

# **GUIDELINES FOR MAINTENANCE OF PUBLIC SCHOOL FACILITIES IN MARYLAND**

**Interagency Committee on School Construction  
May 30, 2008**

The Interagency Committee on School Construction (IAC)

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# Section I

## Types of Facility Maintenance Programs

The Maryland Consolidated Capital Loan Bill of 2007 (HB 51) requires the Interagency Committee on School Construction (IAC) to develop guidelines for the maintenance of public school facilities in Maryland. Since the summer of 2005, the IAC and the Public School Construction Program (PSCP), the State agency charged with implementation of school construction policies and management of State funding for school construction projects, has placed a special emphasis on the maintenance of public school facilities. Good maintenance of schools protects the substantial investment that the State and the local governments have made in capital improvements; just as important, it ensures that the occupants of school buildings will be allowed to carry out their important tasks of teaching and learning in environments that are safe, healthy, and reliable.

This manual, the product of research conducted by the PSCP Maintenance Inspectors, is a contribution to the continuing effort to improve Maryland's public schools.

### **1.a Introduction**

What is facility maintenance and why is it performed? Webster's New College Dictionary defines maintenance as "*the upkeep of property or equipment*". This definition implies that maintenance should include actions to prevent a device or component from failing, or to correct the normal degradation of equipment and building systems in order to keep them in proper working condition. In both the private and governmental sectors, maintenance too often consists of the repair of equipment or systems after failure has already occurred. Information obtained over the past decade indicates that most private and governmental facility owners do not expend the necessary resources to maintain equipment in proper working order. Rather, these organizations wait for equipment failure to occur and then take whatever actions are necessary to repair or replace the equipment.

All equipment has associated with it a predefined life expectancy or operational life. For example, a specific piece of equipment may be designed to operate at full design load for 5,000 hours and may be designed to go through 15,000 start/stop cycles. Most equipment requires periodic maintenance during its design life. Belts need adjustment, alignment and balancing needs to be performed, proper lubrication on rotating equipment is required, and so on. Certain components may need replacement, e.g., a wheel bearing on a motor vehicle, to ensure that the main piece of equipment lasts for its design life. Whenever we fail to perform maintenance activities intended by the design manufacturer, we shorten the operating life of the equipment. Equipment that has been well maintained will generally also run more efficiently, resulting in energy savings reflected within the operating budget.

More than any other single individual, the principal of a public school establishes the standards that are reflected in teacher attitudes, student behavior, how the school is viewed by the community, and the physical condition of the facility. Public schools rely heavily on the principal to act as the on-site manager who oversees the daily operation of the maintenance and custodial staff as well as the upkeep and the condition of the building and its components. The principal should maintain a good relationship with the community, keep community members abreast of ongoing issues at the school, and inform them how they can assist with facility issues as well as other matters. The principal should have regular contact with the central office with regards to building-related issues, and must possess a sense of ownership regarding all aspects of the building and staff.

For the purposes of this report, the following items are *not* included in maintenance:

- Major repairs;
- Alterations;
- Renovations;
- Grounds work;
- Vehicle or grounds equipment repairs;
- Supervision of work being performed.

Over the past 30 years, different approaches to how maintenance can be performed to ensure that a facility will reach or exceed its design life have been developed in the United States. As alternatives to a *reactive maintenance* approach, in which maintenance is performed only after a piece of equipment or building system fails, *preventive maintenance* and *predictive maintenance* are programs that should be considered.

## 1.b Reactive Maintenance

### Advantages

- **Low Initial Cost**
- **Smaller Staff**

### Disadvantages

- **Risk that facilities will become inoperable, without prior warning**
- **Increased cost due to unplanned downtime**
- **Increased labor cost, especially if overtime is necessary**
- **Cost involved with repair or replacement of equipment**
- **Possible secondary equipment or process damaged during failure**
- **Inefficient use of staffing resources**

**Reactive maintenance** is basically the “*run it till it breaks*” maintenance approach. No actions or efforts are taken to maintain the equipment or building system as the designer had originally intended in order to ensure that its design life is reached. As noted above, this is still the predominant mode of operation in the United States. A case study by (Piotrowski) breaks down the actions taken in the average maintenance program as follows:

- Reactive: More than 55%
- Preventive: 31%
- Predictive: 18%
- Other: 2%

According to this study, the majority of maintenance resources and activities applied to an average facility are still reactive.

Reactive maintenance can be viewed as a double-edged sword. With new equipment, we can expect minimal incidents of failure. If our maintenance program is purely reactive, we will not expend manpower dollars or incur capital costs before an item breaks. Since we do not see any associated maintenance cost in the meantime, we can consider that we are saving money during this period. In reality, during this time we are really obligating ourselves to greater expense than under a different maintenance approach, because we are shortening the life of the equipment, resulting in the eventual need for more frequent, more intensive, and more costly replacement. The labor cost associated with this repair will likely be higher than normal because the failure will require more extensive repairs than if the equipment had not been run to failure. If critical equipment fails during off hours or close to the end of a normal work day and needs to be put back on line immediately, emergency overtime expenditures will be required. Since we run equipment to failure, a large inventory of materials and parts must be kept on hand, a significant cost factor. These costs would not have been necessary had the maintenance program been proactive from the beginning.

Most important, if the equipment fails during the hours of school operation, the continuity of the educational program may be jeopardized as students and staff must be relocated, alternative measures are

put in place to keep the building in operational condition, or, in the worst instance, the program is temporarily halted while repairs are in progress. The health and safety of building occupants may be jeopardized if the equipment failure affects the electrical, lighting, egress and mobility, or ventilation systems. Among the other liabilities noted, the potential dissatisfaction of the community at the closure of an educational program on even a temporary basis should be taken into account. These are costs and risks that would be minimized under the maintenance programs described below.

## **1.c Preventive Maintenance**

**Preventive maintenance** can be defined as follows: Actions performed on a regular schedule to detect, prevent, or mitigate deterioration of a component or system in order to sustain or extend its useful life by reducing wear to an acceptable level. Typical preventive maintenance activities include lubrication of

parts, filter changes in mechanical equipment, routine visual inspections of roofs and drains, and infrared inspection of electrical components.

The U.S. Navy pioneered preventive maintenance as a means to increase the reliability of their vessels (Piotrowski). By expending resources to conduct maintenance activities intended by the equipment designer, equipment life is extended and reliability is increased. In addition, operating and capital funds are saved compared to a program that only uses reactive maintenance. One study indicates that these savings can amount to as much as 12%-18% on average. Depending on current maintenance practices for the facility, the reliability of present equipment, and the implications if a facility must be closed due to a maintenance failure, there is little doubt that many facilities that are purely reliant on reactive maintenance could save more than 18% by instituting a

### **Advantages**

- **Cost effective in many capital intensive processes**
- **Allows for the flexible adjustment of maintenance activities**
- **Increased component life cycle**
- **Energy Savings**
- **Reduced equipment or process failure.**
- **Estimated 12%-18% cost savings over reactive maintenance programs**

### **Disadvantages**

- **Catastrophic failures cannot be entirely eliminated**
- **Labor intensive**
- **May include performance of unneeded maintenance**
- **Potential for incidental damage to components in conducting maintenance activities that are not needed**

proper preventive maintenance program.

While preventive maintenance is not as optimal as the predictive maintenance program described below, it does have several advantages over a purely reactive program. By performing preventive maintenance as the equipment designer envisioned, the life of the equipment will approach or exceed the designed life expectancy, barring any unforeseen events. While all catastrophic equipment failures cannot be entirely eliminated, the number of failures will decrease. Extending the useful life of equipment and minimizing equipment failures both translate into maintenance and capital cost savings.

## 1.d Predictive Maintenance

**Predictive maintenance** can be defined as follows: A process of investigation and measurement to detect the onset of equipment or system degradation, thereby allowing stressors to be eliminated or controlled before they cause significant deterioration in the physical state of the components. The results of these investigations will indicate the current and future capability of the equipment or system.

Predictive maintenance differs from preventive maintenance in that it bases maintenance needs on the actual condition of the equipment or building system rather than on a pre-set schedule. Preventive maintenance is time based, with activities such as changing lubricant determined by calendar time or equipment run time. For example, when car owners change the oil in their vehicles every three months, the activity is based on calendar time; if they change it every 3,000-5,000 miles traveled, the activity is based on the equipment run time. In both scenarios, no concern is given to the actual condition and performance capability of the oil. This methodology would be analogous to carrying out a preventive maintenance task in a school facility.

If, however, the operator of the motor vehicle discounted the run time and had the oil analyzed at regular intervals to determine its actual condition and lubrication properties, the oil change might be extended to 10,000 miles. This predictive maintenance approach defines maintenance tasks based on actual and quantifiable material and equipment conditions.

The tests and inspections used in a predictive maintenance program may include vibration analysis, thermographs, x-ray or acoustic systems. For example, tests may be conducted to locate thinning piping, fractures or excessive vibration, all of which are indicative of maintenance requirements.

### **Advantages**

- **Increased component operational life/sustainability**
- **Allows for preemptive corrective actions.**
- **Decrease in equipment or process downtime**
- **Better product quality**
- **Improved worker and environmental safety**
- **Energy Savings**
- **Estimate 8%-12% cost savings over preventive maintenance program**

### **Disadvantages**

- **Increased investment in diagnostic equipment**
- **Increased investment in staff training**

The advantages of predictive maintenance are many. A well orchestrated predictive maintenance program will all but eliminate catastrophic equipment failures. Maintenance activities can be scheduled to minimize or completely avoid overtime costs, to minimize inventory and parts orders to only those that are required, and to support future maintenance needs well in advance. The operation of the equipment can be optimized, saving energy costs and increasing plant reliability. One study has estimated that a properly functioning predictive maintenance program can provide a savings of 8%-12% over a program utilizing preventive maintenance alone, (Piotrowski, FEMP). Depending on a facility's reliance on reactive maintenance and its material condition, predictive maintenance could achieve savings opportunities exceeding 30%-40% over a reactive maintenance program. Independent

surveys indicate the following industrial average savings result from initiation of a functional predictive maintenance program:

- Return on investment: 10 times
- Reduction in maintenance costs: 25-30%
- Elimination of breakdowns: 70-75%
- Reduction in downtime: 35-45%

However, it is expensive to initiate a predictive maintenance program . Much of the investigative equipment that is needed requires an initial cost in excess of \$50,000.00. Since personnel must exercise greater judgment and discretion than in a preventive maintenance program, training of in-plant personnel to effectively utilize predictive maintenance technologies will require considerable funding. Program success will require an understanding of the principles of predictive maintenance and a firm commitment to make the program work by all facility organizations and management.

## **1.e Corrective Maintenance and Minor Repairs**

*Corrective maintenance* and *minor facility repairs* are related to reactive maintenance, preventive maintenance, and predictive maintenance:

- **Corrective maintenance** addresses deficiencies that inevitably result from unforeseen events, however diligently a preventive maintenance program is conducted: vandalism, lightning strikes, hail, flooding, etc. Deficiency items are typically low in cost to correct and are normally accomplished through the annual operation and maintenance (O&M) budget. Corrective maintenance excludes activities that expand the capacity of an asset, or otherwise upgrade the asset to serve needs greater than, or different from, those originally intended.
- **Minor repairs** address small alterations needed to improve the suitability of a facility for its current and intended use. These actions could include painting, carpet installation, lighting upgrade, construction of a small partition, etc., all restricted to a few spaces and not requiring capital funding. Minor repairs are typically carried out by in-house maintenance personnel, though outside contractors may be required. Minor repairs do not normally require the involvement of architectural/engineering analysis and design before work begins.

## **1.f Summary**

Irrespective of the maintenance practice adopted, a school system must dedicate personnel and funding that are equal to the program necessities required to carry out their mission of good building performance and upkeep. Due to fluctuating budgets, our school systems face a common problem in finding and retaining dedicated and qualified personnel. Funding and budgetary restraints must be resolved at the local levels if our buildings are to operate successfully for their anticipated life terms.

### **References:**

*Note: The references and resources provided throughout this report are not considered to be all-inclusive. The listed organizations are not endorsed by the authors of this guide and are provided for information only.*

American School and University Magazine, “*Coming Up Short*” (35<sup>th</sup> Annual M&O Cost Study, April, 2006) Pages: 25, 26, 29, 30, and 32. Website: <http://asumag.com/2006MOSchool.pdf>

Federal Energy Management Program (FEMP), *O&M Best Practices Guide* release 2.0, A Guide to Achieving Operational Efficiency, July 2004 issue, Chapter 5, Product of the FEMP O&M Center of Excellence, Website: [www1.eere.energy.gov](http://www1.eere.energy.gov)

Piotrowski, J.; April 2, 2001, *Pro-Active Maintenance for Pumps*. Archives, February 2001, [Pump-Zone.com](http://Pump-Zone.com).

The documents below were used by J. Piotrowski in the above-referenced study:

Higgins, Lindley R., Dale P. Brautigam, and R. Keith Mobley (Editor), *Maintenance Engineering Handbook* (McGraw Hill Text, 5th Edition: September 1994)

Williams, John H., Alan Davies, and Paul R. Drake, *Condition-Based Maintenance and Machine Diagnostics* (Chapman & Hall: October 1994)

Palmer, Richard D. (Doc), *Maintenance Planning and Scheduling Handbook* (McGraw Hill: March 29, 1999)

Patton, Joseph D., Jr., *Maintainability and Maintenance Management* (Instrument Society of America, 3rd Revision: February 1994)

Moubray, John, *Reliability-Centered Maintenance* (Industrial Press, 2nd Edition: April 1997)

Smith, Anthony M., *Reliability-Centered Maintenance* (McGraw Hill: September 1992)



# Section II

## Task Allocations for Maintenance Staff

### 2.a Introduction

Proper resources are critical to a successful maintenance program, and none are more important than the number and the skill levels of maintenance personnel. It is essential to determine the proper number of personnel that are needed in each area of work in order to properly distribute responsibilities and ensure reliable performance of maintenance tasks. This section is based on a study conducted by Engineering Associates, Inc. of Atlanta, Georgia, in Fiscal Year 2000 for the purpose of properly structuring and staffing the maintenance program of Frederick County Public Schools, a school district in western Maryland that has experienced rapid growth. This firm has since closed its doors and no further reference information is available.

### 2.b Cross Training

Cross training, in which in-house personnel are trained in a variety of maintenance tasks, allows for continuous coverage of facility issues at all times. Where non-union shops are in place, plumbers, electricians, HVAC (heating, ventilation and air-conditioning) mechanics, roofers, and carpenters can be cross trained into other shops so that at no time is there a shortage of personnel when emergencies arise and coverage is necessary. Through cross-training, school-based custodial personnel will be capable of making minor repairs and will be equipped and available to respond to emergencies, such as turning water off in cases of flooding and shutting off power at equipment and in the building in order to reduce damage until trained personnel can respond. On-site custodial personnel should not be responsible for specialized preventive maintenance activities such as cleaning cooling towers, cleaning and servicing boilers, repairing electrical equipment, or servicing high pressure plumbing items unless they have been properly trained and are deemed qualified to perform these types of repairs or maintenance.

Where union shops are in place, cross training and out-of-trade-work are generally prevented by union rules unless management specifically creates this type of staff position.

### 2.c Task Allocations

The study referenced in Section 2.a was performed in a county that utilizes a non-union shop, therefore cross-training of specialized individuals was performed and each mechanic was typically assigned to 60,000 square feet of facility space. However, this was for maintenance only, not for building alterations or requested replacements or changes.

As new schools are being constructed and older schools are expanded through additions, manpower allocations must increase to properly maintain the additional educational space. Additional space is often not regarded as a rationale to increase the funding for maintenance, creating another burden to an existing staff shortage.

**Reference:** *Edward Haberly*, Supervisor of Maintenance, Frederick County Public Schools, Facilities Services Division

# **Section III**

## **Training Best Practices**

### **3.a Introduction**

The purpose of staff training is to orient new employees to their responsibilities, as well as to indoctrinate them to work in a controlled environment in which the organization has instilled its own operational procedures and work ethics. Orientation procedures should include safety training and instruction how to deal with ongoing changes, and should provide a stimulating experience to people who perform repetitive tasks, thereby improving staff morale and retention rates. This section will address training of new employees as well as ongoing training and professional development of existing employees.

### **3.b Newly Hired Employees**

In order to explain the job specifics and tasks for which they were engaged, newly hired personnel should receive the following types of training as soon as possible after joining the organization;

- General orientation to rules and regulations governing personnel issues;
- Orientation to working conditions, including the primary location where he/she reports to work and all areas where he/she may be required to perform job related tasks;
- Instruction in all safety and emergency responsiveness procedures and policies that may affect the employee's work;
- Instructions on work-place rules, including channels for communicating questions, complaints, or grievances;
- An introduction to all tools and equipment which the employee will be required to use while performing his or her work duties;
- Instruction on how to best perform individual work tasks;
- A clear description of precisely what the individual must do to meet the requirements of the job;
- An explanation of all criteria on which the individual will be evaluated, such as the tasks and performance standards for the specific job, and identification of who will be evaluating the employee's performance.

### **3.c Transfers**

- An individual must be oriented and familiarized with a new position prior to being transferred to another work site or location.
- Transferred employees generally need no less than 30 days of on-site supervision at a new facility, depending on the differences in equipment and personnel that they will encounter.
- The use of different or unfamiliar equipment may require special training in the operation and repair of that type of equipment, as well as safety training for that particular site.

### **3.d Staff Training and Professional Development**

“Staff Training” refers to learning opportunities designed specifically to help an employee do his or her job better. “Professional Development” has a broader meaning, which includes expanding the participant’s knowledge and awareness to areas outside of their specific job duties, yet still related to the overall well being of the organization. These topics may include:

1. Asbestos Awareness and Training.
2. Emergency Responsiveness.
3. First Aid/CPR.
4. Biohazard Disposal.
5. Use of Technology.
6. OSHA Safety Training.
7. Energy Management.

Professional Development allows the employee to receive advanced training in order to achieve a higher skill level or advanced certification. This assists the organization in filling higher positions with qualified employees as the positions become available in the future, and promotes employee morale by generating opportunities for upward mobility.

**Reference:** National Center for Education Statistics and the National Cooperative Education Statistics System, *Planning Guide for Maintaining School Facilities*, Chapter 6: “*Managing staff and contractors*” (School Facilities Maintenance Task Force, Publication #NCES 2003347, February, 2003)

For ordering information on this report, write:  
U.S. Department of Education  
ED Pubs  
P.O. Box 1398  
Jessup, MD 20794-1398

# Section IV

## Average Life Cycle Expectancy for Equipment and Building Components

All life cycle figures are shown in years

### Building System

### Life Cycle

#### 4.a Building Enclosures

**Concrete Framing Systems:**

Masonry Exterior	45-60
Metal Clad	40-50

**Steel Framing Systems:**

Masonry Exterior	40-50
Metal Clad	40-50

**Wood Framing Systems:**

Masonry Exterior	35-45
Metal Clad	35-60

#### 4.b Roofing Systems

**Built-up Systems (multi-ply):**

Asphalt	10-25
Elastomeric	15-30
Polyurethane Foam	No useful life cycle available

**Pitched Roof:**

Asphalt Shingles	20-25
Metal/Standing Seam	40-50
Clay Tile/Slate	50-70

#### 4.c Windows and Exterior Doors

**Windows:**

Metal Sash	40-50
Wood Sash	30-40
Aluminum Sash	25-30

<b>Doors:</b>	
Aluminum Doors	25-30
Overhead Doors	20-40

## **4.d Interior Construction**

Demountable Partitions	20-30
Acoustical Ceilings	20-30
Carpeting	5-15
VCT	15

### **Painted Surfaces Interior:**

Classrooms, Offices, Hallways	10
Kitchens, Restrooms, Multi-purpose rooms	8

### **Painted Surfaces Exterior:**

Stucco/Masonry	7
Wood & Metal	3

## **4.e Plumbing Systems**

Fixtures	20-30
Water Heaters	10-20
Pumps	15-20
Steel Piping	30-40
Copper Piping	20-30
Fire/Sprinkler Systems	25-35

## **4.f Elevators**

All Types	25
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## **4.g Heating, Ventilation and Air Conditioning**

### **Boilers:**

Steel Water Tube	20-30
Steel Fire Tube	20-30
Electric	15-20

<b>Heat Exchangers:</b>	20-30
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Burners	15-25
Economizers	10-20
<b>Furnaces:</b>	
Gas or Oil	15-20
<b>Radiant Heating Units</b>	20-30
<b>Air Conditioners &amp; Components:</b>	
Water Cooled Package Units	10-20
Rooftop Units	10-20
Commercial Thru-wall units	10-20
Cooling Towers	10-20
Evaporative Condensing units	15-25
Air Cooled Condensing units	15-25
Package Chillers	15-25
<b>Fans:</b>	
Centrifugal	25-30
Axial	20-25
Propeller	15-20
Roof Mounted	20-25
<b>Air Terminals:</b>	
Induction and Fan Coil Units	20-25
Variable Air Volume Boxes	20-25
<b>Steam Turbines</b>	25-35
<b>Control Systems</b>	15-20
<b>Pumps &amp; Compressors</b>	15-20

## **4.h Electrical Systems**

Motors	15-20
Transformers	25-35
Generators	20-30
Primary Wiring	25-30
Switchboards	20-30
Switch units	20-25
Secondary Wiring	20-25
Lighting Ballast	10-15
Fluorescent Fixtures	15
Fire Alarm System	15-25

## **4.i Site Work and Utilities**

Concrete Paving and Curbing	15-25
Bituminous Concrete Pavement	10-15
Concrete Retaining Walls	40
Brick Retaining Walls	30
Chain Link Fencing	20
Wood Fencing	10
Underground Water lines	20-40
Underground Sewage lines	30-60
Underground Steam Lines	10-30
Tunnels for Steam and Chilled Water lines	25-50

## **4.j Summary**

The above listed life cycle averages are based upon good quality components, installation in accordance with manufacturers' instructions and/or the requirements of the construction specifications, a level of maintenance over the useful life of the equipment or system that is consistent with the manufacturer and designer specifications, and maintaining appropriate internal environmental conditions. With good quality maintenance, these items can easily exceed the higher limit given for the component.

### **References:**

Arizona School Facilities Board, *Average Life Cycle of Building Components*, Phoenix Jun 05, 2003.  
<http://www.azsfb.gov/sfb/preventive%20maintenance/life%20expectancies.xls>

National Clearinghouse for Educational Facilities at the National Institute of Building Sciences, (NCEF). 1090 Vermont Ave., NW Suite 700, Washington, D.C. 20005 (Toll free: 888-552-0624; 202-289-7800 [www.ncef.org](http://www.ncef.org))  
Funded by a grant from the U.S. Department of Education

# **Section V**

## **Summary of Maryland Requirements and Practices**

### **5.a Annual Submission of the Comprehensive Maintenance Plan**

By regulation, each local educational agency (LEA) is required to submit annually a Comprehensive Maintenance Plan (CMP) that has been approved by the Local Board of Education (COMAR 23.03.02.18.A.2 ). The CMP describes the LEA strategy for maintaining public school buildings and must be coordinated with their local Educational Facilities Master Plan (EFMP) and the local Capital Improvement Program (CIP).

The Interagency Committee on School Construction (IAC) or its designee shall notify the LEA of concerns and recommendations with regard to the comprehensive maintenance plan, and the LEA shall resolve the IAC's concerns to the reasonable satisfaction of the IAC and/or its designee.

The IAC may determine (COMAR 23.03.02.18.B.1, 2) that a project submitted in the annual CIP is ineligible for planning approval or funding approval for an existing school if:

- a. The school is not properly maintained; or
- b. The LEA does not have an adequate preventive maintenance program.

### **5.b Semi-Annual Roof Inspections**

Beginning July 1, 2000 (FY 2001), each school system has been required to inspect their school roofs twice annually in order to be eligible for State funding for roof replacement projects. Copies of the inspection reports are to be retained for as long as the school is owned by the Local Board of Education. Copies of these reports may be required to support requests for State funding. Beginning in FY 2009, the roof inspection reports will become a required portion of the periodic facilities inspections performed by the Public School Construction Program (PSCP) inspectors.

### **5.c Preparedness for Utility Related Emergencies**

The Maryland State Department of Education (MSDE) requires that each superintendent sign an Annual Assurances for Emergency Preparedness Procedures for Utility Related Emergencies form. After a student was scalded in 1997 by over-heated water, all public school systems were required to sign assurances that the following actions have taken place for each school building:

- Emergency plans for utility related emergencies are maintained in the school administrative office and the chief custodian's office.
- Small scale building and facility plans indicating the locations of utility cutoffs are part of the emergency plan and have been updated to reflect any building modifications.



- Employee training or cross training workshops have been conducted for new maintenance and operations staff in order to handle emergencies identified in the emergency plan.
- Training for new boiler operators has been provided.
- Training in the use of fire extinguishers has been provided for new building-based custodial and maintenance personnel and for new food service managers.

## **5.d PSCP Facility Inspections**

Beginning in FY 2007, the PSCP hired two full time inspectors with the intention of inspecting all school facilities on a routine six year schedule by conducting approximately 230 new inspections and 28 re-inspections each year. As the FY 2007 inspections were completed in the spring of 2007, it was discovered that follow-up inspections were needed on a sample of schools to ensure that repairs had been completed as reported by the LEA. Since both the intensity and annual number of school inspections has increased, the school inspection program has become a new tool to assist the PSCP to achieve a better understanding of how maintenance is being performed by the LEA. This program has unmasked problems which would not have been apparent when only 100 inspections were being performed per year. An annual report is submitted to the Board of Public Works each fall, accompanied by an awards ceremony for those school systems that have one or more schools that have received a rating of Superior

It is our belief that the high level of attention given by the State to school maintenance through this program will eventually assist local maintenance programs to receive the budgeting and manpower that is needed to bring our schools to 21<sup>st</sup> century standards as safe, efficient, and problem free places of learning.

# **Section VI**

## **Recommendations**

Since maintenance begins immediately at the moment that a construction project has been given over to the owner, there are several good practices that need to be performed to ensure the integrity of the building from the very beginning:

- Operating staff of the LEA should be on-site for the last 90-120 days of construction to familiarize themselves with the placement and identification of all equipment which otherwise would be hidden behind walls and above ceilings.
- Building commissioning should be performed while the maintenance staff is present so that they can gain a precise understanding of how and why the equipment works as it does, as well as an understanding of the proper sequence of operation.
- The maintenance staff should be included in the tabulation and completion of the punch-list, since they will ultimately be responsible for oversight of the quality of the facility.
- Record documents such as Record (As-built) Drawings, Shop Drawings and Specifications, Operations and Maintenance (O&M) manuals, and instructional materials should be retained for future use by the Administration in a central location, and one or more sets of the same documents should be kept in the School Office and in the School Engineers office.
- Due to the large turn-over of custodial personnel, a video taping of contractor demonstrations of the mechanical and electrical equipment operations should be maintained by the facilities office for purposes of training new personnel in the proper operation and use of the equipment at that building.
- In addition to the staff training outlined in Section III, the training of new and returning principals in the complete range of their facility responsibilities, from routine maintenance to initiating a major capital project, should be a regular component of the orientation process administered by the school administration.

For further information, contact:

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