Agenda

Bond Reimbursement and Grant Review Committee Meeting Agenda

June 14, 2018
2:30pm - 4:00pm

Teleconference – School Finance Conf. Room
801 W. 10th Street
Juneau, Alaska

Chair: Heidi Teshner, Chair

Thursday, June 14, 2018

Agenda Topics

2:30-2:35 PM

Committee Preparation

- **Call-in, Roll Call, Introductions**
- **Chair's Opening Remarks**
- **Agenda Review/Approval**

2:35 – 3:30 PM

Regulation Update

- **Commissioning Standards**
- **4 AAC 31 Clean-up**

Publication Update

- ***Preventive Maintenance & Facility Management Handbook***
- ***Life Cycle Cost Analysis Handbook***
    - **Action Item: Approval of *Life Cycle Cost Analysis Handbook***

3:30 – 3:40 PM

Legislative Session Update

3:40 – 3:50 PM

BR&GR Calendar and Work Plan Review & Update

3:50 – 4:00 PM

Committee Member Comments

4:00 PM

Adjourn

Audio Teleconference: Call Toll-Free 1-855-244-8681 (US/Canada); Meeting Number 804 571 657

COMMISSIONING -- DRAFT Regulation Language - June 1, 2018

New Text Underlined and Bolded [DELETED TEXT BRACKETED AND IN CAPS]

4 AAC 31.013. Preventive maintenance and facility management

(a) For a district to be eligible for state aid under AS 14.11.011, the district must have a facility management program that addresses the following five elements of facility and maintenance management:

(1) a formal maintenance management program that records maintenance activities on a work order basis, and tracks the timing and cost, including labor and materials, of maintenance activities in sufficient detail to produce reports of planned and completed work;

(2) an energy management plan that includes

(A) recording energy consumption for all utilities on a monthly basis for each building; for facilities constructed before December 15, 2004, a district may record energy consumption for utilities on a monthly basis when multiple buildings are served by one utility plant**, and**

(B) regularly evaluating the effectiveness of and need for commissioning existing buildings;

(3) a custodial program that includes a schedule of custodial activities for each building based on type of work and scope of effort;

(4) a maintenance training program that specifies training for custodial and maintenance staff and records training received by each person; and

(5) a renewal and replacement schedule that, for each school facility of permanent construction over 1,000 gross square feet, identifies the construction cost of major building systems, including electrical, mechanical, structural and other components; evaluates and establishes the life-expectancy of those systems; compares life-expectancy to the age and condition of the systems; and uses the data to forecast a renewal and replacement year and cost for each system.

(b) Repealed 12/15/2004.

(c) At the request of a chief school administrator, the department will assist a district in implementing a qualifying preventive maintenance program through consultation, on-site reviews, and training.

(d) Repealed 12/15/2004.

(e) On an annual basis, the department shall provide a preliminary notice to each district regarding its compliance with each element required in (a) of this section, based on evidence of a program that was previously provided to the department, or that was gathered by the department during an on-site visit conducted under (f) of this section. On or before June 1, the department will provide its preliminary notice. The department may change a determination of non-compliance at any time during the year based on new evidence. Districts that are not in full compliance must provide evidence of compliance to the department by August 1. On or before August 15, the department will notify districts of its final determination regarding compliance. The department will deny a grant application submitted under AS 14.11.011 by a district that has received a final determination from the department that the district is out of compliance with this section.

(f) The department shall conduct on-site inspections of school district preventive maintenance and facility management programs at least once every five years. The department

may make additional inspections as it deems necessary. The department may change its determination of compliance based on information obtained during the on-site inspections.

(g) In this section

(1) "district" has the meaning given in AS 14.11.135;

(2) "maintenance activities" means all work performed by district staff or contractors on building systems, components, utilities, and site improvements.

4 AAC 31.065. Selection of designers, commissioning agents, and construction managers

(a) If a school district determines that it is necessary to engage the services of a private consultant to design or provide **commissioning or** construction management **services** for an educational facility with money provided under AS 14.11.011 - AS 14.11.020, or for a project approved for reimbursement of costs under AS 14.11.100, and the estimated cost of the contract is more than $50,000, the selection of the consultant shall be accomplished by soliciting written proposals by advertising in a newspaper of general circulation at least 21 days before the proposals are due. The contract shall be awarded to the most qualified offeror, after evaluating the proposals submitted.

(b) Nothing in this section precludes a school district from retaining the services of a consultant on an as-needed basis under a multi-year contract, if the term of the contract is not more than five years.

(c) The school district shall provide a procedure for administrative review of complaints by aggrieved offerors which allows them to appeal, within 10 days after the notice of intent to award, requesting a hearing with notice to interested parties, for a redetermination and final award in accordance with law.

4 AAC 31.080. Construction and acquisition of public school facilities.

(new) Commissioning and commissioning agent fees are allowable ***costs of school construction***. A ***school capital project*** that is

(1) a ***rehabilitation*** of, an ***addition*** to, or ***new construction*** of an ***education related facility*** that is over 2,000 square feet requires

(A) commissioning of mechanical, electrical, fuel oil, controls, and building envelope systems as they might be included in the project, and for a ***rehabilitation*** project, where the included system is being substantially upgraded; and

(B) use of a commissioning agent with a department-approved certification;

(2) a ***rehabilitation*** project where the included mechanical, electrical, fuel oil, controls, or building envelope system is impacted by the project but not substantially upgraded may implement commissioning and may use a commissioning agent with a department-approved certification or may use any qualified facility professional or school district employee.

4 AAC 31.900. Definitions

(31) “commissioning” means functional testing activities to ensure that a facility operates as the owner and designers of record intended and that prepares owner staff to operate and maintain its systems and equipment;

(32) “commissioning agent” means an individual who is certified with a recognized standards organization approved by the department to provide commissioning

services, and who works for the school district or as an independent consultant or as the design consultant on behalf of the school district to

(A) coordinate commissioning team of the mechanical, electrical, fuel oil, controls, and building envelope systems;

(B) coordinate between contractor, school district, and commissioning team;

(C) create commissioning plan, checklists, and functional performance tests;

(D) witness the functional performance testing;

(E) assist in resolution of issues found during commissioning; and

(F) coordinate training of owner maintenance personnel on commissioned systems with the contractor;

(33) “construction manager” means a private consultant contracted by the school district during any phase of a construction project to manage the project’s scope, quality, and budget.

DEFINITIONS REFERENCE

Sec. 14.11.135. Definitions.

In this chapter, unless the context requires otherwise,

(1) “approved school construction project” means the plan for a new school or an addition to or major rehabilitation of an existing school to the extent that the plan has been approved by the commissioner under AS 14.07.020(a)(11);

(2) “capital improvement project” or “project” means school construction or major maintenance;

(3) “***costs of school construction***” means the cost of acquiring, constructing, enlarging, repairing, remodeling, equipping, or furnishing of public elementary and secondary schools that are owned or operated by the state, a municipality, or a district and includes the sum total of all costs of financing and carrying out the project; these include the costs of all necessary studies, surveys, plans and specifications, architectural, engineering, or other special services, acquisition of real property, site preparation and development, purchase, construction, reconstruction, and improvement of real property and the acquisition of machinery and equipment that may be necessary in connection with the project; an allocable portion of the administrative and operating expenses of the grantee; the cost of financing the project, including interest on bonds issued to finance the project; and the cost of other items, including indemnity and surety bonds and premiums on insurance, legal fees, fees and expenses of trustees, depositaries, financial advisors, and paying agents for the bonds issued as the issuer considers necessary; . . .

4 AAC 31.900. Definitions As used in this chapter and in AS 14.07, AS 14.08, and AS 14.11, unless the context requires otherwise,

(1) "***addition***" means new space for expanded educational programs or new programs or space that replace substandard or destroyed space, by connection to an existing school facility; the term includes capital equipment;

(2) "capital equipment" means built-in and movable equipment used to furnish a newly constructed or rehabilitated space; it includes first-time purchase of library books, reference material, and media to furnish a new or renovated library; it does not include supply items such as textbooks and expendable commodities; the term is further defined in the Guidelines for School Equipment Purchases, 1997 edition;

. . .

(6) "***new school construction***" means space for educational programs which have not been previously offered, space that replaces a substandard or destroyed school building, or space for an expanded enrollment in the facility, by construction or reconstruction of a detached school facility of any size, with related capital equipment;

(7) "***rehabilitation***" means adapting an existing facility to improve the opportunity to provide a contemporary educational program; and includes major remodeling, repair, renovation, and modernization with related capital equipment;

(8) repealed 12/2/83;

(9) "***education related facility***" means any capital project designed to provide support services for students and for staff, but does not include employee or student housing;

(10) "***facility***" means, for the purpose of state aid under AS 14.11.011 or 14.11.100, the buildings and grounds needed to

(A) house and support the educational program; or

(B) provide a centralized support service which is required to effect an efficient and cost effective operation of the district's education program;

(11) "preventive maintenance program" means the annual activities to be conducted throughout a school district under AS 14.14.090(10);

(12) "maintenance" means an activity conducted on a routine basis to a facility, or a component of a facility, to ensure that the facility remains in operation, and includes the replacement of components with a short physical life and repairing normal wear and tear to the facility;

. . .

(18) "space" means the gross square feet of the floors of a building;

. . .

(21) "***school capital project***" means a school construction or major maintenance project for which state aid is requested or provided when the costs of the construction or maintenance exceed $25,000;

2018 Summary of Changes: 4 AAC 31 Regulations

Prepared by Department of Education and Early Development
Finance & Support Services / Facilities June 6, 2018

Regulation	Summary of Change	Reason for Change
4 AAC 31.013(e)	Reorganize section and refine language to parallel flow of process.	Reorganized language provides more clarity to the timeline of the determination process.
4 AAC 31.013(f)	Provide method for department and a district to waive on-site inspections if district does not seek a compliant PM program.	Current language does not provide the dept. or a district a way to 'opt-out' of the on-site inspection process on the occasion of a district that does not desire to qualify for CIP funding. This will potentially save the department operational costs.
4 AAC 31.013(h) (new)	Add language defining department's current practice of "provisional compliance".	In the past 10 years, the department has issued determinations of "provisional compliance" to districts that have the capacity to meet PM standards but lack documentation of maintaining the program (e.g., being able to provide a full 12 months of reporting data).
4 AAC 31.016(i) (new)	Provide guidance on when to include or exclude attendance area enrollment when housed in leased facilities.	Formalize dept. practice of excluding enrollment of leased-facility schools in attendance areas in determining space eligibility, unless single-site, and include clause for termination of leased space creating unhoused students.
4 AAC 31.020(a)	Update publication titles and editions.	Conform to new dept. publication editions; update publication title formatting.
4 AAC 31.020(d)	Provide department flexibility to reduce or not reduce a project budget at the design development stage.	Current regulation reads to require a budget reduction if enrollment declines during design process; however, fluctuations can cause significant design changes and incur additional design costs. Dept. practice typically holds a project harmless once a grant agreement is signed and design is underway However, there could be circumstances where a later adjustment is appropriate.
4 AAC 31.021(e)	Allow "completed projects" to reuse priority ranking for 5 years after original application.	Enable districts to save costs of re-submitting a new application for projects that were completed and do not have any new information to present.

Regulation	Summary of Change	Reason for Change
4 AAC 31.021(f)	Remove requirement to provide inflation/ escalation to elements of the project that will be completed prior to a grant being issued.	Adding the required escalation to projects with previously completed scope unnecessarily increases ranked project costs, resulting in lapsing balances in appropriations and tying up resources that could be used to fund additional projects.
4 AAC 31.022(b)	Changes primary purpose type "E" projects from school construction to major maintenance.	Conforms to 2010 statute change.
4 AAC 31.023(c)	Specify that application costs are allowable project costs. Define that the 36/120 month limit for reimbursable costs begins with initial application.	More clarity is need for when the "36 months" and "120 months" begin for reimbursable allowable project and land costs in a AS 14.11 grant or reimbursement.
4 AAC 31.023(c)	Add language limiting amount of grant that can be used for district indirect and administrative costs to specified percentage.	Provide more uniformity in treatment of indirect costs, specify that a district may claim either actual personnel and material cost or the identified indirect percentage.
4 AAC 31.026(d)	Changes who appoints a hearing officer for CIP process appeals.	Conforms to 2004 statute change.
4 AAC 31.030(a)	Change statute reference from AS 14.11.020 to more common "grant funded under" AS 14.11.011. Specify that elements of a plan for DEED review must be submitted prior to solicitation of a construction contract.	Conform statute reference to statute providing grant funding. Language reinforces that plan must be provided for dept. review prior to construction contract solicitation, as some projects have been being submitted after contract award.
4 AAC 31.040(a)	Change statute reference from AS 14.11.020 to more common AS 14.11.011. Specify that DEED review and approval must be submitted prior to solicitation of a construction contract, as inferred from timeline requirements in (a)(1)-(3).	Conform statute reference to statute providing grant funding. Language reinforces that project documents must be provided for dept. review prior to construction contract solicitation, as some projects have been being submitted after contract award.
4 AAC 31.060(i)	Change dollar value of reimbursement project costs $200,000.	Conform value to statute. Current $25,000 value is reflective of grant minimum project cost, not debt reimbursement.
4 AAC 31.061(b)(2)	Repeal language related to applications submitted before 1/1/1996.	Removal of non-applicable language.

Regulation	Summary of Change	Reason for Change
4 AAC 31.064	Clarify when remaining bond proceeds can be redirected.	Clarity is needed for when "construction" of a project is considered complete: when design, construction, and equipment contracts are terminated.
4 AAC 31.065(a)	Allow solicitation of contracts for design and construction management consultants by "other appropriate media" including electronic media.	Modern processes can make electronic media/ online solicitations more effective than traditional newspaper outlets. State procurement regulations now allow additional solicitation options.
4 AAC 31.065 (new)	Allow DEED discretion to deny/limit participation in costs of design and construction management for grants and debt reimbursement projects that did not comply with this section	Provide consistency in department treatment of participation in construction and consultant contracts.
4 AAC 31.080(b)	Allow solicitation of construction contracts in local circulation newspaper or "another appropriate media" including electronic media.	Modern processes can make electronic media/ online solicitations more effective than traditional newspaper outlets. State procurement regulations now allow additional solicitation options.
4 AAC 31.080(e)	Allow DEED discretion to deny/limit participation in costs of construction for grants that did not comply with this section; currently DEED may not allow payment for construction contract costs.	Provide consistency between grant and debt programs in dept. discretion to deny construction funding.
4 AAC 31.080(f)	Update publication edition reference.	Conform to new dept. publication edition and update publication title formatting.
4 AAC 31.080(g)	Add "lease" and "donated" to methods a school district may acquire facilities with prior department approval.	Expand methods of school district acquisition of property that require dept. approval; works in conjunction with new subsection (j) to potentially limit AS 14.11 funding for property that was not in the best interest of the state for a district to acquire [note -- most leased facilities are already not eligible for AS 14.11 funding]
4 AAC 31.080(i) (new)	Allow denial or limiting of participation cost of school construction for facilities acquired under specific circumstances.	Provide dept. process for overview of district acquisition of land or facilities in instances where the dept. may be asked to provide financial support for major maintenance or restoration.

Regulation	Summary of Change	Reason for Change
4 AAC 31.085(a)	Provide that responsibilities of a district use permit for a property are terminated with DEED's interest in the property. Specify that a school district is still responsible for liabilities caused by its use of the property.	Specify that the district's one-year post-occupancy maintenance period can end when the dept.'s interest does and that liabilities and responsibilities that were the result of the district's use and management of the property continue beyond the use permit and one-year wind-down period.
4 AAC 31.220	Change date districts shall provide a certificate of insurance to DEED from July 1 to July 15.	Date extension requested by districts and insurance carriers. Certificates not always issued before July 1.
4 AAC 31.900(2)	Update publication edition reference.	Conform to new dept. publication edition and update publication title formatting.
4 AAC 31.900(21)	Change minimum value of "school capital project" to $50,000.	Adjust dollar value in line with inflation to maintain intent of original regulation that projects are "capital" expenses and not "operational". This value is consistent with inflation.

4 AAC 31.013(e) is amended to read:

(e) [ON AN ANNUAL BASIS, THE] **The** department **will make a determination of a district's** [SHALL PROVIDE A PRELIMINARY NOTICE TO EACH DISTRICT REGARDING ITS] compliance with each element required in (a) of this section, based on evidence of a program that was [PREVIOUSLY] provided to **or acquired by** the department, or that was gathered by the department during an on-site visit conducted under (f) of this section. **The department may change a determination at any time during the year based on new evidence. For purposes of eligibility for an application submitted under AS 14.11.011, on** [ON] or before June 1, the department will provide [its] preliminary notice **of its determination**. [THE DEPARTMENT MAY CHANGE A DETERMINATION OF NON-COMPLIANCE AT ANY TIME DURING THE YEAR BASED ON NEW EVIDENCE.] Districts that are not in full compliance must provide evidence of compliance to the department by August 1. On or before August 15, the department will notify districts of its final determination regarding compliance. The department will deny a grant application submitted under AS 14.11.011 by a district that has received a final determination from the department that the district is out of compliance with this section.

4 AAC 31.013(f) is amended to read:

(f) The department shall conduct on-site inspections of school district preventive maintenance and facility management programs at least once every five years**; however, if a school district is not compliant under this section and does not seek a determination of compliance, the department may waive or postpone the inspection**. The department may

make additional inspections as it deems necessary. The department may change its determination of compliance based on information obtained during the on-site inspections.

4 AAC 31.013 is amended by adding a new subsection to read:

(h) Notwithstanding (e) and (f) of this section, the department may make a determination of provisional compliance for a district that provides evidence of a plan that meets all required elements identified in (a) of this section but cannot provide documentation of adherence to that plan. Documentation of adherence is at the discretion of the department and will be applied consistently to all districts. A determination of provisional compliance will allow a district to be eligible for state aid until a final determination of compliance or non-compliance is provided. (Eff. 5/24/2001, Register 158; am 12/19/2002, Register 164; am 12/15/2004, Register 172; am 6/17/2010, Register 194; am __/__/__, Register _____)

Authority: AS 14.07.020 AS 14.11.011 AS 14.11.132
AS 14.07.060

4 AAC 31.016 is amended by adding a new subsection to read:

(i) The enrollment calculated for students in leased space will be excluded from use in calculating eligibility for additional square footage for facilities unless

(A) that enrollment is in an attendance area comprised of a single school, or

(B) the lease is due to terminate within two years and district submits an application for a capital improvement project under AS 14.11 for new school construction to house the student population of the terminating lease space. (Eff. 7/13/2000, Register 155; am 12/19/2002, Register 164; am __/__/__, Register ____)

Authority: AS 14.07.060 AS 14.11.015 AS 14.11.100
AS 14.11.011 AS 14.11.017 AS 14.11.132
AS 14.11.013

4 AAC 31.020(a) is amended to read:

(a) The following are the basic guides for educational facility planning:

(1) for a school capital project application submitted to the department, ***Creating Connections: The CEFPI Guide for Educational Facility Planning*** [CREATING CONNECTIONS: THE CEFPI GUIDE FOR EDUCATIONAL FACILITY PLANNING], 2004 Edition, as published by the Council of Educational Facilities Planners International;

(2) repealed 4/17/98;

(3) repealed 4/17/98;

(4) ***Guidelines for School Equipment Purchases*** [GUIDELINES FOR SCHOOL EQUIPMENT PURCHASES], as published by the Alaska Department of Education and Early Development, **2016 edition** [1997 EDITION];

(5) deleted 8/31/90;

(6) repealed 4/17/98;

(7) ***Swimming Pool Guidelines*** [SWIMMING POOL GUIDELINES], as published by the Alaska Department of Education and Early Development, 1997 edition; and

(8) ***Site Selection Criteria and Evaluation Handbook*** [SITE SELECTION CRITERIA AND EVALUATION GUIDELINE], as published by the Alaska Department of Education and Early Development, **2011 edition** [1997 EDITION].

4 AAC 31.020(d) is amended to read:

(d) The department shall reduce a project budget in proportion to the amount that the project's design exceeds the square feet allowable as determined under (c) of this section. This subsection applies to a project that has not received a grant **or other financial assistance** under AS 14.11 **and**[,] a project that has received money from the department for planning **or construction under 4 AAC 31.023(c).** [, AND] **Notwithstanding, the department may proportionally reduce a project budget of** a project that has not secured the approval of the commissioner under 4 AAC 31.040. This subsection does not apply to a project that has secured the approval of the commissioner under 4 AAC 31.040.

(Eff. 3/1/78, Register 65; am 6/9/83, Register 86; am 12/2/83, Register 88; am 8/31/90, Register 115; am 10/7/95, Register 136; am 4/17/98, Register 146; am 2/18/99, Register 149; am 7/13/2000, Register 155; am 8/23/2001, Register 159; am 12/20/2002, Register 164; am 6/17/2010, Register 194; am __/__/__, Register ____)

Authority: AS 14.07.020 AS 14.11.011 AS 14.11.100
AS 14.07.060 AS 14.11.020 AS 14.11.132

4 AAC 31.021(e) is repealed and reenacted to read:

(e) Using the criteria set out in 4 AAC 31.022(b), the department will score each application and use the score to assign a priority ranking to the projects approved for eligibility.

(1) A school district may use the original application and its score for one year after application was filed if, for a school capital project identified in the district's six-year capital improvement plan,

(A) the school district specifies, in a letter accompanying the six-year plan, which, if any, of the project applications it wants the department to consider beyond the initial application period;

(B) the chief school administrator certifies in writing that the district's eligibility for any additional square footage associated with the project has not decreased; and

(C) for a facility or facilities that are a school capital project,

(i) the physical condition of the facility has not deteriorated so as to increase the project's cost to exceed the amount determined by application of the inflation factor under (f) of this section; and

(ii) health and life safety conditions and code conditions have not changed so as to affect the project's score under 4 AAC 31.022(b).

(2) A school district may use the original application and its score for five years after the application was filed if, for a school capital project identified in the district's six-year capital improvement plan,

(A) the school district specifies, in a letter accompanying the six-year plan, which, if any, of the project applications it wants the department to consider beyond the identified initial application period;

(B) the chief school administrator certifies in writing that the district's eligibility for any additional square footage associated with the project has not decreased;

(C) the project construction is substantially complete; and

(D) the school district agrees that no inflation factor, as determined under (f) of this section, will be added.

4 AAC 31.021(f) is amended to read:

(f) If, under (e)(1) of this section, a district requests use of its previous year's application during the second year after application was filed, the department will add an inflation factor based on an industry accepted method **to costs anticipated to occur after the award of the grant**.

(Eff. 8/31/90, Register 115; am 8/12/93, Register 127; am 3/10/96, Register 137; am 4/17/98, Register 146; am 7/13/2000, Register 155; am 12/19/2002, Register 164; am 6/17/2010, Register 194; am __/__/__, Register ____)

Authority: AS 14.07.060 AS 14.11.011 AS 14.11.132
AS 14.11.008 AS 14.11.013

4 AAC 31.022(b) is amended to read:

(b) When reviewing the six-year capital improvement plans and the grant applications submitted by school districts, department staff shall separately rank projects in the following classifications in the first year of the plan, in descending order of priority, as serves the state's best interests, where:

(1) school construction projects are those projects the primary purpose of which is to accomplish work under the categories established in **AS 14.11.013(a)(1)(A), (B), (F), and (G)** [AS 14.11.013(a)(1)(A), (a)(1)(B), AND (a)(1)(E) - (a)(1)(G)]; and

(2) major maintenance projects are those projects the primary purpose of which is to accomplish work under the categories established in **AS 14.11.013(a)(1)(C)-(E)** [AS 14.11.013(a)(1)(C) AND (D)], except that a major maintenance project may not include additional or replacement square footage.

4 AAC 31.023(c) is amended to read:

(c) The department will, before the disbursement of grant or allocations of other financial assistance money to a school district, require the execution of a grant or other financial assistance agreement, on a form prescribed by the commissioner, that contains the following conditions:

(1) the project will be constructed and equipped under the requirements of 4 AAC 31.020(a), within the project budget determined under 4 AAC 31.022(e);

(2) money will be disbursed as the parties agree to allow the accomplishment of stages in the project, such as site acquisition; design and construction; and to reimburse the district for money actually and necessarily spent, before the award of the grant or allocation of other financial assistance,

(A) for **application costs,** planning costs, design costs, and construction costs incurred not more than 36 months before the **initial** submission of the grant **or other financial assistance** application **with a substantially identical scope**; and

(B) site acquisition costs incurred not more than 120 months before the **initial** grant or other financial assistance application **with a substantially identical scope** for which the department has given its approval under 4 AAC 31.025;

(3) the district's performance under the grant or other financial assistance is subject to financial audit at any time; the cost of an audit required by the state is an allowable cost of school construction;

(4) the site for the school facility is approved under 4 AAC 31.025;

(5) designers of the facility shall be selected under 4 AAC 31.065; and

(6) construction shall be performed by contracts awarded under 4 AAC 31.080.

4 AAC 31.023(c) is amended to read:

(c) The department will, before the disbursement of grant or allocations of other financial assistance money to a school district, require the execution of a grant or other financial assistance agreement, on a form prescribed by the commissioner, that contains the following conditions:

(1) the project will be constructed and equipped under the requirements of 4 AAC 31.020(a), within the project budget determined under 4 AAC 31.022(e);

(2) money will be disbursed as the parties agree to allow the accomplishment of stages in the project, such as site acquisition; design and construction; and to reimburse the district for money actually and necessarily spent, before the award of the grant or allocation of other financial assistance,

(A) for planning costs, design costs, and construction costs incurred not more than 36 months before the submission of the grant application; and

(B) site acquisition costs incurred not more than 120 months before the grant or other financial assistance application for which the department has given its approval under 4 AAC 31.025;

(3) the district's performance under the grant or other financial assistance is subject to financial audit at any time; the cost of an audit required by the state is an allowable cost of school construction;

(4) the site for the school facility is approved under 4 AAC 31.025;

(5) designers of the facility shall be selected under 4 AAC 31.065; [AND]

(6) construction shall be performed by contracts awarded under 4 AAC 31.080**; and**

(7) without providing a detailed accounting of personnel and other costs, district indirect and administrative costs may not exceed

(A) three percent of construction costs if the amount is $500,000 or less;

(B) two percent of construction costs if the amount is over $500,000 but less than $5,000,000;

(C) one percent of construction costs if the amount is over $5,000,000 but less than $10,000,000; and

(D) one half of a percent of construction costs if the amount is $10,000,000 or more.

(Eff. 8/31/90, Register 115; am 8/12/93, Register 127; am 4/17/98, Register 146; am 2/18/99, Register 149; am __/__/__, Register ____)

Authority: AS 14.11.013 AS 14.11.017 AS 14.11.132

AS 14.11.015 AS 14.11.100

4 AAC 31.026(d) is amended to read:

(d) Within 10 working days after the filing of an appeal under (c) of this section, the **chief administrative law judge of the office of administrative hearings** [COMMISSIONER] shall appoint a hearing officer to hear the case. The hearing officer shall consider the issues raised in the appeal on the basis of

(1) the school district's updated capital improvement plan submitted under 4 AAC 31.011;

(2) the grant application, and supporting documentation submitted by the school district under 4 AAC 31.020(c);

(3) the comments received at the public hearing conducted under (a) of this section;

(4) the decision rendered by the department on the request for reconsideration under (b) of this section; and

(5) the appeal filed by the school district under (c) of this section.

(Eff. 8/31/90, Register 115; am 8/12/93, Register 127; am 4/17/98, Register 146; am __/__/__, Register ____)

Authority: AS 14.11.013 **AS 14.11.016** AS 14.11.132
AS 14.11.015

4 AAC 31.030(a) is amended to read:

(a) A school district shall submit the elements of a plan for new construction, additions, demolitions, and rehabilitations to be undertaken by the school district that are to be funded under **AS 14.11.011** [AS 14.11.020] or for which reimbursement is to be sought under

AS 14.11.100. The elements of the plan must be submitted to the commissioner for the commissioner's review and approval as the elements are developed and before any **construction contract solicitation or** construction activity is initiated.

(Eff. 3/1/78, Register 65; am 12/2/83, Register 88; am 10/7/95, Register 136; am 4/17/98, Register 146; am __/__/__, Register ____)

Authority: AS 14.07.020 AS 14.11.011 AS 14.11.020
AS 14.07.060 AS 14.11.013 AS 14.11.100

4 AAC 31.040(a) is amended:

(a) Before commencing **construction contract solicitation or** construction activity under **AS 14.11.011** [AS 14.11.020] or **construction contract solicitation or** construction activity for which reimbursement will be sought under AS 14.11.100, a school district or a regional school board shall secure the approval of the commissioner of the documents for the project as follows:

(1) the school district or regional school board shall submit to the commissioner 95 percent construction documents at least 20 work days before a bid invitation is made;

(2) if construction contract bids are to be invited for the project, the school district or regional school board shall submit the construction bid documents, excluding the construction plans and specifications if the 95 percent construction documents submitted under (1) of this subsection were stamped and signed by the professionals in responsible charge, to the commissioner at least five work days before the bid invitation is made;

(3) if the project will not be advertised for bids, the school district or regional school board shall submit the final stamped and signed construction documents to the commissioner no later than 15 work days before commencing each construction phase; and

(4) a municipality or a school district may request, in writing, a waiver to the construction document approval process set out in (1) - (3) of this subsection for a project based on the ability of the municipality or school district to provide a thorough and complete independent review.

(Eff. 3/1/78, Register 65; am 12/2/83, Register 88; am 4/17/98, Register 146; am __/__/__, Register ____)

Authority: AS 14.07.020 **AS 14.11.011** AS 14.11.100
AS 14.07.060 AS 14.11.020

4 AAC 31.060(i) is amended to read:

(i) Reimbursement for rehabilitation costs under AS 14.11.100 is limited to projects exceeding **$200,000** [$25,000].

(Eff. 3/1/78, Register 65; am 2/24/83, Register 85; am 12/2/83, Register 88; am 9/12/85, Register 96; am 2/8/86, Register 97; am 5/30/90, Register 114; am 4/17/98, Register 146; am 7/13/2000, Register 155; am 6/17/2010, Register 194; am __/__/__, Register ____)

Authority: AS 14.07.020 AS 14.11.020 AS 14.11.102
AS 14.07.060 AS 14.11.100 AS 14.11.132
AS 14.11.011

4 AAC 31.061(b)(2) is repealed:

(2) repealed ___/___/____; [FOR A CAPITAL IMPROVEMENT PROJECT GRANT APPLICATION SUBMITTED TO THE DEPARTMENT BEFORE JANUARY 1, 1996, NONASSIGNABLE SPACE MAY NOT EXCEED 25 PERCENT OF THE TOTAL

SPACE, EXCEPT THAT THE DEPARTMENT WILL, IN ITS DISCRETION, GRANT A VARIANCE OF UP TO 35 PERCENT OF TOTAL SPACE IN SMALL SCHOOLS IN REMOTE AREAS IF IT CAN BE DEMONSTRATED THAT THE VARIANCE IS IN THE BEST INTEREST OF THE STATE AND THE DISTRICT; AND]

(Eff. 9/12/85, Register 96; am 2/8/86, Register 97; am 5/30/90, Register 114; am 9/29/90, Register 115; am 10/7/95, Register 136; am 4/17/98, Register 146; am __/__/__, Register ____)

Authority: AS 14.07.020 AS 14.11.020 AS 14.11.102
AS 14.07.060 AS 14.11.100 AS 14.11.103

4 AAC 31.064 is amended to read:

If a municipality has bond proceeds remaining after **termination of all design, construction, and equipment contracts for** [THE CONSTRUCTION OF] a project approved by the department for debt retirement under 4 AAC 31.060 and by local voters under AS 14.11.100(j), and the municipality seeks to construct a project different from the one approved by the department, the municipality may only receive reimbursement for the project if the new project is approved by the department and

(1) the bond proposition originally approved by the local voters authorized the use of any excess money for school capital projects such as the new project; or

(2) the municipality meets the requirements of AS 14.11.100(j), including the requirement for a municipal election to approve the new use of the money.

(Eff. 5/30/90, Register 114; am __/__/__, Register ____)

Authority: AS 14.07.060 AS 14.11.100 AS 14.11.132

4 AAC 31.065(a) is amended to read:

(a) If a school district determines that it is necessary to engage the services of a private consultant to design or provide construction management for an educational facility with money provided under AS 14.11.011 - AS 14.11.020, or for a project approved for reimbursement of costs under AS 14.11.100, and the estimated cost of the contract is more than $50,000, **the contract shall be awarded to the most qualified offeror after evaluating proposals submitted in response to a solicitation of** [THE SELECTION OF THE CONSULTANT SHALL BE ACCOMPLISHED BY SOLICITING] written proposals **that were advertised at least 21 days before the proposals are due by providing notice by one or more of the following methods:**

(1) publication [BY ADVERTISING] in a newspaper of general circulation**; or** [AT LEAST 21 DAYS BEFORE THE PROPOSALS ARE DUE.]

(2) communication in another appropriate media, including postings in electronic media, and, if practicable, in a way calculated to reach prospective consultants located in the state.

[THE CONTRACT SHALL BE AWARDED TO THE MOST QUALIFIED OFFEROR, AFTER EVALUATING THE PROPOSALS SUBMITTED.]

4 AAC 31.065 is amended by adding a new subsection to read:

(d) The department may deny or limit its participation in the costs of design or construction management for a project eligible for grant funding under AS 14.11.011 or for reimbursement under AS 14.11.100 if the school district does not comply with the requirements of this section.

(Eff. 12/2/83, Register 88; am 8/31/90, Register 115; am __/__/__, Register ____)

Authority: AS 14.11.017 AS 14.11.020 AS 14.11.132

4 AAC 31.080(b) is amended to read:

(b) The school district shall provide notice of its solicitation **at least 21 days** [BY ADVERTISEMENT IN A NEWSPAPER OF GENERAL CIRCULATION IN THIS STATE AT LEAST THREE TIMES] before the opening of the offers. [THE FIRST PRINTING OF THE ADVERTISEMENT MUST OCCUR AT LEAST 21 DAYS BEFORE OPENING THE OFFERS.] The department may approve a solicitation period shorter than 21 days when written justification submitted by the school district demonstrates that a shorter solicitation period is advantageous for a particular offer and will result in an adequate number of responses. **In addition to one of the following methods, a** [A] school district may provide [ADDITIONAL] notice by mailing its solicitation to contractors on any list it maintains, and any other means reasonably calculated to provide notice to prospective offerors. **The school district shall provide notice of its solicitation by one or more of the following methods:**

(1) publication at least three times in a newspaper of general circulation in this state; or

(2) communication in another appropriate media, including postings in electronic media, and, if practicable, in a way calculated to reach prospective consultants located in the state.

4 AAC 31.080(e) is amended to read:

(e) The department may deny or limit its participation in the costs of construction for a project eligible **for grant funding under AS 14.11.011 or** for reimbursement under AS 14.11.100 if the school district does not comply with the requirements of this section. [A SCHOOL DISTRICT THAT ENTERS INTO A CONSTRUCTION CONTRACT FOR A PROJECT AUTHORIZED FOR CONSTRUCTION UNDER AS 14.11.020 THAT WAS AWARDED WITHOUT COMPETITIVE SELECTION UNDER THIS SECTION MAY NOT RECEIVE MONEY UNDER ITS PROJECT AGREEMENT FOR THE CONSTRUCTION PHASE OF THE PROJECT.]

4 AAC 31.080(f) is amended to read:

(f) Nothing in this section precludes a school district from using an alternative construction delivery method as defined and described in the ***Project Delivery Method Handbook*** [PROJECT DELIVERY METHOD HANDBOOK], **2017 edition** [NOVEMBER, 2004], adopted by reference, if the department approves the method in advance of any solicitation, the proposed method is in the state's best interest, and the school district concurs in any directives the department makes concerning the type of selection and award of the contract. The department may deny or suspend use of an alternative construction delivery method by a school district if the department concludes, based on substantial evidence, that use or repeated use of a delivery method by the school district has resulted or will result in limited competition or higher costs.

4 AAC 31.080(g) is amended to read:

(g) A school district may, with prior approval by the department, **enter into a lease or**

purchase **agreement for, or accept a donation of,** an existing facility **or land** for use as an education-related facility if

(1) a cost saving over new construction is achieved;

(2) the purchase **or lease** price is arrived at through impartial negotiation and is supported by a real estate appraisal that meets accepted standards; and

(3) the purchase**, lease, or donation** is in the best interests of the state and the school district.

4 AAC 31.080 is amended by adding a new subsection to read:

(i) The department may deny or limit its participation in the costs of school construction for real property acquired by a school district through purchase, lease, or donation that was not approved under (g) of this section.

(Eff. 12/2/83, Register 88; am 8/31/90, Register 115; am 4/17/98, Register 146; am 11/20/2005, Register 176; am __/__/___, Register: ___)

Authority: AS 14.07.060 AS 14.11.020 AS 14.11.132

4 AAC 31.085(a) is amended to read:

(a) The department may dispose of state-owned school buildings and other facilities under this section if it determines that the buildings or facilities are no longer needed to provide the educational program in the community in which they are located. The determination will be made in writing after consultation with the regional educational attendance area (REAA) in which the property is located, and the reasons for the determination will be documented. The department will not make a determination under this section unless the regional school board that

was given a use permit under 4 AAC 31.090 for the property provides, in support of the determination, a resolution requesting termination of the use permit and declaring that the property, both land and buildings, is no longer needed for the purpose of providing education services. In addition, the regional school board must give notice of its excess property on a form provided by the department, and must agree that the conditions and responsibilities contained under 4 AAC 31.090 in the use permit will remain valid for a one-year period after the date of the notice or the date of last occupancy, whichever is later, **or termination of the department's interest in the property,** unless the department, in writing, relieves the regional school board of responsibility in whole or in part. **Nothing in the section relieves a regional school board of its ongoing responsibilities or liabilities arising out of its use or operation of the property.**

(Eff. 10/4/90, Register 115; am 4/17/98, Register 146; am 12/19/2002, Register 164; am 6/17/2010, Register 194; am __/__/___, Register: ___)

Authority: AS 14.07.030 AS 14.07.060

4 AAC 31.220 is amended to read:

Except for a district that has an authorized self-insurance program under 4 AAC 31.205, each school district shall provide to the department a certificate of insurance, by **July 15** [JULY 1] of each year, that provides notice of the per occurrence and aggregate limits of coverage, and shall provide for 45 days' notice to the department of cancellation, termination, or any material change in policy conditions.

(Eff. 8/31/90, Register 115; am __/__/___, Register: ___)

Authority: AS 14.03.150 AS 14.07.060

4 AAC 31.900(2) is amended to read:

(2) "capital equipment" means built-in and movable equipment used to furnish a newly constructed or rehabilitated space; it includes first-time purchase of library books, reference material, and media to furnish a new or renovated library; it does not include supply items such as textbooks and expendable commodities; the term is further defined in the ***Guidelines for School Equipment Purchases*** [GUIDELINES FOR SCHOOL EQUIPMENT PURCHASES], **2016 edition** [1997 EDITION];

4 AAC 31.900(21) is amended to read:

(21) "school capital project" means a school construction or major maintenance project for which state aid is requested or provided when the costs of the construction or maintenance exceed **$50,000** [$25,000];

(Eff. 3/1/78, Register 65; am 6/9/83, Register 86; am 12/2/83, Register 88; am 9/12/85, Register 96; am 8/31/90, Register 115; am 9/29/90, Register 115; am 10/7/95, Register 136; am 4/17/98, Register 146; am 2/18/99, Register 149; am 7/13/2000, Register 155; am 8/23/2001, Register 159; am 12/19/2002, Register 164; am 12/20/2002, Register 164; am 6/17/2010, Register 194; am __/__/___, Register: ___)

Authority: AS 14.07.020 AS 14.11.020 AS 14.11.102
AS 14.07.060 AS 14.11.100 AS 14.11.132
AS 14.11.011

Alaska School Facilities Preventive Maintenance & Facility Management Handbook

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ACKNOWLEDGEMENTS

Thanks to the Bond Reimbursement and Grant Review Committee members and to school facility personnel across the state who reviewed this publication in its earlier editions and responded to the Department of Education & Early Development with comments for this 3rd Edition.

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Background

The primary focus of the original (1997) and second edition (1999) of the *Alaska School Facilities Preventive Maintenance Handbook* was to present school districts with a basic outline on how to develop and implement a preventive maintenance program. At that point in history, the Department of Education and Early Development realized that many of the school facilities built following the oil boom of the late 1970s were in poor condition and several were already in dire need of major repairs a mere couple decades after original commissioning. In some cases, it was found that the operational systems for many of these schools were having their life-expectancy curtailed mainly because of maintenance staffing levels, training, and management practices. Even though preventive maintenance was present in some of our school districts, other school districts appeared to be unaware of its existence, or simply did not know how to go about managing their schools with adequate maintenance in a manner which would benefit each school while keeping operational and maintenance costs under control.

As a proposal to address these issues, and as a means to better streamline accountability and efforts in all school districts across the state, state officials focused their attention to ensure school districts had at least minimum standards for preventive maintenance and facility management program. In 1998, new legislation~~s~~ was passed and in 2000 regulations were promulgated to implement minimum criteria for maintenance and facility management if school districts wished to remain eligible for state-aid for school capital projects.

The prime objective of these new standards was to empower school districts to develop functioning preventive maintenance and facility care programs; as a reward for their efforts and demonstrated achievements, the department would then enable eligible school districts to apply for future grants.

This narrative summarizes the birth of the preventive maintenance program and the main factors which came about to justify its existence. It was imperative that the department and districts collaborate to ~~move~~ moving all districts beyond a point of ~~being stuck in a world of~~ perpetual "breakdown maintenance" ~~where nothing is done until the equipment breaks down~~and capital expenditure to integrated, sustainable, best-practice facility care and management. This type of maintenance and facility management is ~~detrimental~~ beneficial to the taxpayer, to maintenance personnel, and to the students and staff in our schools.

Statutory Authority

Alaska Statutes (AS):

- Assign responsibility for preventive maintenance, custodial services and routine maintenance (AS 14.14.090, AS 14.08.111, AS 14.14.060)

  AS 14.14.090. In addition to other duties, a school board shall . . .
  (10) provide for the development and implementation of a preventive maintenance program for school facilities . . .

  AS 14.08.111. A regional school board shall . . .
  (8) provide custodial services and routine maintenance of school buildings and facilities;

  AS 14.14.060
  (f) The borough school board shall provide custodial services and routine maintenance for school buildings and shall appoint, compensate and otherwise control personnel for these purposes. The borough assembly through the borough administrator, shall provide for all major rehabilitation, all construction and major repair of school buildings. The recommendations of the school board shall be considered in carrying out the provisions of this section.

- Define preventive maintenance (AS 14.14.090); and,

  AS 14.14.090
  (10) . . . in this paragraph, "preventive maintenance" means scheduled maintenance actions that prevent the premature failure or extend the useful life of a facility, or a facility's systems and components, and that are cost-effective on a life-cycle basis.

- Establish the requirements of a preventive maintenance plan (AS 14.11.011, AS 14.11.100).

  AS 14.11.011
  (b) For a municipality that is a school district or a regional educational attendance area to be eligible for a grant under this chapter, the district shall submit . . .
  (4) evidence acceptable to the department that the district
  (A) has a preventive maintenance plan that
  (i) includes a computerized maintenance management program, cardex system, or other formal systematic means of tracking the timing and costs associated with planned and completed maintenance activities, including scheduled preventive maintenance;
  (ii) addresses energy management for buildings owned or operated by the district;
  (iii) includes a regular custodial care program for buildings owned or operated by the district;
  (iv) includes preventive maintenance training for facility managers and maintenance employees;

Statutory Authority

(v) includes renewal and replacement schedules for electrical, mechanical, structural, and other components of facilities owned or operated by the district; and

(B) is adequately adhering to the preventive maintenance plan.

AS 14.11.100

(j) Except as provided in (l) of this section, the state may not allocate money to a municipality for a school construction project under (a)(5), (6), or (7) of this section unless the municipality complies with the requirements of (1) - (5) of this subsection . . . . In approving a project under this subsection, and to the extent required under (a)(8) - (17) of this section, the commissioner shall require . . .

(5) evidence acceptable to the department that the district

(A) has a preventive maintenance plan that

(i) includes a computerized maintenance management program, cardex system, or other formal systematic means of tracking the timing and costs associated with planned and completed maintenance activities, including scheduled preventive maintenance;

(ii) addresses energy management for buildings owned or operated by the district;

(iii) includes a regular custodial care program for buildings owned or operated by the district;

(iv) includes preventive maintenance training for facility managers and maintenance employees; and

(v) includes renewal and replacement schedules for electrical, mechanical, structural, and other components of facilities owned or operated by the district; and

(B) is adequately following the preventive maintenance plan.

Read in their entirety, these statutes establish that preventive maintenance of Alaska schools is solely the responsibility of school districts and that funding for such must be included within the district's operating budget. Some school districts share the duties of maintenance with another agency within the city or borough. The statutes in no way prohibit school districts from acting in conjunction with these associated agencies to effect all or a part of their maintenance program. However, doing so does not relieve the school board of its obligations in the areas of preventive maintenance.

Also, based on this statutory authority, the department's capital improvement project (CIP) application does not allow capital funding for the accomplishment of preventive maintenance ~~nor for projects caused by lack of it~~. A district requesting capital funding ~~from either the~~for both school construction ~~fund or~~and major maintenance ~~fund~~ projects must provide "evidence that the proposed project should be a capital improvement project and not part of a preventive maintenance program, or regular custodial care program." (AS 14.11.011(b)(3))

Regulatory Requirements

Alaska Administrative Code (AAC):

- Provides direction in regulation for development of a school district Preventive Maintenance and Facility Management program and for periodic review by the department that districts are adhering to the plan.

4 AAC 31.013. Preventive maintenance and facility management

(a) For a district to be eligible for state aid under AS 14.11.011 , the district must have a facility management program that addresses the following five elements of facility and maintenance management:

(1) a formal maintenance management program that records maintenance activities on a work order basis, and tracks the timing and cost, including labor and materials, of maintenance activities in sufficient detail to produce reports of planned and completed work;

(2) an energy management plan that includes recording energy consumption for all utilities on a monthly basis for each building; for facilities constructed before 12/15/2004, a district my record energy consumption for utilities on a monthly basis when multiple buildings are served by one utility plant;

(3) a custodial program that includes a schedule of custodial activities for each building based on type of work and scope of effort;

(4) a maintenance training program that specifies training for custodial and maintenance staff and records training received by each person; and

(5) a renewal and replacement schedule that, for each school facility of permanent construction over 1,000 gross square feet, identifies the construction cost of major building systems, including electrical, mechanical, structural and other components; evaluates and establishes the life-expectancy of those systems; compares life-expectancy to the age and condition of the systems; and uses the data to forecast a renewal and replacement year and cost for each system.

(b) Repealed 12/15/2004.

(c) At the request of a chief school administrator, the department will assist a district in implementing a qualifying preventive maintenance program through consultation, on-site reviews, and training.

(d) Repealed 12/15/2004.

(e) On an annual basis, the department shall provide a preliminary notice to each district regarding its compliance with each element required in (a) of this section, based on evidence of a program that was previously provided to the department, or that was gathered by the department during an on-site visit conducted under (f) of this section. On or before June 1, the department will provide its preliminary notice. The department may change a determination of non-compliance at any time during the year based on new evidence. Districts that are not in full compliance must provide evidence of compliance to the department by August 1. On or before August 15, the department will notify districts of its final determination regarding compliance. The department will deny a grant

application submitted under AS 14.11.011 by a district that has received a final determination from the department that the district is out of compliance with this section.

(f) The department shall conduct on-site inspections of school district preventive maintenance and facility management programs at least once every five years. The department may make additional inspections as it deems necessary. The department may change its determination of compliance based on information obtained during the on-site inspections.

(g) In this section

(1) "district" has the meaning given in AS 14.11.135 ;

(2) "maintenance activities" means all work performed by district staff or contractors on building systems, components, utilities, and site improvements.

Facility Management Overview

Facility Management as a Strategy

Overview

The preceding Background section summarizes the genesis of department-generated preventive maintenance guidance and the following legislation-driven expansion of that narrow facilities care element into a more comprehensive maintenance and facility management requirement. Over the past fifteen years, nearly 100% of Alaska's school districts have achieved compliance in meeting minimum standards. Every school district, with a single exception, has at some point between 2001 and 2016, met the state's minimum standards for maintenance and facility management of school facilities. In August 2002, only six districts met minimum standards. By August 2003, the number was 22. It peaked at 52 school districts in 2008. Disturbingly, since the peak in 2008, and through 2017, two school districts lost certification (and regained it) and an additional 12 school districts have experienced a year or more of provisional compliance where minimum standards are achieved but for which there is not at least 12 months of data demonstrating adherence to the standard. In each of these 14 lapses, it was clear that the measured maintenance, operations, and capital planning areas were not sufficiently integrated into a facility management program so as to remain sustainable through personnel changes or economic shifts in the school district. On a brighter note, some of Alaska's school districts have exceeded the minimum requirements and are operating closer to the forefront of facilities management. Practices and processes such as predictive maintenance to forecast equipment failure, equipment upgrades based on lower life-cycle costs, and managing demand for space are beginning to appear in the department's assessment visits. The Department believes these kinds of results are achievable in every school district, at every level of resource ~~available~~ availability, through integration and ~~local~~ district-level ownership.

Purpose

The purpose for this document is three-fold:

1. To expand department guidance to reflect the full breadth of maintenance and facility management addressed in statute and regulation,
2. To foster greater consistency and sustainability in meeting department requirements by focusing on the integration of operations, maintenance, and capital planning under a Facility Management paradigm, and
3. To offer best-practice insights and meaningful tools to help create facility management programs that exceed minimum requirements.

The structure of this document supports these purposes by addressing each of the five components of maintenance and facility management in three areas: developing, implementing, and sustaining. In addition, where general facility management topics cross one or more of the five mandatory components, these topics are addressed in this Overview section rather than repeatedly in each category. Other pertinent topics and best practices are combined in a section of the publication entitled Additional Considerations. Finally, specific tools and resources are provided as appendices following the narrative documentation.

Facility Management Overview

With limited availability of capital funding, and community pressure on local funding for public works, it is vitally important for school districts to fully integrate overall facility management into district operations. Facility management is not just a matter of fixing things when they break; it is a comprehensive program of ~~fixing~~ operating, maintaining, repairing, and replacing components and systems for optimal results. Such a process addresses facility issues before they have a chance to create a crisis or emergency in a school district facility. With a comprehensive facility management program, a school district has tools that will extend the effectiveness of each maintenance and operations dollar so that the maximum amount of funding is made available for the students in the classroom. ~~Tools~~ Processes for implementing a comprehensive facility management program are heavily dependent on actionable data and include:

- tracking tools such as work-orders,
- planning tools such as reports, and
- other tools such as active inventory control for custodial and classroom supplies.

Facility Management Integration

Whole-building preventive maintenance was the threshold step for Alaska's school districts on the path toward life-cycle, cradle-to-grave, sustainable facility management. That was soon followed with requirements that covered operations (custodial, energy management), maintenance (maintenance management, maintenance training), and construction (capital planning). While each of these functional areas can be built up and managed independently, it is their integration that is most likely to ensure sustainability. In the effort to achieve the most value for the facility dollar contributed from all sources—local, state, and federal—operations, maintenance, and construction programs need to be coordinated though an effective facility management program. They all work hand in hand to extend the life of existing facilities. State law provides the basic building blocks for school districts to get the most out of their facilities. Some school districts have exceeded the minimum requirements and are functioning at the forefront of facilities management, integrating processes, practices, and data between functional areas. They are sustaining momentum by using strategic and tactical measures to extend the service life, lower life-cycle costs, and lower occupancy costs.

Building Systems and Components Inventory

Introduction

An accurate inventory of the systems and components in a facility is core knowledge for facility management. The school district's maintenance management program, custodial program, and capital planning program all depend on this essential data. Energy management programs and maintenance training programs also draw from this information.

Facility Audits and Annual Inspections

Introduction

The implementation phase of both maintenance management and capital planning should establish the practice of regular assessments of facility conditions as part of their programs. Integrating condition data between these two elements of facility management will also assist

school districts in sustaining these two programs long-term. One practical integration is making the measurement of performance indicators in each area dependent on data gathered and updated under the other program.

Facilities Budgeting and Funding

Introduction

Budgeting and funding for school facilities includes all elements of facility management—operations, maintenance, and construction. The interface between maintenance management, custodial programs, energy management, and capital planning (renewal) is especially important when considering the costs associated with school facilities.

Data for Informed Decision Making

Introduction

"Timely access to relevant facilities data is essential to both effective management of school facilities by district officials and appropriate oversight of public investments by a community. Providing the needed information to the public and other decision makers involves:

- the development or maintenance of a facilities information system capable of collecting, organizing, storing, analyzing, and reporting relevant, timely, comparable, and accurate facilities data (chapter 2);
- the meaningful analysis of available data, including the use of appropriate indicators, indices, measures, and benchmarks (chapter 3);
- the collection and frequent updating of a host of clearly defined, comparable data elements that describe school facilities and their funding, operations, maintenance, and use (chapter 4);
- the maintenance of data definitions, data standards, quality controls, and operational protocols affecting the collection, analysis, and use of data;[1]
- the presentation of those data into formats that are reasonably usable by the various stakeholder audiences;[2] and
- timely access to the data in printed public reports or via public websites.[3]

School districts and states throughout the country continue to increase their use of facilities data to inform decision making: to manage day-to-day operations, maintenance, and repairs, as well as short-term operational planning, long-term capital planning, and master facilities planning. High-quality facilities data are used to create efficiencies, save money, preserve

[1] For more information about ensuring data quality and appropriate data use, see the *Forum Guide to Building a Culture of Quality Data: A School and District Resource* (https://nces.ed.gov/forum/pub_2005801.asp) and the *Forum Guide to Taking Action with Education Data* (https://nces.ed.gov/forum/pub_2013801.asp).

[2] For more information about data presentation, see the *Forum Guide to Data Visualization: A Resource for Education Agencies* (https://nces.ed.gov/forum/pub_2017016.asp).

[3] For more information about improving access to education websites, see the *Forum Guide to Ensuring Access to Education Websites* (https://nces.ed.gov/forum/pub_2013801.asp).

the life of capital resources, and help decision makers become more transparent and accountable to education stakeholders." [2]

[KPIs and metrics here]

Commissioning: A Special Type of Facility Audit

Introduction

Smart buildings are complex buildings. Many of the leading-edge practices in facility management are dependent on the technology of automated systems. Predictive maintenance is often based on digital sensor technology. Energy management depends on sensors, measurements, and electronically controlled mechanical and electrical equipment. Building complexity takes maintenance training requirements to new levels. In response to building complexity, commissioning has evolved from a subtask of other professions and trades to a position of prominence—many would argue its own discipline.

Initial Commissioning

Initial commissioning occurs as part of the construction project close-out and the handover of an education facility to the owner—be that the city/borough or the school district. "Commissioning ensures that the new building operates as the owner intended and that building staff are prepared to operate and maintain its systems and equipment." [3] The scope of work included in commissioning, along with the entities involved, is a matter of contractual agreement and can vary from project to project. A key feature of any commissioning agreement should be the involvement of those who will be operating and maintaining the facility.

The department recognizes the need for commissioning within the following building systems: mechanical, electrical, bulk fuel, and building envelope. Much of the commissioning effort will be to optimize the inter-relation of components within these systems but there will also be cross-system coordination which is needed such as when occupancy sensors might control both lighting and ventilation systems. Because of this cross-discipline need, utilizing a certified commissioning agents is often appropriate on complex facilities.

Retro Commissioning

~~X~~Retro commissioning, also known as existing building commissioning (EBCx) can generally be expected to yield a positive payback after approximately five years of building operations. It may also be appropriate to conduct retro commissioning at any time on a building which never received initial commissioning. Most energy service companies (ESCOs) make it a practice to include a retro commissioning piece in their energy savings performance contracts. The basis for this is the relatively safe assumption that most, if not all, existing buildings are not performing optimally with respect to their energy performance.

During the portions of the building life-cycle that follow project delivery—i.e., operations, capital asset management—buildings, and building uses, change. Equipment is added, school populations grow and shrink, and space utilization is altered. These, and other changes can render previous systems and settings ineffective. For good cause, and often for inappropriate reasons, building control systems are bypassed or overridden by maintenance personnel. Reasons

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for temporary overrides can be forgotten resulting in systems operating outside of the original parameters. Retro commissioning, done well, can account for these building changes and can recalibrate building performance.

Example/Vignette

Initial Commissioning: The Lower Kuskokwim School District has completed several state-of-the-art new schools and renovation/additions since 2005 and has several more in the pipeline. On the XXX School project, the district . . . .

Lessons learned include:

Retro Comissioning: The XYZ School District has implemented retro commissioning on it XXX School project, the district . . . .

Lessons learned include:

Maintenance Management

Developing a Maintenance Management Program

Introduction

Department regulations for maintenance management require:

> *(1) a formal maintenance management program that records maintenance activities on a work order basis, and tracks the timing and cost, including labor and materials, of maintenance activities in sufficient detail to produce reports of planned and completed work;*

This brief paragraph results in a series of eight documents—seven reports plus samples of varying work orders—that are intended to provide solid evidence of a minimally compliant maintenance management program. School district maintenance managers may be able to develop this level of maintenance plan on an ad-hoc basis with rules of thumb and the knowledge of experienced maintenance technicians. This is especially true for small facilities with a minimal range of ~~surfaces~~ components and ~~appurtenances~~systems. However, as school facility complexity increases, maintenance management plans are best built from a component-based inventory.

The most common deficiency noted during the department's certification process, is that maintenance management programs do not track materials associated with maintenance work. All school districts have systems that track labor, but materials tracking, by work order, is often lacking. This does not meet minimum criteria. While there is no question that a well-developed maintenance management program must track labor efforts, materials can be a significant component of maintenance and tracking them by work order is important for measuring the impact of repeated maintenance, or trends on systems.

Compliance with this regulation is demonstrated by providing:

- copies of work orders in various states of completion;
- report total maintenance labor hours collected on work orders by type of work (e.g., scheduled, corrective, operations support, etc.) vs. labor hours available by month for the previous 12 months;
- report scheduled and completed work orders by month for previous 12 months;
- report number of incomplete work orders sorted by age (e.g., 30 days, 60 days, and 90 days, etc.) and status for the previous 12 months (e.g., deferred, awaiting materials, scheduled, etc.);
- report comparison of scheduled maintenance work order hours to unscheduled maintenance work order hours by month for the previous 12 months;
- report monthly trend data for unscheduled work orders showing both hours and numbers of work orders by month for the previous 12 months;
- report planned maintenance activity for the following quarter;

- report completed maintenance activity for previous three months including labor and material costs; and
- report preventive maintenance components by building system.

School district officials should be prepared to discuss their maintenance management program and the results from the program.

Maintenance Data Information

In order to have an effective maintenance management program, the first step is to develop a mechanism for collecting information on facility components and systems that will be the subject of the maintenance management program. There ~~are now affordable~~is a plethora of computer programs on the market that are specifically designed for such purpose; these are known as Computerized Maintenance Management Systems (CMMS). For all intent and purpose, the basic key to any of these programs is the capability to store, retrieve and analyze the information collected on facilities, their maintenance needs, and the organization's maintenance practices.

Historical Management Systems

Modern CMMS have evolved following the use of 3" X 5" index cards and twelve manila folders (one for each month). One side of the index card contained information about the facility components and systems as well as the services that need to be performed. The back side of the card was used to record the date on which the service was performed, the name of the maintenance or custodial staff, and the cost of materials. Upon task completion, the card was placed in the manila folder assigned to the future month when the task was due. Although this method now seems crude, it could possibly still meet minimum requirements of the department for a small school district. The analogy is similar to having accountants using pencils, ledgers, and ten-key adding machines. However, the value of a CMMS—especially one specifically designed for school districts—is measureable and all but mandatory.

Early generations of CMMS consisted of software which was locally installed and hosted on district computers. Data storage was also local. Some of these systems were network compatible, making them useful for organizations where access to the system could not be centralized at one location or functional area. With the advent of 'cloud computing', many CMMS service providers developed business models which involved hosting customer facility and maintenance data on their own servers and providing a web-based user interface. Both of these delivery models remain available to organizations with the hosted-data model being prevalent in most Alaska~~'s~~ districts. For a peek into history, see the pop-out for how CMMS worked in the 'good old days'.

With the rise and almost universal market penetration of the software-as-service business model, most CMMS include an initial purchase fee (which can include software, hardware, installation,

and set-up costs) and an annual service or maintenance fee. While selecting a suitable CMMS to meet the needs of their school district, school officials ~~are cautioned about purchasing extra~~ should be aware there are many options. Most vendors offer modules targeted at specific functions such as space management, fleet management, and inventory management, many of which are neither required by statute or regulation nor useful to the school district. Marketing personnel within CMMS ~~companies~~ vendors excel at selling their products, but some companies have hidden fees that are charged after the program is instituted, where school districts find themselves forced to pay extra in order to achieve adequate results. Other ~~marketing~~ companies, after a successful marketing push, offer poor customer service, which quickly becomes problematic during initial setup. Most of these programs are web-based and consume a good portion of bandwidth during usage. CMMS software should be user-friendly so that it can be implemented with minimal training for all maintenance and custodial personnel as well as school educators. The bottom line is to ask around to other school districts and see what will work best for your organization in order to make an informed decision. The department's PM State of the State, published annually by June 1 and finalized not later than August 15, includes data on each school district's CMMS tool.

Identification of Facilities, Systems, and Components

The second step in developing an effective maintenance management program is to get the information entered into the system.

In order to do so, someone will~~personnel~~ need to inventory and categorize systems and components maintained by the school district in each of the school facilities that the school district maintains. Vendors and a variety of consultants are willing to perform this task if district personnel are unable to. During the inventory, information such as quantity, type, size, age, condition, manufacturer, model, material specification, location, key parts, part numbers, specialized upkeep requirements (e.g., oil and filter types), and other item-specific data need to be documented. The data collection is time consuming and requires a significant amount of data entry. Part of this data entry will be development of an asset naming convention (see pop-out).

Asset Naming & Equipment IDs

"A little forethought at the start can save a lot of time in the future"

Creating an asset naming convention within your CMMS normally involves both an asset name and an asset ID. Asset names can usually be normal, descriptive text ~~righ~~ titles (e.g., Generator, Diesel Standby 200KVA Siemens). The problem comes when there are multiple instances of that same asset within the universe of assets ~~needing to be~~ managed within the CMMS. An asset ID, on the other hand, is a unique identifier—only one asset has that specific ID. Asset ID's, or equipment tags, are often cryptic combinations of text and numbers ~~which~~ that include indicators tying the asset to industry classification systems and types, to particular facilities, to locations within that facility and to the quantity of that particular asset. Asset naming doesn't have to be complex but it must always be consistent and logical. Standardized naming conventions also aid in data reporting and analysis. Come up with a useful naming convention before you go live with your CMMS system because it can be difficult to change later.

The data collection will reveal systems and components that apply to each of the facilities. School district personnel may add items as necessary to create a complete plan. Many facilities may have multiple system types within a particular category (e.g., roofing, package unit heaters, etc.) as well as multiple components of the same type (e.g., circulating pumps, water closets, toilet partitions, etc.). For each item, and wherever appropriate, a specific preventive maintenance task should be developed. In large school districts, the data collection will reveal similarities amongst systems and components; following these observations, some school districts may elect to standardize as many of their systems and components as possible (e.g., same water closets, light fixtures, etc.), thereby reducing spare parts inventory and training costs, which in turn creates increased productivity and quality of work. Note that standardization may in some cases only be possible during remodel projects or new construction (e.g., boiler replacement / installation, unit heater replacement / installation, etc.); however, simple part replacements may also enable standardization (e.g., energy efficient bulbs, low-flush water closet flushometers, etc.) and save on utility costs.

To assist the school district with executing this task, the department has established a baseline by identifying facility systems and components that should be included in the CMMS. A list of these components is included as Appendix A and should clarify the tasks needing to be done in this section. While thorough, the list is not intended to be exhaustive of every possible component. The list is designed to dovetail with other useful assessment devices such as the Association for Learning Environments International (A4LE) *Alaska School Facility Appraisal* and the department's *Guide for School Facility Condition Survey*, as well as other professional facility audit organizations. The list also gives its users a better understanding on how to update Renewal and Replacement (R&R) schedules, a topic which will be discussed later in this guide. A sample of an R&R schedule is included as Appendix B.

Determining Present Conditions

While developing the inventory of systems and components described previously, the school district will need to complete an inspection of the components in order to establish their current condition. Following the identification of systems and components in each facility, a detailed inventory is needed to quantify the building components and to establish their current condition. This step includes both an objective process of fact-gathering and a subjective assessment of the current condition. Information such as quantity, type, size, manufacturer, model, material specification, location, key parts, part numbers, and other item-specific data will be documented. A qualified technician or professional will need to make the assessment of current condition. The condition assessment is used to determine both the immediate and future levels of preventive maintenance for the system or component and its end-of-service-life replacement date.

Establishing Appropriate Levels of Maintenance

Preventive maintenance efforts range from visual inspections only to performance testing and analysis; from minor adjustment, cleaning and/or lubrication to complete overhauls; from reconditioning to components replacement. [3]

School districts that are accredited by the Northwest Association of Schools and Colleges will recall that the accreditation standards include the following:

> Standard III - School Plant and Equipment
> "13. Inspection(s) of the school plant and equipment **shall** be made each school year by a qualified official and any deficiencies addressed." [4]

This type of standard is an example of a preventive maintenance requirement at the visual inspection level.

In establishing levels of maintenance, two determinations are needed. The first is to establish a basic life-span for the system or component (e.g., asphalt shingle roofing - 20yrs, oil-fired boiler, 15yrs, drive belt – 3yrs, etc.). The second determination is, "What maintenance activities are needed to ensure that this particular system/component meets or exceeds its life expectancy?"

Answers to the above queries can oftentimes be found in the Operations and Maintenance (O&M) manuals. These manuals are usually turned in shortly after facilities commissioning or major project completion. Manufacturers' literature, practical experience, test results, and industry averages are some ways to determine both acceptable life cycles and what preventive maintenance work would result in achieving those life expectancies in the most efficient manner; as mentioned previously (i.e., the lowest total life-cycle cost). Alaska presents formidable environmental challenges to our facilities, and the life expectancy of certain systems / components may vary greatly from one region to another, so an informed analysis is necessary.

Preparing the Work Items Plan

Once your levels of maintenance have been established, setting the tasks into a workplan is the next step. According to Basil Castaldi, a recognized expert, and author, in the field of facility planning ~~and author~~, four elements make up any preventive maintenance work item.

> "In any prescribed maintenance program, the list of tasks to be performed is described in detail. The frequency and nature of the work are clearly stated. The materials to be used are specified in considerable depth and the manner in which the work is to be accomplished is expressed in simple language." [5]

Consider this further detail of these tasks:

I. The list of tasks to be performed is described in detail.

The detail that accompanies this step is critical and should be as comprehensive as the efforts that were placed in the previous step while identifying facilities, systems, and components. Any maintenance individual who is assigned any of the tasks should be able to determine the location of the equipment, what replacement parts, if any, are needed, what the work entails (e.g. replace air filters), tools and manuals required, estimated time of completion, what Personal Protective Equipment (PPE) should be worn, if any, etc. This task is particularly useful when a new maintenance employee takes over a particular school without having the possibility of shadowing an existing employee.

II. The frequency and nature of the work are clearly stated.

This task is self-explanatory. For instance, a school district may elect to conduct a 30 minute load test for its entire generator fleet at the beginning of each month, with exception to June and July when affected schools are in seasonal shut down. The test will include monitoring and recording all gauges. Another example may be the changing of air handlers filters twice a year, at the beginning of August, and then again at the beginning of February.

III. The materials to be used are specified in considerable depth.

This is another important task, because it avoids the plausibility of maintenance personnel switching various components of a system to a point where functionality and performance are diminished costing the district several operating dollars. For instance, clearly defining a specified nozzle for a fuel burner may enable boilers to maintain peak performance (e.g., hollow, 3.0 gallon per hour, 60 degree angle). Another example could be the adherence to specified air filters, where low-cost air filters may compromise the occupants' environmental safety and well-being (e.g., high capacity pleated filter, MERV 8, Moisture Resistant Die Cut Chipboard, Nominal Height 24 inches, nominal width 24 inches, nominal depth 2 inches).

IV. The manner in which the work is to be accomplished is expressed in simple language.

The tasks needing attention will be addressed by custodial and maintenance individuals with various educational backgrounds. The best means to ensure understandability across the board is to keep the language simple and direct.

Implementing a Preventive Maintenance Program

Introduction

Where the first school board responsibility was to *develop* a preventive maintenance program, the second responsibility is to *implement* a preventive maintenance program. This section offers guidance on carrying out the developed preventive maintenance work plan and establishes the importance of having management reports and a system of feedback from the field in order to implement an effective program.

The basic task of preventive maintenance implementation is to match needs with resources. However, both needs and resources are variables in the facilities management effort. As a result, implementation efforts may occur once to initiate a preventive maintenance program but will also require continuous monitoring of needs and resources to accommodate changes in these variables. For example, the work items assessment of a circulating pump may have indicated an anticipated failure in three years. At the three-year point, a stress test of the pump may indicate no appreciable degradation has occurred. This information may necessitate a revision to the preventive maintenance plan initially implemented. ~~Other examples include the impact of new technologies, improvements to building systems or new tools that reduce repair times. These examples of variables in needs and resources all support the conclusion that implementation requires both an initial and an on-going effort.~~

The Need for Sustainability

Revisions to the maintenance plan must occur over the life-cycle of the facility. Other examples driving this change include the impact of new technologies, improvements to building systems or new tools that reduce repair times. These examples of variables in needs and resources all support the conclusion that implementation requires both an initial and an on-going effort. For additional discussion on Sustaining a Maintenance Management Program, see page 20.

Moving from the planning and development phase to implementation and operation almost always involves funding, regardless of the endeavor. Preventive maintenance is no exception. As evidence of the importance of funding in this transition, the portion of the Encyclopedia of Architecture devoted to implementation of a preventive maintenance program is largely a discussion of funding.[6] Because funding is so critical to the transition, some findings from research concerning maintenance funding and resources are included in the following paragraphs.

Determining Necessary Resources

As previously mentioned, most of the resource requirements result in a need for funds. Determining the level of funding needed for preventive maintenance at a detailed level requires estimating literally thousands of labor and material line items. This method is very time consuming. Other approaches to budgeting for preventive maintenance include establishing a

formula based on a percentage of the operating budget or a percentage of building replacement value(s). In California, research showed that:

> "If a planned maintenance program is followed, about 5 percent of a district's operating budget will be required to provide an adequate maintenance program.
>
> In addition to the 5 percent expenditure for the district's maintenance program, a reserve fund is needed for unanticipated and emergency maintenance expenditures. Another criterion for determining budget requirements is to calculate 2.9 percent of the current net building replacement cost or a projected cost based on the square footage of property to be maintained." [7]

In another budgeting formula, the Encyclopedia of Architecture indicated:

> "The cost of preventive maintenance ranges according to the intent of the *plans developed.* To set a budget for this type of work, one may estimate 5% of the present value of the building for preventive maintenance activity. Perhaps 1.5% of the value of the building may be estimated for simpler structures or systems." [8]

The department's capital improvement project (CIP) application scoring criteria assigns increased points to school districts based on the percentage of total maintenance expenditures relative to the building replacement value(s). Maximum points are achieved when the percentage is five percent or greater.

One effective strategy for determining the necessary resources is to identify the smallest detailed increments of the preventive maintenance plan and combine them for the aggregate picture. Take each well-developed preventive maintenance work item and ask, "What skills (trained personnel), tools, materials (parts etc.), and time are needed to complete this work item?" Once these factors are tabulated and the resource needs are clear, the supporting issues of space for shops, material staging and transportation requirements can be addressed.

While starting with the most detailed information and building up yields a comprehensive assessment of necessary resources, broad and systematic thinking is required to arrive at the necessary organizational structure with which to accomplish the preventive maintenance program.

Determining Organizational Structure

The structure and organization of the preventive maintenance program must be in place before effective scheduling of work can occur. Some operations and maintenance organizations establish a cross-disciplined preventive maintenance work center whose main task is to inspect various systems and components (usually dynamic equipment) and write maintenance work orders. Following the inspection, more traditional work centers such as plumbing, sheet metal, etc. are assigned the actual work tasks. Other maintenance organizations are oriented almost completely to preventive maintenance tasks with major crafts taking responsibility for components and systems within their respective areas. In this model, a small multi-disciplined workcenter handles routine maintenance and emergency repairs and, in some cases, minor improvement work. These organizational structures are variations on how best to accomplish the

work ~~which~~that is identified in the component needs-based maintenance assessment. This approach to organizational structure—one that examines the necessary maintenance work and builds an organization structure to match—is often overlooked.

Another driver for determining organizational structure is management. This strategy asks the question, "How can the maintenance management resources best be managed?" The expectation is that from good management will follow good maintenance. Most of the management approach structures can be distilled to supporting, or describing, three approaches: centralized, decentralized (or zone maintenance), and hybrid.

Taken together, the combination of organizing personnel to accomplish necessary tasks, and organizing personnel for effective management is most likely to yield a comprehensive maintenance management implementation. There are many resources which can assist a district in implementing an organizational structure. Textbooks have been written and many trade periodicals run at least one if not multiple articles in any calendar year dealing with maintenance organization.

Scheduling and Assigning Work

The heart of any maintenance management program is scheduling and assigning specific maintenance tasks, and tracking the completion of those tasks. In addition, it is best practice to be able to account for all available maintenance hours and to measure time on task and other productivity and utilization metrics. This element of the maintenance management program takes the work items developed for each component and assigns them to the appropriate maintenance craftsperson or team according to the established structure and schedule.

This is accomplished through the CMMS. Once pertinent data is entered into the database system, work orders detailing the scheduled maintenance requirements can be generated and tracked along with all unscheduled work and categories of ancillary work such as training, education support, mail runs, etc. More advanced CMMS programs have an integral query feature which prompts maintenance managers for necessary input and provides industry standards for certain maintenance tasks. It is estimated that there are more than fifty ~~(50)~~ suppliers of maintenance software packages with price variations based on need and capacity. Maintenance magazines and the world-wide-web are good locations to look for these products.

Intentional & Directed

In a roundtable of school maintenance directors, one mentioned an increased awareness of the need to be intentional in the scheduling and management of maintenance efforts. For this district, it appeared that the more workable way to achieve that goal was to bring maintenance scheduling to a more centralized location. For others, site-based management of maintenance is the norm and allows local flexibility in scheduling work. In a site-based organization, the site administrator, or principal, needs to understand the level of importance to be given to scheduled, preventive maintenance.

[Cover the related area of planning work here also (i.e., logistics, labor, scheduling of large PM overhauls and large repair or mission support projects handled by maintenance staff.]

Reporting Systems and Feedback

In addition to automating the list of items needing scheduled maintenance, most maintenance management software programs also provide the capability for a computerized building data file. This database of facility requirements can be used to generate a wide variety of accurate reports on matters related to building maintenance and operations and the associated costs. To a certain extent, an integrated maintenance system that incorporates both daily maintenance tasks and long-range planning depends on an automated database of facility information. Effective preventive maintenance programs depend on feedback from maintenance personnel and a reporting/tracking system of costs associated with the preventive maintenance effort. This information is used to maintain the proper balance between preventive maintenance and renewal and replacement efforts (i.e., determining when costs have increased to the extent that preventive maintenance on a system is no longer effective on life-cycle basis).

Through a combination of informal evaluations and formal audits, a reporting system should be established to analyze a district's maintenance system to achieve the most cost-effective maintenance program. In addition to general feedback and reporting, district maintenance programs should undergo periodic evaluations of their effectiveness. This can occur both at the worker's task level and at the maintenance management level. Evaluations can be done either internally or through the use of an outside evaluation team. Maintenance management audits examine the functional program and generally consider the following four factors:

Productivity - the portion of a worker's time that is directly productive.
Performance - how well the individual is working, e.g., is work being completed as planned?
Work Quality - is the individual producing a satisfactory work product?
Priority - effective allocation of available time to the most important tasks. [1]

Though maintenance management audits may look at symptoms of ineffective maintenance at the worker/task level (e.g. number of callbacks, work completed on schedule, etc.), a management audit's focus, as the name implies, is on improvements through better management.

Sustaining a Maintenance Management Program

Introduction

Why do maintenance management programs falter, and even fail, over time in Alaska's school districts? The answers to this question may be many and complex, but one over-arching response may be able to encompass the myriad details, and that is, the practices are not sufficiently integrated into the facility management construct of the district so as to be indispensable to district operations. This section of the handbook describes some key elements in the building lifecycle, which district leadership should use to weave maintenance management into the essential fabric of the district's operations.

Budgeting and Staffing

Software Upgrades

Performance Metrics

Evaluations, Inspections, & Education

Energy Management

Developing an Energy Management Program

Introduction

Department regulations for energy management require:

> *(2) an energy management plan that includes recording energy consumption for all utilities on a monthly basis for each building; for facilities constructed before December 15, 2004, a district may record energy consumption for utilities on a monthly basis when multiple buildings are served by one utility plant;*

This baseline requirement—the recording of energy consumption—is deceptively simple. However, because the two categorical requirements—all utilities and all buildings—are comprehensive in nature, the complexity of record keeping multiplies quickly. Not only does the math of buildings x utilities result in many data points, the variety of utilities used varies from building to building as does the variety of delivery methods for those utilities. School district energy program managers will be challenged if they attempt to develop this level of energy plan on an ad-hoc basis without data tracking tools. However, as school facility complexity increases, energy plans, like maintenance programs, must be built from a facility-specific inventory.

The most common deficiency noted during the department's certification process is that energy programs are not tracking all types of utilities used or are not doing tracking using a monthly metric. This does not meet minimum criteria. While there is no question that a well-developed energy management program should include districtwide information (e.g., goals, standards, organizational structure, staffing, etc.), the energy consumption records are unique to each building.

The utility consumption records are just the beginning of the planning needed to develop a complete, effective energy management program. Other planning factors include: expectations/goals, staffing, schedules, equipment, safety, and supplies.

An energy management plan is a comprehensive document that "…maps out internal maintenance schedules, equipment logs, and keeps equipment manuals and buildings drawings on hand for reference. Unlike an energy policy, the energy management plan is regularly updated, typically on an annual basis. It is used to document recent achievements, changes in performance, and shifting priorities." (AHFC White Paper, p.8)

As described above, there is overlap between the energy management plan and the preventive maintenance management program in regards to maintenance schedules. Although maintenance personnel involvement is critical, a successful energy management plan also necessitates everyone's participation, from school board members to students. The energy plan should incorporate what measures are selected to optimize resource utilization while minimizing costs and expenses. Most importantly, the plan should utilize data gathering to benchmark whether or not efforts are paying dividends; to do so, many school districts set objectives (e.g., reduce fuel consumption by 15% within the next 12 months; reduce electric consumption by 10% within the

Energy Management

next 12 months). The plan should be simple and clearly define everyone's tasks in support of the plan. School districts who have effective energy management plans usually assign its execution to a responsible individual with access to top-level administrators. In such manner, school board members can receive updates from their energy plan manager on a regular basis (e.g. monthly, quarterly, or bi-annually) and determine how well the plan is working. Officials may then review issues that could be faltering the plan objectives or need to attention.

Here are examples of measures taken by various school districts in their effort to mitigate energy consumption:

- Energy monitoring via automated remote reporting;
- Turn off electrical appliances at the end of each day (e.g., lights, smart boards, computers, monitors, speakers, televisions, stereos, copy machines, kitchen hoods, etc.);
- Utilize minimal corridor night lighting during non-occupancy;
- Report all utility malfunctions immediately to maintenance personnel (e.g., oil / gas/ water leaks, lights no longer shutting off automatically, etc.);
- Shut down boilers, refrigerators, and freezers during summer;
- Turn down the heat during non-occupancy periods (also known as night setback), including holiday breaks;
- Install occupant sensor lighting;
- Install low-flow flush flushometers for water closet / urinals;
- Shut down the school at 5:00 p.m. one night a week;
- Optimize Heating Ventilation and Air Conditioning (HVAC) systems (e.g. replace air filters, tune-up boilers twice a year, ensure fans are not continuously running in manual override mode, ensure air louvers are operational, etc.);
- Replace antiquated lighting systems with more efficient ones (e.g. replace T-12 fixtures with T-8; replace Tungsten filament bulbs with high efficiency Light-Emitting Diode (LED) bulbs);
- Install provisional arctic porticos during cold season;
- Reward schools that decrease energy use (e.g., free movie night at the gym); and
- Enlist/appoint an 'energy champion' and ensure someone is comparing and using the information.

As defined in the regulation, the energy plan also needs to record energy consumption on a monthly basis for each building. Energy consumption recording must comprise all school district utilities such as heating fuel, steam, natural gas, Liquid Propane Gas (LGP), waste heat, electricity, wood, coal, potable water, waste water, refuse, etc.

As noted, the regulation makes exception for buildings built before December 15, 2004. In such case, for instance, if a large fuel tank supplying multiple facilities was built prior to this date (e.g., school, teacher housings, and generator shed all feeding off one main fuel line), it is permissible to record the monthly utility readings for the entire distribution system. The same goes for electrical meters. However, any school built after this date must have individualized

Energy Management

means to record each of its utilities (e.g., oil meter, waste heat meter, electric meter, etc.); the daisy-chaining of numerous buildings off one utility meter is no longer permitted.

Compliance with this regulation is demonstrated by providing:

- Written copy of the energy management plan; and
- Utility report recording energy consumption for all utilities, on a monthly basis, for each building for the previous 12 months.

School district officials should also be prepared to discuss their energy management plan and the results gained from the plan.

Energy Management

Implementing an Energy Management Plan

Introduction

[This is where we will discuss any energy management implementation steps; how to put a plan into action.]

An Energy Champion

Incentives

Reporting & Feedback

Energy Management

Sustaining an Energy Management Plan

Introduction

[This is where we will discuss any maintenance management elements that respond to the cradle-to-grave/cradle-to-cradle life cycle of a building.].

Custodial Program

Developing a Custodial Program

Introduction

Department regulations for custodial programs require:

> *(3) a custodial program that includes a schedule of custodial activities for each building based on type of work and scope of effort;*

This baseline requirement—a schedule of custodial tasks for each building based on the type of work needed (i.e., the activity needed for each surface or equipment item) and the level of effort (i.e., the frequency of care for each type of work)—represents a significant planning effort. School district custodial program managers may be able to develop this level of custodial plan on an ad-hoc basis with rules of thumb and the knowledge of experienced custodians. This is especially true for small facilities with a minimal range of surfaces and appurtenances. However, as school facility complexity increases, custodial plans, like maintenance programs, are best built from a component-based inventory.

The most common deficiency noted during the department's certification process is that custodial programs are not building-specific but rather are a one-size-fits-all program written for the entire school district. This does not meet minimum criteria. While there is no question that a well-developed custodial program should include districtwide information (e.g., goals, standards, organizational structure, staffing, etc.), the schedule of custodial activities is unique to each building.

The schedule of custodial activities is just the beginning of the planning needed to develop a complete and effective custodial program. Other planning factors include: expectations/goals, staffing, schedules, equipment, safety, and supplies.

Leadership

The custodial program is a tool, customized to individual school districts, designed to guide custodial personnel in the execution of their work. ***"The first step toward establishing an effective custodial program is to determine the district's expectations of its custodial services. This requires input from both the school board (who ultimately will fund the program) and the building administration (who will live with the results of the program)."***[1] [NCES/ALASBO *Planning Guide for Maintaining School Facilities*, 2003, p.82] This is often developed as a vision statement. If this vision is absent, it falls to the Facility Manager to elicit it in order to make proper plans. Often, suitable statements from which to plan can be found in board policy.

Custodial Program

Sample Vision Statement

"It is our vision to provide the highest level of customer service satisfaction of any school district in Alaska by being innovative, flexible, and competitive with a can-do attitude."

One common, and helpful, step in establishing and communicating a vision is to provide a mission statement. These two elements, vision and mission, can serve as the basis of a custodial plan or program. The mission statement should be supported by goals and objectives. It is imperative that custodial program staff know what is expected of them. For example, will custodians do light maintenance? To whom do custodians report? Are custodians responsible for event set-up such as equipment and furniture?

Sample Mission Statement

"The mission of the XYZ School District Custodial Team is to provide an attractive, healthy, and safe, working and learning environment to facilitate greatness in our staff and students."

Custodial Activities

"Within school districts, custodial operations should reflect the needs of individual facility types, i.e., elementary schools, middle schools, high schools, technical schools, and ancillary buildings. Each type of facility requires a number of basic custodial services in support of the educational process; however, the requirements for middle and secondary/technical schools may be greatly expanded due to their size, complexity, and use patterns." [Florida DOE *Maintenance and Operations Administrative Guidelines for School Districts and Community Colleges*, 2010, pg 49]

As mentioned in the introduction, the most complete custodial plan is based on a component inventory, a quantification, of building elements and equipment requiring custodial services. In order to streamline this effort, a good place to begin is with a list of custodial tasks. These can be developed from industry guidelines, samples from other school districts, or internal documents such as custodial job descriptions or existing checklists. Consider the following as a sample list which, on the left, covers a variety of custodial tasks pertinent to the common areas in a school:

Sample Custodial Tasks	*Inventory Building Element*
Sweep/clean exterior walkways to 10ft from entries/exits	*Quantity of exterior walkways*
Vacuum entries/exits and/or wet-mop entries/exits	*Type/quantity of entry flooring*

Custodial Program

Clean glazing (doors & sidelites) at all entry/exits, inside and out	*Quantity of glass at entries; height of glass at entries*
Vacuum all carpeted corridors	*Quantity of carpet in corridors*
Dry mop all hard surface corridors	*Quantity of hard surface in corridors*
Wet mop all hard surface corridors	*Quantity of hard surface in corridors*
Extract soiled areas on carpets	*N/A; as needed*
Remove stains and marks from hard surface floors	*N/A; as needed*
Clean all drinking fountains	*Quantity of drinking fountains*
Clean glazing at interior windows, window walls, displays	*Quantity of interior glazing*
Dust all equipment, sills, trims and hard surface furnishings	*Density of dusting surfaces per SF*

On the right side of the table are the associated building elements that would need to be inventoried in order to develop a custodial schedule for the building that was based on the type and frequency of custodial activity. An added benefit of having this component and quantity based inventory is the ability to use industry standards to develop staffing requirements. For example, if the inventory of glass in the facility totaled 350sf, and that amount needed daily cleaning, an industry standard of 525sf/hour would yield 40 minutes of direct cleaning time for that activity. The combination of all tasks would provide data for determining custodial FTEs needed for the facility.

In developing custodial activities, don't forget the plethora of non-cleaning related duties. These might include: recycling, snow removal, events and set-ups, relamping, pest control, mail pickup/delivery, supplies inventory/stocking, direct visitors, record keeping, and training.

Standards of Cleanliness

When developing the custodial program based on custodial activities—and especially when developing time based standards for the activity—the standard of cleanliness must be considered. In other words, how clean is clean? The Association of Physical Plant Administrators (APPA) has developed a widely recognized, and adopted, standard consisting of 5 levels, each with descriptive narratives. Under this standard, the target for most school spaces would be Level II "Ordinary Tidiness". A number of other industry and trade associations also have cleanliness standards that can be adopted and/or modified. Once adopted, these should be integrated into custodial program documents and schedules.

Procedures. Cleaning procedures by function (e.g., empty waste receptacle, clean chalkboard, etc.), to include scheduling (e.g., daily, weekly, etc.) in each area of the building. This description is usually relatively broad and should include location, task at hand, and frequency for all areas of the building:

Methods and procedures. This depiction should give ample details on how to get the job done effectively. For instance, marker boards may require a specific solution to clean their surfaces;

mirrors may require a specific cloth. The instructions should also warn personnel as to what not to do, such as using a particular solution on a specific surface. Gymnasium floors and countertops have been ruined while using the wrong cleaning agents. The following subjects should be covered at length in the custodial program:

Safety

Personnel Safety. Custodial personnel are exposed to a variety of health hazards such as chemicals, blood-borne pathogens, toxic substances, electrical shocks, trip and falls, etc. It is important that these employees be informed and trained on how to protect themselves and to conduct their work in the safest possible environment. The custodial program should include:

- when / how to use Personal Protective Equipment (PPE);
- how to deal with Hazardous Materials (HazMat) including Sharps and bio waste; and
- awareness of location and use of Material Safety Data Sheet (MSDS) and the "Right to Know."

Equipment Needs

Care of cleaning equipment and use. The cleaning equipment must be stowed, maintained and operated properly. Custodial personnel should be well-versed and familiar on how to care for all of their equipment, including:

- buffers;
- personnel lifts;
- ladders;
- carts;
- mop buckets and presses;
- dust mops;
- wet mops;
- push brooms and corn brooms;
- vacuum cleaners;
- carpet extractors, etc.
- entrance, lobbies, and corridors;
- classrooms and laboratories;
- offices, lounges, and conference rooms;
- restrooms, locker rooms, showers and dressing areas;
- cafeterias and lunch areas; and
- gymnasiums and multipurpose rooms, etc.

Products

Selection and listing of school district prescribed cleaners. The list should be inclusive of all cleaners, as well as a brief description on use (e.g., spray cleaner; shower foam, etc.) and methodology (e.g., daily, on most hard surface; per manufacturer's instructions, etc.). The following are examples that could be included in the custodial program:

- all-purpose cleaner
- all-purpose degreaser
- glass cleaner;
- disinfectant;
- absorbing deodorant;
- scale and lime remover;
- mar and spray paint remover;
- gum remover aerosol;
- shower descaler;
- stainless steel cleaner;
- septic enzymes, etc.

As in the case for the Preventive Maintenance program, the custodial program will be utilized by custodial individuals with various educational backgrounds. The best means to ensure effective

communication is to keep the language simple and direct. If custodial personnel do not read English, the program should be translated in order to achieve proper results.

A good custodial program should also include random inspections. A list of *Standard for Clean Classroom* can be found in Appendix G. By using the standard, strong points and weaknesses can be identified, giving custodians an appraisal of what is getting done properly, and what needs to be improved upon.

Another important tool for the custodial workforce is the *Master Custodial Schedule*. (see Appendix H). A customized schedule should be displayed in each custodian's workplace. The schedule should indicate what tasks need done daily, weekly, monthly, annually, and as needed.

Custodial Program

Implementing a Custodial Program

Introduction

Implementation of a custodial program requires gathering and deploying resources you have identified in the planning stage.

Custodial Program

Sustaining a Custodial Program

Introduction

[This is where we will discuss any maintenance management elements that respond to the cradle-to-grave/cradle-to-cradle life cycle of a building.]

Maintenance Training

Developing a Maintenance and Custodial Training Program

Introduction

Department regulations for maintenance training require:

> *(4) a maintenance training program that specifies training for custodial and maintenance staff and records training received by each person;*

The intention of statute and regulation is that there should be a program of continuous training for maintenance personnel, custodians, and their managers as part of ensuring maintained state financed facilities. Training in facility systems and operations assist a facility in reaching its expected life and insures the continued effectiveness of an educational facility as designed. This maintenance training is separate from the training mandated and provided by a school district's human resources (HR) department. It is specific to facility maintenance and custodial operations. The previously mentioned HR training is important; however, it is not a substitute for mandated training under these statutes and regulations.

Definition: Custodian

" one that guards and protects or maintains "

There are two common problems found when evaluating districts maintenance training programs. The first is that there are many cases of no planning being done. This is usually due to not establishing a training plan with set dates and schedules to perform training. Without a plan, training is forgotten or put off until another time. The second issue is that increased HR training has begun to encroach on maintenance training. Even when there is a scheduled day, or days, of training, the non-maintenance training utilizes this time due to its convenience.

A good training program, as part of an efficient maintenance program, interacts with all other aspects of the program: maintenance management, energy management, custodial, and capital planning. No part of a preventive maintenance program operates in a vacuum. Good custodial is actually one part of a balanced maintenance program and it will be included under the term "maintenance training" in this section.

Planning

The first thing to contemplate when developing a maintenance training program is, what are is being maintained? This is where coordination with maintenance management and capital planning is important. Start with a list of school district facilities and assets, including O&M manuals and scheduled preventive maintenance items. Once the list is compiled of equipment, finishes, and other assets that school district personnel need training on, a school district can begin to plan. Training should include initial new hire training, training on new equipment and finishes, periodic re-training, and training review. Also, an essential part of a training program is recording who was trained and on what subject the training was on. Efficient training records list all types of training over the year and the personnel who attended each one, and separately

list each individual and each of the training that person received. One convenient way of recording this is through the maintenance management work order system.

HELPFUL HINT

Standardize to reduce training and inventory costs

Working with capital planning and maintenance to develop school district standards for materials and components will simplify operations, minimize variation of inventory parts, and reduce the makes and models of equipment needing training.

Having "training" as an available work order sub-group makes sorting efficient. Assigning a work order to each individual attending a training session and having those individuals code their time to that work order allows easy sorting by training or by individual. This method also captures hours and costs of training. This is not the only method of recording. There are other personnel management programs available for recording training. Just make sure that it shows facility-mandated training versus HR training. A paper record is not recommended, as this is less useful for long-term tracking of personnel training.

Implementing a Maintenance and Custodial Training Program

Introduction

Once maintenance and O&M requirements have been established, a school district can decide what and how much training is required and set in place its training program. Some things to consider are identifying fundamental training elements for new employees, and what items may require annual training versus every few years. Formulate how training will be conducted, as well as when, where, and by whom. See below for some factors to consider as you develop your program.

New Hires

After basic orientation of the duties expected of the assigned position, additional training should be planned depending on the position or craft.

Custodians

If custodians in the school district are only responsible for cleaning, a closer title would be janitor, then initial training in cleaning procedures and expectations are expected. Custodians are also the first level of eyes-on for the maintenance program. They need to be trained on inspecting and observations and how to initiate a work order based on any conditions requiring maintenance. If they are expected to perform some light maintenance, closer to the definition of a custodian, then there needs to be additional training. For some school districts the additional training is performed by maintenance mechanics. A work order is initiated with a new hire for training in mechanical, electrical, or other trade. The assigned mechanic performs the training (e.g. filter changing, flushometers, etc.) and the time is recorded.

Maintenance Technicians

Facility maintenance will be very new for many maintenance mechanics, even for journeymen. Most of these technicians have a background in construction, performing repairs in a facility environment is not the same. Add in the complexity of being in an educational facility with administration, teachers, and students, it can be a lot to adjust to. Initial training should include the work order system (including asset numbering), procedures for working in a school. A very successful way many school districts use for this training is to have new people initially assigned to the preventive maintenance team. The extent of time varies from one turn of facilities to a set time like six months. This orients the person to all facilities and locations of components, operations in an active educational facility and how to perform work orders, close work orders, and create new work orders.

Continuous Training

After maintenance management has assembled the list of maintenance training needs, decide if an item requires annual, semi-annual, or periodic training. Setting a schedule for the training that

avoids interfering with normal maintenance duties will help learning. One method is to have an annual in-service for employees just prior to a new school year. Depending on the size a school district, a strategy can be to have two days with half of the personnel on each day. This helps to keep the numbers manageable and maintains a maintenance personnel presence in the facilities. This becomes a good time for many training sessions with some hands-on training. Balance quantity of training with quality and avoid over-load. If an in-service is not possible or desired, the school district will need to arrange for the proper training either by going to each facility or having some version of a distributed gathering.

HELPFUL HINT

Train the Trainers

Example:
Custodians are tasked with replacing flushometers on the toilets. Have a maintenance technician train the lead custodian for a facility. When he is competent, have that person train the other custodians in the school under the technician's supervision. This will insure work is able to be performed onsite and the lead custodian has better retention of the skill. This will save time and money by not having a centrally based technician travelling to the facility.

Periodic Training

At times, a training need becomes apparent that is outside of normally scheduled training. This could be from the maintenance supervisor(s) seeing repetition of work orders for the same issue or periodic inspections by preventive maintenance staff or building personnel of conditions that need to be addressed. The training program should have built in allowances for investigating issues and arranging for appropriate training.

Opportunity Training

Shadowing a contracted maintenance technician or craftsman can provide another training opportunity for school district maintenance personnel. These visits may occur during regular inspections or as a result of a failed component.

Sustaining a Maintenance and Custodial Training Program

Introduction

As time passes, finishes and assets are replaced. A good training program must be agile -- ready for changes and to develop or update training as required. One way to stay ahead of the curve is to maintain contact with capital planning. As facilities are being planned for construction or renovation, be prepared to discuss specific items in the plan and what training each may require. Identify whether the items are part of the school district's standards and can be included as part of the normal training plan.

As part of project planning, ensure that adequate factory training is included in the project. This should be true factory-level training and not just an orientation showing where it is and how it works. Training should include all facets of maintenance including a list of recommended parts to keep on hand. For items like building automation and fire alarm systems, training should be full maintenance and programing to the level of a certified technician. This project-specific training is required if the project is funded or reimbursed through AS 14.11 state aid. Training requirements should be incorporated in the project's bid documents. Take this training as a time to refresh your long-term staff and as new training for recently added staff.

HELPFUL HINT

Let technology and the force make training easier and less expensive

Use videos from **YouTube** to assist in training. Many manufacturers and some individuals have posted videos of maintenance procedures. Keep a library, or create a playlist, for training and refresher courses.

Use **mobile video chat** program apps to use smartphones or tablets to communicate when performing maintenance.

Use the school's **distance learning assets** for training across the district when face-to-face is not required.

Part of sustaining a training program is to set a schedule for training that works into the foreseeable future. Review individual training histories and be ready to incorporate training that may be missing. A good time for this is during personnel annual reviews. Review any new items that will require a change in training.

A school district training plan should contain or perform the following:

- A written training plan that has training for new staff, annual training, and how the need for periodic training is addressed;
- Produce at any time the scheduled maintenance training for the next year;
- Produce and review an individual's training history;

Maintenance Training

- Produce and review the prior year's training activity and attendance; and
- An efficient training program can track training on the maintenance work order system to able to track training costs and individual training time.

Capital Planning

Developing a Capital Planning Program

Introduction

Department regulations for capital planning require:

> *(5) a renewal and replacement schedule that, for each school facility of permanent construction over 1,000 gross square feet, identifies the construction cost of major building systems, including electrical, mechanical, structural and other components; evaluates and establishes the life-expectancy of those systems; compares life-expectancy to the age and condition of the systems; and uses the data to forecast a renewal and replacement year and cost for each system.*

Of the five maintenance and facility management criteria outlined in regulation, the capital planning requirement is the longest; it uses the most words. In practice, however, it's been demonstrated that a single, relatively simple spreadsheet—for each facility—can accomplish all of the required elements. Most districts utilize the department-developed Renewal and Replacement Schedule spreadsheet file to document their capital planning efforts. Many districts, especially those being served by the Southeast Regional Resource Center (SERRC), have added functions to the department's basic tool. Two of those include: multiple linked worksheets to account for different ages and renewal cycles, and data updates following the completion of capital projects. That said, capital planning is so much more than simply managing renewal and replacement spreadsheets.

The most common deficiency in capital planning seen by the department during its site assessments is its lack of use. The required data can be produced but there is a starkly apparent lack of its relevance to district processes. While there is evidence that every district is doing some amount of capital renewal, little of it springs from, or is even related to, a cohesive plan. The impact of available capital planning data on district six-year CIP plans is noticeably absent. Moving from data to a program, from develop to implement is a challenge for districts of every size. Exacerbating the issue is value question, "What good does it do?" When there are economic issues that limit resources for capital renewal and deferred maintenance, it's not uncommon to develop the attitude that capital planning is efforts are wasted. This can prove to be shortsighted if and when funding becomes available and districts find themselves not in position for available funding.

Planning

A school district cannot efficiently maintain their facilities through capital planning alone, nor can a school district manage and maintain their facilities properly without capital planning. Capital planning is, as the name implies, planning for future capital needs. But, in order to plan for those needs, the owner needs to identify the capital components, establish an expected life-span of the components, track repairs and maintenance performed during the life of the components, establish protocols for condition assessment of components, modify the life

Capital Planning

expectancy based on condition, and plan for the eventual replacement or rehabilitation of the component.

The first step in establishing a capital planning program is to identify what items the school district intends to include in its plan. Statute ~~says~~ indicates electrical, mechanical, structural, and other components of facilities owned or operated by the school district; in other words, the physical buildings and grounds. This is the minimum to satisfy state statute, but a program that properly serves the school district should also include items like vehicles, grounds equipment, and other capitalized equipment. The planning part of the process is the most important part of establishing a capital planning program and needs to be thorough in the items to include. Under "grounds", is playground equipment included by components: play structures, swings, free standing slides, etc.? Should it also include paving and other hard surfaces? In mechanical, boilers and fans are obvious items, but consider pumps, VAV boxes, day tanks, expansion tanks, etc. As a school district begins planning it needs to establish the criteria of what a capital component is and what is not.

The next step in establishing the program is uniquely identifying a component from others in order to track its condition and work already performed. The identifying asset number for a particular object should be assigned in the maintenance management program. Some parts of the identifying number and the record keeping of the item should be able to include and sort by the following items that are important to capital planning:

1. Location (facility, room, etc.);
2. Date placed in service;
3. Make, model;
4. Life expectancy, date of replacement, and date of review;
5. Estimated cost of replacement;
6. All work orders including repairs, PM inspections. Include descriptions and costs; and
7. Date removed from service and identifier of replacement.

There is much more information that a good maintenance program should have available, but these elements are critical for effective capital planning. The first is obvious, recording what school a component is associated with, additionally, identifying a specific room is helpful to physically locate the component; sorting by school also assists in evaluating capital needs by facility. Date in service and a component's make and model helps to establish expected life and when a school district can anticipate future needs. Date of review is when school district personnel begin to review the history of repairs and preventive maintenance inspections to possibly adjust the date of replacement. The date of replacement shows that it is no longer in service and including the new component identifier tracks what replaced the item.

Capital Planning

Implementing a Capital Planning Program

Introduction

Capital planning does not happen in a vacuum. The identification and scheduling of maintenance is performed through maintenance management. If it can have an effect on energy efficiency, then tracking performance is important. Many items involve custodial operations -- from being the on-site eyes to possibly changing filters or general cleaning. And finally, the proper training on maintaining the component has a large impact on whether the component meets, or possibly exceeds, the expected life. Below are steps and discussion on how to plan a school district's capital planning program, how to implement it, and how to sustain it into the future.

~~Now that~~Once all of the capital components and equipment have been identified, tagged, and put into the maintenance management program, the day-to-day (or year-to-year) part begins. As the components start to reach their expected life, capital planning begins to review the records of repairs and inspections and makes adjustments to the replacement schedule. An example of the flow of information and decision making is as follows:

Boiler 001 at school ABC was installed with the construction of the school in 1990. Part of its O&M information is that it is expected to be replaced at 30 years and reviews to begin at 25 years. In 2015, the maintenance program puts the boiler on the review list and capital planning begins review. As part of the review, capital planning reviews the scheduled inspections performed twice a year and the scheduled cleaning, maintenance, and tuning performed once a year. Also reviewed are all repair work orders for scope of repairs, frequency, and costs. The boiler condition is discussed with the boiler technician(s) and maintenance manager. After discussion, it is decided whether the replacement should be done sooner, at the scheduled date, or if the boiler is in a condition that its useful life can be extended. At the same time the cost of replacement is adjusted to reflect the current cost of replacement. Review is performed again at 27 years.

If an asset is not performing well and does not appear to be able to meet its expected life, the technicians doing repairs and inspections can request an earlier review of the asset. The process of review starts and, if needed, a new replacement date is assigned and planned for.

After all scheduled reviews are performed, a report is produced by facility that shows replacement needs for the next six years and the expected costs. The person(s) deciding on the final six-year capital improvement plan review the replacement report and put together projects for the plan that may combine related items or stand alone as a single project. In the example above, all three boilers are scheduled for replacement and one project is put forward for boiler replacements; it may include other equipment reaching replacement age, like pumps, expansion tanks, etc.

Sustaining a Capital Planning Program

Introduction

As a school district's capital planning program matures, there will be upgrades, component replacements, new facilities, and maybe facilities being removed from the school district. Planning the process of managing the data for these instances will help to smoothly update the system. One challenge is when an asset is transferred from one facility to another. This is usually capitalized equipment that can be easily moved like vehicles, grounds equipment, or educational equipment such as smartboards. Scheduled PM inspections should catch that the equipment is not where it should be per the asset record. Once the asset is located, it can be reassigned in the record or returned.

Another situation is where an asset has reached its end of useful life and is not of a value to be considered a capital improvement project. An example would be a replacement of a heat circulation pump with a value of a few thousand dollars plus labor. When writing a work order for replacement, either to be performed in-house or by contractor, it is best to assign the new asset number in the work order and order both the pump and asset tag. When the work is complete, the out-of-service date is registered with the old asset and a placed-in-service date is registered to the new asset. The O&M manuals can be electronically made part of the new asset's file and the preventive maintenance schedule can be initiated.

HELPFUL HINT

Involve consultants in the asset replacement strategy

During design identify assets being replaced and assign the new asset numbers and include them in the equipment schedules. Example:

BOILERS

ID	Old Asset Number	New Asset Number	Manufacturer/Model	In-Service
B-1	03MC02OB01	03MC02OB03	Wiel-Mclain Model 886	06/02/1990
B-2	03MC02OB02	03MC02OB04	Wiel-Mclain Model 886	08/21/2018

This shows that the asset being retired is identified and the new asset number is assigned. For new construction, only the new asset number is shown.

When a large project replaces many assets, it is best to start early in planning and design stages to coordinate asset replacement strategies. At this point involving the consultants, the maintenance management, and capital planning will make the process smoother. Capital planning and the consultants identify which assets are being replaced and maintenance management assigns the new asset numbers and prepares the old assets for retirement in the system. As the project begins, the contractor submits documents on the proposed replacement/new assets. During submittal review, if the submittal is approved, maintenance management inputs data on make/model, preventive maintenance schedule, maintenance parts, and expected life from the submittal documentation. When O&M manuals are provided electronically, the manuals can be attached to the asset file in the CMMS.

Capital Planning

Capital asset management is not a stand-alone operation. It takes coordination with maintenance management, maintenance technicians, maintenance mangers, and the committee that creates and reviews capital improvements.

[BELOW ARE POTENTIAL AREAS OF CONTENT UNDER CONSIDERATION]

TOOLS -

1. Six-year plan: Department has basic template for use in documenting project priority, category, name/scope and cost.

2. DEED provides a basic spreadsheet tool (the Renewal and Replacement Schedule) to assist school districts in capital planning. It identifies 26 systems, calculates basics life expectancies, and estimates costs based on facility value (typically insurance appraisal value). Discussion of the plan should also include identification of funding sources. Projects anticipated to be funded with state aid will have a school district match component; what is the intended funding stream for the school district portion of the project costs? If all projects in first year of the six-year plan were to receive funding, will the school district be able to provide its required match?

3. TIPS for presenting to the school board or capital planning committee.
   Not helpful to only have "emergent districtwide" projects. (In "compliance" area of Preventive Maintenance Handbook, note that application scores may be marked down in "capital planning" if no specific out-years projects are identified.)

4. STATUTES
   Specific statute, AS 14.08.101(7), requiring school board approval of six-year plan.

Additional Considerations

Managing Contracted Staff and Privatized Activities

[Content to be developed.]

Evaluating Your Maintenance Program

[Content to be developed.]

Environmental Safety

[Content to be developed.]

—remain as good as new for as long as practicable?"

Portable Devices in the Maintenance Work Flow

[Content to be developed.]

Electronic Operations & Maintenance Manuals

[Content to be developed.]

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Appendices

Appendix A

Sample Systems and Components Inventory List

Foundation and Substructure

- Footings
- Foundation walls
- Slab/beams on grade
- Piling/Posts
  - thermopiles
- Reinforcing
- Connectors
- Waterproofing
- Insulation
- Underdrains

Superstructure

- Columns
- Beams
- Rigid frames
- Floor structure
  - joists
  - deck/slab/sheathing
  - ramps
- Roof structure
  - trusses
  - deck/slab/sheathing
- Monolithic bearing walls
- Stairs and railings
- Structural bracing
- Welds/connectors

Roof Systems

- Roofing
- Insulation
- Paving and ballast
- Curbs/supports
- Expansion/seismic joints
- Drains, gutters and d.s.
- Drywells
- Flashing and trim
- Fasteners
- Snow stops
- Roof openings

Exterior Wall Systems

- Wall construction
- Cladding/sheathing
- Doors
  - frame
  - door unit
  - hardware
- Glazing systems
  - frame
  - glazing
  - hardware
  - curtain walls
  - storefronts
- Balcony walls/railings
- Louvers and screens
- Expansion/seismic joints
- Insulation
- Protective coating
- Sealants

Interior Construction

- Fixed partitions
- Demountable partitions
- Retractable partitions
- Doors
  - frame
  - door unit
  - hardware
- Glazing systems
  - frame
  - glazing
  - storefronts/entrances
- Interior finishes
  - carpet
  - resilient tile/sheet
  - ceramic/clay tile
  - terrazzo
  - paint
  - vinyl/fabric wall cover
  - wood
  - metal panels

Appendix A - Sample Systems and Components Inventory List

- Ceiling system
  - suspension grid
  - acoustical units
  - soffits (metal/gyp.)

Specialties
- Toilet partitions
- Display boards
- Projection screens
- Display cases
- Lockers
- Flag poles

Conveying Systems
- Elevators
- Moving stairs/walks
- Dumbwaiters
- Pneumatic tube
- Lifts(material/personnel)

Heating Systems
- Boilers
- Furnaces
- Burners
- Fuel tanks & distribution
- Heat transfer equipment
  - heat exchangers
  - coils
- Terminal/package units
- Fin tubes/radiators
- Heating accessories
  - dampers/draft control
  - breeching and ductwork
  - stacks
  - insulation
  - piping
  - valves

Cooling Systems
- Condensing units
- Compressors
- Heat exchangers
- Packaged A/C units
- Chillers
- Absorption units

Air Handling Systems
- Air handling units
- Unit ventilators
- Fans
- Inlets/outlets
- Ducting systems
  - dampers
  - filters
  - mixing boxes
  - sound attenuators
- Humidifiers
- Dust collection systems

Mechanical Controls
- Compressors
- Pneumatic valves/levers
- Pneumatic tubing
- Electronic controls

Plumbing Systems
- Cold water piping
- Water heater
- Hot water piping
- Pumps
  - sewage lift
  - water booster
  - circulating
  - sump
- Valves and traps
- Insulation
- Plumbing fixtures
  - sinks and faucets
  - toilets/urinals
  - coolers/drinking fountains
  - exterior hose bibs
- Waste vents
- Waste piping
- Septic tanks

Appendix A - Sample Systems and Components Inventory List

Fire Protection/Suppression Systems

- Sprinkler piping
- Backflow preventers
- Sprinkler heads
- Fire extinguishers
- Fire hose system
- Standpipe connection
- Fire pumps
- Grease hood extinguisher

Power Generation and Transmission

- Generators
- Engines/turbines
- Transfer switches
- Transformers
- Service wiring
- Substation
- Switchgear
- Bus ducting
- Overcurrent protection

Power Distribution Systems

- Main distribution panel
- Wiring
- Conduits
- Raceway
- Cable trays
- Distribution panels
- Electrical receptacles
- Circuit breakers
- Baseboard heaters
- Motors/fans
- Heat trace

Lighting Systems

- Fixtures
  - fluorescent fixtures
  - incandescent fixtures
  - HID fixtures
- Wiring
- Lighting panels
- Emergency lighting
- Standby lighting
- Exterior lighting

Signal Systems

- Computer data
- Public address
- Television
- Telephone
- Clock system
- Satellite delivery system
- Fire alarms
- Fire door hold-opens
- Security alarm/devices

Landscaping Systems

- Irrigation
- Tree/shrub plantings
- Flower bed plantings
- Turf/lawn
- Walks/plazas

Playfields and Playground Systems

- Football fields
- Baseball/softball fields
- Hard surface courts
- Hockey/skating rinks
- Playdecks
- Swings
- Climbing toys
- Safety mats
- Gravel and containment
- Markings/painting

Vehicular Systems

- Parking lots
- Roads/drives
- Curbs
- Fire lanes

Site Utilities

- Fuel tanks
- Fuel distribution piping
- Storm drainage
- Fire hydrant systems
- Electrical power
- Pole-mounted lighting

Appendix A - Sample Systems and Components Inventory List

Equipment

- Furnishings
  - classroom furniture
  - seating
  - rugs and mats
- Fixtures
  - window treatments
  - artwork
  - vending
- Equipment
  - waste handling
  - loading dock
  - parking equipment
  - postal
  - food service
  - woodworking shop
  - auto/engine shop
- Special construction
  - vaults
  - swimming pools
  - acoustical enclosures
  - raised computer flooring

Appendix B

Anticipated Life Expectancies (Renewal Schedule)

System Life and Cost Data Sheet

	System Life Expect
Site Improvements	25
Site Utilities	40
Foundation/Substruct.	50
Superstructure	50
Exterior Wall System	25
Exterior Windows	30
Exterior Doors	20
Roof Systems	20
Interior Partitions	50
Interior Doors	30
Interior Floor Finishes	15
Interior Wall Finishes	25
Interior Ceiling Finishes	25
Specialties	40
Conveying Systems	40
Plumbing piping	30
Plumbing Fixtures	30
Fire Protect./Suppres.	30
HVAC Distribution	40
HVAC Equipment	30
HVAC Controls	20
Electrical Serv./Gen.	40
Electrical Distribution	50
Electrical Lighting	25
Special Electrical	15
Equip and Furnishings	25

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Appendix C

Facility Funding Formulas

[To Be Developed]

Appendix D

Checklists

District Preventative Maintenance Program Review

District:
Review Year: Site Visit Date:

Item	Requirement	Approved	Comments
	Maintenance Management		
A1	Provide copies of work orders of varying types and status.	☐	
A2	Report: Total maintenance labor hours collected on work orders by type of work (scheduled, corrective, operations support, etc.) vs. labor hours available—by month for previous 12 months.	☐	
A3	Report: Scheduled and completed work orders—by month for previous 12 months.	☐	
A4	Report: Number of incomplete work orders sorted by age (30, 60, 90 days, etc.) and status (deferred, awaiting materials, scheduled, etc.)—by month for the previous 12 months.	☐	
A5	Report: Comparison of scheduled maintenance work order hours to unscheduled maintenance work order hours—by month for previous 12 months.	☐	
A6	Report: Monthly trend data for unscheduled work orders showing both hours and numbers of work orders—by month for the previous 12 months.	☐	
A7	Report: Planned maintenance activity report—by facility for next 3 months.	☐	
A8	Report: Completed maintenance activity (work orders) including labor and material costs—by facility for previous 3 months.	☐	
	Energy Management		
B1	Provide a written energy management plan.	☐	
B2	Reports: Consumption data for each building, each utility [e.g., fuel oil, electricity, natural gas, LPG, water, etc.]—by month for the previous 12 months.	☐	
	Custodial Program		
C1	Provide a written custodial plan that is building-specific and describes both the frequency (schedule) and level of custodial care for each facility.	☐	
	Maintenance Training		
D1	Provide a schedule of planned training for both custodial and maintenance personnel—for the current or upcoming school year.	☐	
D2	Provide a record of training describing type and duration of training—by individual for current school year.	☐	
	Renewal and Replacement (R&R) Schedules		
E1	Provide a Renewal/Replacement Schedule (detailed to at least EED's 26 systems) for each permanent building over 1000sf.	☐	
E2	Provide information that supports that the data in the R&R schedules was developed based on system condition assessments.	☐	
	Fixed Asset Inventory System (FAIS)		
F1	Report: Report of fixed asset, date acquired, location and estimated period of service.	☐	

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Appendix D - Checklists

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(a) For a district to be eligible for state aid under AS 14.11.011, the chief school administrator of the district must certify, on a form provided by the department, that the district has, and is in compliance with, a facility management program that addresses the following five elements of facility management, including maintenance management:

(1) a maintenance management program that is a formal system that records maintenance activities on a work order basis and tracks the timing and costs, including labor and materials, of maintenance activities in sufficient detail to produce reports of planned and completed work;

Mandatory

- ☐ Show that your system for can recording all maintenance activities on a work order basis and how a work order is handled from its creation to completion?
- ☐ Show your maintenance personnel performed no activities this week or this month not recorded on a work order?
- ☐ Show a record of your work orders that track all of your maintenance activities according to typical categories such as preventive, routine, emergency and operations?
- ☐ Generate a report of your planned maintenance activity for the next quarter that shows the timing (i.e., schedule) and anticipated costs, including labor and materials, of that work?
- ☐ Produce a report covering the previous three months of all maintenance activities and their costs, including labor and materials broken out by typical maintenance categories such as preventive, routine, emergency and operations?
- ☐ Show a report of planned versus completed maintenance activity for each facility by work order?

Best Practice

- ☐ Show that assets are identified for tracking purposes to the component level?
- ☐ Demonstrate how the data collected is used in the day-to-day management program?

(2) an energy management plan that includes recording energy consumption for all utilities on a monthly basis for each building;

Mandatory

- ☐ Produce a monthly record of energy consumption for each utility by building?
- ☐ Demonstrate that each building over 1000 square feet is separately measured each month.
- ☐ (If this is not practical at every site, tell what you do instead.)

Appendix D - Checklists

4 AAC 31.013 PREVENTIVE MAINTENANCE AND FACILITY MANAGEMENT COMPLIANCE TEST
Page 1

Best Practice

- ☐ Show comparison of energy consumption in each building over multi-year period.
- ☐ Identify causes of increased or decrease energy consumption.

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(3) a custodial program that includes a schedule of custodial activities for each building based on type of work and scope of effort;

Mandatory

- ☐ Produce a copy of your written custodial plan at each site showing a schedule of custodial activities?
- ☐ Show that your plan for each building includes the type of work (i.e., the activity needed for each surface or equipment item) and the scope of effort (i.e., the frequency of care for each type of work)?

Best Practice

- ☐ Demonstrate the district's plan has been made available to all custodial staff, principals, and management personnel?
- ☐ Demonstrate how the plan transfers to custodial work being done at the site?
- ☐ Show that the program has included in a scope of effort the quantity (e.g., square feet of carpet, number of toilet fixtures, etc.)?
- ☐ Custodial plan shows areas of each custodians responsibility.

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(4) a maintenance training program that specifies training for custodial and maintenance staff and records training received by each person; and

Mandatory

- ☐ Show a written training plan or training schedule that addresses annual training goals?
- ☐ Produce a schedule of planned training for the coming year?
- ☐ Produce a record of training activities by individual custodian and maintenance staff?
- ☐ Show training records for last year?

Best Practice

- ☐ Track maintenance training through work orders on CMMS?

Appendix D - Checklists

4 AAC 31.013 PREVENTIVE MAINTENANCE AND FACILITY MANAGEMENT COMPLIANCE TEST
Page 1

(5) a renewal and placement schedule that, for each school facility of permanent construction over 1,000 gross square feet, identifies the construction cost of major building systems, including electrical, mechanical, structural and other components; evaluates and establishes the life-expectancy of those systems; compares life-expectancy to the age and condition of the systems; and uses the data to forecast a renewal and replacement year and cost for each system.

Mandatory

- ☐ Provide a Renewal & Replacement (R&R) Schedule for each permanent building over 1000 square feet in size?
- ☐ Demonstrate that major building systems are identified at least at the level of the 26 systems used on the DEED renewal and replacement schedule?
- ☐ Show information that supports the data in the R&R schedule was developed based on on-site assessments?

Best Practice

- ☐ Show how these schedules are being used by the district to formulate capital plans?
- ☐ Show, for buildings with major additions of different ages, that separate R&R schedules have been created?
- ☐ Demonstrate that the R&R schedules are updated each year?
- ☐ Provide a site-by-site or districtwide forecast of renewal cost by fiscal year?

Appendix E

Definitions

Component

A part of a system in the school facility.

Component Repair or Replacement

The unscheduled repair or replacement of faulty components, materials, or products caused by factors beyond the control of maintenance personnel.

Custodial Care

The day to day and periodic cleaning, painting, and replacement of disposable supplies to maintain the facility in safe, clean and orderly condition.

Deferred Maintenance

Custodial care, routine maintenance, or preventive maintenance that is postponed for lack of funds, resources, or other reasons.

Major Maintenance

Facility renewal that requires major repair or rehabilitation to protect the structure and correct building code deficiencies, and shall exceed $25,000 per project, per site. It must be demonstrated, using evidence acceptable to the department that (1) the school district has adhered to its regular preventive, routine and/or custodial maintenance schedule for the identified project request, and (2) preventive maintenance is no longer cost effective.

Preventive Maintenance

The regularly scheduled activities that carry out the diagnostic and corrective actions necessary to prevent premature failure or maximize or extend the useful life of a facility and/or its components. It involves a planned and implemented program of inspection, servicing, testing and replacement of systems and components that is cost effective on a life-cycle basis.

Renewal or Replacement

A scheduled and anticipated systematic upgrading of a facility system or component to rehabilitate it to a renewed functioning standard.

System(s)

An assembly of components created to perform specific functions in a school facility, such as a roof system, mechanical system or electrical system.

Note: The above definitions are those adopted by the Bond Reimbursement and Grant Review Committee April 18, 1997.

Appendix F

Bibliography of Maintenance Publications

[To Be Developed]

Appendix G

Standard for a Clean Classroom

[To Be Developed]

Appendix H

Master Custodial Schedule

[To Be Developed]

Life Cycle Cost Analysis Handbook

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Acknowledgements

Thanks to current staff of the Facilities section of DEED for their assistance in producing and editing this 2nd Edition and to past staff for their assistance with the first edition

Thanks also to the Bond Reimbursement and Grant Review Committee members who reviewed the publication in its final form.

Table of Contents

Introduction

For years, the architecture and construction industries have focused on two primary concerns in the creation of buildings. The first, of utmost importance to architects, is the design of a building. Is the building enjoyable to view and occupy? Does the organization of spaces enhance the user's program? The client expects an architect to be able to design a building that satisfies their aesthetic and functional goals.

The second concern, the primary focus of contractors, is the construction of a building. How will the building be built? How much will the building cost? The client expects a contractor to be able to construct a sound building for the estimated construction cost.

These are typically the primary concerns of a client when the idea of constructing a building is addressed, so it is no surprise that architects and contractors focus their efforts to this end. Granted, these are significant concerns; however, they are not the only concerns that should be addressed when planning for the future.

A third concern that is receiving more attention as building owners investigate the economics of facility management, is the cost of building operations over the life of a building. The combination of economic theory and computer technology allows for a more sophisticated approach to the design and construction of a facility than ever before. Instead of merely looking at the facility in terms of cost to design and build, owners can broaden their perspective to include operations, maintenance, repair, replacement, and disposal costs. The sum of initial and future costs associated with the construction and operation of a building over a period of time is called the life cycle cost of a facility.

The *National Institute of Standards and Technology (NIST) Handbook 135, 1996 edition*, defines **Life Cycle Cost (LCC)** as "the total discounted dollar cost of owning, operating, maintaining, and disposing of a building or a building system" over a period of time. Life Cycle Cost Analysis (LCCA) is an economic evaluation technique that determines the total cost of owning and operating a facility over period of time.

Life Cycle Cost Analysis can be performed on large and small buildings or on isolated building systems. Many building owners apply the principles of life cycle cost analysis in decisions they make regarding construction or improvements to a facility. From the homeowner who opts for vinyl siding in lieu of wood to the federal highway commission that chooses concrete paving over asphalt, both owners are taking into consideration the future maintenance and replacement costs in their selections. While initial cost is a factor in their decisions, it is not the only factor.

The guidelines incorporated in this handbook have been developed to assist Alaskan school districts, their consultants, and communities in evaluating the life cycle cost of school construction decisions. The guidelines are based on AS 14.11.013, which directs the Department of Education & Early Development (DEED) to review projects to ensure they are in the best

interest of the state, and AS 14.11.014, which stipulates the development of criteria intended to achieve cost-effective school construction.

In response to these legislative directives, the department evaluates all school construction and major maintenance grant requests based on their initial and long-term costs, i.e. their life cycle cost. This handbook establishes the Life Cycle Cost Analysis technique and criteria by which educational facility construction alternatives are to be evaluated. It is important to note that the usefulness of a LCCA lies not in the determination of a total cost of a project alternative, but in the ability to compare the cost of project alternatives and to determine which alternative provides the best value per dollar spent.

Terminology of Life Cycle Cost Analysis

Life Cycle Cost Analysis is an essential design process for controlling the initial and the future cost of building ownership. LCCA can be implemented at any level of the design process and can also be an effective tool for evaluation of existing building systems. LCCA can be used to evaluate the cost of a full range of projects, from an entire site complex to a specific building system component. The Department of Education & Early Development has been charged with the responsibility of determining if a school capital project is in the best interest of the State of Alaska. The effective use of LCCA is vital in demonstrating that a school district's project request is not only the best solution for the district themselves, but also for the State of Alaska.

As defined earlier, Life Cycle Cost is the total discounted dollar cost of owning, operating, maintaining, and disposing of a building or a building system over a period of time. Keeping this definition in mind, one can breakdown the LCC equation into the following three variables: the pertinent **costs** of ownership, the period of **time** over which these costs are incurred, and the **discount rate** that is applied to future costs to equate them with present day costs.

Initial & Future Expenses

The first component in a LCC equation is cost. There are two major cost categories by which projects are to be evaluated in a LCCA. They are Initial Expenses and Future Expenses. **Initial Expenses** are all costs incurred prior to occupation of the facility. **Future Expenses** are all costs incurred after occupation of the facility. Appendix A outlines the individual costs that are to be evaluated within the two major cost categories.

Defining the exact costs of each expense category can be somewhat difficult since, at the time of the LCC study, nearly all costs are unknown. However, through the use of reasonable, consistent, and well-documented assumptions, a credible LCCA can be prepared.

One should also note that not all of the cost categories are relevant to all projects. The preparer is responsible for the inclusion of the pertinent cost categories that will produce a realistic LCC comparison of project alternatives. If costs in a particular cost category are equal in all project alternatives, they can be documented as such and removed from consideration in the LCC comparison.

Residual Value

One future expense that warrants further explanation is that of residual value. **Residual value** is the net worth of a building at the end of the LCCA study period. Unlike other future expenses, an alternative's residual value can be positive or negative, a cost or a value.

Since a LCC is a summation of costs, a negative residual value indicates that there is value associated with the building at the end of the study period. Perhaps, the value is a roof that was recently replaced or it is the building's superstructure that could function for another thirty years. Whatever the reason for the remaining value, it is a tangible asset of building ownership and should be included in the LCCA.

A positive residual value indicates that there are disposal costs associated with the building at the end of the study period. Perhaps, the costs are related to abatement of hazardous material or demolition of the structure. Whatever the cause, these are costs of building ownership and should be included in the LCCA.

Zero residual value indicates that there is no value or cost associated with the building at the end of the study period. This rare instance occurs if the intended use of the building terminates concurrent to the end of the study period, the owner is unable to sell the building, and the owner is able to abandon the building at no expense.

Study Period

The second component of the LCC equation is time. The **study period** is the period of time over which ownership and operations expenses are to be evaluated. Typically, the study period can range from twenty to forty years, depending on owner's preferences, the stability of the user's program, and the intended overall life of the facility. While the length of the study period is often a reflection of the intended life of a facility, the study period is usually shorter than the intended life of the facility.

The NIST breaks the study period into two phases: the planning/construction period and the service period. The planning/construction period is the time period from the start of the study to the date the building becomes operational (the service date). The service period is the time period from date the building becomes operational to the end of the study.

Due to the uncertainty of construction funding and the short construction season, the planning/construction period can take several years to complete for an Alaskan school project. To remove the uncertainty regarding the appropriate length of the planning/construction period and to simplify the LCC calculation, the department approves of the assumption that all initial costs will be incurred in the base year of the study. Thus, all initial costs will be entered into the LCCA at their full value.

The DEED recommended study period for LCCA is twenty years. This is due to population fluctuations within communities, the ever-changing nature of educational programs, the relative life span of individual building systems, and the reduced economic impact of costs incurred after twenty years.

The department's LCCA Spreadsheet is designed for a twenty year study period. It can be used to evaluate project options for complete school facilities (new construction and renovation

projects), as well as evaluate project options related to individual building systems (roof replacement projects, mechanical upgrade projects, etc.).

Real Discount Rate

The third component in the LCC equation is the discount rate. The **discount rate**, as defined by *Life Cycle Costing for Design Professionals, 2nd Edition*, is "the rate of interest reflecting the investor's time value of money." Basically, it is the interest rate that would make an investor indifferent as to whether he received a payment now or a greater payment at some time in the future.

The NIST takes the definition of discount rates a step further by separating them into two types: real discount rates and nominal discount rates. The difference between the two is that the **real discount rate** *excludes* the rate of inflation and the **nominal discount rate** *includes* the rate of inflation. This is not to say that real discount rates ignore inflation, their use simply eliminates the complexity of accounting for inflation within the present value equation. The use of either discount rate in its corresponding present value calculation derives the same result. For simplicity, this handbook will focus on the use of real discount rates in the calculation of LCC for project alternatives.

Obviously, as the economics of the world around us change, so to does the discount rate. To establish a standard discount rate to be used in LCCA, the department has adopted the U.S. Department of Energy's real discount rate. This rate is updated and published annually in the *Energy Price Indices and Discount Factors for Life-Cycle Cost Analysis – Annual Supplement to NIST Handbook 135*. The publication can be found at https://www.nist.gov/publications/

Constant-Dollars

Just as discount rates can be defined as either real or nominal, so too can costs. The *NIST Handbook 135, 1995 edition*, defines **constant-dollars** as "dollars of uniform purchasing power tied to a reference year and exclusive of general price inflation or deflation." The NIST defines **current-dollars** as "dollars of nonuniform purchasing power, including general price inflation or deflation, in which actual prices are stated."

When using the real discount rate in present value calculations, costs must be expressed in constant-dollars. Likewise, when using the nominal discount rate in present value calculations, costs must be expressed in current-dollars. In the rare case that the inflation rate is zero, constant-dollars are equal to current-dollars and the real discount rate is equal to the nominal discount rate.

In practice, the use of constant-dollars simplifies LCCA. For example, suppose one wants to evaluate roofing products over a 30-year period. However, one roofing product must be replaced after 20 years. How much will the replacement of the roof cost in 20 years? By using constant

dollars, the guesswork of estimating the escalation of labor and material costs is eliminated. The future constant dollar cost (excluding demolition) to install a new roof in 20 years is the same as the initial cost to install the roof. Any change in the value of money over time will be accounted for by the real discount rate.

Present Value

To accurately combine initial expenses with future expenses, the present value of all expenses must first be determined. The *NIST Handbook 135, 1995 edition*, defines **present value** as "the time-equivalent value of past, present or future cash flows as of the beginning of the base year."

The present value calculation uses the discount rate and the time a cost was or will be incurred to establish the present value of the cost in the base year of the study period. Since most initial expenses occur at about the same time, initial expenses are considered to occur during the base year of the study period. Thus, there is no need to calculate the present value of these initial expenses because their present value is equal to their actual cost.

The determination of the present value of future costs is time dependent. The time period is the difference between the time of initial costs and the time of future costs. Initial costs are incurred at the beginning of the study period at Year 0, the base year. Future costs can be incurred anytime between Year 1 and Year 20. The present value calculation is the equalizer that allows the summation of initial and future costs.

Along with time, the discount rate also dictates the present value of future costs. Because the current discount rate is a positive value (inflation), future expenses will have a present value less than their cost at the time they are incurred.

Future costs can be broken down into two categories: one-time costs and recurring costs. **Recurring costs** are costs that occur ever year over the span of the study period. Most operating and maintenance costs are recurring costs. **One-time costs** are costs that do not occur ever year over the span of the study period. Most replacement costs are one-time costs.

To simplify the LCCA, all recurring costs are expressed as annual expenses incurred at the end of each year and one-time costs are incurred at the end of the year in which they occur. To determine the present value of future one-time costs the following formula is used:

$$PV = A_t \times \frac{1}{(1 + d)^t}$$

Where:

- PV = Present Value
- A_t = Amount of one-time cost at a time "t"
- d = Real Discount Rate
- t = Time (expressed as number of years)

Terminology of Life Cycle Cost Analysis

To determine the present value of future recurring costs the following formula is used:

$$PV = A_0 \times \frac{(1 + d)^t - 1}{d \times (1 + d)^t}$$

Where:

- PV = Present Value
- A_0 = Amount of recurring cost
- d = Real Discount Rate
- t = Time (expressed as number of years)

Selection of Project Alternatives

Prior to beginning a LCCA, project alternatives need to be established. These alternatives should be distinctly different and viable solutions to the facility issue being addressed. The chosen alternative is to be the most reasonable and cost-effective solution to the project problem. A minimum of three different project alternatives should be incorporated into the LCCA. A brief description of each project alternative and why it was chosen should be included in the LCCA.

Listed below are some possible project options that should be considered while selecting the most viable, reasonable, and cost-effective alternatives. These options are based on statutory language found in AS 14.11 and are included in the instructions to the annual CIP grant applications.

- Renovation and addition to the existing school facility.
- Rental and remodel of an existing local facility.
- Purchase and remodel of an existing local facility.
- Alteration of the attendance area boundary.
- Demolition of existing school and construction of a new school on the same site.
- The use of double shifting or year round school.
- Sale of existing school and construction of a new school on a new site.

Renovation and addition to the existing facility must be considered as at least one of the project alternatives for replacement school projects. A "No Action" alternative is not an acceptable project alternative. Options for the replacement of a building system could include replacement of select items, refurbishment, phasing the replacement in sections or different materials or equipment type.

An LCCA for each of the selected project alternatives is to be generated using DEED's LCCA spreadsheet or other software. The department's spreadsheet is available online at: https://education.alaska.gov/facilities/publications

Completion of the Life Cycle Cost Analysis

A LCCA can be performed a variety of ways without compromising the results if the assumptions that shape the LCCA employ reasonable and consistent judgement. Given the various methods used to perform a LCCA, the Department of Education & Early Development has outlined the basic steps for preparation of a LCCA below.

This is not intended to be the only way a LCCA should be prepared, but it is meant to clarify the department's expectations. This outline should also enable school districts to judge for themselves the quality of services provided by their consultants.

The LCCA need only address cost categories that are pertinent to the scope of the project. However, to insure accurate comparison of alternatives, all LCCA evaluations of the project alternatives must incorporate the same cost categories. The LCCA of each project alternative should include:

- A brief description of the project alternative.
- A brief explanation as to why the project alternative was selected.
- A brief explanation of the assumptions made during the LCCA.
- Conceptual or schematic documentation indicating design intent of the alternative.
- A site plan showing the integration of the proposed facility on the site and necessary site improvements (for projects involving additions or new construction).
- A detailed LCCA of the project alternative.
- A summary table that compares the total life cycle costs of Initial Investment, Operations, Maintenance & Repair, Replacement, and Residual Value of all the project alternatives.

Initial Investment Costs

The first step in the completion of the LCCA of a project alternative is to define all the initial investment costs of the alternative. **Initial investment costs** are costs that will be incurred prior to the occupation of the facility. All initial costs are to be added to the LCCA total at their full value. Appendix A lists the minimum initial investment cost categories that are to be addressed.

The level of detail of these costs should be commensurate with the level of project detail. Construction costs can be derived by using DEED's Cost Model spreadsheet, construction cost literature, contractor quotes, or professional cost consultants.

Operation Costs

The second step in the completion of the LCCA of a project alternative is to define all the future operation costs of the alternative. The **operation costs** are annual costs, excluding maintenance and repair costs, involved in the operation of the facility. Most of these costs are related to building utilities and custodial services. All operation costs are to be discounted to their present value prior to addition to the LCCA total. Appendix A lists the minimum operation cost categories that are to be addressed in the LCCA.

Operation costs that are not directly related to the building should usually be excluded from the LCCA. An example of a cost that should be excluded is the cost of office materials. While it is an annual operating expense, it has nothing to do with the operation of the building but is rather, a function of the building user.

However, should project alternatives generate different requirements of the user, it is appropriate to include these costs. An example of such a situation is the comparison of a year round school alternative with an alternative that uses the traditional nine month school season. It is quite possible that the two alternatives would have different staffing requirements. While staffing is hardly a building operation cost, it should be included in the LCCA to provide an accurate comparison of the alternatives.

Maintenance & Repair Costs

The third step in the completion of the LCCA of a project alternative is to define all the future maintenance and repair costs of the alternative. For simplicity, maintenance and repair costs have been combined in the department's LCCA spreadsheet. It should be noted that there is a distinct difference between the two costs.

Maintenance costs are scheduled costs associated with the upkeep of the facility. An example of a maintenance cost is the cost of an annual roof inspection and caulking of the building's roof penetrations. This task is a scheduled event that is intended to keep the building in good condition.

Repair costs are unanticipated expenditures that are required to prolong the life of a building system without replacing the system. An example is the repair of a broken window. This is an unscheduled event that does not entail replacement of the entire window unit, merely the replacement of the broken pane.

Some maintenance costs are incurred annually and others less frequently. Repair costs are by definition unforeseen so it is impossible to predict when they will occur. For simplicity, maintenance and repair costs should be treated as annual costs. All maintenance and repair costs are to be discounted to their present value prior to addition to the LCCA total. Appendix A lists the minimum maintenance and repair cost categories that are to be addressed in the LCCA.

Completion of the Life Cycle Cost Analysis

It is important to note that all options are not created equal. At first glance, maintenance and repair costs could be judged to be equal for all alternatives. However, the department urges districts to delve deeper and ask "Is it possible that an alternative is more susceptible to damage than others?" Facility location, age of building systems, and variations in exterior envelope area are just a few factors that should be considered when estimating maintenance and repair costs for project alternatives. Credible explanation of the district's evaluation assumptions should be included in the LCCA.

Due to the variation in the Alaskan climate and building conditions, the department recommends using actual historical data and the district's preventative maintenance plan to generate maintenance and repair costs. Since maintenance and repair costs are typically part of the school's operating budget, historical costs for this work should be available. When actual maintenance costs are unavailable, costs can be derived from use of available literature or cost consultants.

Replacement Costs

The fourth step in the completion of the LCCA of a project alternative is to define all the future replacement costs of the alternative. **Replacement costs** are anticipated expenditures to major building system components that are required to maintain the operation of a facility. All replacement costs are to be discounted to their present value prior to addition to the LCCA total. Appendix A lists the minimum replacement cost categories that are to be addressed in the LCCA.

Replacement costs are typically generated by replacement of a building system or component that has reached the end of its useful life. An example of a replacement cost is the replacement of a boiler. A boiler has a life expectancy that is shorter than that of the facility it serves. At some point it will fail and require replacement to keep the facility operational.

Since this handbook assumes the use of the constant-dollar approach to LCCA, the cost to replace a building component in the future will be the same as the current cost of the building component plus demolition costs and any alterations of existing systems required for the new component(s). Replacement costs can be derived from use of DEED's Cost Model spreadsheet, construction cost literature, contractor quotes, historical data, or cost consultants.

Residual Value

The fifth step in the completion of the LCCA of a project alternative is to define the residual value of the alternative. **Residual value**, as defined earlier, is the net worth of a building or building system at the end of the LCCA study period. This is the only cost category in a LCCA where a negative value, one that reduces cost, is acceptable.

The residual value of a facility or building system is especially important when evaluating project alternatives that have different life expectancies. An example is the evaluation of two roofing alternatives, a metal roof and a composition shingle roof.

The shingle roof has a life span of 20 years where as the metal roof is expected to last 40 years. In a LCCA over a 30-year study period the shingle roof will have to be replaced, thus incurring replacement costs. The metal roof will not require replacement; thus no replacement costs will be incurred. The residual value of each option is to be calculated as follows:

Metal Roof Residual Value = (Initial Cost) x (Age of Metal Roof/Metal Roof Life - 1)

Shingle Roof Residual Value = (Initial Cost) x (Age of Shingle Roof/Shingle Roof Life - 1)

The metal roof has a residual value of one quarter its initial cost because at the end of the study period three-quarters of its intended life will have been consumed. The shingle roof has a residual value of half its initial cost because a replacement roof was installed ten years prior. Thus, at the end of the study period, half of the *current* shingle roof's intended life will have been consumed.

The residual value of a project alternative can be established several different ways depending on level of detail available. However, project solutions that opt for a new replacement facility in lieu of renovation and addition to the existing facility should establish residual value on a building systems basis.

Finalize LCCA

Once all pertinent costs have been established and discounted to their present value, the costs can be summed to generate the total life cycle cost of the project alternative. After this has been done for all the viable project alternatives, a summary of the results should be prepared. The summary of project alternatives should compare the total life cycle costs of Initial Investment, Operations, Maintenance & Repair, Replacement, and Residual Value of all the project alternatives.

It is anticipated that the project alternative with the lowest overall life cycle cost will be the project alternative presented in the school district's Capital Improvement Project (CIP) request.

Summary

This handbook was created to assist school districts and consultants in the Life Cycle Cost Analysis of proposed educational facility construction projects. The Department of Education & Early Development is responsible for ensuring that funded projects are in the best interest of the State of Alaska and are cost-effective solutions. The submittal of realistic LCCAs assists in such a determination.

Unfortunately, not all grant applications have convinced the department that the proposed project was the best and most cost-effective solution. Problems encountered with LCCAs have ranged from faulty methodology to the use of "straw man" alternatives. To assist school districts in avoiding the problems that have surfaced in previous LCCAs, the following list of suggestions is provided:

- Evaluate all project alternatives by the same cost categories, over the same study period, using the same discount rate.
- Include only cost categories that are pertinent to the project scope. If one project alternative incurs costs in a specific cost category, that cost category must be included in all other project alternatives even if no costs are incurred.
- Use the constant-dollar approach to LCCA. This is especially important when defining Replacement Costs.
- Include demolition costs of a building component or system when calculating its Replacement Cost.
- Project alternatives that surplus buildings to the State of Alaska are required to include the cost of demolition in their LCCA.
- Project alternatives that surplus buildings to the local community are required to include the cost of hazardous material abatement in their LCCA.
- Define at least three viable project alternatives for further study. The selected alternatives should be distinctly different to cover the spectrum of possible options. A "No Action" alternative is not considered a viable project alternative.
- All project alternatives must be viable options (i.e. no "straw man" alternatives).
- Address why a project alternative is in the best interest of the State of Alaska.

Closing

The guidelines incorporated in this handbook are intended to assist Alaska school districts with the evaluation of various educational facility project alternatives using LCCA. The process of performing a LCCA will heighten understanding of the proposed project among designers and district representatives. Often, cost saving ideas are generated that can be applied to more than one alternative. These ideas can direct the final design of a project toward cost-effective construction and enhance the overall value of a project.

The use of LCCA enables projects to be evaluated by their long-term costs rather than just their initial construction cost. This requires facility owners to consider the long-term operations and maintenance costs of a facility design. The emphasis on future facility costs directly benefits school districts. A building design that minimizes future operations and maintenance expenses leaves more money in the school district's operating budget, thus making more funds available for the education of the students.

The Department of Education & Early Development believes the implementation of proper LCCA techniques will promote cost-effective design and construction practices. The long-term savings generated by these efforts will benefit students, teachers, school districts, as well as the State of Alaska.

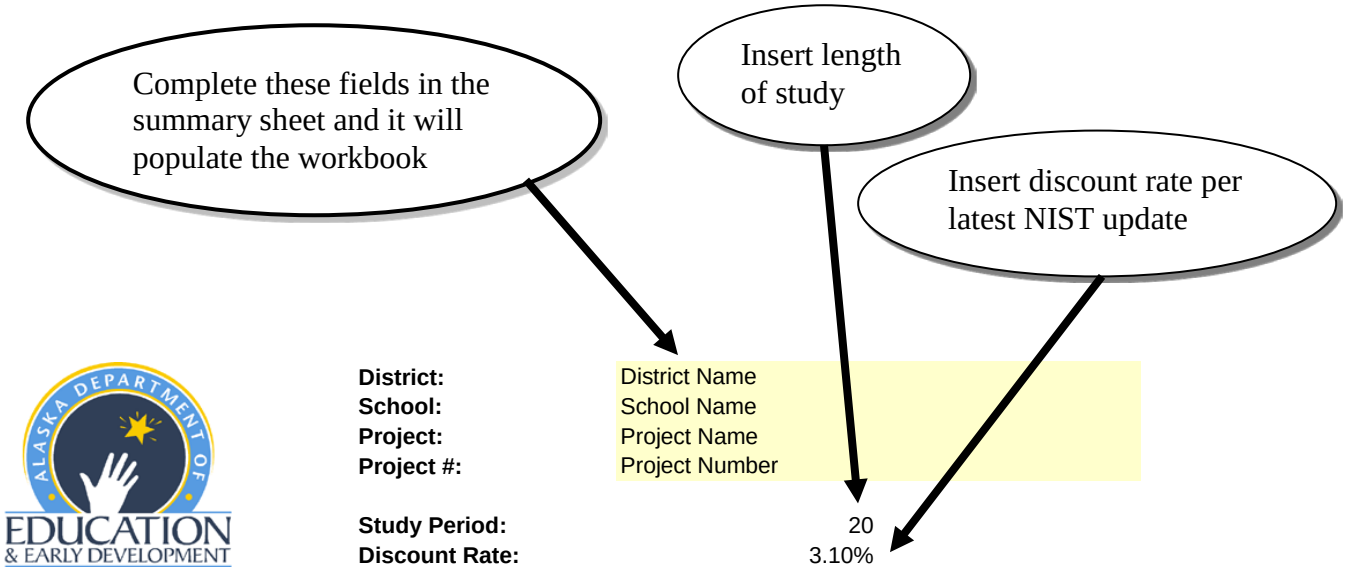
Samples

Life Cycle Cost Analysis Sample

And

Instructions

Samples



Life Cycle Costs of Project Alternatives

	Alternate #1	Alternate #2	Alternate #3
Initial Investment Cost	$0	$0	$0
Operations Cost	$0	$0	$0
Maintenance & Repair Cost	$0	$0	$0
Replacement Cost	$0	$0	$0
Residual Value	$0	$0	$0
Total Life Cycle Cost	**$0**	**$0**	**$0**
GSF of Project	1 GSF	1 GSF	1 GSF
Initial Cost/ GSF	$0.00	$0.00	$0.00
LCC/ GSF	$0.00	$0.00	$0.00

The summary will auto-fill from the Alternate 1, 2 and 3 worksheets

Samples

District: District Name
School: School Name
Project: Project Name
Project #: Project Number
GSF: 1 GSF

	Quantity	Unit	Unit Cost	Total Cost	Years	Present Value
Initial Expenses						
Initial Investment Cost (one time start-up costs)						
Construction Management	1	LPSM	$0	$0	0	$0
Land Acquisition	1	LPSM	$0	$0	0	$0
Site Investigation	1	LPSM	$0	$0	0	$0
Design Services	1	LPSM	$0	$0	0	$0
Construction	1	LPSM	$0	$0	0	$0
Equipment	1	LPSM	$0	$0	0	$0
Technology	1	LPSM	$0	$0	0	$0
Indirect/Administration	1	LPSM	$0	$0	0	$0
Art	1	LPSM	$0	$0	0	$0
Contingency	1	LPSM	$0	$0	0	$0
Future Expenses						
Operations Cost (annual costs)						
Heating Fuel	1	GALS	$0.00	$0	20	$0
Electricity	1	KWH	$0.00	$0	20	$0
Water and Sewer	1	LPSM	$0	$0	20	$0
Garbage Disposal	1	LPSM	$0	$0	20	$0
Custodial	1	LPSM	$0	$0	20	$0
Grounds	1	LPSM	$0	$0	20	$0
Lease	1	LPSM	$0	$0	20	$0
Insurance	1	LPSM	$0	$0	20	$0
Other	1	LPSM	$0	$0	20	$0
Maintenance & Repair Cost (upkeep costs…estimate on annual basis)						
Site Improvements	1	LPSM	$0	$0	20	$0
Site Utilities	1	LPSM	$0	$0	20	$0
Foundation/Substructure	1	GSF	$0.00	$0	20	$0
Superstructure	1	GSF	$0.00	$0	20	$0
Exterior Wall Systems	1	EWSF	$0.00	$0	20	$0
Exterior Windows	1	GLSF	$0.00	$0	20	$0
Exterior Doors	1	LEAF	$0.00	$0	20	$0
Roof Systems	1	RFSF	$0.00	$0	20	$0
Interior Partitions	1	PTSF	$0.00	$0	20	$0
Interior Doors	1	LEAF	$0.00	$0	20	$0
Interior Floor Finishes	1	FFSF	$0.00	$0	20	$0
Interior Wall Finishes	1	WFSF	$0.00	$0	20	$0
Interior Ceiling Finishes	1	CFSF	$0.00	$0	20	$0
Interior Specialities	1	GSF	$0.00	$0	20	$0
Conveying Systems	1	LPSM	$0	$0	20	$0
Plumbing Piping	1	GSF	$0.00	$0	20	$0

Samples

District: District Name
School: School Name
Project: Project Name
Project #: Project Number
GSF: 1 GSF

	Quantity	Unit	Unit Cost	Total Cost	Years	Present Value
Plumbing Fixtures	1	FIXT	$0.00	$0	20	$0
Fire Protection Systems	1	GSF	$0.00	$0	20	$0
HVAC Distribution	1	GSF	$0.00	$0	20	$0
HVAC Equipment	1	LPSM	$0	$0	20	$0
HVAC Controls	1	GSF	$0.00	$0	20	$0
Electrical Service/Generation	1	LPSM	$0	$0	20	$0
Electrical Distribution	1	GSF	$0.00	$0	20	$0
Electrical Lighting	1	GSF	$0.00	$0	20	$0
Special Electrical Systems	1	GSF	$0.00	$0	20	$0
Equipment & Furnishings	1	LPSM	$0	$0	20	$0
Other	1	LPSM	$0	$0	20	$0
Replacement Cost (scheduled replacement of building system or component)						
Site Improvements	1	LPSM	$0	$0	1	$0
Site Utilities	1	LPSM	$0	$0	1	$0
Foundation/Substructure	1	GSF	$0.00	$0	1	$0
Superstructure	1	GSF	$0.00	$0	1	$0
Exterior Wall Systems	1	EWSF	$0.00	$0	1	$0
Exterior Windows	1	GLSF	$0.00	$0	1	$0
Exterior Doors	1	LEAF	$0.00	$0	1	$0
Roof Systems	1	RFSF	$0.00	$0	1	$0
Interior Partitions	1	PTSF	$0.00	$0	1	$0
Interior Doors	1	LEAF	$0.00	$0	1	$0
Interior Floor Finishes	1	FFSF	$0.00	$0	1	$0
Interior Wall Finishes	1	WFSF	$0.00	$0	1	$0
Interior Ceiling Finishes	1	CFSF	$0.00	$0	1	$0
Interior Specialities	1	GSF	$0.00	$0	1	$0
Conveying Systems	1	LPSM	$0	$0	1	$0
Plumbing Piping	1	GSF	$0.00	$0	1	$0
Plumbing Fixtures	1	FIXT	$0.00	$0	1	$0
Fire Protection Systems	1	GSF	$0.00	$0	1	$0
HVAC Distribution	1	GSF	$0.00	$0	1	$0
HVAC Equipment	1	LPSM	$0	$0	1	$0
HVAC Controls	1	GSF	$0.00	$0	1	$0
Electrical Service/Generation	1	LPSM	$0	$0	1	$0
Electrical Distribution	1	GSF	$0.00	$0	1	$0
Electrical Lighting	1	GSF	$0.00	$0	1	$0
Special Electrical Systems	1	GSF	$0.00	$0	1	$0
Equipment & Furnishings	1	LPSM	$0	$0	1	$0
Other	1	LPSM	$0	$0	1	$0
Residual Value (value of facility at end of study period)						
Site Improvements	1	LPSM	$0	$0	1	$0
Site Utilities	1	LPSM	$0	$0	1	$0
Foundation/Substructure	1	GSF	$0.00	$0	1	$0
Superstructure	1	GSF	$0.00	$0	1	$0

Samples

District:	District Name
School:	School Name
Project:	Project Name
Project #:	Project Number
GSF:	1 GSF

	Quantity	Unit	Unit Cost	Total Cost	Years	Present Value
Exterior Wall Systems	1	EWSF	$0.00	$0	1	$0
Exterior Windows	1	GLSF	$0.00	$0	1	$0
Exterior Doors	1	LEAF	$0.00	$0	1	$0
Roof Systems	1	RFSF	$0.00	$0	1	$0
Interior Partitions	1	PTSF	$0.00	$0	1	$0
Interior Doors	1	LEAF	$0.00	$0	1	$0
Interior Floor Finishes	1	FFSF	$0.00	$0	1	$0
Interior Wall Finishes	1	WFSF	$0.00	$0	1	$0
Interior Ceiling Finishes	1	CFSF	$0.00	$0	1	$0
Interior Specialities	1	GSF	$0.00	$0	1	$0
Conveying Systems	1	LPSM	$0	$0	1	$0
Plumbing Piping	1	GSF	$0.00	$0	1	$0
Plumbing Fixtures	1	FIXT	$0.00	$0	1	$0
Fire Protection Systems	1	GSF	$0.00	$0	1	$0
HVAC Distribution	1	GSF	$0.00	$0	1	$0
HVAC Equipment	1	LPSM	$0	$0	1	$0
HVAC Controls	1	GSF	$0.00	$0	1	$0
Electrical Service/Generation	1	LPSM	$0	$0	1	$0
Electrical Distribution	1	GSF	$0.00	$0	1	$0
Electrical Lighting	1	GSF	$0.00	$0	1	$0
Special Electrical Systems	1	GSF	$0.00	$0	1	$0
Equipment & Furnishings	1	LPSM	$0	$0	1	$0
Other	1	LPSM	$0	$0	1	$0
Total Life Cycle of Alternate #1						**$0**

Life Cycle Cost Analysis – Example

(un-used rows hidden)

Samples

LCCA Task

Compare life-cycle costs for three roof insulation R-values to determine the most cost effective solution over a 40–year life.

Project Assumptions

- Project Location: Fairbanks
- Roof Area: 10,000 SF

	Alternate 1	Alternate 2	Alternate 3
Description		R-60 insulation under	R-80 insulation under 30 yr. EPDM
Initial Investment Costs	Cost of insulation and roof from contractor estimate, heating system base -55F design temp $165,700	Cost of insulation and roof from estimate less heating system demand reduction (-10,417btu) $178,600-$7,500	Cost of insulation and roof from estimate less heating system demand reduction (-15,625 btu) $194,800-$14,350
Energy Costs (Operational)	Energy modeling using 13,500 hdd and 75% AFUE for oil fired boiler. 818 gal/yr.	Energy modeling using 13,500 hdd and 75% AFUE for oil fired boiler 545 gal/yr.	Energy modeling using 13,500 hdd and 75% AFUE for oil fired boiler 409 gal/yr.
Maintenance and Repair	Same for all alternates	Same for all alternates	Same for all alternates
Replacement Costs	EPDM at 30 years Insulation - 50 years	EPDM at 30 years Insulation - 50 years	EPDM at 30 years Insulation - 50 years
Discount Rate NIST 2016	3%	3%	3%

Samples

District:	ABC School District
School:	ZYX Elementary
Project:	New School
Project #:	DR-xx-1xx
Study Period:	40
Discount Rate:	3.00%

Life Cycle Costs of Project Alternatives

	Alternate #1	Alternate #2	Alternate #3
Initial Investment Cost	**$165,700**	**$171,100**	**$180,450**
Operations Cost	**$56,724**	**$37,793**	**$28,362**
Maintenance & Repair Cost	**$0**	**$0**	**$0**
Replacement Cost	**$0**	**$0**	**$0**
Residual Value	**-$27,684**	**-$30,083**	**-$33,036**
Total Life Cycle Cost	**$194,740**	**$178,810**	**$175,776**
GSF of Project	10,000 GSF	10,000 GSF	10,000 GSF
Initial Cost/GSF	$16.57	$17.11	$18.05
LCC/GSF	$19.47	$17.88	$17.58

Samples

District:	ABC School District
School:	ZYX Elementary
Project:	New School
Project #:	DR-xx-1xx
GSF:	10,000 GSF

	Quantity	Unit	Unit Cost	Total Cost	Years	Present Value
Initial Expenses						
Initial Investment Cost (one time start-up costs)						
Construction	1	LPSM	$165,700	$165,700	0	$165,700
Future Expenses						
Operations Cost (annual costs)						
Heating Fuel	818	GALS	$3.00	$2,454	40	$56,724
Maintenance & Repair Cost (upkeep costs…estimate on annual basis)						
Replacement Cost (scheduled replacement of building system or component)						
Roof Systems	10,000	RFSF	$4.60	$46,000	30	$0
Roof Insulation	10,000	RFSF	$6	$58,000	60	$0
Residual Value (value of facility at end of study period)						
Roof Systems	10,000	RFSF	$4.60	$46,000	30	-$16,979
Roof Insulation	10,000	RFSF	$6	$58,000	60	-$10,704
Total Life Cycle of Alternate #1						**$194,740**

Samples

District:
School:
Project:
Project #: - -
GSF:

	Quantity	Unit	Unit Cost	Total Cost	Years	Present Value
Initial Expenses						
Initial Investment Cost (one time start-up costs)						
Construction	1	LPSM	$171,100	$171,100	0	$171,100
Future Expenses						
Operations Cost (annual costs)						
Heating Fuel	545	GALS	$3.00	$1,635	40	$37,793
Maintenance & Repair Cost (upkeep costs…estimate on annual basis)						
Replacement Cost (scheduled replacement of building system or component)						
Roof Systems	10,000	RFSF	$4.60	$46,000	30	$0
Roof Insulation	10,000	RFSF	$7	$71,000	60	$0
Residual Value (value of facility at end of study period)						
Roof Systems	10,000	RFSF	$4.60	$46,000	30	-$16,979
Roof Insulation	10,000	RFSF	$7	$71,000	60	-$13,104

Total Life Cycle of Alternate #2 **$178,810**

Samples

District:
School:
Project:
Project #: - -
GSF:

	Quantity	Unit	Unit Cost	Total Cost	Years	Present Value
Initial Expenses						
Initial Investment Cost (one time start-up costs)						
Construction	1	LPSM	$180,450	$180,450	0	$180,450
Future Expenses						
Operations Cost (annual costs)						
Heating Fuel	409	GALS	$3.00	$1,227	40	$28,362
Maintenance & Repair Cost (upkeep costs…estimate on annual basis)						
Replacement Cost (scheduled replacement of building system or component)						
Roof Systems	10,000	RFSF	$4.60	$46,000	30	$0
Roof Insulation	10,000	RFSF	$9	$87,000	60	$0
Residual Value (value of facility at end of study period)						
Roof Systems	10,000	RFSF	$4.60	$46,000	30	-$16,979
Roof Insulation	10,000	RFSF	$9	$87,000	60	-$16,057

Total Life Cycle of Alternate #3 **$175,776**

Appendices

Appendix A – Life Cycle Cost Categories

Initial Expenses

Initial Investment Cost (one time start-up costs)
- Construction Management
- Land Acquisition
- Site Investigation
- Design Services
- Construction
- Equipment
- Technology
- Indirect/Administration
- Art
- Contingency

Future Expenses

Operation Cost (annual costs)
- Heating Fuel
- Electricity
- Water and Sewer
- Garbage Disposal
- Custodial
- Grounds
- Lease
- Insurance

Maintenance and Repair Cost (scheduled & unscheduled upkeep costs)
- Site Improvements
- Site Utilities
- Foundation/Substructure
- Superstructure
- Exterior Wall Systems
- Exterior Windows
- Exterior Doors
- Roof Systems
- Interior Partitions
- Interior Doors
- Interior Floor Finishes
- Interior Wall Finishes
- Interior Ceiling Finishes
- Interior Specialties

Appendix A – Life Cycle Cost Categories

Maintenance and Repair Cost (cont.)

Conveyance Systems
Plumbing Piping
Plumbing Fixtures
Fire Protection Systems
HVAC Distribution
HVAC Equipment
HVAC Controls
Special Mechanical Systems
Electrical Service/Generation
Electrical Distribution
Electrical Lighting
Special Electrical Systems
Equipment & Furnishings
Special Construction

Replacement Cost (scheduled replacement of building systems or components)

Site Improvements
Site Utilities
Foundation/Substructure
Superstructure
Exterior Wall Systems
Exterior Windows
Exterior Doors
Roof Systems
Interior Partitions
Interior Doors
Interior Floor Finishes
Interior Wall Finishes
Interior Ceiling Finishes
Interior Specialties
Conveyance Systems
Plumbing Piping
Plumbing Fixtures
Fire Protection Systems
HVAC Distribution
HVAC Equipment
HVAC Controls
Special Mechanical Systems
Electrical Service/Generation
Electrical Distribution
Electrical Lighting Special Electrical Systems
Equipment & Furnishings
Special Construction

Appendix A – Life Cycle Cost Categories

Residual Value (value of facility at end of study period)

- Site Improvements
- Site Utilities
- Foundation/Substructure
- Superstructure
- Exterior Wall Systems
- Exterior Windows
- Exterior Doors
- Roof Systems
- Interior Partitions
- Interior Doors
- Interior Floor Finishes
- Interior Wall Finishes
- Interior Ceiling Finishes
- Interior Specialties
- Conveyance Systems
- Plumbing Piping
- Plumbing Fixtures
- Fire Protection Systems
- HVAC Distribution
- HVAC Equipment
- HVAC Controls
- Special Mechanical Systems
- Electrical Service/Generation
- Electrical Distribution
- Electrical Lighting
- Special Electrical Systems
- Equipment & Furnishings
- Special Construction

Appendix B – Quantity Abbreviations

CFSF – Ceiling Finish Square Feet: sum of all interior areas that receive a ceiling finish.

EWSF – Exterior Wall Square Feet: sum of all exterior wall surfaces excluding windows and doors but including exterior soffits.

FIXT – Plumbing Fixtures: sum of all plumbing fixtures that are connected to both supply and waste piping.

FFSF – Floor Finish Square Feet: sum of all interior areas that receive a floor finish.

GALS – Gallons: sum of annual fuel consumed for heating and electrical generation.

GLSF – Glazing Square Feet: square feet of exterior windows.

GSF – Gross Square Feet: sum of the building's interior spaces including wall area and mechanical mezzanines.

KWH – Kilowatt Hour: sum of annual electricity usage.

LPSM – Lump Sum: estimated financial allowance for a work item.

LEAF – Door Leafs: sum of the number of door leafs. Double doors count as two leafs where as single doors count as one leaf.

PTSF – Partition Square Feet: square feet of interior partitions. Exclude all exterior walls and count only one face of the partition.

RFSF – Roof Square Feet: square feet of roof surface.

WFSF – Wall Finish Square Feet: sum of all interior areas that receive a wall finish, including interior face of exterior walls.

Glossary

Constant-Dollars: dollars that have uniform purchasing power over time and that are not affected by general price inflation or deflation.

Current-Dollars: dollars that do not have uniform purchasing power over time and that are affected by general price inflation or deflation.

Discount Rate: the rate of interest that balances an investor's time value of money.

Initial Investment Cost: any cost of creation of a facility prior to its occupation.

Life Cycle Cost: a sum of all costs of creation and operation of a facility over a period of time.

Life Cycle Cost Analysis: a technique used to evaluate the economic consequences over a period of time of mutually exclusive project alternatives.

Maintenance Cost: any cost of scheduled upkeep of building, building system, or building component.

Nominal Discount Rate: a discount rate that includes the rate of inflation.

Operating Cost: any cost of the daily function of a facility.

Present Value: the current value of a past or future sum of money as a function of an investor's time value of money

Real Discount Rate: a discount rate that excludes the rate of inflation.

Repair Cost: any cost of unscheduled upkeep of a building system that does not require replacement of the entire system

Replacement Cost: any cost of scheduled replacement of a building system or component that has reached the end of its design life.

Residual Value: the value of a building or building system at the end of the study period.

Study Period: the time period over which a Life Cycle Cost Analysis is performed.

Bibliography

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American Society for Testing and Materials, *Standard Practice for Measuring Life-Cycle Costs of Buildings and Building Systems*, Philadelphia: ASTM, 1994.

Department of Education & Early Development
Division of Finance & Support Services/Facilities

Work Topics for the BR & GR Committee

As Of: April 3, 2018

BR&GR 2018 Work Items	Responsibility	Due Date
1. CIP Grant Priority Review – [(b)(1)]		
1.1. FY19 MM & SC Grant Fund Final Lists (4 AAC 31.022(a)(2)(B))	Committee	Mar 2018
1.2. FY20 MM & SC Grant Fund Initial List	Committee	Dec 2018
2. Grant & Debt Reimbursement Project Recommendations – [(b)(2)]		
2.1. Six-year Capital Plan (14.11.013(a)(1); 4 AAC 31.022(2))	Dept	Annually, Nov
3. Construction Standards for Cost-effective Construction – [(b)(3)]		
3.1. DEED Cost Model	Dept	2018
3.1.1. Model School Analysis (Allowable Costs)	Commmittee	Annually, Apr
3.1.2. Site Work + Major Maintenance Line Items	Dept	TBD
3.2. Cost Standards	Dept	TBD
3.2.1. Cost/Benefit, Cost Effectiveness Guidelines	Dept	TBD
3.2.2. Life Cycle Cost Guidelines	Dept	TBD
3.3. Commissioning	Committee	2018
3.3.1. Project Categories Requiring Commissioning	Committee	2018
3.3.1.1. Draft Regulation	Committee	July 2018
3.3.1.2. SBOE Public Comment on Regulation	Dept	Sept 2018
3.3.1.3. SBOE Action on Regulation	Dept	Dec 2018
3.3.2. Commissioning Agent Qualifications	Committee	2018
3.3.2.1. Draft Regulation	Committee	July 2018
3.3.2.2. SBOE Public Comment on Regulation	Dept	Sept 2018
3.3.2.3. SBOE Action on Regulation	Dept	Dec 2018
3.3.3. System Requirements for Commissioning	Committee	2018
3.3.3.1. Draft Regulation	Committee	July 2018
3.3.3.2. SBOE Public Comment on Regulation	Dept	Sept 2018
3.3.3.3. SBOE Action on Regulation	Dept	Dec 2018
3.4. Materials/Systems Analysis	Committee	TBD
3.4.1. Model School Building Systems	Dept	2018
3.4.2. School District Building Systems	Dept	TBD
3.5. Design Ratios	Committee	TBD
3.5.1. Climate Zones	Committee	TBD
3.5.2. Opening to Exterior Wall	Committee	TBD
3.5.3. Footprint Area to Gross Square Feet	Committee	TBD
3.5.4. Building Volume to Net Floor Area	Committee	TBD
3.5.5. Building Volume to Exterior Surface Area	Committee	TBD
4. Prototypical Design Analysis – [(b)(4)]		
4.1. *SB87 – Amendments to 14.11.014(b)(4)*	*Dept (w Cmte)*	*TBD*
5. CIP Grant Application & Ranking – [(b)(5) & (6)]		
5.1. FY20 CIP Draft Application & Instructions	Dept	Apr 2018
5.1.1. Facility Condition Survey Minimum Standards	Dept	Mar 2018
5.1.2. Life Safety/Code Rater Scoring Matrix	Dept	Mar 2018
5.1.3. Emergency Rater Scoring Matrix	Dept	TBD
5.1.4. Priority Weighting Factors Review	Dept	TBD
5.2. FY20 CIP Final Application & Instructions	Committee	Apr 2018
5.3. FY20 CIP Briefing – Issues and Clarifications	Dept	Dec 2018

6. CIP Approval Process Recommendations – [(b)(7)]

6.1.	Publication Updates		
6.1.1.	Program Demand Cost Model for Alaskan Schools	Dept	Annually, Apr
6.1.2.	Alaska School Facilities Preventive Maintenance Handbook Initial	Dept	Mar 2018
	Alaska School Facilities Preventive Maintenance Handbook Final	Committee	June 2018
6.1.3.	Life Cycle Cost Analysis Handbook - Initial	Dept	Apr 2018
	Life Cycle Cost Analysis Handbook - Final	Committee	Jun 2018
6.1.4.	A/E Services for School Construction - Initial	Dept	May 2018
	A/E Services for School Construction - Final	Committee	Aug 2018
6.1.5.			
6.2.	New Publications		
6.3.	Regulations		
6.3.1.	Facility “Clean-up” Reg Project	Dept (w/Cmte)	July 2018

7. Energy Efficiency Standards – [(b)(8)]

7.1. (None)

Projected Meeting Dates

January – July 2018 (TBD) (Teleconference), Subcommittees
March 15, 2018 (Teleconference), Work Session, PM Handbook
April 3-4, 2018 (Juneau), 1-1/2 Day, FY20 Application + LCCA
May 8, 2018 (Teleconference), A/E Services Publication & PM Handbook Final
June 14, 2018 (Teleconference), LCCA Publication Final
July 19, 2018 (Teleconference), Commissioning Regs; 4 AAC 31 Reg Clean-up
August 2018 (TBD) (Teleconference), A/E Services Publication Final
December 2018 (TBD) (TBD), Half day, CIP