PREVENTIVE MAINTENANCE AND FACILITY MANAGEMENT

An Introduction to Facility Management Strategies for Alaskan Schools

Presented By
Mike Gaede
Building Management Specialist
Discussion Topics

- **Overview of school maintenance programs**
  - The critical role of preventive maintenance
  - The work order process – 2 examples
  - The importance of communication and community involvement
  - PM and facility management requirements for CIP eligibility – 6 elements
Maintenance = Extended Facility Life
School building materials, wear factors, and maintenance requirements.

- Average Age of School Facilities in Alaska = 20+ Years.
- Proper maintenance yields a long life span. Lack of care brings premature failure.
Deterioration of School Facilities – Contributing Elements

- Organic solvents, cleaning solutions
- Water
- Cycles of heat, cold & relative humidity
- Mechanical stress
- Abrasives
- Radiant Energy
- Acids, salts, alkaline
Maintenance vs. Learning Environment

Appropriate scheduling of maintenance activities is critical
Maintenance Categories

- General Maintenance
- Grounds Maintenance
- Preventive Maintenance
- Emergency Repair
- Vandalism
- Vehicle Maintenance
Discussion Topics

• Overview of school maintenance programs
• **The critical role of preventive maintenance**
• The work order process – 2 examples
• The importance of communication and community involvement
• PM and facility management requirements for CIP eligibility – 6 elements
Preventive Maintenance
Preservation through a cyclical process of inspections

“to ensure the school operates at proper efficiency without interruption”
The Benefits of Preventive Maintenance

• Provides for extended life of the building and grounds.
• Provides a healthy learning environment for students.
• Increases the productivity of faculty, administrators, students, and maintenance personnel.
• Aesthetic qualities of the building and grounds are improved and maintained.
• Timely identification of building degradation that may otherwise be unnoticed.
• Maintains compliance with current codes and standards.
• Achieves reductions in energy consumption.
PM vs. Other Types of Maintenance

- **Predictive Maintenance**
  Anticipate failure through vibration, ultrasonic, infrared detection

- **Corrective Maintenance**
  Planned replacement of worn parts – based on PM inspections

- **Repair Maintenance**
  Maintenance work that requires immediate action
Common PM Tasks

- Cleaning
- Painting
- Lubricating
- Replacing Worn Parts
- Lighting Replacement and Repair

Objective: to keep materials and components maintained at an optimal level of performance
Prioritizing PM Procedures

- Life Safety
- Overall Safety
- Regulatory Requirements
- Known Requirements
- Equipment Life Cycle
- Energy Efficiency
Contracting Outside Professionals

Licensed Professionals Required:

- Elevators
- Alarm Systems
- Fire Systems
- Pest Control Systems
- Fire Extinguisher Certification
Successful PM Protocol - Training

- Establish routine training sessions
- Collect and provide up-to-date training materials

- On the job training ➔ Perfect skills under supervision
- New equipment ➔ Vendor service training
PM Protocol – Record Keeping

“Essential for understanding the potential of equipment failure and preventing future problems”

- Work logs
- Work orders
- Inspection checklists
- Equipment maintenance logs
- Equipment manuals and warranties
- Computerized maintenance management software (CMMS)
PM Protocol
Equipment Records & Tagging

Equipment Record Details:

- Location / Building
- Room number
- Equipment name / tag #
- Description of equipment defect
- Description of the PM or repair task to be performed
- Estimated work hours need to complete the PM task
- Task assignment
- Cost
- Date
Discussion Topics

- Overview of school maintenance programs
- The critical role of preventive maintenance
- **The work order process – 2 examples**
- The importance of communication and community involvement
- PM and facility management requirements for CIP eligibility – 6 elements
MAINTENANCE WORK ORDERS

The ‘How To’ guide for getting things fixed
Work Order Process: Initiation

Maintenance work order request form
- Can be requested by any staff member in the school
- Requests are submitted using the electronic ‘work order request’ form in the CMMS or handwriting traditional paper work order request forms

Decision
Approvers Will:
- Accept or reject the request
- Set the Priority of Request
- Fill in remaining fields - (Administrative Data)

Approval Process
- Requests are delivered /e-mailed to a designated approver
- Approvers: Instructional Leaders, Maintenance Supervisors, Director of Maintenance, Superintendent

Data Entry
Approved Requests will be entered into the CMMS Work Order System
(School Dude, Maximo, TMA)
Work Order Process: Action & Completion

**Work Order**
- Produced by the CMMS
- Delivered to the Maintenance Dept. (electronic or paper)
- Estimated start date
- Estimated completion date
- Prioritized
  1. Emergency
  2. Life/Safety
  3. PM
  4. Corrective or seasonal maintenance

**Deferred**
Due to:
- Parts availability
- Scheduling conflict (school activities or other on-going projects)
- Cost (funds unavailable)

**Maintenance Task Completion**
- Actual completion date, time spent, materials (new purchase/inventory part) and cost are recorded onto the work order
- Completed work order data verified - entered into the CMMS
Various types of Work Order Requests

- Computer (email) or handwritten
- Depends on district size and protocol
Maintenance Request - Procedure

Large District Example:
Matanuska-Susitna Borough School District
Mat-Su Borough School District

Administrative organization

- Superintendent
- Director of operations and maintenance
- 3 maintenance divisions: east, central, and west
- Maintenance foreman and custodial supervisor for each division
- Maintenance technicians, custodial staff associated with each division

Work order process

- Work request – site level school admin. and teachers
- Request approval – school administrator
- Entered into CMMS
- Work request to appropriate maintenance foreman
- Prioritized and scheduled
- Work order issued
- Work order completion
- Completion notes written on issued work order
- Submitted to admin. secretary for entry into CMMS
- Weekly status reports / monthly summary reports
Maintenance Request Procedure

Small District Example

Hoonah City School District
Hoonah City School District

Administrative organization

- Superintendent
- Maintenance contractor
- Site administrator
- Custodial staff

Work order process

- Work requests – site level – all district staff involved
- Hand written work request sheets
- Work request approval – Superintendent
- Work request forwarded to Maintenance Contractor
- Prioritized and scheduled as W/O
- Time, cost, comments written in daily work log
- Completed W/O entered into CMMS at end of each day
- Weekly meetings with Superintendent to discuss on-going issues, future maintenance needs
Discussion Topics

- Overview of school maintenance programs
- The critical role of preventive maintenance
- The work order process – 2 examples
- **The importance of communication and community involvement**
- PM and facility management requirements for CIP eligibility – 6 elements
Communicate!

Observed problems should be communicated and addressed promptly.
Paths of communication

- Teachers
- School Nurse
- Site Administrator
- Maintenance Department
- Custodial Services
- Superintendent

Courteous communication builds good working relationships
Positive Role Models

School Maintenance Technicians
School Custodians

• Encourage positive rapport with students
• Become a visible presence on campus
Community Involvement

Avenues for participation in creating a healthy, well maintained school environment.

• Citizen’s Advisory Committee
• PTA
• School Board Planning Sessions
Discussion Topics

- Overview of school maintenance programs
- The critical role of preventive maintenance
- The work order process – 2 examples
- The importance of communication and community involvement

- PM and facility management requirements for CIP eligibility – 6 elements
Grant Applications – Statute Requirements
AS 14.11.011 / 4 AAC 31.013

Each district is required to have a preventive maintenance plan that includes:

- **maintenance management program**, capable of tracking the timing and costs of planned and completed maintenance activities
- **energy management program** for district buildings
- **custodial care program** for district buildings
- **maintenance training program** for facility managers and maintenance employees
- **renewal and replacement schedules** for major facility components
- **fixed asset inventory system** for equipment valued $5000 or more
Maintenance Management Program

Requirements:

• A formal work order system
• Ability to track timing and costs
• Ability to track labor and materials
• Ability to produce reports of planned and completed work
Energy Management Plan Requirements:

- Ability to record energy consumption for all utilities on a monthly basis
- Utilities are recorded for each building
- Utilities include electricity, heating oil, propane, and water
- If the facility was constructed before 12/15/2004, the district may record energy consumption for multiple buildings served by one utility plant (one meter)
Custodial Program Requirements:

• Provide a schedule and description of custodial activities for each building
• The custodial schedule is based on type of work and scope of effort required for each building
Training Program Requirements:

• Provide a training program that specifies training for custodial and maintenance staff
• Maintain training logs describing type and duration of training received by individuals
• Provide training logs recording both completed and scheduled training sessions
Capital Planning Requirements:

• Provide renewal and replacement schedules for each school facility over 1,000 gsf.
• Identify the construction cost of major building systems (electrical, mechanical, structural, etc…)
• Evaluate and establish the life-expectancy of major building systems
• Compare life-expectancy to the age and condition of major building systems
• Use the renewal and replacement data to forecast the replacement year and cost for each system
### DEED Renewal and Replacement Schedule

#### Renewal Replacement Schedule - Chiitotina School Original

<table>
<thead>
<tr>
<th>Facility or Building</th>
<th>System</th>
<th>Year Installed</th>
<th>Remaining Life Span</th>
<th>Year Work 1</th>
<th>Year Work 2</th>
<th>Year Work 3</th>
<th>Year Work 4</th>
<th>Year Work 5</th>
<th>Year Work 6</th>
<th>Total Costs by System (in dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EED # 11003021</td>
<td>Site Improvements</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$121,514</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Site Utilities</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$161,718</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Roof Systems</td>
<td>2008</td>
<td>13</td>
<td>2013</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$55,063</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Interior Finishes</td>
<td>1578</td>
<td>16</td>
<td>2013</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$52,448</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Exterior Finishes</td>
<td>1578</td>
<td>5</td>
<td>2013</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$19,381</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Interior Finishes</td>
<td>2001</td>
<td>3</td>
<td>2013</td>
<td>2014</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$64,663</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Interior Finishes</td>
<td>2001</td>
<td>13</td>
<td>2013</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$24,005</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Interior Finishes</td>
<td>1578</td>
<td>10</td>
<td>2013</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$41,327</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Replacement Value</td>
<td>$1,131,905</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>NOTES</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chimpan multipurpose</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Building</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

www.education.alaska.gov/facilities/publications.htm
Fixed Asset Requirement:

- Provide a report which records assets valued at $5,000* or more
- Date acquired
- Location
- Estimated date of service

*(minimal level of asset valuation is usually associated with the district’s tax audit requirements - $500 valuation is commonly used by some)*
In review

- Building components wear out eventually
- Various types of maintenance are employed. Preventive Maintenance (PM) extends component life cycles
- Successful PM requires training and record keeping
- Work order system required in Alaska
- Unique, yet similar, work order systems throughout Alaska
- ‘Maintenance work requests’ start the work order process
- Maintenance planning - the public is invited
- A comprehensive preventive maintenance and facility management program is required State CIP funding
Resources

- **Preventive Maintenance Guidelines For School Facilities**  
  John C. Maciha, RS Means Company, 2000

- **Indoor Air Quality – Tools for Schools**  
  US Environmental Protection Agency / Office of Air and Radiation (6609)/EPA 402-K-95-001(third edition)  
  January, 2005

- **Facilities Masters Online Webcast**  
  “Improving Indoor Air Quality and the Learning Environment” – July 2012  
  Classroom Maintenance: Ed Cenedella (Hampden-Wilbraham Regional School District, NH)  
  Classroom Organization: Janet Brough (Laconia School District, MA) and Sandy Rhee (Organization Guru)

- **Alaska School Laws and Regulations Annotated 2011-2012 edition**  
  4 AAC 31.013. Preventive maintenance and facility management.

- **Alaska School Facilities Preventive Maintenance Handbook**  
  [http://education.alaska.gov/facilities/publications.html](http://education.alaska.gov/facilities/publications.html)