2017

# Fort Bend ISD ~ Facilities Management Audit

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# Contents

# Introduction

School facilities should be designed and maintained to support the educational curriculum and to provide an effective learning environment that is educationally adequate to deliver the curriculum. Having suitable facilities requires good planning, which is made possible by accurate measurement of school capacities and enrollment projections. There must be good communication between facilities planning, design and construction, and facilities management. Finally, processes to enable feedback from the operations and maintenance of facilities to planning and design are important to enhance the quality of new and renovated schools.

Once schools are built, preventive maintenance activities (i.e., planned maintenance that minimizes potential disruptions of service due to equipment breakdown and serves to extend the useful life of equipment), sustainable facility operations, and a long-term capital improvement program are essential elements for extending the serviceable life of facilities and reducing life cycle costs. An aggressive energy and utility management program is critical to reducing operating expenses and providing a sustainable building environment. In addition, adequate custodial and grounds operations are necessary to ensure buildings and grounds provide a clean, safe, healthy, and suitable learning environment.

This report presents the results of an internal audit of the Fort Bend Independent School District's (FBISD) Facilities Department. This audit was conducted by Gibson Consulting Group, Inc. (Gibson) of Austin, Texas as part of the board's ongoing internal audit program. Facilities management was identified as an area for review on the initial comprehensive risk assessment conducted for the board by Gibson in 2013.

The scope of this audit included functional areas under the responsibility of the Executive Director of Facilities and Building Operations, including facilities organization and management, maintenance and operations, energy management, custodial services, and grounds maintenance. The scope of this audit did not include the Facilities Design and Construction Department.

## Audit Objectives and Approach

The objectives of the audit were to:

- Determine the effectiveness and efficiency of facilities management functions.
- Determine compliance with applicable laws, regulations, contracts and policies of the FBISD Board of Trustees.
- Evaluate policies and procedures to safeguard district assets supporting facilities management functions.
- Assess the reliability and integrity of financial and operational information produced by the Facilities Department.

The audit approach involved the collection and analysis of data (see data request list in Appendix A), interviews of FBISD Facilities Department staff and district leadership (see interview roster in Appendix B), school site visits, and transaction and compliance testing of certain FBISD facilities operations. This work culminated in the development of this audit report.

In addition to the development of audit findings and recommendations, this audit identified several best practices in place at FBISD. Following are summaries of the commendations and major findings and recommendations from this audit, with more detailed descriptions in later report sections.

## Commendations

1. **Effective use of technology.** The district's use of a cloud-based enterprise asset management program is creating operational efficiencies and data that are useful for improving performance. For example, from 2012 to 2015 the Facilities Department progressively reduced the average number of days to close work orders. FBISD shares work order completion statistics on its website, which creates a climate of transparency and accountability. The Facilities Scheduling module is being used to automate information exchange between the building automation system and building controls. This process increases the optimization of building system operating schedules.

2. **Strong employee development programs.** The Facilities Department is supporting its workforce in participating in General Educational Development (GED) and English as a Second Language (ESL) programs, which may contribute to employee retention as well as workforce development. An added benefit is increased employee morale and job satisfaction. Some managers are also pursuing Spanish language training to help remove communication barriers and promote open lines of communication.

3. **High rate of professional certifications.** The Facilities Department invests in and supports training and workforce development for the in-house heating, ventilation and air condition (HVAC) staff. As a result, all but one HVAC technician holds a Class A or B contractor's license. Passing this exam is a significant professional accomplishment, and developing a highly skilled in-house workforce enhances the Facilities Department's ability to better manage its HVAC operations.

4. **Valuing custodial services.** Several schools apply unique approaches to acknowledge the importance and performance of school custodial services. During the audit teams' school visits several principals spoke very highly of the custodial services function at their school, and the audit team's observations validated their perceptions. These principals make their custodians feel important and connected to the school's mission. This, in turn, makes the custodians very proud of their schools and highly dedicated to their work. At one school, donations are volunteered by school employees to buy gifts for their custodial staff before the winter holiday break. Other celebrations or recognitions are done during the year. While the principals are not the supervisors of the custodial function at schools, their role in supporting this function is critical to a successful custodial services program.

5. **Efficient cleaning equipment.** The schools are provided with sufficient equipment to support efficient cleaning practices. Most schools have riding auto-scrubbers or "chariots" to clean hallways and other

common areas in a highly efficient manner. Back-pack vacuum cleaners are also used in schools to support efficient cleaning of carpeted areas. In 2015-16, $100,000 was budgeted for custodial equipment purchases, reflecting an ongoing commitment to maintain current, efficient equipment.

## Audit Summary

Seventeen (17) recommendations are provided in this audit report (see summary in Table 1). Recommendations are not listed in order of priority; however, their priority is established in the first column with a color code that is described in a legend below the table.

Table 1. Summary of Recommendations

| Priority | No. | Recommendation |
|---|---|---|
| | | ***Facilities Department Organization and Management*** |
| | 1 | Develop a strategic facility management plan and goals. |
| | 2 | Implement a performance measurement framework. |
| | 3 | Implement a more robust facilities management training program. |
| | 4 | Ensure compliance with Board Policy DI (Legal) for the Hazard Communication Act. |
| | 5 | Develop and implement standard operating procedures. |
| | | ***Operations and Maintenance*** |
| | 6 | Enhance the PM program. |
| | 7 | Develop staffing plan for HVAC maintenance. |
| | 8 | Re-engineer the maintenance parts purchase process. |
| | 9 | Conduct a safety inspection of Facilities shops and correct identified hazards. |
| | | ***Energy Management*** |
| | 10 | Develop an approved energy plan, set reduction goals, and monitor performance. |
| | 11 | Update and maintain energy data in ENERGY STAR Portfolio Manager. |
| | | ***Custodial Services*** |
| | 12 | Change custodial staffing formulas to reflect volume of work. |
| | 13 | Standardize custodial work schedules to accomplish more cleaning time after school. |
| | 14 | Implement a custodian substitute pool. |
| | 15 | Standardize and document cleaning frequencies and summer deep cleaning procedures. |
| | 16 | Conduct quarterly school inspections of custodial services and analyze results. |
| | | ***Grounds Maintenance*** |
| | 17 | Increase staffing for athletics fields maintenance. |

**Red** = High Priority
**Orange** = Medium Priority
**Yellow** = Low Priority

The remainder of this report presents the audit findings and recommendations for each functional area within the Facilities Department. It is organized into the following sections:

1. Background
2. Facilities Department Organization and Management
3. Operations and Maintenance
4. Energy Management
5. Custodial Services
6. Grounds Maintenance

# Section 1 – Background

The Fort Bend Independent School District (FBISD) is a school district in the state of Texas created in 1959 and currently based in the City of Sugar Land. With an estimated 73,000 students and over 5,000 more expected by 2018, FBISD is the seventh largest public school system in the state of Texas and is reportedly the largest employer in Fort Bend County employing more than 9,000 district employees. The district spans 170 square miles and covers most of the City of Sugar Land, the City of Meadows Place, the Fort Bend County portions of Missouri City and Mission Bend, Arcola, small sections of Houston, small sections of Pearland, and the unincorporated communities of Clodine, Four Corners, Juliff, and Fresno.

Across the district there are:

- 15 high schools (including four unique secondary campuses)
- 14 middle schools
- 46 elementary schools

Table 2 shows the gross square feet of space, by facility type, reported by FBISD as of December 17, 2015.

Table 2. FBISD Gross Square Feet by Facility Type

| Facility Type | Gross Square Feet | | |
|---|---|---|---|
| | Permanent Facilities | Temporary Facilities | Total |
| High School Campuses | 4,098,158 | 56,832 | 4,154,990 |
| Middle School Campuses | 2,764,724 | 29,184 | 2,793,908 |
| Elementary School Campuses | 3,834,805 | 184,719 | 4,019,524 |
| Total Campus Facilities | 10,697,687 | 270,735 | 10,968,422 |
| Other FBISD Facilities | 662,723 | 0 | 662,723 |
| **Total Square Feet** | **11,360,410** | **270,735** | **11,631,145** |

Source: Data from FBISD Facilities Department

Voters in FBISD approved a $484 million bond program in 2014. The major elements of this program are:

- New construction and classroom additions to support increasing student enrollment, and major maintenance and renovation items identified through a comprehensive facilities assessment
- Safety and security improvements
- New school buses, bus cameras, and global positioning systems on all buses
- Technology infrastructure
- Land purchases and other needs

FBISD recorded $56.5 million for facilities maintenance and operations expenditures in fiscal year 2014-2015, up $5.6 million, or 13.5 percent since fiscal year 2012-2013. On a per student basis, expenditures

have increased 9.4 percent over the same time period. Table 3 shows actual (audited) operating expenditures for facilities management (Function 51) over the past four years.

Table 3. FBISD Facilities Maintenance and Operations – Actual Operating Expenditures and Metrics, All Funds, 2012-13 to 2014-15

| Expenditures in $ | 2012-13 | 2013-14 | 2014-15 |
|---|---|---|---|
| Actual Expenditures | $49,740,097 | $54,438,869 | $56,463,371 |
| Enrollment | 69,123 | 70,512 | 71,681 |
| Cost per Student | $720 | $772 | $788 |
| % of Total Operating Expenditures | 9.68% | 9.91% | 9.09% |

Source: TEA Texas Annual Performance Reports, 2012-13 through 2015-16

In 2014-15 FBISD spent less than the state average on facilities maintenance on a per-student basis and as a percentage of total operating expenditures. Based on a total student enrollment of 73,377 reported in the 2014-15 Comprehensive Annual Financial report, FBISD incurred $788 per student on facilities maintenance and operations. The per-student spending level was 12.5 percent below the state average of $901 per student. The district's percentage of Facilities M&O expenditures to total operating expenditures (9.09%) was also below the state average of 9.94 percent.

The overall cost of facilities for 2014-15 was $4.68 per square foot, which is below the national median of $5.40 per square foot. Energy costs in the 2014-15 school year were slightly higher than the prior year, but have shown an overall downward trend (6.1 percent) since the 2012-13 school year. Refer to Section F, Energy Management for a more detailed discussion on energy.

## School Size & Configuration

School sizes and configurations are developed to meet the requirements of Texas Administrative Code, Title 19, Part 2, Chapter 61, Subchapter CC which defines minimum classroom sizes and minimum allowable classroom square footage per student. Space requirements for elementary schools are further defined in the Fort Bend ISD *2015 – Elementary School Educational Specifications* dated September 21, 2015.

As shown in Table 4, FBISD is above national averages for gross square footage per student and, with the exception of the general category of middle schools, is below national average for space utilization.

Table 4. School Ratios of Gross Square Footage per Student and Utilization Rates

| Facility Type | FBISD Actual | National Average[1] | FBISD Utilization | CEFPI Average Utilization |
|---|---|---|---|---|
| Elementary Schools | 126 sf/student | 120 sf/student | 87.7% | 95-100% |
| Middle Schools | 164 sf/student | 146 sf/student | 77.8% | 70-85% |
| High Schools | 180 sf/student | 163 sf/student | 78.0% | 80-85% |

Source: FBISD Active Student Counts, 12/7/2015; Council of Educational Facility Planners International (CEFPI)

According to the Fort Bend ISD *Facilities Master Plan Update*, approved on September 21, 2015, FBISD administration will review projected and actual enrollment to ensure school utilization is maintained at a desired capacity, specifically noting utilization benchmarks of less than 80 percent and above 120 percent capacity. Specific measures to respond to under- or over-utilization are noted to potentially include student transfers, programs present, use of temporary classrooms, enrollment caps, boundary changes, consolidation or closure, and construction.

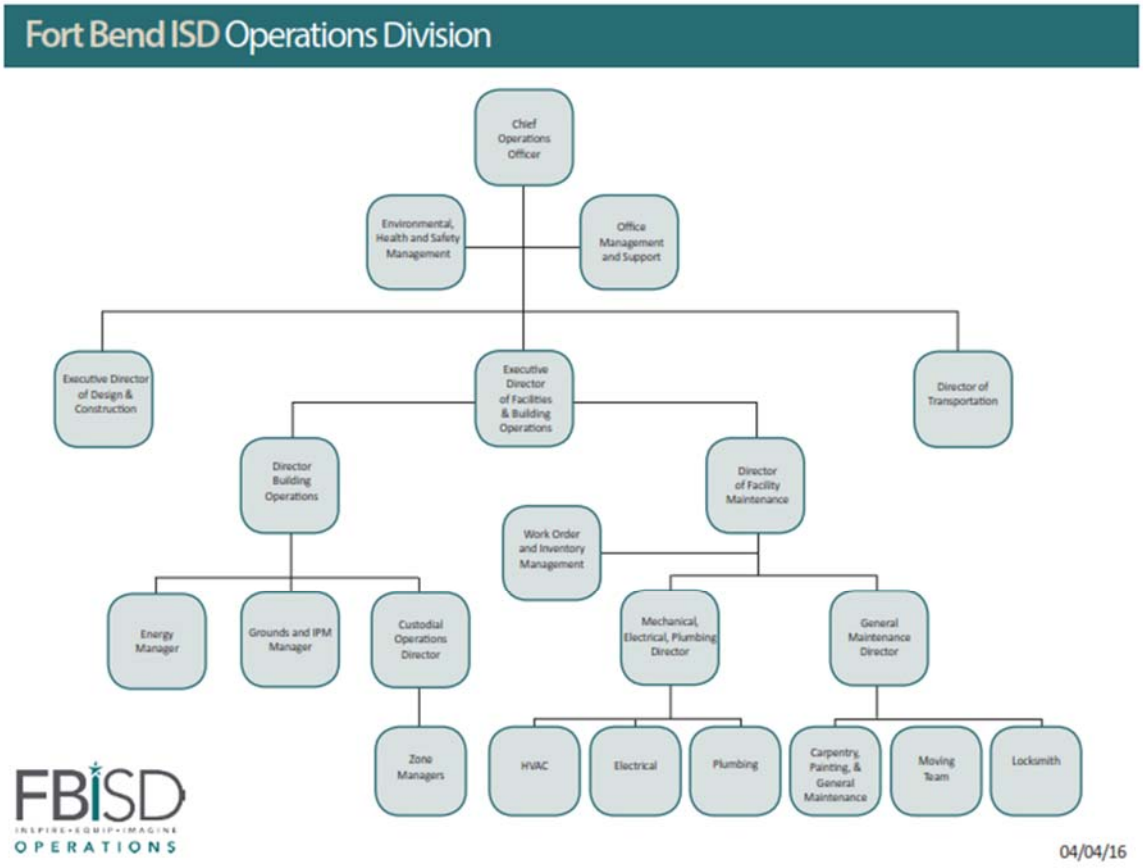
Enrollment is expected to increase and, according to the Facilities Master Plan, an estimated $258 million has been provided by the 2014 bond program for the construction of eight new elementary schools and one new middle school to address expected growth. An additional $42.2 million has been provided for additions at ten elementary schools, one middle school, and three high schools. In the updated master plan, needs for additions at schools were revised down to include six elementary schools, no middle or high schools, and a renovation at one elementary school.

## Facilities Department Organization

The organization chart of FBISD's Facilities Department as of April 2016 is presented in Figure 1. All facilities management functions report to the Executive Director of Facilities and Building Operations, who reports to the Chief Operations Officer. Reporting to the Executive Director are two directors, one for Maintenance and one for Building Operations. Energy management, Grounds keeping and Integrated Pest Management (IPM), and Custodial Services report to the Director of Building Operations while all of the maintenance trades and work order management report to the Maintenance Director. As of June 2015, the Facilities and Building Operations Department had 406 custodial employees, 142 maintenance employees, and 18 managers and staff – for a total of 566 employees.

[1] CEFPI Calculating School Capacity: Local, State & National Perspectives, October 2007.

Figure 1. FBISD Facilities and Building Operations Department Organizational Chart




Source: FBISD Facilities and Building Operations Department

Using the total FBISD facility inventory to be maintained of 11,631,145 gross square feet and a front-line trades workforce of 119 craft positions, the overall maintenance staffing is approximately 97,741 square feet per maintenance worker. This ratio is in line with best practices and representative maintenance staffing formulas for K-12 schools. However, the staffing report provided to the audit team shows that as of December 1, 2015, fourteen of these positions were vacant. With an onboard workforce of 105 maintenance workers, the staffing ratio increases to 110,773 SF/person which is higher than recommended for K-12 schools. When all positions are not filled, one can expect that certain work requirements will be delayed or not accomplished at all. The reduced staffing level may have been a contributing factor to the decrease in preventive maintenance work orders accomplished over the past four school years (discussed later in this report).

The Facilities and Building Operations Department staff is responsible for ensuring compliance with board policies related to facilities management. The major board policies that are relevant to facilities management include:

- CKA (Legal) – Safety Program/Risk Management Inspections – addresses responsibilities under the Asbestos Hazard Emergency Response Act (AHERA).

- CL (Legal) – Buildings Grounds and Equipment Management – addresses energy reduction goals and conservation measures, recycling program requirements, mold remediation documentation, and pool safety measures.

- CLB (Legal) – Buildings Grounds and Equipment Management Maintenance – addresses basic sanitary requirements for buildings, pest management, and IPM program requirements.

- DI (Legal) – Employee Welfare – addresses duties to be in compliance with the Hazard Communication Act.

- Policy CLB (Legal) – requires buildings shall be maintained in a sanitary manner, and that all full-time building custodians and janitors know the fundamentals of safety and school sanitation.

- Policy CKA (Legal) – requires all custodial and maintenance employees are trained as required by law under the Asbestos Hazard Emergency Response Act.

# Section 2 – Facilities Department Organization and Management

This section presents audit findings and recommendations related to the overall management of the Facilities and Building Operations Department. Elements of this management analysis included:

- The organizational structure – to ensure that functions are logically aligned and that the span of control (number of direct reports to a supervisor) is reasonable.
- Planning – an assessment of planning activities that guide the operations of the facilities management functions.
- Performance accountability – the analysis of performance measurement and how these measures are used to hold individuals accountable for facilities management objectives.

## Audit Findings and Recommendations

***Finding: The FBISD Facilities Management function is not held accountable for performance.***

Documents provided in advance of the audit site visit list a few Facilities Department goals and strategic actions in support of FBISD District Goals; however, interviews conducted with management showed that implementation is still in the planning stages. There is no concise facilities strategic plan or other documents to provide a framework for defining goals and consistently measuring performance against established targets.

Some managers cited data used to monitor certain measures, such as the percentage of overtime, work order completion time, and the number of open hazard deficiencies. However, there is no written evidence of what standards are expected, how regularly these items are monitored, or what necessary actions are taken. Several managers stated that a lack of customer complaints is their gauge of success. While there may be some correlation between fewer complaints and increased success, the lack of quantifiable data concerning complaints undermines the validity of that sentiment. Without written goals or performance targets, the ability to hold this function accountable is limited.

**Recommendation 1: Develop a facility management plan and goals.**

The Executive Director of Facilities and School Services should develop a facility management plan which clearly identifies program goals, processes, prioritization scheme, and means to measure progress against goals. The plan should contain a long term vision for facilities management that demonstrates alignment with the school district's goals and promotes efficient, effective asset management as the district adds new facilities and expands or renovates existing schools. The plan should also address workforce recruitment, talent development, and employee retention, and consider factors such as appropriate

maintenance staffing levels, departmental growth and the demographics of the workforce with respect to retirement eligibility.

As a best practice, the audit team recommends the creation of a matrix to document training requirements based on job function, compliance requirements, certification and licensure needs, and facilities program processes. The matrix can then be used to demonstrate the link between department requirements and district goals and to help justify budgets for training and development. Figure 2 is an example training matrix which identifies the types of training typically included in a comprehensive training program, as well as indications of how such training is generally delivered and who should receive it. Documentation of training completed by each employee should be centrally recorded and monitored by supervisors and managers.

Figure 2. Example Employee Training Matrix

| | Director of M&O | Maintenance Supervisor/Lead | HVAC Mechanic | Electrician | Plumber | Carpenter | Maintenance Generalist | Painter | Ground Crew Leader | Grounds Worker | Clerk | | Online | Video | Peer Delivered | Outside Provider |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Asbestos Awareness | ● | ● | ● | ● | ● | ● | ● | ● | | | | Regulatory | ● | | | |
| Bloodborne Pathogens Safety | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ● | ● | ● | |
| Combustible & Flammable Liquids | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | ● | ● | | |
| Confined-Space Entry | ● | ● | ● | ● | ● | | ● | | | | | | ● | ● | | |
| Hazard Communications | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ● | | ● | |
| HAZ-MAT Spill Prevention & Control | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | ● | | | |
| Lock-out/Tag-out | ● | ● | ● | ● | ● | | ● | | | | | | ● | | ● | |
| Materials Handling, Storage & Use | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ● | | | |
| Alcohol-Free Workplace | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | General Training | ● | | | |
| Back Injury Prevention | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | ● | | ● | |
| Building Evacuation & Emergencies | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | ● | |
| Emergency Response | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | ● | |
| CPR Academic | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | ● | | ● | ● |
| Disaster Preparedness | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ● | | ● | |
| Electrical Safety | ● | ● | ● | ● | ● | ● | ● | | | | | | ● | ● | ● | |
| Eye Safety | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | ● | ● | ● | |
| Fall Protection | ● | ● | ● | ● | ● | ● | ● | ● | | | | | ● | ● | | |
| Fire Extinguisher Safety | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ● | ● | ● | |
| Fire Prevention Safety | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ● | ● | | |
| General Construction Safety | ● | ● | ● | ● | ● | ● | ● | ● | | | | | ● | ● | | |
| General First Aid | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ● | | ● | |
| Golf Cart | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | ● | ● | |
| Fortklift | | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | ● | ● | |
| Bucket Truck | | ● | ● | ● | ● | ● | | | | | | | | ● | ● | |
| Job-Specific Equipment | | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | ● | ● | |
| Hand & Power Tool Safety | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | ● | ● | ● | |
| Hearing Conservation | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | ● | ● | | |
| Ladder & Scaffolding Safety | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ● | ● | | |
| Office Safety | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ● | ● | ● | |
| Cultural Differences | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | ● | ● |
| Personal Protective Equipment | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | ● | ● | | |
| Sexual Harassment | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | | ● |
| Slips, Trips, & Falls Prevention | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ● | ● | | |
| H.S. Diploma/GED | ● | ● | ● | ● | ● | | | | ● | | ● | Certification/Licenses | | | | ● |
| College Degree | ● | | | | | | | | | | | | | | | ● |
| Technical Degree | | ● | ● | ● | ● | | | | | | | | | | | ● |
| Electrical - Master/Journeyman | | | | ● | | | | | | | | | | | | ● |
| Plumbing - Master/Journeyman | | | | | ● | | | | | | | | | | | ● |
| HVAC Certificate | | | ● | | | | | | | | | | | | | ● |
| On-the-Job | | | | | | ● | | ● | | ● | | | | | | ● |
| Department Procedures | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | General Personnel Practices | | | ● | |
| Work Practeices - Time Management/Orga | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ● | | | ● |
| Supervision | ● | ● | | | | | | | ● | | | | | | | ● |
| Employee Relations - Conseling, Performa | ● | ● | | | | | | | ● | | | | | | | ● |
| Work Order System | ● | ● | ● | ● | ● | ● | | | ● | | ● | | ● | | ● | ● |

Source: Developed by Facility Engineering Associates.

**Management Response:** Staff agrees with this recommendation. The Interim Chief Operations Officer has begun the preliminary stages of developing a comprehensive facilities management plan that includes measureable goals. We expect to complete the plan by June 30, 2018.

***Finding: There are no established metrics or methods used to monitor performance in the Facilities Management and Building Operations Department.***

Senior managers stated that they have begun benchmarking Facilities Department performance using resources such as "Benchmark for Excellence" and "Council of Great City Schools," but this was their first year doing so and thus did not have results to share. Benchmarks are helpful in understanding comparisons; however, to achieve long term value they must be tracked, monitored, and interpreted within the context of district operations to obtain useful information for ongoing improvement.

**Recommendation 2: Implement a performance management framework.**

Metrics provide essential links between strategy, execution, and ultimate value creation. Educational organizations at the forefront of their communities have developed best practices by using various approaches, such as a balanced scorecard, to develop and track key performance indicators (KPIs). Any approach used should integrate financial and non-financial performance measures to show a clear linkage between an institution's goals and strategies. KPIs should focus on those services that have the most prominent place in FBISD's strategic plans. The right mix of KPIs should consider all three aspects of facilities performance:

- Inputs: Indicators that measure the financial, staffing, portfolio condition, and operating impacts from limited budgets/resources, churn and construction and renovation activities.
- Process: Indicators that measure how efficiently the department is performing its key process.
- Outcomes: Indicators that provide a measure of how successfully the facilities function is performing at the enterprise level.

Figure 3 provides examples of KPIs tracked in the K-12 education sector.

Figure 3. K-12 Example School Key Performance Indicators

Input Measures:

- FCI of building inventory (% DM/CRV)
- Maintenance staffing levels (# of FTEs)
- Operations funding ($/GSF)
- Baseline energy utilization index (EUI) /school
- Capital project funding ($)

Process Measures:

- Work orders by type

- Top 10 work order problem codes
- Staff utilization (productivity) rates
- PM completion rate (%)
- Proactive maintenance (PrM) WOs generated
- PM / CM mix (%)
- Re-work percentage (%)
- School safety inspection findings
- Work order turn-around time (days)
- Annual building inspections completed (%)

Outcomes:

- Custodial inspection scores (#)
- Change in FCI (%)
- Trend in EUI per school
- Customer Satisfaction (%)
- Budget Performance (%)

Source: Developed by Facility Engineering Associates.

The Executive Director of Facilities and School Services should select KPIs and metrics that are reasonable and useful for monitoring performance and establish a framework for organizing the performance metrics and communicating results on a clear and consistent basis.

**Management Response:** Staff agrees with this recommendation. As addressed in the 2016-17 FBISD Strategic Plan, staff is planning to identify Key Performance Indicators for each operational area by August 2017. Once identified, the KPIs will be incorporated into the comprehensive facilities management plan, district scorecards, and performance management dashboards by June 30, 2018.

***Finding: The facilities management training program is not adequate to meet long-term needs.***

The Facilities and Building Operations Department does not have a documented program to guide training and development of the overall facilities workforce. Senior management recognizes that certain employees are required to attend training to maintain licenses or certifications as part of their job responsibilities, and those requirements are supported. However, for the general workforce there is no documentation to show training requirements for each position nor is there a history of training completed by each employee. The online program *SafeSchools* was cited as one place where training is documented, but this resource is only targeted at safety-related training and does not provide courses or track completion of training in technical subjects, job-specific tasks, or FBISD-prescribed topics. Even within the focused area of safety, the review of *SafeSchools* Training Course Completions data provided showed only 43 of 564 employees as having completed a course of any type. Of the courses recorded as having been completed, the majority were Asbestos Awareness (completed by 34 employees) and Termination: Practice and Procedure (completed by 12 employees), with six other courses having been

completed by one person. These extremely low completion numbers support statements by senior management that there are opportunities for improvement in employee training and development.

**Recommendation 3: Implement a more robust facilities management training program.**

FBISD should expand its training program to ensure that all facilities maintenance and operations employees have the requisite skills to perform their jobs efficiently and effectively. Figure 2 presents a sample training matrix that could be used as a guide in improving the training program.

**Management Response:** Staff agrees with this recommendation. Development of the facilities management training program will be addressed along with the comprehensive facilities management plan scheduled for completion by June 30, 2018.

***Finding: There are no records or oversight regarding employees receiving training on the handling of hazardous materials.***

The district could not produce documentation to show compliance with Board Policy DI (Legal), Employee Welfare, with respect to the Hazard Communication Act. This policy requires, among other things, that the district provide an education and training program for employees using or handling hazardous chemicals and that it maintain the written hazard communication program and a record of each training session to employees, including the date, a roster of the employees who attend, the subjects covered in the training session, and the names of the instructors. In an interview with the Safety Engineer Specialist, it was noted that the district does not keep central records for this mandatory training. It was further clarified that identifying the employees who might need hazard communication training, ensuring the training is held, and maintaining the required records is the responsibility of line supervisors. There is no oversight or periodic check to verify that supervisors dispersed across the organization are in compliance with these duties. The Safety Engineer Specialist stated that the online training program *SafeSchools* could possibly contain records of this mandatory training, but documents from *SafeSchools* later provided to the audit team did not show any employees as having completed hazard communication training.

**Recommendation 4: Ensure compliance with Board Policy DI (Legal) for the Hazard Communication Act.**

The Executive Director of Facilities and School Services should ensure the Facilities Department is in compliance with all requirements of Board Policy DI (Legal), Employee Welfare, for employees who handle hazardous chemicals, including maintaining a written hazard communication program, providing an education and training program for employees using or handling hazardous chemicals, and keeping a record of each training session. In addition, a methodology to maintain oversight on a routine basis should be established.

**Management Response:** Staff agrees with this recommendation. A plan to ensure compliance with Board Policy DI (Legal) will be developed and implemented by June 30, 2017.

***Finding: The Facilities and Building Operations Department does not have standard operating procedures.***

At the time of the audit there were no documented procedures that had been fully implemented. Several Facilities Department managers stated that they are working to develop Facility Standard Operating Procedures (SOPs) to provide clarity and consistency in maintenance and operations across the organization. They stated the custodial SOP is in draft form and others are under consideration. An additional document provided to the audit team shows a "DRAFT" Facilities Work Process Map, but it only covers the work order process.

The Executive Director stated that he identifies changes that need to be made to any ongoing practices, he communicates those changes by preparing a memo to describe the change and distributes it electronically to facilities managers. There is no repository of these process change memos other than attachments in saved emails.

**Recommendation 5: Develop and implement Standard Operating Procedures.**

Procedural documents that provide standards of practice help organizations maintain consistency of service and memorialize best practices as they are discovered. The Executive Director of Facilities and School Services should develop a list of desired SOPs, set milestones for completion, assign responsibility for drafting each document, and monitor progress through regular management oversight. In addition, training should be provided for employees who are expected to conform to the SOPs and feedback should be gathered for recommended improvements as practices are put into place. As management directs changes to on-going procedures, SOPs should be updated and additional training should be provided as needed.

**Management Response:** Staff agrees with this recommendation. Standard operating procedures and related training will be developed for implementation by December 31, 2018.

# Section 3 – Maintenance Operations

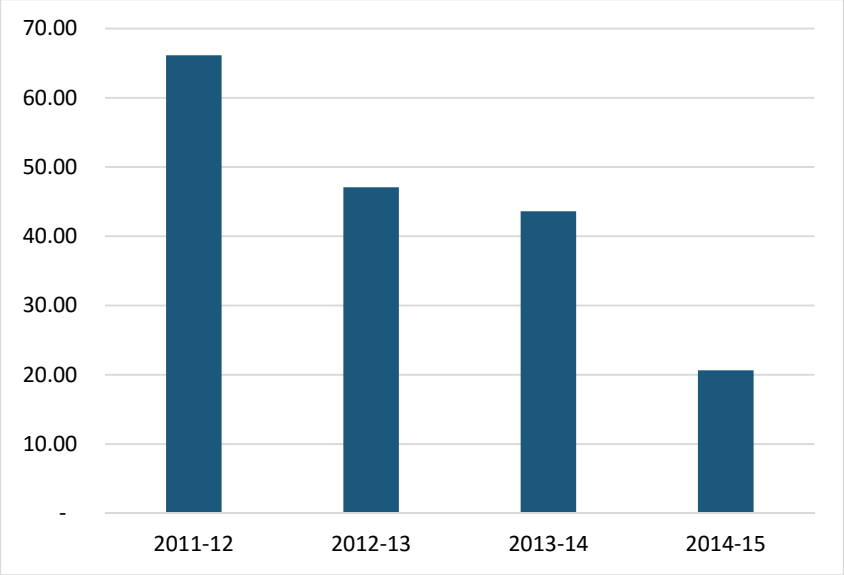
This section presents audit findings and recommendations related to the FBISD maintenance function. Maintenance includes all of the maintenance trades, such as plumbing, electrical and carpentry, as well as the work order management system activities used to manage and execute the maintenance transactions in the district.

Prior to the district's April 2016 reorganization of the maintenance function (see April 2016 organizational chart in Section 2 – Background), individual trades were split into geographic zones, limiting the ability to effectively plan and manage maintenance resources. In April the district changed this approach to centralize the maintenance functions and eliminated the zone management approach. The audit team endorses these changes and believes this will help improve the efficiency, effectiveness, and performance accountability for this area.

FBISD uses *SchoolDude* software for its maintenance work order management system, also referred to as a Computerized Maintenance Management System (CMMS). This software product is common among Texas school systems and provides a rich assortment of modules that support facilities management activities.

The audit team downloaded the *SchoolDude* data set and performed a series of analyses. One analysis showed that the average number of days to close a work order declined from the 2011-12 school year to the 2014-15 school year. This is an example of a maintenance performance indicator – and improved performance – that the district can measure and monitor frequently (see related Recommendation 2 in Section 2 – Organization and Management). Figure 4 shows the result of a deliberate district effort to be more responsive with respect to completing maintenance work orders. Average closing time improved from 68 days to 21 days since 2011-12.

Figure 4. Average Number of Days to Close Work Orders by School Year




Source: FBISD *SchoolDude* data extract

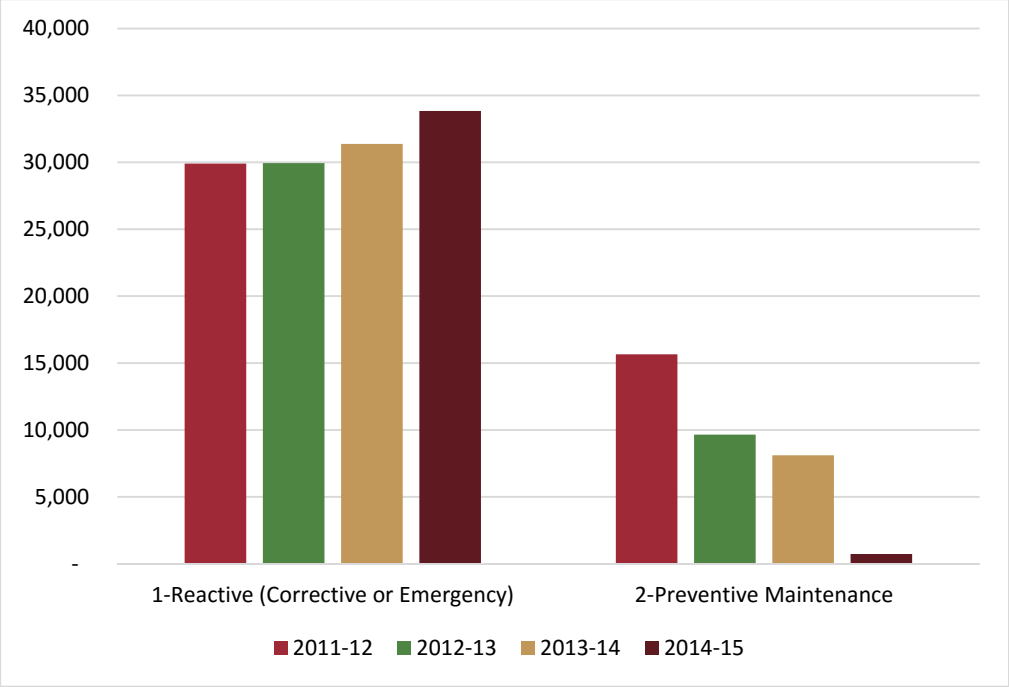
The data analysis resulted in other audit findings that are discussed further below.

## *Audit Findings and Recommendations*

***Finding: Preventive Maintenance work orders are not automatically being scheduled in the district's work order system.***

Maintenance and repair work in FBISD is mostly reactive in response to customer work requests. Nearly all preventive maintenance (PM) events in *SchoolDude* are shown in a "Discontinued" status. PM work orders in the 2011-12 school year represented 28 percent of total work orders recorded in *SchoolDude* and have dropped every year since then. An analysis of FBISD data from the *Maintenance Essentials Pro* module of *SchoolDude* shows that the number of work orders identified as "Preventive Maintenance" rapidly declined from the 2011-12 school year to the 2014-15 school year, the last year for which there is a full year's data. At the same time, the number categorized as "Corrective or Emergency" grew during this same time period. Figure 5 graphically depicts these data.

Figure 5. Number of Reactive and PM Work Orders Completed by School Year




Source: FBISD *SchoolDude* data extract

If preventive maintenance is not performed, essential equipment is more likely to fail unexpectedly and the cost of repairs can increase.

An important element that feeds into an effective PM program is an inventory of maintainable assets. It was noted that the department has the items needed to perform asset inventories and bar code all maintainable assets, but they lack the in-house resources or contract funding to actually carry out the field work to verify the description and location of all equipment and properly mark it. Without thorough knowledge of all items that require preventive maintenance, it is difficult to develop a full inventory of PM activities s or to predict the level of staffing needed to complete all PM tasks.

**Recommendation 6: Enhance the Preventive Maintenance program.**

The ability to receive, prioritize, plan, and execute work in an organized manner is essential for properly sizing and managing a maintenance workforce, meeting customer expectations in an efficient manner, and ensuring that all preventive maintenance tasks are completed. The Facilities Department should perform an inventory of maintainable assets, develop PM job plans, and integrate the scheduling of preventive maintenance work with work requested by customers. The district should ensure that PM work is properly recorded in *SchoolDude* and monitor the Preventive-to-Corrective Maintenance ratio and service call workload to ensure the increased level of PM is having the desired effect of reducing breakdown maintenance. Annual targets for the ratio of PM to total maintenance should be established by the district and monitored annually.

**Management Response:** Staff agrees with this recommendation. As addressed in the 2016-17 FBISD Strategic Plan, staff was originally working to develop a preventive maintenance program by December 2016. However, staff turnover in key leadership jobs has caused the deadline to be extended to June 30, 2017. Once the preventive maintenance program has been designed, staff will work to use *SchoolDude* in the most effective way to efficiently manage the program. Staff is currently working to identify the reasons work orders designated as Preventive Maintenance have declined significantly since 2011-12 and will take immediate action to correct coding errors or other reasons identified for the decline.

***Finding: The transition to an in-house HVAC maintenance program at FBISD has not been well planned or executed.***

Services provided by the Heating, Ventilation and Air Conditioning (HVAC) maintenance shop have transitioned over the past three years from a single, long-term outsourced HVAC maintenance contract to a collection of three different HVAC contracts, then finally to a primarily in-house workforce. At the time of the audit, one of the three transition contracts was still in place. The contract provides three HVAC technicians that perform similar duties as district employees in terms of where they report and how their work is assigned. There is no plan for phasing out the remaining contract. The HVAC Manager stated that he believes six more district employees are needed (three to replace contractor employees plus three additional positions), but there has been no detailed workload and staffing analysis to determine the ideal staff size for HVAC support. As the district works to improve its overall PM program and complete its inventory of maintainable assets (including HVAC equipment), particular emphasis should be placed on matching the size and mix of the HVAC workforce to accomplish all preventive and corrective maintenance functions. Data available from the CMMS such as HVAC PM completion percentage and average number of days to close an HVAC work order can be used to verify whether staffing adjustments are producing the desired effects.

Over the past several years, HVAC performance has been a significant issue at several schools. During the audit, several schools were visited and school administrators at some schools cited improvement; others, however, stated that problems remain. The FBISD bond program is also addressing HVAC issues over the next several years.

The lack of an inventory of maintainable assets has been particularly problematic for HVAC maintenance. No records were obtained from outsourced vendors to support the transition to an in-house operation. This may explain the significant drop in PM work orders over the past three years.

**Recommendation 7: Develop staffing plan for HVAC maintenance.**

Given the significant shifts in service delivery models for the HVAC maintenance function, and its importance in providing a comfortable learning and working atmosphere, the district should fully execute the transition to an in-house workforce by converting the final three positions to in-house staff, and use the inventory of maintainable assets to support ongoing workforce needs in the HVAC area. In the future, as the district enhances its overall PM program and the repairs resulting from the bond program are

completed, management should continue to monitor HVAC performance data and optimize the in-house staffing and contractor mix in order to deliver effective and efficient HVAC maintenance.

**Management Response:** Staff agrees with this recommendation. The Interim Chief Operations Officer is currently reviewing the HVAC Maintenance Plan adopted in 2012 to gain an understanding of the various aspects of the plan. He will then make recommendations to the Superintendent regarding changes to the plan that would improve the district's ability to more effectively and efficiently maintain the district's significant investment in HVAC equipment. Any recommendation changes will be reported to the Board and, where necessary, presented for Board consideration by June 30, 2017.

***Finding: The procurement process for parts ordering is inefficient.***

The procurement process for parts ordering is a paper-driven process using a four-copy form that is manually routed through multiple layers of approval before parts are ordered. The Executive Director for Facilities and Building Operations reviews every purchase order for the Facilities Department. This level of oversight appears to be excessive, especially for small, low dollar value or routinely ordered items.

There were also complaints from maintenance employees about the cumbersome paper trail and the length of time it takes to get parts and materials, and how the receipt of parts and materials in the warehouse is communicated to those awaiting the items.

Facilities Department leaders recently completed an inventory of maintenance parts and materials including commonly used parts that are kept on trucks and in shop spaces. Inventory records are maintained on a spreadsheet as opposed to a secured software system. A tour of the parts warehouse showed that, in general, items on the shelf were neatly stored and labelled, and most bore tags that would indicate they had been recently inventoried.

Tools storage areas in the warehouse were recently reconfigured to allow for better accountability. Tools are stored in bays by type of work in which they are normally used (see Photograph 1), and the warehouse tool custodian is the single key holder for all bays.

Photograph 1. Warehouse Tool Storage Bay


**Recommendation 8: Re-engineer the maintenance parts purchase process.**

Reviewing and altering processes, such as the routing chain and the level of authority needed to approve items based on dollar value, can reduce parts delivery time, increase work throughput, and reduce workforce frustration with the purchasing process. As an element of the process re-engineering, the audit team recommends the district move away from inventory spreadsheets and incorporate existing technologies such as the inventory module in *SchoolDude* or other districtwide inventory systems to manage its parts. *SchoolDude* also has a "Click to Purchase" interface with a supplies vendor that is under consideration by the Facilities Department, which may allow for automation of some procurement steps and easier access to data about materials needed for work orders.

Management should set achievable goals for parts procurement approval and delivery and monitor performance. Publishing goals for the procurement of parts and materials sets expectations for both customers and implementers of the process. Tables 5 and 6 provide examples of matrices that can be adjusted to meet the district's procurement guidelines.

Table 5. Example Procurement Approver Authorities

| Procurement Category | Final Approver |
|---|---|
| - Items greater than $25,000<br>- Sole-source purchases greater than $10,000 | Executive Director of Facilities and Building Operations |
| - Items $10,000 to $25,000<br>- Sole-source purchases from $2,500-$10,000 | Director Level |
| - Items $1,000 to $10,000<br>- Sole-source purchases up to $2,500 | Manager Level |
| - Items up to $1,000 | Supervisor Level |

Source: Gibson Consulting Group, Inc.

Table 6. Example Maintenance Parts Procurement Standards

| Procurement Urgency (Tied to Work Order Priority) | Target for Approval to Order | Target for Receipt of Item |
|---|---|---|
| Emergency | 1 hour | 4 hours |
| High | 12 hours | 2 days |
| Medium | 3 days | 7 days |
| Low | 7 days | 30 days |

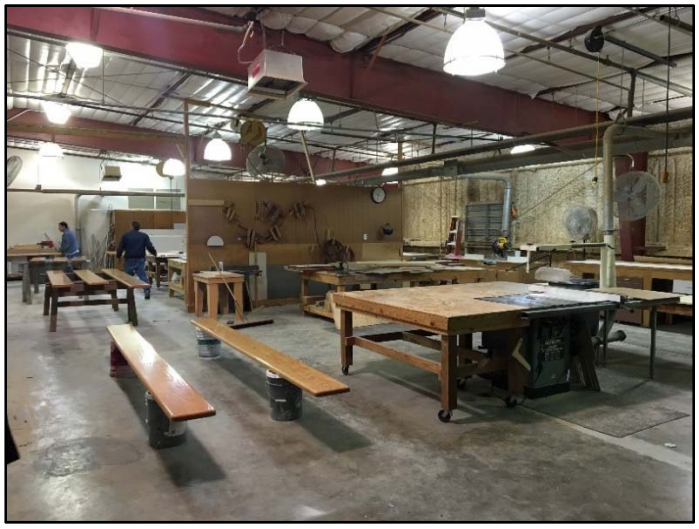
Source: Gibson Consulting Group, Inc.

**Management Response:** Staff agrees with this recommendation. Department leaders will develop revised inventory procurement and management processes in conjunction with development of the comprehensive facilities management plan by June 30, 2018. Recommendations will also include ways to best automate inventory procurement and management.

***Finding: Instances of improper storage of hazardous material was revealed at the FBISD Facilities Complex.***

A tour of the carpenter shop and automotive repair shop located at the Police & Facilities Complex in Stafford revealed a number of safety and hazardous material storage risks. The carpenter shop was neat and in good order (Photograph 2), except for materials blocking access to the electrical panels (Photograph 3).

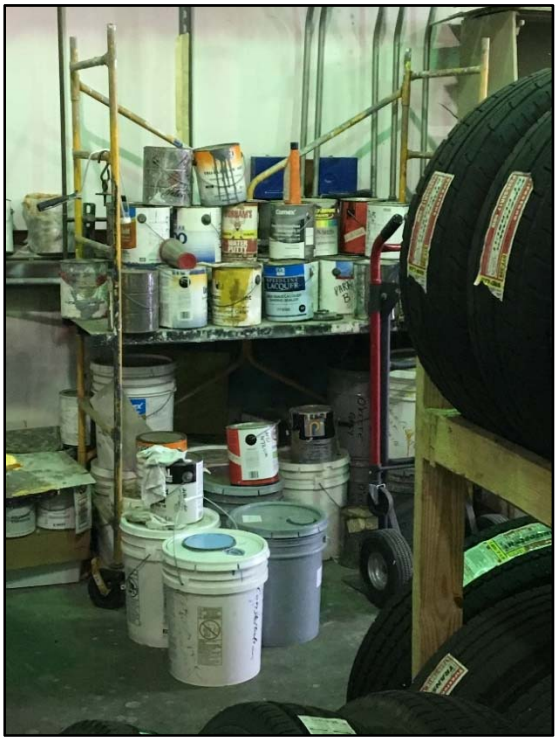
Photograph 2. Carpenter Shop Work Area



Photograph 3. Carpenter Shop Electrical Panels

General housekeeping in the automotive shop was substandard, with cans of paint stacked throughout several bays (Photographs 4 and 5); a light switch in a paint storage room lacked a cover (Photograph 6); a five-gallon can labeled as flammable liquid was stored in the open (Photograph 7); and a flammable storage cabinet was found with the doors open and general materials and tools taking up most of the space (Photograph 8). While the purpose of the tour was not to conduct a thorough safety audit, the observation of so many potential hazards in one location seemed to reflect either a lack of knowledge of basic safety standards or a lack of enforcement.

Photograph 4. Automotive Shop



Photograph 5. Automotive Shop

Photograph 6. Missing Switch Plate in Automotive Shop

Photograph 7. Container Labelled as Flammable Liquid in Open Area

Photograph 8. Open Flammable Storage Locker

**Recommendation 9: Conduct a safety inspection of Facilities shops and correct identified hazards.**

The district should conduct a safety inspection to assess industrial workplace hazards and address all items noted by the inspection report. Management should also develop procedures to ensure safety on an ongoing basis.

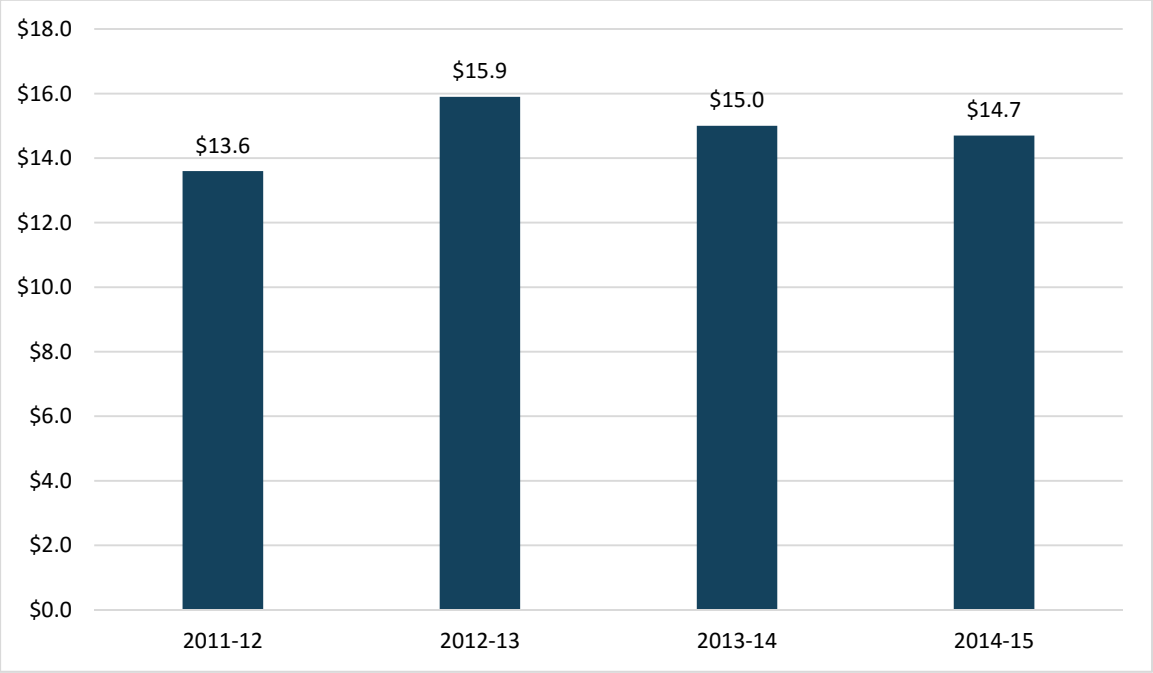
**Management Response:** Staff agrees with this recommendation. A safety inspection will be completed by March 31, 2017, and identified hazards will be corrected by June 30, 2017. Standard operating procedures (see above) will be developed to ensure the facilities shops remain a safe workplace.

# Section 4 – Energy Management

This section addresses energy utilization and management at FBISD. Energy Management is addressed by the Energy Manager who is supported by two staff assistants. The Energy Manager reports to the Director of Building Operations and is responsible for managing and coordinating energy conservation efforts including monitoring consumption, implementation of energy conservation measures, and providing training. The Energy Manager is the primary face of energy conservation, engaging with individual schools to manage energy use and conservation practices. The energy manager is also responsible for procuring the services of third party contractors if needed.

After staffing costs, utilities represent the single largest expenditure for school districts. FBISD utilities costs in 2014-15 were $14.7 million. Figure 6 presents a four-year history of facilities costs and usage. The district has shown reductions in absolute cost since 2012-13.

Figure 6. FBISD Utilities Expenditure History, 2011-12 to 2014-15 (in $ millions)




Source: FBISD PEIMS Expenditure Data, 2011-12 to 2014-15

## *Audit Findings and Recommendations*

***Finding**: **There is no written energy management plan or energy reduction goals that comply with board policy to reduce energy consumption.***

Board Policy CL (Legal) requires school districts to develop a long-range energy plan. Below is the section of this policy that states the requirements of these plans.

*The Board shall establish a long-range energy plan to reduce the District's annual electric consumption by five percent beginning with the 2008 state fiscal year and consume electricity in subsequent fiscal years in accordance with the District's energy plan. The plan must include:*

1. *Strategies for achieving energy efficiency, including facility design and construction, that:*
    a. *Result in net savings for the District; or*
    b. *Can be achieved without financial cost to the District; and*
2. *For each strategy identified above, the initial, short-term capital costs and lifetime costs and savings that may result from implementation of the strategy.*

*In determining whether a strategy may result in financial cost to the District, the Board shall consider the total net costs and savings that may occur over the seven-year period following implementation of the strategy.*

*The Board may submit the plan to the State Energy Conservation Office for the purposes of determining whether funds available through loan programs administered by the office or tax incentives administered by the state or federal government are available to the District. The Board may not disallow any proper allocation of incentives.*[2]

At the time of the audit team's on-site visit, there was no written energy management plan or energy reduction goals that would demonstrate that the District has complied or was working to comply with the Board Policy CL to reduce electricity consumption by 5 percent per year beginning with the 2008 state fiscal year. Managers in the Facilities Department described several specific conservation measures that are either in process or are proposed, but these actions are not elements of an approved energy plan. According to a three-page summary provided by the district entitled "Energy Saving Projects", energy conservation initiatives have resulted in an estimated $39,502 in annual savings. Additionally, the district has received $445,000 from CenterPoint Energy in energy conservation project rebates and $13,900 for demand response program participation. Two controls related projects currently in progress are estimated to provide additional annual savings of $432,000. Table 7 summarizes the projects and programs.

[2] FBISD Board Policy CL (Legal)

Table 7. Energy Conservation Projects and Programs

| Project/Program | Estimated Savings | |
|---|---|---|
| In progress | | |
| Interfacing School Dude and Automated Logic BAS to control scheduling (savings is estimated for program once fully implemented) | $185,000 | per year, estimated |
| Implementing optimal start features for HVAC systems | $247,000 | per year, estimated |
| Completed | | |
| Retro-commissioning at four schools over the last 3 years | $22,772 | per year, estimated |
| Converted parking lights and high bay lights to LED fixtures at 22 locations | $16,730 | per year, estimated |
| Other Programs | | |
| Participation in ERCOT's demand response program | $13,900 | first year payment, estimated |
| Rebates from CenterPoint Energy's SCORE program | $445,000 | received to date |

Source: FBISD Conservation Projects reported by FBISD staff

FBISD staff stated that the district participates in CenterPoint Energy's Schools Conserving Resources (SCORE) program, and through that program has receive $445,000 in rebates on energy conservation upgrades. Utility-sponsored retro-commissioning has resulted in a reported $16,055 in savings.

Subsequent to the audit interviews, the District provided two documents related to energy reduction:

- *Fort Bend ISD Energy Plan (draft)*, which describes energy strategies and guidelines and "will serve as the District's long-range energy plan."
- *Fort Bend ISD Five year Energy Goals*, which state goals for reductions in electricity, water, and natural gas and provide a list of specific actions to be taken in each utility area. We note that the reduction goal for electricity is stated as, "Reduce electrical use 2.5 percent per year for the next five years based on kwh/gross square foot."

Neither of these documents is dated nor reflects approval by District leadership.

**Recommendation 10. Develop an approved energy plan, set reduction goals and monitor performance.**

The district should follow through with initial efforts to write an energy management plan that complies with Board policy. Once plans and goals are approved, management should establish a monitoring program to track performance and make adjustments as needed. Through specific monitoring, the district can additionally focus its efforts on the highest consumers of energy. The district can also continue to leverage retro-commissioning and rebate opportunities available through CenterPoint Energy.

As part of the plan, the district should incorporate operations and maintenance best practices for better performance of systems. Care systems through regular maintenance not only can result in energy savings,

but can also extend the life of assets. Refer to Appendix C for example operations and maintenance best practices.

**Management Response:** Staff agrees with this recommendation. We have reviewed minutes from Board meetings in 2007 and 2011 to determine the Board twice approved resolutions establishing the district's energy plan. However, we have not been able to find a final version of any energy plans that complies with policy CL (Legal). At this time, the district is out of compliance with policy CL (Legal) because the Board has not approved an energy plan or related resolution since June 13, 2011. Staff will develop a compliant energy plan for Board consideration by March 31, 2017.

***Finding*: *Information in the district's ENERGY STAR Portfolio Manager*[3] *is not regularly updated, analyzed, or reported to the board.***

Measurement and monitoring of consumption is critical to the success of any energy management program. Based on the data reviewed, FBISD is doing well at gathering electricity consumption from its energy meters located throughout the district. Information is aggregated and transferred into the district's ENERGY STAR Portfolio Manager[4] account where facilities can be benchmarked based on peer comparisons. The ENERGY STAR data is current through September 30, 2015; data for school year 2011-12 and prior does not exist within Portfolio Manager.

Table 8 presents selected energy management metrics for FBISD over the past three years. Analysis of energy consumption and cost data shows district schools have made small overall gains in energy reduction over the last two years, with school facilities showing a reduction in electricity consumption of 3.6 percent, a reduction in cost per square foot of 5.1 percent, and a reduction in cost per kWh of 1.6 percent - compared to performance in the 2012-13 school year.

Table 8. Electricity Metrics for School Facilities

| School Year | kWh/SF | $/SF | $/kWh |
|---|---|---|---|
| Electricity SY 2012-13 | 12.9 | $1.19 | $0.091 |
| Electricity SY 2013-14 | 12.4 | $1.11 | $0.088 |
| Electricity SY 2014-15 | 12.4 | $1.13 | $0.089 |
| Percent Change, SY 2012-13 vs. SY 2014-15 | -3.9% | -5.0% | -2.2% |

Source: ENERGY STAR Portfolio Manager

A review of ENERGY STAR Portfolio Manager benchmarking data shows over half of the schools perform below average in comparison to their peer group; on the opposite end of the spectrum seven schools are

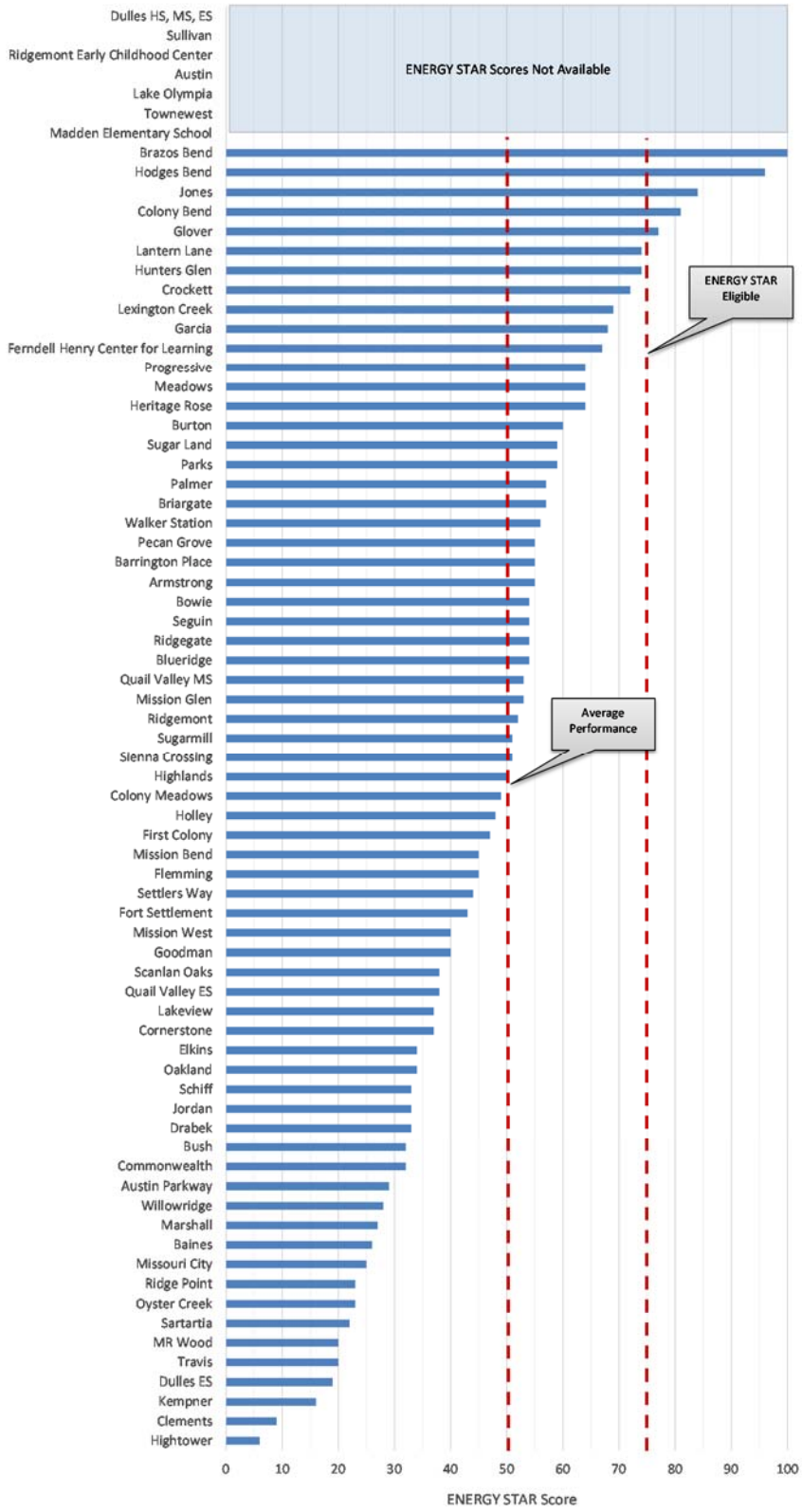
[3] ENERGY STAR Portfolio Manager is a free benchmarking tool developed by the Environmental Protection Agency. Utilizing energy consumption data, weather data, and facility use factors, the tool benchmarks facilities on a 100 point scale with a score of 100 being the highest, 1 the lowest, and 50 average.

[4] ENERGY STAR Portfolio Manager is a free benchmarking tool developed by the Environmental Protection Agency. Utilizing energy consumption data, weather data, and facility use factors, the tool benchmarks facilities on a 100 point scale with a score of 100 being the highest, 1 the lowest, and 50 average.

eligible to pursue ENERGY STAR certification[5]. No schools, according to the data base, have actually ever undergone validation to receive the ENERGY STAR. Figure 7 presents each school's score for ENERGY STAR eligibility.

[5] Based on data uploaded into Portfolio Manager through September 30, 2015.

Figure 7. ENERGY STAR Scores at Schools Facilities



**Recommendation 11. Update and maintain energy data in ENERGY STAR Portfolio Manager.**

Data in ENERGY STAR has been maintained through September 30, 2015. The Executive Director of Facilities and School Services should ensure that the database is updated and metrics are reported for each school on a regular (e.g., quarterly and annual) basis. This will assist the district in understanding energy performance in schools in terms that consider both consumption and operational requirements. Regular monitoring will also help the district identify energy consumption related problems more quickly.

**Management Response:** Staff agrees with this recommendation. Staff will ensure the ENERGY STAR database is updated by June 30, 2017, and we will provide an update to the Board at that time. Based on the current ENERGY STAR database, FBISD does have 19 sites that have earned ENERGY STAR Certification: Austin HS, Bush HS, Colony Bend ES, Dulles Complex, Elkins HS, Ferndell Henry, Heritage Rose ES, EA Jones ES, Kempner HS, Lantern Lane ES, Marshall HS, Mission Glen ES, Palmer ES, Ridgepoint HS, Travis HS, Willowridge HS, McAuliffe MS, and Hodges Bend MS.

# Section 5 – Custodial Services

Keeping schools clean is an important element of FBISD's facilities management function. Under Goal 3 in the district's strategic plan "FBISD will provide a supportive climate and a safe learning/working environment." Under Goal 5 "FBISD will be a collaborative, efficient and effective learning community." A priority under Goal 5 states that "Fort Bend ISD will demonstrate the development of scalable systems that support productive, reliable, and efficient district operations." The quality and efficiency of custodial services directly affect the accomplishment of both of these goals.

The FBISD custodial services function is responsible for cleaning 75 schools and other district facilities comprising more than 11.6 million square feet. District-wide there are 438 custodian positions, with 23 vacant positions at the time of the audit. In 2015-16, FBISD has budgeted approximately $16.4 million for custodial services, the vast majority of which is related to payroll and benefits.

Three FBISD board policies pertain to custodial services. Each of these policies is legally required of all Texas school districts.

- CLB (Legal) – states that "All school buildings and appurtenances to buildings shall be maintained in a sanitary manner, and all full-time building custodians and janitors shall know the fundamentals of safety and school sanitation."

- CKA (Legal) – states that "all custodial and maintenance employees are trained as required by law" under the Asbestos Hazard Emergency Response Act.

- DI (Legal) – references the Hazard Communication Act that requires training for employees using or handling hazardous chemicals. This policy also requires the completion and annual update of a chemical list for certain highly toxic or dangerous hazardous chemicals, the maintenance of manufacturers' safety data sheets for each hazardous chemical, and proper labeling and signage for chemicals. Some cleaning solutions used by custodians may meet the definition of a hazardous chemical.

In April 2016, the district reorganized its facilities management area, including the custodial function. Previously there was no facilities management leadership position dedicated specifically to custodial services. As of March 2016 this has been changed. The district now has a custodial operations director that oversees the custodial zone supervisors. Under the previous and new organization structure, lead custodians at each school report to a zone supervisor, and other custodians report to the lead custodian.

Overall, the custodial function at FBISD is well managed. During campus visits, several principals spoke very highly of their lead custodian and the quality of custodial services. The most recent district survey showed that 89 percent of campus staff agreed or strongly agreed with the statement "My school is kept clean."[6] Overall custodial staffing at the district level is efficient (more than 25,000 square feet per

[6] FBISD Campus Climate Surveys conducted by K-12 Insight, 2015

custodian) in comparison to industry standards, but the current school allocation formula is inequitable and should be changed. Most schools have efficient equipment to support cleaning, and custodians perform necessary cleaning duties even in the absence of documented cleaning frequencies in the "red book" procedures manual distributed to each school. Custodial services has not been compliant with hazardous materials training and sign postings, although this is reportedly being remedied since the issue surfaced during the audit. Other training is informal and school-based, and would benefit from a more structured approach. These and other findings and related recommendations are discussed in greater depth in the following section.

## Audit Findings and Recommendations

***Finding: The district's school custodian allocation formula is inequitable.***

Custodial standards published in the *Planning Guide for Maintaining Public School Facilities,* issued in sponsorship by the National Center for Education Statistics and National Cooperative Education Statistics System, establishes a standard that a school custodian (night shift) should be able to clean between 28,000 and 31,000 square feet per each 8-hour shift to keep school areas clean. The standard square footage allocation is best served by the night custodial staff because the majority of their work is performed during hours when students are not on campus. Since some custodians are also needed during the day shift, a weighted average standard of 23,000 square feet per custodian is applied for purposes of this audit.

FBISD uses a simple custodial staffing formula for its schools that is unrelated to the number of square feet cleaned. Table 9 presents the allocation approach for elementary, middle and high schools.

Table 9. FBISD School Custodian Allocations, 2015-16

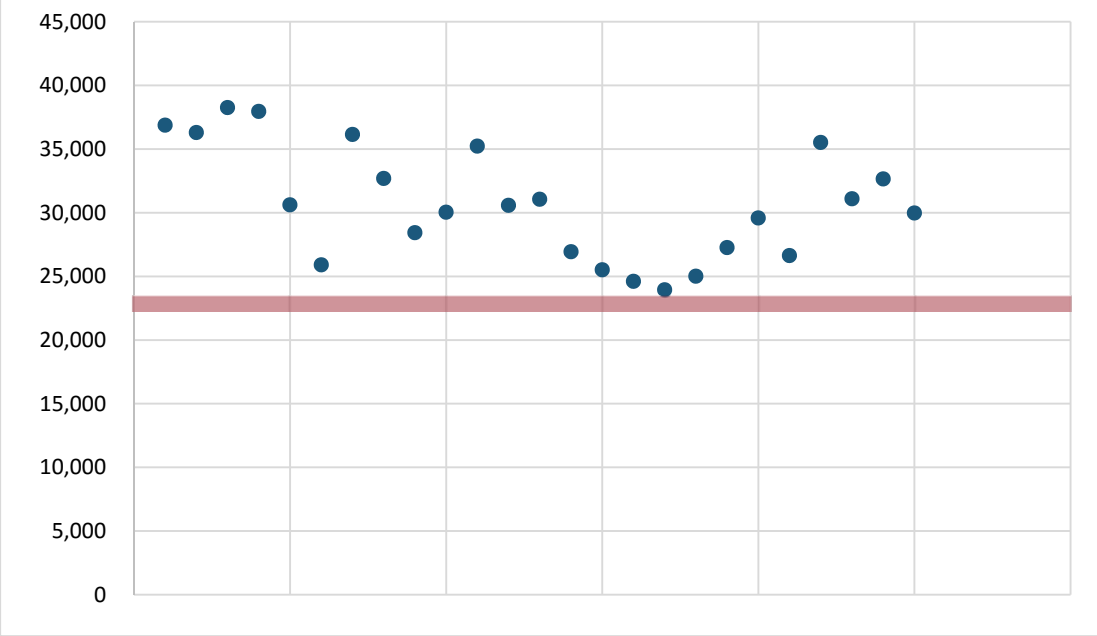
| | Lead Custodian | Assistant Lead Custodian | Custodian | Total |
|---|---|---|---|---|
| Elementary Schools | 1 | 1 | 2 | **4** |
| Middle Schools | 1 | 1 | 5 | **7** |
| High Schools | 1 | 1 | 10 | **12** |

Source: FBISD Description of Methodology for Allocating Custodians

This formula results in a district average allocation of approximately 25,000 square feet per custodian – which reflects efficient staffing levels overall. However, the size of schools are different and have accordingly different demands for cleaning. Most schools systems, commensurate with industry best practices, apply a custodial staffing formula that is based on the gross square feet of space in the schools and round to the nearest 0.5 full-time equivalent – allowing for part-time staff. Some school systems go further and have adjustments or weights applied based on the age and condition of facility, the physical layout of the campus, the degree to which portable space exists, and the type of flooring (e.g., carpet versus tile).

Figure 8 presents a scatter diagram depicting the range of gross square feet per custodian by secondary school (middle and high schools) for 2015-16. Each point on the graph represents a secondary school; the bar represents the industry standard. While every secondary school is above the efficient industry standard, the range of coverage varies by as much a 60 percent. This is the result of a fixed staffing formula for schools.

Figure 8. Gross Square Feet per Custodian by FBISD Secondary School, 2015-16

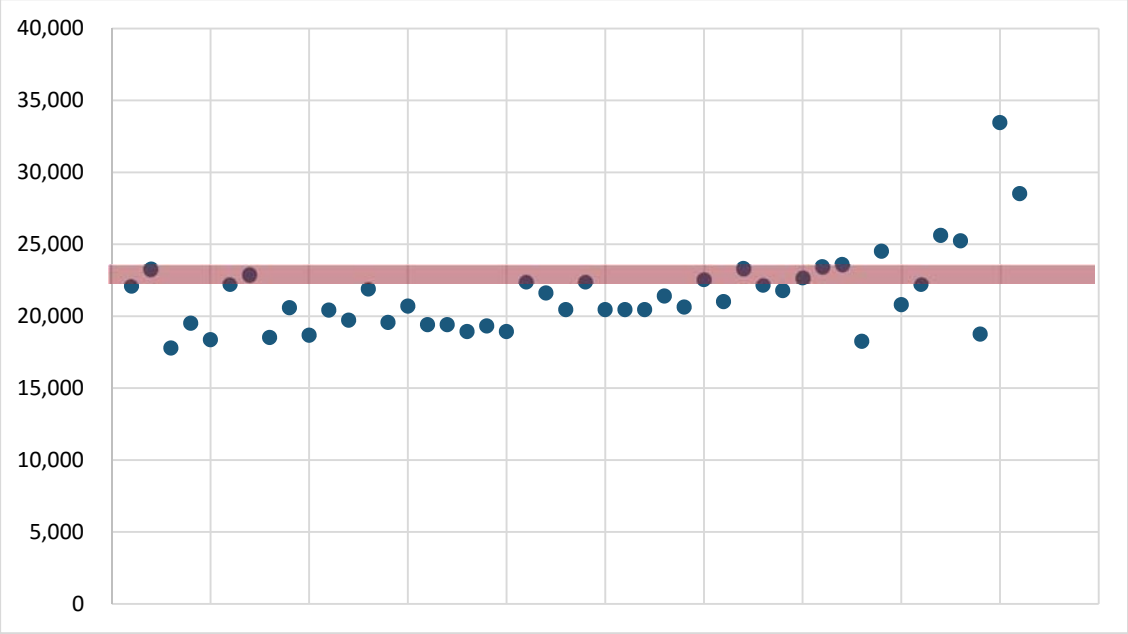



Source: Calculated based on data obtained from FBISD Custodial Assignment.xlsx and FBISD District Sq. Ft. List w acreage.pdf

Another factor affecting the range of high school productivity is that actual custodian counts reflect less than the formula allocation for 8 out of 11 high schools, and in one school the actual positions (9) are three less than the allocation for high schools (12). For middle schools, one school has one more custodian than the formula allocation (7) and one middle school has one less custodian.

Elementary school coverage also varies but to a lesser degree. Figure 9 presents a scatter diagram depicting the range of gross square feet per custodian by elementary school for 2015-16. The fixed staffing formula for most elementary schools results in staffing levels that are lower than the industry standards.

Figure 9. Gross Square Feet per Custodian by FBISD Elementary School, 2015-16




Source: Calculated based on data obtained from FBISD Custodial Assignment.xlsx and FBISD District Sq. Ft. List w acreage.pdf

Three elementary schools have five custodians, one more than what the allocation prescribes. No elementary schools have less than the four custodial positions.

Based on this analysis, the staffing approach is highly inequitable, placing inconsistent work demands on custodians depending on the school to which they are assigned. Most FBISD secondary schools are understaffed relative to their square footage and most elementary schools are overstaffed.

The custodial work schedules also affect the staff of FBISD's productivity, particularly at elementary schools. These are discussed in a separate audit finding below.

**Recommendation 12: Change custodial staffing formulas to reflect volume of work.**

The custodial staffing formulas should be changed to be driven by square footage, as square footage is a better indicator of work demand. The formula should establish overall productivity levels (as opposed to a fixed staffing level) for each school type, and incorporate part-time positions to more closely align actual staffing with the target. In the short-term, the district should reallocate existing staffing levels based on the following targets.

- High Schools: 28,000 square feet per custodian
- Middle Schools 27,000 square feet per custodian
- Elementary Schools 23,000 square feet per custodian

If the quality of service can be maintained, if not improved, through the redistribution of the custodial work force through the above formulas, the district may wish to consider adopting different formulas that

are closer to industry standards. This would require additional costs to be incurred. The audit team recommends that the district re-distribute the existing staff, implement the other audit recommendations contained in this report, and then determine if additional actions or changes are needed with respect to staffing formulas.

Other factors can be considered by the district in modifying the custodial staffing formula, including the layout of the schools (one or two large buildings versus many smaller buildings), the number of portables (which take longer to clean), and the age of the facility. These adjustments could result in higher or lower staffing levels than those suggested above for specific schools.

Table 10 represents the impact of the above formula change on FBISD secondary schools. The current formula amount represents the larger of (1) the formula allocation or (2) actual staff counts at the school. Based on the revision of staffing formulas, secondary schools will be allocated 12 additional custodian positions.

Table 10. Proposed Reallocation of Custodial Staff, Secondary Schools

| Campus | Current Formula | Proposed | Change |
|---|---|---|---|
| Dulles HS | 12.0 | 13.0 | 1.0 |
| Willowridge HS | 12.0 | 14.5 | 2.5 |
| Clements HS | 12.0 | 13.5 | 1.5 |
| Kempner HS | 12.0 | 12.0 | - |
| Elkins HS | 12.0 | 12.0 | - |
| Austin HS | 12.0 | 11.0 | (1.0) |
| Hightower HS | 12.0 | 13.0 | 1.0 |
| Bush HS | 12.0 | 13.0 | 1.0 |
| Marshall HS | 12.0 | 12.0 | - |
| Travis HS | 12.0 | 13.0 | 1.0 |
| Ridgepoint HS | 12.0 | 12.5 | 0.5 |
| Dulles MS | 7.0 | 8.0 | 1.0 |
| Missouri City MS | 7.0 | 8.0 | 1.0 |
| Sugar Land MS | 7.0 | 7.0 | - |
| Quail Valley MS | 7.0 | 6.5 | (0.5) |
| First Colony MS | 7.0 | 6.5 | (0.5) |
| McAuliffe MS | 7.0 | 6.0 | (1.0) |
| Hodges Bend MS | 7.0 | 6.5 | (0.5) |
| Lake Olympia MS | 7.0 | 7.0 | - |
| Garcia MS | 7.0 | 7.5 | 0.5 |
| Sartartia MS | 8.0 | 8.0 | - |
| Fort Settlement MS | 7.0 | 8.0 | 1.0 |
| Baines MS | 7.0 | 8.0 | 1.0 |

| Campus | Current Formula | Proposed | Change |
|---|---|---|---|
| Crockett MS | 7.0 | 8.5 | 1.5 |
| James Bowie MS | 7.0 | 8.0 | 1.0 |
| **Totals** | **231.0** | **243.0** | **12.0** |

Sources: FBISD Description of Methodology for Allocating Custodians; FBISD Custodial Assignment.xlsx; Gibson Consulting Group, Inc.

Table 11 shows the impact of the redistribution on elementary schools. The current formula amount represents the larger of (1) the formula allocation or (2) actual staff counts at the school. Based on the revision of staffing formulas, elementary schools will receive a net allocation of 11.5 fewer custodian positions. However, some of the larger elementary schools will receive additional positions.

Table 11. Proposed Reallocation of Custodial Staff, Elementary Schools

| Campus | Current Formula | Proposed | Change |
|---|---|---|---|
| EA Jones ES | 4 | 4.0 | - |
| Lakeview ES | 4 | 4.0 | - |
| Blue Ridge ES | 4 | 3.0 | (1.0) |
| Ridgemont ES | 4 | 3.5 | (0.5) |
| Meadows ES | 4 | 3.0 | (1.0) |
| Quail Valley ES | 4 | 4.0 | - |
| Dulles ES | 4 | 4.0 | - |
| Briargate ES | 4 | 3.0 | (1.0) |
| Townewest ES | 4 | 3.0 | (1.0) |
| Lantern Lane ES | 4 | 3.0 | (1.0) |
| Ridgegate ES | 4 | 3.5 | (0.5) |
| Colony Bend ES | 4 | 3.5 | (0.5) |
| Mission Bend ES | 4 | 4.0 | - |
| Sugar Mill ES | 4 | 3.5 | (0.5) |
| Settlers Way ES | 4 | 3.5 | (0.5) |
| Palmer ES | 4 | 3.5 | (0.5) |
| Hunters Glen ES | 4 | 3.5 | (0.5) |
| Highlands ES | 4 | 3.5 | (0.5) |
| Mission Glen ES | 4 | 3.5 | (0.5) |
| Pecan Grove ES | 4 | 3.5 | (0.5) |
| Austin Parkway ES | 4 | 4.0 | - |
| Barrington Place ES | 4 | 4.0 | - |
| Colony Meadows ES | 4 | 3.5 | (0.5) |
| Mission West ES | 4 | 4.0 | - |
| Walker Station ES | 4 | 3.5 | (0.5) |

| Campus | Current Formula | Proposed | Change |
|---|---|---|---|
| Glover ES | 4 | 3.5 | (0.5) |
| Lexington Creek ES | 4 | 3.5 | (0.5) |
| Fleming ES | 4 | 3.5 | (0.5) |
| Burton ES | 4 | 3.5 | (0.5) |
| Commonwealth ES | 4 | 4.0 | - |
| Brazos Bend ES | 4 | 3.5 | (0.5) |
| Sienna Crossing ES | 4 | 4.0 | - |
| Oyster Creek ES | 4 | 4.0 | - |
| Goodman ES | 4 | 4.0 | - |
| Drabek ES | 4 | 4.0 | - |
| Jordan ES | 4 | 4.0 | - |
| Scanlan Oaks ES | 4 | 4.0 | - |
| Mary Holley ES | 5 | 4.0 | (1.0) |
| Armstrong ES | 4 | 4.5 | 0.5 |
| Oakland ES | 5 | 4.5 | (0.5) |
| Rosa Parks ES | 4 | 4.0 | - |
| Cornerstone ES | 4 | 4.5 | 0.5 |
| Schiff ES | 4 | 4.5 | 0.5 |
| Seguin ES | 5 | 4.0 | (1.0) |
| Heritage Rose ES | 4 | 6.0 | 2.0 |
| Madden ES | 4 | 5.0 | 1.0 |
| **Total** | **187.0** | **175.5** | **(11.5)** |

Sources: FBISD Description of Methodology for Allocating Custodians; FBISD Custodial Assignment.xlsx; Gibson Consulting Group, Inc.

**Management Response:** Staff agrees with this finding. Based on concerns expressed by principals and concerns about the 2017-18 budgets, staff has been exploring ways to assign custodians in a more effective and efficient way. Although staff agrees that the use of part-time staff is an option to consider, we have found that it is often difficult to recruit and retain part-time custodians due to the pay structure and because they are not eligible for health benefits. Staff will consider ways to provide greater equity in this area and develop a plan for the 2017-18 school year by March 31, 2017; a long range plan will be developed in conjunction with the comprehensive facilities management plan by June 30, 2018.

***Finding: Current custodial work schedules result in excessive burdens on night shift staff.***

There are two competing demands in establishing a custodian schedule. School facilities cannot be effectively cleaned when there are students in the building, but school principals need daytime support from the custodial staff. Finding the right balance often creates a challenge in establishing custodian work schedules.

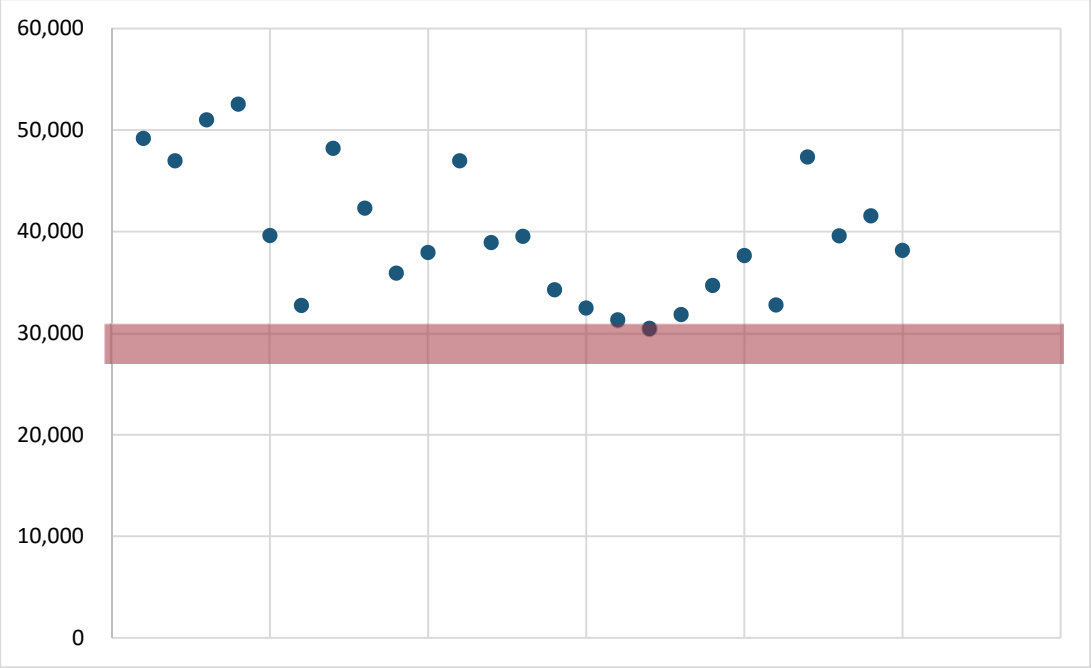
At FBISD the zone supervisors establish the custodial schedules after consultation with school principals. There is a mix of day shift, mid-day shift and night shift custodians. One or more day shift custodians work during the school day – to open up the building, perform spot cleaning, work the lunch periods, and perform other duties such as entering maintenance work orders, setting up furniture for events, and other activities. Generally, the elementary schools and middle schools have one day shift custodian and high schools have two day shift custodians.

Mid-day shift custodians arrive late morning before the lunch period and work for the remainder of the school day and additional time after school. They assist with lunch period cleaning, then clean other areas as they are vacated by the students. Elementary and middle schools generally have one mid-day custodian; high schools have two mid-day custodians. The remainder of the custodians work the night shift, arriving near the end of the school day. Actual work schedules may vary within school types.

Figure 10 presents the custodial night shift productivity (gross square feet per custodian) for FBISD secondary schools. To determine the actual night shift (after school) counts, all night shift positions and 50 percent of day shift positions were added together and compared to the gross square feet of space. Industry standards for night shift productivity are 28,000 to 31,000 square feet.[7] All schools are above the night shift standard (reflecting less staff relative to square feet of space). Since there are no secondary schools below the efficiency standard, and 75 percent of the custodians work after school, the primary issue with secondary schools is not scheduling but staffing levels.

[7] Planning Guide for Maintaining School Facilities, School Facilities Maintenance Task Force, National Forum on Education Statistics and the Association of School Business Officials International, February 2003

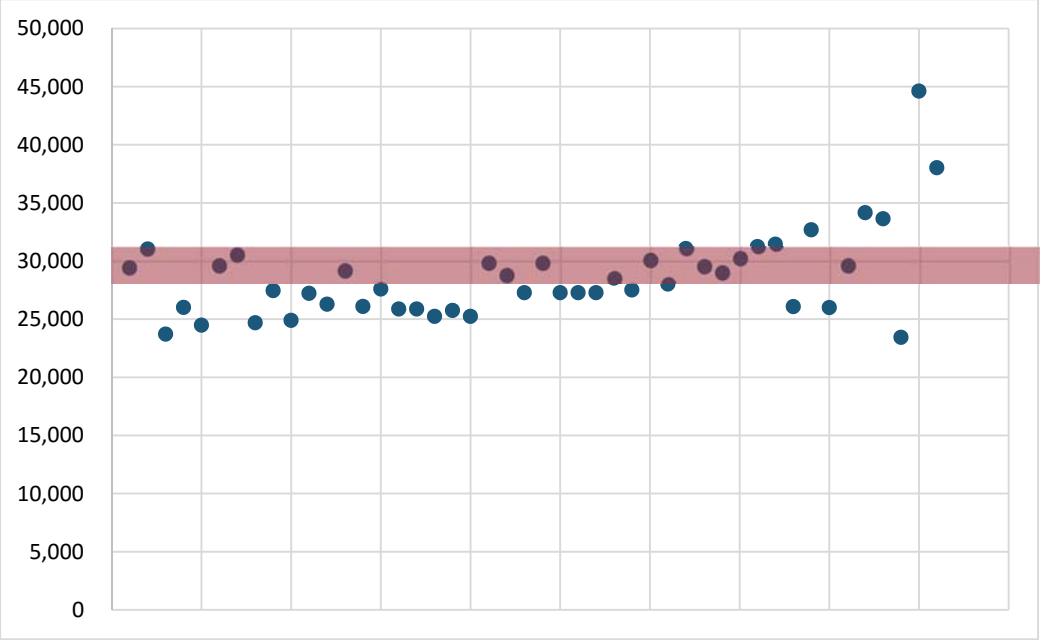
Figure 10. Gross Square Feet per Night Shift Custodian by FBISD Secondary School, 2015-16




Source: Calculated based on data obtained from FBISD Custodial Assignment.xlsx and FBISD District Sq. Ft. List w acreage.pdf

This is not the case with elementary schools however. Figure 11 presents the custodial night shift productivity at FBISD elementary schools compared to the night shift industry standard. Because elementary schools and related custodial staff counts are smaller, it is more challenging to meet the target productivity levels. However, the data suggests that moving more positions from the mid-day shift to night shift would improve night shift productivity at some schools.

Figure 11. Gross Square Feet per Night Shift Custodian by FBISD Elementary School, 2015-16




Source: Calculated based on data obtained from FBISD Custodial Assignment.xlsx and FBISD District Sq. Ft. List w acreage.pdf

The audit team obtained custodian payroll records from a sample of elementary schools to evaluate the variation in work schedules and determine the percentage of custodial time that occurs after school. Table 12 shows the standard work schedule for custodians and the aggregate percentage of custodial time that occurs after school hours.

Table 12. Custodian Work Schedules, Sample of Elementary Schools, December 2015

| School | Custodial Count | School Ends | Standard Schedule | % of Time After School |
|---|---|---|---|---|
| Blue Ridge ES | 1<br>1<br>2 | 3:10 | 6:30 – 3:30<br>10:30 – 7:00<br>11:30 – 8:00 | 44% |
| Jan Schiff ES | 1<br>2<br>1 | 3:00 | 6:30 – 3:30<br>10:30 – 7:30<br>1:30 – 10:00 | 51% |
| Heritage Rose ES | 1<br>2 | 3:00 | 6:30 – 3:30<br>12:30 – 9:00 | 52% |

Source: FBISD Custodial Timesheets, December 2015

Each elementary school has a custodian with a 6:30 to 3:30 day shift schedule. However, there is variation in the mid-day shift schedules and no school has custodial schedules that are exclusively night shift (after school hours).

The current scheduling approach for elementary schools results in too many scheduled work hours during the school day when students are there. While some support is needed during the day, most school facilities cannot be effectively cleaned when students are present.

**Recommendation 13: Standardize custodial work schedules to accomplish more cleaning time after school.**

The district should evaluate options to standardize the work schedules among school types. The following implementation strategies are recommended.

- Implement standard times for all custodians by school type (elementary, middle, high)
- At elementary schools, use part-time staff to support day shift needs so that more full-time staff can work after school

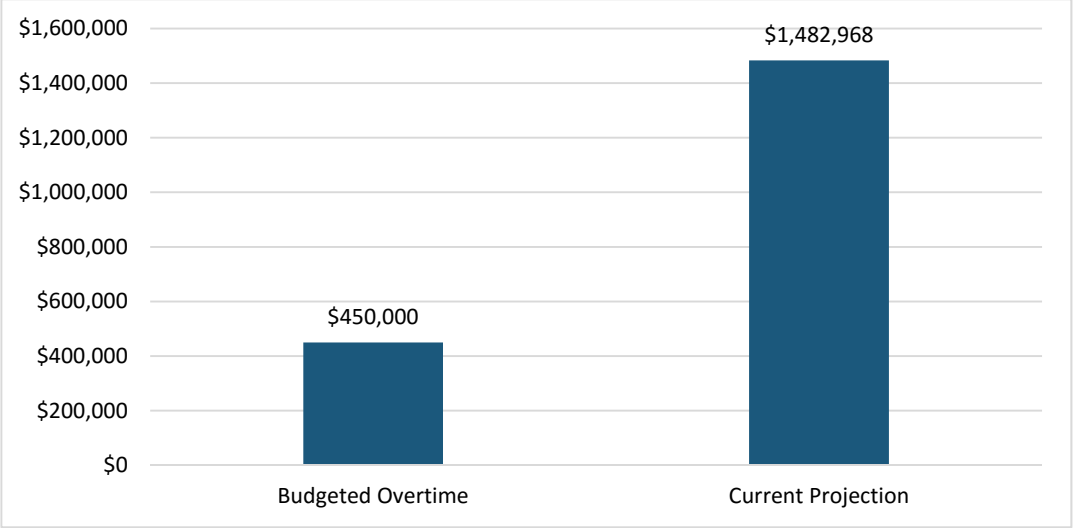
**Management Response:** Staff agrees with this recommendation. A plan to standardize custodial work schedules will be developed by June 30, 2017.

***Finding: No substitute pool exists for custodial staff.***

A custodial substitute pool is similar to a teacher substitute pool – if an employee is absent, or if a position becomes temporarily vacant, someone from the pool can fill in for that day, week, month, or in some cases such as extended leave, a longer period of time. FBISD does not have a custodial substitute pool. As a result, other school custodians must perform the duties of vacant positions or absent custodians – or – cleaning frequencies are sacrificed due to the smaller work force. At secondary schools, the burden is less significant since there are more custodians. However, for elementary schools, the burden is more significant since they have fewer positions. In some instances, overtime is incurred.

The lack of a custodian substitute pool is contributing to high overtime costs. Figure 12 presents extra duty pay budgeted for 2015-16, compared to the projected year-to-date amount. Projected overtime is more than three times the amount budgeted for the year.

Figure 12. Budgeted and Projected Year-to-Date Supplemental (Overtime) Pay for Custodians, 2015-16




Source: FBISD Custodial Budget – 2015-16.xls

This overage is expected to be offset by lower salaries than what was budgeted, due primarily to the number of allocated positions not filled.

**Recommendation 14: Implement a custodian substitute pool.**

The district should implement a custodian substitute pool of 20 custodians who can be used as needed for absentees and vacant positions. Elementary schools, because of lower staffing levels, should receive priority for substitutes, particularly if the lead custodian is absent. The implementation of this pool should result in lower overtime costs and more consistent service levels when vacancies are high.

**Management Response:** Staff agrees with this recommendation. Facilities leaders will work with the Human Resources Department to create a custodian substitute pool by August 31, 2017.

***Finding: Cleaning frequencies are not documented in custodial procedures.***

The district maintains a "red book" of procedures for how to conduct specific cleaning activities. The red book also contains job descriptions and other materials useful for the management of school custodial functions. Each school visited during this audit had the red book and the lead custodians were familiar with its contents. The red book, however, did not have cleaning frequencies, nor did it have summer deep cleaning procedures. Lead custodians reported that they trained staff at their schools on how frequently to clean certain areas, but there is no assurance that each school is applying the same cleaning frequencies to ensure a standard level of care.

Summer deep cleaning procedures also were not documented. These annual activities, which include stripping floors, cleaning light fixtures, and other in-depth cleaning activities are as important as the daily activities conducted by the custodial staff and should be documented.

**Recommendation 15: Standardize and document cleaning frequencies and summer deep cleaning procedures.**

Cleaning frequencies should be standardized across the district, documented, and included in the "red book" – in both English and Spanish. These frequencies should be incorporated into the district training program for custodians, and zone supervisors should validate the cleaning frequency during site inspections.

The district should also document annual deep cleaning procedures, and estimate the amount of time needed to conduct each procedure for each school type. Zone supervisors should conduct on-site inspections upon the completion of deep cleaning at each school on a rotating basis (every 3 to 5 years).

**Management Response:** Staff agrees with this recommendation. Standard operating procedures will be developed by December 31, 2018 (see above), and will include standardized cleaning frequencies and summer deep cleaning procedures.

***Finding: Inspections by zone supervisors are not consistently performed across schools, and results are not aggregated at the district level for analysis.***

Overall, schools appear to be pleased with the quality of custodial services. Based on the most recent Campus Climate Survey conducted by an outside firm, 89 percent of campus staff responding to the survey agreed or strongly agreed with the statement "My school is kept clean."

Another performance monitoring tool used by the district is the on-site inspection. Zone supervisors periodically perform on-site inspections of custodial services at schools and issue a formal report to the lead custodian and principal at the school. This is an effective practice but has not been applied consistently. Some lead custodians reported that inspections in prior years occurred monthly but now occur much less frequently or not at all. Other lead custodians perceived that when a certain performance level was obtained the inspections stopped.

The inspection reports that are prepared are not entered into any type of system to analyze trends or overall district performance. This information would be useful to district leaders in ensuring an effective and consistent cleaning program across all schools. The performance report data can also point to training or equipment needs at specific schools.

Zone supervisors reported that there was not enough time to conduct the monthly inspections at each school. These zone supervisors, however, also have maintenance responsibilities. The new organization structure implemented by the district for facilities management should help the zone supervisors focus specifically on custodial services and be more consistent in performing these inspections at schools.

**Recommendation 16: Conduct quarterly school inspections of custodial services and analyze results.**

On-site inspections and reporting should be conducted quarterly at each school with a formal report going to the lead custodian (and incorporated into his or her performance evaluation), the school principal and

the Director of Custodial Services. Low performing schools should receive more frequent on-site inspections until a satisfactory rating is achieved.

The Director should also implement a system to complete and track the information electronically. This will support the efficient entry of data (into a smartphone or other mobile device) as well as useful data analysis. Performance trends should be analyzed for each school and across the district as a whole to determine individual school needs and overall district needs such as training or equipment needs.

The inspections should be unannounced, and when possible, the zone supervisor should meet with the school principal or assistant principal to obtain feedback on the lead custodian and overall custodial performance, attendance, and reliability. The inspections should also include the measurement of time it takes to clean standard areas, such as classrooms and bathrooms, noting variation from standards and prior performance.

Other performance measures should be tracked and monitored at the district level, including:

- Actual gross square feet per custodian – night shift, by school
- Actual gross square feet per custodian – combined day and night shift, by school
- Actual custodial expenditures per square foot, by school

**Management Response:** Staff agrees with this recommendation. Standard operating procedures will be developed by December 31, 2018 (see above), and will include protocols for unannounced school inspections and means by which to obtain feedback from principals regarding performance of the lead custodian and overall custodial function.

# Section 6 – Grounds Maintenance

The FBISD Grounds Department consists of 12 individuals and is responsible for the maintenance of athletic fields and playgrounds, outdoor pest control, application of weed and turf treatments, and oversight of indoor pest control. Lawn maintenance (other than fields) and outdoor pest control services are performed by contracted service providers. The FBISD grounds crew provides supplemental support when work is beyond the scope or capacity of the normal contract landscaping workforce.

According to documentation on approved contractors, there are thirteen approved contractors to provide lawn maintenance and landscaping services, indoor integrated pest management, and ground maintenance supplies. The maximum value of the current term contracts totals $1,950,000. The total estimated cost of groundskeeping for the entire district is $3,000,000, including in-house and outsourced functions. By dividing the total expenditures by the number of maintainable acres in the district (1,045 acres), the district is estimated to spend approximately $2,870 per acre on maintenance and landscaping. A 2009 study by *American School & University*[8] found the national average for grounds maintenance-related expenditures is $0.15 per square foot (the cost includes payroll and ground equipment supplies). This translates to about $6,500 per maintained acre. Based on the data provided, FBISD is spending significantly less than the national average on grounds maintenance and landscaping.

Grounds work is prioritized considering athletic competition schedules, occupancy schedules for pest control application, and work requests from *SchoolDude* for on-demand services. The grounds crew consists of 10 personnel who are assigned to mowing, marking, irrigation, drainage and painting the district's 129 athletic fields. Over the past four years, the district has lost and gained personnel, generally staying between a crew of 9 and 11 positions.

Documents provided following the onsite portion of the audit validate statements made during interviews that in-house grounds personnel possess current Texas Department of Agriculture certifications, they attend required training, and that they are audited regularly by the Texas Department of Agriculture. Lawn maintenance, landscaping, and integrated pest management contractors all possess current Texas Department of Agriculture certifications for chemical application and management. The firms with term contracts also maintain proper TDA certifications.

## *Audit Findings and Recommendations*

***Finding*: *Ground maintenance staffing is inadequate in order to maintain facilities.***

The district has an estimated 1,695 acres. Of this acreage, there are 785 acres of lawn and 260 acres of athletic lawn for a total of 1,045 maintainable acres. To maintain 260 acres of athletic fields (129 fields total) at the lowest APPA benchmark level (Level 5) using 13.5 acres per full-time equivalent (FTE) would require 19.2 FTEs (APPA Grounds Maintenance 2011). An alternate standard, the *Planning Guide for*

[8] *38th Annual Maintenance & Operations Cost Study* (American School & University, 2009)

*Maintaining School Facilities (PGMSF)* can be used. With this standard, between 13 and 17.3 FTEs are needed to provide basic grounds care, and these standards apply to general grounds, not athletic fields. With an assigned crew of 10, the district is operating below the lowest APPA benchmark level and below the PGMSF Acceptable level. Table 13 summarizes the service level staffing levels and associated FTEs.

Table 13. Grounds Maintenance Service Levels

| Service Level | Acres per FTE | FTEs Required |
|---|---|---|
| PGMSF Acceptable Level | 20.0 | 13.0 |
| PGMSF Standard Level | 18.0 | 14.4 |
| PGMSF High Level | 15.0 | 17.3 |
| APPA Level 5 | 13.5 | 19.3 |
| **Fort Bend ISD** | **26.0** | **10.0 (actual)** |

U.S. Schools Facilities Maintenance Task Force, *Planning Guide for Maintaining School Facilities* (Washington, D.C.: National Center for Education Statistics, 2003).

To illustrate the scope of work for various levels of grounds care, Table 14 shows the expectations for each level of care.

Table 14. APPA Grounds Maintenance Service Levels

| Grounds Maintenance Service Levels | | | | | |
|---|---|---|---|---|---|
| | **1 State of the Art** | **2 High** | **3 Moderate** | **4 Moderately Low** | **5 Minimum** |
| **Turf Care** | | | | | |
| Mow | every 5 days | every 5 days | every 10 days | based on species may not be mowed | based on species may not be mowed |
| Aeration | 4 times a year | 2 times a year | turf quality indicates | none | none |
| Reseeding | as needed | Bare spots present | major bare spots appear | none | none |
| Sodding | as needed | Bare spots present | major bare spots appear | none | none |
| Weed Control | to 1% surface | to 5% surface | to 15% surface | limited to legal requirements | limited to legal requirements |
| **Fertilizer** | | | | | |
| Level of care | species optimum requirements | Healthy & Growing | when turf vigor is low | not fertilized | not fertilized |
| Rates | ensure supply of nutrients | lowest recommended | 1/2 recommended | not fertilized | not fertilized |
| Times | ensure supply of nutrients | ensure even supply | once a year | not fertilized | not fertilized |
| Seasonal Charts | modify for seasons | over entire year | low level application | not fertilized | not fertilized |

| Grounds Maintenance Service Levels | | | | | |
|---|---|---|---|---|---|
| **Irrigation** | | | | | |
| Controlled | automated sprinkler | automated sprinkler | demand & portable | no irrigation | no irrigation |
| Staffing | adequate | adequate | minimal | no irrigation | no irrigation |
| Frequency | as plant material demands | as plant material demands | 2 to 3 times a week | no irrigation | no irrigation |
| **Pruning** | | | | | |
| Frequency | As species requires | once per season | once every 2 to 3 years | no regular trimming | safety reasons only |
| Design concepts | As species requires | some sculpting | Health or reasonable appearance | safety or damage | safety reasons only |
| Grow characteristics | As species requires | as species requires | Health or reasonable appearance | safety or damage | safety reasons only |
| **Disease and Insect Control** | | | | | |
| Objective | avoid public awareness of problem | not bothersome to public | when an issue with public | when public comfort is an issue | when public is threatened |
| Corrective schedule | immediately | when damage is noticeable | when health or survival of plant is threatened or to address epidemics | Only to address epidemic or public safety | only to address epidemics or public safety |
| **Repairs** | | | | | |
| | performed immediately to elements of design | when safety, function, or appearance is in question | when safety or function is in question | when safety or function is in question | when safety or function is in question |
| **Inspections** | | | | | |
| | daily | regular working days | once per week | once per month | once per month |

Steve Glazner, *Operational Guidelines for Educational Facilities,* Grounds (Alexandria, VA: APPA, 2011)

**Recommendation 17. Increase staffing for grounds maintenance.**

The grounds crew is inadequate to meet the needs of the district. To achieve even the lowest levels recommended by the *Planning Guide for Maintaining School Facilities* at least three additional positions are needed.

**Management Response:** Staff agrees with this recommendation. Campus based Athletics Coordinators have historically assisted with some maintenance at athletics fields, but staff has been working to relieve them of that responsibility due to their other job responsibilities and safety concerns. We expect to include a request for turfed fields at each secondary school in the 2018 Bond Program, which would address this recommendation by reducing the square footage of fields requiring maintenance. Staff will

consider ways to address this recommendation pending a decision regarding items to be included in the 2018 Bond Program.

# Appendix A – Data Request List

| Request No. | Request Description |
|---|---|
| 1 | Current organization chart for M&O department with name of employee currently assigned |
| 2 | Current district organization chart |
| 3 | Facilities staff job descriptions |
| 4 | Goals for the department |
| 5 | Performance measures or reports for department |
| 6 | Departmental operating procedures and process maps |
| 7 | Customer survey results during the past 5 years |
| 8 | Outsourcing agreements related to any M&O department and sub-departments |
| 9 | List of outside consultant studies of the department during the past 5 years and resulting report, if applicable |
| 10 | List of state or federal compliance reports during past 5 years |
| 11 | List of significant application software used by department including<br>- Vendor name<br>- Application name<br>- Version number<br>- Modules purchased<br>- Modules used |
| 12 | Facilities Master Plan |
| 13 | Facility capacity and utilization statistics, by school |
| 14 | Number of acres maintained, by school/site |
| 15 | Leadership in Energy and Environmental Design (LEED) certification information by certification level and by school for existing and new construction (pre-certification efforts) |
| 16 | Any facility condition evaluation studies during the past five years |
| 17 | Facilities inventory, including building/campus name, date constructed, date of most recent renovation, number of classrooms (if applicable) |
| 18 | Gross square feet by location/campus, by permanent and portable space, by building for the past five years |
| 19 | Description of maintenance work order system and no. of years in use |
| 20 | Work order statistics, past three years |
| 21 | List of companies that routinely provide skilled tradesmen for any Facilities & Support Services area (e.g. plumbing, electrical, HVAC, etc.) |
| 22 | Custodian assignments by school and shift. Indicate head custodian, shift supervisors, etc. Indicate the time allocated to cafeteria for Food Services. |
| 23 | Description of methodology for allocating custodians to district facilities |
| 24 | List of all maintenance staff and related trade or skill area |
| 25 | Employee turnover statistics, by position, for past three years |
| 26 | Facilities usage policies |

| Request No. | Request Description |
|---|---|
| 27 | Facilities usage report -- school, fees charged, costs incurred, etc. |
| 28 | Energy usage reports, by facility, by energy type, past three years |
| 29 | Description and related data of any major energy savings for the past three years |
| 30 | List of all M&O purchase orders issued during the past three years (Function 51) |
| 33 | Maintenance Schedule by major asset (e.g. asset type, frequency of scheduled activities) |
| 34 | Sample Preventive Maintenance job plans |
| 35 | Work order processes in place |
| 36 | Facilities maintenance performance standards |

# Appendix B – Interview Roster

| Participant | Position |
|---|---|
| Charles Dupre | Superintendent |
| Max Cleaver | Chief Operations Officer |
| Allen Bassham | Executive Director of Facilities and School Services |
| David Moore | Director of Facilities |
| Robert Marsh | Assistant Director of Facilities |
| Don Johnson | Central Zone |
| Terrence Thomas | East Zone |
| Melvin Williams | West Zone |
| David Bass | Energy Manager |
| Tim Cox | HVAC/MEP Manager |
| Jay Vanga | Engineering Specialist/CAD/Blueprints |
| Jimmy Bell | Engineering Specialist/HAZMAT |

# Appendix C – Operations & Maintenance Best Practices

### Controls

| Description | Comments | Maintenance Frequency | | | |
|---|---|---|---|---|---|
| | | Daily | Weekly | Semi-Annually | Annually |
| Overall visual inspection | Complete overall visual inspection to be sure all equipment is operating and safety systems are in place | ✓ | | | |
| Verify control schedules | Verify in control software that schedules are accurate for season, occupancy, etc. | ✓ | | | |
| Verify setpoints | Verify in control software that setpoints are accurate for season, occupancy, etc. | ✓ | | | |
| Time clocks | Reset after every power outage | ✓ | | | |
| Check all gauges | Check all gauges to make sure readings are as expected | | ✓ | | |
| Control tubing (pneumatic system) | Check all control tubing for leaks | | ✓ | | |
| Check outside air volumes | Calculated the amount of outside air introduced and compare to requirements | | ✓ | | |
| Check setpoints | Check setpoints and review rational for setting | | ✓ | | |
| Check schedules | Check schedules and review rational for setting | | ✓ | | |
| Check deadbands | Assure that all deadbands are accurate and the only simultaneous heating and cooling is by design | | ✓ | | |
| Check sensors | Conduct thorough check of all sensors – temperature, pressure, humidity, flow, etc. – for expected values | | | ✓ | |
| Time clocks | Check for accuracy and clean | | | ✓ | |
| Calibrate sensors | Calibrate all sensors: temperature, pressure, humidity, flow, etc.: | | | | ✓ |
| | | | | | |

*Source: Operations & Maintenance Best Practices, A Guide to Achieving Operational Efficiency, Federal Energy Management Program, August 2010*

### Air Handling Units, Fan Coils, and Packaged Conditioning Equipment

| Description | Comments | Maintenance Frequency | | | |
|---|---|---|---|---|---|
| | | Daily | Weekly | Semi-Annually | Annually |
| Overall visual inspection are in place | Complete overall visual inspection to be sure all equipment is operating and safety systems | ✓ | | | |
| Filters | Check filter condition according to system type and manufacturer's recommendations | | | ✓ | |
| System integrity | Inspect for leakage due to major connections and access doors not being properly closed. | | | ✓ | |
| Dampers | Inspect damper actuator and linkage for proper operation by cycling fully opened to fully closed. | | | ✓ | |
| Filter assemblies | Inspect filter rack for integrity. Inspect local pressure differential gauge, tubing, and pilot tubes for condition | | | | ✓ |
| Coils | Inspect coil fins for physical damage, and comb out any bent fins. Clean coils if significant dirt is present and hampering coil performance | | | | ✓ |
| | | | | | |

*Source: Operations & Maintenance Best Practices, A Guide to Achieving Operational Efficiency, Federal Energy Management Program, August 2010*

### Fans

| Description | Comments | Maintenance Frequency | | | |
|---|---|---|---|---|---|
| | | Daily | Weekly | Semi-Annually | Annually |
| System use/ sequencing | Turn off/sequence unnecessary equipment | ✓ | | | |
| Overall visual inspection | Complete overall visual inspection to be sure all equipment is operating and safety systems are in place | ✓ | | | |
| Observe belts | Verify proper belt tension and alignment | | | ✓ | |
| Inspect pulley wheels | Clean and lubricate where required | | | ✓ | |
| Inspect dampers | Confirm proper and complete closure control; outside air dampers should be airtight when closed | | | ✓ | |
| Observe actuator/ linkage control | Verify operation, clean, lubricate, adjust as needed | | | ✓ | |
| Check fan blades | Validate proper rotation and clean when necessary | | | ✓ | |
| Filters | Check for gaps, replace when dirty – monthly | | | ✓ | |
| Check for air quality anomalies | Inspect for moisture/growth on walls, ceilings, carpets, and in/outside of duct-work. Check for musty smells and listen to complaints. | | | ✓ | |
| Check wiring | Verify all electrical connections are tight | | | | ✓ |
| Inspect ductwork | Check and refasten loose connections, repair all leaks | | | | ✓ |
| Coils | Confirm that filters have been kept clean, as necessary | | | | ✓ |
| Insulation | Inspect, repair, replace all compromised duct insulation | | | | ✓ |
| | | | | | |

*Source: Operations & Maintenance Best Practices, A Guide to Achieving Operational Efficiency, Federal Energy Management Program, August 2010*

## Motors

| Description | Comments | Maintenance Frequency | | | |
|---|---|---|---|---|---|
| | | Daily | Weekly | Semi-Annually | Annually |
| Motor use/ sequencing | Turn off/sequence unnecessary motors | ✓ | | | |
| Overall visual inspection | Complete overall visual inspection to be sure all equipment is operating and safety systems are in place | ✓ | | | |
| Motor condition | Check the condition of the motor through temperature or vibration analysis and compare to | | ✓ | | |
| Check lubrication | Assure that all bearings are lubricated per the manufacture's recommendation | | | ✓ | |
| Check packing | Check packing for wear and repack as necessary. Consider replacing packing with mechanical seals. | | | ✓ | |
| Motor alignment | Aligning the motor coupling allows for efficient torque transfer to the pump | | | ✓ | |
| Check mountings | Check and secure all motor mountings | | | ✓ | |
| Check terminal tightness | Tighten connection terminals as necessary | | | ✓ | |
| Cleaning | Remove dust and dirt from motor to facilitate cooling | | | ✓ | |
| Check bearings | Inspect bearings and drive belts for wear. Adjust, repair, or replace as necessary. | | | | ✓ |
| Motor condition | Checking the condition of the motor through temperature or vibration analysis assures long life | | | | ✓ |
| Check for balanced three-phase power | Unbalanced power can shorten the motor life through excessive heat build up | | | | ✓ |
| Check for over-voltage or under-voltage conditions | Over- or under-voltage situations can shorten the motor life through excessive heat build up | | | | ✓ |
| | | | | | |

*Source: Operations & Maintenance Best Practices, A Guide to Achieving Operational Efficiency, Federal Energy Management Program, August 2010*

### Pumps

| Description | Comments | Maintenance Frequency | | | |
|---|---|---|---|---|---|
| | | Daily | Weekly | Semi-Annually | Annually |
| Pump use/sequencing | Turn off/sequence unnecessary pumps | ✓ | | | |
| Overall visual inspection | Complete overall visual inspection to be sure all equipment is operating and safety systems are in place | ✓ | | | |
| Check lubrication | Assure that all bearings are lubricated per the manufacture's recommendation | | | ✓ | |
| Check packing | Check packing for wear and repack as necessary. Consider replacing packing with mechanical seals. | | | ✓ | |
| Motor/pump alignment | Aligning the pump/motor coupling allows for efficient torque transfer to the pump | | | ✓ | |
| Check mountings | Check and secure all pump mountings | | | ✓ | |
| Check bearings | Inspect bearings and drive belts for wear. Adjust, repair, or replace as necessary. | | | | ✓ |
| Motor condition | Checking the condition of the motor through temperature or vibration analysis assures long life | | | | ✓ |
| | | | | | |

*Source: Operations & Maintenance Best Practices, A Guide to Achieving Operational Efficiency, Federal Energy Management Program, August 2010*

### Chillers

| Description | Comments | Maintenance Frequency | | | |
|---|---|---|---|---|---|
| | | Daily | Weekly | Semi-Annually | Annually |
| Chiller use/sequencing | Turn off/sequence unnecessary chillers | ✓ | | | |
| Overall visual inspection | Complete overall visual inspection to be sure all equipment is operating and safety systems are in place | ✓ | | | |
| Check setpoints | Check all setpoints for proper setting and function | ✓ | | | |
| Evaporator and condenser | Assess evaporator and condenser coil fouling as required | | ✓ | | |
| Compressor motor temperature | Check temperature per manufacturer's specifications | | ✓ | | |
| Perform water quality test | Check water quality for proper chemical balance | | ✓ | | |
| Leak testing | Conduct leak testing on all compressor fittings, oil pump joints and fittings, and relief valves | | ✓ | | |
| Check all insulation | Check insulation for condition and appropriateness | | ✓ | | |
| Control operation | Verify proper control function including:<br>• Hot gas bypass<br>• Liquid injection | | ✓ | | |
| Check vane control settings | Check settings per manufacturer's specification | | | ✓ | |
| Verify motor load limit control | Check settings per manufacturer's specification | | | ✓ | |
| Verify load balance operation | Check settings per manufacturer's specification | | | ✓ | |
| Check chilled water reset settings and function | Check settings per manufacturer's specification | | | ✓ | |
| Check chiller lockout setpoint | Check settings per manufacturer's specification | | | | ✓ |
| Clean condenser tubes | Clean tubes at least annually as part of shutdown procedure | | | | ✓ |
| Eddy current test condenser tubes | As required, conduct eddy current test to assess tube wall thickness | | | | ✓ |
| Clean evaporator tubes | Clean tubes at least annually as part of shutdown procedure | | | | ✓ |
| Eddy current test evaporator tubes | As required, conduct eddy current test to assess tube wall thickness | | | | ✓ |
| Compressor motor and assembly | • Check all alignments to specification<br>• Check all seals, provide lubrication where necessary | | | | ✓ |
| Compressor oil system | • Conduct analysis on oil and filter<br>• Change as required<br>• Check oil pump and seals<br>• Check oil heater and thermostat<br>• Check all strainers, valves, etc. | | | | ✓ |
| Electrical connections | Check all electrical connections/ terminals for contact and tightness | | | | ✓ |
| Water flows | Assess proper water flow in evaporator and condenser | | | | ✓ |
| Check refrigerant level and condition | Add refrigerant as required. Record amounts and address leakage issues. | | | | ✓ |

*Source: Operations & Maintenance Best Practices, A Guide to Achieving Operational Efficiency, Federal Energy Management Program, August 2010*

### Cooling Towers

| Description | Comments | Maintenance Frequency | | | |
|---|---|---|---|---|---|
| | | Daily | Weekly | Semi-Annually | Annually |
| Cooling tower use/sequencing | Turn off/sequence unnecessary cooling towers | ✓ | | | |
| Overall visual inspection | Complete overall visual inspection to be sure all equipment is operating and safety systems are in place | ✓ | | | |
| Inspect for clogging | Make sure water is flowing in tower | ✓ | | | |
| Fan motor condition | Check the condition of the fan motor through temperature or vibration analysis and compare to baseline values | | ✓ | | |
| Clean suction screen | Physically clean screen of all debris | | ✓ | | |
| Test water samples | Test for proper concentrations of dissolved solids, and chemistry. Adjust blowdown and chemicals | | ✓ | | |
| Operate make-up water | Operate switch manually to ensure proper float switch operation | | ✓ | | |
| Vibration | Check for excessive vibration in motors, fans, and pumps | | ✓ | | |
| Check tower structure | Check for loose fill, connections, leaks, etc. | | ✓ | | |
| Check belts and pulleys | Adjust all belts and pulleys | | ✓ | | |
| Check lubrication | Assure that all bearings are lubricated per the manufacture's recommendation | | | ✓ | |
| Check motor supports and fan blades | Check for excessive wear and secure fastening | | | ✓ | |
| Motor alignment | Aligning the motor coupling allows for efficient torque transfer | | | ✓ | |
| Check drift eliminators, louvers, and fill | Look for proper positioning and scale build up | | | ✓ | |
| Clean tower | Remove all dust, scale, and algae from tower basin, fill, and spray nozzles | | | | ✓ |
| Check bearings Inspect bearings and drive belts for wear. | Adjust, repair, or replace as necessary. | | | | ✓ |
| Motor condition | Checking the condition of the motor through temperature or vibration analysis assures long life | | | | ✓ |
| | | | | | |

*Source: Operations & Maintenance Best Practices, A Guide to Achieving Operational Efficiency, Federal Energy Management Program, August 2010*

### Lighting

| Description | Comments | Maintenance Frequency |
|---|---|---|
| Visual inspection | Inspect fixtures to identify inoperable or faulty lamps or ballasts. Burned-out lamps may damage ballasts if not replaced. | Weekly to monthly |
| Visual inspection | Inspect fixtures and controls to identify excessive dirt, degraded lenses, inoperable or ineffective controls. | Semi-annually |
| Clean lamps and fixtures | Lamps and fixture reflective surfaces should be cleaned periodically for maximum efficient delivery of light to the space | 6 to 30 months, depending on space and luminaire type |
| Clean walls and ceilings | Clean surfaces allow maximum distribution of light within the space | 1 to 3 years, depending on dirtiness of environment |
| Replace degraded lenses or louvers | Replace yellowed, stained, or broken lenses or louvers | As identified |
| Repaint walls and replace ceilings | Lighter colored surfaces will increase light distribution efficiency within the space | As identified or at tenant change |
| Replace burned out lamps | For larger facilities consider group relamping | As needed or on group schedule |
| Evaluate lamps and ballasts for potential upgrade | Rapid change in technology may result in significant savings through relamping or simple retrofit. | Every five years or on group relamping schedule |
| Survey lighting use/illumination levels for reduction or increase in illuminance Initially and at task/tenant change | Measure light levels compared to tasks needs in typical spaces. | Identify areas |
| Survey for daylighting capability | Identify areas where daylighting controls could be used | One-time analysis or at tenant change |
| Survey for local controls capability | Identify areas where local automatic controls could be used | Initially and at tasks/tenant change |
| | | |

*Source: Operations & Maintenance Best Practices, A Guide to Achieving Operational Efficiency, Federal Energy Management Program, August 2010*