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# A Checklist for Measuring Performance

## APPENDIX B

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**T**his appendix lists performance measures that school districts, cities, and counties may use to evaluate their preventive maintenance. As discussed in Appendix A, the performance measures reflect state and federal health and safety requirements as well as guidelines in the building construction and maintenance industries. We used these performance measures as the basis for questions on our surveys of school districts, cities, and counties and to identify jurisdictions with effective and efficient practices.<sup>1</sup>

The next section explains the importance of measuring performance in preventive maintenance and the process for doing so. Following that, we list the performance measures identified during the study. We present them in a checklist format for local jurisdictions that may want to conduct a self-assessment of their performance.

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**Local jurisdictions may use the checklist for a self-assessment of their performance.**

## THE VALUE OF PERFORMANCE MEASUREMENT

Performance measures enable school districts, cities, and counties to quantify their progress toward maintenance goals and objectives. Evaluating performance involves analyzing data on the impact, efficiency, and cost-effectiveness of preventive maintenance. Performance data equip local jurisdictions to make informed decisions about modifying or enhancing their preventive maintenance.

Collecting performance-measurement data over time helps local jurisdictions identify which areas of their preventive maintenance programs may need improvement. Further, trend data on personnel costs, equipment expenditures, levels of deferred maintenance, and building occupant satisfaction, for example, can help facility managers develop budget requests and communicate maintenance needs to local policymakers.

Although performance measurement aims to improve the cost-effectiveness of preventive maintenance, measuring performance has its own costs. Securing the resources necessary to measure performance requires local policymakers' support. Performance measurement requires identifying goals and objectives; deciding on yardsticks to measure performance; recording the necessary data; and analyzing the data. Each of these steps involves an investment of resources in the form of personnel time and, in some cases, data-collection tools.

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<sup>1</sup> Because data were unavailable on some of the measures we identified, we could not use all of the measures listed in this appendix when conducting our analysis.

In addition, performance measurement is not a one-time event. Performance evaluations provide useful information when they are done consistently over time. For some local jurisdictions, computerized maintenance management systems may facilitate the process of gathering, storing, and analyzing performance measurement data.

## **Defining a Mission, Goals, Objectives, and Measures**

The first step in preparing to evaluate preventive maintenance is identifying the overall mission of the preventive maintenance program. A mission describes the fundamental purposes of the program, such as supporting well-maintained buildings and a healthy building environment. The mission serves as the foundation on which goals, objectives, and performance measures are based.

After defining the mission, local governments should set goals for preventive maintenance. Broad goal statements outline what a local jurisdiction intends to achieve with its preventive maintenance, such as maintaining equipment at full operating capacity or conserving energy. Goals should be comprehensive and cover all aspects of the program. In developing their own preventive maintenance goals, school districts, cities, and counties may want to refer to the five key goals of preventive maintenance listed at the beginning of Chapter 2.

Articulating their mission and goals prepares school districts, cities, and counties to develop program objectives. Objectives relate to, but are more specific than, the mission and goals. They target individual preventive maintenance activities, pinpointing what a local jurisdiction aims to achieve and by when. For example, an objective might be to complete preventive maintenance work orders within 72 hours, in support of a goal of maintaining buildings efficiently.

Performance measures quantify the extent to which a local jurisdiction is meeting its objectives. We identified four types of measures: outputs, outcomes, efficiency, and cost-effectiveness. Output measures quantify the amount of services provided. For example, in relation to an objective to complete work orders within 72 hours, an output measure is the number of maintenance work orders completed within 72 hours, by type of maintenance. Outcome measures quantify the results of services. A measure of outcomes related to the work orders objective is an improvement in the percentage of work orders completed on time. Efficiency measures quantify the costs of providing services, and are based on dollars, personnel, or time. An example related to the work orders objective is the number of minutes spent per completed work order. Cost-effectiveness measures quantify the costs associated with achieving desirable results. A measure of cost-effectiveness is the average cost of maintenance personnel and materials to complete work orders successfully within the 72-hour period.

## PERFORMANCE MEASURES FOR PREVENTIVE MAINTENANCE

We identified numerous performance measures for evaluating preventive maintenance. Measures are based on state statutes and rules as well as guidelines from professional organizations such as the Building Owners and Managers Association International and the International Facilities Management Association.

In the following list, we converted measures to a “yes or no” format to make it easier for school districts, cities, and counties to conduct a self-assessment by applying them to their own performance. We present the measures in an order that corresponds to the seven best practices recommended in Chapter 2.

Measures related to comprehensive preventive maintenance, as defined in Chapter 3, are designated by an asterisk. Although each measure appears only once, some measures apply to more than one practice. For example, regularly updating building-condition inventories relates both to Best Practice 1 on assessing the condition of buildings and to Best Practice 3 on planning for preventive maintenance.

When we conducted our analysis, we based some of the measures on statewide median rankings among the school districts, cities, and counties responding to our surveys. For example, we compared school districts based on whether the number of preventive maintenance practices they used for most building components was greater than or equal to the median for all school district respondents. As an alternative to using statewide data, local jurisdictions evaluating their program may want to compare their actions to their own base line data or to data from similar jurisdictions in their region.

The following list of measures is not exhaustive. The measures do not represent all performance measures that jurisdictions could use to evaluate preventive maintenance. Individual school districts, cities, and counties may choose to supplement the measures we identified with additional measures related to their specific objectives.

### Checklist of Performance Measures<sup>2</sup>

#### **Best Practice 1: Inventory building components and assess their conditions (p. 13 in Chapter 2).**

The following performance measures relate to periodically inspecting facility conditions and taking an inventory of building components and equipment.

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<sup>2</sup> Asterisks denote measures used to define comprehensive preventive maintenance, as described in Chapter 3.

	<u>Yes</u>	<u>No</u>
A. Does the local government periodically inspect the condition of building components?*	<input type="checkbox"/>	<input type="checkbox"/>
B. Does the local government keep a comprehensive list of building systems and equipment with information such as location, model type, warranty information, age, and replacement parts?*	<input type="checkbox"/>	<input type="checkbox"/>
C. Does the local government assign condition ratings to building components?	<input type="checkbox"/>	<input type="checkbox"/>
D. Does the local government regularly update facility inventories to reflect changes in square footage, value, condition, and maintenance practices?*	<input type="checkbox"/>	<input type="checkbox"/>
E. Do technicians and managers receive training to conduct the condition assessments?	<input type="checkbox"/>	<input type="checkbox"/>
F. Do trained technicians and managers use written guidelines, standardized checklists, or automated systems to conduct the assessments?	<input type="checkbox"/>	<input type="checkbox"/>

**Best Practice 2: Build the capacity for ranking maintenance projects and evaluating their costs (p. 20).**

These performance measures refer to using an objective process to set priorities among maintenance projects. They also apply to calculating the total costs of equipment over its expected lifetime.

	<u>Yes</u>	<u>No</u>
A. Does the local government have a priority-rating system for maintenance projects that:		
• helps sort out the relative importance of maintenance and renewal projects?	<input type="checkbox"/>	<input type="checkbox"/>
• reflects differences in building uses?	<input type="checkbox"/>	<input type="checkbox"/>
• helps determine funding priorities?	<input type="checkbox"/>	<input type="checkbox"/>
B. Does the local government use standardized cost data based on an industry-accepted cost estimating system to determine repair and replacement costs?	<input type="checkbox"/>	<input type="checkbox"/>
C. Does the local government use an evaluation tool, such as life-cycle costing or internal rate of return, to compare building systems and equipment against demonstrated standards and to determine when to replace (instead of continuing to maintain) them?	<input type="checkbox"/>	<input type="checkbox"/>

**Best Practice 3: Plan strategically for preventive maintenance in the long- and short-term (p. 29).**

These performance indicators refer to building managers' and other local officials' responsibility to develop short- and long-term maintenance plans that include preventive maintenance and are connected to capital and operating budgets.

	<u>Yes</u>	<u>No</u>
A. Does the local government have a written, long-range plan for building maintenance and repairs that:		
• extends out a minimum of three to five years?*	<input type="checkbox"/>	<input type="checkbox"/>
• contains an inventory of all buildings' components and systems, their condition, and estimates of their expected remaining useful life?*	<input type="checkbox"/>	<input type="checkbox"/>
B. As part of the local government's long-range plan, is there a plan to reduce deferred maintenance that includes:		
• a list of major deferred maintenance projects ranked by level of severity and urgency?	<input type="checkbox"/>	<input type="checkbox"/>
• estimates of the costs for reducing the existing backlog?	<input type="checkbox"/>	<input type="checkbox"/>
C. Has the local government prepared a capital plan based on the long-range plan for buildings and their components with cost estimates based on the major components' useful remaining life, and is the capital plan updated annually?*	<input type="checkbox"/>	<input type="checkbox"/>
D. Does the local government establish an adequate facility funding level for ongoing maintenance, such as the recommended guideline of between 2 and 4 percent of current replacement value?	<input type="checkbox"/>	<input type="checkbox"/>
E. Has the local government established reserved funds specifically for renewing and replacing building components?	<input type="checkbox"/>	<input type="checkbox"/>
F. Does the local government develop an annual facilities maintenance plan based on goals and objectives for maintaining buildings?*	<input type="checkbox"/>	<input type="checkbox"/>
G. Is the annual maintenance plan linked to capital and operating budgets?*	<input type="checkbox"/>	<input type="checkbox"/>
H. Does the local government's annual maintenance plan include a labor-needs analysis to determine the total labor hours required to operate and maintain the property, as well as time estimates for unscheduled repairs and emergency work orders?	<input type="checkbox"/>	<input type="checkbox"/>

	<u>Yes</u>	<u>No</u>
I. Does the local government have estimates of operating costs to maintain or replace buildings' components or systems? Do the estimates include projections of any future savings resulting from equipment replacements?	<input type="checkbox"/>	<input type="checkbox"/>
J. Have building conditions in the local government improved or stayed at acceptable levels from year to year?	<input type="checkbox"/>	<input type="checkbox"/>
K. Has the backlog of deferred maintenance declined from year to year?	<input type="checkbox"/>	<input type="checkbox"/>
L. Is the ratio of deferred maintenance to buildings' current replacement value within an acceptable range around the median for similar jurisdictions (or, alternatively, within acceptable levels in the jurisdiction)?	<input type="checkbox"/>	<input type="checkbox"/>
M. Is the ratio of preventive maintenance expenditures to estimated deferred maintenance costs within an acceptable range around the median for similar local governments (or, alternatively, within acceptable levels in the jurisdiction)?	<input type="checkbox"/>	<input type="checkbox"/>

**Best Practice 4: Structure a framework for operating a preventive maintenance program (p. 43).**

The indicators below help evaluate the framework that personnel responsible for building maintenance have established to perform preventive maintenance, including its (1) coordination of preventive maintenance with other maintenance projects, (2) use of a checklist of preventive maintenance tasks, (3) development of a timeline for the tasks, (4) preparation of procedures for managing the program, and (5) coordination of preventive maintenance with activities aimed at controlling indoor air quality.

	<u>Yes</u>	<u>No</u>
A. Has the local government designated an individual department or employee to coordinate maintenance projects and delegate tasks to employees?	<input type="checkbox"/>	<input type="checkbox"/>
B. Does the local government have procedure manuals or checklists of tasks for employees to use when performing preventive maintenance?*	<input type="checkbox"/>	<input type="checkbox"/>
C. Does the local government's preventive maintenance program include one-year schedules that prescribe weekly preventive maintenance activities for specified equipment and components according to manufacturers' recommended frequency or other set intervals?*	<input type="checkbox"/>	<input type="checkbox"/>
D. Does the schedule estimate the number of work hours needed for each activity?	<input type="checkbox"/>	<input type="checkbox"/>

	<u>Yes</u>	<u>No</u>
E. Does the local government keep acceptable levels of materials and spare parts to support timely repairs?*	<input type="checkbox"/>	<input type="checkbox"/>
F. Does the local government have an indoor air quality (IAQ) management program? Does the IAQ program include:	<input type="checkbox"/>	<input type="checkbox"/>
• a designated IAQ coordinator to manage the IAQ program?	<input type="checkbox"/>	<input type="checkbox"/>
• an IAQ profile, based on existing records and an IAQ assessment, describing the features of the buildings' structure, function, and occupancy that relate to IAQ?	<input type="checkbox"/>	<input type="checkbox"/>
• training in IAQ issues for in-house staff and education for contractors whose functions could affect IAQ?	<input type="checkbox"/>	<input type="checkbox"/>
• an IAQ plan for facility operations and maintenance addressing HVAC operations, cleaning and storage practices, and preventive maintenance?	<input type="checkbox"/>	<input type="checkbox"/>
• procedures for managing processes with potentially significant pollutant sources, including remodeling and renovation, painting, pest control, shipping and receiving, and smoking?	<input type="checkbox"/>	<input type="checkbox"/>
• procedures for responding to IAQ complaints?	<input type="checkbox"/>	<input type="checkbox"/>
• procedures for updating the program when equipment is added or removed?	<input type="checkbox"/>	<input type="checkbox"/>
G. Does the local government's IAQ activities include:		
• inspecting outside air dampers for nearby sources of contamination?	<input type="checkbox"/>	<input type="checkbox"/>
• ensuring that air dampers are clear of obstruction and operating properly?	<input type="checkbox"/>	<input type="checkbox"/>
• regularly replacing or cleaning air filters?	<input type="checkbox"/>	<input type="checkbox"/>
• cleaning and inspecting drain pans?	<input type="checkbox"/>	<input type="checkbox"/>
• inspecting and cleaning heating and cooling coils?	<input type="checkbox"/>	<input type="checkbox"/>
• inspecting and cleaning, as warranted, the interior of air handling units?	<input type="checkbox"/>	<input type="checkbox"/>
• inspecting fan motors and belts?	<input type="checkbox"/>	<input type="checkbox"/>

	<u>Yes</u>	<u>No</u>
• regularly inspecting and cleaning air humidification equipment and controls?	<input type="checkbox"/>	<input type="checkbox"/>
• inspecting, cleaning, and treating cooling towers?	<input type="checkbox"/>	<input type="checkbox"/>
• inspecting and cleaning air distribution pathways and variable air volume boxes?	<input type="checkbox"/>	<input type="checkbox"/>
H. Is there a high level of customer satisfaction with the building environment and maintenance services?	<input type="checkbox"/>	<input type="checkbox"/>
I. Is the number of complaints about the building environment within acceptable levels in the jurisdiction?	<input type="checkbox"/>	<input type="checkbox"/>
J. Does the local government have a low percentage of work orders for emergency or unscheduled repairs compared to the percentage for preventive maintenance and other scheduled repairs?	<input type="checkbox"/>	<input type="checkbox"/>
K. Has the frequency of equipment failures and service interruptions declined from year to year?	<input type="checkbox"/>	<input type="checkbox"/>
L. Is a high percentage of buildings, building components, and systems in the jurisdiction in good condition? (See Table 3.1 on p. 85 for the definition of “good condition” used in this report.)	<input type="checkbox"/>	<input type="checkbox"/>
M. For local governments with buildings in good condition, is the cost per square foot for maintenance and minor repair within an acceptable range around the median for similar jurisdictions (or, alternatively, within acceptable levels in the jurisdiction)?	<input type="checkbox"/>	<input type="checkbox"/>
N. For local governments with a high percentage of buildings in good condition, are preventive maintenance costs (operating or capital) per square foot within an acceptable range around median costs for similar jurisdictions (or, alternatively, within acceptable levels in the jurisdiction)?	<input type="checkbox"/>	<input type="checkbox"/>
O. For local governments with a comprehensive preventive maintenance program, are preventive maintenance costs (operating or capital) per square foot within an acceptable range around the median costs for similar jurisdictions (or, alternatively, within acceptable levels in the jurisdiction)? (See p. 82 for the definition of “comprehensive preventive maintenance program” used in this report.)	<input type="checkbox"/>	<input type="checkbox"/>

- |   | <u>Yes</u>               | <u>No</u>                |
|---|--------------------------|--------------------------|
| P. Are preventive maintenance costs (operating or capital) per square foot within an acceptable range around median costs for similar jurisdictions that have a low ratio of emergency to nonemergency work orders? | <input type="checkbox"/> | <input type="checkbox"/> |
| Q. Are operating costs for emergency repairs per square foot within an acceptable range around the median for similar jurisdictions (or, alternatively, at an acceptable level in the jurisdiction)?                | <input type="checkbox"/> | <input type="checkbox"/> |

**Best Practice 5: Use tools to optimize the preventive maintenance program (p. 57).**

The following measures relate to maximizing benefits from preventive maintenance by incorporating preventive maintenance tasks into a work-order system, keeping systematic maintenance records, and evaluating the preventive maintenance program. They also cover exploring potential efficiencies gained through sharing preventive maintenance services.

- |   | <u>Yes</u>               | <u>No</u>                |
|---|--------------------------|--------------------------|
| A. Does the local government maintain historical records to document building conditions and the costs of renewing or replacing building components and to provide trend data for updating long-range capital needs?* | <input type="checkbox"/> | <input type="checkbox"/> |
| B. Does the local government have procedures manuals that provide guidelines for:   |                          |                          |
| • program planning and control?*  | <input type="checkbox"/> | <input type="checkbox"/> |
| • budget management?*   | <input type="checkbox"/> | <input type="checkbox"/> |
| • coordinating work performed by trade workers and contractors?   | <input type="checkbox"/> | <input type="checkbox"/> |
| • managing emergency situations?  | <input type="checkbox"/> | <input type="checkbox"/> |
| • controlling inventories?  | <input type="checkbox"/> | <input type="checkbox"/> |
| C. Does the local government have policies and procedures that designate responsibility for managing public use of the public buildings during after-school or after-office hours?                                    | <input type="checkbox"/> | <input type="checkbox"/> |
| D. Does the local government have a management information system (either computerized or manual) to maintain records of department maintenance activities?*  | <input type="checkbox"/> | <input type="checkbox"/> |

	<u>Yes</u>	<u>No</u>
E. Does the information system allow users to:		
• ascertain the number of work orders outstanding and completed?	<input type="checkbox"/>	<input type="checkbox"/>
• track the maintenance and repair history on individual building components?	<input type="checkbox"/>	<input type="checkbox"/>
• record equipment malfunctions?	<input type="checkbox"/>	<input type="checkbox"/>
• track all maintenance and repair costs?	<input type="checkbox"/>	<input type="checkbox"/>
F. Has the local government developed a process to evaluate the efficiency and effectiveness of preventive maintenance efforts?	<input type="checkbox"/>	<input type="checkbox"/>
G. Does the evaluation process include at least one of the following:		
• setting goals, objectives, and performance measures to review preventive maintenance progress on a periodic basis?	<input type="checkbox"/>	<input type="checkbox"/>
• reviewing records of preventive maintenance activities and system repairs to identify potential problems?	<input type="checkbox"/>	<input type="checkbox"/>
• following a quality assurance program that includes use of maintenance standards; monitoring, inspecting, and evaluating completed work; and developing corrective action plans?	<input type="checkbox"/>	<input type="checkbox"/>
• periodically surveying service recipients or building occupants about the building environment?	<input type="checkbox"/>	<input type="checkbox"/>
• using evaluative methods, such as cost-benefit analyses, to quantify savings due to preventive maintenance efforts?	<input type="checkbox"/>	<input type="checkbox"/>
H. Has the local government explored whether efficiencies can be gained through cooperative maintenance efforts with other jurisdictions or with other agencies within the jurisdiction?	<input type="checkbox"/>	<input type="checkbox"/>
I. Is the average percentage of work orders (out of total monthly work orders) carried over from month to month within an acceptable level in the jurisdiction?	<input type="checkbox"/>	<input type="checkbox"/>

	<u>Yes</u>	<u>No</u>
J. Does the local government have a high percentage of work orders completed within 72 hours or within its own predetermined schedule?	<input type="checkbox"/>	<input type="checkbox"/>
K. For local governments with building occupants indicating a high satisfaction level with building conditions (as measured by a survey of occupants or reduction in the number of complaints per square foot), is the cost per square foot for maintenance and minor repair within an acceptable range around the median for similar jurisdictions (or, alternatively, within acceptable levels in the jurisdiction)?	<input type="checkbox"/>	<input type="checkbox"/>
L. Are operating costs per completed work order for preventive maintenance, repairs, and emergency maintenance within an acceptable range around the median for similar local governments (or, alternatively, at an acceptable level in the jurisdiction)?	<input type="checkbox"/>	<input type="checkbox"/>

**Best Practice 6: Advance the competence of maintenance workers and managers (p. 69).**

These measures relate to local jurisdictions' responsibility to ensure that maintenance employees receive the training they need to complete their tasks safely and competently.

	<u>Yes</u>	<u>No</u>
A. Does the local government require that maintenance personnel receive training on recognizing and diagnosing the cause of maintenance problems in buildings for which they are responsible?	<input type="checkbox"/>	<input type="checkbox"/>
B. Does the local government provide training in the areas of:		
• energy conservation?	<input type="checkbox"/>	<input type="checkbox"/>
• new facility technologies?	<input type="checkbox"/>	<input type="checkbox"/>
• analyzing the remaining useful life of building components?	<input type="checkbox"/>	<input type="checkbox"/>
C. Does the local government provide additional training for maintenance managers in the subjects of:		
• management skills?	<input type="checkbox"/>	<input type="checkbox"/>
• budget development?	<input type="checkbox"/>	<input type="checkbox"/>
• communication and presentation techniques?	<input type="checkbox"/>	<input type="checkbox"/>

	<u>Yes</u>	<u>No</u>
D. Does the local government provide ongoing training for maintenance workers?	<input type="checkbox"/>	<input type="checkbox"/>
E. Does the local government provide training as required by the U.S. Occupational Safety and Health Act (OSHA) and Minnesota OSHA for activities maintenance workers may be expected to perform?	<input type="checkbox"/>	<input type="checkbox"/>
F. Is the number of person hours per completed work order below the median for similar local governments (or, alternatively, at an acceptable level in the jurisdiction)?	<input type="checkbox"/>	<input type="checkbox"/>

**Best Practice 7: Involve appropriate maintenance personnel in decision making and in communicating buildings' needs (p. 75).**

The following measures pertain to local officials' responsibility to include maintenance personnel early in decisions about purchasing major components or adding square footage. They also relate to the need for a multiple-level education strategy to inform various audiences about maintenance needs and costs.

	<u>Yes</u>	<u>No</u>
A. Do senior management and policymakers receive periodic reports of appropriate building information tailored to their needs?*	<input type="checkbox"/>	<input type="checkbox"/>
B. Do the reports include the following information:		
• the number and replacement value of all buildings?	<input type="checkbox"/>	<input type="checkbox"/>
• building condition ratings?	<input type="checkbox"/>	<input type="checkbox"/>
• costs of deficiencies?	<input type="checkbox"/>	<input type="checkbox"/>
• costs for long-range renewal of building components based on annual life-cycle funding?	<input type="checkbox"/>	<input type="checkbox"/>
• a plan for managing deferred maintenance projects?	<input type="checkbox"/>	<input type="checkbox"/>
C. Are appropriate maintenance personnel involved in reviewing capital projects, major equipment purchases, and designs for adding square footage to assess potential maintenance problems and identify maintenance costs?	<input type="checkbox"/>	<input type="checkbox"/>
D. Do policymakers have a clear understanding of the scope of maintenance needs and costs?	<input type="checkbox"/>	<input type="checkbox"/>