Guide for School Facility Condition Surveys

PRIMARY CONTRIBUTOR Tim Mearig, RA
Facilities Manager
Alaska Department of Education & Early Development
Juneau, Alaska

CONTRIBUTORS Larry Morris
Architect Assistant
Alaska Department of Education & Early Development
Juneau, Alaska

Facilities Staff
Alaska Department of Education & Early Development

ACKNOWLEDGEMENTS
Thanks to the Bond Reimbursement and Grant Review Committee members who reviewed the original publication in its draft form and a special thank-you to Harley Hightower for his contribution of the original format and his creation of the specific building system checklists.

Originally published in a limited quantity in June, 1995 by the State of Alaska, Department of Education as *Educational Facility Condition Survey*. Updated in 1997 as the *Guide for School Facility Condition Surveys.*

Table of Contents

The Condition Survey

Background
Immediately after being constructed and put into use, school facilities begin to age. Their moving parts begin to wear. Their more static elements are impacted by loads and stresses, by environmental conditions, and by building users. In order to mitigate this degradation, facility owners implement maintenance and custodial measures. Eventually, inevitably, replacement or renewal becomes necessary. Capital renewal schedules can form the basis for identifying and forecasting this work, but they lack detail regarding specific conditions. The move from capital planning to capital projects—from general data on renewal schedules to actual assessments of conditions on site—is the realm of the condition survey.

A properly performed condition assessment is the initial step for any well-defined capital improvement project. The assessment can be expansive in scope to include an entire facility and all of its systems (i.e. civil, structural, architectural, mechanical, electrical, and hazardous-materials) or small and specifically directed (e.g., assessing the heating plant portion of the HVAC system). Department of Education & Early Development (DEED) documents describe the ends of these ranges with the nomenclature "Facility Condition Surveys" and" Component Condition Surveys".

Regardless of the scope of a condition assessment, which is determined by the targeted needs of a capital renewal program, the facility/component survey is a comprehensive product that informs and supports the project. It documents the conditions justifying the project and should include the following elements based on need:

- A basic description of existing systems including the components making up the system, their function, and their age;
- The current condition of the system(s) based on function/operation, visual observation/ inspection, and testing;
- A listing of the code deficiencies found, with citations;
- Recommendations for corrective action related to all deficiencies described;
- Costs associated with each deficiency's corrective action; and
- Supporting data such as cost/benefit analyses and life cycle cost analyses, special inspections, engineering calculations, photographs, and drawings related to any of the prior elements.

Depending on the scope and complexity of the condition survey, and its intended audience, it is also common to provide executive summaries, tabulations, and other organizational elements as part of the overall product.

The Survey
The condition survey process has three basic elements: pre-inspection review, on-site condition assessment, and report preparation.

Pre-Inspection

Best practices in the pre-inspection phase include reviewing available record documents for both buildings and infrastructure (e.g., building information models (BIM), drawings, and operations and maintenance manuals) for an understanding of the existing systems, gathering available maintenance and operations data such as work order histories, and completing a code review. Much of the information gathering process will involve communication with district personnel. At a minimum this will involve conversations with district facilities personnel; at a most-robust level, surveys would be conducted with user groups and responses indexed for further review. One objective of the code review is to ground the survey in the realities of the codes in force at the time of construction. Code awareness helps inform the on-site assessment and report phases—especially when differentiating between code deficiencies and code upgrades. The pre-inspection phase is also the time when various logistical elements are considered and planned. When conducting facility condition surveys with a broad scope, many logistical elements are integrated with the consultant solicitation, proposal, and award process.

On-site Condition Assessment

Particulars of the on-site condition assessment phase are driven by the scope of the condition survey. For facility condition surveys it is anticipated that the on-site condition assessment will be accomplished by a team of professionals with the necessary expertise to inspect the various building systems being included. A common team makeup would include an architect as the team lead with representation from civil, structural, mechanical, and electrical engineering disciplines. One challenge for design professionals is suitable equipment and tools for accessing areas of the facility or to accomplish testing, whether non-destructive or destructive. Often, the most robust condition assessments include an appropriate collaboration of design professionals and tradespersons or owner facilities personnel. The team makeup for a component condition survey could be significantly different from that of a facility condition survey. At this scale, condition assessment is often handled by tradespersons, contractors, or facilities personnel. Regardless of the team composition and complexity, there are some key procedures that are followed in performing an efficient and effective on-site assessment. These include the use of:

- Inspection Checklists: Inspection checklists can be prepared for each building system in the template. Use of checklist increases both the efficiency and the effectiveness of the on-site assessment and can help guard against inadvertently missing critical components. Appendix B provides some basic sample checklists.
- Condition Rating Scales: The template provided suggests a primarily narrative style report. However, this does not mean that indexing conditions should not occur. A solid best-practice is to develop a simple, well-crafted rating scale for the conditions observed. Generally, a 5-point numeric rating scale is sufficient to differentiate between various conditions. Appendix C provides an example of typical rating scale.
- Recording and Testing Equipment: Essential equipment to enhance the recording of conditions beyond the checklists and rating scales include a digital camera and measuring devices. For the latter, each building system establishes its own needs. In addition, the scope and complexity of the survey help determine the need for specific test equipment. Appendix D provides a list of typical test equipment and each of their uses.

- Personal Protective Equipment (PPE): Safety is the procedure; PPE is the means to that end. Condition assessments can be hazardous. They often involve accessing areas of facilities and infrastructure that are not meant to be inhabited or exposed—even temporarily. On-site assessments are often required to be conducted in compressed time frames, sometimes resulting in long work hours. In addition to protective equipment, personal care cannot be overlooked. Proper hydration, nutrition, and breaks require conscious preparation and personal awareness. Appendix D provides a list of typical PPE and personal care items.

Report Preparation

After the on-site inspection is complete, a report—the condition survey product—is prepared. Key elements of this document were previously identified in the Background section as: Description of Existing Systems, Current Conditions, Code Deficiencies, Recommendations, and Estimates. The report sections describing the existing systems should draw from the pre-inspection review phase while those documenting current condition and code deficiencies will be based on the on-site assessment phase. Though the data in these three elements form the core of the condition survey report, the usefulness of the report depends on the information found in the recommendations and costing elements. The recommended corrective actions should be able to assist the school district in developing a cost-effective plan for restoration of the facility or component, or to establish the need for replacement. In addition to this content-related structure, it is important for the report as a whole to be organized in relation to the building systems that make up the school facility and its related infrastructure. Utilizing the *DEED Cost Format* or similar or equal building systems structure is highly recommended for all other forms of condition surveys for schools in Alaska. Finally, the survey should assist the district in communicating those needs to the public and government agencies. These stakeholders are often those being asked to provide support for corrective work in the way of funding.

When performing a condition survey, a wide spectrum of conditions will likely be observed. A correspondingly range of recommendations for corrective action will be needed in the report. An important factor to consider when producing condition surveys on school facility projects is a distinction that may be needed between corrective actions that require capital expenditures and those that should be part of normal maintenance and repairs. Both categories should be documented in the report.

DEED Provisions

Because of a condition survey's value in defining a project, the department's *Application for Funding Capital Improvement Project by Grant or State Aid for Debt Reimbursement* incentivizes completion of a survey by assigning points and making it a requirement in order for certain projects to receive points for planning and design.

Under the department's capital improvement project (CIP) application process, a facility condition survey is required for major rehabilitation projects to receive any planning and design points, including Phase 1 - Planning/Concept Design. A condition survey may also be required for other projects if determined to be necessary to adequately support the scope of the proposed work. Instances of this have included projects where capital forecasting tools such as Facility Condition

Index or Renewal & Replacement Schedule indicated a scheduled renewal need but no evidence of an on-site assessment was included. Also, project scopes that warrant identification of in-depth examination of deteriorated systems may require a scope-specific facility or component condition survey. For project scopes that are component or system renovations, a condition survey of the component or system is acceptable. Condition surveys should be clearly identified and establish a specific date or date range when the survey occurred or was produced.

The department does not consider submittal of a Spill Prevention, Control, and Countermeasures (SPCC) Plan as a condition survey for fuel tank or fuel facility projects. In addition, an energy audit, although useful and informative, does not meet criteria to be a condition survey if the project's scope warrants additional facility condition survey data. Similarly, a condition statement found in a project scope narrative of a CIP application would not constitute a facility/component condition survey. Always refer to the department's latest application information for the most current instructions in this area.

Life Safety/Code scoring in the CIP application will be assessed based on the severity of the conditions and upon the documentation provided to support the reported severity. Documentation, such as a condition survey, can provide quantitative information to support the building or component condition. The primary purpose of this documentation is to present objective, primary, specific, and verifiable data.

Generally, the department does not have specific guidelines on what entities can perform and produce condition surveys. Portions of the condition survey, such as that information pertaining to building codes and analysis of structural and engineered systems during on-site assessments may need to be completed by an architect, engineer, or specialists with documented expertise in a building system. Surveys of this type can easily surpass the $50,000 threshold where competitive selection is required under DEED regulations. However, it might be possible for a district to complete the on-site investigation work and send the documentation to a corresponding professional to review for code issues. School district personnel, or their municipal counterparts, may also be able to produce in-house facility/component surveys depending on their particular expertise and knowledge.

Another area where special knowledge and skills may be needed is in the preparation of the cost estimate associated with proposed corrective actions. There are a variety of estimating tools available for use in this aspect of the condition survey process. Over the years, an increased level of detail for renovation work has been added to the DEED *Program Demand Cost Model for Alaskan Schools*. This enhances its use for estimating the cost of facility deficiencies in the context of condition surveys. However, this and other similar tools have their limitations, and often there is no substitute for a professional cost estimator.

The Template

Introduction

The condition survey template included in this publication is provided for convenience to establish a baseline recommendation for evaluating the condition of school facility systems and their components. The use of this template is not mandatory. Other forms and documents providing this information are acceptable. The template is available as a editable file from the department.

Template Structure

This condition survey template is designed to provide a basic, consistent structure to all phases of the condition survey process, and to all levels of condition survey scope. It accomplishes this by using a building system structure, and establishing within that structure a minimum level of detail. For the template provided in this publication, a building system structure conforming to the *DEED Cost Format* is used. When using the template, the first task is to norm the included sections to the scope of the survey. A full-scope facility condition survey would utilize every first-tier element and all applicable sub-elements. The smallest component condition survey could isolate any second-tier sub-element (e.g., Flat Roofs, or Dust Collection System). Within any of these scope elements, the five key process and product elements (description, existing condition, code deficiencies, recommendations, cost estimate) remain standardized. It should be noted that the format of any information presented in the five process elements can vary widely from straight narrative, to bulleted lists, to tables and can include photographs, figures, test results, and other supporting information. To illustrate, an example has been provided of a Mechanical System Condition Survey. While it is possible to embed supporting data within the main condition survey report, placement of supporting data, such as inspection checklist results, in respective appendices can also be helpful in organizing the report.

While there is great latitude in the means of presenting a condition survey, the building system/component structure should remain in place, as should the process of gathering and reporting the data in the five key elements. A condition survey without a description of existing systems or an estimated cost of recommendations would be incomplete.

Template Elements

Cover Page. The cover page is not limited to one page and should include: facility name and location, school district, dates of inspections, dates of building constructions and any additions including gross square footages, history of any renovations, and the survey team performing the survey. There should also be a discussion of the survey including its scope, purpose of the conditional survey, and some background on the facility. This is also where, if the condition survey is being performed by a non-licensed professional working within their expertise, the qualifications of the person performing the survey are provided.

Regulatory Data: Codes used for evaluating the facilities shall be referenced either in this section or in the relevant component sections. Any code discrepancies noted should be included in each component section and list the code references including title, edition, chapter, section, paragraph, and sub-paragraph. This section may also include code analysis of the facility for allowable area and fire, life, and safety. Survey, reports, and other documentation such as ADA Surveys, AHERA Surveys, Fire Marshal Inspection Reports, and similar documentation shall be referenced under this section of the condition survey and attached as an appendix if available. Results of these surveys and studies shall be considered in the recommendations and cost summary.

Site and Infrastructure: This section consists of Site Improvements, Site Structures, Civil/Mechanical Utilities, Site Electrical, and Offsite Work. The subsystems under these categories provide for detailed assessments of general site conditions as well as utilities and equipment that supports athletics and play. The latter portion addresses the civil engineering and utility requirements of the building. Site issues not related to improvements and infrastructure are assessed and reported under Special Construction. Examples would be site drainage and remediation of hazards.

Substructure: This section consists of Standard Foundations & Basements, Slabs on Grade, and Special Foundations. The subsystems under these categories provide for detailed assessments of all types of building foundations and supporting elements such as waterproofing and drainage systems. Many of these systems are below grade or covered with finish materials and can be difficult to assess directly. Best practice in determining conditions in these components is to look for the impacts of compromise or failure in related and connected systems.

Superstructure: This section consists of Floor Structure, Roof Structure, and Stair. The subsystems under these categories provide for detailed assessments of the structural elements of the building; those carrying dead loads and live loads associated with building use. Similarly to Substructure, these systems are often obscured or covered with finish materials and can be difficult to assess directly. Best practice in determining conditions in these components is to look for the impacts of compromise or failure in related and connected systems. The decision on whether or not to include destructive testing in the scope of a condition survey is often tied to the conditions being observed in these ancillary systems.

Exterior Enclosure: This section consists of Exterior Walls and Soffits, Exterior Glazing, Exterior Doors, and Exterior Accessories. The subsystems under these categories provide for detailed assessments of building components that form the building envelope. In complex buildings, the building should be broken down into discrete areas (e.g. wings, etc.) and separate information obtained for each area. In addition, changes in materials or structural systems will require separate assessment in the report.

Roof Systems: This section consists of Pitched Roofs, Flat Roofs, and Roof Accessories. The subsystems under these categories provide for detailed assessments of the components associates with each roofing system including the roofing material, and collection and drainage features. Roof accessory components such as hatches and skylights, and curbs for mechanical equipment are also in this section. Roofs which also serve as walkable/usable decks and components associated with vegetative roofs would be assessed in this section.

Interiors: This section consists of Interior Partitions, Special Partitions, Interior Openings, Interior Finishes, and Specialties. It is intended to capture all interior information and can be presented in a room-by-room format or on a system component basis. If reviewing room-by-room, it can be helpful to group rooms into basic types based on typical use and systems: 1) general spaces with standard amenities (e.g. classrooms, administrative offices, etc., 2) spaces with additional plumbing elements (e.g. science labs, administrative offices, etc.), 3) individual spaces with special uses (Corridors, Kitchens, Shops, Locker Rooms/Restrooms, Gymnasiums). This area of the survey could also discuss functional considerations such as adequacy of space, passive and active security measures, acoustics—including mechanical system noise, lighting, and indoor air quality (IAQ). ADA deficiencies could also be referenced.

Conveying Equipment: This section consists of Passenger Conveyors, and Materials Handling Systems. The subsystems under these categories provide for detailed assessments of elevators, lifts, and building-mounted hoists. These are uncommon in most Alaskan schools and may require assessment by specialists in these types of devices.

Mechanical: This section consists of Plumbing, HVAC, Integrated Automation, and Fire Protection. The subsystems under these categories provide for detailed assessments of the mechanical systems found in various areas of a building, including heating, cooling, and ventilation as well as plumbing piping, plumbing fixtures, building controls, and sprinkler systems. For room-based assessment, a form for Mechanical Rooms to gather significant information on the heating, cooling, and ventilation systems supplying the building's spaces is recommended. As such, information gathered in Interiors will augment the information in this section. However, the basic principle is that Interiors is limited to the visual aspects of the appurtenances of the mechanical systems whereas Mechanical will address the functionality and support for the appurtenance. For example, if mechanical system noise was documented in Interiors, this section would examine the sources and solutions to that functional issue. This section also deals with some specific regulatory data that may not be part of a standard code analysis.

Electrical: This section consists of Service and Distribution, Lighting, Power, Special Electrical, and Other Electrical. The subsystems under these categories provide for detailed assessments of MDPs, transformers, lighting fixtures, lighting controls, distribution panels, power devices, and the host of special electrical systems that make up 21st century schools. This include fire alarms, data and communications, intercoms, and clocks. Power generation and special grounding systems are examples of Other Electrical components. Information gathered in Interiors will augment the information in this section. Again, the basic principle is that Interiors is limited to the visual aspects of the appurtenances of the electrical systems whereas Electrical will address the functionality and support for the appurtenance. This section also deals with some specific regulatory data that may not be part of a standard code analysis.

Equipment and Furnishings: This section consists, unsurprisingly, of Equipment and Furnishings. The subsystems under these categories provide for detailed assessments of career technology, art, athletic, and other built-in school equipment. In the furnishings area, only those furnishings that are affixed to the building would be assessed. Examples would be special entry and walk-off mats, and window coverings.

Special Construction: This section consists of Site Conditions and Special Construction. The subsystems under these categories provide for detailed assessments of site features such as grading, drainage, and site remediation. Special Construction subsystems sometimes associates with schools include, packaged utility modules (e.g., water treatment, biomass boilers, etc.), swimming pools and greenhouses.

Although the preceding template elements are designed to capture all types of building systems and components, some hybrid systems can be difficult to locate within the recommended structure. These instances can be described and noted in the report's introductory information. There are also some types of inspections and assessments that are unique to a specific law or certification and that touch on several building systems. Examples of these are ADA assessments, Indoor Air Quality testing, and certifications for overall building performance such as LEED. If these specialty surveys are included in the scope of a facility condition survey, there could also be the recommendation would be to include these as an appendix to the report.

Template Element Content

Description of Existing Systems: The description should include all components; for instance, in describing the heating system, the boilers, pumps, piping, valves and all terminal units. It should also discuss the original design intent of the system, any modifications made to the system, and any operational deviations that have made changes to the original design and operation. Age of the individual components will be listed, including whether each is an original or a replacement. Ascertaining the age may require research into original drawings, renovations, and component work orders. There can also be a discussion of the component condition that is observed during the inspection.

Existing Conditions: Documentation of the system should be noted in narrative or bulleted write-ups and should include photographs wherever possible. Photographs should depict overall condition, as well as, any specific issues that will be included in the deficiency section of the report. Deficiencies types can be a failure, near to failure, does not meet the requirements of the facility, or a code issue. When referring to age as a reason for deficiency there are some guidelines; using the term "at the end/near end of its useful life" is not meaningful unless information is provided on the age of the component as well as the minimum expected life for a properly maintained system or component. The description of the deficiency should also describe any operational or maintenance issues, backed up by work orders or comments from operators. Noting whether there were no reported issues is important. For components that have failed or are near failure, the survey should review preventive maintenance schedules and work orders to determine if failure is due to age or lack of proper maintenance. This would also be the place to evaluate deviations from original design intent and the possible benefit of retro- or re-commissioning the system.

Code Deficiencies: If here is a code violation, as mentioned above, a citation of the code must be included.

Recommendations: Upon completion of the condition survey, recommendations shall be provided for all discrepancies and upgrades described. Each recommendation should reference the corresponding item contained in the Condition Survey by section, paragraph, and sub-paragraph designations. Recommendations can be a significant responsibility. Sometimes recommendations are obvious, such as those based on like-for-like replacement. At other times, recommendations can be a challenge. The best recommendations are made under a consideration of available options and an analysis that supports the option selected. Tools such as life-cycle cost analysis can assist in making well-supported recommendations. The survey team should include discussion of department-approved construction standards and how the standards may affect the design of any deficiencies and corrective actions. Consideration of district construction and building system standards is also appropriate.

Estimates: Cost associated with each discrepancy and upgrade shall be provided. The cost of corrections should be entered in this section and estimating details for each cost should be included in the appendix. Recommendations for developing costs have been covered in the Introduction section and include professional estimates, use of the *DEED Cost Model*, contractor quotes, and vendor quotes. A condition survey submitted without costs associated with each discrepancy is considered incomplete.

Executive Summary

This section could include a general review of the survey findings. It could also include possible project strategies to accomplish the needed repairs, including: suggested bundling of items into distinct projects for efficiency, small capital projects being performed by the district, maintenance and repair work, and possible long range planning for items that may need attention in the future.

Supplements and Appendices

Supplements may be included in an Appendix to the Condition Survey report. Appendices may include subjects such as special inspections, checklists, engineering calculations, photographs, drawings, estimate worksheets, etc. Floor plans, with building area designations, room identification and door numbers used in the survey should be included.

.

Example

An example School Condition Survey Mechanical system narrative excerpt is included on the following pages to show an example of how specific elements of the template can be selected to align with a survey scope, and how the five content areas are used to document the survey information.

ABC ELEMENTARY MECHANICAL CONDITION SURVEY

The site was visited on Friday, August 9th, 2019 to inspect the mechanical systems for the facility. The building was inspected for conformance of the following adopted codes and standards:

2013	International Building Code (IBC)
2012	International Fire Code (IFC)
2012	International Mechanical Code (IMC)
2015	Uniform Plumbing Code (UPC)
2012	International Fuel Gas Code (IFGC)
2012	International Energy Conservation Code (IECC)
2005	Americans with Disabilities Act Guidelines (ADA)
2016	ASHRAE 62.1-2016 Ventilation for Acceptable Indoor Air Quality
2016	ASHRAE 90.1-2016 Energy Standard for Buildings Except Low-rise Residential

Mechanical

Synopsis
The mechanical systems in the school varied in age and condition. The original school was constructed in 1981; there have been numerous renovation and addition projects since. Many of the mechanical systems are nearing the end of their useful life expectancy and should be scheduled for replacement. Ventilation to the school is not provided in accordance with ASHRAE 62.1-2010. The following is a summary of recommendations to address mechanical deficiencies in the school:

1. Replace plumbing fixtures and piping throughout the building.
2. Replace heating piping and heating equipment throughout the building.
3. Upgrade boiler system; replace existing boilers with high efficiency condensing boilers.
4. Replace heating pump system with variable speed pumping system.
5. Replace ventilation systems throughout the building.
6. Replace all pneumatic controls with DDC controls.

Plumbing Overview

Synopsis
Domestic water and sanitary sewer service is provided to the school by the municipal system. The storm drainage system is connected to the municipal system in the road right of way on the east side of the school.

Mid-Alaska School District
School Facility Condition Survey **ABC Elementary** **August 2019**

Plumbing Fixtures

Description of Existing Systems

There are two toilet room groups, one each wing consisting of a male and female toilet rooms. Plumbing fixtures in these rooms are commercial quality, vitreous china and are configured for minimal ADA requirements following a project in 2002. Toilets are wall mounted; urinals are wall mounted; lavatories are counter-set, self-rimming with single-handle faucets. Toilets and urinals are provided with commercial quality manual flush valves. Three individual toilet rooms are also present. Rooms 134A & B off the staff work room and 102A in the kindergarten classroom. Individual toilet room fixtures include vitreous china floor mounted toilets and wall mounted sinks with standard valves and faucets. There is a residential quality double bowl stainless steel kitchen sink in room 135 with a single level faucet and a single bowl stainless steel sink in room 105 with a double handle gooseneck faucet. Additionally, there is single bowl stainless steel sink in room 138 with a two-handle faucet and an integral vacuum breaker. There is a floor sink and a wall mounted faucet with an integral vacuum breaker in Janitor room 111. Dual height drinking fountains are installed in two locations in the main corridor, along with a hand-held emergency eye wash that is plumbed in room 138.

Existing Conditions

The plumbing fixtures vary in condition from fair to poor. With the exceptions of the fixtures or valves that have been replaced in the 2002 project, the fixtures are from the original construction or additions to the school. The fixtures vary in age from 30 to 39 years old and are at the end of their useful life expectancy. ADA Accessibility is limited to gang restrooms. Additionally, the fixtures are not water conserving fixtures; water usage at the school could be significantly reduced with the replacement of the fixtures. The dual-fixture drinking fountains are marginally functioning. Water pressure is low indicating chemical buildup in piping. These should be replaced as scheduled.

Code Deficiencies

Fixtures at the staff workroom are not ADA compliant under Americans with Disabilities Act of 1990, 42 U.S.C.

Recommendations

Replace plumbing piping and fixtures building wide. Typical life expectancy for plumbing fixtures is 30 years; the fixtures have met or are near the end of their useful life. Install new water conserving plumbing fixtures and provide upgrades for ADA compliance. Some architectural modifications will be required to provide for more ADA compliant bathrooms. Inspect underground plumbing with camera and repair or replace piping as required. Plumbing piping and fixture replacement in the north wing would be the first priority as this is the oldest piping in the building. The floor sink and associated wall tile are heavily stained and probably cannot be restored. If visual condition is objection-able, these should be replaced.

Estimate

$62,450 (see Appendix C for Cost Model)

Domestic Water Supply

Description of Existing Systems

The facility is provided with domestic cold water from two sources. A 2in underground water main enters the facility through the floor in Mechanical room 101 and feeds the entire facility. A second, 3/4in cold water line enters the building through the floor in Janitor room 111 and ties into the cold-water distribution system through an isolation valve to stop the flow for maintenance and safety purposes. Both lines are fed from the same underground 8” water main. The 3/4in line connects to the main at the south side of the building. There is no water meter or backflow protection device on either incoming cold water line. There are four exterior flush mounted key-type non-freeze hose bibbs with integral vacuum breakers distributed around the perimeter of the facility. Hot water is distributed via a 3/4in copper branch and 1/2in supply lines directly from the water heater. Hot water distribution piping has fiberglass pipe insulation. There is no hot water recirculation system.

Existing Conditions
Water distribution piping was not generally visible for inspection with the exception of short runs within the mechanical room. The exterior non-freeze hose bibs were operated and found to be functioning with no issues. Domestic hot water is distributed directly from the water heater to the restrooms without an ASSE-1070 device to limit the maximum temperature to 120 degrees F. There is no hot water recirculation system. Lack of a hot water recirculation system will result in increased domestic water usage and may result in user complaints. The condition of the plumbing piping is fair to poor. The piping varies in age, it is our understanding that only small sections of the original piping have been replaced. Most of the piping has met or exceeded the typical life expectancy of the domestic water piping.

Code Deficiencies
There was no tempering valve provided on hot water equipment.

Recommendations
Install appropriate tempering valve on hot water generating equipment.

Estimates
$400

Plumbing Equipment

Description of Existing Systems
A 1/4hp circulation pumps is located in room 140 Mechanical and provides recirculation to approximately 65ft of domestic water line that runs in the interstitial floor space. Domestic hot water is generated in a single, 120 gallon atmospheric natural gas fuel-fired water heater located in Mechanical room 140.

Existing Conditions
All plumbing equipment was in good serviceable condition. The water heater was replaced in the 2002 project and is reaching its 20-year expected life.

Code Deficiencies
The water heater was not equipped with a pressure relief valve.

Recommendations
Replace water heater in the next five years. Install an PRV as summer maintenance.

Estimates
$300 O&M costs;
$3000 construction cost.

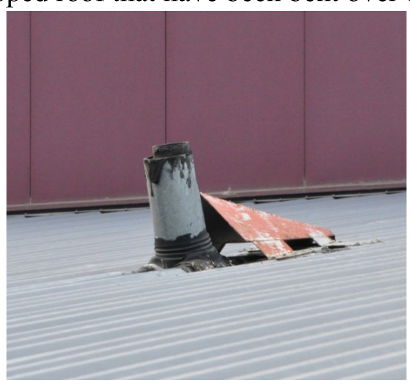
Waste & Vent Piping

Description of Existing Systems

The facility is served by a gravity sanitary sewer system. Sanitary waste and vent piping within the building is copper DWV except for a 4in cast iron vent through roof (VTR) above Fan Room 201. A 4in sanitary sewer cast iron main exits the facility to the west. Vent piping collects from plumbing fixtures to a 4in VTR on the north roof slope in Fan Room 201. Separate 3in VTRs serves the science lab and the main outfall line. Floor drains are provided at wet areas and tie to 2in waste piping. VTRs are insulated to 3 ft. below the roof deck.

Existing Conditions

The sanitary waste piping and venting was not generally visible for inspection with the exception of short runs within the mechanical room. However, there was no ancillary evidence that the waste and vent piping was not performing adequately except as noted below. There are two plumbing vent through roof (VTR) extensions on the north sloped roof that have been bent over by sliding snow.


The waste piping is buried and was not available for inspection. The underground piping could be flushed and inspected with a camera to review the condition of the piping.

Code Deficiencies

None

Recommendations

Consider repair of VTRs as O&M work.

Estimates

Special Systems

Description of Existing Systems

Two inch acid resistant waste and vent piping (ARW) serves sinks and floor drains in rooms 135 Science.

Existing Conditions

The acid resistant waste and vent piping system was not visible for inspection with the exception a small portion under the sink area of room 135. However, there was no ancillary evidence that the waste and vent piping was not performing adequately as installed. Note; equipment and fixtures tied to this system have been revised from original construction; only one sink remains in 135 and waste piping is now standard ABS.

Code Deficiencies
None noted.

Recommendations
None.

Estimates

HVAC Overview

Synopsis
The HVAC system consists of hot water boilers feeding a piped hydronic heat loop. Ventilation is provided by ducted supply system fed by air handling units to a majority of the school. A three-classroom addition is served by individual cabinet unit ventilators. A dedicated exhaust system feeds toilet rooms and science rooms.

Heating Equipment

Description of Existing Systems
There are two boiler systems in the school. One boiler system is located in the 1999 addition and serves the gymnasium, kitchen, MPR and 1985 classroom addition. The second boiler system is located in the original 1981 boiler room on the east side of the building near the IMC and serves the areas of the school.

The boiler system in the 1999 addition consists of two fuel-fired cast iron boilers. The boilers are Burnham PF-505 boilers rated at 786,000 BTU/hr gross output each. The boilers were installed in 1999 during the school addition. The boilers are in fair condition for their age but are nearing the end of their useful life expectancy. The boilers are directly piped to the primary heating system pumps, with a three-way valve on the supply header that operates to temper heating supply water to the building. The piping as configured does not provide for even flow to each boiler and does not provide minimum return water protection or minimum flow to the boilers. The piping configuration can lead to condensation of flue gases due low temperature, and uneven system heating as each boiler receives part of the flow regardless of boiler operation.

The boiler system in the 1981 boiler room consists of two fuel-fired cast iron boilers. The boilers are Burnham PF-510 boilers rated at 1,612,000 BTU/hr gross output each.
Each boiler is independently vented through the north wall of Mechanical 140. Snow guards have been installed up-slope of the vent stacks. Hydronic heating system make-up water is fed into the system through a 3/4in reverse principle backflow preventer (RPBP).

Existing Conditions
The boilers are approximately 39 years old. The boilers are in fair condition for their age but are nearing the end of their useful life expectancy. Boiler circulation pumps were installed on the boilers in 2003 to provide minimum flow through the boilers.

Both of the boiler systems utilize compression tanks for the heating system that do not have external bladders. These tanks have a tendency to become water logged and do not provide as good of expansion compensation as current bladder style tanks.

Code Deficiencies
None

Recommendations
Both of the boiler systems, main system heating pumps and associated piping should be scheduled for replacement. The boilers are nearing the end of their typical life expectancy. The boilers should be scheduled for replacement with high efficiency boilers as they are near the end of their useful life expectancy. The boilers should be consolidated to a single location with only one boiler room and two boilers, to reduce maintenance requirements. Upgrading the boilers to high efficiency condensing boilers with variable speed pumping system would provide significant energy savings over the existing boiler system. Additionally, the existing boiler systems are prone to thermal shock issues, high efficient boilers are designed to operate with low water temperatures eliminating concerns with thermal shock.

Estimates
$457,950 (see Appendix C for Cost Model)

Heating Distribution Systems

Description of Existing Systems
The hydronic piping in the building consists of steel and copper piping. The piping in the 1999 additions had signs of leakage but appeared to be in fair condition.

Heating for the school is provided by a combination of in-floor heating, cabinet unit ventilators, perimeter fin tube and heating coils in the air handling units. Miscellaneous unit heaters and cabinet unit heaters are located throughout the school to provide heating to utility areas and vestibules. Hydronic hot water heating fluid (100% water) is circulated to terminal units throughout the facility via copper piping. There are two inline constant volume supply pumps located downstream of the boilers in Mechanical room 140.

Existing Conditions
The distribution piping in the 1981 areas of the school have exceeded its useful life expectancy. The piping insulation in the fan rooms has been damaged and should be repaired/replaced.

Code Deficiencies
The heating system equipment and piping is not seismically restrained in accordance with the IBC. Seismic restraint requirements have increased since the installation of the heating system.

Recommendations
The heating system pumps, air separator and compression tanks should be replaced with the boilers as they are also near the end of their life expectancy of 30 years.

The heating piping and terminal heating equipment has exceeded its typical life expectancy and should be replaced. The distribution piping and terminal units are approximately 28 years old.

Seismic restraint for the heating piping and equipment throughout the building should be installed in accordance with the 2009 edition of the IBC. Repair or replace the damaged piping insulation in the fan rooms.

Estimates
See above.

Ventilation Equipment

Description of Existing Systems
Ventilation for the school is provided by air handling units and cabinet unit ventilators. The ventilation systems in the school are not capable of providing the current ASHRAE 62.1-2007 ventilation rates. The classroom and office areas in the 1981 areas are ventilated by a central air handling unit located in a fan room adjacent to the boiler room. The air handling unit is a constant volume, built up unit with mixing box and filters. The unit has exceeded its useful life expectancy and does not meet current building codes. The classrooms in the 1999 addition are ventilated by cabinet unit ventilators. The ventilators draw fresh outside air in low to the ground. The multi-purpose room and gymnasium are ventilated by constant volume air handling units. The air handling units that serves the MPR is from the 1999 addition. Two air handling units serve the gym, the units were installed in the 1981 building.

Ventilation for bathrooms is provided by a combination of central and local exhaust fans. The kitchen in the elementary wing does not have a hood above the convection oven. The kitchen is ventilated by a roof mounted exhaust fan.

Existing Conditions
The air handling unit utilizes the corridor as a return air path which is no longer allowed by the IMC. The MPR unit has exceeded it useful life expectancy. The gymnasium air handling units are nearing the end of their useful life expectancy and should be scheduled for replacement. The intakes for the CUH are subject to blockage from snow, and there is the potential for intake of fumes from vehicles in the parking lots depending on wind direction. The path for the relief/exhaust air for classrooms is through the corridor to central relief air fans. Utilizing the corridor as the relief air path is a code violation. The unit ventilators are in fair to poor condition and have exceed their useful life expectancy.

Code Deficiencies
The ventilation system equipment and ductwork is not seismically restrained in accordance with the 2009 edition of the IBC. Seismic restraint requirements have increased since the installation of the ventilation systems. The exhaust airflow rates for the bathrooms are below current code requirements. Most of the exhaust fans have met or are exceeding their useful life expectancy. The kitchen ventilation system does not comply with ventilation codes. The combustion air systems for the boilers are engineered systems with boiler room ventilation fans and relief air/combustion air opening.

Recommendations
The insulation tape on the ductwork insulation in the fan rooms is failing off and should be replaced.

Estimates
$8,000 (accessible portions could be O&M)

Ventilation Distribution Systems

Description of Existing Systems
Supply air ductwork is routed above the ceilings to ceiling diffusers in the MPR and gym. The MPR return air is by ceiling return air plenum open to the fan room. The gym return air is ducted back to the two air handling units. Air returns back to the AHU through light fixture perimeter slots to a plenum above the ceiling where it is transferred to the mezzanine level fan room through a bank of silencers. Local exhausts are provided through three exhaust fans and galvanized steel ducting. EF-1 serves the toilet rooms. EF-2 serves the science lab. EF-3 serves the office areas. All exhausts terminate at exterior wall louvers with automatic shutoff dampers on the north side of the facility.

Existing Conditions

Code Deficiencies
The ventilation system equipment and ductwork is not seismically restrained in accordance with the 2009 edition of the IBC. Seismic restraint requirements have increased since the installation of the ventilation systems.

Recommendations
Perform a building wide ventilation upgrade to replace ventilation equipment that is at or beyond its useful life expectancy. Install new ventilation equipment to comply with ASHRAE 62.1-2007. Install new Type 2 hood for the kitchen with exhaust fan sized for the equipment served. Install seismic restraint for the ventilation equipment and ductwork in accordance with the 2006 edition of the IBC.

Estimate
$988,950 (see Appendix C for Cost Model)

Cooling Equipment

Description of Existing Systems
There is no refrigerant based mechanical space cooling system. Economizer-only space cooling is provided by the single 20,500 CFM air handling unit (AHU) located in Fan Room 201. All of the equipment associated with the computer room cooling system shown on the original construction plans has been removed.

Existing Conditions
N/A

Code Deficiencies
N/A

Recommendations
None.

Estimates

Cooling Distribution Systems

Description of Existing Systems
N/A

Integrated Automation Overview

Synopsis
See below.

Control Systems

Description of Existing Systems
HVAC control is provided by a Siebe pneumatic control panel in Mechanical Room 130, and a control panel in Fan Room 201, and pneumatic control sensors located throughout the facility. Fin tube control valves are also pneumatic. There is a control air compressor storage tank in Mechanical room 140 but the compressor has been removed.

Existing Conditions
Mechanical controls installed in the original construction (a pneumatic system) are in disrepair, all are non-functional due to the absence of head end equipment (i.e., the compressor). The operating system and main controllers of this system are suspect even if the system was charged and pressurized and should be replaced or upgraded. In addition, approximately 40% of the room temperature sensors on the west side of the facility are missing. The remaining room temperature sensors indicated a reasonably accurate room temperature. The control air compressor storage tank in Mechanical room was not in working condition; only the tank remains.

Code Deficiencies

Recommendations
Remove all elements of the non-functioning pneumatic control system and install a DDC control system.

Estimates
$165,888 (see Appendix C for Cost Model)

Fire Protection Overview

Synopsis
Originally, fire protection is provided via portable fire extinguishers. Extinguishers are placed in recessed wall cabinets throughout the interior. The current fire protection system is a wet sprinkler system installed during the summer of 2009.

Sprinklers & Piping

Description of Existing Systems
Black iron schedule 40 pipe with threaded fittings. Standard 180 degree heads.
Existing Conditions
The system is in good condition.

Code Deficiencies
None.

Recommendations
No fire protection upgrades are recommended at this time. Routine testing and inspections in accordance with NFPA 25 should be performed to ensure reliable operation of the sprinkler system.

Estimate
$500/yr in O&M

Special Mechanical Systems Overview

Synopsis

Fuel Supply (Gas & Oil)

Description of Existing Systems
There is a 3000 gallon above ground fuel oil storage tank secured to a concrete pad located behind a concrete retaining wall approximately 35 feet from the northwest corner of the facility. A 3/4in threaded steel pipe delivers fuel oil to Mechanical Room 140 where it is distributed directly to the four heating boilers; there is no day tank. A 3/4in threaded steel pipe returns fuel oil from the boilers to the exterior storage tank. Both pipes run above ground from the storage tank to the north wall of Mechanical room 140.

Existing Conditions
The 3000gal above-ground storage tank is in good condition according to its approximate 20-year age. Piping has minor corrosion typical of steel piping. Tank fixtures and appurtenances appeared to be functioning. Tank finish was in good condition; tank was free of significant corrosion. Fuel distribution and return piping was in good serviceable condition. No evidence of leaks was observed.

Appendix A – Condition Survey Template

Facility Overview

School District:	
Facility:	
Inspection Date(s):	

Dates of Construction and Additions

	Date	GSF
Original Construction:		
Addition:		
Addition:		
Addition:		
	Total:	

*Confirm dates and GSF with DEED Facility Database

Renovations and System Replacement

Date	Description (including renovations as part of above additions)

Survey Team

Name	Firm

Notes

Regulatory Data

Codes Utilized

Code Analysis

Site and Infrastructure

Synopsis

Site Improvements Overview

Synopsis

Vehicular Surfaces

Description of Existing Systems

Existing Conditions

Code Deficiencies

Recommendations

Estimates

Pedestrian Surfaces

Description of Existing Systems

Existing Conditions

Code Deficiencies

Recommendations

Estimates

Elevated Decks, Stairs & Ramps

Description of Existing Systems

Existing Conditions

Code Deficiencies

Recommendations

Estimates

Site Walls

Description of Existing Systems

Existing Conditions

Code Deficiencies

Recommendations

Estimates

Landscaping & Irrigation

Description of Existing Systems

Existing Conditions

Code Deficiencies

Recommendations

Estimates

Fencing and Gates

Description of Existing Systems

Existing Conditions

Code Deficiencies

Recommendations

Estimates

Site Furnishing & Equipment

Description of Existing Systems

Existing Conditions

Code Deficiencies

Recommendations

Estimates

Playgrounds

Description of Existing Systems

Existing Conditions

Code Deficiencies

Recommendations

Estimates

Other Site Improvements

Description of Existing Systems

Existing Conditions

Code Deficiencies

Recommendations

Estimates

Site Structures Overview

Synopsis

Freestanding Shelters

[Note: For brevity, the five-part narrative categories is not repeated at each subsystem throughout the remaining listing of the template structure.]

Attached Shelters

Support Buildings

Civil/Mechanical Utilities Overview

Synopsis

Water System

Sanitary Sewer

Storm Water

Fuel Systems

Heating/Cooling Piping & Utilidors

Site Electrical Overview

Synopsis

Supply & Distribution

Data/Comm Service & Distribution

Lighting & Equipment

Security Systems

Offsite Work Overview

Synopsis

Offsite Improvements

Offsite Utilities

Other Offsite Work

Substructure

Synopsis

Standard Foundations & Basements Overview

Synopsis

Continuous & Column Footings

Foundation Walls & Treatment

Foundation Drainage

Slab on Grade Overview

Synopsis

Structural & Non-structural Slabs

Trench, Pit, and Pad

Underslab Elements

Special Foundations Overview

Synopsis

Piling & Pile Cap

Caissons

Grade Beams

Arctic Foundation Systems

Other Special Foundations

Superstructure

Synopsis

Floor Structure Overview

Synopsis

Lower & Main Floors

Upper Floors

Ramps

Special Floors

Roof Structure Overview

Synopsis

Pitched Roofs

Flat Roofs

Special Roofs

Stairs Overview

Synopsis

Stair Structure

Stair Railings

Ladders and Steps

Exterior Enclosure

Synopsis

Exterior Walls & Soffits Overview

Synopsis

Exterior Walls

Fascias & Soffits

Curtainwalls & Non-bearing Walls

Exterior Glazing Overview

Synopsis

Windows

Storefronts

Structural Window Walls

Translucent Panels

Exterior Doors Overview

Synopsis

Personnel Doors

Special Doors

Exterior Accessories Overview

Synopsis

Louvers, Screens & Shading Devices

Balcony Elements

Other Exterior Accessories

Roof Systems

Synopsis

Pitched Roof Overview

Synopsis

Pitched Roofing

Gutters & Downspouts

Flat Roof Overview

Synopsis

Flat Roofing

Roof Drains & Piping

Roof Accessories Overview

Synopsis

Skylights

Roof Hatches

Roof Decks, Walls & Railings

Other Roof Accessories

Interiors

Synopsis

Partitions/Soffits Overview

Synopsis

Fixed Partitions

Soffits & Ceilings

Special Partitions Overview

Synopsis

Operable Partitions

Demountable Partitions

Glazed Partitions

Railings & Screens

Interior Openings Overview

Synopsis

Personnel Doors

Special Doors

Windows & Sidelites

Interior Finishes Overview

Synopsis

Floor Finishes

Wall Finishes

Ceiling Finishes

Other Finishes

Specialties Overview

Synopsis

Interior Specialties

Casework/Millwork

Seating

Window Coverings

Conveying Systems

Synopsis

Passenger Conveyors Overview

Synopsis

Passenger Elevators

Lifts & Other Conveyors

Material Handling Systems Overview

Synopsis

Elevators & Lifts

Hoists & Cranes

Other Systems

Mechanical

Synopsis

Plumbing Overview

Synopsis

Plumbing Fixtures

Plumbing Piping

Plumbing Equipment

Waste & Vent Piping

Special Systems

HVAC Overview

Synopsis

Heating Equipment

Heating Distribution Systems

Ventilation Equipment

Ventilation Distribution Systems

Cooling Equipment

Cooling Distribution Systems

Heat Recovery System

Integrated Automation Overview

Synopsis

Control Systems

Other Automation

Fire Protection Overview

Synopsis

Riser & Equipment

Sprinklers & Piping

Special Suppression Systems

Special Mechanical Systems Overview

Synopsis

Fuel Supply (Gas & Oil)

Dust Collection Systems

Compressed Air & Vacuum Systems

Other Special Mechanical Systems

Electrical

Synopsis

Service & Distribution Overview

Synopsis

Main Distribution Panels & Switchgear

Panels & Motor Control Centers

Transformers

Conduit & Feeders

Lighting Overview

Synopsis

Light Fixtures

Lighting Controls

Conduit & Wiring

Power Overview

Synopsis

Devices & Connections

Conduit & Wiring

Special Systems Overview

Synopsis

Fire Alarm

Data & Communications

Security Systems

Clock Systems

Intercom Systems

Other Special Systems

Other Electrical Systems Overview

Synopsis

Power Generation & Distribution

Electrical Heating Systems

Grounding Systems

Equipment and Furnishings

Synopsis

Equipment Overview

Synopsis

Food Service & Kitchen Equipment

Athletic Equipment

Career & Technology Equipment

Science Equipment

Library Equipment

Theater Equipment

Art Equipment

Loading Dock Equipment

Other Equipment

Furnishings Overview

Synopsis

Fixed Furnishings

Mats

Other Furnishings

Special Conditions

Synopsis

Special Construction Overview

Synopsis

Packaged Utility Modules

Swimming Pool

Greenhouse

Special Demolition

Synopsis

Structural Demolition

Building Selective Demolition

Site and Utility Demolition

Hazardous Material Removal

Building Relocation

Special Site Conditions

Synopsis

Site Shoring & Dewatering

Site Earthwork

Site Remediation

Appendix B – Sample Inspection Checklists

See the below example checklists for an example of how to structure a component inspection checklist. Additional checklists may be available from the department.

Site Structures – Inspection Checklist

Description of Existing Systems
[enter basic description from building system data]

Existing Conditions

Subsystem – Freestanding Shelters

Component(s)	Checklist	Photos	Condition
Foundation	Inspect for: • Proper drainage • Corrosion • Deterioration • Plumb/Level		
Superstructure	Inspect for: • Deformation • Cracks/Damage • Plumb/Level		
Enclosure	Inspect for: • Siding integrity • Roof integrity • Opening integrity • Sealant/caulk		
Accessories	Inspect for: • Damage • Corrosion • Missing pieces • Excessive wear		
Lighting	Inspect for: • Function • Corrosion • Damage • Excessive wear		

Subsystem – Attached Shelters

Component(s)	Checklist	Photos	Condition
Foundation	Inspect for: • Proper drainage • Corrosion • Deterioration • Plumb/Level		

Superstructure	Inspect for: • Deformation • Cracks/Damage • Plumb/Level		
Enclosure	Inspect for: • Siding integrity • Roof integrity • Opening integrity • Sealant/caulk		
Accessories	Inspect for: • Damage • Corrosion • Missing pieces • Excessive wear		
Lighting	Inspect for: • Function • Corrosion • Damage • Excessive wear		

Subsystem – Support Buildings

Component(s)	Checklist	Photos	Condition
Foundation	Inspect for: • Proper drainage • Corrosion • Deterioration • Plumb/Level		
Superstructure	Inspect for: • Deformation • Cracks/Damage • Plumb/Level		
Enclosure	Inspect for: • Siding integrity • Roof integrity • Opening integrity • Sealant/caulk		
Accessories	Inspect for: • Damage • Corrosion • Missing pieces • Excessive wear		

Component(s)	Checklist	Photos	Condition
Plumbing	Inspect for: • Function • Leaks • Corrosion • Damage • Excessive wear		
HVAC	Inspect for: • Function • Leaks • Corrosion • Damage • Excessive wear		
Power	Inspect for: • Function • Corrosion • Damage		
Lighting	Inspect for: • Light levels • Corrosion • Damage • Excessive wear		

Code Deficiencies
[Citations are from the IBC (unless noted otherwise) – check with the AJH for amendments or for other applicable codes]

Code Section	Subsection	Potential/Observed Issue
Section 1607 Structural Design	(1607.12 Awnings and canopies)	
Section 3105 Awnings and Canopies	(3105.5 Special construction, loads)	
Chapters 1 - 12, 14 - 28, and 30 - 35	(Elements related buildings, and structures)	
NFPA 70, National Electrical Code	(Elements related to electrical systems)	
IAMPO Uniform Plumbing Code	(Elements related to plumbing systems)	
International Mechanical Code	(Elements related to non-plumbing mechanical systems)	

Flat Roofing – Inspection Checklist

Description of Existing Systems
[enter basic description from building system data]

Existing Conditions

Subsystem - Roofing

Component(s)	Checklist	Photos	Condition
Membranes	Inspect for: • Proper drainage • Seam separation • Hole/tears • Plant growth		
Insulation	Inspect for: • Water intrusion • [consider IR imaging]		
Flashings/ Copings	Inspect for: • Damage • Seam separation • Corrosion • Missing sections • Excessive wear		

Subsystem – Roof Drains &Piping

Component(s)	Checklist	Photos	Condition
Roof Drains	Inspect for: • Loose pieces • Corrosion • Dirt/debris		
Piping	Inspect for: • Leaks • Corrosion • Insulation cond. • [consider video-scoping]		
Heat Trace	Inspect for: • Operation • Wear/damage • Attachment		

Code Deficiencies
[Citations are from the IBC (unless noted otherwise) – check with the AJH for amendments or for other applicable codes]

Code Section	Subsection	Potential/Observed Issue
Section 720 Thermal- And Sound-Insulating Materials	(720.5 Roof insulation)	
Section 1202 Ventilation	(1202.2 Roof ventilation)	
	(1202.2.1 Ventilated attics and rafter spaces)	
	(1202.3 Unvented attic and unvented enclosed rafter assemblies)	
Section 1502 Roof Drainage		
Section 1503 Weather Protection		
Section 1504 Performance Requirements		
Section 1505 Fire Classification		
Section 1506 Materials		
Section 1507 Requirements for Roof Coverings	(1507.1.1 Underlayment)	
	(1507.10 Built-up roofs)	
	(1507.11 Modified bitumen roofing)	
	(1507.12 Thermoset single-ply roofing)	

Code Section	Subsection	Potential/Observed Issue
	(1507.13 Thermoplastic single-ply roofing)	
Section 1508 Roof Insulation		
Section 1509 Radiant Barriers Installed Above Deck		
Section 1510 Rooftop Structures		
Section 2603 Foam Plastic Insulation	(2603.6 Roofing)	

Fire Protection – Inspection Checklist

Description of Existing Systems
[enter basic description from building system data]

Existing Conditions

Subsystem – Riser and Equipment

Component(s)	Checklist	Photos	Condition
Entrance and Tree	Inspect for: • Backflow prevention • Pressure Gauges • Relief Valves • Corrosion or leaks • Valving is locked open and tamperproof		
Bracing	Inspect for: • Presence of bracing • Damage • Corrosion • Secure connections		
Water Flow Alarm Devices	Inspect for: • Presence of devices • Check operation		

Subsystem – Sprinklers & Piping

Component(s)	Checklist	Photos	Condition
Heads	Inspect for: • Spacing • Obstructions • Damage		
Piping	Inspect for: • Leaks • Corrosion • Bracing		
Accessories	Inspect for: • Escutcheons/trims • Air vent condition • Tags/labels		

Subsystem – Special Fire Protection Systems

Component(s)	Checklist	Photos	Condition
Water Storage	Inspect for: • Leaks • Corrosion • Piping		
Pumps	Inspect for: • Operation • Pressure and flow		
Compressed air systems	Inspect for: • Operation • Pipe connections • Leaks		

Code Deficiencies
[Citations are from the NFPA 13 – check with the AHJ for amendments or for other applicable codes]

Code Section	Subsection	Potential/Observed Issue
Backflow prevention	Local code from utility	
Chapter 6 System components and Hardware	6.2 Sprinklers	
	6.7 Valves	
	6.9 Water Flow Alarm Devices	
Chapter 7 System Requirements	7.1 Wet Pipe Systems	
	7.2 Dry Pipe Systems	
Chapter 8 Installation Requirements	8.5 Position, location, spacing and use of sprinklers	
	8.7 Sidewall sprinklers	
Chapter 9 Hanging, Bracing and Restraint of System Piping	9.1 Hangers	

Code Section	Subsection	Potential/Observed Issue
	9.3 Protection of Piping against Damage Where Subject to Earthquakes	
Chapter 12 General Requirements of Storage	12.9 Restrictions	

Other Electrical Systems – Inspection Checklist

Description of Existing Systems
[enter basic description from building system data]

Existing Conditions

Subsystem – Power Generation & Distribution

Component(s)	Checklist	Photos	Condition
Generator	Inspect for: • Damage • Corrosion • Excessive hours • Trickle charger • Fluid levels • Operational pressures • Power delivery • Functionality		
Switchgear Panel	Inspect for: • Damage • Corrosion • Excessive wear • Water intrusion • Review reports o Arc flash, etc. • Functionality		
Conduit	Inspect for: • Damage • Corrosion		
Feeder	Inspect for: • Damage • Corrosion • Excessive wear • [consider IR imaging] • Functionality		

Subsystem – Heating Systems

Component(s)	Checklist	Photos	Condition
Baseboard	Inspect for: • Damage • Excessive wear • Functionality		
Unit Heater	Inspect for: • Damage • Excessive wear • Functionality		
Radiator / Heat Exchanger	Inspect for: • Damage • Excessive wear • Functionality		
Radiant Heat	Inspect for: • Damage • Excessive wear • Functionality		

Subsystem – Grounding System

Component(s)	Checklist	Photos	Condition
Special Grounding	Inspect for: • Connections • Insulation condition • Corrosion • Damage		
Lightning Protection	Inspect for: • Connections • Continuity • Insulation condition • Corrosion • Damage		

Code Deficiencies

[Citations are from the NEC (unless noted otherwise) – check with the AHJ for amendments or for other applicable codes]

Code Section	Subsection	Potential/Observed Issue
Section 430.14 Generator location factors	(445.10 Adequate ventilation and adequate room for maintenance)	
445.12 and 445.13(A) Overcurrent protection requirements		
445.18(B) Generator Mechanical reset		
110.12(C) Broken or damaged parts and contamination by foreign materials		
110.13 Secure mounting and adequate ventilation space for equipment		
110.26(B) Working space and dedicated space are not used for storage.		
110.22 Identification of disconnect means and circuit directories for panelboards, switchboards, switchgear and similar equipment		
300.3(C)(1) and (2) Insulation where conductors of different systems share common enclosures		
300.11 and applicable Chapter 3 article(s) Wiring methods are securely fastened in place, supported independently of suspended ceilings, and not used as supports		
404.9(B), 404.12 Grounding of metal switch boxes, switches, and any metal faceplates		

Appendix C – Sample Rating Guides

Rating Guide – Reliability Basis

This rating is based on how close an asset or component is to replacement or major overhaul. Scores will not have a greater granularity than a half point. An asset is in a State of Good Repair if the score is greater than 2.5.

Score	Photos	Condition
5	New or like new	The inspector is 95% to 100% confident in reliability; no visible defects, no damage, cosmetically looks new. Note: An asset is only new once, after rebuild some old parts are not new and therefore the highest score after rebuild is {4.5).
4.5		The inspector is 90% to 95% confident in the reliability of the component/ asset.
4	Cosmetic defects/minor wear.	The inspector is 80% to 90% confident in the reliability of the component/ asset. Shows minimal signs of wear, no major defects, and some minor defects with only minimal signs of deterioration.
3.5		The inspector is 70% to 80% confident in the reliability of the component/ asset.
3	Small repairs or minor refurbishment.	The inspector is 60% to 70% confident in the reliability of the component/ asset. Some moderately defective or deteriorated components; expected maintenance needs. Cosmetically "fair" but all devices are functioning as designed.
2.5		The inspector is 50% to 60% confident in the reliability of the component/ asset.
2	Significant or multiple repairs needed.	The inspector is 40% to 50% confident in the reliability of the component/ asset. Asset near overhaul or retirement, but in serviceable condition. Asset has increasing number of defects or deteriorated component(s).
1.5		The inspector is 30% to 40% confident in the reliability of the component/ asset.
1	Critical deterioration, overhaul or replacement needed.	The inspector is less than 30% confident in the reliability of the component/ asset. Asset is in need of major repair or refurbishment, multiple minor and major defects. Possible structural issues.
0		Not safe to use, multiple major repairs or Asset set for disposal/retirement.

Rating Guide – Visual Condition

This rating is based on a general visual observation of the component or system. It can incorporate empirical data. An asset is in a State of Good Repair if the score is 3 or above

Score	Photos	Condition
5	Excellent	No visible defects, new or near new condition, may still be under warranty if applicable.
4	Good	Good condition, but no longer new, may have some slightly defective or deteriorated component(s), but is overall functional.
3	Adequate	Moderately deteriorated or defective components; but has not exceeded useful life.
2	Marginal	Defective or deteriorated component(s) in need of replacement; exceeded useful life.
1	Poor	Critically damaged component(s) or in need of immediate repair; well past useful life.

Appendix D – Sample Equipment Lists

Recommended Inspection Equipment

Inspection equipment as required is often needed to access areas of the facility, to measure features, and building operations, and to record observations. This is not a complete list. Specific review of local job conditions, available local support, and general logistics is also important. Guidance on the proper use of inspection equipment should also be provided to condition assessment inspection personnel. Specialized professionals maybe required to perform specific condition assessments.

Item	Use	On-site
Transportation	Transport of personnel and equipment to/from locations	Y
Storage Totes/Bins	Gear transport while traveling	Y
Carry Bag	Equipment transport while making condition assessments	Y
Mobile Phone	Primarily communications for logistics *(also see note below table)*	Y
Laptop or Tablet	Repository of data, files, and records related to the survey	Opt.
Portable Hard Drive	Repository of project information for use on other’s computers	Opt.
Thumb Drive (8 GB min.)	Alt. repository of project information for use on other’s computers	Opt.
Notepad/Clipboard/Binder *	To hold checklists; location for written notes and observations	Y
Inspection Checklist(s) *	Inspection scope and content; location for notes and observations	Y
Electronic Voice Recorder *	Alternative tool to written notes and observations	Y
Calculator, Construction *	Assists with basic analysis of measurements and capacities	Y
Digital Camera *	Primary means of recording actual conditions	Y
Step Ladder, 6ft	Access to items above head/hand height; primarily interior	Opt
Extension Ladder, 24ft	Access to elevated items and surfaces; primarily exterior	Opt
UAV/Drone w/camera	Alternative for documenting less accessible building/site elements	Opt
Measuring Wheel	Measurements, typically exterior, of large surfaces and distances	Opt
Measuring Tape, 100ft	Measurements of longer dimensions of any type	Y
Measuring Tape, 25ft	Measurements of shorter dimensions of any type	Y
Electronic Tape Measure	Alternative, primarily, to 25ft tape measures	Opt
Penlite/tactical (400lm) *	Illumination and inspection of objects and materials in close range	Y
Flashlight (2000 lm)	Illumination and inspection of objects and materials at a distance	Y
Multi-tip screwdriver	Accessing and re-securing covered component; adjusting elements	Y
Bits: Flat, Philips, Star, Square	For use with multi-bit screwdriver	Y
Awl or probe	Testing wood for decay	Y
Torpedo Level *	Measuring and assessing vertical and horizontal alignments	Y
Mechanic’s Grabber	General retrieval in confined locations	Y
Receptacle GFCI Tester	Measuring and assessing grounding and polarity of receptacles	Y
Line Voltage Tester	Assessing the presence of voltage in electrical wiring/systems	Y
Multimeter	Measuring and assessing various electrical conditions	Y
Light Meter	Measuring and assessing required light levels in spaces	Y
Magnet	For determining types of metal (ferrous/non-ferrrous)	Y
Accessibility Guidelines for Buildings and Facilities * ISBN-13: 9781557014993	Provides knowledge and information related to universal design and accessibility	Opt
OSHA 29 CFR-1910 General Industry Regs * ISBN 159959385-8	Provides knowledge and information related to operations and maintenance requirements for personnel safety	Opt

Item	Use	On-site
An Illustrated Guide to Building, Plumbing, Mech., and Electrical Codes * ISBN 978-1-56158-911-1	Provides knowledge and information related to building systems and subsystems	Opt
Other		

** Note: Items in italics might be adequately covered with a suitable smartphone with appropriate apps downloaded.*

Recommended Personal Protective Equipment

Safety equipment should be provided to inspection personnel as required. This is not a complete list. Specific review of local and industry standard safety requirements should be reviewed to provide individual safety. Guidance on the proper use of safety equipment should also be provided to condition assessment inspection personnel. Assessment teams comprised of two employees should be standard practice when inspecting electrical, steam, dynamic systems, or other systems where there is a higher safety risk.

Item	Comments	On-site
First Aid Kit	Treatment of minor injuries that might occur during activity	Y
Head Protection (hard/soft)	Soft for general protection; hard hat where warranted	Y
Safety Shoes/Boots	General precaution; use reasonable discretion	Opt
Wet Weather Gear	Poncho or full suit; don't overlook foot wear	Opt
Cold Weather Gear	Seasonal protective gear; consider layers	Opt
Reflective Vest	Helpful in busy or crowded conditions	Y
Safety Glasses	When scope involves observing flying/loose material	Y
Sunglasses	Control of glare and excess solar exposure	Y
Gloves	Hand protection when scope includes lift/carry/adjust	Y
Coveralls	Extra protection when needed from areas with contaminants	Opt
Knee Pads	Protection when crawling is required for assessments	Opt
Bug Spray	Seasonal protection from insects	Y
Ear Plugs/Protection	When scope involves loud noises	Y