*Not Satisfactory*		
Floor covering				
Interior walls				
Ceiling				
Interior doors				
Interior windows				
Window glazing				
Other				
General Remarks:				

PLUMBING

Most of a school's plumbing has five major parts: water supply, water storage, fixtures, waste collection, and septic system. Water is provided either by a public system or a private well, and the water storage could be underground or elevated. From there the distribution enters the school building through the wall or up through the floor slab, and water goes into distribution piping, which runs throughout the school building. Next there is waste collection. At each lavatory, sink, wash basin, shower, drinking fountain, urinal, and toilet there will be a connection to waste collection piping. Waste water is channeled down and out of the school building. If there is a public waste treatment, a pipe from the school will join a major public sewer line. If there is an on-site treatment, the pipe will lead to a septic treatment system. Waste collection piping also has vents to get sewer gas into the atmosphere, and provide air into the system to help it work. These vents should lead to the roof so that sewer gases are vented into the atmosphere. In between the water supply and the waste collection systems, there are fixtures. A fixture may be a lavatory, a sink, a washing basin, a shower, a drinking fountain, a urinal or a toilet. The fixture is where the water distribution and the waste collection join.

Fortunately, problems with plumbing systems do no happen often, but when they do, generally the problems are leaks, which should be dealt with promptly. Damage to the school can be as severe as water from rain; in fact, plumbing

leaks often can be a bigger problem. If the water system is under pressure, and a rupture in the water system will cause water to continue spilling into the school compound. Most of the plumbing is out of sight, behind the walls and under the floor, so typically you cannot see the leaks when they occur until they manifest somewhere else.

If a water pipe ruptures, pressure will force the water out, and the water supply should be temporary turned off. Where the water service pipe enters the school, there will be a main shut-off valve. If there is a pipe break anywhere in the school, that main valve can stop water flowing to all points. Become familiar with the location of the shut-off valve because you will have to find it quickly in case of an emergency. Most plumbing fixtures have shut-off valves mounted on them which can be used to isolate the fixture from the water system in case of leaking or pipe breaks. Typically they are below the fixture. Find them.

One of the biggest problems is a break in the water service entry pipe. It may show itself as a slow, dribbling leak, or it can be dramatic, it can blow like a geyser and remove a portion of the ground. The problem usually starts either at the connection with the source or at the point where the pipe comes through the school. What causes these problems? One cause is settlement or some other type of movement in the ground. They can shift and allow the trench to move, but the pipe will not move since it is anchored at both ends; a high sheer stress is created and the pipe gives way. Whether a slow leak or a dramatic blow off, this type of problem requires excavating the trench, in which the service entry pipe is located, either a portion or the entire trench. When the problem is found, the pipe may be repaired, or under certain circumstances, it may be replaced for its entire length from its origin to the school building.

Some schools may have service entry pipes made from lead, which raise concerns about possible lead poisoning. As a general rule, lead content in the water stays at low levels so long as the water is running, and builds-up only when the water stands for prolonged periods, so it is a good idea to run water through fixtures for a few minutes before drawing water for drinking or cooking. Replacing the service entry pipe with another material is the best solution, but an expensive one.

Another problem sometimes encountered is a knocking or spitting sound as the water is turned on. This can occur if an excessive amount of air gets trapped in the pipes and is trying to find a way out. If there has been any plumbing work done, or the water supply to the school has been shut off for a period, a knocking sound can be heard. Typically, this is air and can be bled out by running the water.

Water storage tanks, underground or elevated, should be inspected every year, and cleaned if necessary. In underground tanks, the access cover should fit properly, be in good condition, and easy to remove for cleaning. The access cover should be protected to avoid rain water seeping into the tank. Where there is a water pump, periodical checks should be done.

Main tanks and toilets often continue to run water in the tank after they are filled. The flow should stop when the tank has reached a predetermined fill level, when the ball float inside the tank is properly adjusted (the ball float closes the water supply valve). In flush tanks, the flapper valve at the bottom should close off the opening where the water flows from the tank into the bowl. If water still runs, the situation can usually be corrected by adjusting one or the other. If a simple adjustment does not work, the inner mechanism in the tank may have to be replaced.

The waste collection system consists of a series of large pipes that gather the used water from all fixtures and transport it out of the school to a treatment system. The pipes are large because, unlike the water supply, the waste collection system operates by gravity flow. If a leak is experienced in this system, it will be different from a leak in the water supply piping. Usually the leak is from the bathroom, originating at a fixture connection, such a lavatory, a toilet, a urinal or a sink. If the toilet or any other fixture rocks when used, it is not properly fixed to the floor or to the wall and should be tightened. Because the system depends on gravity, the waste water will slowly run down to the outside of the pipe. Over time it can cause rotting. These leaks may go unnoticed for some time, so preventive maintenance requires a periodic look under lavatories and sinks to see if there is any water. Other common problems experienced with waste lines are blockages. Paper or other objects can become stuck in the waste line, totally blocking the flow of water, and waste water will back up into the fixture served by the section of the piping, and may even overflow. To clean the obstruction, a special auger, like a snake, has to be used.

Septic tanks should be inspected every year, cleaned and flushed out at least every four years. The access cover should fit properly, be in good condition, and be able to be removed for cleaning. The access cover should not be opened too

easily, as children may remove the cover wilfully. The cover holders should not cause people to trip; the holders should be recessed with just enough room for a pickaxe blade to get under the holder. The inlet pipe should be firmly fixed to the tank and checked for leaks. Where there is a soak-away, the pipe to the soak-away should be firmly bedded. If there is any odor around the tank, it needs cleaning or another soak-away should be dug. Where there are tile fields, the pipes (tiles) should not be exposed; they should be well below ground level. The tiles should be working without any water on the ground around the pipes.

SCHOOL BUILDING PLUMBING

Name of school:			Date of inspection:	
Name of community:			Name of person who filled out the form:	
Identify the specific item accordingly with a description. Leave blank if the item does not exist.	*Choose one.*		*If unsatisfactory, describe the problem.*	*Where is the unsatisfactory component located in the school building?*
	Satisfactory	*Not Satisfactory*		
Water Supply				
Water Store				
Fixtures				
Waste collection				
Septic Tank				
Other				
General Remarks:				

ELECTRICAL

The school's electrical system is somewhat similar to the body's nervous system, with a brain and nerves running throughout the school building. The brain is the electrical panel box. Inside this box, main power lines bring electricity into the school, and branch lines (circuits) take electrical power to other parts of the school. The main lines are called service entry lines. In most school buildings there are two, each brings 110 volts into the school. Smaller circuits, those for lights, outlets and most other equipment, use 110 volts. Heavier equipment will need 220 volts. A third main line called the neutral, sometimes called the ground conductor, carries electricity back out of the school, to the transformer where it originated. There is also one more main wire, the grounding wire. This wire runs from the connection at the neutral to a metal rod buried in the earth. This might be a metal water line, or it might be a separated rod, driven into the earth. If the school loses the neutral connection, electricity will follow through this wire to the ground, literally into the earth. If the incoming water pipe has a heavy-duty electrical wire connected to it, in all likelihood, that is the grounding wire. On the other hand, if your grounding wire is outside the school, it should be near the electric meter. It will be a wire running through the ground where it attaches to the top of a metal rod.

The electrical panel box will contain either fuses or circuit breakers. These are known as over-current devices. They prevent dangerous heat build-ups and potential fires. If a circuit becomes overloaded, or experiences a rapid power surge, heat can build up in the circuit wire in the walls. Unless the flow of current is stopped, the insulation around the wire can melt, and the heat can cause a fire. The overload protector is designed to prevent this.

The heat is transferred to the circuit breaker or fuse in the electrical panel box; if it reaches a preset level, the breaker then trips, or the fuse blows, cutting off current in the circuit. If this happens, someone should be brought in to determine the cause. If it is determined that the cause was faulty equipment, be sure to have it repaired or replaced. Once the cause is determined and solved, reset the circuit breaker, or replace the fuse.

Circuit breakers, fuses, and wires are carefully sized to handled both the current flowing through them and the devices each circuit is serving. The size is expressed in terms of voltage and amperage. Voltage is the "push" in an electrical current. In most schools, both 110 and 220 volts are available, to match the requirement of the equipment on the circuit. Amperage is the ability of a wire to allow that flow to pass through: the bigger the wire, the more electrical energy can safely go through it. Large equipment, such as air conditioners and electrical stoves, require large wires and overload protection to match. Wall outlets and lighting circuits use smaller wires.

If there is a circuit breaker in the school, there is a simple maintenance task to be performed every six to 12 months. Open the door of the panel box cover. Then one by one, turn off the circuit breaker and turn it back on. Don't do this with the main breaker if there is one, just individual circuits. And if there is any critical equipment on a circuit that could be affected by power loss, leave that one alone too. There is a possibility that the breaker will not reset and will have to be replaced. In fact, that is what it is being testing for, breakers that do not operate properly. So use good judgement in selecting breakers for testing.

SCHOOL BUILDING ELECTRICAL SYSTEM

Name of school:			Date of inspection:	
Name of community:			Name of person who filled out the form:	
Identify the specific item accordingly with a description. Leave blank if the item does not exist.	*Choose one.*		*If unsatisfactory, describe the problem.*	*Where is the unsatisfactory component located in the school building?*
	Satisfactory	*Not Satisfactory*		
Service entrance cable				
Main panel box				
Circuits and conductors				
Outlets and switches				
Interior lighting (lamps and bulbs)				
Exterior lighting				
Electrical equipments				
Other				
General Remarks:				

GROUNDS

Sidewalks are the paved walking areas that run parallel to the street and walkways leading from the street, driveway or courtyard to the school building. Sidewalks are typically concrete, but a walkway may be concrete, asphalt, brick, stone, or even wood. Whatever the material is, good maintenance means keeping a watchful eye for conditions that may cause tripping hazards or water drainage toward the school building. Any tripping hazards should be eliminated through repair, ramping or clearing. Repairs must also be done if the condition of the material deteriorates and creates an eyesore.

Driveways and parking lots are typically built of either asphalt, concrete or gravel. All require some degree of maintenance. Gravel driveways often develop ruts, and if severe enough, regrading may be needed in addition to more gravel. Concrete is a durable material, but it may start to crack as the ground under the driveway shifts slightly. Asphalt driveways may experience sinking, or the surface can crack due to settlement and water, but asphalt can be patched. When severely deteriorated, an asphalt driveway can have a new topcoat added, provided that the additional coating does not create a problem to the school building. The driveway elevation should be below the school building floor so that rain will drain away from the school building, not into it. An elevation mismatch can create a water problem, so the old asphalt driveway may have to be removed, and a new one laid, if the potential for that problem arises.

Particular attention should be paid to the direction of the water flow in heavy rain. If either a sidewalk, walkway, courtyard, driveway, or parking lot is tilted toward the school building, forcing water toward it, then a flood proofing technique is in order before water ends up in the school building. Flood proofing techniques are used to reduce flood damage to the buildings. It includes, among others, tearing out the existing sidewalk, walkway, courtyard, driveway, or parking lot and reinstalling it or constructing barriers to stop flood-water from entering the school building.

Retaining walls deteriorate because of excessive pressure built-up behind them, generally due to water accumulation. Often conditions can be improved by excavating a trench behind the retaining wall and filling it with coarse gravel. Drain holes through the wall will then be able to relieve the water pressure. Retaining walls sometimes suffer from the root pressure or from general movement of top soil down the slope. Normally these conditions require rebuilding the retaining wall.

Gardens should be watered and fertilized frequently to cultivate a lovely landscape. Flower and plant beds should be cleaned and remade, plants pruned, hedged trimmed, and grass cut in a regular basis. Leaves, limbs or any other plant materials which may have accumulated should be raked.

SCHOOL BUILDING GROUNDS

Name of school:			Date of inspection:	
Name of community:			Name of person who filled out the form:	
Identify the specific item accordingly with a description. Leave blank if the item does not exist.	*Choose one.*		*If unsatisfactory, describe the problem.*	*Where is the unsatisfactory component located in the school building?*
	Satisfactory	*Not Satisfactory*		
Courtyard				
Sidewalks and walkways				
Parking lot and driveway				
Retaining walls				
Gardens				
Fencing				
Other				
General Remarks:				

UNSATISFACTORY FURNITURE AND EQUIPMENT

Name of school:				Date of inspection:					
Name of community:				Name of person who filled out the form:					
Location / *Item*	Classroom	Lab	Workshop	Library	Gym	Office	Storeroom	Kitchen	
Desk									
Chair									
Blackboard									

Board								
Cabinet								
File cabinet								
Table								
Audiovisual equipment								
Computer								
Typewriter								
Educational material								
Lab equipment								
Musical instruments								
Sports equipment								
Office supplies								
Books								

General Remarks:

SCHOOL BUILDING MAINTENANCE PROGRAM

List of problems according to priority

Name of school:	Date of inspection:
Name of community:	Name of person who filled out the form:

#	ITEM	TIME FRAME	ESTIMATED COST
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
		Total:	

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