

# Forum Guide To Facility Information Management:

A Resource for State and Local Education Agencies



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# National Cooperative Education Statistics System

The National Center for Education Statistics (NCES) established the National Cooperative Education Statistics System (Cooperative System) to assist in producing and maintaining comparable and uniform information and data on early childhood, elementary, and secondary education. These data are intended to be useful for policymaking at the federal, state, and local levels. The National Forum on Education Statistics (Forum) is an entity of the Cooperative System and, among its other activities, proposes principles of good practice to assist state and local education agencies in meeting this purpose. The Cooperative System and the Forum are supported in these endeavors by resources from NCES. Publications of the Forum do not undergo the same formal review required for products of NCES. The information and opinions published here are those of the Forum and do not necessarily represent the policy or views of NCES, the Institute of Education Sciences (IES), or the U.S. Department of Education (ED).

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# Foreword

The National Forum on Education Statistics (Forum) is pleased to release the *Forum Guide to Facility Information Management: A Resource for State and Local Education Agencies*. This 2018 guide includes additions and improvements to the facility data elements presented in the 2012 guide, as well as coordination with the Common Education Data Standards (CEDS) (<https://ceds.ed.gov/>), which is a set of the most commonly used education data elements to support the effective exchange of data within and across states, as students transition between education sectors and levels, and for federal reporting.

This 2018 guide is part of a series of Forum publications and online tools designed to promote good practices relating to the collection, maintenance, and use of education data.

## National Forum on Education Statistics

The work of the National Forum on Education Statistics (Forum) is a key aspect of the National Cooperative Education Statistics System (Cooperative System). The Cooperative System was established to produce and maintain, with the cooperation of the states, comparable and uniform education information and data that are useful for policymaking at the federal, state, and local levels. To assist in meeting this goal, the National Center for Education Statistics (NCES) within the Institute of Education Sciences (IES)—a part of the U.S. Department of Education (ED)—established the Forum to improve the collection, reporting, and use of elementary and secondary education statistics. The Forum includes approximately 120 representatives from state and local education agencies, the federal government, and other organizations with an interest in education data. The Forum deals with issues in education data policy, sponsors innovations in data collection and reporting, and provides technical assistance to improve state and local data systems.

## Development of Forum Products

Members of the Forum establish working groups to develop guides in data-related areas of interest to federal, state, and local education agencies. They are assisted in this work by NCES, but the content comes from the collective experience of working group members who review all products iteratively throughout the development process. After the working group completes the content and reviews a document a final time, publications are subject to examination by members of the Forum standing committee that sponsors the project. Finally, Forum members review and formally vote to approve all documents prior to publication. NCES provides final review and approval prior to online publication. The information and opinions published in Forum products do not necessarily represent the policies or views of ED, IES, or NCES. Readers may modify, customize, or reproduce any or all parts of this document.

There is no federal mandate for collecting the data elements identified in this report. The recommendations in this document are meant to serve as best practice guidelines to promote the collection of high-quality and useful public school facility data.

This guide took as its sources both current and recommended practice, and relied upon the advice of subject experts and data specialists to organize the information into a logical, accessible resource. The field of education facilities management is always changing and improving, and this guide and the data definitions associated with education facilities should continue to be revised on a regular basis.

# Acknowledgements

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# Purpose and Organization of the Guide

This guide builds upon the 2012 publication *Forum Guide to Facilities Information Management: A Resource for State and Local Education Agencies*. The content is presented in the following chapters and appendices:

**Chapter 1: Why School Facility Data Matter** reviews why school facility data are important to states, localities, and the education community for a host of critical functions, including facility planning, acquisition, construction, alteration, maintenance, and operations (including decommissioning and disposal).

**Chapter 2: Planning Facility Information Systems** recommends a five-step process that an education agency can undertake to design and develop a robust facility information system around policy goals, objectives, and indicators.

**Chapter 3: Measures of School Facility Quality** discusses commonly recognized measures that apply to policy goals, objectives, and indicators related to facility condition, adequacy of design, utilization, the natural environment, and health and wellness.

**Chapter 4: School Facility and Site Data Elements** describes a logical approach to organizing school facility and site data elements associated with facility identification, condition, design, utilization, management, and budget and finance—including a link to the Common Education Data Standards (CEDS) initiative (<https://ceds.ed.gov/>), which is a common vocabulary, data model, and suite of implementation tools to help education stakeholders understand and use comparable education data.

**Appendix A: Recommendations for Decommissioning a Facility** contains a list, created by the Saint Louis Public Schools (MO), of steps that need to be taken to decommission a facility.

**References** lists the resources used in developing the document.

**Related Resources** lists additional resources and other Forum publications.

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# Chapter 1:

# Why School Facility Data Matter

The purpose of a school facility is to provide a safe and healthy learning environment that supports the core mission of the education community. Chapter 1 reviews why school facility data are important to states and localities for a range of critical functions, including facility planning, acquisition, construction, alteration, maintenance, and operations (including decommissioning and disposal of facilities at the end of their useful life).

## The Value and Importance of Facility Information

School facility data matter because school facilities matter. There is a growing body of research that recognizes the effects of school facilities on the safety, health, and comfort of students and school staff (Maxwell 2016; Uline and Tschanen-Moran 2008; U.S. Environmental Protection Agency 2011).<sup>1</sup> Research also shows that school facilities have a direct and tangible impact on the environment and the economic development of surrounding communities (Neilson and Zimmerman 2014; U.S. Environmental Protection Agency 2016).

Adequate and appropriate learning environments are essential to successful teaching and learning, and providing high-quality instructional settings is a significant component of a school district's core responsibilities (Office for Civil Rights 2014).

School facilities serve as the setting for student learning and impact student and staff safety, health, and comfort. School facility data matter because school facilities matter.

### Impact of Facilities on Education and Health

Environmental health experts working with a large, urban school district were called in to evaluate a dance studio contaminated by mold resulting from long-term plumbing problems. The mold was so extensive that the dance teacher and a number of students developed respiratory problems that caused them to miss many days of school. These respiratory problems were so acute for the teacher—who had spent by far the greatest amount of time in the studio—that she had to leave the school. Because the school could not find and hire a replacement dance instructor, it was forced to shutter the dance program, thereby depriving its students of one of the few artistic and physical fitness opportunities available to them.

When communities, districts, states, and the federal government have accurate, timely, complete, and comparable data about the status and condition of school facilities, they make better plans and decisions—and they are able to direct spending where it will have the most beneficial effects on teaching and learning, health and safety, and the allocation of facility funding and educational opportunities.

But school districts and states face many obstacles to collecting, analyzing, using, and communicating facility data, including the availability of adequate resources for data collection, analysis, and communication. More fundamentally, however, unless the education

<sup>1</sup> For additional resources, see those cited on page 3 of the U.S. Environmental Protection Agency's 2014 publication *Energy Savings Plus Health: Indoor Air Quality Guidelines for School Building Upgrades*, available at <https://www.epa.gov/iaq-schools/printable-version-energy-savings-plus-health-indoor-air-quality-guidelines-school>.



community employs common data standards (including measures, term definitions, formulas, and data structures) at the local, state, and federal levels, it will not be possible to consistently compare data across organizations and states, or over time, as necessary to assess and improve the quality, adequacy, and equity of education facilities.

### **Who Will This Guide Help and in What Ways?**

This Guide is written to help state and local education agencies plan, design, build, use, and improve their facility information systems. The audience for this Guide is broad. It includes those who use facility data for planning, funding, maintaining, or managing school buildings, as well as people who plan and design facility information systems. The Guide may also be of interest to other stakeholders who are affected by facilities decisions, including students, parents, community members, and other parties who rely on data that describe the status and quality of school facilities.

This document can also serve as a tool for explaining the importance and complexities of education facility stewardship in the overall mission of public education. It can help facility managers communicate the need for high-quality facility data in making fiscally responsible decisions. It can also help clarify how school facilities establish the setting for teaching and learning, with a focus on the kinds of data that describe school environments, as well as information necessary to ensure transparency and accountability for capital outlay and operational spending.

Above all other uses, this document details the information needed to effectively plan, design, and implement facility data management systems. It outlines an effective, step-by-step process for designing a facility information system; provides a framework for organizing data and information; identifies a broad set of indicators and metrics that can be used to describe and evaluate facilities; and recommends data element definitions that will support the collection of high-quality facility data.

## **The Scope and Scale of School Facilities**

Almost any way you measure it, school facilities have a major impact on their communities. In 2016, our nation's 100,000 elementary and secondary public schools served more than 50 million children and adolescents and more than 6 million teachers and other school-based staff. Most students and teachers are in school buildings 5 days a week and often well beyond a 6-hour school day. School facilities are commonly used by community groups who access spaces such as gyms, classrooms, libraries, auditoriums, polling stations, and emergency shelters. These facilities also often serve as the setting for the delivery of adult and early childhood education.

According to a 2016 study, PreK-12 public schools account for nearly 7.5 billion square feet of interior space and 2 million acres of land (Filardo 2016). This means that schools represent the largest public building inventory in most communities. School districts typically have more buildings and grounds under their care than libraries, recreation departments, or local government. Moreover, the square footage of public school district facilities equals almost half the area of all commercial office space in the nation.

State and local governments spend more capital dollars on K-12 public school facilities than any other infrastructure sector except highways. According to fiscal data collected by the U.S. Census of Governments, between 1994 and 2013, public school districts spent an average of \$49 billion per year (2014 dollars) on school construction. School districts also reported that for fiscal years (FY) 2011-13, they spent an average of \$46 billion per year for "maintenance and operation of plant" (Filardo 2016).

The substantial scope and scale of PreK-12 public education infrastructure result in a comparably extensive impact on both the education enterprise and local communities. The character and quality of school facilities affect educational opportunities, community vitality, government finances, and the environment. As a result, the quality of school facility data is critical for both public and personal decisionmaking. It is important to stakeholders responsible for planning, building, and managing school facilities; those who pay for the facilities through taxes or live in the same neighborhood as them; and those deciding where to live and in which schools to enroll their children. As such, school facilities are an integral component of our public investment in education.

According to the National Center for Education Statistics, F-33 Fiscal Survey, \$53 billion was spent on capital outlay expenditures in public elementary and secondary school districts in fiscal year 2015 (NCES 2018-303).

## Facility Responsibilities in School Districts

Our nation's PreK-12 public education infrastructure consists of both the facilities (buildings) and the sites (land) that are the setting for a wide range of educational programs and support services delivered by state and local education agencies (see figure 1). In addition to classrooms, the term "school facilities" refers to a host of support facilities, including special-purpose settings such as administrative offices, gymnasiums, bus barns, warehouses, and teacher housing (particularly in rural areas).

Major Components of PreK-12 Public Education Infrastructure			
Campus		Facility	
Site	Facility		
Improved site	Unimproved site	Building or buildings	
			Schools Athletic complexes Playgrounds Performing arts centers Administrative offices Warehouses Maintenance facilities Bus lots and garages Teacher housing Multiuse centers

**Figure 1.** Our nation's education infrastructure consists of both facilities (buildings) and sites (land), sometimes together referred to as campuses, that are the setting for educational programs and support services delivered by state and local education agencies. This conceptual model serves as the framework for the data system structure recommended throughout this document. Some education agencies do not use the term "campus" or may define it in different ways in PreK-12 education settings, so use of this term is optional. An improved site is defined as land with utilities, services, or structures. An unimproved site does not have such "improved" resources available for development use.

## School District Facilities Stewardship

Adequately constructing and maintaining school district buildings and grounds (campuses) helps to ensure the safety, health, and comfort of the people in the teaching and learning environment and protect the public's substantial investment in school facilities. However, doing so in an effective and cost-efficient manner requires access to accurate and timely information about the state of the facilities and facility management efforts. As the operators and managers of school buildings and grounds, local school districts are both the primary source and primary users of school facility data. Districts often collect data on facilities design, utilization, operation, management, and costs on a periodic or ongoing

basis. Such information is collected through inspections, assessments, and surveys, as well as directly from building sensors, meters, and digital controls, which generate data about facility operations and conditions. School district stewardship of school buildings and grounds encompasses six major responsibilities (National Council on School Facilities 2015):

1. **Planning** - determining facility and site needs
2. **Acquisition and Disposal** - purchasing or disposing of land or buildings
3. **Construction** - building new, or fully modernizing, buildings
4. **Alteration** - modifying existing school facilities
5. **Maintenance** - tending to school facilities and sites
6. **Operations** - supporting facilities occupancy and site use

Facility data are essential to the good stewardship and management of school facilities—accurate and timely facilities data are necessary for managing work order systems, correcting building deficiencies, preserving capital investments, and ensuring occupant health and safety.

## Planning

The long-term stewardship of education facilities requires planning, which involves the identification of the future steps required to build, maintain, and furnish facilities that will adequately support an education agency's intended outcomes. Planning is needed for both short- and long-term facility and site responsibilities (see table 1).

**Table 1. Functions and Activities Involved in Planning**

Function or Activity	Overview
Education Facility Master Planning	The planning for enrollment, program, and community use of district-owned education facilities and other facilities. Includes the planning for attendance boundaries, closings, consolidations, openings, co-locations, and joint development.
Long-Term Capital Planning	The creation of comprehensive plans for the funding, establishment, acquisition, construction, alteration, capital maintenance, and disposal of school facilities deployed to meet a district's needs for a period typically longer than 5 years.
Short- or Near-Term Capital Project Planning	The creation of detailed plans to meet a district's needs during the upcoming 5 years. Such plans include preliminary or predesign project information such as education specifications, potential sites, facilities, budgets, and timelines.
Maintenance Planning	The planning for the routine, preventive, predictive, and emergent unscheduled tasks and minor repairs required to ensure that a facility functions according to its design and for its expected lifespan.
Operations Planning	Planning for the custodial, security, and utility services required to keep a facility clean and safe so that occupants are comfortable, healthy, and productive, as well as for the operational services required for vacant facilities and sites.
Emergency Preparedness Planning	Planning for facility-related requirements in cases of rare but catastrophic human and natural events, such as shootings, floods, hurricanes, earthquakes, or other natural disasters potentially affecting school occupants and the community.

### **Using Facility Information to Prioritize Capital Investments at the District Level**

A large urban school district recognized that it couldn't meet all of its modernization needs at one time, so it developed a transparent, data-driven process to rank its modernization needs. Based on guiding principles to direct decisionmaking, it established criteria for prioritizing capital projects that focused on the condition and functional adequacy of each campus.

To evaluate each campus, the district used campus inventory and campus conditions data from its facility information system. These data included measurements of facility condition (the facility condition index, or FCI; see chapter 3), seismic integrity, energy use intensity, existing play acreage, site density, facility security, and percentage of students in portable classrooms. The consistent collection of accurate data over time made it possible for the district to compare the needs of each of its campuses and to identify the schools with the highest needs, based on their agreed-upon criteria.

### **Acquisition and Disposal**

Acquisition includes all the activities that result in a facility or site ending up under the ownership or control of a school district; disposal refers to the steps needed to sell, lease, demolish, or otherwise dispose of a facility or site (see table 2).

**Table 2. Functions and Activities Involved in Acquisition and Disposal**

Function or Activity	Overview
Acquisition of Land	Obtaining the use of land through purchase in fee simple or through long-term lease purchase, including environmental, legal, and other activities required to make the land usable for its intended purposes.
Acquisition of Facilities	Obtaining a preexisting facility through purchase in fee simple ownership or through long-term lease purchase. Includes activities and costs associated with exercising authority for eminent domain, purchase of rights-of-way, and tax or special assessment foreclosure.
Capital Disposal	Selling, long-term leasing, or demolition of facilities or sites that are under ownership, control, or care of a school district or state.

## Construction

Construction includes all the activities related to construction of a new or replacement facility, as well as what is involved in bringing an existing facility into a “like new” or fully modern condition. These activities include the hard costs for construction, as well as the expenditures for engineering, design, and project management services that are often referred to as soft costs (see table 3).

**Table 3. Functions and Activities Involved in Construction**

Function or Activity	Overview
New Construction	Construction of a new facility, including support infrastructure both on-site and off-site, such as water, sewer, drainage, gas, power, access roads, etc. Includes all steps from planning to occupancy that are necessary to put a facility in use for its designed lifespan—generally 30-50 years, upon which comprehensive renewal would be required to gain back the learning and operational advantages of a new facility.
Replacement Construction	Construction of a replacement facility, including demolition, as well as modernization of on-site utilities, such as water, sewer, drainage, gas, power, and access roads. Includes all steps from planning to occupancy that are necessary to put a facility in use for its designed lifespan—generally 30-50 years, upon which comprehensive renewal would be required to recover the learning and operational advantages of a new facility.
Renewal of Existing Campus (Full Modernization)	Renovation of an entire campus, including all its buildings, grounds, and support infrastructure both on-site and off-site, to like-new condition (equal to a facility condition index of 15 percent or lower; see chapter 3), during a period of time not to exceed 4 years.

## Alteration

Alterations change an existing facility to support program and enrollment changes, but do not, by definition, bring the complete facility into a like-new condition or design. School facilities are long-term assets. As such, both permanent and temporary changes to enrollment capacity and design are necessary over the life of a facility to support evolving programs, activities, building codes, and number and types of users (see table 4).

**Table 4. Functions and Activities Involved in Alteration**

Function or Activity	Overview
Permanent Enhancement Alteration	A renovation or other major modification to a school campus that enhances the facility’s educational, administrative, or community functions, but is insufficient to fully modernize the entire facility and site (see Construction, above).
Permanent Capacity Alteration	A building addition or other major modification to a school campus that permanently adds or reduces capacity, but is insufficient to renew the facility (see Construction, above).
Temporary Capacity Modification	Augmentation of the capacity of a campus through the installation of portable classrooms or similar assets—along with associated support systems—that are not permanent.

## Maintenance

Facility and site maintenance refers to the routine and capital work required to keep a school or campus in such condition that it can be fully functional and continuously utilized, with acceptable energy efficiency, for its expected lifespan and intended purpose (see table 5).

**Table 5. Functions and Activities Involved in Maintenance**

Function or Activity	Overview
Operating Maintenance	The routine, preventive, predictive, and emergency tasks and minor repairs required to ensure that a facility functions according to its design and for its expected lifespan. Includes such work as scheduled inspections; record keeping; equipment servicing; replacement of lamps and filters; replacement of failed equipment components such as motors, pumps, and switches; responding to calls for emergency repairs; patching holes; and repairing furniture and fixtures. Operating maintenance is generally paid from the annual operating budget.
Capital Maintenance (and Renewal)	Major repair and replacement of one or more building systems, pieces of equipment, finishes, or components, including removal and disposal. Such system and component renewals occur more often at the end of a building system's or equipment's useful life. They serve to sustain or extend the useful life of the entire facility, but are insufficient to result in the facility's condition becoming "like new" (see the Construction section). Includes improvement of roadways and drainage; replacement of playing fields, roofs, HVAC systems, windows, and doors; structural repairs; and installation or replacement of long-life assets such as furniture, fixtures, and equipment. Capital maintenance and renewal is generally paid from the multiyear capital budget.

## Operations

Operating facilities and sites involves the delivery of all services required to keep a facility clean, safe, sanitary, and tidy, such that it offers the necessities to keep occupants comfortable, healthy, and productive. This includes the provision of utilities such as fuel, electricity, water, and sewerage; support services to assist occupants; and the disposal and recycling of unnecessary structures, equipment, and trash. Operations also incorporate all staffing, equipment, and services needed for building and occupant security. Further, it includes all activities required to close, decommission, and demolish or otherwise dispose of school facilities and sites (see table 6).<sup>2</sup>

**Table 6. Functions and Activities Involved in Operations**

Function or Activity	Overview
Utilities	The purchasing of energy, water, and waste disposal services to enable the operation of a school facility. Utilities include electricity, natural gas, liquid propane, oil, water, sewerage, recycling, and waste disposal services. Generally, this excludes telephone and internet services.
Custodial Services	The completion of all necessary, day-to-day janitorial and grounds tasks, to keep a facility sanitary, polished, and tidy. Includes trash removal, cleaning, vacuuming, mopping, waxing, pest management, weed removal, trimming, mowing, irrigating, snow and ice removal, and otherwise caring for school facilities and grounds. This also includes non-cleaning tasks such as opening the school, checking for vandalism, and identifying safety and maintenance needs.
Educator Support Services	The completion of routine and nonroutine work tasks to support occupant functions. Includes responding to educators' and administrators' requests, setting up spaces for special activities and events, ordering and delivering supplies, and management of equipment for physical education and athletic activities.
Building Security	The completion of daily tasks associated with ensuring the safety and security of occupants and visitors to the school. Includes electronic surveillance systems, recordkeeping, and contracts.
Decommissioning	The operational steps to close out district use of a school, including taking inventory; securing records; moving supplies, equipment, and furniture; weatherization; and providing security and maintenance for the vacant property.
Demolition of an Active School	The end-of-life removal of assets, including furniture and equipment. Includes spot removal of any unsafe product such as lead or asbestos, as well as cleanup of spills, mold, and other contaminants. Does not include facility disposal, environmental cleanup, or responsibilities related to acquisition, construction, or capital maintenance.

<sup>2</sup> From an accounting perspective, decommissioning, demolition, and disposal of active school facilities falls within the purview of facility operations. See appendix A for a detailed list of tasks that must be addressed to successfully decommission a facility.

## The Demand for Facility Information

While the stewardship responsibilities of school districts make them the primary users of facility data and information, they are not the only entities that need high-quality data on public school infrastructure. A wide range of other stakeholders—local governments, local communities, states, and the federal government—need accurate, timely, and appropriate facility information to carry out their varied roles and responsibilities for the governance, funding, and oversight of school facilities and sites.

### Local-Level Uses

Local communities need information about their public school buildings and grounds in order to engage in informed debate and decisionmaking regarding the use of public funds for these substantial public investments. Occupants of school buildings, such as teachers, central administration, and board members, may also expect to have access to information about their working and learning environments, as may families looking to make choices about where to live and send their children to school.

### State-Level Uses

State roles and responsibilities for PreK-12 school facilities continue to evolve—and therefore, states' interest in facility data and information also continues to evolve. Between FY 1994 and FY 2013, 38 states provided some level of direct capital funding to local school districts for elementary and secondary public school facilities (Filardo 2016). In these states, data on school facilities were necessary to inform the approval, allocation, and accountability of capital funding—although states often maintained data only on the projects that they funded, rather than on the full inventory of the state's school facilities. States that are actively addressing facilities inequities are more likely to have information systems that measure progress and support their efforts (Filardo et al.).

*Pay me now or pay me later.* We have all heard this warning and should heed it in the facilities arena. The use of timely, quality facility data produces savings over the life cycle of a building. In fact, a good facility data system increases efficiency, extends building life, and reduces operational costs. For example, when a roof is renovated or replaced as a part of routine planning, this is a predictable and budgeted capital expense; when a roof is repaired because of an unplanned leak, the expense often comes out of operational costs, the cost for repair is higher than it would have been to prevent the leak through planned renovation or replacement, and occupants' use of the facility is disrupted.

### Using Facility Information to Prioritize Capital Investments at the State Level

In many states, the majority of capital funds for K-12 campuses are generated from local tax revenues. In one state, school districts that couldn't generate as much revenue as other districts in the state successfully argued in court that the local basis for their facilities funding resulted in a violation of the constitutional mandate of a "complete and uniform system of public instruction" across the state. Thus, the court ordered that the state bring all of its K-12 school facilities up to a common set of minimum condition and adequacy standards.

To comply, the state had to maintain and monitor facility data over time so that it could keep track of the condition and adequacy of each school campus. To manage this dataset, the state hired a vendor to provide a statewide facility information system that captured data on the inventory, condition, utilization, maintenance, and capital investment of every school campus. The system generated reports that allowed the state to allocate resources in a manner that ensured equity across all districts in the state.

## **Federal-Level Uses**

The federal government is active as a sponsor of both school operations funding and the development of education data standards—and is a user of local and state school facility data.<sup>3</sup> Although there is not a federal program for capital responsibilities, the federal government contributes about 10 percent of the annual operating costs for K-12 public education (U.S. Census Bureau n.d.).<sup>4</sup> As such, school districts must report financial data on capital outlay to the National Center for Education Statistics (NCES) and the U.S. Census of Governments as part of the annual collection of government fiscal data. Moreover, the U.S. Department of Education’s Office for Civil Rights provided guidance to districts and states concerning responsibilities relating to the condition, adequacy, and equity of public schools and school facilities (Office for Civil Rights 2014). While no comprehensive information on K-12 school facilities condition, design, or utilization is regularly collected or reported at the federal level, the U.S. Government Accountability Office conducted a series of national studies in the mid-1990s on the condition of public school facilities, and NCES conducted comparable surveys over the past two decades on the condition of public school facilities (Alexander and Lewis 2014; Bahr and Sparks 2016; Chaney and Lewis 2007; Lewis et al. 2000).

### **The Need for High-Quality Facility Data**

School districts and states need timely, comparable, and accurate school facility data, but they face many obstacles to collecting it and subsequently using it to make important facilities-related decisions. Common challenges include limited resources available for data collection, analysis, and communication; evolving expectations for the data on the part of common stakeholders; and the inability to consistently compare data across organizations and states, or over time.

This document presents a proven process for developing a facility information system (chapter 2), recommendations for comparable measures (chapter 3), and a common set of definitions for needed data element components of the system (chapter 4).

<sup>3</sup>The National Forum on Education Statistics, which developed this document, is an example of federal efforts to support the quality, comparability, and utility of education data nationally.

<sup>4</sup>This is the “F-33 Fiscal Survey” of the U.S. Census Bureau’s Governments Division, available at <https://www.census.gov/did/www/schooldistricts/data/finance.html>; see also other appropriate NCES sources.

### In the Real World ... Facility Data and Budgets: Keeping Up with A District's Facilities Needs

The school district is part of a vibrant, growing community located on the outskirts of a large metropolitan area. Due to increasing enrollment and aging facilities, the Board of Education established a goal of becoming more familiar with the district's school buildings. It scheduled its second public meeting of each month at a different school site and included a tour of the facilities—including going into each classroom, exploring closets and hallways, and being briefed on mechanical equipment and grounds—as a formal agenda item.

The district's original high school building was built in the 1930s and sat at the top of a hill overlooking Main Street. It was considered to be a treasure by many in the community, but the Board's tour of the building showed that the classrooms were no longer up to current teaching standards, and the restrooms were not Americans with Disabilities Act compliant. Moreover, the auditorium had an antiquated sound system, and numerous seats were failing badly. The approach to the stage and the stage height were dangerous and unable to accommodate accessibility needs.

Over time, the Board realized that the district needed major facilities improvements, and it began the process of preparing for a capital bond ballot measure. It looked to its annual facilities assessment for data: each year an independent, outside contractor reviewed and rated a wide range of facilities components on a scale of Unsatisfactory – Poor – Fair – Good – Excellent. The district had data on years of ratings for

- ✓ school sites (e.g., grading, playfields, walkways, parking lots, landscaping, security, and fencing);
- ✓ structure and envelope (e.g., foundation, interior doors, exterior doors, siding and finishes, roof and gutters, and windows);
- ✓ interiors (e.g., floors, walls, lockers, and interior ceilings);
- ✓ equipment (e.g., HVAC, electrical, and plumbing);
- ✓ furnishings and fixtures (e.g., millwork and furniture); and
- ✓ life safety and code compliance (e.g., fire protection).

These data were used for regular maintenance and operations purposes, but were also available to inform the work of the Capital Bond Planning Task Force. The district hired an architectural firm to conduct a formal needs assessment of all district facilities. The firm talked to staff, students, and community members and used their input to create a detailed description of the district's facilities, current conditions, life expectancy, budgets, tax rates, enrollment projections, and related information.

The Board also established a Facilities Advisory Council consisting of community members, staff, parents, administrators, and regional business leaders. The Council met twice a month for a year to evaluate facility data, review the district's master plan, tour facilities, prioritize needs, narrow project scope to fit a proposed bond budget, and submit a set of facilities recommendations for Board consideration.

The district then organized five open forums and prepared factual facility data to distribute throughout the community. Adhering to local election laws, the district provided only information regarding proposed capital projects, the bond request, and election logistics (e.g., when and where to vote), and did not urge anyone to vote a certain way. The open forums were held at each school building because the bond measure would affect all facilities.

Throughout the process, the campaign referred to four key components of the bond projects that had become evident from the research, data, and analysis that the Board had supported:

- Enhancing safety and security across the district
- Maximizing space for a growing student population
- Improving parking and traffic flow around district facilities
- Evolving career and technical education programs to prepare students for the future

In the end, the data showed that the district's capital needs were compelling, and the community voted in favor of the bond. Moreover, the facility data that the district had collected over the years served as a foundation for capital planning and design once the project was underway. District leaders saw the value of high-quality facility data and continued to collect and use facility data as it occupied its new and renovated facilities.

# **Chapter 2:**

## **Planning Facility Information Systems**

A facility information system is an organized system, usually automated through the use of computing technologies and databases, designed to help collect, organize, store, analyze, and communicate information about education facilities. Chapter 2 recommends a five-step process that an education agency can undertake to design and develop a useful facility information system.

Timely access to relevant facility 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 decisionmakers involves

- the development or maintenance of a facility information system capable of collecting, organizing, storing, analyzing, and reporting relevant, timely, comparable, and accurate facility 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;<sup>5</sup>
- the presentation of those data into formats that are reasonably usable by the various stakeholder audiences;<sup>6</sup> and
- timely access to the data in printed public reports or via public websites.<sup>7</sup>

School districts and states throughout the country continue to increase their use of facility data to inform decisionmaking: to manage day-to-day operations, maintenance, and repairs as well as to engage in short-term operational planning, long-term capital planning, and master facilities planning. High-quality facility data are used to create efficiencies, save money, preserve the life of capital resources, and help decisionmakers be more transparent and accountable to education stakeholders.

<sup>5</sup> 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* at [https://nces.ed.gov/forum/pub\\_2005801.asp](https://nces.ed.gov/forum/pub_2005801.asp) and the *Forum Guide to Taking Action with Education Data* at [https://nces.ed.gov/forum/pub\\_2013801.asp](https://nces.ed.gov/forum/pub_2013801.asp).

<sup>6</sup> For more information about data presentation, see the *Forum Guide to Data Visualization: A Resource for Education Agencies* at [https://nces.ed.gov/forum/pub\\_2017016.asp](https://nces.ed.gov/forum/pub_2017016.asp).

<sup>7</sup> For more information about improving access to education websites, see the *Forum Guide to Ensuring Equal Access to Education Websites: An Introduction to Electronic Information Accessibility Standards* at [https://nces.ed.gov/forum/pub\\_2011807.asp](https://nces.ed.gov/forum/pub_2011807.asp).

But how does an education agency provide high-quality, comparable facility data to data users in a timely manner? The short answer is by developing a robust facility information system. The process begins with constructing a team of knowledgeable people who will develop the system and oversee its ongoing maintenance and refinement over time.

## Build a Project Team

Planning and implementing a facility information system requires the expertise of a broad range of organizational resources, including staff who work with facilities or who provide, collect, maintain, analyze, report, or use facility data. A commitment from the organization to engage the full spectrum of potential facility stakeholders during the planning process will promote a sense of ownership in the system and enhance the likelihood of its success and usefulness. As such, many organizations have found it beneficial to solicit input from representatives of the following stakeholder groups:

- **Facilities operations and maintenance personnel** - the district staff and contractors who use facility data in their day-to-day work, including custodians, repair workers, building engineers, and risk management and security personnel, as well as clerical personnel who capture or enter data on such things as the workflow of maintenance staff or contractors, and supervisors who approve work or overtime requests.
- **Facility management staff** - the school business officers, finance staff, facility directors, and management personnel who use data to oversee facilities or present information to the public, school boards, superintendents, or other agencies regarding facility needs, uses, costs, and conditions.
- **Capital program staff** - the education facilities planners, business managers, architects, design engineers, capital budget and procurement officers, auditors, and project managers who approve payment draws for capital project contractors.
- **Information managers** - the data management staff and other district personnel or contractors who manage and oversee the quality and functioning of the organization's information systems, data governance, data management protocols, user training, or user support, as well as information technology staff who upload and integrate facility data with other education data.
- **Researchers, analysts, and communications officers** - the staff from the district's research and evaluation division, research staff and partners, and staff working with senior-level officials who prepare reports generated from data.
- **Other agencies** - the representatives from local and state government agencies, including municipal government and education agency staff who are involved in facility financing, budgeting, law enforcement, and corresponding oversight responsibilities.
- **Facilities users** - the representatives of facility occupants, including teachers, students, other staff, and community partners who use space after school hours or who share school space during school hours. This includes school administrators, school board members, and interested members of the public, including parents.
- **General public** - the representatives of the civic community engaged in issues of school quality and equity, good government, and public accountability.

Once a facility data team has been assembled, the organization can expect that its facilities stakeholders will have a range of perspectives to share regarding the facility information system's functional requirements—that is, what people need the facility information system to do for them. While there may be disagreement about the vision for the facility information system and, in some cases, resistance to changing how data are currently managed, when the organization

makes a point of listening to the opinions of those who will be affected by the new processes, it minimizes the likelihood of obstacles to the change process. Promoting ownership of the information system in this manner will enhance its eventual success and usefulness.

Planning or improving a district's or state's facility information system must be a collaborative effort, but it should be led by a project manager who is assigned to the task and given proper resources. The project manager should lead and drive the work, while being accountable to the stakeholder team and agency leadership.

## Apply a Strategic Process for Developing the System

Once an organization has established a project leader and team of representative stakeholders, the following five operational steps will help it develop its facility information system in a thorough, effective, and efficient manner:

- Step 1** - Describe the information and data processes currently in place.
- Step 2** - Determine the purpose of the facility information system.
- Step 3** - Develop framework of policies, objectives, and indicators.
- Step 4** - Develop a written program of technical requirements.
- Step 5** - Develop or procure a facility information system that meets the requirements.

### **Step 1: Describe the Information and Data Processes Currently in Place**

Every school district has a facility information system of some sort. In some districts, there may be an informal system that depends heavily, or entirely, on the years of experience and knowledge of individual school facilities managers and their school-based custodians and engineers. There may also be a system of paper files and electronic spreadsheets on desktop computers with information about each facility. Alternatively, there may be a multifaceted information system that incorporates relational databases, custom software interfaces, web access, sophisticated reporting capabilities, and organization-wide protocols for regular updating and quality controls. Whatever the current facility information system is, it should be documented and evaluated before moving to improve or replace it.

Start by making a list of every dataset and software or web-based application related to public school facilities that is maintained by the school district, regardless of format and media. For example, agencies that have data in a PDF still have access to data that don't need to be collected; they just need to be rekeyed or reformatted. This list should include information about each dataset and information resource available to, or used by, the agency. Details about these resources might include answers to these questions:

- What is the purpose of the dataset or system?
- What entity or organization collects the data?
- Who is responsible for the content and quality of the dataset (the data steward)?
- Where is the dataset located (e.g., in a particular server, file structure, or website)?
- What information is in the dataset?
- How complete and accurate is it?
- When was it last updated?
- How often is it updated?

An easy, yet effective, approach to evaluating an agency's facility information capacity is to create a spreadsheet of every dataset related to school facilities that is maintained by the organization.

- Do the data reflect a single point in time, or are they maintained longitudinally so that changes over time can be observed?
- What format are the data in?
- What security or privacy issues are associated with the use of the data?
- Are the data organized by school organization, or by building?
- Is there any standard key or naming convention that links the data to data about other schools or buildings?
- Who generates reports from, analyzes, or otherwise uses the data?

This inventory should also include descriptions—if not actual samples—of any information that exists only in paper files and other nonelectronic formats. This may include documents such as design and construction contracts, leases and use agreements, as-built drawings, and photos of facilities. Because such documents and their contents include important historical and current information about public school facilities, they should be included in the inventory. Decisions regarding historic paper documents are likely to have a significant effect on the cost of the system, so the team will wish to address these questions during the planning and evaluation process. A decision should be made on how to manage these paper records (e.g., whether to include or exclude them in the system). If the information contained within such documents is not essential to the purpose and operations that the planned information system will support, the scanning and conversion of such documents to digital file formats might be scheduled for later phases in the project.

It is also critical to document existing data management processes, such as how access controls—that is, who has access to a dataset—are managed across the organization. Consider, for example, a scenario in which a comprehensive set of facility data is already maintained, but access to the data is highly constrained. In such a case, the data may be current, complete, and relevant, but not accessible to all who need it. Using the spreadsheet, the planning team might create a schematic that illustrates the relationships between datasets, data flow, and data use and users, which may clarify and improve how access is controlled.

## **Step 2: Determine the Purpose of the Facility Information System**

Clarifying or confirming the purpose of a facility information system is a fundamental component of the system development process. Establishing a clear objective for the system informs all subsequent design and implementation activities. Thus, team members need to consider the data usage needs of the full spectrum of likely system stakeholders, such as these:

- A custodian who requires real-time information about the schedule for community access to school buildings
- A building engineer or energy manager who needs to know the indoor temperatures of all occupied spaces
- Maintenance workers who need access to the 3-year work order history of the roof
- An architect who asks to see as-built architectural drawings of the school
- The superintendent who expects reports on 5 years of capital expenditure data, categorized by school
- Capital planners who need major building and component ages and life-cycle deficiencies

In many agencies, a lack of facility data is not the problem that needs to be solved. The problem is that staff don't have the *right information, at the right time* for making decisions. Thus, a sound facility information system isn't simply about collecting more data; an effective system needs to collect and share the appropriate data for improving decisionmaking and accountability.

- Education facility master planners who request 5- and 10-year enrollment projections, capacity rates, and utilization rates, categorized by school
- The energy manager who needs real-time energy usage data
- Members of a public advisory board who ask for a dashboard of health measures relating to cleanliness, air quality, and water quality, in every school
- School administrators who need an inventory of all identified deficiencies in building conditions and environments, uncovered by both complaints (reactive) and inspections (proactive)
- Authorities, such as school board members, who approve facility funding and budgets

The likely result of such an examination of user needs will be an overarching understanding of the types of data needed from the facility information system by real data users. In other words, it will result in a better understanding of the purpose of the system from the perspective of its users.

#### **The Purpose of Our Facility Information System (Example)**

The quality of our school district's facilities affects education services, district finances, community vitality, and the environment. In support of our overarching facilities mission to provide a quality teaching and learning environment for the benefit of students and staff, our facility information system will enable us to deliver accurate, complete, timely, and comparable data about our school facilities, systems, and grounds. This means supplying the right information at the right time to empower data-driven facilities planning, acquisition, construction, alteration, maintenance, and operations—thereby protecting our public investment in school facilities and ensuring the safety, health, and comfort of the teaching and learning environment.

#### **Simplifying a System to Meet Actual System Needs**

A state legislature mandated that the Department of Education collect information on the condition, maintenance, and operations of each public school. The agency responded by procuring a facility information system that was designed to house large sets of data, but the system proved to be difficult to maintain. Eventually, the state developed its own simplified and streamlined information system to house just the essential data needed to provide the information required for capital funding decisions by the legislature, the public, and school district administrators. By scaling down the information system to include only necessary components, the state reduced data entry burdens on school districts, minimized data quality problems, and improved the data so that key information was available to decisionmakers. Moreover, because of its simplicity, the system is easy to expand, and easy to maintain with a small information technology staff. Thus, the “best” system on the market wasn’t necessarily the best system to meet the state’s specific needs.

#### **Step 3: Develop Framework of Policies, Objectives, and Indicators**

Every activity that an education agency undertakes should support its core educational mission. As such, the organization’s goals are effective tools for ensuring that the facility information system adequately reflects the mission and strategic plan of the agency. The following illustrates an example of primary facilities-related goals that might appear in an agency’s strategic plan, and therefore could serve as a framework for a facility information system.

**Goal 1** - The school facility and site are healthy and safe environments for children and adults.

**Goal 2** - School environments support high-quality teaching, learning, operations, administration, and student support.

**Goal 3** - The school's campus provides sufficient space for enrollments and community use.

**Goal 4** - Education facilities are managed effectively, efficiently, and in accordance with environmental and energy-saving best practices.

**Goal 5** - Funds for school facilities are adequate and equitably allocated.

Such policy goals not only frame the scope of inquiry about school facilities, but also provide the context for the types of information needed to help direct the organization's primary functions and efforts. A comprehensive facilities policy framework may, therefore, include interfaces or data from other systems that can be integrated within the facility information management system.

When creating the framework, the data team should consider the spectrum of reports that they have used, or would like to use, for facilities management, planning, budgeting, and oversight. These could be reports that team members have used themselves, or examples from other school districts or states that have robust facility information systems. For example, school districts often pay electricity bills without knowing how much of the bill, and how much of the electricity, reflects consumption by each individual school. A growing number of school districts have data systems that collect utility consumption data at the school or building level to ensure utility cost control and savings. Look at examples of reports from districts with such data systems to help determine which data to collect.

One of the greatest challenges in designing a facility information system is the need to avoid unnecessary complexity. Working from actual reports—real output that people actually use—will help discipline the design and clarify the agency's priorities as it determines whether a potential system feature is likely to be worth its cost.

Objectives and indicators can be developed for each policy goal to help assess whether the objectives are being met. A sound indicator system relies on a body of indicators with enough related data points to provide meaningful information in context, rather than pieces of data that must be interpreted in isolation. The specific indicators used by a district or state will vary, depending upon its policy goals and priorities, the purposes of its data system, and the data that are available to construct the indicators.

The following tables show an example framework of policy goals, objectives, and indicators.

**Table 7. Goal 1: The school facility and site are healthy and safe environments for children and adults.**

Objectives	Examples of Indicators
The school is safe for occupancy.	<ul style="list-style-type: none"><li>Buildings are in compliance with the state building code.</li><li>Fire protection measures are inspected and maintained.</li><li>Hazardous materials are properly stored.</li><li>Hazardous contaminant exposures such as mold, asbestos, and lead are absent.</li></ul>
The school is secure.	<ul style="list-style-type: none"><li>State regulations governing safety from human factors are followed.</li></ul>
The school environment is healthy.	<ul style="list-style-type: none"><li>Buildings comply with federal air and water quality standards.</li><li>Buildings comply with state environmental standards and regulations.</li><li>School buildings are clean.</li></ul>
The building and grounds are in good repair.	<ul style="list-style-type: none"><li>A life-cycle replacement schedule is adhered to, and components and systems have not exceeded their expected useful life.</li><li>Maintenance and repairs are done in a timely manner.</li></ul>

**Table 8. Goal 2: School environments support high-quality teaching, learning, operations, administration, and student support.**

Objectives	Examples of Indicators
Specialized instructional spaces and amenities are adequate to support the educational program.	<ul style="list-style-type: none"> <li>There is an art room with amenities appropriate to the grades taught.</li> <li>There is a laboratory science classroom that supports scheduling demand for required and elective science classes.</li> <li>Career/technical education laboratories are aligned with workforce demand.</li> <li>There is a music room that is appropriate to the grades taught.</li> </ul>
Schools can support full integration of computer technology for administration and instruction.	<ul style="list-style-type: none"> <li>There are sufficient electrical power supplies and outlets to support computer technology.</li> <li>There is voice, video, wireless, and data cabling to support communications, networking, and access to the Internet.</li> </ul>
Facilities comply with federal or state codes and regulations concerning student access to education opportunities.	<ul style="list-style-type: none"> <li>The school complies with the Individuals with Disabilities Education Act (IDEA).</li> <li>The school complies with state codes and timetables for complying with the federally mandated Americans with Disabilities Act (ADA).</li> </ul>
Classroom and instructional support spaces are designed to be age appropriate.	<ul style="list-style-type: none"> <li>Early childhood classrooms have bathrooms adjoining the classroom.</li> <li>Secondary schools are designed as “small schools” or have schools within schools.</li> </ul>
Athletic and recreational site improvements are age appropriate and adequate to support the physical education, health, and athletic programs.	<ul style="list-style-type: none"> <li>Play equipment is age appropriate and ADA compliant.</li> <li>Athletic fields are available for male and female athletics programs.</li> <li>Appropriate safety measures are built into outdoor features—lighting, surfaces, and fencing.</li> <li>There is appropriate space for physical education.</li> </ul>

**Table 9. Goal 3: The school’s campus provides sufficient space for enrollments and community use.**

Objectives	Examples of Indicators
There is sufficient space for the current enrollment.	<ul style="list-style-type: none"> <li>Current classroom space meets local and state class size targets.</li> <li>All students are housed in permanent structures.</li> <li>The instructional space per student meets standards.</li> <li>No students are housed in a substandard space.</li> </ul>
There is sufficient space for projected enrollments.	<ul style="list-style-type: none"> <li>The school can support its projected enrollment.</li> <li>The school can support expansion of early childhood education.</li> </ul>
Schools are utilized after normal school hours by the community.	<ul style="list-style-type: none"> <li>Appropriate areas of the school are made available for community use after normal school hours.</li> <li>The school district informs the community about facilities availability and encourages community use.</li> </ul>

**Table 10. Goal 4: Education facilities are managed effectively, efficiently, and in accordance with environmental and energy-saving best practices.**

Objectives	Examples of Indicators
Facility information is accurate, up to date, and available to staff, decisionmakers, and the public.	<ul style="list-style-type: none"> <li>• There is a regularly maintained database on school facilities.</li> <li>• There is adequate funding, training, and technical support for information system hardware and software.</li> </ul>
School facilities are well maintained.	<ul style="list-style-type: none"> <li>• There is an up-to-date maintenance plan.</li> <li>• Operating funds for maintenance are adequate.</li> <li>• The number of maintenance employees is adequate.</li> <li>• The training of maintenance employees is adequate.</li> <li>• There is a preventive maintenance program.</li> <li>• There is a routine maintenance program.</li> </ul>
There is regular and participatory planning for long- and short-term facility needs.	<ul style="list-style-type: none"> <li>• Facilities plans are regularly developed and updated.</li> <li>• Facilities plans are developed with local school and community participation.</li> <li>• Facilities plans are used to assess progress for capital improvements.</li> </ul>
There are clear processes and procedures for addressing facility problems, and facility needs are addressed in a systematic way.	<ul style="list-style-type: none"> <li>• Decisions on facilities are made in public.</li> <li>• There is a publicly understood process for establishing priority for facility improvements.</li> <li>• Facility needs have been identified and prioritized.</li> <li>• A schedule of projects has been developed.</li> <li>• Methods for addressing needs have been identified.</li> </ul>
The facilities operations and maintenance staff is well supported.	<ul style="list-style-type: none"> <li>• All staff have job descriptions and pay commensurate with level of experience and responsibilities.</li> <li>• Records of work completed and underway are maintained in an orderly system.</li> <li>• There is sufficient staff for the volume of work.</li> <li>• Training and/or outside expertise are regularly utilized to improve staff performance.</li> <li>• Contracts are well defined, procured, and managed to deliver high-quality services.</li> <li>• The facilities staff is well trained and supported in their work.</li> </ul>
There are quality controls and regular oversight of the operations, maintenance, and capital improvement programs.	<ul style="list-style-type: none"> <li>• There are clear codes of ethics and integrity in the procurement and management of contracts.</li> <li>• There are regular audits of the quality of, processes for, and cost of contracts to maintain and improve school facilities.</li> <li>• Requests for bids are responded to by multiple contractors with satisfactory references from their last five clients.</li> </ul>

**Table 11. Goal 5: Funds for school facilities are adequate and equitably allocated.**

Objectives	Examples of Indicators
The operating budget for school facilities is adequate to maintain buildings in good repair.	<ul style="list-style-type: none"><li>• Work order requests are filled in a timely fashion.</li><li>• Preventive maintenance work orders are sufficient to minimize the likelihood of emergencies and extend the life of building systems, components, and finishes.</li><li>• The operating expenditures for maintenance and repair are sufficient to make progress toward reducing maintenance and repair deficiencies.</li><li>• The operating budget for maintenance is stable or increasing as a proportion of the total operating budget.</li><li>• Utilities costs reflect deliberate energy management and conservation.</li></ul>
Capital funds are adequate for new construction to relieve overcrowding.	<ul style="list-style-type: none"><li>• The capital plan and budget provide for new schools to meet projected enrollments.</li><li>• The school district does regular 5-year enrollment projections as part of a long-range educational facility master plan.</li></ul>
Capital funds are adequate for improvements and modifications to the building design required to support the educational program.	<ul style="list-style-type: none"><li>• The capital plan and budget support technology upgrades.</li><li>• The capital plan and budget support science lab improvements.</li><li>• The capital plan and budget support improvements to early childhood spaces.</li><li>• The capital plan and budget support improvements to basic classroom amenities: communications, storage, lighting, and furniture.</li><li>• The capital plan and budget support improvement of career-technical education facilities to meet emerging workforce needs.</li></ul>
Capital funds are adequate for the replacement of obsolete and non-operable building systems and components.	<ul style="list-style-type: none"><li>• The capital plan and budget include replacement of boilers, roofs, windows, and doors in accordance with the condition assessment and life-cycle replacement plan.</li><li>• The capital plan and budget include upgrades for electrical, plumbing, security, technology, and heating and cooling distribution systems in accordance with a condition assessment and life-cycle plan.</li><li>• The capital plan budgets are at a reasonable percentage (e.g., 2 percent) of the current replacement value of facilities for capital renewal of building systems; components; finishes; and furniture, fixtures, and equipment in existing facilities.</li></ul>

The development of such a detailed framework—one that lists out goals, objectives, and indicators, as in the example—is important because it will help the data team identify which measures (chapter 3) can be applied to each goal, objective, and indicator and what specific data need to be incorporated into the facility information system.<sup>8</sup> Creating this type of framework requires extensive collaboration between those who manage the information systems, those who collect the information, and those who use the information that such systems produce.

Facilities goals often relate to data from non-facility datasets, such as enrollment data in student databases and building assignment data in educator databases. Therefore, the process of developing a facility information system benefits from the participation of experts who use and manage a district's student information system, educational program information system, human resources system, and budget and finance system. The process of selecting, screening, and defining the components of an information system is crucial to ensuring the collection of useful, valid, timely, and cost-effective facility information.

<sup>8</sup> For more information about how data elements can be used to create indicators that address key policy questions and goals, see the *Forum Guide to Education Indicators* at [https://nces.ed.gov/forum/pub\\_2005802.asp](https://nces.ed.gov/forum/pub_2005802.asp).

## **Step 4: Develop a Written Program of Technical Requirements**

A program of technical requirements is a formal document that describes the functional and technical requirements of the facility information system. It includes detailed descriptions of the specific data elements, indicators, policy questions, policy goals, and operational aspects of the system, as determined by the framework of policies, objectives, and indicators developed in step 3.

The program of technical requirements not only identifies the data to be captured in the information system, but also clearly answers fundamental questions such as the following:

1. What will be the units of analysis for the data collected: the district, school, building, site, or space? What IDs or codes will link the data?
2. How will data get into the system? How easy will it be to integrate datasets from the range of existing or envisioned organizational databases?
3. How will the interface organize and relate the data? Will a user be able to easily navigate the interface to compare and contrast indicators across facilities, and across time?
4. What will be the quality controls on data entry? What will be the protocols for changing or updating data? Will these be viewable in the system by administrators or users?
5. How easy will it be to export datasets to other systems? What reports will be available from the system? How easy and how costly will it be to generate new reports, or revisions to existing reports?
6. Will it be necessary for nontechnical users to conduct analyses, make queries, sort data, and view facility history? How much training, if any, will be necessary to empower this level of use initially? What will be the ongoing training demands?
7. What security and quality controls will need to be established for access to the front and back ends of the system, and for administration of the system?
8. What types of business rules will be necessary to ensure that system processes generate valid, accurate, and appropriate information?
9. Will system access be designed and documented in such a way that the organization's designated information technology (IT) staff or contracted vendors can readily maintain or modify the system?
10. How will the facility information system be linked to the other data systems of the district or state? Will it be a component of an existing longitudinal data system, such as those in use in many states that track the performance of their public school students?
11. Will the facility information system align with accepted national and industry-related data standards, such as Common Education Data Standards (CEDS) and other best practices referenced throughout this document?<sup>9</sup>
12. Will there be training available for end users and system administrators? How much training will be required to enable the various user groups to use the system?
13. How will the system and the data within it be backed up, and how will data integrity be ensured?

A thorough understanding of these types of program, information, usage, technical, and functional requirements should inform all aspects of system design.

<sup>9</sup>The Common Education Data Standards (CEDS) initiative (<https://ceds.ed.gov/>) is a voluntary common vocabulary, data model, and suite of implementation tools to help education stakeholders understand and use comparable education data throughout the early learning through postsecondary and workforce settings.

14. What IT infrastructure standards must be met by the hardware and software of the system?
15. Will the system be mobile friendly so that users can enter data, generate reports, or view data remotely?

A list of functional needs as expressed by stakeholders—that is, what they need the system to do for them—might focus on the following topics:

- Web and app access
- Geospatial display of information
- Downloading and printing features
- Access to raw data, tabular data, and graphically presented information
- Access to data definitions and explanations

#### **Step 5: Develop or Procure a Facility Information System That Meets the Requirements**

Once the program of technical requirements has been documented, the project team can explore and evaluate different options for obtaining a facility information system that will meet the specific needs of its stakeholders. The planners must consider whether to build the system in-house or obtain a system developed elsewhere; whether the system should be web-based; and what the specific technical requirements for the system should be. Then, they must either develop or procure the system.

If a district or state has the internal capacity to develop and deploy applications that meet the program of technical requirements, it may consider doing so in-house. One benefit of in-house development is that applications can be crafted to make use of the organization's existing approaches to collecting, organizing, and utilizing information. A second benefit is that, with careful project scoping, the agency can develop only the features it needs and avoid paying for features that it will not use or that otherwise aren't high priorities. Conversely, in-house production is the functional equivalent of single-sourcing a procurement: while an agency may be satisfied with the final product, it is effectively limited to the production capabilities and ongoing maintenance capacity of the in-house team—and is responsible for all of the ongoing development and maintenance costs that might otherwise be shared by a commercial product's developer and customer base.

If, on the other hand, an agency chooses not to develop an in-house solution (or does not have the internal capacity to develop systems in-house), it can turn to outside vendors who offer either standalone applications or data system components that can be integrated into existing agency data systems and applications. Such applications can be purchased off the shelf (i.e., "commercial off the shelf" or COTS), shared from peer agencies and adapted as needed, or customized to fit the district's or state's specific needs. Turning to outside vendors and agencies can be beneficial because they may have solutions that have already been built and tested. However, planners should evaluate these options thoroughly before purchasing. A good COTS system should be a proven solution (for comparable organizations and purposes) that is scalable, expandable, and adaptable to the agency's specific needs without incurring substantial customized development costs. Further, planners should keep in mind that customizing a vendor solution can increase both the costs and the risks associated with the project.

Following the concept of enterprise resource planning, many organizations are integrating the management of the entire suite of their business information and data processes. Such assimilation requires integrated data systems that allow comparability, which facilitates faster and more accurate decisionmaking. Nowadays, this is most often accomplished

through web-based applications. Web-based applications are becoming more attractive to organizations as stakeholders demand increased access to information in a timely and seamless fashion. Whereas access used to be provided through dedicated user portals on desktop computers, it is now most often provided via web browsers, mobile apps on smartphones, or both. An agency may choose to host such an integrated facility information system on its own servers, or it can engage an outside vendor to host the system in the cloud. Users likely would not see an observable difference between the two, so the choice is likely to reflect the IT infrastructure and data security needs of the organization.

Regardless of the nature of system development—in-house, external, or via product purchase—or whether or not it is web-based, agency decisionmakers will likely want to consider the analytical capabilities and requirements of their envisioned system. Many state-of-the-art systems are capable of supporting robust research and analysis activities, including quantitative and qualitative exploration of large and complex sets of facility data. Additional considerations when planning, developing, and purchasing include the qualities of the system interface, the number of users, how data may or may not be aggregated, and the cost of ownership over time.

One final, but critical, challenge for many information systems relates to the sheer quantity of data that can be generated for each school facility over time. When large amounts of data are created through real-time collections across multiple facilities, the system must offer a correspondingly robust data analytic capacity to manage the volume. Using the framework of policies, objectives, and indicators (described in step 3) will provide functional boundaries to datasets and analytical priorities and, therefore, will narrow the required content and data expertise needed to turn data into information that is useful to stakeholders.

With a comprehensive program of technical requirements, the team can help their agency develop a request for proposals (RFP) as needed for contractual purposes. In an RFP, the agency should provide prospective bidders with its program of technical requirements, including the underlying policy framework; an evaluation and description of its current information and data processes; and the matrices that specify required data elements and indicators, as well as their relationships to policy goals. In developing the scope of the project, it makes sense to plan big but start small, first incorporating the organization's existing datasets, and then adding additional data over time.

Many education agencies request permission to review procurement-related materials from peer agencies as a way of confirming that technical requirements and cost estimates have been accurately represented.

### **Approaching Facility Information Management as a Continuous Process**

Maintaining an efficient and highly usable facility information system is an ongoing activity. All such systems should be evaluated periodically to determine whether new types of information are needed to address emerging state and local issues. The management of any effective facility information system includes regularly performed activities such as implementing ongoing training; developing updates to user guides and report formats; and incorporating evolving facilities standards, access demands, and data needs. Some organizations utilize a formal data (or system) governance process to track, manage, and approve ongoing activities and changes.

The National Forum on Education Statistics developed the *Forum Guide to Taking Action with Education Data* (available at [https://nces.ed.gov/forum/pub\\_2013801.asp](https://nces.ed.gov/forum/pub_2013801.asp)) to provide practical information about the knowledge, skills, and abilities needed to identify, access, interpret, and use data to improve the operation of education agencies. Although the document is not focused solely on the needs of the facility data community, the recommended processes and frameworks can be readily applied to the use of facility data.

The cycle of data use, as explained in the *Forum Guide to Taking Action with Education Data*, is as follows:

- 1. Seek information** - Fill the gap between what is already known and what needs to be known to solve a problem, inform a decision, or undertake an action.
- 2. Access or collect data** - Gather data that are most relevant to the questions you wish to address, which might require a new data collection but, in many cases, is about accessing data that have already been collected by, for example, a facility information system.
- 3. Analyze and interpret data** - Derive logically (or statistically) sound evidence to inform decisionmaking and action.
- 4. Act** - Take action to address a problem, answer a question, or change a situation.
- 5. Evaluate** - Formally assess whether data-informed choices and actions have improved an outcome or situation.

### In the Real World ... Reversing the Lost Costs of “Dashboard Drive Time”

The school district had 37 sites, covering over 700 acres of land, in a service area of more than 60 square miles. The amount of “dashboard drive time”—that is, the time that staff spent traveling from one work site to another—created a real lag in productivity. Every maintenance and operations staff member had a story of arriving at a school site to find that the equipment inventory, installations, or materials were different than what they had been told to expect—which meant that they’d have to drive to another site to pick up different tools or materials for the job. All this time spent driving instead of working was taking a big toll on efficiency and customer service.

At a monthly managers meeting, someone wondered whether the district might improve its inventory management processes to combat this waste of staff time. The current system tracked and reported inventory on an annual basis, but any changes that occurred in the interim weren’t captured until the next annual inventory. The head of support services thought that changes in inventory could be recorded immediately if the paper-based process were to be automated. In such a system, changes in materials, location, and installations could be entered into a facilities database when the changes took place, rather than weeks or months afterward.

The head of the IT department liked the idea, but noted that dashboard drive time wouldn’t be significantly reduced if staff could only access the database while they were at a desktop computer. Instead, people who needed access to the database while working in locations across the district would need access via mobile devices—smart phones and tablets—if they were to resolve the problem of dashboard drive time.

The head of maintenance added that if the district was going to go to this effort, it might as well record more than just the serial numbers and barcodes of equipment; for just minor incremental costs, the database could also include pictures of all equipment installations and conditions. Thus, whenever staff planned repair or maintenance activities, they would be able to see what equipment was present, which tools and materials would be needed, how much room was available to work in, and what other features would affect how they should plan the work. In this way, even staff who weren’t involved in the installation of a new piece of equipment, but had to maintain it at a later date, could get a detailed look at the situation before they arrived on-site.

After these initial improvements were made to the inventory process, the system evolved into a more general repository that also included online manuals, service documents, and product warranties. These are now routinely scanned and available for viewing at the touch of a mobile device. The initiative met its original purpose—to dramatically reduce dashboard drive time—and also enabled a host of staff planning efficiencies. It helped the district recapture productivity time and save money in a sustainable manner. Customer service improved, and staff are more content because they spend their time doing important work, rather than sitting in traffic.

# Chapter 3:

## Measures of School Facility Quality

Using standard measures of school facility quality means that findings can be compared across states, districts, and schools, as well as over time. Chapter 3 examines commonly recognized indicators that can be used to measure whether school facilities meet policy goals for quality as it relates to condition, design, utilization, the environment, and health and wellness.

Providing educationally appropriate instructional settings is one of the core responsibilities of school districts and communities (Office for Civil Rights 2014). Standards for facility quality can be issued by government agencies at the federal, state, or local level, by national or international organizations, or by local entities in a district or community. Standards are important in helping people understand and communicate needs, priorities, and the overall importance of good facilities stewardship. They enable informed decisionmaking and promote greater public accountability.

The goal of an effective facility information management system is to improve the processes that are key to enhancing facility quality, as defined by standards, and assessed by measuring indicators. Data are needed to determine the extent to which facilities are meeting standards, and whether changes in processes are resulting in higher quality.

The value of standardized school facility quality measures is twofold: (1) they can be used to compare state and local facility quality to nationally recognized facility standards, and subsequently to other states and localities that may be nearby or otherwise interesting to education stakeholders; and (2) standardized measures can also be used to evaluate the progress of the same facility or a particular district or state, over time.

### The Importance of Standards, Indicators, and Measures

Standards establish benchmarks against which a data value can be compared, and are generally associated with minimally acceptable levels of quality, or with aspirational targets. Measures give meaning to indicators, transforming them into something that can be compared and tracked across districts, schools, and time.

There is a growing body of research that describes the conditions of facilities and the resultant impact on the security, health, and educational opportunities of students and school staff. There is also developing research on the

impact—positive or negative—of school campuses on the natural environment, as well as on the economic conditions of surrounding communities. Facility standards, indicators, and measures are integral to all of this research. This chapter examines measures relating to the condition, adequacy, utilization, environmental impact, and health and wellness of facility quality.

### Measures of Facility Condition

Planners, architects, engineers, and facilities managers use a variety of indicators of facility condition to describe the mechanical, structural, and environmental serviceability of school facilities. As funding for education facilities

and operations continues to be a challenge, school systems will increasingly be required to have good facility data to support public funding and accountability expectations.

School facilities affect the core mission of the education enterprise. An efficiently designed, well-maintained, and comfortable learning setting contributes to occupant satisfaction, productivity, and health; meanwhile, studies have found significant correlations between undesirable structural, conditional, and aesthetic attributes of school buildings and diminished student learning and achievement. Poor or substandard facilities negatively influence school climate, which, in turn, detrimentally affects students' academic performance (Maxwell 2016). When facilities are renovated or otherwise improved, planners have the opportunity to respond to changing instructional and operational needs and build the science labs, technology features, special education resources, and other spaces needed for state-of-the-art educational activities (Uline and Tschannen-Moran 2008).

### Data Gain Meaning from Context

A piece of data is rarely usable in raw form, since it is simply a value without context. However, data elements can be combined into indicators that translate data into information. For example, the data elements "School Type" (elementary, middle, high, etc.) and "School Address" (street, city, state, zip code, etc.) can be used to generate the indicator "Number of High Schools in a Community." Individually, the data element "School Type = High School" doesn't provide a great deal of information; after all, it doesn't say anything except that a high school exists. Similarly, "School Address" lists address components, but doesn't say anything else about a school. Together, however, as in the indicator "Number of High Schools in a Community," the two data elements create meaning or information; for example, they might reveal that there are four high schools in a town.

### Indicators of Maintenance Effectiveness

Indicators of maintenance effectiveness describe how an organization is meeting current routine, preventive, and unscheduled maintenance of their facilities and sites. These measures are vital to effective management because the life of a building system, component, finish, or fixture can only be fully achieved (or extended) through effective routine maintenance and repair. Formulas 1-8 below reflect commonly accepted measures for assessing the effectiveness of school maintenance efforts.

#### Formula 1: Work Order Completion Rate by Number of Work Orders (for a Defined Time Period)

$$\text{Work Order Completion Rate} = \frac{\text{Number of Work Orders Completed}}{\text{Total Number of Work Orders Created}}$$

*This and other measures can be framed by a unit of time, such as month, semester, or year. The complement to the work order completion rate is the work order backlog rate, which is described in formula 2.*

#### Formula 2: Work Order Backlog Rate by Number of Work Orders (for a Defined Time Period)

$$\text{Work Order Backlog Rate} = \frac{\text{Number of Incomplete Work Orders}}{\text{Total Number of Work Orders Created}}$$

*This and other measures can be framed by a unit of time, such as month, semester, or year.*

### **Formula 3: Preventive Maintenance Work Order Completion Rate (for a Defined Time Period)**

$$\text{Preventive Maintenance Work Order Completion Rate} = \frac{\text{Number of Preventive Maintenance Work Orders Completed}}{\text{Total Number of Work Orders Completed}} \quad \text{Divided by}$$

*This and other measures can be framed by a unit of time, such as month, semester, or year. An ambitious target ratio for the preventive maintenance work order completion rate is 30 percent. If 30 percent of all work orders are preventive maintenance work orders, this is a signal that maintenance is intended to be a proactive rather than reactive undertaking.*

### **Formula 4: Preventive Maintenance Cost Ratio (for a Defined Time Period)**

$$\text{Preventive Maintenance Cost Ratio} = \frac{\text{Total Expenditures for Preventive Maintenance Work Orders or Contracts}}{\text{Total Expenditures for Maintenance}} \quad \text{Divided by}$$

*This and other measures can be framed by a unit of time, such as month, semester, or year.*

### **Formula 5: Maintenance and Repair Expenditure per Student (for a Defined Time Period)**

$$\text{Maintenance and Repair Expenditure per Student} = \frac{\text{Total Operating Expenditures for Maintenance and Repairs}}{\text{Student Enrollment of Same Fiscal Year}} \quad \text{Divided by}$$

*This and other measures can be framed by a unit of time, such as month, semester, or year.*

### **Formula 6: Maintenance and Repair Expenditure per Gross Square Foot (for a Defined Time Period)**

$$\text{Maintenance and Repair Expenditure per Square Foot} = \frac{\text{Total Operating Expenditures for Maintenance and Repairs}}{\text{Gross Square Footage of Building(s) of Same Fiscal Year}} \quad \text{Divided by}$$

*This and other measures can be framed by a unit of time, such as month, semester, or year.*

#### **Formula 7: Capital Expenditures per Student (for a Defined Time Period)**

<b>Capital Expenditure per Student =</b>	<b>Total Capital Expenditures for Defined Period</b> <i>Divided by</i>
	Average Student Enrollment for Defined Period OR Current Year Student Enrollment

*This and other measures can be framed by a unit of time, such as month, semester, or year.*

#### **Formula 8: Capital Expenditures per Gross Square Foot (for a Defined Time Period)**

<b>Capital Expenditure per Square Foot =</b>	<b>Total Capital Expenditures for Defined Period</b> <i>Divided by</i>
	Gross Square Footage of Building(s) During Defined Period

*This and other measures can be framed by a unit of time, such as month, semester, or year.*

Measures of expenditures should be viewed both on a per-square-foot basis and on a per-student basis. In a facility information system that is designed to recognize the relationships between data elements (that is, a relational database), costs can be compiled and analyzed for the state, a school district, an area within a district, a type of school (elementary, middle, high), an individual school, a building, or even an otherwise definable space. The ability to report on how facility conditions or improvements are allocated across schools and districts is important to understanding the equity of allocation of funding and conditions and may be especially relevant in light of recent court challenges to inequities in school funding.

#### **Facility Condition Index**

The facility condition index (FCI) describes the condition of a facility by measuring the difference between the cost to eliminate any building deficiencies and the cost to replace the building. An FCI is a point-in-time comparative assessment of the condition of a facility. As illustrated in formula 9, this index is computed as a ratio of the total cost to remedy identified deficiencies to the current replacement value of the building. The FCI is a nationally recognized standard that has been adopted by the National Association of College and University Business Officers ([www.nacubo.org](http://www.nacubo.org)), the Association of School Business Officials (ASBO) International (<http://asbointl.org/>), and APPA: Leadership in Educational Facilities ([www.appa.org](http://www.appa.org)).<sup>10</sup>

<sup>10</sup> Some organizations refer to the FCI as a “deficiency rating.” This illustrates the important point that many of these terms are sometimes referred to by alternative names. Although this may confuse users and impede comparability, the indicators still generate useful information to decisionmakers.

### Formula 9: Facility Condition Index

$$\text{Facility Condition Index (FCI)} = \frac{\text{Cost to Correct Building Deficiencies}}{\text{Divided by Current Facility Replacement Value}}$$

To calculate the FCI, it is first necessary to identify a building's deficiencies, to be used as the numerator in formula 9. To identify building deficiencies, facility owners generally conduct a facility condition assessment during which appropriate facilities experts inspect a set of building features, document any deficiencies in their condition, and then estimate the cost of any repairs or replacements required to correct those deficiencies. The numerator of the FCI equation equals the estimated total cost to eliminate all life-cycle, maintenance (functional), and site deficiencies, defined as follows:

- **Life-Cycle Deficiencies.** A life-cycle deficiency exists when a system, component, finish, fixture, or piece of installed equipment is in use beyond the recommended life of the item, as established by manufacturer or school district standards. A life-cycle deficiency is recognized even though the system or equipment may still be functioning effectively. For example, until 2004, some New York City Public Schools were heated by coal-fired boilers that were still fully functional, but were obsolete because of their poor environmental effects.
- **Maintenance (Functional) Deficiencies.** A maintenance deficiency, usually referred to as “deferred maintenance,” exists when a system, component, finish, fixture, or piece of equipment is nonfunctional or operates at suboptimal levels. The facility feature may require minor maintenance, extensive repair, or replacement. Whether or not the system, component, finish, fixture, or equipment has exceeded its recommended life cycle is not a consideration in determining the cost for deferred maintenance. For example, a chiller may have an expected useful life of 20 years, but if the water in the distribution system is not properly treated, a new chiller can be ruined within just a few years.
- **Site Deficiencies.** Deficiencies in school sites include both natural deficiencies and those resulting from problems with design or condition. Examples of natural site deficiencies include inadequate size, the presence of wetlands or rocky terrain, and radon or other naturally occurring chemical pollutants. Examples of site design deficiencies include inadequate parking, no student drop-off area, a poor approach to the front entrance, no city sewer or water hookups, and a lack of road access. Examples of site condition deficiencies include deteriorated fencing, retaining walls, sidewalks, or blacktop.

The denominator of formula 9 equals the average cost to build a new school in the construction market where the school is located. This includes hard and soft costs (see the information about construction in chapter 1), but excludes land and site work, since those are so variable. The cost per square foot of new construction is multiplied by the gross square footage (GSF) of the existing building to calculate the replacement value for the facility, as shown in formula 10.

#### **Formula 10: Current Facility Replacement Value**

<b>Current Facility Replacement Value =</b>	Gross Square Footage of Existing Facility <i>Multiplied by</i> Estimated Per-Square-Foot Cost for New Construction
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*Because the cost of construction varies over time (as labor, materials, and design costs change), a facility's replacement value must be periodically recalculated.*

Because the FCI is a ratio that can be applied to any facility, the FCI allows the physical condition of one school facility to be compared to that of another facility. As a result, the FCI is an indicator that facility owners can use to prioritize capital and maintenance dollars, and maximize value and protect investments.

It should be noted that the FCI can be applied to parts or components of a facility; that is, it need not apply only to entire facilities. For example, if higher-than-expected utility costs and work orders suggest that controls of mechanical systems are not functioning optimally, it may make sense to conduct a targeted assessment of the mechanical systems and controls. The facility manager could calculate an FCI of these specific components and, subsequently, construct a budget for the targeted replacements or improvements to heating, cooling, and ventilation controls and systems, without calculating the FCI of the remaining building components.

Because an FCI is a point-in-time measurement, the assessment must be kept current. Use of a computer maintenance management system to update the assessment, by storing maintenance and replacement activities over time, can help ensure that FCI data are current and accurate.

#### **Alternative Ways to Assess Facilities Condition**

The FCI, which incorporates a detailed assessment of facilities deficiencies, can be an expensive and time-consuming calculation. However, there are alternative approaches to evaluating a facility's condition that can provide comparable metrics for planning and budgeting. One such approach is to compare the amount of operating and capital funds expended on a facility to good practice spending standards.

Recognized industry standards for capital investment in, and maintenance and operations of, a facility are based on a percentage of the current replacement value of the facility. School districts can identify which facilities are likely to have the greatest needs by comparing their historical spending on each facility against these standards. Because such spending data are public records, facilities needs can also be estimated at the district, state, and national levels (see figure 2).

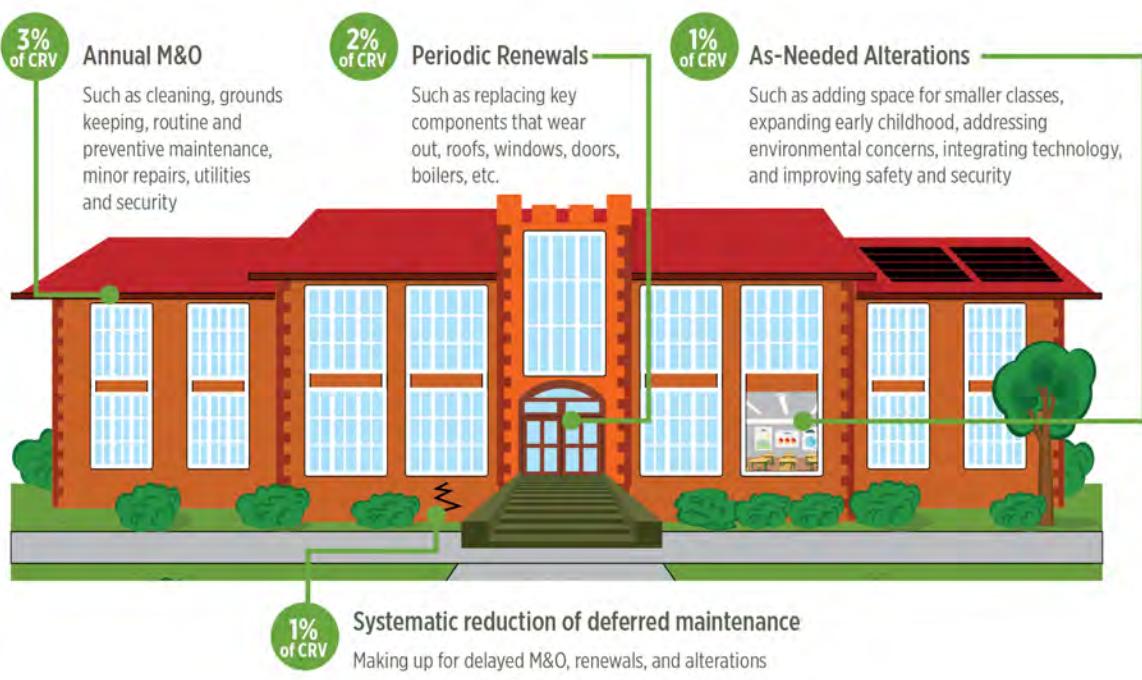
The specific formulas used to measure whether a school or district is meeting good stewardship standards for maintaining and upgrading their school facilities are provided in formulas 11 through 14. These formulas apply the standards described in figure 2.

### Formula 11: Modern Standard for Annual Maintenance and Operations Funding<sup>11</sup>

$$\text{Annual Maintenance and Operations Funds Needed} = \frac{\text{Current Replacement Value of Facilities}}{\text{Multiplied by } 3\%}$$

### Modern Standards for Maintaining and Upgrading Current K–12 Public School Facilities

The following proposed national standards for school facilities are based on building industry best practice. The percentages refer to the percentage of facilities' current replacement value that should be invested annually to maintain school buildings in good condition. Local conditions will vary. For example, school facilities in very poor condition will need more than 1 percent a year toward their deferred maintenance. But in general, if communities have stable funding at these levels, they should be able to deliver healthy, safe, educationally appropriate, and environmentally sustainable school facilities.



**Figure 2.** These modern standards for maintaining and upgrading current K-12 school facilities come from State of Our Schools: America's K-12 Facilities, a joint publication of the 21st Century School Fund, Inc., U.S. Green Building Council, Inc., and the National Council on School Facilities (Filardo 2016).

<sup>11</sup> Once an estimate for a standard has been established, it is possible to compare the record of historic and current spending on a facility to evaluate whether the spending is increasing or decreasing meaningfully. This is helpful in determining whether the facility requires maintenance or replacement to meet modern standards.

### **Formula 12: Modern Standard for Capital Funding (for Budget Planning Rather than Project Planning)**

<b>Annual Capital Funds Needed =</b>	2% to 4%
<i>Multipled by</i>	Current Replacement Value of Facilities

### **Formula 13: Annual Maintenance and Operations Spending Gap/Surplus**

<b>Annual Maintenance and Operations Spending Gap/ Surplus =</b>	3-Year Annual Average Maintenance and Operations Expenditures
<i>Minus</i>	Annual Maintenance and Operations Needed

### **Formula 14: Annual Capital Investment Gap/Surplus**

<b>Annual Capital Investment Gap/Surplus =</b>	20-Year Annual Average Capital Investment (Inflated to Current \$)
<i>Minus</i>	Annual Capital Funds Needed

### **Building Age**

Because building materials physically degrade over time due to weather and use, all buildings deteriorate over time. Every building therefore has a usable lifespan. But the length of that lifespan depends on many interacting factors, including its design, the type and quality of the materials used in its construction, the quality of the construction itself, the environmental conditions surrounding the building, how the building is used, how it is maintained, and the degree to which the programs and activities conducted within the building diverge from what the building's design and configuration can support. A building's lifespan can also be extended through renovation or modernization. It is not uncommon to find 100-year-old schools in excellent condition and 20-year-old schools in poor condition.

As a result, the age of a building—as defined by the year of its original construction—does not necessarily accurately describe the condition of the building. However, the age of a building can often be an indicator of the design, materials, and durability of its structure. Many of our finest civic and educational buildings are more than 50 years old.

### **Monitoring Compliance with State Standards... and Saving Districts Money**

New Mexico's state legislature responded to equity and adequacy lawsuits by enacting laws that established state oversight of how school districts manage PreK-12 facilities maintenance, operations, and capital investments. The state established condition standards, facilities design standards, and standards for minimum spending on maintenance as a percentage of foundational operations budgets.

To enable the state to monitor compliance with these standards, it required that all school districts enter their capital investments, maintenance activities, condition assessments, and inspection results into a common online facility information system.

This system gives the state's facilities staff the ability to see real-time indicators of work order completion rates and average completion times, compliance with deadlines for corrective action, maintenance spending levels, and outstanding issues requiring attention or technical assistance—helping it to assess the equity and adequacy of school facilities across the state. Moreover, the system gives both the state and the school districts the ability to conduct predictive analyses and schedule preventive maintenance activities that can save a considerable amount of money in the long run.

### **Factors That Measure Facility Adequacy**

The facility condition index provides a measure of, and a way to compare, building conditions. However, the FCI does not provide information about facility adequacy. Adequacy is the ability of a facility to support the delivery of the educational programs required by the state or district. This is a critical measure for determining the equity of access to educational opportunities. For example, a facility may be in good repair, but it might not have been built with acceptable lighting, acoustics, or ventilation. These serious design deficiencies would not be reflected in the FCI because nothing needs to be repaired per se, but the facility still isn't an adequate instructional setting. While the FCI is usually determined by an engineer, the assessment of educational adequacy is typically conducted by architects and education facilities planners.

The factors used to assess a facility's educational adequacy are design elements (see table 12, next page). Facility design measures can be used to assess the ability of a school building to accommodate the educational, administrative, support, and nonschool or community activities and programs that take place in the school buildings and on the school grounds. Design measures address the size, type, location, materials, and other features of the spaces in school buildings and grounds. Just as with physical condition, it is possible to compare and rank design quality if evaluative criteria are defined and applied consistently.

A design deficiency exists when a building, regardless of its condition, does not have the appropriate number of spaces, size of spaces, location of spaces, or amenities needed to support the programs, services, administration, and operation of the facility. School districts can create their own list of design factors, to be evaluated based on their own educational program specifications. Districts can also weight factors for importance and use their assessment of educational adequacy of design to compare and rank schools along a scale, so that buildings and grounds are assessed for not only physical condition but also design quality.

**Table 12. Examples of Relevant Evaluative Criteria**

Design Factors	Overview
Accessibility	Is the facility designed to be accessible and appropriate for <ul style="list-style-type: none"><li>• persons with physical disabilities?</li><li>• early childhood education?</li><li>• special education?</li><li>• community use?</li></ul>
Specialized curriculum spaces	Is the facility designed with appropriate <ul style="list-style-type: none"><li>• science laboratories and prep areas?</li><li>• career/vocational education labs?</li><li>• 2D and 3D art studios?</li><li>• instrumental and choral music areas?</li><li>• drama and dance studios?</li></ul>
Outdoor educational spaces	Is the facility designed with appropriate <ul style="list-style-type: none"><li>• outdoor classrooms and amenities?</li><li>• student gardens?</li><li>• school compost areas appropriate for student tending?</li></ul>
Common spaces	Is the facility designed appropriately for educational and community use with respect to <ul style="list-style-type: none"><li>• gyms?</li><li>• auditoriums?</li><li>• cafeterias?</li><li>• kitchens?</li><li>• multipurpose rooms?</li><li>• playgrounds?</li><li>• athletic fields?</li></ul>
Indoor environment	Is the facility designed so that occupied areas have appropriate <ul style="list-style-type: none"><li>• daylighting?</li><li>• acoustics?</li><li>• air quality?</li><li>• security?</li><li>• signage?</li><li>• thermal comfort?</li><li>• technology?</li><li>• furniture?</li></ul>
Security	Is the facility designed to ensure <ul style="list-style-type: none"><li>• occupant safety and security, including restricted access via monitored entries?</li><li>• preventive security mechanisms, including adequate lighting, fire safety, camera placement, and related monitoring equipment?</li><li>• lockdown processes during emergencies?</li><li>• modular security to open some areas (e.g., public use of the auditorium) while still securing the remainder of the facility?</li><li>• reasonable protections from burglary and vandalism?</li></ul>
Aesthetics	Is the facility designed with <ul style="list-style-type: none"><li>• an exterior design that is uplifting and compatible with the neighborhood?</li><li>• entrances that are welcoming and safe?</li><li>• grounds that are appropriately landscaped with structured and natural elements?</li></ul>

## Factors That Measure Facility Utilization

One of the primary responsibilities of a school district is to house students for the duration of the school day. If enrollments are growing, a school district needs to plan for construction of new schools or additions to existing schools. If enrollments are shrinking, a school district needs to reduce its responsibility for underutilized space. Before policymakers can determine whether a school district needs to build or close schools, they need information on how schools are being utilized.

Finding out how a school is being utilized requires a room-by-room survey that assesses how each room or space is used; which hours it is used; and how many students, staff, and community members use it. Such a survey may reveal that support spaces have been turned into classrooms, or that classrooms have been turned into support spaces. For example, perhaps an elementary school library is being used by a nonschool agency, occupying a space originally intended for students.

### Enrollment Capacity

School utilization rates are measures used to determine overcrowding and underutilization. Enrollment capacity describes the maximum number of students that a school building can satisfactorily accommodate at one time for the educational program and curriculum offered. Typically, enrollment capacity is guided by state law provisions related to class size, teacher contracts, and program features. Building factors that determine enrollment capacity include the design of the school, particularly as it relates to the number and sizes of classrooms and other instructional spaces, though a school can also be limited by noninstructional spaces, such as a too-small cafeteria. The number of students assignable to a classroom varies by grade level and the type of instruction being offered, most dramatically in regard to whether students have special needs.

### Elementary School Capacity

In the elementary school context, enrollment capacity is based on the standard number of students in a class assignable to each grade level or dedicated special education classroom in the school. For example, a prekindergarten room will have fewer students assignable to it than a sixth-grade classroom. Moreover, in an elementary school, specialty instructional spaces are not included in the calculation of capacity space. This is because grade-level teachers are classroom based and the regular classrooms remain empty while classes are receiving instruction in the art or music room. The calculation of enrollment capacity for an elementary school is shown in formula 15.

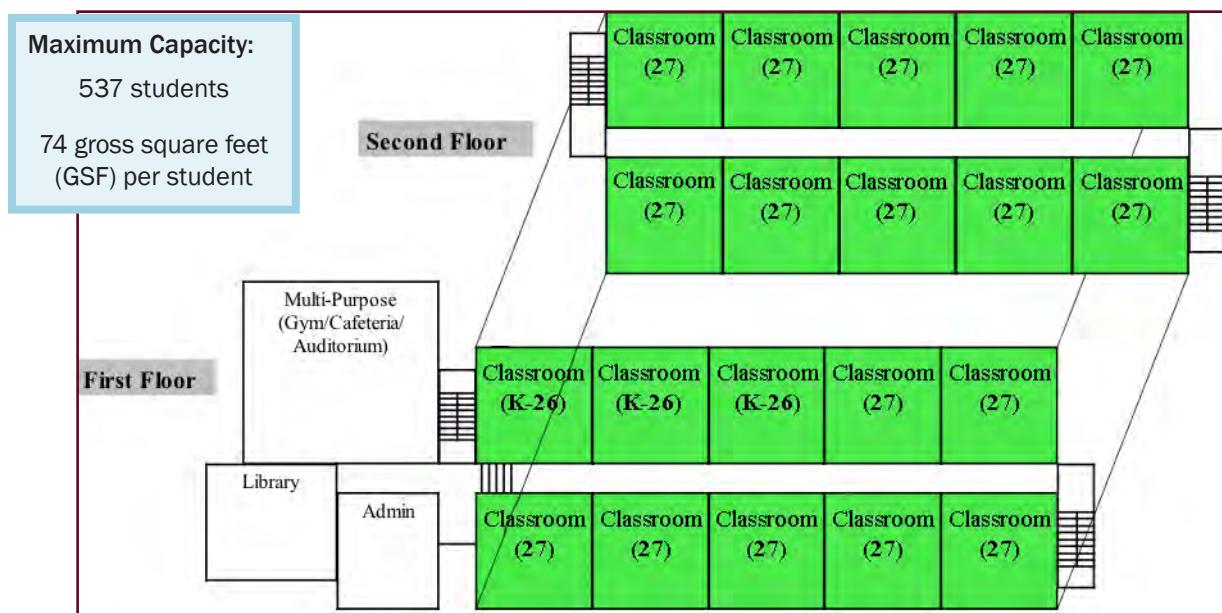
#### Formula 15: Elementary School Enrollment Capacity

$\text{Elementary School Enrollment Capacity} = \sum \text{Number of Each Type of Basic Classroom} \times \text{Number of Students Assignable to Each Type of Classroom}$	Number of Each Type of Basic Classroom  Multiplied by  Number of Students Assignable to Each Type of Classroom
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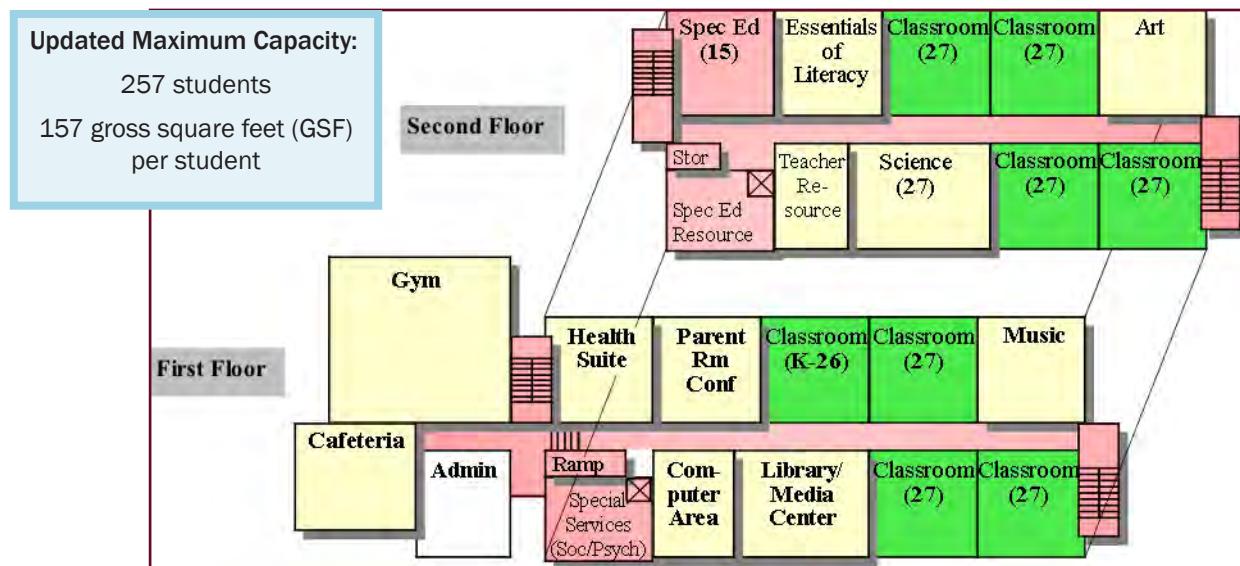


Instructional spaces that generate capacity for enrollment are considered capacity space, while all other rooms and spaces within a school building are considered non-capacity, or unassigned, space. Even though non-capacity space—including hallways, stairwells, cafeterias, playgrounds, parking lots, teacher work areas, storage rooms, restrooms, etc.—is not considered in the determination of enrollment capacity, it obviously cannot be ignored when determining a facility's adequacy of design. For example, the sizes of the existing cafeteria and hallways need to be considered when adding a wing for new classroom space.

Capacity is not a static measure, but can change year to year and has certainly changed over time. A school originally built for one purpose has a capacity for that purpose, but if the school's needs change, its capacity may change as well. Take, for example, the floor plans in figures 3 and 4, which are identical, although the enrollment capacities are dramatically different. The 1950s capacity of 537 students is very different from the 2017 capacity of 257 students, which illustrates the importance of standards for determining capacity and utilization. Using the old standards for capacity, if the school enrolled 257 students, it would be considered only 48 percent utilized. Using modern standards for capacity, the school would be 100 percent utilized. Capacity is based on standards for class size, special needs delivery methods, administrative needs, and other programmatic ways a school is used—which can change over time.



**Figure 3.** This floor plan, of a hypothetical elementary school built in 1925 with a 1950s addition, has a relatively high maximum capacity by 1950s standards.



**Figure 4.** The identical footprint has a lower maximum capacity in 2017 because of changes to space standards reflecting contemporary educational purposes (e.g., the repurposing of the space to include music and art rooms, a computer area, a cafeteria separate from the gym, a health suite, a conference room, and special education facilities).

### Secondary School Capacity

Enrollment capacity is calculated differently in secondary schools than in elementary schools. In high schools and junior high/middle schools, both basic classrooms and specialty instructional spaces (such as art or music rooms) are usually counted toward capacity, because regular classrooms are not left unoccupied while students are in art or music instruction. The formula for determining secondary school capacity is the sum of the capacities for each type and number of classrooms multiplied by a utilization rate, which is typically between 80 and 90 percent. A utilization rate recognizes the impossibility of scheduling classes to fully utilize every classroom every period. For example, an advanced science classroom may be able to accommodate 20 students, but there may be only 16 students in the fifth period class. The calculation of secondary school capacity is shown in formula 16.

#### Formula 16: Secondary School Enrollment Capacity

Secondary School Enrollment Capacity =	Sum of	Number of Each Type of Basic Classroom <i>Multipled by</i> Number of Students Assignable to Each Type of Classroom	<i>Multipled by</i>	Utilization Rate
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### School Utilization Rate

A school utilization rate gives facility planners, public officials, and the public a way to understand the extent to which buildings are used by comparing actual student enrollment to the enrollment capacity of the school. If a school has a capacity of 450, and 500 students are enrolled, the utilization rate is 111 percent. Formula 17 illustrates the calculation of the school utilization rate.

### **Formula 17: School Utilization Rate**

<b>School Utilization Rate =</b>	Student Enrollment <i>Divided by</i> Number of Students Assignable to Each Enrollment Capacity	x 100%
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### **Gross Square Feet per Student**

A key measure in determining a school's density factor is gross square feet per student (GSF per student). This is the total square footage of the school—including all instructional and noninstructional interior spaces—divided by the number of students enrolled at the school. The only spaces not included in this calculation are those dedicated for use by nonschool programs, such as a community health clinic or offices for central administration staff. The calculation of GSF per student is shown in formula 18.

### **Formula 18: Gross Square Feet per Student**

<b>Gross Square Feet per Student =</b>	Gross Square Footage of Building <i>Divided by</i> Student Enrollment
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The GSF per student measure is extremely useful when more detailed or reliable capacity information is unavailable. School districts usually know the gross building size of a school and always have the current student enrollment. However, since schools of the same size vary tremendously in design, a density factor cannot substitute for the utilization rate. A modern school with an open-plan design and a school of the 1950s with double-loaded corridors, small classrooms, and few support spaces could have the same gross square footage and the same enrollment, and so would have the same density factor, but because of the design, adjacencies of classrooms, and even what space is below grade and above grade, one school could have a substantially different capacity than the other.

### **Density Factor**

Calculating the density factor is another way to assess schools for overcrowding or underutilization. While utilization rates measure enrollment capacity by comparing number of rooms and class sizes to actual enrollment, the density factor compares the standard gross square feet of building space per student (as established by an education specification space standard) to the actual amount of gross square feet of building space per student. There are no universal standards for how much average space should be allotted for each student in a school. Rather, space standards are defined in the education specifications for various grade levels and enrollment sizes of schools, and vary according to the instructional program, school design, and budget.

Using the density factor is recommended when there is a need to assess the equity of space distribution. Capacity is program sensitive, and so using it as a factor can lead to disparities in the distribution of space. Capacity and utilization

rates can exclude spaces, and the sizes of capacity spaces are not factored in. Unassigned space that is not reflected in the calculation of enrollment capacity is counted in the density factor.

For example, in the floor plan in figure 3, there are 17 classrooms for 27 students and 3 classrooms for 26 students, a lunchroom, and a main office—adding up to a school capacity of 537 students. In the same floor plan in figure 4, there are 8 classrooms for 27 students, 1 classroom for 26 students, and 1 classroom for 15 students, but in this school they have not just a lunchroom, library, and main office, but also a music room, art room, separate gym, parent resource center, special education office and resource center, health suite, student services office, and computer room.

A standard education specification that determines a set relationship between building size and enrollment capacity is used to establish the numerator in formula 19, the standard gross square feet per student. The denominator, the actual gross square feet per student, is determined through formula 18. The ratio of the standard gross square feet per student and the actual gross square feet per student is the density factor, shown in formula 19—which enables comparisons of similar types of schools (for example, comprehensive high schools), revealing whether there is equitable access to space.

#### **Formula 19: Density Factor**

$$\text{Density Factor} = \frac{\text{Standard Gross Square Feet per Student}}{\text{Actual Gross Square Feet per Student}}$$

For example, if the guidelines of a school district or state department of education indicate that a standard elementary school facility requires 115 gross square feet per student, then an elementary school with 78 gross square feet of space per student has a density factor of 1.47 ( $115 / 78 = 1.47$ ). Another elementary school of the same size with fewer students might have 140 gross square feet per student, with a density factor of .82 ( $115 / 140 = .82$ ). A density factor of 1 indicates that a school has the density recommended in the guidelines, a density factor over 1 indicates that a school tends toward overcrowding, and a density factor under 1 indicates that there is more space than the recommended amount in the standard education specifications.

#### **Net Square Feet per Student**

Some of the problems of comparing school density using gross square footage can be avoided by using the net square footage (NSF) of instructional space. Instructional space is all space where there is direct instructional contact between a student and teacher. It includes certain types of non-capacity, or unassigned, spaces—such as elementary school art and music rooms, libraries, and student project rooms. The calculation of NSF per student is shown in formula 20.

#### **Formula 20: Net Square Feet per Student**

$$\text{Net Square Feet per Student} = \frac{\text{Net Square Footage of Instructional Space}}{\text{Student Enrollment}}$$

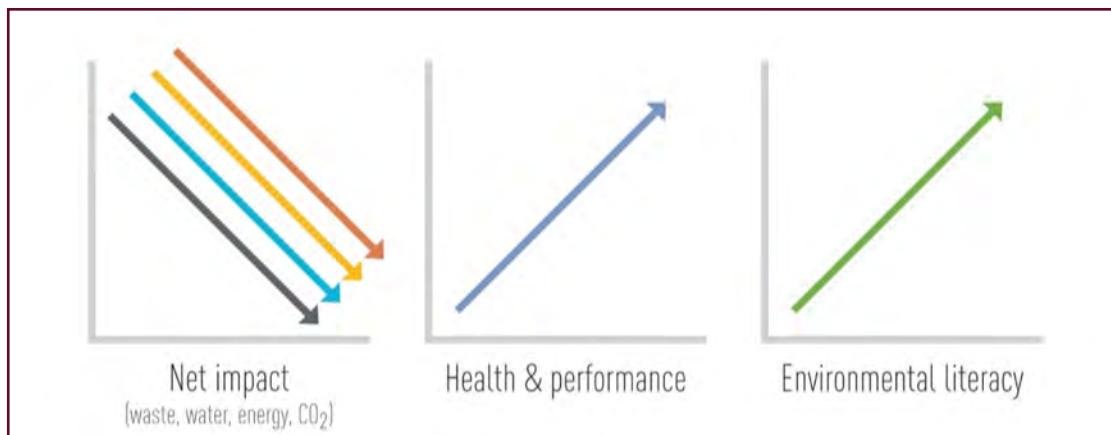
## Factors That Measure the Environmental Impact of Facilities

The massive scale of the nation's public school facilities infrastructure has a substantial impact on the environment. Public school facilities cover an estimated 2 million acres of land and 7.5 billion gross square feet of building space (Filardo 2016), but the U.S. Department of Energy reports that up to 30 percent of school districts' energy use is inefficient or unnecessary (U.S. Environmental Protection Agency 2016). In a nation in which buildings account for 70 percent of electricity use (as cited in McLaren, 2009)<sup>12</sup> and nearly 40 percent of carbon emissions (U.S. Green Building Council n.d.),<sup>13</sup> retrofits, retro-commissioning, and proper energy management can help to reduce the consumption of natural resources, as well as save taxpayer dollars by lowering school district utility expenditures.<sup>14</sup>

Even the placement of schools affects energy costs and the environment. For example, locating schools near the homes of students can reduce vehicle miles traveled by parents and buses, thereby contributing to healthier air and reduced fuel consumption.

District officials are not only responsible for the effect of condition and design on occupants, but also for how their choices on design, maintenance, and operations affect the environment. The U.S. Department of Education operates the Green Ribbon Schools (ED-GRS) award program. It started in 2012 and recognizes public schools for focus, progress, and practices that advance environmental sustainability. Environmental sustainability of public schools encompasses the three pillars of ED-GRS:

1. Net environmental impact
2. Health and performance
3. Environmental literacy



**Figure 5. The three pillars of the U.S. Department of Education's Green Ribbon Schools (ED-GRS) award program are net environmental impact, health and performance, and environmental literacy.**

<sup>12</sup>This source cites U.S. Green Building Council data. See also the Alliance to Save Energy's Buildings page at <http://www.ase.org/buildings>, as well as the U.S. Energy Information Administration 2016 figures of 38 percent residential + 37 percent commercial = 75 percent total, available at [https://www.eia.gov/energyexplained/index.cfm?page=electricity\\_use](https://www.eia.gov/energyexplained/index.cfm?page=electricity_use).

<sup>13</sup>This source cites U.S. Energy Information Administration figures.

<sup>14</sup>Retrofitting and retro-commissioning refer to modifying a building's systems and equipment after original design and construction to remedy problems that have developed as the facility aged or systems and equipment evolved over time.

Figure 5 illustrates these three pillars. For construction and operations, the first two of these pillars are particularly relevant. Common concerns include the net impact of facility operations on the environment due to utility usage (energy and water), transportation fuel use, and waste sent to the landfill (and not reused or recycled). For optimal health and performance, school buildings must be kept clean. Facility managers must also be able to quickly respond to problems that may arise in their buildings and on their grounds that expose children or adults to hazards, including substandard conditions arising from natural disasters or facilities deficiencies. Finally, the students attending the school need to learn about and explore the environment and the relationship of human behavior to sustainability.

### **Environmental Impact**

The operation and maintenance of existing facilities has a significant impact on the environment. The scale of the people served and the facilities involved suggests that the PreK-12 infrastructure enterprise is a large consumer of energy, and a large producer of waste. Because utility costs are not isolated in school district fiscal reporting on the maintenance and operation of plants, there are not district-by-district data on expenditures for utilities. Tracking the cost of utilities over time is one way to understand building operations. Operating costs of school districts are typically compared on a cost per student basis, as shown in formula 21.

#### **Formula 21: Utility Expenditure per Student**

$$\text{Utility Expenditure per Student} = \frac{\text{Total Utility Expenditures in Local School(s)}}{\text{Student Enrollment}}$$

*Divided by*

However, it is more informative from an operations perspective to compare utility spending by gross square footage, as illustrated in formula 22.

#### **Formula 22: Utility Expenditure per Gross Square Foot (GSF)**

$$\text{Utility Expenditure per Gross Square Foot} = \frac{\text{Total Utility Expenditures in Local School(s)}}{\text{Gross Square Footage of Building(s)}}$$

*Divided by*

Because a district's costs rise if utility costs are on the rise, even if the district is conserving energy or water, school districts need to track the actual consumption of energy and natural resources. This way, even as the price of utilities changes, it is possible to track and understand the levels of energy and water that a school and district use. Consumption is measured in therms of gas or oil, gallons of water, and kilowatts of electricity used. Waste is measured in cubic meters or pounds of material sent to a landfill or recycled. Consumption can also be analyzed on per student and per GSF bases.

If a district wants to compare sustainable practices and design features across school campuses, one way to do so is to convert fuel usage (from buildings and transportation), water usage, and waste hauling information to carbon emission

equivalents. Carbon footprint calculators specifically created for schools are available at no cost from the University of New Hampshire Sustainability Institute and Green Schools Ireland, as well as for purchase through several utility and sustainability tracking platforms.<sup>15</sup> These calculators convert information on levels of consumption into a number that reflects how much carbon dioxide a facility is contributing to the carbon emissions depleting the ozone layer and warming the planet.

### Energy Usage

The calculation of an ENERGY STAR score gives facilities managers a benchmark that can help them compare their school to other schools in similar climate areas. It is calculated through the EPA's free Portfolio Manager tool online (<https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager>) and yields a score from 0 (worst) to 100 (best). A score of 75 is required to earn the ENERGY STAR designation.

#### Common Measures of Energy Usage

Electricity: kWh (kilowatt hour) per square foot and/or kWh per occupant

Lighting efficiency: lumens per watt

Daylighting: percentage of average illuminance from daylight (relative to artificial light)

Natural gas: CCF (i.e., the volume of gas per 100 cubic feet) per square foot and/or CCF per occupant

Fuel oil: gallons per square foot and/or gallons per occupant

To compare usage across fuel type, it is common to convert all units to British thermal units (BTUs).

1 kWh of electricity = 3,412 BTU

1 CCF of natural gas = 103,700 BTU (approximately)

1 gallon of fuel oil = 138,500 BTU (depending in part on oil content)

A CCF is the energy equivalent of burning 100 cubic feet of natural gas. The therm is a unit of heat energy equal to 100,000 BTUs and is the equivalent of 1 CCF.

### Water Usage

An ENERGY STAR score through the Environmental Protection Agency's (EPA's) Portfolio Manager tool is also available for water usage. A district can benchmark its facility water usage through this program.

#### Common Measures of Water Usage

Water: gallons used per square foot over a defined time period

Water: gallons used per occupant over a defined time period

<sup>15</sup>The carbon- and nitrogen-accounting platform SIMAP™ (Sustainability Indicator Management and Analysis Platform) is available, through the Sustainability Institute at the University of New Hampshire, at <https://unhsimap.org/>.

## Waste Generated

Depending on the capabilities of the organization's waste hauler, reports about dumpster contents can be made by volume or weight. Either is a valid measure and can provide a useful comparison over time to determine whether waste diversion programs are working.

### Common Measures of Waste Generation

Landfill waste: volume in cubic meters or weight in pounds

Materials for recycling: volume in cubic meters or weight in pounds

Materials for compost: volume in cubic meters or weight in pounds

Total waste generated = Landfill waste + Materials for recycling + Materials for compost

## Formula 23: Amount of Waste Diversion

<b>Total Waste Diversion =</b>	Volume (or Weight) of Materials for Recycling + Volume (or Weight) of Materials for Compost <i>Divided by</i> Total Volume (or Weight) of Materials Generated	$\times 100\%$
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## Vehicle Miles Traveled

Depending on a school district's bussing policies, the difficulty of assessing the environmental impact of transportation can vary tremendously. If most students are bussed to school, the district will want to focus its calculations on the miles traveled by busses, the fuel type used on busses, and idling practices. If students arrive to school through a variety of means, the district may want to consider surveying students, staff, and/or parents to assess the impact of transportation on the environment. The primary objective for environmental impact reduction is to reduce the number of miles traveled by cars carrying only one student or staff member (Ewing, Pendall, and Chen 2003).<sup>16</sup>

### Common Measures of Transportation Miles

Transportation measures include the total miles traveled by students and staff to and from school via each of the most common means, such as total miles traveled by a single occupant car (carrying one student or staff), by carpool, by school bus, by public transportation, and by bike or walking.

<sup>16</sup> For more information about school siting, visit the U.S. Environmental Protection Agency's voluntary *School Siting Guidelines* at [https://www.epa.gov/sites/production/files/2015-06/documents/school\\_siting\\_guidelines-2.pdf](https://www.epa.gov/sites/production/files/2015-06/documents/school_siting_guidelines-2.pdf).

## **Factors That Measure Facility Impact on Health and Wellness**

Research on indoor environmental health provides overwhelming evidence of the benefits to children and adults that healthy school buildings provide. In a healthy school environment, there is ample fresh air and daylight, and the indoor environment can be regulated, with proper maintenance and operations, to control temperature and moisture. A healthy environment is clean and has entirely nonexistent or contained toxic materials (Allen et al. 2017). Because of their continuously developing bodies, children have unique sensitivities and vulnerabilities to toxic materials that were once considered safe for use in school facilities. Children are especially vulnerable to harm by the many “legacy toxics”—such as lead, asbestos, and PCBs—which are sometimes found in facilities built before the late 1970s (U.S. Environmental Protection Agency 2011).<sup>17</sup>

At a minimum, the operators of schools are responsible for providing facilities that are safe and do not pose a threat to the health and wellness of the students in attendance, the community served, and the staff employed. Providing high-quality facilities requires maximizing the health and wellness of the facility’s occupants and users through good air quality, good water quality, adequate lighting, and appropriate acoustics.<sup>18</sup> Each of these four components (air, water, lighting, and acoustics) can be assessed through measurement-based indicators that connect to research-based standards (Allen et al. 2017). Calculation of some of these indicators requires the use of basic data elements such as the area and/or volume of spaces within the facility.

### **Air Quality**

According to the EPA, indoor air pollution is among the top five environmental risks to public health (U.S. Environmental Protection Agency 2009), and the risks posed by pollutants are even greater on average for children, due to their smaller body size. Good indoor air quality (IAQ) helps reduce the risk and rate of illness by reducing the transmission of infectious diseases and removing contaminants that exacerbate or cause illnesses such as asthma. Research shows that good IAQ increases productivity, improves performance on mental tasks, and increases student and staff comfort levels and attendance rates (U.S. Environmental Protection Agency 2012).<sup>19</sup>

The primary components of good IAQ are the maintenance of acceptable air temperature and relative humidity, the introduction and distribution of adequate fresh (outdoor) air, and the control of airborne contaminants and pollutants. Sources of indoor air pollutants include building equipment; components and furnishings; outdoor air brought in by HVAC systems or through the building envelope; and indoor contaminants such as chemicals, insects and other pests, and pesticides.

<sup>17</sup> For additional resources, see those cited on page 3 of the U.S. Environmental Protection Agency’s 2014 publication *Energy Savings Plus Health: Indoor Air Quality Guidelines for School Building Upgrades*, available at

<https://www.epa.gov/iaq-schools/printable-version-energy-savings-plus-health-indoor-air-quality-guidelines-school>.

<sup>18</sup> Anthropometry, or the study of the measurements and proportions of the human body, refocuses some health and wellness measurements from an emphasis on the facility to an emphasis on its human occupants. For example, “building temperature” might be recast as “thermal comfort for occupants.”

<sup>19</sup> See also *EPA Research References Related to Indoor Air Quality in Schools*, available at <https://www.epa.gov/iaq-schools/research-references-related-indoor-air-quality-schools>.

**Table 13. Common Air Quality Contaminants and Pollutants**

Air Quality Pollutants	Types
Biological	Mold, pollen, bacteria, viruses, dust mites, animal dander, insect matter
Chemical	Carbon monoxide (CO), carbon dioxide (CO <sub>2</sub> ), nitrogen oxides (NOx), volatile organic compounds (VOCs), pesticides, ozone, radon, lead, polychloride biphenyls (PCBs), formaldehyde
Particle (nonbiological)	Dust, tobacco smoke, fine particulate matter (e.g., from vehicle exhaust and industrial sources)

To create indicators for health and wellness, IAQ should be measured in a classroom and other contained areas relative to the standards presented in the Air Quality Measures table below. Your organization can then compare the measurements with the relevant standards to assess air quality.<sup>20</sup>

**Table 14. Air Quality Measures**

Air Quality Measures	Sources for Relevant Standards, Guidelines, or Recommendations
Carbon dioxide (CO <sub>2</sub> ), in parts per million (PPM)	ASHRAE Standard 62.1-2016, Table C-1
Carbon monoxide (CO), in parts per million (PPM)	ASHRAE Standard 62.1-2016, Table C-1
Formaldehyde (HCHO), in parts per million (PPM)	ASHRAE Standard 62.1-2016, Table C-1
Lead (Pb), in mg/m <sup>3</sup>	ASHRAE Standard 62.1-2016, Table C-1
Nitrogen dioxide (NO <sub>2</sub> ), in parts per million (PPM)	ASHRAE Standard 62.1-2016, Table C-1
Outdoor air ventilation rate, in cubic feet per minute (CFM) per person	ASHRAE Standard 62.1-2016
Ozone, in parts per million (PPM)	ASHRAE Standard 62.1-2016, Table C-1
Particles (<2.5µm MMAD), in µg/m <sup>3</sup>	ASHRAE Standard 62.1-2016, Table C-1
Particles (<10µm MMAD), in µg/m <sup>3</sup>	ASHRAE Standard 62.1-2016, Table C-1
Polychlorinated biphenyls (PCB)	Title 40 U.S. Code of Federal Regulations Part 761
Radon (Rn), in Bq/m <sup>3</sup> or pCi/L	Radon Measurement in Schools – Revised Edition (EPA 402-R-92-014); ANSI/AARST MALB-2014
Relative humidity, in %	ASHRAE Standard 55-2013
Sulfur dioxide (SO <sub>2</sub> ), in parts per million (PPM)	ASHRAE Standard 62.1-2016, Table C-1
Temperature, in degrees F	ASHRAE Standard 55-2013
Total particles, in mg/m <sup>3</sup>	ASHRAE Standard 62.1-2016, Table C-1
Volatile organic compounds (VOCs), in parts per billion (PPB) or µg/m <sup>3</sup>	ASHRAE Standard 62.1-2016, Table C-3; California Dept. of Public Health Standard Method v1.1 (2010)

Guidance on the measurement and management of IAQ is available in the EPA's *IAQ Tools for Schools Action Kit*.<sup>21</sup> School operators can analyze data from measurements of IAQ along with data on student and staff absenteeism, asthma incidence, and other health-related issues as well as data on student academic performance. A full picture of health and wellness can help a school identify ways to improve its facility and better support students and staff.

<sup>20</sup> For up-to-date values of ASHRAE standards, visit <https://www.ashrae.org/>. In 2012, ASHRAE began doing business as "ASHRAE" rather than its full legal name, the American Society of Heating, Refrigerating and Air-Conditioning Engineers.

<sup>21</sup> Available at <https://www.epa.gov/iaq-schools/indoor-air-quality-tools-schools-action-kit>. For more EPA tools for schools, visit <https://www.epa.gov/schools/epa-guidance-and-tools-schools>.

## Water Quality

Like air, water can be a medium of exposure to toxins and pollutants. Common pollutants in water include biological contaminants such as bacteria and viruses; toxic metals and elements such as lead, arsenic, and chromium; and chemicals of all types, including organic and inorganic compounds used in solvents, pesticides, and paints. Exposure to even small amounts of many of these pollutants can cause cancer or other illnesses. Some pollutants may enter the water prior to its arrival at the school facility, while other pollutants may enter the water through the pipes and fixtures within the facility. As water sits unmoving in a reservoir, tank, or pipe, it can absorb pollutants and bacteria can grow.

Because virtually all occupants in a facility come into daily physical contact with water through drinking, washing, and food preparation, facilities operators should monitor the water quality periodically at all of the locations where water is used in those ways. Based on scientific research, the EPA has set mandatory maximum contaminant levels (MCLs) for many of the contaminants that can be found in water. The following are indicators of water quality.<sup>22</sup>

**Table 15. Water Quality Measures**

Water Quality Measures	Sources for Relevant Standards, Guidelines, or Recommendations
Arsenic, in milligrams per liter (mg/L)	U.S. EPA National Primary Drinking Water Regulations, in Title 40 U.S. Code of Federal Regulations Part 141
<i>Giardia lamblia</i> , in mg/L	U.S. EPA National Primary Drinking Water Regulations, in Title 40 U.S. Code of Federal Regulations Part 141
Lead, in mg/L	U.S. EPA National Primary Drinking Water Regulations, in Title 40 U.S. Code of Federal Regulations Part 141
Odor rating, in threshold number	U.S. EPA National Secondary Drinking Water Regulations, in Title 40 U.S. Code of Federal Regulations Part 143
Total dissolved solids, in mg/L	U.S. EPA National Secondary Drinking Water Regulations, in Title 40 U.S. Code of Federal Regulations Part 143

## Lighting

Because both learning and efficient mobility within a facility require appropriate lighting, the condition and design of lighting is an essential component of a school facility. Research has shown that, due to the breadth of the spectrum in sunlight, diffuse and glare-free daylighting increases the comfort level of students and staff and increases their performance, and therefore is the optimal light source. In addition, however, on cloudy days, before sunrise, after sunset, in latitudes where sunlight is minimal or nonexistent during parts of the year, and in spaces that lack access to daylight, artificial lighting of adequate brightness levels is required. Although there are no mandatory national minimum brightness standards for school facilities, states or districts may have specification standards in school designs. In all cases, architects work to design for adequate lighting for the activities that are expected to take place within a facility as part of basic design. The Collaborative for High Performance Schools (CHPS), a nonprofit organization dedicated to making schools better places to learn, provides guidelines for adequate lighting in indoor spaces that require daylight-responsive lighting. These include minimum standards for workspace illumination and daylighting, limits on direct sunlight on work surfaces, and measures of maximum illuminance versus average illuminance to reduce glare.<sup>23</sup>

<sup>22</sup> For up-to-date values of EPA water quality standards, visit <https://www.epa.gov/ground-water-and-drinking-water/national-primary-drinking-water-regulations>.

<sup>23</sup> For up-to-date lighting standard values from CHPS standards, visit <http://www.chps.net/>.

At the same time, artificial lighting consumes energy, and energy costs money and consumes environmental resources. The American National Standards Institute (ANSI) and the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) have established voluntary consensus standards that aim to recommend lighting that is sufficient but also avoids unnecessary energy consumption.

**Table 16. Lighting Quality Measures**

Lighting Quality Measures	Sources for Relevant Standards, Guidelines, or Recommendations
Average illuminance for more than 75% of the classroom area, in footcandles	Collaborative for High Performance Schools (CHPS) U.S. CHPS Criteria (2016), section EQ 11.1
Ratio of average illuminance to maximum illuminance at 9:00 am, 12:00 pm, and 3:00 pm	Collaborative for High Performance Schools (CHPS) U.S. CHPS Criteria (2016), section EQ 11.1
Lighting power density for a space, in watts per square foot (W/ft <sup>2</sup> ) of floor area	ANSI/ASHRAE/IES Standard 90.1-2016

### Acoustics

Noise can be defined as unwanted sound. Excessive noise and long sound reverberation times negatively affect speech communication, concentration, and student learning (Collaborative for High Performance Schools 2016). The design of a facility, the materials used in its construction, its systems and equipment, and objects placed in the facility's spaces can all affect the levels of noise and the reverberation times of noises created in the spaces. Facilities operators can use acoustical equipment to measure background noise levels, reverberation times, and the ability of partitions to attenuate noise.

**Table 17. Acoustical Quality Measures**

Acoustical Quality Measures	Sources for Relevant Standards, Guidelines, or Recommendations
Total background A-weighted noise level, in decibels	ANSI/ASA Standard S12.60-2010; Collaborative for High Performance Schools (CHPS) U.S. CHPS Criteria (2016), sections EQ 14.0–14.1
Reverberation time (time required for a 60-dB drop in noise level), in seconds	ANSI/ASA Standard S12.60-2010; Collaborative for High Performance Schools (CHPS) U.S. CHPS Criteria (2016), sections EQ 14.0–14.1
Noise attenuation of partitions surrounding a space, in Sound Transmission Class (STC) rating	ANSI/ASA Standard S12.60-2010; Collaborative for High Performance Schools (CHPS) U.S. CHPS Criteria (2016), Tables 9–11

### Schools, Communities, and Public Value

A community's public school facilities are a source and symbol of civic pride. Through joint use agreements, custom, and necessity, school buildings can provide shelter in emergencies, function as polling stations during elections, welcome community organizations, and serve as places in which children and adults can access a wide variety of programs during or outside of school hours. Having a modern, high-quality elementary and secondary school infrastructure strengthens communities in many ways, including increasing local property values, attracting families with school-age children, accommodating growing school enrollments, and, in school districts that are renovating or constructing their facilities, maintaining (or regaining) stakeholders' confidence (Neilson and Zimmerman 2014).

A school district's operating budget—including expenditures for cleaning and maintaining facilities—contributes dependable jobs to local economies. In fact, for every billion dollars invested in capital construction, an estimated 6,664 direct construction jobs and another 11,121 indirect or induced jobs are created (Bivens and Blair 2016).

The standard facilities metrics presented in this chapter improve the management of these important public assets, enable research on their use and effectiveness, and improve decisionmaking regarding their stewardship—protecting public investment, improving communities, and helping students achieve in the classroom.

#### **In the Real World... Balancing Energy Efficiency and Educational Needs**

When constructing new schools, it can be both environmentally and economically beneficial to proactively build energy efficiency into the planning process. For example, some school districts set a goal of building “Net Zero” schools. These are buildings that throughout an entire year’s life cycle exhibit a net energy consumption of zero—meaning that, on an annual basis, the total amount of energy used is equal to the amount of renewable energy created at the site (e.g., through solar panels). In fact, some buildings actually produce more energy than they consume.

School planners must balance the educational needs of a school construction project with the environmental and economic benefits of conserving energy. Education staff should evaluate all design choices, including, for example, recommendations for optimizing energy use through the use of fewer power outlets, less powerful wireless access points, low-power projectors, high-efficiency audio systems, and natural lighting—all of which might predictably yield energy saving but, less predictably, might negatively impact instructional capacity in the building in the form of reduced internet access, decreased visibility, and other limited functioning of the learning space.

Although the process of negotiating power consumption versus power generation can be difficult, it is critical that every decision regarding energy saving and building functionality be thoroughly vetted by instructional staff and school architects, as well as by energy efficiency consultants.

# Chapter 4:

# School Facility and Site Data Elements

Data elements are the basic units, or fields, in a database. Chapter 4 points to a catalogue of data elements in the Common Education Data Standards (CEDS), including data element names, definitions, and related attributes, that are likely to populate a facility information system in an education agency.

Chapter 2 describes a process for developing a facility information management system, including how policy goals and objectives frame the information needs of the system. Data elements are the lowest level of information that gets stored in the system. Although data elements are, by definition, quantifiable and measurable, they are rarely useful on their own (e.g., how do you know the meaning of the data value “85”?). But when combined, analyzed over time, or interpreted within the context of a body of information, data elements can be built into indicators that can be used to assess the status of policy objectives and goals (e.g., “85” percent of our facilities work orders are completed within one week, which is 20 percent higher than it was 2 years ago, but 5 percent lower than our stated goal of 90 percent).<sup>24</sup>

This chapter points to data elements in CEDS that have been determined to be most useful in answering a full range of policy questions about facilities and sites, as well as the data needed to describe or assess the stewardship of public school facilities. It should be noted that CEDS recommendations do not represent a federal collection mandate, nor do they reflect an exhaustive list of all the data elements that can be used or may be needed in determining the status of each indicator or sub-indicator.

School and district data users will find these data elements to be commonly used by peer PreK-12 education agencies and, at the local level, useful for day-to-day management and planning. In addition to its local applications, CEDS recommendations can help to standardize the terminology associated with educational facilities across school districts and states and by private sector building industry and finance professionals. While this list of data elements and options has been made as comprehensive as possible, it may omit some data elements and options needed by states and districts to inventory, monitor, and manage the stewardship of their facilities and sites.

## Categories of Facility and Site Data Elements

Data associated with school facilities stewardship can be categorized into the following six major areas: (1) inventory, (2) condition, (3) design, (4) utilization, (5) management, and (6) budget and finance. The following box describes each category and provides examples of the types of questions that might be addressed from related data.

<sup>24</sup> For more information about data elements and indicators, see the *Forum Curriculum for Improving Education Data: A Resource for Local Education Agencies* at [https://nces.ed.gov/forum/pub\\_2007808.asp](https://nces.ed.gov/forum/pub_2007808.asp) and the *Forum Guide to Decision Support Systems: A Resource for Educators* at [https://nces.ed.gov/forum/pub\\_2006807.asp](https://nces.ed.gov/forum/pub_2006807.asp).

**Table 18. Categories of Facility and Site Data Elements**

<b>1. Inventory</b>	How many buildings are in the school district and community? How many buildings are associated with each school campus? What are the ages, sizes, and locations of all district school buildings?
Inventory data elements include a set of basic elements to create a register of buildings and site areas that support schools. Identification data elements and their definitions are the most important building blocks of any information management system. These data elements are needed to clearly identify the unit of analysis, so that when information is aggregated and compared, it is like to like. An important consideration when identifying a campus is that it be linked to, but able to be isolated from, a school identifier. Most accountability and budget information is tracked at the school level. For the information about buildings or grounds to be most meaningful, it needs to be able to be tracked at the school level.	
<b>2. Condition</b>	Are the school facilities and sites safe, healthful, and in good repair? Are they being properly maintained?
Data elements on the condition of a district's or state's fixed assets will help track condition changes—both improvement and deterioration—over time and allow administrators to compare differences in condition among buildings, facilities, and campuses. These data elements can help administrators describe the condition and safety of a building or site, and their various components and systems. The data elements that define buildings and sites use the Uniformat system for classifying buildings, going down to level 3 of their system. <sup>25</sup> This system has been modified to reflect building and site components and systems that are uniquely found in schools or district-related facilities.	
<b>3. Design</b>	Are the school buildings designed to support best educational practices and help students achieve at high levels? Are the operations and administrative buildings designed for efficient operations and administration?
Design data elements can be used to assess a facility's design for purposes of education, sustainability, community use, and efficiency of operation and utilization. Within these elements are definitions and options for the types of spaces that are designed for education, administration, and operation of schools. Note that data elements on furniture, fixtures, and movable equipment are not included in this resource.	
<b>4. Utilization</b>	Do the school facilities and sites provide appropriate space to accommodate changing enrollments and community use? Are the administrative buildings fully used and not crowded?
Utilization data elements capture information on how space is used. Administrators use these elements to describe the use of space within a building, regardless of the space's intended design or permanency. New elements for student assignment have been added to the list to support data collection associated with planning for school capacity and utilization.	
<b>5. Management</b>	Are school district facilities and sites managed effectively and efficiently? Are they managed by the school district, private contractors, or another government agency?
Management data elements describe key work standards and processes in the operation and maintenance of campuses, and for the capital project management of school campuses.	
<b>6. Budget and Finance</b>	Are capital budgets and operating funds for school district facilities adequate, and are they equitably allocated and distributed?
Budget and finance data elements include many definitions from the National Center for Education Statistics (NCES) publication <i>Financial Accounting for Local and State School Systems: 2014 Edition</i> (Allison 2015). <sup>26</sup> These data elements include definitions for revenue, operating and capital costs, public and private finance information, and data relevant to school facilities management.	

<sup>25</sup> Uniformat is a widely accepted ASTM International standard for classifying building specifications, cost estimating, and cost analysis. Level 3 refers to additional standards details at the level of building substructures.

<sup>26</sup> Available at <https://nces.ed.gov/pubs2015/2015347.pdf>.

## Facility and Site Data Elements

The data element recommendations in CEDS can be incorporated into a state or local education agency data system and then extended by adding data elements and options needed for use in a local or state information system. In addition, there are many other data elements and options related to students, staff, school programs, curriculum, and services that should be reviewed for inclusion in a data system about facilities and sites.

Resources for implementing these and other nationally comparable data elements can be found through the CEDS initiative (<https://ceds.ed.gov/>), which is a common vocabulary, data model, and suite of implementation tools to help education stakeholders understand and use comparable education data throughout the early learning through postsecondary and workforce settings.

Each data element in CEDS includes a unique identifying number, its definition, and, where appropriate, data element coding options that further define possible data element values. Using the NCES School ID as the link to connect these data elements in a relational database will help ensure that building and site data can be analyzed by school and compared to other schools, campuses, facilities, buildings, and sites.<sup>27</sup>

### Finding Facility Data Elements in CEDS

The CEDS Domain Entity Schema (DES) provides a hierarchy of CEDS domains, entities, categories, and elements displayed as folders. It is intended for use primarily as an index to search, map, and organize data elements in a logical way. The DES has a folder called “Facilities” with many of the data elements relevant to facilities. Visit <https://ceds.ed.gov/domainEntitySchema.aspx> to access the CEDS Domain Entity Schema and click the [+] symbol next to the Facilities folder to view facilities-related data elements.

The CEDS Extend tool (<https://ceds.ed.gov/extend.aspx>) was designed to incorporate data definitions from other efforts that have not yet been adopted by CEDS but are nonetheless relevant to education data systems. This repository of metadata from other efforts includes some elements from the NCES Handbooks and Forum Guides in a searchable database of elements. Visit <https://ceds.ed.gov/elements.aspx> to access the CEDS Extend search function. Enter a keyword in the search field, and, under the search box, select Search Extend Elements. The resulting list of elements will include both formally adopted CEDS elements and element definitions from sources such as the older NCES Handbooks and Forum Guides as well as other data standards.

#### How to View Facility Elements in CEDS: Three Methods

- Visit the CEDS Domain Entity Schema at <https://ceds.ed.gov/domainEntitySchema.aspx>. Click the [+] symbol next to the Facilities folder to access the elements.
- Visit CEDS Extend at <https://ceds.ed.gov/elements.aspx>. Enter a keyword in the search field, and, under the search box, select Search Extend Elements. The resulting list of elements will include both formally adopted CEDS elements and element definitions from sources such as the older NCES Handbooks and Forum Guides as well as other data standards.
- Download CEDS (including Extend) at <https://ceds.ed.gov/CEDSDownloads.aspx>. All CEDS and Extend elements can be downloaded as an Excel file by choosing the Complete Element List with Extend Elements for the latest version.

<sup>27</sup>The NCES School ID is a 12-digit school identification number that can be used to link a school to a district in data systems and reporting. The first 7 digits of the 12-digit school ID are the district ID, and the last 5 are the school ID—which, together, make a 12-digit unique code for each school. Visit <https://nces.ed.gov/ccd/psadd.asp> for more information about the NCES School ID.

## In the Real World... Making Facility Information Available for Teaching and Learning

School facilities can be more than just passive learning environments; they can also be a component of the curriculum.

There are many aspects of a school facility and its operations that, when integrated into the curricula of the school, can help students learn content and develop skills. The design, construction, and history of a facility can connect with content in the disciplines of science, technology, engineering, and mathematics, as well as in the arts and humanities. When, for example, students monitor water and energy usage alongside occupant behaviors and operational practices, it can help them practice teamwork, learn scientific methods and sociological principles, and develop communications skills.

The benefits of making facility information available to teachers and students include changing occupant behavior, generating operational efficiencies, and increasing the lifespan of a school facility, all of which result in cost savings. In a county school district, for example, a high school developed an energy-efficiency program in which students developed a Green Room Certification program, conducted energy audits, and identified unnecessary lighting that could be removed. Student engagement in the program increased, and the school realized a 21 percent savings in energy costs within 6 months. After 5 years, 59 of the 68 schools in the district had implemented energy management programs, reducing the district's average annual energy costs by 26 percent.

To identify the data and information useful to teachers and students, the data team should engage the agency's curriculum or content specialists, as well as representative teachers and students, through a process that evaluates both the facilities and the curricula and that maps out both the potential data users and the desired data elements or indicators. For the purpose of this process, facility data elements can be grouped into two simpler categories: (1) facility attributes (including siting and environment; design, layout, and building systems and controls; and construction and materials) and (2) operations and occupant behaviors (including utilities usage and costs, space usage and scheduling, and transportation practices).

The goals of such a facility information project team should be to

1. ensure that the data elements identified by teachers and students are educationally relevant;
2. design the facility information system to make appropriate data accessible to students and teachers; and
3. create interfaces through which teachers and students can analyze and report data in ways that support instructional need.

The team should then incorporate the results of this process into the program of technical requirements for the facility information system, so that it is designed to enable the collection, maintenance, and communication of the relevant facility data and information.

# Appendix A: Recommendations for Decommissioning a Facility

Decommissioning a school facility requires a multitude of operational steps. The many tasks necessary to close out the use of a facility include securing student- and building-level records; taking inventory and moving supplies, equipment, and furniture; canceling vendor services; closing out financial operations; weatherizing and otherwise preparing the facility for inactivity; and providing security and maintenance for the vacant property. The following list of activities reflects a decommissioning project plan developed by the Saint Louis Public Schools (MO).

## Development of School Decommissioning Project Plan

- ✓ Receive direction from authorized decisionmaker (e.g., school board, school superintendent) to decommission a facility.
- ✓ Develop a Decommissioning Project Plan with input from staff across the agency, including central administration, academic office, curriculum, human resources, technology services, and operations.
- ✓ Establish a timeline for the decommissioning.
- ✓ Receive approval of Decommissioning Project Plan.
- ✓ Distribute Decommissioning Project Plan as appropriate.

## School Building Administration (Principal) Tasks

- ✓ Secure and store any hard (paper) copies of student and staff records, and other critical facility-level paperwork; coordinate and document removal to a new secure location.
- ✓ Remove building Asbestos Hazard Emergency Response Act (AHERA) Report Books.<sup>28</sup>
- ✓ Contact U.S. Post Office and other subscriptions with forwarding address.
- ✓ Supervise the packing of all classroom materials.
- ✓ Direct staff to remove all personal items.
- ✓ Require staff to remove all materials attached to the walls and ceilings.
- ✓ Require staff to remove all items in storage or display cases.
- ✓ Prohibit the removal of any technologies, including telephone, computers, printers, copiers, etc.
- ✓ Advise staff regarding new service location assignment.
- ✓ Direct principals to collect, label, and secure all keys to building and closets.

## Curriculum and Instruction Tasks

- ✓ Inventory all textbooks, library books, instructional supplies, and fixed assets (greater than \$1,000 in value).
- ✓ Box, label (with content, grade, and number of books), and store textbooks for pickup; coordinate and document removal to a new secure location.
- ✓ Contact the buy-back company for obsolete boxed textbooks not needed by schools.

## Technology Services Tasks

- ✓ Inventory all technology equipment, including audio visual equipment.
- ✓ Disconnect all computers, smartboards, projectors, monitors, audio visual equipment, and related technologies.

<sup>28</sup> Visit <https://www.epa.gov/asbestos/asbestos-and-school-buildings> for more information about complying with AHERA regulations.

- ✓ Label and box ancillary equipment, such as the mouse and computer cables.
- ✓ Dismantle wall-mounted televisions and monitors.
- ✓ Inform building staff that they may not remove any technology-related items (e.g., computers, telephones).
- ✓ Disconnect and remove all telephones (except for two phone lines to be left operational for fire and security service).
- ✓ Collaborate with central office to develop recommendations for the relocation of instructional computers to other sites.
- ✓ Securely transport all technology equipment to reassigned locations, including, if relevant, disposal locations; coordinate and document removal to new locations.

## **State and Federal Liaison Tasks**

- ✓ Identify, inventory, and bundle all federally funded equipment, including but not limited to projectors, interactive boards, computers and various peripherals, televisions, VCRs, and listening stations.
- ✓ Disconnect electronically, inventory, and bundle all peripherals, including keyboards, cables, connectors, and other background equipment.
- ✓ Notify state and federal data staff in order to update the building's status code in data systems.

## **Warehousing and Logistics Tasks**

- ✓ Furnish all boxes and packing materials needed to pack textbooks and school supplies.
- ✓ Collaborate with Curriculum and Instruction to reassign and redistribute textbooks and other instructional materials.
- ✓ Assist Library Services with the removal and storage of library materials.
- ✓ Assist Technology Services with the removal and storage of computing technologies and phone systems.
- ✓ Assist Buildings and Grounds with the removal and storage of custodial supplies and equipment.
- ✓ Assist Operations with the redistribution of other school furniture and equipment.
- ✓ Remove and securely relocate or safely dispose of all nonhazardous chemicals, cleaning solutions, paint, etc.
- ✓ Document all support, transportation, relocation, and storage activities for all items in the facility inventory.
- ✓ Coordinate with state and federal liaisons to ensure the secure pickup of all federally funded items and delivery to designated locations.
- ✓ House all federal equipment until school designation is identified and delivery of equipment is requested.

## **Operations Tasks**

- ✓ Re-key closed buildings.
- ✓ Confirm that building-level AHERA Report Books have been removed.
- ✓ Coordinate the removal of hazardous materials.
- ✓ Send letters requesting discontinuation of services, with an “as of” date and forwarding address.
  - Stop trash and dumpster services (contact vendor).
  - Stop grease traps services (contact vendor).
  - Stop exhaust hood services (contact vendor).
  - Stop pest and termite services (contact vendor).
  - Stop water treatment (contact vendor).
  - Stop fire sprinkler services (contact vendor).

- Stop elevator services (contact vendor).
- Stop fire extinguisher services (contact vendor).
- Stop domestic backflow services (contact vendor).
- ✓ Notify Election Board of closed status (unavailability as a polling place for elections).
- ✓ Check the building interior/exterior on a routine and ongoing basis (monthly).

## Maintenance and Custodial Staff

- ✓ Remove all supplies from storage rooms, boiler rooms, closets, outside storage areas, and attics.
- ✓ Secure exterior doors with chains.
- ✓ Cover exposed windows with a transparent plastic.
- ✓ Drain all fuel tanks.
- ✓ Move all fire extinguishers to staging area for removal.
- ✓ Clean building (according to district standards).
- ✓ Send letters requesting discontinuation of services, with an “as of” date and forwarding address:
  - Request removal of dumpster (contact vendor).
  - Shut off gas services (contact vendor).
  - Shut off water services (contact vendor).
  - Shut off sewer services (contact vendor).
  - Shut off exterior water valves (exterior).
- ✓ Fill P-traps with vegetable oil in
  - sinks;
  - floor drains;
  - drinking fountains;
  - air conditioning condensate drains;
  - boiler condensate drains; and
  - kitchen equipment.
- ✓ Drain liquid out of boilers.
- ✓ Drain liquid out of cooling and heating coils.
- ✓ Drain liquid out of cooling towers.
- ✓ Drain liquid out of water heaters.
- ✓ Drain liquid out of water holding tanks.
- ✓ Drain liquid out of expansion tanks.
- ✓ Drain liquid out of irrigation systems.
- ✓ Drain liquid out of sprinkler system.
- ✓ Disconnect all power in school building except for these:
  - Ensure power is connected to fire alarm.
  - Ensure power is connected to security alarm.
  - Ensure power is connected to exterior lights (dusk to dawn).

## Safety and Security

- ✓ Remove metal detectors.
- ✓ Remove camera/monitoring systems.
- ✓ Remove alarm codes.
- ✓ Remove hand-held security wands.

## Food and Nutrition Services Tasks

- ✓ Remove all food items from facility.
- ✓ Clean kitchen area and equipment.
- ✓ Leave doors opened.
- ✓ Bolt all walk-in freezers.
- ✓ Unplug appliances.

## Human Resources Tasks

- ✓ Develop employee spreadsheet (name, job title, facility location) for all staff assigned to decommissioned facility.
- ✓ Verify employee spreadsheet with principal.
- ✓ Email spreadsheet to principal (for use in cataloging and boxing employee files).
- ✓ Email cataloging and boxing instructions to facility. All boxes should be labeled in a manner that identifies the employee and school name (e.g., Anderson, John - Gateway Middle School).
- ✓ Coordinate with principal the return of personnel files and employee spreadsheet to HR Department.
- ✓ Review employee spreadsheet and ensure that a file is received for each employee.
- ✓ Review content of files prior to sending files to receiving school location.
- ✓ Notify staff of their new location and the effective date.
- ✓ Forward employee files to their new location.

## Special Education Tasks

- ✓ Collaborate with Curriculum and Instruction in the removal of all Special Education materials.
  - Remove all Special Education student files.
  - Remove all used Occupational and Physical Therapy equipment.
  - Remove all Speech and Language materials.
- ✓ Remove all Early Childhood Special Education student files, materials, and equipment.
- ✓ Remove all psychological examination student files, materials, and testing equipment.

## Finance Tasks

- ✓ Prepare itemized list of all equipment and supplies purchased with federal funds; provide list to program administrators as well as state and federal liaisons assigned to identify, inventory, and bundle all federally funded equipment.
- ✓ Conduct final inventory of all moveable equipment purchased with federal funds. Documents should be forwarded to fiscal control officers, chief administrators, and relevant department heads.
- ✓ Arrange for the removal of all vending machines from building.

- ✓ Deposit or return outstanding checks made payable to the facility fund (e.g., postage, vending, commissions, reimbursements, etc.).
- ✓ Close out petty cash and consumable accounts.
- ✓ Log all goods receipts.
- ✓ Forward all unpaid invoices to agency's accounts payable office.
- ✓ Reconcile all outstanding travel advances.
- ✓ Write check payable to agency for final bank account balances (e.g., checking, investments, activity funds, etc.) and confirm delivery to Treasurer's Office.
- ✓ Submit checkbooks, deposit slips, bank statements, and all other documentation to the fiscal control office.
- ✓ Close all bank accounts after final checks clear the bank account.
- ✓ Coordinate with purchasing office to cancel all outstanding purchase orders, requisitions, and encumbrances.
- ✓ Inform insurance carrier that the facility has been decommissioned.

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# Related Resources

## Additional Resources

### APPA: Leadership in Educational Facilities

[www.appa.org](http://www.appa.org)

With one eye on providing excellence in today's educational environment, and one always trained on adapting, enhancing, and transforming the facilities of the future, APPA seeks to create positive impact in educational facilities on three important levels: APPA transforms individual facilities professionals into higher performing managers and leaders, which helps transform member institutions into more inviting and supportive learning environments, which elevates the recognition and value of educational facilities and their direct impact on the recruitment and retention of students, faculty and staff.

### ASHRAE

<https://www.ashrae.org>

ASHRAE, founded in 1894, is a global society advancing human well-being through sustainable technology for the built environment. The Society and its members focus on building systems, energy efficiency, indoor air quality, refrigeration and sustainability within the industry. Through research, standards writing, publishing and continuing education, ASHRAE shapes tomorrow's built environment today.

### Association of School Business Officials International

<http://asbointl.org>

Founded in 1910, the Association of School Business Officials International (ASBO) is an educational association that supports school business professionals who are passionate about quality education. They are committed to providing programs and services that promote the highest standards of school business management, professional growth, and the effective use of educational resources. Through their programs, services, advocacy, and global network, ASBO International is the voice of school business officials.

### Collaborative for High Performance Schools

<http://www.chps.net>

Collaborative for High Performance Schools is leading a national movement to improve student performance and the entire educational experience by building the best possible schools.

### Common Education Data Standards

<https://ceds.ed.gov>

The Common Education Data Standards (CEDS) initiative is a voluntary common vocabulary, data model, and suite of implementation tools to help education stakeholders understand and use comparable education data throughout the early learning through postsecondary and workforce settings.

### CEDS Domain Entity Schema

<https://ceds.ed.gov/domainEntitySchema.aspx>

The Domain Entity Schema provides a hierarchy of domains, entities, categories, and elements. It is intended for use primarily by people as an index to search, map, and organize elements in a logical way.

## CEDS Element Downloads

<https://ceds.ed.gov/CEDSDownloads.aspx>

This page has dynamic download functionality. Check the box next to the domain, entity or category that you would like to download. You can select any combination or number of domains, entities or categories to download. Once you have made your selection, click the Download button to generate an Excel file.

## CEDS Elements

<https://ceds.ed.gov/elements.aspx>

Using CEDS Extend's search function, people can find CEDS elements alphabetically, by Domain, or by Key Word, or they can download them as an Excel file.

## CEDS Extend

<https://ceds.ed.gov/extend.aspx>

To facilitate the growing demand for the incorporation of data definitions from other efforts that have not yet been adopted into CEDS but are relevant to specific data systems and education data discussions, the CEDS website has expanded to include a repository of metadata from other efforts. This initial effort includes merging the elements of the NCES Handbooks into Extend, a searchable database of elements.

## National Association of College and University Business Officers

[www.nacubo.org](http://www.nacubo.org)

The National Association of College and University Business Officers (NACUBO) is a membership organization representing more than 2,100 colleges and universities across the country. NACUBO specifically represents chief business and financial officers through advocacy efforts, community service, and professional development activities. The association's mission is to advance the economic viability, business practices and support for higher education institutions in fulfillment of their missions.

## National Center for Education Statistics' Common Core of Data: About Public School Name and Address File

<https://nces.ed.gov/ccd/psadd.asp>

This file contains information concerning the National Center for Education Statistics School ID as well as other data, including the names, addresses, telephone numbers, and enrollment (membership) of the public schools in the 50 states, District of Columbia, five outlying areas, the Department of Defense, and Bureau of Indian Affairs schools for the 2009-10 school year. Also included for each record are various codes to help subset the file for targeting mailouts. These codes comprise school type, lowest and highest grades taught, school locale, and a derived variable for grades taught (primary, middle, and high schools), and school status.

## Sustainability Indicator Management and Analysis Platform (SIMAP™)

<https://unhsimap.org>

SIMAP™ is a carbon and nitrogen-accounting platform that can track, analyze, and improve campus-wide sustainability. Their proven algorithms, based on nearly two decades of work supporting campus inventories with the Campus Carbon Calculator, CarbonMAP, and Nitrogen Footprint Tool, help people create a baseline, benchmark performance, create reports, set goals, and analyze progress year over year.

### **U.S. Environmental Protection Agency's ENERGY STAR Portfolio Manager®**

<https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager>

The Environmental Protection Agency (EPA) created ENERGY STAR Portfolio Manager®, an online tool people can use to measure and track energy and water consumption, as well as greenhouse gas emissions. Use it to benchmark the performance of one building or a whole portfolio of buildings, all in a secure online environment.

### **U.S. Environmental Protection Agency's Guidance and Tools for Healthy Schools**

<https://www.epa.gov/schools/epa-guidance-and-tools-schools>

These EPA and other federal agency resources address a broad range of issues that affect children's health in schools, from selecting appropriate locations for schools to maintaining the buildings and grounds. Use them to assess a school's environmental health efforts and implement or improve related programs, policies and procedures.

### **U.S. Environmental Protection Agency's Indoor Air Quality Tools for Schools Action Kit**

<https://www.epa.gov/iaq-schools/indoor-air-quality-tools-schools-action-kit>

This action kit shows schools how to carry out a practical plan to improve indoor air problems at little or no cost using straightforward activities and in-house staff. The kit provides best practices, industry guidelines, sample policies, and a sample indoor air quality management plan.

### **U.S. Environmental Protection Agency's National Primary Drinking Water Regulations**

<https://www.epa.gov/ground-water-and-drinking-water/national-primary-drinking-water-regulations>

The National Primary Drinking Water Regulations are legally enforceable primary standards and treatment techniques that apply to public water systems. Primary standards and treatment techniques protect public health by limiting the levels of contaminants in drinking water.

### **U.S. Environmental Protection Agency's Research References Related to Indoor Air Quality in Schools**

<https://www.epa.gov/iaq-schools/research-references-related-indoor-air-quality-schools>

This is a list of references used in research related to indoor air quality in schools.

### **U.S. Environmental Protection Agency's School Siting Guidelines**

[https://www.epa.gov/sites/production/files/2015-06/documents/school\\_siting\\_guidelines-2.pdf](https://www.epa.gov/sites/production/files/2015-06/documents/school_siting_guidelines-2.pdf)

EPA's voluntary school siting guidelines can help local school districts, local education agencies, and community members evaluate environmental factors to make the best possible school siting decisions.

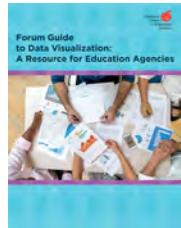
### **U.S. Environmental Protection Agency's Web Page on Asbestos and School Buildings**

<https://www.epa.gov/asbestos/asbestos-and-school-buildings>

Public and nonprofit private schools have distinct regulatory requirements to protect school children and school employees from asbestos exposure. This page provides information on these requirements as well as resource materials for schools and parents.



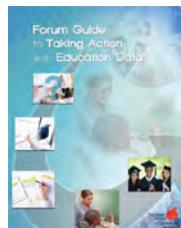
## National Forum on Education Statistics Resources



### Forum Guide to Data Visualization: A Resource for Education Agencies (2016)

[https://nces.ed.gov/forum/pub\\_2017016.asp](https://nces.ed.gov/forum/pub_2017016.asp)

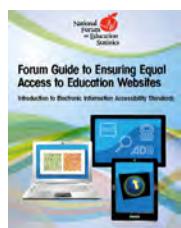
The purpose of this publication is to recommend data visualization practices that will help education agencies communicate data meaning in visual formats that are accessible, accurate, and actionable for a wide range of education stakeholders. Although this resource is designed for staff in education agencies, many of the visualization principles apply to other fields as well.



### Forum Guide to Taking Action with Education Data (2012)

[https://nces.ed.gov/forum/pub\\_2013801.asp](https://nces.ed.gov/forum/pub_2013801.asp)

This Guide provides practical information about the knowledge, skills, and abilities needed to identify, access, interpret, and use data to improve instruction in classrooms and the operation of schools, local education agencies, and state education agencies.



### Forum Guide to Ensuring Equal Access to Education Websites: An Introduction to Electronic Information Accessibility Standards (2011)

[https://nces.ed.gov/forum/pub\\_2011807.asp](https://nces.ed.gov/forum/pub_2011807.asp)

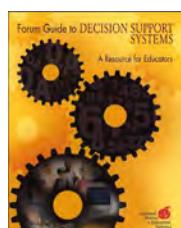
This resource guides education institutions in improving the accessibility of websites and other electronic information technology, and in complying with accessibility standards and laws.



### Forum Curriculum for Improving Education Data: A Resource for Local Education Agencies (2007)

[https://nces.ed.gov/forum/pub\\_2007808.asp](https://nces.ed.gov/forum/pub_2007808.asp)

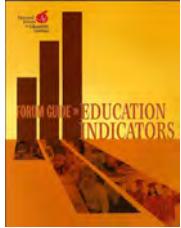
This curriculum supports efforts to improve the quality of education data by serving as training materials for K-12 school and district staff.



### Forum Guide to Decision Support Systems: A Resource for Educators (2006)

[https://nces.ed.gov/forum/pub\\_2006807.asp](https://nces.ed.gov/forum/pub_2006807.asp)

This document was developed to remedy the lack of reliable, objective information available to the education community about decision support systems.



### **Forum Guide to Education Indicators (2005)**

[https://nces.ed.gov/forum/pub\\_2005802.asp](https://nces.ed.gov/forum/pub_2005802.asp)

The Forum Guide to Education Indicators provides encyclopedia-type entries for 44 commonly used education indicators. Each indicator entry contains a definition, recommended uses, usage caveats and cautions, related policy questions, data element components, a formula, commonly reported subgroups, and display suggestions.



### **Forum Guide to Building a Culture of Quality Data: A School & District Resource (2004)**

[https://nces.ed.gov/forum/pub\\_2005801.asp](https://nces.ed.gov/forum/pub_2005801.asp)

There has been a growing awareness that effective teaching, efficient schools, and quality data are linked. A “Culture of Quality Data” is the belief that good data are an integral part of teaching, learning and managing the school enterprise.