

## **Maintenance and Capital Planning Best Practices**

The MSBA has instituted many reforms to make the MSBA's school construction and renovation grant program more effective, efficient, and user-friendly for school districts and to ensure the long-term viability of the program. A vital component of these reforms is to protect the over \$20 billion investment in school facility construction and renovation projects throughout the Commonwealth in the past 25 years, through active and on-going maintenance of school facilities by the school districts. Accordingly, the MSBA has adopted criteria based on industry best practices as a prerequisite for MSBA funding and for the determination of the allocation of maintenance incentive reimbursement points on eligible projects. As part of the initial discussions with a school district that has filed a Statement of Interest (SOI) with the MSBA, the district will be asked to submit documentation that demonstrates that the district is actively performing routine and capital maintenance to its school facilities. The following information describes the activities and practices that the MSBA believes are best practices and are part of a strategy for maintenance and capital planning and budgeting to ensure the long term operation of school facilities.

### Staffing

In order to effectively maintain the district's building portfolio, the district should have qualified and sufficient staff and staffing policies to maintain and operate its facilities, including:

- Written job descriptions for custodial and maintenance staff that clearly delineate duties and responsibilities and minimum qualifications.
- Training protocol for newly hired staff including orientation, instructions on operating equipment and major building systems and safety protocols.
- Data driven performance evaluation system for custodial staff that is used to review staff performance annually and that is updated regularly to address new goals and account for new building systems.
- Specialized training for health, safety, code compliance for appropriate staff.
- Training in how to improve the energy efficiency, air quality and comfort of district facilities.
- Vendor contracts as appropriate.

### Written Maintenance Manual

A maintenance manual is a written guide consisting of items such as:

- minimum custodial and routine maintenance standards that govern day to day operations
- the district's philosophy and approach to maintenance
- standards and benchmarks related for the effect outcomes of good maintenance
- preventative/predictive maintenance plan and schedule
- operating instructions for specialized equipment

- instructions regarding emergencies and protocols regarding safety
- protocols to maintain healthy air quality and building comfort

### Predictive/Preventative Maintenance

A component of effective maintenance typically includes preventative maintenance which is defined by activities that are performed at regularly scheduled intervals to prevent premature failure or to maximize the useful life of a building system and/or facility. Preventive maintenance applies to all buildings and their building systems and components. All buildings and building systems should have an established baseline for a comprehensive preventive maintenance program. A preventative maintenance program can be implemented more effectively if the district has created an inventory (See Facility Condition Index below).

A preventative maintenance program includes:

- A detailed listing of activities including, but not limited to, items such as roof inspections, exterior wall inspections, interior flooring and finishes inspections, repainting, door hardware adjustments, window replacement, as well as more traditional items such as bearing lubrication and belt replacements on HVAC equipment and the dates for performance.

### Work Order System

A work-order system is a way of systematically tracking planned and completed maintenance activities, including scheduled preventive maintenance and emergencies. Whether the job originates as a problem communicated by building users or as part of planned maintenance projects, a work-order system provides uniformity in planning maintenance jobs. Using work orders for upcoming preventive maintenance tasks helps schedule the work so that it does not get neglected amidst multiple maintenance jobs. Although preventive maintenance tasks can be managed using a manual system, the computerized maintenance management system is now state-of-the-art, increases efficiency and capacity to perform analysis.

- Districts should address facility problems as they occur or are reported and utilize a manual or computerized work order system for managing facility problems.

### Budgeting

The district should operate buildings (1) as they were intended, (2) in a cost-effective manner, (3) plan building maintenance as necessary, (4) have a methodical building inspection and preventative maintenance plan, and (5) budget resources for addressing the highest needs. The district should:

- Monitor the percentage of the budget spent on buildings, grounds and equipment maintenance from its entire operating budget (according to DESE data the state average of non-utility maintenance, not including custodial costs, in 2010 was 2.5% of the total district operating budget.)<sup>1</sup>

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<sup>1</sup> Maintenance managers from Baltimore were cited in a June 2005 study by Baltimore County Public Schools as stating that they believe that 3% of the annual operating budget is a benchmark that would allow for correction of deficiencies

### Facilities Condition Index (FCI)

Collecting building condition information is necessary to provide building managers with the information needed to plan maintenance and capital projects, set priorities and estimate costs. An inventory is a reliable count of each of the school district's facilities and should contain basic information on (1) the facility's condition, and (2) the various building components and equipment and basic information of their condition. Information in the inventory should include, but not be limited to, the following:

- A count of each facility, its age, square footage, and a basic building history describing any upgrades, major repairs, renovations, and/or additions.
- For each facility, a listing of the building components, their condition and functional performance, as well as the equipment's age, usage, location, warranty information, and model type.

A Facilities Condition Index (FCI) is used to calculate life cycle costs and provides information to help determine whether it is more cost effective to replace or repair building components by tracking the ratio of the cost of correcting all the deficiencies in a given building to the cost of replacing the entire building. The FCI is a relative indicator of condition, and a budgeting tool, where maintenance is budgeted and performed to keep the physical value of the facilities at as close to 100 percent of replacement cost as is reasonable. An FCI provides a linkage between building inventory, condition and systems information to the district's maintenance budget and capital repair/replacement program.

- Compute the ratio of the total cost to remedy identified deficiencies to the current replacement value of the facility. A low FCI means the facility is in relatively good conditions and that correcting deficiencies is more cost effective than replacement. A high FCI or one that is greater than 1 may indicate that the facility is in relatively poor condition and that may more cost effective to replace the building rather than modernize it.

### Building Inspections Plan

Preventive maintenance is facilitated by an inspection program that is conducted on a regular basis and looks at predetermined building components. Standardized checklists of the components facilitate the process as inspectors are more likely to collect consistent information and complete thorough inspections if they use checklists. This method can make possible year to year comparisons that can be applied uniformly by individuals responsible for the inspections. The district should have:

- Standardized forms and checklists and a standard condition rating system that allows inspectors to observe building components logically and record data uniformly.

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and implementation of a preventative maintenance program. This same study cites a 2004 report from the American Association of School Administrators that states that 2%-4% of a building's total replacement costs should be spent annually on preventative maintenance.

- A detailed schedule of inspections for each building within the district and all building components within each building.
- A detailed and regular schedule for testing safety equipment (e.g., fire detection, alarms and suppression).
- A methodology for storing and retrieving the data collected.
- A linkage to the districts work order/capital program plan for deficient items found during inspections.

#### Long-Term Ten-Year Facility Capital Improvement Plan

A long term (5-10 year) capital improvement plan is a systematic approach to addressing deferred maintenance and the replacement of building components that have reached the end of their useful life and. Projections of operating and capital costs should be coordinated with school boards, municipal officials and other policymakers' information in order to anticipate and develop budgets that incorporate the upcoming financial needs. Key components of a capital improvement plan include:

- a listing of improvements, the number of years expected for completion and an estimated cost of each improvement
- a ranking by priority, based on the expected remaining life of building systems and/or educational needs
- an assessment of the financial resources required to fund and operate the desired improvements
- coordination with the municipal officials, a link to the budget, routine review for implementation and dedicated funding

#### Facility Staff participation in Capital Projects

Consistent participation by facilities staff in capital project activities such as:

- participation in developing a capital plan
- participating in project meetings and design review meetings throughout the planning, design and construction process

This insures that the perspective of the people who are going to operate the building is taken into consideration and can result in the custodial and maintenance staff taking more ownership of the effective operation of the building.

#### Segregated Local Capital Projects Fund

Municipalities and districts that are serious about preserving their assets consistently set aside funds to keep up with the necessary and ongoing capital improvements. This can be effectuated by the:

- Creation and use of segregated local funds or a stabilization fund reserved for use on capital projects.

#### Commissioning, re-commissioning and retro-commissioning

*Commissioning (Cx)* is a systematic quality assurance process that begins during design and continues through construction, occupancy, and operations. It is a process of

verifying that building elements and systems are installed and operating as designed and specified. The process focuses upon verifying and documenting that the facility and all of its systems, components, and assemblies are planned, designed, installed, tested, operated, and maintained to meet the Owner's project requirements. Commissioning ensures that the new building operates initially as the owner intended and that building staff are prepared to operate and maintain its systems and equipment. (Based on definitions from National Conference on Building Commissioning and ASHRAE)

*Re-commissioning (Rx)* (the act of "commissioning again") is performing this verification after a number of years of building use and occupancy to ensure that systems are performing appropriately over time.

*Retro-commissioning (Retro Cx)* is performed on existing buildings that were never commissioned when originally constructed. Retro-commissioning is the systematic process by which the Owner ensures that the building and systems are optimized to perform interactively to meet the current operational needs as closely as possible. This may include remedial design and construction and most often focuses on dynamic energy-using systems with the goal of reducing energy waste, saving energy costs, and identifying and fixing operational defects. (Based on information from NEBB and the EPA)

Ideally, the district has an established practice of:

- commissioning new buildings or existing buildings subsequent to a renovation or substantial modification (e.g., a classroom is changed into a computer lab);
- performing periodic re-commissioning of new/renovated buildings after 5 years of initial commissioning and occupancy of the building;
- retesting systems on a five-year cycle relative to baselines established during the original commissioning; and
- retro-commissioning older buildings to ensure that the building and systems are optimized to perform interactively to meet the current operational needs as closely as possible.

#### Energy Conservation and Indoor Environmental Quality

Energy conservation and the quality of the indoor environment in a school are contributing factors to the health and safety of the students and staff and the efficient operation of a school facility. The indoor environmental factors that most influence occupant health and welfare are the thermal conditions, the lighting, and the concentrations of indoor pollutants. Thermal control and lighting are integral in energy management. In order to achieve a healthy environment and control energy consumption, the district should:

- have a staff person responsible to perform specific tasks such as compliance with environmental quality standards and energy conservation implementation
- monitor energy use/costs
- routinely implement energy conservation measures
- routinely inspect, balance and clean the HVAC components

- eliminate water infiltration and remediate mold
- actively monitor air changes and the quality of indoor air
- eliminate the use of toxic chemicals and has protocols for use of “green” products and materials for cleaning and repairs
- implement the practices recommended by the EPA IAQ Tools for Schools

### Performance

Visual observations of the facilities should demonstrate the effectiveness and adequacy of maintenance, capital repair efforts and custodial care as evidenced by the cleanliness of the buildings, routine maintenance and prior capital repairs/replacements. In addition to the best practices identified above, encouraging a respectful attitude toward use of the district facilities by the district administration, faculty and students can contribute to the cleanliness, organization and good working order of a building.

### Resources:

- NCES Planning Guide for Maintaining School Facilities <http://nces.ed.gov/pubs2003/2003347.pdf>
- US DOE Federal Energy Management Program: Boiler Maintenance Checklist [http://www1.eere.energy.gov/femp/operations\\_maintenance/om\\_blrchecklist.html](http://www1.eere.energy.gov/femp/operations_maintenance/om_blrchecklist.html)
- EPA Tools for Schools <http://www.epa.gov/iaq/schools>
- Energy Star Portfolio Manager [www.energystar.gov/benchmark](http://www.energystar.gov/benchmark)
- Northeast CHPS Operations and Maintenance Guide <http://neep.org/uploads/policy/NE-CHPS-OMG.pdf>
- NCES Facilities Information Management guide <http://nces.ed.gov/pubs2003/2003400.pdf>