PREVENTIVE MAINTENANCE PLAN

AMERICAN SAMOA

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List of Acronyms

AC	Air Conditioning
ASDOE	American Samoa Department of Education
ASDPW	American Samoa Department of Public Works
CIP	Capital Improvement Projects
DM	Deferred Maintenance
EAMS	Enterprise Asset Management Systems
HVAC	Heating, Ventilation, and Air Conditioning
KPI	Key Performance Indicators
O&M	Operation and Maintenance
PM	Preventive Maintenance

*Royalty free cover photos sourced from www.pexels.com

Preface

The study team would like to acknowledge the leadership and support provided by the American Samoa Department of Public Works (ASDPW) Director Voigt and Deputy Director Tilei. Their support for the ABCs Initiative and willingness to commit staff time and knowledge to the development of this report are greatly appreciated.

For his outstanding support and generous provision of time, resources, and knowledge in overseeing all aspects of facility management for the School Maintenance Division and invaluable contributions to this report, special thanks are given to Don McMullin.

The ABCs Team hopes this work will assist the School Maintenance Division in building a sustainable preventive maintenance (PM) program.

Executive Summary

This preventive maintenance (PM) plan documents critical actions that should be undertaken to ensure that American Samoa Department of Public Works facilities, infrastructure and equipment remain viable and to maximize investments made. The plan is comprised of three core components:

1. Job Plans: identification of key PM tasks and summary steps for execution by maintenance staff or to inform scopes for contracted work.
2. Work plans: task locations and frequencies, including resource estimation and logistical considerations.
3. Organization and Management Structure Change Recommendations: a review of existing management and staff positions and conditions, and recommendations for adjustments or new positions that would help support proactive facility management.

The first section of this report provides background on what PM is, why it is important, and why it makes sense to invest in it. Goals of the program proposed herein are reviewed and discussions of environmental considerations, construction typology and material selections, and inventory age and related concerns are provided.

Core components of the PM plan are summarized in Section 2, with additional detail provided in the appendices. Eleven basic tasks and frequencies (e.g., annual, semi-annual, and monthly) are defined along with locations where the work should occur. Annual labor resources required to conduct this work are estimated to total 77,746 labor hours (40 person years) that would be done in-house or contracted to local service providers. Out of that total, 57,072 hours is for patching and painting every five years. The remaining 20,674 hours represents maintenance work done on a yearly basis (11 person years). Out of the 20,6744 hours, 11,586 hours (6 person years) is for in-house work. The other 9,088 hours (5 person years) is assumed to be contracted out.

Existing funding and sources for facility management, as well as estimated costs for the PM work presented in this report and associated cost controls, are reviewed in Section 3. The overall budget for maintenance is estimated to be about $2M to $4M (based on a national average of two to four percent current replacement value and a public-school facility inventory value of about $100M). Cost controls for PM tasks and strategies for addressing facility needs with constrained budgets are also reviewed.

Organization and management structure change recommendations are provided in Section 4, along with an overview of current staffing, facility management challenges, and adjustments that could be made to support the move to a knowledgeable and appropriately staffed facility management team, including training and succession planning.

Based on the findings of this report, PM requires about $1M per year for contracted work, and about 80,000 labors hours per year (41 person years) for in-house work that can be done by maintenance staff. To help balance School Maintenance's ability to cover PM along with other duties, two scenarios are provided.

1. Adding 3 carpenter and 1 electrician positions (whose time would be 100% dedicated to PM), with existing maintenance staff dedicating about 50 percent of work time to PM.

2. Adding only 2 carpenters (100% PM), with existing maintenance staff dedicating about 70 percent of work time to PM.

1 Introduction

1.1 Why a Preventive Maintenance Plan?

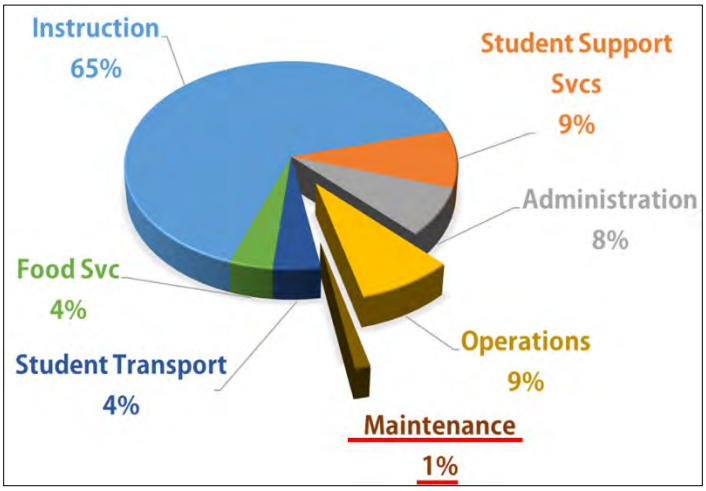
PM is conducted to ensure that facilities are performing as intended, to keep occupants safe, and preserve healthy indoor and outdoor environments while helping to extend facility life. PM tasks include activities such as scheduled visual inspections of roofs and drains, lubrication of machine parts, painting, inspecting plumbing for leaks, and cleaning drains and gutters.

Over time, if facility maintenance staff can conduct this work regularly, PM will lead to a reduction in time spent responding to trouble calls (i.e., unanticipated work). Trouble calls, or emergency repairs, result in added costs such as paying a premium when urgently sourcing spare parts and labor. Routine maintenance and monitoring will build a facility manager's awareness of facility needs and allow for planning larger maintenance activities (e.g., major repair and replacements). This helps avoid school disturbances that could result from equipment failure and unplanned downtime.

Studies show that reactive maintenance is more costly than PM (see Section 1.2). The overall program should be comprehensive, but facility managers should set priorities and allocate resources based on asset value and cost of failure (e.g., fire protection, weatherproofing, air conditioning (AC), indoor environmental quality).

1.2 Industry Standards and Trends

It is common for institutional organizations around the world to have facility management budgets that are not based on empirical data, are chronically underfunded and lack dedicated funding sources. School maintenance budgets are no different, and school districts depend on annual budget allotments that may vary based on other regional needs and public priorities. School facility management operation and maintenance (O&M) budgets must also compete with other major school related costs such as instruction and student support (e.g., staff salaries), student transportation, food services, and administration. Average maintenance budgets are estimated to account for a very small fraction of O&M budgets and about one percent of overall school district budgets (see Figure 1).



What is Preventive Maintenance?

"Preventive maintenance is the routine, regularly scheduled maintenance of a piece of equipment to ensure its continued use and maximize its life expectancy (e.g., by replacing filters, changing oil, and cleaning coils)" (NCES, 2003). This is proven to be more cost effective than the "run it to failure" approach by extending economic life and improving system reliability.

Figure 1 – Average Maintenance Budget as a Percentage of Overall School District Operating Budget
(Source: HHF Training and Sustainability Program Framework Report, 2015)

Establishing and executing a PM program is challenging. Facility management research shows that it is a critical component of comprehensive maintenance program that will ensure reliability, reduce operating costs, and increase the life expectancy of the equipment (National Center for Education Statistics (NCES), 2003). Key references related to justifying and guiding development of a PM program include:

- The Impact of Underfunding Preventative Maintenance on Total Cost of Ownership (2020)
- Planning Guide for Maintenance of School Facilities (2003)
- Priority Actions for Adequate & Equitable U.S. PK-12 Infrastructure (2015)
- Best Practices for School District Facilities and Maintenance (2015)
- State of our Schools (2016)

Facility management literature emphasizes the need for PM in reducing the frequency of trouble calls and overall maintenance costs in the long-term. Furthermore, because a rigorous PM program leads to fewer trouble calls or other emergency events, PM also tends to reduce school disruptions (e.g., down AC units, or repairs during school hours).

Questions to keep in mind when implementing the program:

- For districts that are instituting PM for the first time, has an appropriate system (e.g., AC, lighting, roofing) been identified for piloting before commencing with a full-scale, district-wide program?
- Have manufacturer-supplied user manuals been examined for guidance on PM strategies for each targeted piece of equipment?

"To realize the full potential of a comprehensive preventive maintenance system, school staff, the school board, and town planners must incorporate maintenance priorities into all modernization goals, objectives, and budgets. However, it is also fair for stakeholders to expect the maintenance program to yield results—namely: clean, orderly, safe, cost-effective, and instructionally supportive school facilities that enhance the educational experience of all students. But stakeholders also need to demonstrate patience because the only thing that takes more time than implementing changes to a maintenance program is waiting to see the improvements bear fruit." (NCES, 2003)

- Are records of PM efforts maintained, and, if so, is it done efficiently and is historical information easily accessible?

In *The Impact of Underfunding Preventative Maintenance on Total Cost of Ownership (2020)*, researchers found that cutting 50 percent of funding from an existing PM program is estimated to increase total cost of facility ownership by more than 30 percent, a much higher factor than the cost of PM. As an example, a PM budget of about $30,000 was analyzed. Cutting this budget in half (i.e., "saving" about $15,000) resulted in about a $50,000 increase to overall ownership costs with a fully funded PM program (see Figure 2).

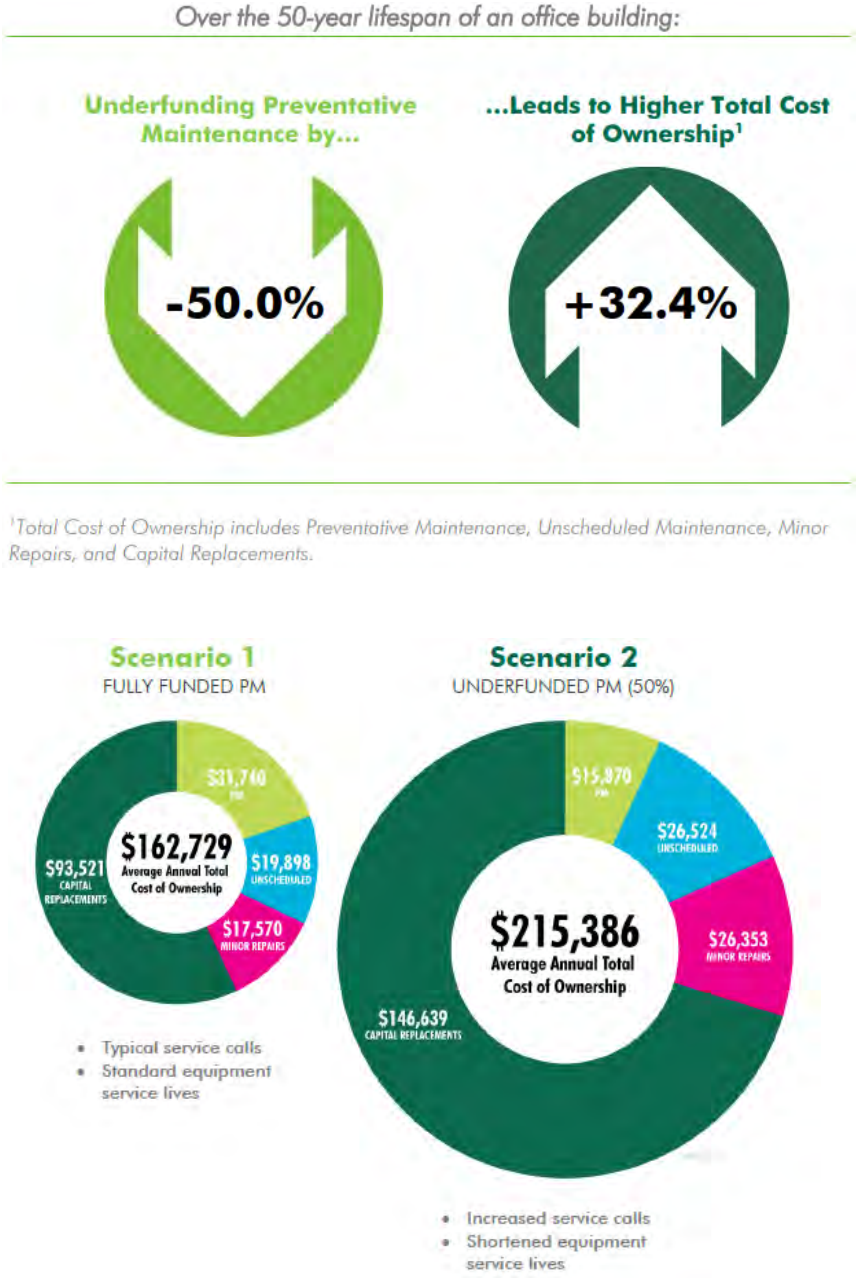


Figure 2 - Effects to Total Cost of Ownership from Reducing Investments in Preventive Maintenance *(Source: IFMA, 2020)*

This finding highlights the value of PM over time and is further illustrated in cumulative costs of ownership in Figure 3, which shows higher costs over time and higher probability of failure for facility assets when PM is underfunded.

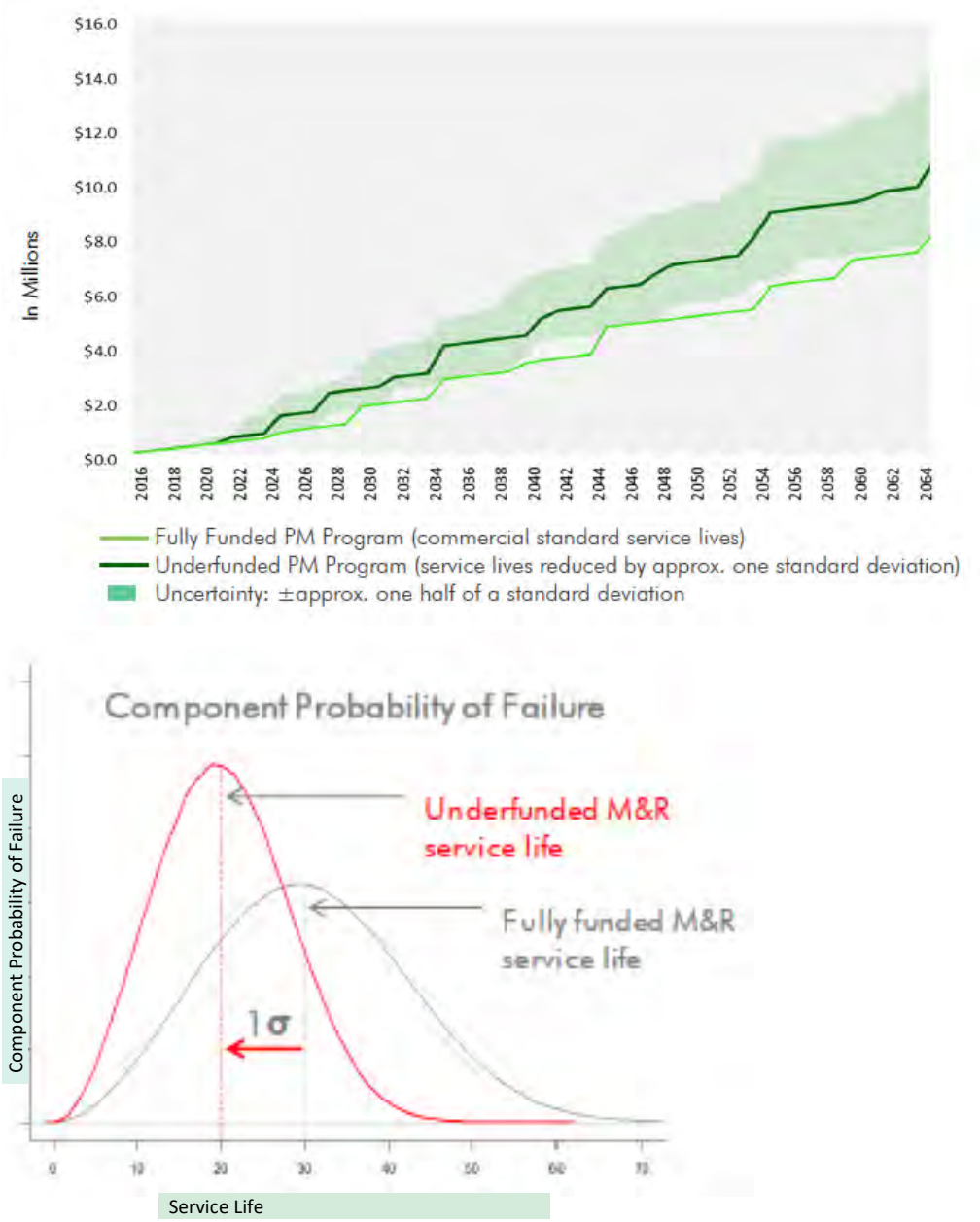


Figure 3 - Higher Costs over Time and Higher Probability of Failure for Facility Assets when Preventive Maintenance is Underfunded (Source: IFMA, 2020; disclaimer: A conclusive mathematical relationship between underfunding PM and the effect on unscheduled maintenance and replacement frequencies is unknown. This case study makes the reasonable assumption that unscheduled maintenance increases and service lives are reduced if equipment is not properly maintained.)

These concepts are widely understood by facility managers and are evident in facility conditions. The concept that regularly conducting cleaning and maintenance tasks will extend service life, reduce overall

costs, and create a more amenable environment for students and teachers serves as the basis for this report and the impetus behind instituting and sustaining and PM program.

As noted in a recent article published on FacilitiesNet (2020), in managing condition assessment data, PM actions, and planned replacements it is important to use PM to recalibrate anticipated repair and replacement schedules. “There needs to be some mechanism for continually validating the assessments, and they need to be integrated with the operations and maintenance plans.” By conducting preventive maintenance, facility managers can keep an accurate accounting of conditions and priorities. An enterprise asset management system (EAMS) can facilitate an integrated approach if appropriate levels of detail are applied to maintenance planning, tasks are executed, respective data is tracked, and facility managers are able to report information effectively to leadership. For tracking performance, attention should be given to establishing the right metrics. “Rather than establishing 200 metrics, focus on key performance indicators.”

Key performance indicators (KPIs) should focus on long-term goals, not short-term measures. School facility management is always in flux (e.g., alterations to building or asset inventories, building code changes, programmatic goals and facility needs). Setting a number for achievement (e.g., number of work orders completed per month or in a year, time required to execute tasks) could result in ongoing changes as milestones are reached, or targets abandoned if considered unattainable, and lose legitimacy. Short-term measures can also cause data misinterpretations (e.g., fewer work orders completed compared to last month). Looking at facility management in terms of “finite games” or playing to win and “infinite games” or for the purpose of continuing the play can help. Stacey Barr (2020) notes that “finite games in performance improvement are the projects we implement to make a change in performance. The infinite game of performance matters more: it’s continuing the play of continual improvement in the result we ultimately want to excel at, by getting better at winning the right finite games.” As examples, focusing on student safety, environmental quality, continuity of student learning, and extent of ability to address all facility maintenance and repair jobs can help tailor KPIs to the administrative needs of school district leadership while accounting for the immediate needs of school facility occupants, staff, and students. This view can help facility managers select meaningful performance analysis measures and identify hidden constraints to improved performance.

Integrating current facility condition data with capital improvement plans and O&M plans supports long-range performance goals and clarifies budget needs. Reporting this information effectively can be approached in terms of reliability, in addition to overall dollar amounts, e.g., “If I don’t spend money and repair this unit, I’m afraid it's going to fail. Then we won’t have air conditioning for two weeks.” (FacilitiesNet, 2020) Impacts of failed assets or building elements can cause injury, downtime, and prolonged interruptions to school services. Part of conveying facility management needs in relatable terms includes the consequences of deferring needed maintenance and the risks of increased costs of facility ownership that would be projected to result.

1.3 Goals and Objectives - Best practices

When implementing and monitoring a PM program, a set of guidelines can help achieve a successful result. The following list is a set of recommended best practices.

Facility Managers

- Should set high standards and promote workplace accountability.
- Ensure that all maintenance staff are adequately trained to perform the duties that they are assigned.
- Implement a practice of job shadowing, or an apprentice/mentor model should be used for building and transferring knowledge and experience.
- Maintain and consider staff morale and their perceptions.

Work Allocation

- Each week, a percentage of person-hours should be allocated for PM tasks (vs. trouble calls).
- It is important that all scheduled PM tasks are performed as appropriate for each site.
- Tasks should be planned well in advance (e.g., one year) to ensure that resources are available, responsibilities are clear, and personnel have enough time to perform.
- If the work is outsourced, then the in-house team should be trained to properly inspect and verify the adequacy of outsourced services.

Documentation

- A successful program involves documenting the work performed.
- Work orders should be filled out completely and should accurately indicate hours for all completed work.
- Benchmarking, analysis of program effectiveness, and ongoing revisions or modifications of the program can be informed by documented work history and are necessary to identify ways to improve processes to meet tenant expectations and ensure that maintenance staff have confidence in the program.
- Adjustments and corrective action can be pursued as needed based on data analysis.

Program Monitoring Metrics - KPIs

- KPIs should be defined to help facility managers evaluate programs in a way that considers the end users (e.g., building occupants such as students, school staff/administrators) as well as human resources (e.g., maintenance and managerial staff).
- Program performance ultimately will be judged by these groups so helping them understand program goals and soliciting input on process and performance will bolster program rollout.
- Example KPIs include completion time for maintenance tasks and percentage of all planned maintenance tasks that are completed.
- Performance metrics should be reevaluated if they fail to align with expected or desired results. Facility managers should consider how they are helping maintenance staff prepare for assigned tasks and if scheduling adjustments are needed (Cowley 2014).

Funds

- Stable, annually recurring appropriations are critical to a successful PM program. This also requires a commitment that funds will be spent on maintenance and not be directed to other priorities (e.g., teacher salaries, utilities).

New programs

- Newly initiated PM programs may require an increase in maintenance staffing during the transition from reactive or emergency maintenance to PM.

1.4 Background

1.4.1 Environment and Climate

American Samoa Department of Education (ASDOE) schools are in a coastal tropical environment. These conditions are hard on facilities because of constant sun, rain, salt, and humidity, frequent high winds, high salt content in the air, and potential for floods and earthquakes. Facility design and construction or renovation needs to account for these detrimental conditions to maximize a facility's useful life. The following is a listing of tropical conditions and how potential impacts to facilities adapted from the Department of Defense's discontinued tropical design guide.

High solar radiation: The ultraviolet spectrum in the tropics is particularly harmful to many commonly used building products. High ultraviolet exposure results in rapid deterioration of most non-metallic roofing materials, paints, sealants, elastomeric coatings, and wood. High solar radiation also causes building materials to develop high material temperatures which require careful detailing of the joints in cladding and structural systems.

High humidity: Relative humidity in the range of 70 percent to 100 percent for most of the year creates ideal conditions for mold and mildew that promote wood decay. It also accelerates rusting of various metals and intensifies galvanic action in many metals. Many paints in high humidity conditions do not perform well. In addition, high humidity conditions require careful detailing of vapor barrier locations in air-conditioned buildings. Common building materials that exhibit hygroscopic properties (i.e., absorbs moisture) such as gypsum, insulation, and particle board can lose their structural and functional properties in humid climates.

Intense rain periods: Facility mangers may need to specify soil treatments in addition to water infiltration control. Consider and avoid structural instability and exacerbation of rust and decay due to possible water infiltration of buildings. Because tropical areas experience seasonal intense rainfall, producing flood conditions, include provisions for and consideration of ponding and runoff conditions.

Prolonged elevated temperatures: elevated temperatures have adverse effects on building materials such as paints, woods, and many asphalt-based products. These high temperatures combined with high humidity will cause severe deterioration.

Salt-laden air: salt rapidly accelerates wood deterioration, promotes galvanic action between metals, rusting of ferrous metals (including inadequately protected reinforcing steel), and pitting of many

aluminum alloys. Salt laden air also adversely effects the application of paints, sealants, elastomeric coatings, and asphalt roofing applications.

The severity of salt-laden environments varies throughout the tropics. The degree of intensity varies with elevation, prevailing onshore wind, vegetation, and rainfall. Although all tropical design must address corrosion protection, installations in known or suspected severe corrosive environments require additional protective enclosures, materials, and coatings.

Air-conditioned buildings: The major design problems affecting plumbing, AC, ventilation, and other mechanical systems in tropical areas include accelerated corrosion of materials due to exposure to salt-spray, condensation, and rain; and condensation on building materials, equipment, ductwork, and piping. These problems lead to subsequent problems of moisture absorption, swelling, mold, and mildew formation.

1.4.2 Building Types and Construction

Structural deficiencies are relatively isolated throughout the public-school facility inventory and not consistently associated with a certain building type. Deferred maintenance (DM) associated with structural elements of the buildings observed during Phase 2 condition assessments (2012-2013) was caused primarily by corrosion of steel components, including steel reinforcing within concrete or masonry buildings, and termite damage or rot of wood framed components. Steel corrosion and wood rot is typically due to water infiltration or exposure to humid, salt-laden atmospheric conditions.

The table below provides an overview of structural deterioration based on building type and an indication of frequency of both the building types and the problems associated with each building type:

Table 1: Overview of Structural Deterioration Based on Building Type (Source: ABCs Condition Assessment Report; updated with input from the ABCs team structural engineer)

VF	Observed very frequently
C	Observed commonly
I	Observed in isolated instances

Common Structural Concerns by Building Type	**Frequency Observed**
One and Two-Story Low Slope Reinforced Concrete Roofs and Masonry Walls	I
Roof water ponding causing leaking, reinforcing corrosion and spalling	C
Concrete Gable Frames with Wood Decking and Masonry Walls	I
Termite damage in wood decking and nailers	I
Rot or other wood damage	C
Deficient wind uplift capacity	VF
One and Two-story Wood Framed Gable Roofs with Masonry Walls	VF
Termite damage or rot in wood decking and nailers	I
Incomplete uplift ties between walls and roof	I
Light Gage Metal Roofs with Masonry Walls	I
Corrosion of steel components, esp. exposed rafter tips	I
Prefabricated Wood or Steel Framed Roofs with Structural Steel Walls	I

Common Structural Concerns by Building Type	Frequency Observed
Corrosion of steel components affecting structural integrity	C
Wood Framed Buildings on Slabs or Elevated Piers	C
Isolated termite damage or rot	C
Missing uplift ties or under-designed for wind uplift or lateral loads	VF
Slabs cracked or spalled	C
Fales	VF
Isolated termite damage	VF
Corrosion of steel connectors	I
Slab on grade cracking/spalls	I

To avoid these problems, PM should focus on keeping water out of the interior enclosure with well-maintained exterior wall and roof finishes (especially at low sloped roofs and roof ridge joints) and isolation of steel components from the outside environment. This will also eliminate corrosion of steel components, wood decay and most termite activity.

Some instances of slab cracking were observed because of tree roots causing heave. Roots should be cut back, and root barriers installed, or trees removed if warranted, to keep large roots away from buildings (e.g., Matafao ES). It is noted that banyan trees cannot be trimmed and contained in this way because of their shallow wide spreading surface roots (v. a central root ball with a tap root). Banyan trees should be removed to mitigate intrusion problems.

Construction and repair of wood framed buildings should consider design capacities for structural members (e.g., lateral span load capacity). Existing buildings with under-designed structural wood members should be monitored (e.g., roof wood purlins) for risk of stress-failure. Any retrofits should consider the wind lateral and uplift capacity of the roof framing.

Weather proofing finishes at low sloped roofs should be closely monitored to ensure cracks and spalls are repaired when visible to avoid corrosion of steel components (e.g., rebar).

While not a widespread issue, a proactive approach to repairs of cracks and spalls while they are minor issues will help to ultimately prevent more extensive and expensive repairs and help preserve the integrity of the buildings.

1.4.3 Age and History

Older buildings may require more upkeep and building assets may be close to failure and require monitoring. Larger capital improvement projects may be needed to address deterioration, footprint rightsizing (physical capacity adjustments based on current enrollment), or functional obsolescence (physical layout of old buildings regarding current educational program objectives), the regular inspection of assets conducted as a part of PM can help inform these considerations.

Potential presence of lead-based paint, asbestos containing material, polychlorinated biphenyls and/or AC refrigerants should also be considered during any PM actions that could disrupt and release any of these hazardous materials. Ways to encapsulate, work around, or otherwise not disturb these hazardous

materials should be considered in addition to methods for removal and remediation to prevent exposure and potential health and safety risks. Referencing year-built dates and repair work history (e.g., in EAMS) can help inform hazardous material considerations.

The American Samoa public school system facility inventory includes buildings with ages exceeding 50 years. Traditional Samoan fale-style buildings were constructed at many of the public schools in the 1960s as part of an Educational TV project and are considered potentially significant historic resources. The structures have been altered over the years (e.g., enclosing walls), but work at these buildings should consider original design and materials during repair and renovation.

Other structures or grounds that warrant consideration during school improvement scoping (e.g., drainage improvements or other ground disturbing activities) include:

- Concrete foundation on the grounds of Nu'uuli Polytech High School, based on the possibility that is may be a remnant of WWII-era Tafuna Airbase, although somewhat lacking in integrity.
- Potential adverse effect to historic properties/disturbance of cultural deposits:
    - Mt. Alava School
    - Nuu'uli PolyTech High School
    - Leone High School
    - Pavaia'a Elementary School
    - Faleasao Elementary School
    - Fitiuta Elementary School
    - Manu'a High School
    - Olosega Elementary School

Any maintenance activities that include excavations below ground surface at these schools should be coordinated with the Historic Preservation Office.

Ground disturbing activities must also consider the potential presence of unknown underground infrastructure (e.g., power, communications, water, sewer) and appropriate surveying activities (e.g., toning for utility lines) to minimize inadvertent discoveries.

2 Preventive Maintenance Program

2.1 Overview of Components and Resource Needs

The core of an effective PM program is the scheduling and assigning of work, which is typically done through a work order system (Alaska Department of Education and Early Development 1999). Enterprise asset management consists of the management and maintenance of assets throughout their lifecycle (Rouse, 2018). EAM Systems focus on the time, resources, and efforts necessary to achieve optimal performance of assets (McKeon & Ramshaw, 2013).

Embedded in the EAMS architecture for the Insular ABCs Initiative is a work order system with which job plans can be applied and used as templates for many different work orders. This capability helps to schedule and plan maintenance work expediently. Job plans are the documentation of repeatable repair processes that list specific maintenance steps for a job. These plans standardize required maintenance

actions to promote consistency and thorough completion for each maintenance task. Templated job plans in EAMS can also be modified for unique assets or locations to account for individual needs (e.g., different types of equipment, materials, or conditions).

Current PM work for American Samoa's public school facilities address the following systems:

- wall finishes
- flooring
- restrooms
- AC
- elevators
- lighting
- fans
- windows
- roofing
- grounds work
- septic tanks/grease interceptors

Work is done at various frequencies, such as daily, monthly, quarterly, semi-annually, and annually.

Each task requires various levels of skills to perform them. These certification levels have been broken down into the following 3 categories.

Skill Level

- Skill Level 1: Basic skill range with some formal training.
- Skill Level 2: Advanced skill range with formal training and certification.
- Skill Level 3: Advanced skill range with factory training and certification.

Time

The average times required to perform the specified tasks are estimated in hours. Manpower estimates were developed based on assumptions of how tasks would be grouped (e.g., provide maintenance to all AC units of a building in one visit) and time needed for mobilization and transportation to respective sites. These estimates were developed in cooperation with host-agency facility managers.

The PM tasks, skill levels required to do the work, the frequency with which the tasks should occur, locations of where these tasks should be executed, and estimates of time required to execute the tasks is summarized in Table 2. More details are available in Appendix 2 – Preventive Maintenance Work Plan and Resource Needs.

Table 2: Breakdown of Preventive Maintenance Tasks

Asset	Trade / Skill Level	Frequency	Total Schools	Total Bldgs or Units	Total Time (Hr/Yr) w/ Mob/Demob
Wall Finishes	1	A	29	267	296
Flooring	Contr.	A	29	267	8,811
Restrooms	2	A	29	184	765
AC-General	1	Q	29	206	1,265
Elevator	2	Q	8	8	144
Elevator	2	SA	8	8	16
Elevator	2	A	8	8	8
Panels/Receptacles/Switches	2	A	29	262	160
Lighting - Interior Fluorescent	2	A	29	262	2,328
Lighting - Emergency	2	Q	5	72	77
Fans	2	A	29	676	1,381
Patching and Painting Walls	1	A	29	267	1,097
Patching and Painting Walls	Contr.	5-Years	29	290	57,072
Railings	1	A	29	90	389
Lighting - Exterior	2	A	29	813	842
Doors	2	A	29	267	296
Jalousie Windows	2	A	29	267	1,097
Roofing/Gutters	1	A	29	267	296
Dry Wells	1	A	3	58	32
Storm Drains/Culverts/Swales/Retention Basins	1	A	29	267	1,097
Septic Tanks/Grease Interceptors	ASPA	A	25	63	277
				Subtotal:	**77,746**
				Total**	**20,674**

**Frequency categories: annual (A), semi-annual (SA), quarterly (Q)*

***Total does not include the 57,072 hours of patching and painting of walls contracted out every 5 years.*

The total hours shown in Table 2 were used to estimate the resources required for the proposed PM program. See Section 3.2 for more information on resource estimates.

2.2 In-house and Contracted Work

To reduce costs, facility managers evaluate the cost effectiveness of retaining in-house specialists for frequently occurring tasks compared to the benefits of contracting the work. Reactive maintenance, or responding to emergency repairs, often occupies most of the available staff time, resulting in large workload fluctuations. Adding PM activities to staff duties reduces the peaks and valleys in maintenance workload by reducing the amount of maintenance emergencies and creating a more predictable schedule. PM includes periodic servicing and inspections to ensure proper functioning and keep warranties intact (e.g., roofing, AC units, etc.).

If the organization is still uncertain whether to outsource, other factors to consider are specialized skills, certifications, tools required, liability, urgency of timing and workload. Highly specialized tasks that do not occur very often (i.e., a small fraction of a typical staff year) should probably be outsourced. Alternatively, some routine maintenance tasks that must occur on a frequent basis might also be better outsourced, as that frees up in house staff to attend to unplanned maintenance activities. Maintenance tasks associated with liability such as servicing expensive equipment or accessing rooftops, may justify outsourcing.

Planned repair and capital renewal are typically contracted because they are long cycle (i.e., once every 5+ years) and require specialized tools or skills. If a surge of maintenance or capital improvements need to be completed before a tight deadline, contract labor may also be better suited to coordinate the multiple tradesmen needed (APPA 2011).

The goal of this preventative maintenance program is to reduce reactive maintenance by conducting preventative maintenance and identifying and correcting developing problems before emergency work is required.

It is important that all scheduled PM tasks are performed as appropriate for each site. It is also recommended that the tasks be planned well in advance (e.g., one year) to ensure that resources are available, and responsibilities are clear.

Tasks should be handled by qualified maintenance personnel only. The work can either be completed by trained in-house maintenance staff or outsourced. Facility managers should ensure that all maintenance staff are adequately trained to perform the duties to which they are assigned, and a practice of job shadowing, or an apprentice/mentor model should be used for building and transferring knowledge and experience. It is necessary for some tasks such as roof inspection and repair work to be conducted by specialized professionals and be outsourced if needed (Division of Public School Capital Construction Assistance 2008). If the work is outsourced, then the in-house team should be trained to properly inspect and verify the adequacy of outsourced services.

It is critical to note that a successful PM program requires stable, annually recurring appropriations and commitment that funds will be spent on maintenance, that no other priorities will compete for operating funds (e.g., teacher salaries, utilities) (Alaska Department of Education and Early Development 1999).

3 Preventive Maintenance Budget

3.1 Existing Funding and Sources

Recent budget information was not made available by ASDPW for school facility maintenance and capital improvements. NCES data was used to provide data for fiscal years 2012-2018. The Division of School Maintenance (as titled under ASDPW) relies on an annually appropriated budget approved by the legislature and disbursed by the Governor (HHF, 2017). Table 3 shows expenditures and capital outlay.

Table 3: Expenditures, American Samoa

FY	O&M	Capital Outlay	Total
2010	$2,239,000	$4,407,000	$6,646,000
2011	$4,803,000	$7,039,000	$11,842,000
2012	$6,529,000	$13,021,000	$19,550,000
2013	$2,340,000	$3,474,000	$5,814,000
2014	$3,071,000	$9,416,000	$12,487,000
2015	$2,797,000	$1,943,000	$4,740,000
2016	$0	$6,833,000	$6,833,000
2017	$0	$9,507,000	$9,507,000
2018	$0	$10,384,000	$10,384,000

Note: As shown in Figure 1, maintenance accounts for about one tenth of an average O&M budget; furthermore, it is assumed that O&M data is incomplete (e.g., missing years 2016-2018), possibly because school maintenance transitioned from ASDOE to ASDPW around 2012 and NCES may not have been able to capture associated data.

Sources of funding include capital improvement grants provided by OIA and the Adopt-a-School program that helps execute small repair and maintenance jobs. School maintenance should be supported by tax revenue from a 1% tax on goods (provided as an annual allocation of funds), however, this tax fund is also used to pay fuel costs for ASDOE's bus fleet, maintenance supplies, and contract labor. Previously, a $0.05/gallon fuel tax was also intended to support school maintenance, but DPW staff reported in a 2017 phone interview that those funds are now allocated to road maintenance. According to DPW, salaries for maintenance staff are paid by a different source, not the 1% goods tax. DPW also reports that revenues available to support maintenance have been declining in recent years. (HHF, 2017) In recent years, capital outlay has focused on demolition and building replacement to open campuses for play and sports areas.

3.2 Estimated Needs

The overall budget allotment covers operational costs, CIP, DM reduction, and PM. Given that current DM cost estimates (about $8M; see Section 3.4 for more), it is evident that maintenance and operational needs exceed available funding. Table 4 provides a summary of the PM work plan hours and costs that should be accounted for in annual budget appropriations.

Table 4: Preventive Maintenance Work Plan Summary Hours

Classification	*Asset*	*Total Schools*	*Total Time (Hr/Yr)*	*Est. Contr. Cost*
B2021	Jalousie Windows	28	1,097	
B20-5	Patching and Painting Walls	29	57,072	$ 856,080
B20-A	Patching and Painting Walls	28	1,097	
B20-WD	Doors	28	296	
C2023	Railings	28	389	
C3010	Wall Finishes	28	296	
C3024	Flooring	28	8,811	$ 129,690
D1010-1	Elevator	8	8	
D1010-2	Elevator	8	16	
D1010-4	Elevator	8	144	
D2010	Restrooms	28	765	
D2040	Roofing/Gutters	28	296	
D2043	Dry Wells	3	32	
D3041/ D3052	AC-General	28	1,265	
D50	Panels/Receptacles/Switches	28	160	
D5020-E	Lighting - Exterior	28	842	
D5020-I	Lighting - Interior Fluorescent	28	2,328	
D5092	Lighting - Emergency	5	77	
E1099	Fans	28	1,381	
G3020	Septic Tanks/Grease Interceptors	23	277	ASPA
G3030	Storm Drains/Culverts/Swales/Retention Basins	28	1,097	
		Subtotal:	**77,746**	**$ 985,770**
		****Total:**	**20,674**	

***Total does not include the 57,072 hours of patching and painting of walls contracted out every 5 years. Assumes $15/hour labor rate.*

The total time in hours per year presented in Table 4, are based off actual maintenance work executed by ASDPW (prior to the return of School Maintenance to ASDOE). Tasks with estimated contract costs are for outsourced labor hours only (supplies and material costs would also need to be considered for cost estimation).

3.3 Cost Controls

For in-house maintenance work, the appropriate number of personnel should be tasked with performing the work. Balancing labor requirements for PM tasks and other work conducted throughout the year and adjusted based on demonstrated trends (e.g., PM may reduce trouble calls and emergency work

over a few years). Additionally, job plans should specify the necessary skill levels of personnel and material quantities to control labor and materials costs.

The scopes of work for PM tasks need to be clearly defined, particularly for contracted work because oversight and course correction are difficult for the owner to enforce. This includes appropriate maintenance frequencies that should be clearly stated in bid solicitation documents to ensure that the contracts awarded fulfill maintenance needs and maximize the use of budgeted maintenance funds. Inventories of equipment (e.g., AC units) listed in initially awarded multi-year contracts need to be closely monitored throughout the maintenance contract year. Adjustments to inventories need to be made prior to award of contract option years to ensure maintenance tasks are performed in accordance with current contract equipment inventory listings and frequencies. Reduction in inventories should correspondingly reduce required maintenance costs. "Repair by Replacement" of equipment should be carefully evaluated to ensure it is done only when it is determined to be cost effective. Qualified contract managers should oversee these contracts and be diligent in enforcing contract scope, terms, and conditions.

3.4 Overall Maintenance Budget Needs, Current Funding, and Deferred Maintenance

As shown in Table 3, School Maintenance's budget has been unpredictable for the last few years (not including allocations for capital outlay) and does not provide specific funding for the PM program items covered in this report. As popularized in "Committing to the Cost of Ownership: Maintenance and Repair of Public Buildings" (National Research Council, 1990), a sustainable steady state maintenance budget should be in the range of two to four percent the current replacement value of an organization's inventory, depending on the age of the facilities and construction materials used. The current replacement value for ASDOE schools is estimated at $100M (HHF, 2013). This means that ASDOE's school maintenance budget should be in the range of $2M to $4M. Based on budget discussions with the head of School Maintenance, the average maintenance budget has been about $0.8M in recent years but is not dedicated and has been used to address other priorities. This is less than half to one quarter of the national benchmark.

The current replacement value for ASDOE schools is estimated at $100M. This means that ASDOE's school maintenance budget should be in the range of $2M to $4M. Based on budget discussions with the head of School Maintenance, the average maintenance budget has been about $0.8M in recent years but is not dedicated and has been used to address other priorities. This is less than half to one quarter of the national benchmark.

Future budget proposals should include the PM tasks identified in this report, along with other maintenance needs identified by School Maintenance. Reliable annual funding is required to provide adequate maintenance to facilities. Furthermore, DM is currently estimated at about $8M. An investment of about $1M per year of strategic funding would be required to eliminate all DM within ten years. As a part of the ABCs Initiative, OIA and the Governor's office provided a total of about $3.5M of strategic DM reduction funding

DM is currently estimated at about $8M. An investment of about $1M per year of strategic funding would be required to eliminate all DM within ten years because DM continues to accrue.

over the last five years. The Governor also aggressively replaced aging facilities with new larger buildings that reduced overall DM and consolidated schools to help create space for play structures and sports facilities. Methods to consider for reducing DM include:

- Footprint reduction/consolidation or mothballing of underutilized facilities
- Preventative maintenance to extend economic life (to prevent the accrual of additional DM)
- Capital improvement, modernization/building replacement

Capital improvement projects (CIP), PM, and trouble call repairs help reduce DM costs. Addressing PM and DM will reduce overall operating costs in the long-term.

4 Organization and Management Structure

4.1 Current Staffing, and Recommended Management and Maintenance Structure

Current maintenance staffing is shown in Table 5 and is based on the actual FY 2021 facilities maintenance staffing pattern. For every full-time employee, 1,960 annual labor hours were used to estimate current available manhours. A total of 154,840 labor hours are available for all 79 positions. PM tasks that require more than 50 percent of existing maintenance staff time are highlighted in yellow, and tasks that require more than 70 percent of existing maintenance staff time are highlighted in green. Additional staff positions may be warranted to cover these duties and other maintenance tasks (e.g., trouble call response). Because AC technicians are limited and shared between district, the analysis of available and required time are shown separately in Table 6. Similarly, Manua schools are addressed separately in Table 7.

Table 5 indicates that more than 20 percent of staff time would be required to cover electrician- and carpenter-related preventive maintenance tasks for the Eastern, Mideast, Central, and Midwest Districts.

AC technicians are centralized and cover all districts on Tutuila, and additional AC staff may be warranted as well. Maintenance at Manua schools is not staffed regularly but can be provided by local tradespeople.

Table 5: Employment Positions, Associated Workhours, and Preventive Maintenance Needs

Positions by District	*Position Counts*	*Annual Workhours*	*Avail Workhours*	*PM HRs Needed*	*% of Total Time*
Eastern District					
Coordinator	1	1,960	1,960		
Asst Coordinator	1	1,960	1,960		
Plumber	2	1,960	3,920	198	5%
Electrician	1	1,960	1,960	486	25%
Carpenter	1	1,960	1,960	1,623	83%
BM	4	1,960	7,840		
AC			-	191	(see AC tech)
Mideast District					
Coordinator	1	1,960	1,960		
Plumber	1	1,960	1,960	135	7%
Electrician	1	1,960	1,960	431	22%
Carpenter	1	1,960	1,960	1,252	64%

Positions by District	*Position Counts*	*Annual Workhours*	*Avail Workhours*	*PM HRs Needed*	*% of Total Time*
Skillworker	1	1,960	1,960	140	7%
BM	5	1,960	9,800		
AC				88	(see AC tech)
Central District					
Coordinator	1	1,960	1,960		
Asst Coordinator	1	1,960	1,960		
Plumber	1	1,960	1,960	164	8%
Carpenter	1	1,960	1,960	2,489	127%
Skillworker	1	1,960	1,960	330	17%
BM	8	1,960	15,680		
Electrician				1,095	No Staff
AC				323	(see AC tech)
Midwest District					
Coordinator	1	1,960	1,960		
Plumber	1	1,960	1,960	158	8%
Carpenter	2	1,960	3,920	2,939	75%
Electrician	1	1,960	1,960	1,350	69%
BM	8	1,960	15,680		
AC				245	(see AC tech)
Western District					
Coordinator	1	1,960	1,960		
Carpenter	1	1,960	1,960	3,170	162%
Plumber	2	1,960	3,920	231	6%
Electrician	1	1,960	1,960	1,127	57%
BM	8	1,960	15,680		
AC				336	(see AC tech)
ECE/SPED Crew					
Coordinator	1	1,960	1,960		
Carpenter	1	1,960	1,960		
Electrician	1	1,960	1,960		
Plumber	1	1,960	1,960		
Total:	**71**	**NA**	**139,160**	**17,235**	**12%**

AC staff available to support PM work at schools located in Tutuila, and percentage of required hours, are summarized in Table 6.

Table 6: AC Staff Available for Tutuila Schools and Percentage of Required Hours

A/C Technician	*Position Counts*	*Annual Workhours*	*Avail Workhours*	*Total AC hours needed (all districts):*	*% of Total Time*
AC Leadman	1	1,960	1,960		
AC LM Asst.	1	1,960	1,960		
Skillworker	2	1,960	3,920		
Total:	**4**	**NA**	**7,840**	**1,265**	**16 %**

On-island maintenance staff positions are not provided to support Manua schools. The total number of bathroom monitors and labor hours required for PM work at Manua schools are summarized in Table 7.

Table 7: Maintenance Staff and Percentage of Labor Hours Required for Preventive Maintenance Work at Manua Schools

Manu'a Schools	*Position Counts*	*Annual Workhours*	*Avail Workhours*	*PM Hours Needed*	*% of Total Time*
BM	4	1,960	7,840		
Carpenter				1,468	No Staff
Plumber				156	No Staff
Electrician				468	No Staff
AC				82	No Staff
Total:	**4**	**NA**	**7,840**	**2,174**	**No Tradesman Time Available**

On average, 50-70 percent of staff time dedicated to PM is considered a balanced proportion, keeping time available for trouble call and other duties. Table 5 highlights tasks that require more than 50 percent and 70 percent of staff time related to electrician and carpenter related PM tasks for the Eastern, Mideast, Central, and Midwest Districts.

Table 8 shows two scenarios, the first shows how many new positions would be needed to cover PM (dedicating all work time to PM) to ensure that existing maintenance staff dedicate no more than 50 percent of work time to DM. The second scenario shows how many new staff would be needed if existing staff dedicate no more than 70 percent of work time to PM. All new positions would be 100% dedicated to PM, and actual resource allocations and needs could be monitored over time to see if the work plan and resource estimates could be revised or if other approaches are preferred (e.g., outsourcing PM work).

Table 8: Additional Positions Recommended for PM </=50% and </=70%

	Total HRs Avail	Total PM HRs Needed	Additional Employees	Additional HRs	Percent
Scenario 1: 50% work time to PM					
Carpenter	11,760	11,473	3	5,880	48%
Electrician	3,920	2,477	1	1,960	13%
Scenario 2: 70% work time to PM					
Carpenter	11,760	11,473	2	3,920	64%
Electrician	3,920	2,477	-	-	63%

In the 50% and under scenario, adding 3 carpenters and 1 electrician would help balance School Maintenance's ability to cover PM along with other duties.

When the threshold is set at 70% and under, adding 2 carpenters would help balance School Maintenance's ability to cover PM along with other duties (no additional electricians needed).

AC technicians are centralized and cover all districts on Tutuila, and additional AC staff may be warranted as well. Maintenance at Manua schools is not staffed regularly but can be provided by local tradespeople. Additional summaries are provided in Tables 9 and 10 to show PM tasks assigned by

trades positions and labor hours associated with these tasks, and an overall summary of labor hours by maintenance position. Table 9 breaks down the positions required for each PM task with the number of hours needed.

Table 99: Preventive Maintenance Hours per Year Needed for Each Task and Associated Position

Position	Task	Classification	Hrs/Yr
Carpenter	Exterior Enclosure - Windows	B2021	1,097
Carpenter	Exterior Enclosure - Patching and Painting Walls	B20-A	1,097
Carpenter	Exterior Enclosure - Doors	B20-WD	296
Carpenter/Skillworker	Stair Finishes - Painting	C2023	389
Carpenter	Wall Finishes	C3010	296
Carpenter	Flooring	C3024	8,811
Electrician	Elevators and Lifts	D1010-1	8
Electrician	Elevators and Lifts	D1010-2	16
Electrician	Elevators and Lifts	D1010-4	144
Plumber	Plumbing	D2010	765
Carpenter	Rainwater Drainage - Plumbing	D2040	296
Carpenter/Skillworker	Rainwater Drainage Equipment - Plumbing	D2043	32
AC	HVAC/AC	D3041/D3052	1,265
Electrician	Electrical	D50	160
Electrician	Electrical	D5020-E	842
Electrician	Electrical	D5020-I	2,328
Electrician	Electrical	D5092	77
Electrician	Electrical - Fans	E1099	1,381
Plumber	Sanitary Sewer - Site	G3020	277
Carpenter/Skillworker	Storm Sewer - Site	G3030	1,097
		Total:	**20,674**

***** *This does not include the 57,072 hours of patching and painting of walls contracted out every 5 years.*

Table 10 summarizes the total yearly hours needed for PM for each trade.

Table 100: Summary of Total Hours for Each Trade

Position	Hrs/Yr
Carpenter	12,941
Skillworker	470
Electrician	4,956
Plumber	1,042
AC	1,265
Total:	**20,674**

**This does not include the 57,072 hours of patching and painting of walls contracted out every 5 years.*

4.2 Training, Capacity Building, and Succession Planning

Training is required to support the move to a knowledgeable and appropriately staffed facility management team. Project management training of contract management staff for the development and administration of outsourced contracts is essential. In addition to project supervision and management needs, current trades training needs include heating, ventilation, and air conditioning (HVAC), electrical and plumbing systems, and job site safety.

ASDPW conducted a few semesters of maintenance staff training, for School Maintenance staff. This training is recommended to continue.

5 Resources

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6 Appendices

A1 - Preventive Maintenance Job Plans

A2 - Preventive Maintenance Work Plan and Resource Needs

A3 - Preventive Maintenance Tasks – Schools Detail

A4 - Preventive Maintenance Tasks – Breakdown by District

Appendix 1 - Preventive Maintenance Job Plans

The following is the list of critical preventive maintenance tasks and work steps (i.e., job plans) that are required to ensure functionality, extend useful life, and avoid school disruptions that could be caused by the failure of these assets.

The job plans are divided into categories of work type (e.g., fire alarm, elevator, AC) and provides work details for each associated task. Each category listed here correlates to the work plan tasks itemized in *Appendix 2: Preventive Maintenance Work Plan and Resource Needs Estimation*.

1. B2021-Jalousie Windows

Annually

- Check movement of window frames, remove and lubricate.
- Clean glass blades.
- Replace rat wire and bug screens as needed.

2. B20-5 & B20-A - Surfaces/Wall Finishes

Annually – ***Contracted*** (about $900,000 (labor only) Every Five Years) or Adopt a School

- Inspect stairs, landings and structural components for spalls; patch (or submit service request as needed). Wash all dirt accumulation on building surfaces. Inspect surfaces for peeling, blistering, or cracked paint. Touch-up paint building exterior as required.
- Repaint exterior wall; prime and two finish coats with satin exterior paint with mildewcide.

3. B20-WD - Windows and Doors

Annually

- Check door, door frame and window frame for signs of deterioration, sharp edges, gaps, termites, bowing, splitting, water intrusion or mold.
- Check operation of door hardware - Verify that hinges are solidly anchored in frames and that door handles, knobs, push bars and locks operate properly. Adjust if required.
- Check swing and proper closure.
- Ensure proper lubrication or doors (lockset and hinges) and windows.
- Check latches and window hold open devices for operational integrity.
- Inspect window glass for cracks and verify that the glass is held tight at the window frames. Check seal around windows for gaps or signs of water intrusion.
- Clean doors and windows.

4. C2023 - Railings

Annually

- Railings: Remove scale and touch up paint.

5. C3010 - Wall Finishes

Annually

- Repair expansion joints in block and concrete surfaces that have cracks, gaps, splits or vegetation build-up.
- Check overall condition, cleanliness and for signs of mildew. Determine source and repair or replace as necessary.
- Inspect and repair block and concrete surfaces that have signs of cracks, bare spots, missing segments, corrosion, oxidation, decay, rot, or termites and/or vegetation build up.
- Inspect drywall surfaces for delamination, peeling paint, dry rot, holes, blisters, cracks, curling, and sagging. Determine the cause of the condition and repair as necessary to correct condition.
- Inspect drywall surfaces for evidence of corrosion or oxidation. Correct the condition.
- Determine in termite activity is present, especially where water has penetrated the building envelope. Correct the condition.
- Inspect sealant and paint conditions. Determine sources or any stains on wall surfaces. Reseal or repair as necessary.
- Touchup paint as needed (to match existing paint color).

6. C3024 - Flooring

Annually – ***Contracted*** (about $140,000 labor only)

General

- Remove all furniture outside of the classroom.
- Sweep and damp mop floors to remove loose dirt.
- Correct any tripping hazards.
- Inspect for low spots that prevent water from draining, or delaminated tiles, and submit service request if observed.
- Conduct steps below for VTC or Epoxy flooring.
- Wipe baseboards with soap and water.
- Replace furniture.

VCT

- Check for delamination and excessive wear; repair/replace as needed.
- Use a motorize floor machine with stripping solution to remove floor polish and embedded dirt and scratches.
- Use a floor machine to apply floor sealant and polishing solution.

Epoxy

- Clean with soap and water.
- Check for wear (submit service request if restorative work is needed, e.g., crack, low spot).
- Apply a maintenance coat if needed.

7. D1010 - Elevator

Quarterly

- Lubrication - examine all moving parts to determine proper adjustments and lubrication.
- Plumb and alignment - check to make sure the elevator levels at floor height.
- Noise and vibration - listen for any unusual noise or vibrations.
- Obstructions - clear all passageways of any obstructions.
- Verify that the elevator lighting system is operational.
- Overall condition and cleanliness - Check open/close buttons and open/close door functions.
- Piping condition - inspect piping for damage or corrosion.
- Hydraulic power unit: Run through a complete cycle and check for smooth operation.
- Relief valve and Blowdown block: Run cycle and halt between limit switches. Check pressure at the power unit to ensure there is no pressure drop and blowdown block is holding and there is no movement with the car. Check for oil leaks.
- Control Valve: Check for oil leaks. While running through a complete cycle, check for smooth operation and no fluctuations in oil pressure.
- Tank: Check oil level and top up as needed. Depending upon usage, oil may have to be changed if showing signs of breakdown or discoloration. There should be no water in the system. If water is detected, shutdown the system immediately and drain oil and replace in tanks, cylinders, valves, hoses and fittings. Bleed air from the system.
- Flexible hose and fittings assembly: Check hoses and fitting for leaks. Check hoses for distortions, ballooning and cracking. Check fittings for tightness to proper torque. Check fittings for signs of cracking and corrosion. Do not over-torque to avoid damaging fittings.
- Supply line and shutoff valve: Check supply line from control valve to ram for leaks or hose kinks and pinching.
- Hydraulic Cylinder: Check hose connections for leaks and hose deterioration. Cylinder shaft should be a highly polished surface, remove dirt, debris and corrosion.
- Run through a complete cycle and observe that cylinder has full range of motion and no binding.
- Pressure switch. Check operation of pressure switch. Facilitate a failure and observe operation of the blowdown block, car should stop immediately.
- Check operation of low oil pressure cutoff protection.

Biannually

- Condition of wheels and pulleys - Roller guide wheels and assemblies should be adjusted or replaced depending on their condition.
- Check operation of electric devices and wiring connections: motors, switches, generators, etc.
- Cable/pulley/rope tension, alignment and condition - Examine the pit, which is located at the bottom of the hoistway. Check the cable pulley and tensioning devices, counterweight buffers, and limit switches.
- Inspect the condition of the motor and its bearings, brushes, and the machine brake system.
- Chains and cotter pin condition - verify chains and cotter pins are in good working condition.
- Inspect drive sheaves and hoist cables for deterioration. Test the tension of the hoist cables.

- Condition of interlock functions, limit and shutdown switches - Inspect for dust, debris, corrosion, damage, and tightness of connections.
- General safety conditions - Test emergency communication device and emergency stop button.

Annually

- Verify that there are no sharp edges or large gaps throughout the elevator system.
- Examine hoistway equipment located in the elevator shaft (guide rails, corridor doors, and hangers).
- Examine condition of railing system, shaft and bearings.
- Certification - Obtain required certifications by the appropriate and responsible party to testify that the elevator system performs in accordance to rules, regulations, laws, and specifications.

8. D2010 –Restrooms

Annually

- Check fixtures and repair/replace as needed:
  - Inspect piping systems for deterioration, leaks, scaling, rust, or other signs of failure (submit service request for needed repairs).
  - Test all flush valves.
  - Check overflow drain operations. Check for flow and obstructions, leaks and corrosion.
  - Check for breaks, cracks, or other defects in any porcelain surfaces.
  - Check seals for leakage, scaling, damage, or other deterioration.
  - Replace washers or packing on leaking faucets.
- Inspect partitions for damage (submit service request for needed repairs)
- Inspect tile (walls and floors); clean and replace missing tiles and grout (or submit service request for needed repairs)

9. D2040-Roofing/Gutters

Annually

- Check roof and gutters and remove any fallen debris.
- Inspect and clear downspouts.
- Inspect straps for roof gutters and downspouts and re-secure if necessary.

10. D2043-Dry Wells

Annually

- Inspect dry well and remove accumulated debris as needed.

11. D3041/D3052 – AC General

Quarterly

- Remove and clean all indoor filters (replace filters as recommended by unit manufacturer)

- Inspect exposed piping for obvious leakage and insulation conditions. Repair or replace insulation covering pipes as needed.
- Outdoor unit: clean condenser coils
- Check electrical controls and connections, and proper refrigerant charge
- Clean drain pipeline for clogs and dirt
- Clean outdoor unit case and apply 1-coat of spray on automotive wax.
- Inspect equipment hangers or attachment systems for stability by checking bolts and hardware for stress or weakness. Adjust or replace as required.

12. D50 - Panels/Receptacles/Switches

Annually

- Service Panels: remove excess wire, all wires to enter breakers in a 90-degree angle. Wire tie groups of wire to promote order. Check for loose connections and spray with contact cleaner to remove dirt, grease and corrosion. Ensure that all conduit and cable entering an enclosure are properly secured. Clean all debris from panel enclosure. Verify all circuits and provide a circuit legend on panel door.
- Verify that the electrical room is clean and the electrical panel accessible (tools and equipment are stored/secured, room is free of combustible material, and there are no signs of fluid spills.
- Receptacles and switches: remove cover plates, blow dust off wiring connections and check for corrosion; submit service request if corrosion is visible. Inspect moisture protection items such as O-rings, gaskets and weather stripping for dust, debris and corrosion, damage, cracks and chips; repair/replace as needed.
- Cover plates: and check each plate for cracking, discoloration or burn marks; submit a service request for wiring replacement if burn marks are visible. Replace plates if missing, discolored or damaged
- Junction boxes: verify that conductors are secured, and box covers securely in place.

13. D5020-E – Exterior Lighting

Annually

- Visually inspect lighting for functionality and wear
- Locate switch and or breaker; inspect shutdown switches for corrosion, dust, and debris; check electrical connections for tightness
- Inspect wiring connections for dust, debris, corrosion, and moisture; clean, replace or seal as needed
- Replace expired bulbs as needed

14. D5020-I - Interior Fluorescent Lighting

Annually

- Visually inspect lighting for functionality and wear
- Locate switch and or breaker; inspect shutdown switches for corrosion, dust, and debris; check electrical connections for tightness

- Inspect wiring connections for dust, debris, corrosion, and moisture; clean, replace or seal as needed
- Remove and clean diffusors
- Inspect lighting fixtures by opening fixture to check for tight socket connections, dust, corrosion or humming ballasts
- Replace expired bulbs and or ballast as needed
- Clean fixtures lens to prevent reduction of illumination levels
- Replace diffusors

15. D5092 - Emergency Lighting

Quarterly

- Emergency lighting is installed on a dedicated circuit breaker.
- Turn the breaker off to test the emergency lighting, lights should come on.
- Inspect breaker for corrosion, dust, and debris; check electrical connections for tightness.
- Clean fixture

16. E1099 - Fans

Annually

- Cycle 3-speed fan, cycle reverse.
- Clean metal blades with soap and water and apply 1-coat of automotive wax.

17. G3020-Septic Tanks/Grease Interceptors

Annually – ***ASPA***

- Pump/clean septic tank and grease interceptors
- Inspect piping systems and seals for deterioration, leaks, scaling, rust, or other signs of failure

18. G3030-Storm Drains/Culverts/Swales/Retention Basins

Annually

- Storm drains: remove debris from drain inlets or pipes; flush drain lines.
- Culverts/Swales: flush culvert to check depth and function; clear vegetation and remove silt or regrade to restore depth; regrade slope of surrounding areas to taper to culvert bottom.
- Retention basins: check depth/volume; clear vegetation and regrade to remove silt and restore basin depth and function as needed.

19. Other Tasks for Future Consideration

- Surfaces (e.g., paving, sidewalks)
- Fences & Gates
- Grass/Lawns
- Play/Sport Facilities
- Trees/Vegetation

Appendix 2 - Preventive Maintenance Work Plan and Resource Needs

The work plan shown in Table 1 lists the preventive maintenance tasks and associated UNIFORMAT codes presented in Appendix 1. The work plan identifies which tasks are required at which locations, the required frequency, and the total resources required to execute the work.

The estimated contract cost for each maintenance task is shown in the rightmost column. Trade skill levels required to complete the tasks are also shown to assist with contract scoping.

Asset	Task/Job Plan	Classification	Trade / Skill Level	Frequency	Total Schools	Total Bldgs / Units	Total Time (Hr/Yr)	Est. Contr. Cost
Jalousie Windows	• Check movement of window frames, remove and lubricate • Clean glass blades • Replace rat wire and bug screens as needed	B2021	2	A	29	267	1,097	
Patching and Painting Walls	• Repaint exterior wall; prime and two finish coats with satin exterior paint with mildewcide	B20-5	1	5-Years	29	290	57,072	$ 856,080
Patching and Painting Walls	• Inspect stairs, landings and structural components for spalls; patch (or submit service request as needed). Wash all dirt accumulation on building surfaces. Inspect surfaces for peeling, blistering, or cracked paint. Touch-up paint building exterior as required	B20-A	1	A	29	267	1,097	
Doors	• Check door, door frame and window frame for signs of deterioration, sharp edges, gaps, termites, bowing, splitting, water intrusion or mold. • Check operation of door hardware - Verify that hinges are solidly anchored in frames and that door handles, knobs, push bars and locks operate properly. Adjust if required. • Check swing and proper closure • Ensure proper lubrication or doors (lockset and hinges) and windows • Check latches and window hold open devices for operational integrity • Inspect window glass for cracks and verify that the glass is held tight at the window frames. Check seal around windows for gaps or signs of water intrusion. • Clean doors and windows	B20-WD	2	A	29	267	296	
Railings	• Remove scale and touch up paint	C2023	1	A	29	90	389	

Asset	Task/Job Plan	Classification	Trade / Skill Level	Frequency	Total Schools	Total Bldgs / Units	Total Time (Hr/Yr)	Est. Contr. Cost
Wall Finishes	• Repair expansion joints in block and concrete surfaces that have cracks, gaps, splits or vegetation build-up • Check overall condition, cleanliness and for signs of mildew. Determine source and repair or replace as necessary • Inspect and repair block and concrete surfaces that have signs of cracks, bare spots, missing segments, corrosion, oxidation, decay, rot, or termites and/or vegetation build up • Inspect drywall surfaces for delamination, peeling paint, dry rot, holes, blisters, cracks, curling, and sagging. Determine the cause of the condition and repair as necessary to correct condition. • Inspect drywall surfaces for evidence of corrosion or oxidation. Correct the condition • Determine in termite activity is present, especially where water has penetrated the building envelope. Correct the condition. • Inspect sealant and paint conditions. Determine sources or any stains on wall surfaces. Reseal or repair as necessary. • Touchup paint as needed (to match existing paint color)	C3010	1	A	29	267	296	

Asset	Task/Job Plan	Classification	Trade / Skill Level	Frequency	Total Schools	Total Bldgs / Units	Total Time (Hr/Yr)	Est. Contr. Cost
Flooring	General • Remove all furniture outside of the classroom • Sweep and damp mop floors to remove loose dirt • Correct any tripping hazards • Inspect for low spots that prevent water from draining, or delaminated tiles, and submit service request if observed • Conduct steps below for VTC or Epoxy flooring • Wipe baseboards with soap and water • Replace furniture VCT • Check for delamination and excessive wear; repair/replace as needed • Use a motorize floor machine with stripping solution to remove floor polish and embedded dirt and scratches • Use a floor machine to apply floor sealant and polishing solution Epoxy • Clean with soap and water • Check for wear (submit service request if restorative work is needed, e.g., crack, low spot) • Apply a maintenance coat if needed	C3024	Contr.	A	29	267	8,811	$ 132,165
Elevator	• Verify that there are no sharp edges or large gaps throughout the elevator system • Examine hoistway equipment located in the elevator shaft (guide rails, corridor doors, and hangers) • Examine condition of railing system, shaft and bearings • Certification - Obtain required certifications by the appropriate and responsible party to testify that the elevator system performs in accordance to rules, regulations, laws, and specifications	D1010-1	2	A	8	8	8	

Asset	Task/Job Plan	Classification	Trade / Skill Level	Frequency	Total Schools	Total Bldgs / Units	Total Time (Hr/Yr)	Est. Contr. Cost
Elevator	• Condition of wheels and pulleys - Roller guide wheels and assemblies should be adjusted or replaced depending on their condition. • Check operation of electric devices and wiring connections: motors, switches, generators, etc. • Cable/pulley/rope tension, alignment and condition • Inspect the condition of the motor and its bearings, brushes, and the machine brake system • Verify chains and cotter pins are in good working condition • Inspect drive sheaves and hoist cables for deterioration. Test the tension of the hoist cables • Condition of interlock functions, limit and shutdown switches - Inspect for dust, debris, corrosion, damage, and tightness of connections • General safety conditions - Test emergency communication device and emergency stop button	D1010-2	2	SA	8	8	16	

Asset	Task/Job Plan	Classification	Trade / Skill Level	Frequency	Total Schools	Total Bldgs / Units	Total Time (Hr/Yr)	Est. Contr. Cost
Elevator	• Examine all moving parts to determine proper adjustments and lubrication • Check to make sure the elevator levels at floor height • Listen for any unusual noise or vibrations • Clear all passageways of any obstructions • Verify that the elevator lighting system is operational • Check buttons and open/close door functions • Inspect piping for damage or corrosion • Hydraulic power unit: Run through a complete cycle, and check for smooth operation • Check relief valve and blowdown block • Control Valve: Check for oil leaks • Tank: Check oil level and top up as needed • Check hoses and fittings • Supply line and shutoff valve: Check supply line from control valve to ram for leaks or hose kinks and pinching • Hydraulic Cylinder: Check hose connections for leaks and hose deterioration. Cylinder shaft should be a highly polished surface, remove dirt, debris and corrosion • Run through a complete cycle and observe that cylinder has full range of motion and no binding • Check operation of pressure switch. • Check operation of low oil pressure cutoff protection	D1010-4	2	Q	8	8	144	

Asset	Task/Job Plan	Classification	Trade / Skill Level	Frequency	Total Schools	Total Bldgs / Units	Total Time (Hr/Yr)	Est. Contr. Cost
Restrooms	• Check fixtures and repair/replace as needed: o Inspect piping systems for deterioration, leaks, scaling, rust, or other signs of failure (submit service request for needed repairs) o Test all flush valves o Check overflow drain operations. Check for flow and obstructions, leaks and corrosion o Check for breaks, cracks, or other defects in any porcelain surfaces. o Check seals for leakage, scaling, damage, or other deterioratio. o Replace washers or packing on leaking faucets • Inspect partitions for damage (submit service request for needed repairs) • Inspect tile (walls and floors); clean and replace missing tiles and grout (or submit service request for needed repairs)	D2010	2	A	29	184	765	
Roofing/ Gutters	• Check roof and gutters and remove any fallen debris • Inspect and clear downspouts • Inspect straps for roof gutters and downspouts and re-secure if necessary	D2040	1	A	29	267	296	
Dry Wells	• Inspect dry well and submit service request to remove accumulated debris as needed	D2043	1	A	3	58	32	

Asset	Task/Job Plan	Classification	Trade / Skill Level	Frequency	Total Schools	Total Bldgs / Units	Total Time (Hr/Yr)	Est. Contr. Cost
AC-General	• Remove and clean all indoor filters (replace filters as recommended by unit manufacturer) • Inspect exposed piping for obvious leakage and insulation conditions Repair or replace insulation covering pipes as needed • Outdoor unit: clean condenser coils • Check electrical controls and connections, and proper refrigerant charge • Clean drain pipeline for clogs and dirt • Clean outdoor unit case and apply 1-coat of spray on automotive wax. • Inspect equipment hangers or attachment systems for stability by checking bolts and hardware for stress or weakness. Adjust or replace as required.	D3041/ D3052	1	Q	29	206	1,265	

Asset	Task/Job Plan	Classification	Trade / Skill Level	Frequency	Total Schools	Total Bldgs / Units	Total Time (Hr/Yr)	Est. Contr. Cost
Panels / Receptacles / Switches	• Service Panels: remove excess wire, all wires to enter breakers in a 90 degree angle. Wire tie groups of wire to promote order. Check for loose connections and spray with contact cleaner to remove dirt, grease and corrosion. Ensure that all conduit and cable entering an enclosure are properly secured. Clean all debris from panel enclosure. Verify all circuits and provide a circuit legend on panel door. • Verify that the electrical room is clean and the electrical panel accessible (tools and equipment are stored/secured, room is free of combustible material, and there are no signs of fluid spills • Receptacles and switches: remove cover plates, blow dust off wiring connections and check for corrosion; submit service request if corrosion is visible. Inspect moisture protection items such as O-rings, gaskets and weather stripping for dust, debris and corrosion, damage, cracks and chips; repair/replace as needed. • Cover plates: and check each plate for cracking, discoloration or burn marks; submit a service request for wiring replacement if burn marks are visible. Replace plates if missing, discolored or damaged • Junction boxes: verify that conductors are secured, and box covers securely in place	D50	2	A	29	262	160	

Asset	Task/Job Plan	Classification	Trade / Skill Level	Frequency	Total Schools	Total Bldgs / Units	Total Time (Hr/Yr)	Est. Contr. Cost
Lighting - Exterior	• Visually inspect lighting for functionality and wear • Locate switch and or breaker; inspect shutdown switches for corrosion, dust, and debris; check electrical connections for tightness • Inspect wiring connections for dust, debris, corrosion, and moisture; clean, replace or seal as needed • Replace expired bulbs as needed	D5020-E	2	A	29	813	842	
Lighting - Interior Fluorescent	• Visually inspect lighting for functionality and wear • Locate switch and or breaker; inspect shutdown switches for corrosion, dust, and debris; check electrical connections for tightness • Inspect wiring connections for dust, debris, corrosion, and moisture; clean, replace or seal as needed • Remove and clean diffusors • Inspect lighting fixtures by opening fixture to check for tight socket connections, dust, corrosion or humming ballasts • Replace expired bulbs and or ballast as needed • Clean fixtures lens to prevent reduction of illumination levels • Replace diffusors	D5020-I	2	A	29	262	2,328	
Lighting - Emergency	• Emergency lighting is installed on a dedicated circuit breaker • Turn the breaker off to test the emergency lighting, lights should come on • Inspect breaker for corrosion, dust, and debris; check electrical connections for tightness • Clean fixture	D5092	2	Q	5	72	77	
Fans	• Cycle 3-speed fan, cycle reverse • Clean metal blades with soap and water and apply 1-coat of automotive wax	E1099	2	A	29	676	1,381	

Asset	Task/Job Plan	Classification	Trade / Skill Level	Frequency	Total Schools	Total Bldgs / Units	Total Time (Hr/Yr)	Est. Contr. Cost
Septic Tanks/ Grease Interceptors	• Pump/clean septic tank and grease interceptors • Inspect piping systems and seals for deterioration, leaks, scaling, rust, or other signs of failure • Storm drains: remove debris from drain inlets or pipes; flush drain lines	G3020	1	A	25	63	277	ASPA
Storm Drains/ Culverts/ Swales/ Retention Basins	• Culverts/Swales: flush culvert to check depth and function; clear vegetation and remove silt or regrade to restore depth if needed; regrade slope of surrounding areas to taper to culvert bottom • Retention basins: check depth/volume; clear vegetation and regrade to remove silt and restore basin depth and function as needed	G3030	1	A	29	267	1,097	
						Total:	77,746	

A3 - Preventive Maintenance Tasks - School Detail

Location / Bldg #	School	*Exterior Enclosure - Windows*	*Exterior Enclosure - Patching and Painting Walls*	*Exterior Enclosure - Doors*	*Stair Finishes - Painting*	*Wall Finishes*	*Flooring*	*Rainwater Drainage - Plumbing*	*Rainwater Drainage Equip Plumbing*	*Storm Sewer - Site*	*Elev*	*Elev*	*Elev*	*Elec*	*Elec*	*Elec*	*Elec*	*Elec*	*Plumb*	*Sanitary Sewer - Site*	*HVAC/ AC*
		B2021	B20-A	B20-WD	C2023	C3010	C3024	D2040	D2043	G3030	D10 10-1	D1010 -2	D1010 -4	D50	D5020-E	D5020-I	D50 92	E1099	D2010	G3020	D3041/ D3052
AS01004	Aua ES	25	25	7	21	7	198	7		25	1	2	18	4	50	56		51	25	9	19
AS01005	Coleman ES	89	89	23	13	23	726	23		89	1	2	18	12	28	184		95	29	5	67
AS01008	Le'atele ES	37	37	10	13	10	297	10		37				6	35	80		43	25	13	109
AS01014	Matafao ES	45	45	12	17	12	363	12	17	45	1	2	18	7	35	96	17	57	29	-	55
AS01020	Samoana HS	33	33	9	13	9	264	9	7	33	1	2	18	5	16	72		63	29	-	73
AS01003	Alofau ES	41	41	11	5	11	330	11		41	1	2	18	6	26	88		53	29	13	49
AS01013	Masefau ES	17	17	5	9	5	132	5		17				3	15	40		19	25	13	25
AS01015	Matatula ES	17	17	5	25	5	132	5		17				3	10	40		29	25	13	31
AS01018	Olomoana ES	37	37	10	1	10	297	10		37				6	11	80		25	25	25	55
AS02024	AP Lutali ES	21	21	6	17	6	165	6		21				1	1	8		1	25	5	31
AS03025	Faleasao ES	25	25	7	1	7	198	7		25				4	14	56		31	25	5	19
AS03026	Fitiuta ES	21	21	6	1	6	165	6		21				4	14	48		27	25	13	25
AS03027	Manu'a HS	41	41	11	1	11	330	11		41				6	20	88		29	29	17	13
AS03028	Olosega ES	37	37	10	1	10	297	10		37				6	15	80		27	29	13	25
AS01001	Afonotele ES	29	29	8	9	8	231	8		29				5	20	64		27	25	13	19
AS01006	Faga'itua HS	21	21	6	13	6	165	6		21				4	10	48		17	25	-	31
AS01007	Lauli'i ES	33	33	9	1	9	264	9		33				5	12	72		23	25	5	19
AS01016	Mt. Alava ES	33	33	9	1	9	264	9		33				5	13	72		35	25	17	19
AS01011	Lupelele ES	65	65	17	17	17	528	17		65				9	46	136	13	61	29	5	19
AS01012	Manulele ES	37	37	10	29	10	297	10		37	1	2	18	6	57	80		69	25	5	25

Appendix 3 Preventive Maintenance Tasks - School Detail

Location / Bldg #	School	*Exterior Enclosure - Windows*	*Exterior Enclosure - Patching and Painting Walls*	*Exterior Enclosure - Doors*	*Stair Finishes - Painting*	*Wall Finishes*	*Flooring*	*Rainwater Drainage - Plumbing*	*Rainwater Drainage Equip Plumbing*	*Storm Sewer - Site*	*Elev*	*Elev*	*Elev*	*Elec*	*Elec*	*Elec*	*Elec*	*Elec*	*Plumb*	*Sanitary Sewer - Site*	*HVAC/ AC*
		B2021	**B20-A**	**B20-WD**	**C2023**	**C3010**	**C3024**	**D2040**	**D2043**	**G3030**	**D10 10-1**	**D1010 -2**	**D1010 -4**	**D50**	**D5020-E**	**D5020-I**	**D50 92**	**E1099**	**D2010**	**G3020**	**D3041/ D3052**
AS01017	Nu'uuli Polytech HS	33	33	9	9	9	264	9		33	1	2	18	5	24	72		33	25	9	37
AS01022	Tafuna ES	37	37	10	37	10	297	10		37	1	2	18	6	71	80		179	25	5	43
AS01023	Tafuna HS	65	65	17	33	17	528	17		65				9	89	136		107	25	5	121
AS01002	Alataua II ES	33	33	9	9	9	264	9		33				5	18	72		37	25	13	61
AS01009	Leone HS	41	41	11	25	11	330	11	8	41				6	61	88	16	41	29	17	121
AS01010	Leone Midkiff ES	65	65	17	17	17	528	17		65				9	32	136	27	37	29	21	49
AS01019	Pavaia'i ES	85	85	22	29	22	693	22		85				12	61	176		117	29	-	49
AS01021	Siliaga ES	21	21	6	13	6	165	6		21				4	20	48	4	23	25	9	37
AS01030	Fagali'i ES	13	13	4	9	4	99	4		13				3	18	32		25	25	9	19
	Total Time (hrs/yr):	1,097	1,097	296	389	296	8,811	296	32	1,097	8	16	144	160	842	2,328	77	1,381	765	277	1,265

Grand Total: 20,674

A4 - Preventive Maintenance Tasks – Breakdown by District

District	Location/ Bldg #	School	B2021	B20-A	B20 - WD	C2023	C3010	C3024	D2040	D2043	G3030	Carpenter HRs/ School	C2023	D2043	G3030	Skillworker HRs / School
Central	AS01004	Aua ES	25	25	7		7	198	7			269	21		25	46
Central	AS01005	Coleman ES	89	89	23		23	726	23			973	13		89	102
Central	AS01008	Le'atele ES	37	37	10		10	297	10			401	13		37	50
Central	AS01014	Matafao ES	45	45	12		12	363	12			489	17	17	45	79
Central	AS01020	Samoana HS	33	33	9		9	264	9			357	13	7	33	53
											District Total:	2,489			District Total:	330
East	AS01003	Alofau ES	41	41	11	5	11	330	11		41	491				0
East	AS01013	Masefau ES	17	17	5	9	5	132	5		17	207				0
East	AS01015	Matatula ES	17	17	5	25	5	132	5		17	223				0
East	AS01018	Olomoana ES	37	37	10	1	10	297	10		37	439				0
East	AS02024	AP Lutali ES	21	21	6	17	6	165	6		21	263				
											District Total:	1,623			District Total:	-
Manua	AS03025	Faleasao ES	25	25	7	1	7	198	7		25	295				0
Manua	AS03026	Fitiuta ES	21	21	6	1	6	165	6		21	247				0
Manua	AS03027	Manu'a HS	41	41	11	1	11	330	11		41	487				0
Manua	AS03028	Olosega ES	37	37	10	1	10	297	10		37	439				0
											District Total:	1,468			District Total:	-
Mid East	AS01001	Afonotele ES	29	29	8		8	231	8			313	9		29	38
Mid East	AS01006	Faga'itua HS	21	21	6		6	165	6			225	13		21	34
Mid East	AS01007	Lauli'i ES	33	33	9		9	264	9			357	1		33	34
Mid East	AS01016	Mt. Alava ES	33	33	9		9	264	9			357	1		33	34
											District Total:	1,252			District Total:	140
Mid West	AS01011	Lupelele ES	65	65	17	17	17	528	17		65	791				0
Mid West	AS01012	Manulele ES	37	37	10	29	10	297	10		37	467				0
Mid West	AS01017	Nu'uuli Polytech	33	33	9	9	9	264	9		33	399				0
Mid West	AS01022	Tafuna ES	37	37	10	37	10	297	10		37	475				0
Mid West	AS01023	Tafuna HS	65	65	17	33	17	528	17		65	807				0
											District Total:	2,939			District Total:	-
West	AS01002	Alataua II ES	33	33	9	9	9	264	9		33	399				0
West	AS01009	Leone HS	41	41	11	25	11	330	11	8	41	519				0
West	AS01010	Leone Midkiff ES	65	65	17	17	17	528	17		65	791				0
West	AS01019	Pavaia'i ES	85	85	22	29	22	693	22		85	1043				0
West	AS01021	Siliaga ES	21	21	6	13	6	165	6		21	259				0
	AS01030	Fagali'i ES	13	13	4	9	4	99	4		13	159				0
											District Total:	3,170			District Total:	-
		Total:	**1,097**	**1,097**	**296**	**288**	**296**	**8,811**	**296**	**8**	**752**	**12,941**	**101**	**24**	**345**	**470**

Appendix 4 Preventive Maintenance Tasks - Breakdown by District

District	Location/ Bldg #	School	D1010-1	D1010-2	D1010-4	D50	D5020-E	D5020-I	D5092	E1099	Total Elec HRs/School	D2010	G3020	Total Plumber HRs/ School	D3041 / D3052	Total AC HRs/ School	District Total
Central	AS01004	Aua ES	1	2	18	4	50	56	0	51	182	25	9	34	19	19	
Central	AS01005	Coleman ES	1	2	18	12	28	184	0	95	340	29	5	34	67	67	
Central	AS01008	Le'atele ES	0	0	0	5.5	35	80	0	43	163.5	25	13	38	109	109	
Central	AS01014	Matafao ES	1	2	18	6.5	35	96	17	57	232.5	29		29	55	55	
Central	AS01020	Samoana HS	1	2	18	5	16	72	0	63	177	29		29	73	73	
										District Total:	1,095		District Total:	164	District Total:	323	4,401
East	AS01003	Alofau ES	1	2	18	6	26	88	0	53	194	29	13	42	49	49	
East	AS01013	Masefau ES	0	0	0	3	15	40	0	19	77	25	13	38	25	25	
East	AS01015	Matatula ES	0	0	0	3	10	40	0	29	82	25	13	38	31	31	
East	AS01018	Olomoana ES	0	0	0	5.5	11	80	0	25	121.5	25	25	50	55	55	
East	AS02024	AP Lutali ES	0	0	0	1	1	8	0	1	11	25	5	30	31	31	
										District Total:	485.5		District Total:	198	District Total:	191	2,498
Manua	AS03025	Faleasao ES	0	0	0	4	14	56	0	31	105	25	5	30	19	19	
Manua	AS03026	Fitiuta ES	0	0	0	3.5	14	48	0	27	92.5	25	13	38	25	25	
Manua	AS03027	Manu'a HS	0	0	0	6	20	88	0	29	143	29	17	46	13	13	
Manua	AS03028	Olosega ES	0	0	0	5.5	15	80	0	27	127.5	29	13	42	25	25	
										District Total:	468		District Total:	156	District Total:	82	2,174
Mid East	AS01001	Afonotele ES	0	0	0	4.5	20	64	0	27	115.5	25	13	38	19	19	
Mid East	AS01006	Faga'itua HS	0	0	0	3.5	10	48	0	17	78.5	25		25	31	31	
Mid East	AS01007	Lauli'i ES	0	0	0	5	12	72	0	23	112	25	5	30	19	19	
Mid East	AS01016	Mt. Alava ES	0	0	0	5	13	72	0	35	125	25	17	42	19	19	
										District Total:	431		District Total:	135	District Total:	88	2,046
Mid West	AS01011	Lupelele ES	0	0	0	9	46	136	13	61	265	29	5	34	19	19	
Mid West	AS01012	Manulele ES	1	2	18	5.5	57	80	0	69	232.5	25	5	30	25	25	
Mid West	AS01017	Nu'uuli Polytech	1	2	18	5	24	72	0	33	155	25	9	34	37	37	
Mid West	AS01022	Tafuna ES	1	2	18	5.5	71	80	0	179	356.5	25	5	30	43	43	
Mid West	AS01023	Tafuna HS	0	0	0	9	89	136	0	107	341	25	5	30	121	121	
										District Total:	1,350		District Total:	158	District Total:	245	4,692
West	AS01002	Alataua II ES	0	0	0	5	18	72	0	37	132	25	13	38	61	61	
West	AS01009	Leone HS	0	0	0	6	61	88	16	41	212	29	17	46	121	121	
West	AS01010	Leone Midkiff ES	0	0	0	9	32	136	27	37	241	29	21	50	49	49	
West	AS01019	Pavaia'i ES	0	0	0	11.5	61	176	0	117	365.5	29		29	49	49	
West	AS01021	Siliaga ES	0	0	0	3.5	20	48	4	23	98.5	25	9	34	37	37	
	AS01030	Fagali'i ES	0	0	0	2.5	18	32	0	25	77.5	25	9	34	19	19	
										District Total:	1,126.5		District Total:	231	District Total:	336	4,864
		Total:	**8**	**16**	**144**	**160**	**842**	**2,328**	**77**	**1,381**	**4,956**	**765**	**277**	**1,042**	**1,265**	**1,265**	**20,674**