Ysleta Independent School District

FACILITIES MANAGEMENT REVIEW

Conducted by SCRS, Inc. and Facility Engineering Associates, Inc. for the Legislative Budget Board

February 2009

LEGISLATIVE BUDGET BOARD

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March 30,2009

Dr. Michael Zolkoski
Superintendent
Ysleta Independent School District

Dear Dr. Zolkoski:

The attached report reviews the management and performance of the Ysleta Independent School District's (YISD) facilities operations.

The report's recommendations will help YISD improve its overall performance as it provides services to students, staff, and community members.

The Legislative Budget Board engaged SCRS, Inc. and Facility Engineering Associates, Inc. to conduct and produce this review, with LBB staff working in a contract oversight role.

The report is available on the LBB website at http://www.lbb.state.tx.us.

Respectfully submitted,

John O'Brien
Director
Legislative Budget Board

cc: Ms. Carmen G. Munoz
Ms. Liza Montelongo
Ms. Beth M. Riggs
Mr. Ray Mendoza
Mr. Robert "Bob" S. Ward
Ms. Martha "Marty" Reyes
Ms. Linda Chavez

YSLETA INDEPENDENT SCHOOL DISTRICT FACILITIES MANAGEMENT

Texas school districts are challenged with providing instructional services in the most cost-effective and productive manner possible. Effective and efficient programs and a well-designed instructional program determine how well a district meets its goal of educating children. In support of this goal, the facilities organization is tasked with developing effective facilities operations and maintenance programs to provide safe, productive, and clean environments where students can learn.

From its beginnings in the 1930s as a rural education district, the Ysleta Independent School District (YISD) has grown into one of the major school districts in the state of Texas with nearly 45,000 students and over 7,000 administrators, teachers and staff. The district has 61 campuses, which sprawl through an urban area stretching from northeast El Paso to the east and southeastern areas of the city. There are currently a total of 67 buildings (including 9 high schools, 11 middle schools, and 35 elementary schools, plus 12 other learning and support facilities).

Historically, local enrollment projections have the district's enrollment declining over the next five years. The school district is landlocked by Mexico on the south, New Mexico/ Fort Bliss on the north, and the Socorro and El Paso school districts on the east and west boundaries respectively. Growth trends are directly associated with demographic changes and not geographic expansion.

YISD's geography is such that Fort Bliss separates the district into two parts. Fort Bliss has been identified as part of the military's Base Realignment and Closure (BRAC) program. Fort Bliss is expecting significant increases in personnel and family member population over the next five years. The Base Transformation Office reports expected increases in school aged children within the five local school districts in the El Paso area by the end of the 2012–13 school year. The exact impact on specific school districts has not yet been determined. YISD reported that most projections show the largest impact of this influx of new students on the neighboring Socorro ISD. YISD's enrollment projections will be affected by BRAC over the next five years but the extent is unknown.

As the district continues to change and age there comes an opportunity for improvement in operations and maintenance. Practices and processes that once were sufficient and even advanced for the setting may quickly become antiquated.

The facilities organization is responsible for a diverse set of facilities covering 7,244,455 square feet. A summary of the schools and areas categorized by feeder schools rolling-up to high schools is presented in **Exhibit 1**.

The facilities organization is led by the Executive Director of Facilities and Construction, who directly reports to the Associate Superintendent of Operations. The maintenance functions are overseen by the Director of Warehouse and Maintenance. The maintenance function includes eight teams consisting of 188 authorized employees. About 167 of the 188 employees are non-supervisory/administrative positions. Currently, there are four vacant positions. The division of labor is shown in **Exhibit 2**.

YISD's facilities maintenance budget for 2007–08 was $10,235,364. YISD's fiscal year 2008–09 Budget Summary is shown in **Exhibit 3**.

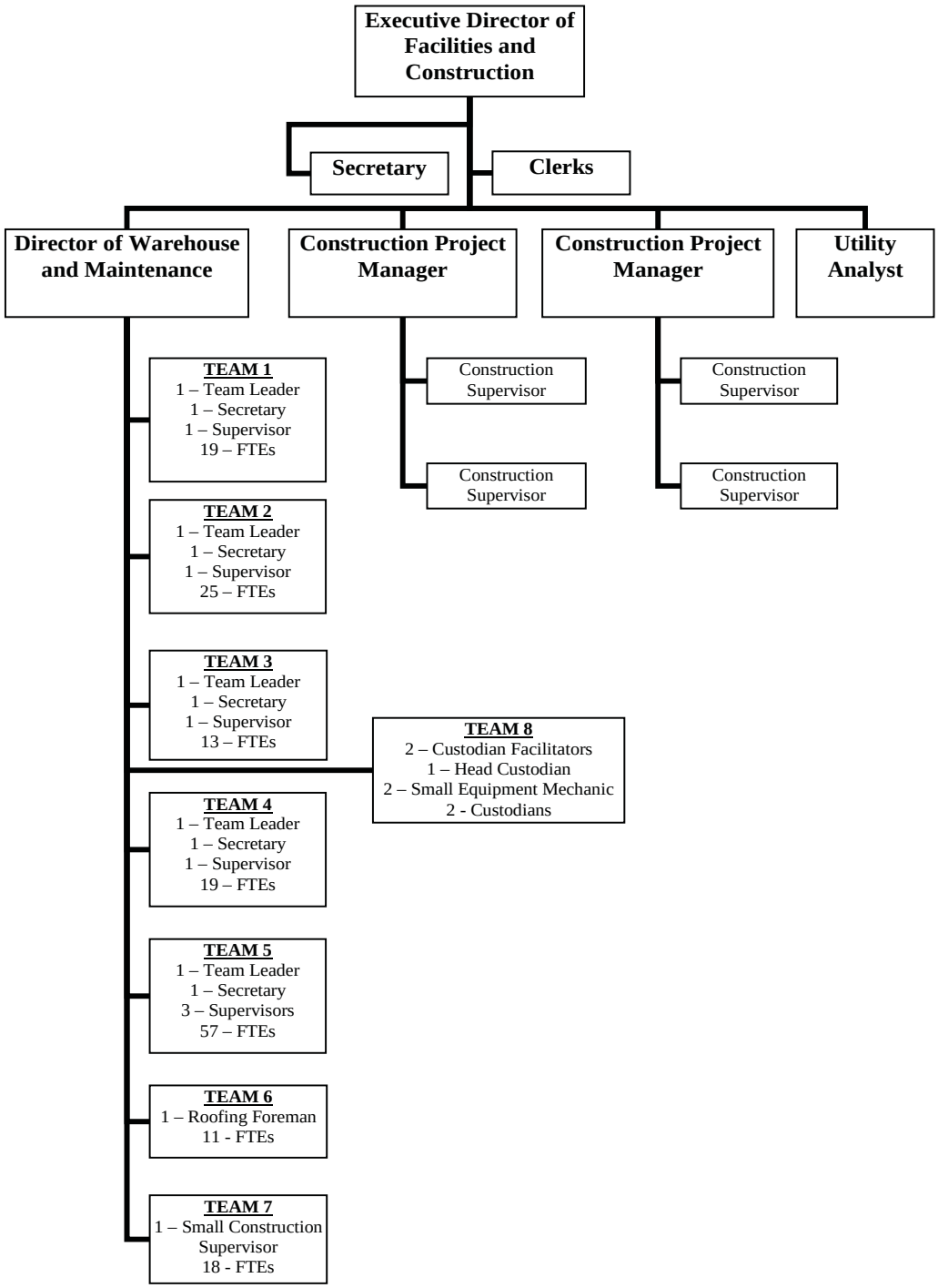
The following sections provide a summary of accomplishments, findings and recommendations regarding facilities, construction, use and management for YISD. The information is based on field visits, interviews, document review, and observations completed at the district in June 2008.

EXHIBIT 1
YISD FACILITIES INVENTORY
JUNE 2008

BUILDING	SQUARE FEET	BUILDING	SQUARE FEET
Bel Air High School	387,770	**Riverside High School**	316,233
Hillcrest Middle School	123,665	Riverside Middle School	140,290
Ranchland Hills Middle School	65,725	Ascarate Elementary School	62,911
Constance Hulbert Elementary School	64,500	Cadwallader Elementary School	79,595
Del Norte Heights Elementary School	61,768	Cedar Grove Elementary School	72,572
Hacienda Heights Elementary School	71,325	Ramona Elementary School	63,473
Loma Terrace Elementary School	92,000	Thomas Manor Elementary School	79,949
Mesa Vista Elementary School	64,484	**Ysleta High School**	334,385
North Loop Elementary School	86,733	Camino Real Middle School	75,349
Sageland Elementary School	66,505	Ysleta Middle School	136,375
Del Valle High School	356,608	Rio Bravo Middle School	71,301
Valley View Middle School	102,755	Alicia R. Chacon International	93,449
Lancaster Elementary School	73,980	Capistrano Elementary School	87,940
LeBarron Park Elementary School	80,919	Pasodale Elementary School	96,241
Marian Manner Elementary School	78,995	Presa Elementary School	61,858
Mission Valley Elementary School	70,052	South Loop Elementary School	64,702
Eastwood High School	302,945	Ysleta Elementary School	79,106
Eastwood Middle School	263,000	Administration	180,545
Eastwood Knolls Elementary School	141,704	Adult Learning Center	28,143
East Point Elementary School	73,987	A.S.T. Teen Parent	3,072
Eastwood Heights Elementary School	97,880	**Cesar Chavez Academy High School**	55,706
Edgemere Elementary School	107,789	Cesar Chavez Academy Middle School	8,064
Scotsdale Elementary School	90,016	District Wide Homebound	768
Hanks High School	386,473	Grounds Department	2,460
Desert View Middle School	141,368	Plato Academy	9,200
Indian Ridge Middle School	102,755	Robert F. Kennedy Pre-Kindergarten	81,300
Glen Cove Elementary School	115,650	Service Center	52,925
Pebble Hills Elementary School	96,276	Student Entrepreneur Center	25,857
R.E.L. Washington Elementary School	81,300	Tejas School of Choice	29,550
Tierra Del Sol Elementary School	91,476	Ysleta Pre-Kindergarten Center	30,636
Vista Hills Elementary School	83,471	Valle Verde Early College High School	16,128
Parkland High School	285,432		
Parkland Middle School	125,958	**TOTAL**	**7,244,455**
Desertaire Elementary School	81,747		
Dolphin Terrace Elementary School	104,749		
North Star Elementary School	80,512		
Parkland Elementary School	102,100		

SOURCE: YISD, Director of Warehouse and Maintenance.

EXHIBIT 2
YISD MAINTENANCE ORGANIZATION CHART
JUNE 2008



NOTE: Full-time equivalents (FTEs)
SOURCE: YISD, Director of Warehouse and Maintenance.

EXHIBIT 3
YISD MAINTENANCE DEPARTMENT BUDGET SUMMARY
FISCAL YEAR 2008–09
JUNE 2008

DESCRIPTION	SALARIES	NON-SALARY	TOTAL
Administration	$106,256	$834,107	$940,363
Team I	$797,675	$500,005	$1,297,680
Team II	$1,009,639	$489,185	$1,498,824
Team III	$587,081	$221,764	$808,845
Team IV	$784,218	$480,007	$1,264,225
Team V	$1,651,914	$149,386	$1,801,300
Team VI	$368,709	$83,368	$452,077
Team VII	$594,064	$40,408	$614,064
Custodial	$220,338	$20,000	$260,746
Districtwide		$148,297	$148,297
Utility Analyst*	$82,574	$24,874	$107,448
Heating, Ventilating, and Air Conditioning (HVAC)		$241,495	$241,495
Preventive Maintenance		$300,000	$300,000
Small Construction		$500,000	$500,000
Total	**$6,202,468**	**$4,032,896**	**$10,235,364**

*The Utility Analyst has been moved under the umbrella of facilities and construction instead of maintenance only. An adjustment has been made to the maintenance budget to reflect this change.
SOURCE: YISD, Director of Warehouse and Maintenance.

ACCOMPLISHMENTS

- Accomplishment #1 – YISD hired a professional team, including registered engineers, architects and business administrators with facilities experience that are improving the operation and management of the school facilities.
- Accomplishment #2 – The district implemented a comprehensive district energy and resource management program which included hiring an experienced and qualified internal energy manager, developing policies, and making the energy manager a strategic facilities management partner. The program goes beyond energy conservation to include overall enhancement of sustainable facility management operations and resource management.
- Accomplishment #3 – YISD initiated the implementation of a preventive maintenance (PM) program. Current initiatives include inventorying and bar coding maintainable equipment, and identifying and developing associated PM procedures.

FINDINGS

- Finding #1 – Facilities maintenance and repair (M&R) funding levels have not kept pace with the growth and increased space to be maintained.
- Finding #2 – While YISD has initiated a preventive maintenance program, the program is limited in scope.
- Finding #3 – Facilities maintenance staffing levels (by number of staff) are slightly above industry benchmarks.
- Finding #4 – Facilities grounds maintenance staffing levels (by number of staff) exceed industry benchmarks.
- Finding #5 – While there are many good facilities initiatives and effective processes, some are informal and lack documentation.
- Finding #6 – The district lacks a formalized facilities master plan which has resulted in perceptions of inequality among schools, extensive use of portable classrooms, lack of coordination between project managers and the maintenance project group and a lack of prioritization of maintenance verse new construction.
- Finding #7 – There are currently no productivity tracking initiatives.
- Finding #8 – YISD is struggling with the use of the current enterprise resource planning system to effectively manage facility management information. This makes it difficult to track performance and obtain good data to make decisions on a campus by campus basis.
- Finding #9 – There is a process in place to identify facility conditions and capital needs. However, it is consensus based and lacks a means of credibly and objectively assessing facility needs. It appears to be inefficient through redundancy of assessors. This may also make it difficult to justify.
- Finding #10 – The Director of Maintenance and Warehouse indicated that the department had money

allocated for training, but there was no formal internal training program or tracking mechanism for external training completed.

- Finding #11 – Maintenance supervisors receive work orders and administer maintenance paperwork limiting their ability to truly supervise actual work being accomplished.
- Finding #12 – There is a lack of coordination in performing building safety inspections.

RECOMMENDATIONS

- **Recommendation 1: Increase maintenance and repair funding levels** to be in alignment with industry benchmarks and provide adequate resources to properly maintain the growing inventory of facilities.
- **Recommendation 2: Evaluate maintenance processes and staffing levels** to ensure effective and efficient use of resources to properly maintain the inventory of facilities.
- **Recommendation 3: Evaluate, improve, and document facilities planning and maintenance policies and procedures.** This should include, but not necessarily be limited to the evaluation and re-engineering processes for the following areas:
  - master planning;
  - school design and performance guidelines;
  - value engineering and post-occupancy reviews;
  - maintainability reviews during design phases;
  - school commissioning;
  - facilities documentation exchange and control;
  - facilities management information standards;
  - capital needs assessment;
  - preventive maintenance programs; and
  - facilities performance measurement (key performance indicators).
- **Recommendation 4: Develop a strategic technology plan** to aide in the evaluation of ERP/CMMS return on investment.
- **Recommendation 5: Continue to implement a comprehensive planned maintenance program** with focus on a reliability-centered maintenance approach.
- **Recommendation 6: Consider revisions to the current facility condition assessment (FCA) process** to prepare credible and defensible annual asset management plans and forecasts of facility capital needs (facility needs assessment).
- **Recommendation 7: Initiate a comprehensive training program** by developing individual training plans to minimize possible on-the-job-accidents, staff inefficiencies, and repeat work.
- **Recommendation 8: Implement a service center/ central work control** to free up maintenance supervisors to spend more time supervising/training and providing Quality Assurance/Quality Control.
- **Recommendation 9: Identify the resources to perform safety inspections and develop processes** to ensure completion and compliance.
- **Recommendation 10: Continue to invest in identifying and implementing opportunities for additional energy conservation; provide methodologies for measurement and verification.** The district has made an excellent start at energy conservation; however, numerous other opportunities remain for additional progress.
- **Recommendation 11: Identify opportunities to use prototype designs** to reduce upfront design and engineering costs and decrease construction turn-around time during any high construction periods the district may experience.

DETAILED ACCOMPLISHMENTS

PROFESSIONAL MANAGEMENT TEAM

Accomplishment #1 – YISD hired a professional team, including registered engineers, architects and business administrators with facilities experience that are improving the operation and management of the school facilities.

YISD has been successful in hiring a facilities construction and management team consisting of professionals that can strategically drive the district in a positive direction for the near and distant future. The addition of two registered architects and a registered professional engineer provide

experience and balance within the management team. With their knowledge of construction and planning procedures they have been able to efficiently develop design documents and oversee bond projects through the development and refinement of a Bond Construction Department Administration Manual, that outlines the policies and procedures required for bond oversight. YISD's professional management team has been critical in accomplishing a change order rate of 2.8 percent, a rate that is less than the 5 percent national average for capital construction projects.

The Director of Maintenance and Warehouse and project managers are relatively new to the facilities organization. However, in a short time they have introduced processes to improve the quality of new school projects and operations and maintenance of the existing facilities. Improved processes have included evaluation and review of existing standards and planning protocol, identification of a number of inconsistencies, gaps, and areas of improvement in past practices and improvement of communication and coordination among designers, contractors, maintenance staff, and end-users of the facilities.

ENERGY AND RESOURCE MANAGEMENT

Accomplishment #2 – The district implemented a comprehensive district energy and resource management program that included hiring an experienced and qualified internal energy manager, developing policies, and making the energy manager a strategic facilities management partner. The program goes beyond energy conservation to include overall enhancement of sustainable facility management operations and resource management.

YISD's district energy and resource management program includes a clear policy to conserve energy and natural resources while exercising sound financial management. The policy includes general guiding statements and specific energy conservation and building and resource management guidelines. The program captures the intent of similar best practices in sustainable facilities management operations. The conservation efforts focus on reduction of usage with and without additional capital investment. The district hired a licensed mechanical engineer as their internal energy manager to help with the administration and implementation of the policy and guidelines. YISD also purchased an energy management accounting system to aide in the execution of policies and guidelines.

Texas House Bill 3693, enacted on May 23, 2007, modified Texas Education Code Chapter 44, Section 44.902 to state the following:

> *GOAL TO REDUCE CONSUMPTION OF ELECTRIC ENERGY. The board of trustees of a school district shall establish a goal to reduce the school district's annual electric consumption by five percent each state fiscal year for six years beginning September 1, 2007. This will require consistent and accurate long-term monitoring of electrical consumption.*

The YISD school board adopted this goal. The district's facilities department has taken several measures to aide in accomplishing the goal. In recognition of the global importance of energy conservation, the YISD facilities department recently restructured to provide the energy manager greater oversight and control in maintenance and construction by making him a direct report to the Executive Director of Facilities and Construction rather than under the purview of the Director of Warehouse and Maintenance. This places him as a strategic partner among the management team, helping to make sound facilities decisions in regards to energy conservation in maintenance and construction.

YISD's conservation efforts included peak load-shedding to lower electrical costs, installation of waterless urinals and xeriscaping to receive water conservation rebates, lighting retrofits focused on the largest consumer areas first, use of lighting retrofit kits to save $75,000 over upgrading to newer lighting and maintaining a payback, implementation of a consolidated 4–10 work schedule for the summer, and implementation of central plants where possible. YISD demonstrates additional commitment by designing a Leadership in Energy and Environmental Design (LEED) certified elementary school, the first school to be fully commissioned.

PREVENTIVE MAINTENANCE IMPLEMENTATION

Accomplishment #3 – YISD initiated the implementation of a preventive maintenance (PM) program. Current initiatives include inventorying and bar coding maintainable equipment, and identifying and developing associated PM procedures.

In order to accomplish this initiative, YISD created a multi-disciplined PM group (2 - HVAC, 1 - Electrician, 1 - Plumber) that is solely focused on its accomplishment. The team has been working over the last year identifying major equipment and developing the steps and durations involved in maintenance schedules. They have now progressed to

drilling down to smaller equipment. Additionally, the district currently uses infrared technologies to assess heat-related issues in electrical equipment. Their next steps include associating PM procedures to the equipment to improve the overall maintenance of the buildings and building systems.

DETAILED FINDINGS

FACILITIES MAINTENANCE FUNDING

Finding #1 – Facilities maintenance and repair (M&R) funding levels have not kept pace with the growth and increased space to be maintained.

Recommendation 1: Increase maintenance and repair funding levels to be in alignment with industry benchmarks and provide adequate resources to properly maintain the growing inventory of facilities.

Growth of the district has resulted in a lean maintenance budget for the current size and needs of the district. The review team compared YISD's maintenance budget data to several benchmarks. The first benchmark compares YISD's maintenance funding and correlates that to industry benchmarks published in the *American School and University Maintenance and Operation (M&O) Cost Study* (April 2008) study. YISD's maintenance director is responsible for 7,244,455 square feet with a budget of $10,235,364. According to data provided by YISD, current maintenance and grounds funding levels are about $1.41/square foot. Responses published in the *American School and University Maintenance and Operation (M&O) Cost Study* (April 2008) suggest that maintenance and grounds funding averages are approximately $1.74/square foot. Thus the shortfall compared to the benchmark equates to $0.33/ square feet or $2,390,670 annually. For comparative purposes the maintenance funding includes: maintenance and grounds payroll, outside contract labor, equipment, supplies, and "other" maintenance items.

The review team also analyzed the maintenance and operations benchmark study completed by the Region 4 Educational Service Center for the 2006–07 school year and published in March 2008. The Region 4 benchmarking study indicated that YISD's total cost/square foot of building maintenance funding was $0.91/square foot as compared to the median funding level of $1.20/square foot.

The apparent lack of funding limits the effectiveness of the maintenance organization and impedes progress in advancing the overall care of the facilities. Continuing to fund maintenance at this level will have a direct impact on an already increasing backlog of deferred maintenance. YISD should scrutinize district revenues and expenditures and seek ways that district operations as a whole could be streamlined to find the funding necessary to properly provide the maintenance department with the necessary resources to meet the ongoing demand. Should additional funding not be available, a plan should be developed to prioritize needs and match stakeholder expectations to the level of service achievable with the current funding levels.

For purposes of estimating a fiscal impact, the Region 4 Educational Service Center benchmark was used. When compared to the benchmark, YISD's funding per square foot is approximately $0.29/square foot lower than the median ($1.20/square foot), a $2,100,892 annual shortfall.

MAINTENANCE AND GROUNDS STAFFING

Finding #2 – While YISD has initiated a preventive maintenance program, the program is limited in scope.

Finding #3 – Facilities maintenance staffing levels (by number of staff) are slightly above industry benchmarks.

Finding #4 – Facilities grounds maintenance staffing levels (by number of staff) exceed industry benchmarks.

Recommendation 2: Evaluate maintenance processes and staffing levels to ensure effective and efficient use of resources to properly maintain the inventory of facilities.

MAINTENANCE

The maintenance work force is currently divided into eight teams. Each team has specific responsibilities within the maintenance function. Teams 1–4 provide maintenance response to the district in a zonal format with zones being designated by school tracts. Teams 5–7 provide more global support to the district. Team 5 is responsible for the grounds maintenance throughout the district. Team 6 is responsible for roof maintenance throughout the district. Team 7 is considered the small construction team. This team provides internal construction support with a primary focus on the renovation of bathrooms throughout the district. Each team consists of various trades to help accomplish the overall goals of the team. Teams 1–5 each have a team leader, secretary, and supervisor that provide the necessary supervisory/ administrative support. The Team 3 team leader has ancillary responsibilities for Team 7. The Team 4 team leader has ancillary responsibilities for Team 6.

The Maintenance Department spends a majority of its time responding to demand work orders. This has resulted in a

recent shift away from project work. The department accomplishes limited planned and preventive maintenance. Custodians (Team 8) provide direct support to the campuses and do the following maintenance related tasks:

- filter changes;
- painting;
- changing ceiling tiles;
- small motor changes;
- minor floor tile repairs; and
- minor adjustments to systems.

The division of labor between maintenance and custodial work is unclear.

YISD maintains approximately 7.24 million square feet of facilities with 87 full-time equivalent (FTE) maintenance positions, including the maintenance staff in Teams 1,2,3,4, and 6 as shown in **Exhibit 2**, and excluding administrative and supervisory staff. Full-time equivalent (FTE) counts do not include any supervisory or administrative level or staff dedicated to non-maintenance functions (i.e., construction, grounds, and custodial). The district's ratio of maintenance staff to building area maintained per FTE (staff : square foot) is 1: 83,270. The standard published in the *American School and University M&O Cost Study* (April 2008) is 1:107,439. Therefore, staffing guidelines would suggest that the district is currently overstaffed by 20 FTEs. According to the 2006–07 Region 4 benchmark study, YISD ranked near the median for square footage covered per maintenance employee suggesting average productivity. The district did not provide the review team with any written or verbal staffing guidelines for which maintenance staffing decisions were made.

YISD's maintenance staffing levels appear to be high, based on recommended industry benchmarks. YISD should evaluate maintenance processes and staffing levels to ensure effective and efficient use of resources to properly maintain the inventory of facilities.

Using the average salary of a maintenance employee in a district with an enrollment between 25,000 and 49,999 from "*Salaries and Benefits in Texas Public Schools, Auxiliary Report 2006–07*," if the district were to downsize maintenance employees from 87 to 67 FTEs, there would be an annual cost savings of $598,042 ($11.98 x 1.2 (20.0% Benefits) x 8 Hours/Day x 260 Days/Year x 20 FTEs).

GROUNDS

YISD is responsible for 887 acres of land. The exact acreage of land maintained by YISD staff was unavailable to the review team; therefore, maintainable land calculations are based on total acreage minus building area (887 acres – 7,244,455 square feet = 721 acres). Grounds maintenance is divided into zonal crews (typically 3–4 FTEs) and assigned specific facilities to maintain. Each crew has a crew leader assigned. Grounds maintenance includes mowing, trash pick-up, irrigation, pest control, weed control, and aeration of all areas including athletic fields and a pecan orchard. Xeriscaping has been incorporated to reduce water consumption and maintenance of plant material.

The district's ratio of grounds staff to acre maintained per FTE (staff: acre) is 1:12. The standard published in the *American School and University M&O Cost Study* (April 2008) is 1:45. Therefore, 721 acres would require only 16 groundskeepers, such that staffing guidelines would suggest that the district is currently overstaffed by 44 FTEs. According to the 2006–07 Region 4 benchmark study, YISD ranked last in grounds maintenance productivity among participants. The district did not provide the review team with any written or verbal staffing guidelines for which grounds staffing decisions were made.

YISD's grounds staffing levels appear to be high based on recommended industry benchmarks. YISD should evaluate grounds processes and staffing levels to ensure effective and efficient use of resources to properly maintain the district's grounds.

Using the average salary of a maintenance employee in a district with an enrollment between 25,000 and 49,999 from "*Salaries and Benefits in Texas Public Schools, Auxiliary Report 2006–07*," if the district were to downsize maintenance employees from 60 to 16 FTEs, there would be an annual cost savings of $1,496,901 ($13.63 x 1.2 (20.0% Benefits) x 8 Hours/Day x 260 Days/Year x 44 FTEs).

If they were to reduce both maintenance staff by 19 FTE's and groundskeepers by 44 FTEs, there would be an annual savings of $2,094,943.

POLICIES AND PROCEDURES

Finding #5 – While there are many good facilities initiatives and effective processes, some are informal and lack documentation.

Finding #6 – The district lacks a formalized facilities master plan that has resulted in perceptions of inequality among

schools, extensive use of portable classrooms, lack of coordination between project managers and the maintenance project group and a lack of prioritization of maintenance versus new construction.

Finding #7 – There are currently no productivity tracking initiatives.

Recommendation 3: Evaluate, improve, and document facilities planning and maintenance policies and procedures.

YISD has begun to evaluate and improve facilities business processes for many of their facilities planning, maintenance, and management efforts. While there are many excellent facilities initiatives and effective processes, many are informal and lack appropriate standards and documentation. The success of these informal processes have served the district well in the past, but this will be more difficult to achieve as the district continues to age and change. YISD should continue to evaluate, re-engineer and document facilities planning and maintenance policies and procedures to ensure effective planning, construction, operation and maintenance of the facilities. This should include, but not necessarily be limited to formalizing processes for the following:

- master planning;
- school design and performance guidelines;
- value engineering and post-occupancy reviews;
- maintainability reviews during design phases;
- school commissioning;
- facilities documentation exchange and control;
- facilities management information standards;
- capital needs assessment;
- preventive maintenance programs; and
- facilities performance measurement (key performance indicators).

The implementation of formal and documented processes for facilities management could result in significant cost avoidance and increased staff efficiencies. While there is effort required to document the processes, it is generally small in comparison to the potential cost savings. This is the right opportunity with new and talented staff to accomplish this effort.

MASTER PLANNING

One of YISD's accomplishments is their short- and long-term planning efforts. Currently, short- and long-term planning is in its infancy and is primarily carried out by the Associate Superintendent of Operations and the Executive Director of Facilities and Construction. The major components of YISD's current master plan include recent field evaluations derived from comprehensive site visits conducted by an ad-hoc committee and previous comprehensive studies performed by consultants reviewing the existing physical environmental issues and educational adequacies. These assessments provide a look into the current operating environment of the district but do not speak to future objectives to overcoming them. A more formalized master plan should be considered.

A school facility master plan is the "blueprint" for decision-making throughout the school district. It is a formal way of communicating the district's needs, priorities, and intentions to all stakeholders. The master plan also establishes the necessary documentation for stakeholders, funding authorities, and the community to approve funding. As such, the process of master planning establishes a forum through which interested members of the community can voice their opinions to school administrators. This collaborative planning process helps the community feel that their views are valued.

Good master plans include short- and long-term objectives linked to the mission and vision of the school district. A more detailed master plan would include the following:

- introduction;
- master plan definitions;
- district strategic objectives (mission, vision, values, initiatives);
- annual expenditures summary;
- historical school development and renewal;
- historical enrollment;
- enrollment projections;
- projected enrollment vs. permanent capacity;
- enrollment configurations;
    - current district grade configuration;
    - anticipated grade configuration changes; and

- anticipated effects on facility needs;
- anticipated school boundary changes or consolidation of schools within the district;
- economic environment of the district;
- other community factors that will affect school facility needs;
- campus areas;
- general facility data;
- campus educational adequacy summaries;
- portable buildings used for academic purposes;
- review of maintenance practices and impact;
- facility condition assessment data;
- 10- to 20-year modernization/replacement program;
- prioritization of capital projects (new schools and renovations);
- cost assumptions;
- development options/alternatives;
- recommendations; and
- project specific timelines.

Well developed and comprehensive master plans provide information to the community and stakeholders that aids in the approval of bonds and funds sufficient to adequately maintain school facilities. Comprehensive master plans also provide adequate documentation to allow decision-makers to objectively and equitably prioritize needs and make better facility decisions.

VALUE ENGINEERING

Value engineering is conducted informally during the construction phase at YISD. It is currently more focused on cost control than long-term life-cycle value. There appears to be limited information captured from post-occupancy reviews and maintainability of the schools. A more formal value engineering process would link the reviews with commissioning results, post-occupancy surveys, and long-term performance measured via the facilities maintenance department. Post occupancy input from principals, teachers, and school staff can lead to higher performing schools over time. Formalizing this process would lead to greater long-term value and enhanced functionality of the schools.

YISD should implement a more detailed and documented value engineering process to help achieve essential school functions at the lowest life cycle cost consistent with required performance, quality, reliability, and safety. Value engineering is typically conducted in two phases. In the design phase, value engineering considers alternative design solutions to optimize the expected cost/value ratio of projects at completion. Concentrating value engineering efforts in the early stages of project design often affords greater savings and allows a change of direction, if appropriate, without affecting project delivery schedules. Emphasis is on obtaining maximum life cycle value for initial investments of the project. In the construction phase, contractors are encouraged to draw on their experience to propose changes that can reduce costs while maintaining or enhancing quality, value, and functional performance.

MAINTAINABILITY REVIEWS

Many of the schools (both new and old) have maintenance issues that may have been resolved by minor changes incorporated through a review of the designs by personnel familiar with the maintenance of the schools. There is currently limited involvement from the Director of Maintenance and Warehouse in the review of school concept and design drawings. Facility maintenance and performance reviews conducted by the Facilities Director and Energy Manager should be incorporated and documented. These reviews generally lead to reduced maintenance costs and often lower capital renewal costs over time.

It is generally accepted that the operations and maintenance costs of schools is in the range of two to four times the cost of construction over the life of a facility. Yet, most of the focus continues to be on design and construction. Even value engineering tends to primarily consider the reduction of first-time costs over the long-term maintainability of building systems. The potential to significantly impact the long-term operating costs should be enough to include the Director of Maintenance and Warehouse in the review of systems and materials to be used in new schools.

COMMISSIONING

YISD does perform some aspects of a formal commissioning process. The construction project managers work with the various school contractors to test and inspect systems, and train YISD facilities maintenance staff on the correct operation of the various systems. While the district has begun the process of developing formal pre-occupancy protocols, including commissioning procedures, the district still lacks a

formal process regarding accepting and occupying a new facility from a contractor.

Commissioning, in its most basic form, is the process of ensuring that building systems are operating in accordance with the design intent and the owner's requirements. More specifically, commissioning:

- defines the building systems performance criteria;
- provides a validated baseline for building performance; and
- provides a means of tracking and evaluating building performance over time.

New buildings and systems often do not operate as intended. When these systems do not operate correctly, they create problems for building occupants and for those managing the facility. Commissioning these systems ensures the building is performing as initially specified.

Commissioning is typically performed in new and existing buildings for a few key reasons:

- to verify that new or existing building systems are operating as designed;
- to identify unexplained rises in energy use;
- to identify an unexplained increased number of thermal comfort complaints; and/or
- to achieve LEED certification for buildings.

Commissioning can uncover many building system errors that may not otherwise be found. Commissioning can help identify numerous issues helping to save money and improve efficiency, such as:

- ductwork disconnected from diffusers sending conditioned air to the above-ceiling space instead of the space to be conditioned;
- Variable Air Volume (VAV) box re-heat valves stuck open, causing over-heating of zones;
- un-insulated conditioned air ductwork located in unconditioned spaces;
- fans rotating backwards;
- lighting controls programmed incorrectly causing lights to stay on longer than necessary;
- cross-connected HVAC sensors, causing systems to over-heat and over-cool;
- clogged filters;
- improperly installed condensate drainage systems resulting in pooling water on the roof and creating the potential for roof damage;
- non-working duct smoke detectors; and
- non-working emergency and exit lights.

Because problems are discovered and corrected as part of the commissioning process, building owners gain systems that perform as designed and are safer. They also increase energy efficiency and thermal comfort, costs less to operate, improve the overall safety, and have fewer tenant complaints. With a properly executed commissioning plan, the building's performance can be improved, systems can operate more efficiently, operating costs can be reduced, and occupant complaints can be decreased from the beginning.

DOCUMENT MANAGEMENT

Currently, the contractor provides electronic copies of school design drawings, specifications, and some Operations and Maintenance (O&M) manuals. The review team did not see the means YISD uses for storing or cataloguing these data. Proper formatting, organization, referencing and use of the data of the CDs will not only help maintenance staff improve processes and efficiency, but aid architects and planners in minimizing future renovation costs, and possibly improve the functionality and safety of the schools.

Experience has shown that institutional organizations and government agencies across the U.S. spend billions of dollars unnecessarily to re-collect or regenerate facilities data and information that has already been created in the past. This is information needed to properly operate, maintain, and improve facilities over their life cycle. Today, this information is also used by first responders in cases of emergency and decision makers to make better decisions about facilities. Easy access to the data is essential.

There are several key issues to making this information most useful. The data needs to be complete, comprehensive (right level of detail), standardized, well organized, and readily accessible. Best practices include providing specifications for designers and contractors to follow to generate and format the data.

At a minimum, the facilities data compiled for every new school facility should include:

- project specifications;

- design drawings;
- design factors/assumptions;
- shop drawings;
- as-built drawings;
- submittals;
- warranties;
- construction photographs;
- commissioning reports;
- general system/equipment descriptions;
- general operating instructions;
- equipment inventories;
- equipment attributes;
- installation instructions;
- set-up/calibration instructions;
- equipment O&M manuals;
- start-up/shut down procedures;
- spare parts data;
- wiring diagrams;
- material safety data sheets (MSDS);
- preventive maintenance procedures; and
- facility plan with emergency shut-off locations

Organization and formatting of the electronic data should make it easy to find the information listed. Placing documents in directories labeled as 'Specifications', 'Drawings', and 'Preventive Maintenance Procedures' is best. Drawings should also be labeled and stored as complete sets by architectural system. O&M Manuals should be filed in accordance with Construction Specifications Institute (CSI) Masterformat or Omniclass guidelines. The equipment inventories and preventive maintenance procedures should be in a flat file format or database that can be easily migrated into a computerized maintenance management system (CMMS).

PERFORMANCE MEASUREMENT

The development of sound data information standards and automating processes enhances facilities performance measurement and the accuracy of key performance indicators (KPIs). The objectives of automating work processes are to increase performance, measure facilities performance, and provide better information to make the best decisions regarding facilities.

The current performance measurement at YISD is limited in scope and requires time-consuming manual data generation via spreadsheets. The performance measurement data provided to the review team included general budget information. The Director of Warehouse and Maintenance indicated he is not being asked for reports. There are great opportunities to improve facilities performance through the development of more specific KPIs aligned with the mission and vision of YISD. The right strategic thinkers are currently in place to accomplish this task.

Measuring facilities operation's performance in today's environment is the route to credibility. The focus must be on prevention, not cure, and there must be recognizable aims and achievable prioritized objectives. Metrics provide essential links between strategy, execution, and ultimate value creation.

There are many ways of identifying and developing metrics and KPIs for use in school facilities management performance measurement. It is also easy to find samples of hundreds of potential facility maintenance metrics. However, it is not easy to identify and implement the right metrics to link facility operations and maintenance to strategy. The right KPIs should focus on those services that have the most prominent place in YISD'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 and tasks.
- Outcomes: Indicators that provide a measure of how successfully the facilities function is performing at the enterprise level.

Educational organizations at the forefront of their industry have developed best practices by using a balanced scorecard approach to KPIs. The balanced scorecard is an approach that integrates financial and non-financial performance measures to show a clear linkage between the institution's

goals and strategies. Most balanced scorecards consider four perspectives: customer perspective, process perspective, learning and growth perspective, and a financial perspective. The framework set by the balanced scorecard approach provides an excellent methodology to measure overall performance as facilities managers.

CAPITAL PLANNING

The topic of facility investments and capital planning for school facilities remains at the forefront of the educational facilities executive's world. School organizations across the U.S. are facing the largest collection of aging buildings ever encountered. Deferred maintenance backlogs continue to grow at unprecedented rates, while the toll it has taken on facilities is reaching critical levels. Current research and data support the need for better facility capital investments and asset management. This research identifies, and recommends the following:

- obtain objective and credible data to make the rational and informed facilities investment decisions through prioritizing needs;
- streamline facilities management processes and reducing the total cost of ownership;
- improve the condition of facilities;
- extend the life of assets through proper maintenance and repair funding and decisions;
- minimize safety and security risks at facilities;
- minimize the disruption to customers (passengers) and tenants caused by facility system failures by maximizing critical system reliability;
- enable optimal use of facilities and infrastructure in support of the agency/organizational mission; and
- improve overall stewardship of facilities and maximizing return-on-investment for stakeholders.

A majority of states across the country are experiencing, or have experienced litigation challenging the adequacy or equity of funding school investments. Equitable distribution of funding schools is probably one of the most difficult and hotly contested challenges school administrators face. To make matters worse, there are too many inconsistent and misapplied assessment practices providing data that is difficult to defend. There are guidelines and new approaches that can alleviate some of the controversy and provide more credible and objective data. YISD should re-evaluate their current process to incorporate key components of these new approaches. Details are provided in Recommendation 6.

FACILITY MANAGEMENT INFORMATION TECHNOLOGY

Finding #8 – YISD is struggling with the use of the current enterprise resource planning system to effectively manage facility management information. This makes it difficult to track performance and obtain good data to make decisions on a campus by campus basis.

Recommendation 4: Develop a strategic technology plan to aide in the evaluation of ERP/CMMS return on investment.

The current facility management information technology system is underutilized and reportedly does not adequately support the overall maintenance processes that restricts facility management's ability to manage work, track performance, and obtain pertinent data and make informed decisions on a campus basis.

Facility management at YISD currently uses the district's enterprise resource planning (ERP) software to support their work order processes. However, the system's capabilities have not panned out as originally thought and the district has had difficulty matching current facilities management processes with the financial terms and setups in the ERP. YISD is currently evaluating options to maintain the current system or replace the ERP with a more traditional computerized maintenance management (CMMS) or computer-aided facility management (CAFM) system. A careful and independent review process is necessary. The district should create an advisory team to generate a strategic technology plan and review process.

One of the benefits of an ERP system is the real-time exchange of enterprise-wide data in a single database. Additionally, it provides a single user interface to minimize training requirements and eliminates the need to learn multiple systems that often maintain redundant data. The challenges are typically that the ERP systems are more complex in order to cover multiple applications and they often sacrifice capability in specific functional areas. One of the more common sacrifices experienced is in the non-core ERP function of facility management maintenance management. An objective value-based decision must be made regarding the trade-off and desired outcome. The majority of facility organizations in the U.S. have moved to separate CMMS/CAFM applications to support their business processes. A major reason for this trend is the

development of more functional and robust data exchange tools and open-architecture systems to allow the migration of data between systems with greater ease than in the past.

Prior to deciding whether to purchase a new system or contribute additional resources into making the current one work, the district should develop a strategic technology plan that will provide the long-term focus needed to successfully select and/or implement a system and ensure that it supports business processes. The most successful CMMS implementations are those where the facility manager had a sound strategic technology plan, automated broadly, emphasized training, did not try to over-populate the system, had good internal electronic communication in place, had a dedicated automation manager, had buy-in from top to bottom of the organization, understood all costs and maintained good administrative procedures.

Implementation of an automated work order system requires careful forethought and development of data standards to ensure long-term usability of the system. Many CMMS and CAFM systems fail because the data is not standardized and maintainable. Proper implementation and the use of data standards will lead to valuable and effective information and work management systems. Because there are currently no CMMS/CAFM systems in use at YISD, there is an opportunity to do it right the first time.

Any automated system should be implemented as a tool to support business processes. Thus, it is imperative to document work processes prior to implementing technology. Then a specific set of data standards should be established to provide the framework for data management. Most often, CSI Uniformat or Omniclass standards are used for creating building information models. These standards provide guidance on defining naming conventions and parameters such as buildings, building systems, equipment, components, work processes, and attributes. Use and enforcement of these standards increases the quality of the data, optimizes the system performance, and enables better reporting.

Developing a strategic technology plan will provide the long-term focus needed to successfully select and implement a system and ensure that it supports facility business processes. The most successful CMMS implementations are those where the facility manager had a sound strategic technology plan, automated broadly, emphasized training, did not try to over-populate the system, had good internal electronic communication in place, had a dedicated automation manager, had buy-in from top to bottom of the organization, understood all costs and maintained good administrative procedures.

The critical success factors in creating a strategic technology plan include the answers to the following questions.

- Who needs to participate on the planning team?
- Who needs to commit to the objectives of the plan?
- What are the roles of vendors and consultants in preparing a plan?
- What are the predictable do's and don'ts?
- What should be included in the plan?
- Have we set up implementation expectations in the strategic plan?

In order to start, the district should assemble a formal Technology Advisory Team (TAT). The team should consist of an integrated team of facility representatives from the district. Each individual on the TAT has an opportunity to provide input regarding his/her specific area of expertise or requirements of the selected system. The TAT is responsible for overseeing implementation and optimization, data integrity and application stewardship, adjudicating resource allocation, evaluating and recommending future needs and requirements. The TAT is also responsible for maintaining the data and data standards. The TAT must be who "owns" the technology vision and must also be the vehicle for maintaining momentum.

The district should consider a TAT consisting of:

- Associate Superintendent of Operations;
- Executive Director;
- Director of Maintenance and Warehouse;
- Supervisors;
- Information Technology (IT) Managers;
- Training Program Managers;
- Finance Managers;
- Construction Project Managers; and
- Customer representatives

The following are issues that the TAT will need to understand:

- Who are the customers?

- Who needs to commit to the objectives of the plan?
- What are the roles of staff, vendors and/or consultants in preparing a plan?
- Have we set up the right expectations in the strategic plan?
- How do we make our IT work for us?
- How do we gain commitment?
- Is our Facilities Management Department IT savvy?
- What are the true costs?
- Who owns the database?
- Who is responsible for standards?

The team that does the planning should also lead the implementation and on-going management of the technology initiative. Typically, the team that selects the strategic goals will be a little smaller than the one that follows through with the implementation.

While it is not essential for every interested stakeholder to participate on the planning team, it is essential for all of them to commit to the goals and desired outcomes. They will only do so if they know their interests have been taken into account in the decision-making process.

Once established, the team must take a look at what the strategic objectives of the organization are and then mirror them with the technology they are trying to implement. A close evaluation of the existing service level should be made to benchmark the current status of the organization. Next, the district needs to determine its preferred service level (see previous discussions on this topic). Finally, the team must link the organization's technology goals to help achieve the desired service level.

Typical FM technology projects incur problems, such as too much reliance on vendor claims or a sense of urgency that shortcuts methodical implementation. The following lists common steps to take and to avoid so that the district will benefit from the FM technology while maintaining cost control.

- go through the discipline of identifying detailed functionality from FM technology that would benefit both clients and staff;
- emphasize training;
- understand all costs;
- ask simple questions about how things are done;
- test applications yourself; don't just watch demonstrations;
- try prototypes and get feedback from users;
- start by fixing small problems to win support;
- structure big projects so there are payoffs along the way;
- select your best employees for implementation;
- settle for 80 percent solutions; and
- agree on realistic goals.

Do not:

- over-populate the database;
- try to use a large project to cover costs;
- set vague objectives such as "improve productivity";
- structure the implementation to avoid conflict;
- select a technical implementation leader unskilled in negotiation;
- assume that interviewing users reveals exactly what they need; and
- emphasize incremental improvement if what you really need is fundamental change.

If the district considers CMMS systems, good general procurement practices should ensure acquisition of the appropriate system. However, the following recommendations are offered:

- obtain a short list of two or three vendors;
- visit at least two reference sites;
- use a predetermined scorecard for evaluation;
- weight evaluation criteria;
- have vendors demo at your facility; and
- provide incentives for value engineering.

COMPREHENSIVE MAINTENANCE PROGRAM

Recommendation 5: Continue to implement a comprehensive planned maintenance program with focus on a reliability-centered maintenance approach.

YISD's maintenance program is insufficient to provide the long-term stewardship needed to preserve the district's facilities. YISD's maintenance program consists mainly of breakdown maintenance, corrective actions, responding to demand work requests, periodic facility inspections, and contracted annual preventive maintenance. The Director of Maintenance and Warehouse does have funds allocated to preventive maintenance that is currently being used to reduce deferred maintenance and purchase equipment. As previously discussed in Accomplishment 3, there is a good initiative to inventory and barcode equipment in development of preventive maintenance plans. Additionally, water chemistry analysis is utilized by the district through outsourced labs for campus cooling tower conditions. However, not investing in additional labor and financial resources to formalize a maintenance program will result in inordinate expenditures and a shortened useful life of building systems and schools.

With few exceptions, preventive maintenance has been considered the most effective way of maintaining building systems and extending the service life of equipment. Most PM programs are based on the assumption that there is a cause and effect relationship between scheduled maintenance and system reliability. The primary assumption is that mechanical parts wear out, thus the reliability of the equipment must be in direct proportion to its operating age. However, research has indicated that operating age sometimes may have little or no effect on failure rates. There are many different equipment failure modes, only a small number of which are actually age or use related.

Reliability Centered Maintenance (RCM) was developed to include the optimal mix of reactive-, time- or interval-based, and condition-based maintenance. RCM is a preventive maintenance process that identifies actions that will reduce the probability of unanticipated equipment failure that are the most cost effective. The principle is that the most critical facilities assets receive maintenance first, based on their criticality to the mission of the facility or organization dependent on that asset. Maintainable facilities assets that are not critical to the mission are placed in a deferred or "run to failure" maintenance category, and repaired or replaced only when time permits or after problems are discovered or actual failure occurs.

A streamlined RCM maintenance process allows organizations to use their scarce personnel and funding resources to support the most critical assets that have the highest probability of failure to the organization's mission.

Streamlined RCM programs have several clear benefits:

1. Managers, not equipment, plan shop technician's activities and time.
2. Planning of work allows labor, parts, materials and tools to be available when needed.
3. Equipment part replacements are minimized. The probability that bearings need only lubrication and not replacement is maximized. PM also minimizes the potential need to not only replace bearings, but the shaft, rotating parts, bearing housings, casings, and possibly motors.
4. Managers/schedulers have time to evaluate what other work could be done at the same time and location as the planned PM, optimizing shop productivity.
5. Engineers can study equipment maintenance histories to implement changes that could improve equipment performance or energy efficiency.

The following sections further define the various aspects of a streamlined RCM program.

Passive Monitoring: Passive monitoring (e.g., corrective, reactive, or breakdown maintenance), does have a place in facility operations, but should be limited to equipment that has been evaluated to have no risk of business interruptions or consequences of direct or indirect damage to facilities. "Run-to-failure" plans can be cost effective where the cost of PM over the life cycle of the equipment is greater than the loaded cost of equipment replacement.

Preventive Maintenance: Preventive Maintenance is interval-based work that is planned and scheduled to allow maximum efficiency, minimize excessive labor and parts replacement and prolong the useful service life of equipment. A comprehensive PM program allows the building systems to operate at full efficiency for their useful life and can prevent expensive repairs due to equipment failure. PM programs are also required to preserve most equipment warranties. PM is deemed appropriate for equipment where abrasive, erosive, or corrosive wear takes place, or material properties change due to fatigue.

Preventive Maintenance should be scheduled to be performed at specific frequencies and completed at times in the aging process of the equipment where it can be restored with minimal investment. This proactive approach through such tasks as filter replacements, belt tightening/changes, cleaning, etc., ensures that the equipment ages as slowly as possible.

Predictive Maintenance (also referred to as condition-based maintenance or predictive testing and inspection – PT&I): Predictive testing and inspection (PT&I) should be implemented as a part of the overall RCM program. Equipment operating conditions should be monitored during the PT&I inspections and trends developed to help determine the need for additional PM and the optimum time for equipment overhaul or replacement.

The best use of PT&I is to implement simple visual/audible and non-destructive procedures (e.g., temperature and pressure readings) to record conditions at a specific time (snap shot) when the equipment is inspected at the time of PM. When a series of condition records (snap shots) are compiled, a trend analysis can be developed. This trend analysis is the basis of PT&I and can provide factual data to support capital expenditure decisions regarding building systems.

Specific PT&I methods that have proven to be effective are listed herein:

- Airborne Ultrasonic Testing – Most rotating equipment and many fluid system conditions will emit sound patterns in the ultrasonic frequency spectrum. Changes in these ultrasonic wave emissions are reflective of equipment condition. Ultrasonic detectors can be used to identify problems related to component wear as well as fluid leaks, vacuum leaks, and steam trap failures.
- Infrared Thermography – Infrared (IR) thermography can be defined as the process of generating visual images that represent variations in IR radiance of surfaces of objects. IR tries to detect the presence of conditions or stressors that act to decrease a component's useful or design life. Many of these conditions result in changes to a component's temperature that can be detected with IR.
- Motor Circuit Evaluator (MCE) Testing – MCE is used during acceptance to evaluate the condition of motor power circuits. Any impedance imbalances in a motor will result in a voltage imbalance. Voltage imbalances in turn will result in higher operating current and temperatures, which will weaken the insulation and shorten the motor's life.
- Vibration Analyses (Rotating Equipment) – Equipment which contains moving parts vibrates at a variety of frequencies. These frequencies are governed by the nature of the vibration sources, and can vary across a wide range or spectrum. If any of these components start to fail, its vibration characteristics change. Vibration analysis detects and analyzes these changes.
- Lubrication Oil Analyses – Oil analysis (OA) is the sampling and laboratory analysis of a lubricant's properties, suspended contaminants, and anti-wear additives. OA is performed during routine preventive maintenance to provide meaningful and accurate information on lubricant and machine condition. By monitoring oil analysis sample results over the life of a particular machine, trends can be established which can help eliminate costly repairs.
- Water Chemistry Analysis – The use of chemistry to determine the chemical make-up of water used in hydraulic systems to help identify existing or future problems. This analysis should include pH, conductivity, Phenolphthalein and Methyl Purple alkalinity, hardness, iron (and any metals specific to the system), Sulfate, Nitrate and Ammonia.

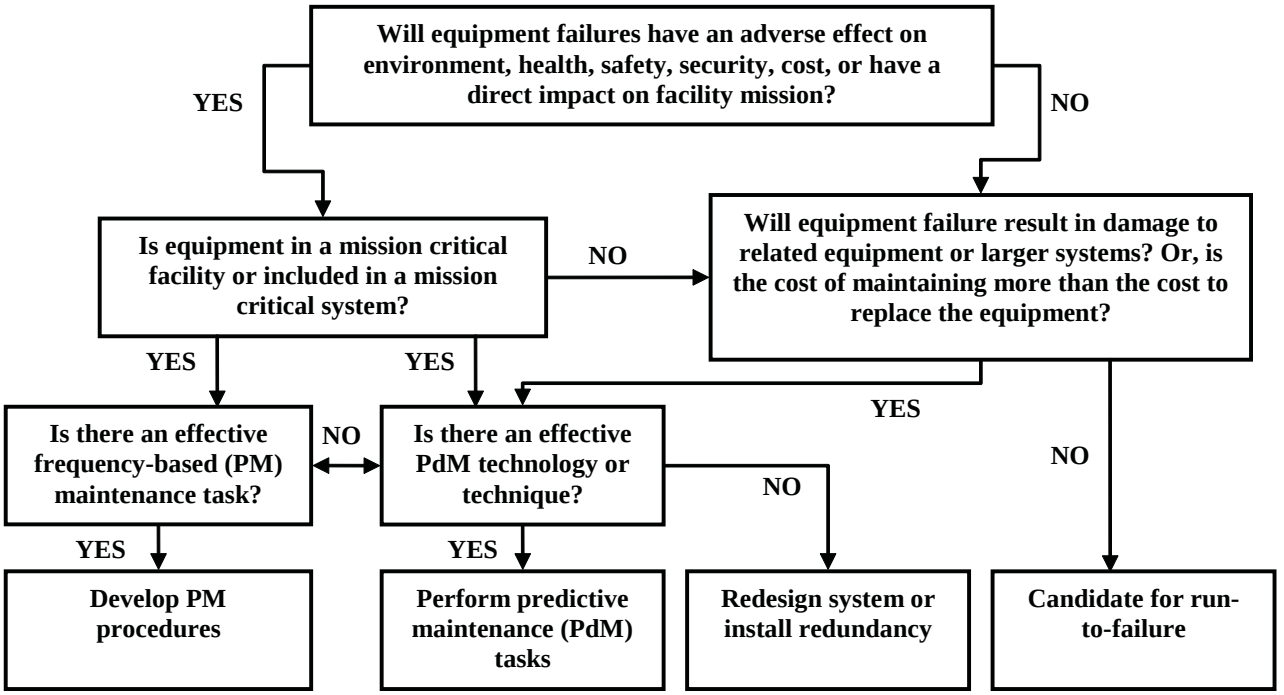
Determination of the right type of maintenance for various equipment types can be determined by following a logic-tree decision-making process as shown in **Exhibit 4**.

The district should implement a comprehensive maintenance program to improve the stewardship of their facilities and increase the total cost of ownership of their assets. A comprehensive maintenance program includes the right mix of preventive maintenance (PM), predictive maintenance (PdM), and reactive maintenance (i.e., passive monitoring) components.

To develop a comprehensive maintenance program, YISD should begin by identifying systems and components, prioritizing maintenance activities, developing job plans, and estimating job plan completion times. Each activity is further defined below:

Step 1: Identification of Systems and Components – Comprehensive maintenance programs begin with a facilities assessment to identify the various assets' systems and maintainable components. All pertinent information should be collected (e.g., manufacturer, serial #, model #, capacity, size, etc.), and a determination of the present condition made, to establish a baseline from which to work. Knowing the age and condition of equipment is a prerequisite for maintaining it properly. For more about facilities asset identification and assessments see Recommendation 6.

EXHIBIT 4
RELIABILITY CENTRAL MAINTENANCE LOGIC TREE



NOTE: Preventive Maintenance (PM); Predictive Maintenance (PdM).
SOURCE: Adapted from National Aeronautics and Space Administration, Reliability Centered Maintenance Guide for Facilities and Collateral Equipment, February 2000.

Step 2: Prioritizing Maintenance Activities – Once the facilities data has been compiled, the logic tree described in **Exhibit 4** can be applied to help determine at what level each piece of equipment should be maintained. Equipment to be included in the maintenance program should be selected based on the cost of performing advanced maintenance weighted against the cost impact of deferring the maintenance.

Information should be obtained during the data collection process to associate a priority with each system and asset in each facility. Criticality of each asset should be determined through a review of the system's function, area served, and importance of reliability. The criticality assessment provides the means for quantifying how important the function of a system and its components are relative to the identified mission. A numerical ranking of one through ten can be adopted and applied in accordance with **Exhibit 5**. The equipment can then be prioritized based on its criticality of maintaining functionality of the facilities or other predetermined district mission needs. Prioritization becomes increasingly important as available resources become more scarce.

The criticality factors for each piece of equipment in conjunction with the logic tree (**Exhibit 5**) can then be used to determine and adjust the level of service attributed to each piece of equipment based upon available resources.

Step 3: Developing Job Plan and Estimating Completion Times – Once the criticality analysis is complete and the appropriate maintenance methods established for each type of equipment and by location, maintenance tasks for all equipment types should be compiled.

Maintenance tasks should be based on manufacturer's recommendations and/or job plans developed by industry standard publications such as R.S. Means, General Services Administration (GSA), and Whitestone and adapted based on experience. Detailed tasks, performance times, and frequencies by equipment type should be developed. Care should be taken to format the tasks in a mean and method for future uploading into a CMMS/CAFM system (See Recommendation 4).

In addition to specific tasks, standard performance times and frequencies, the job plans should also describe a process for resolving maintenance problems and the specific tools and

EXHIBIT 5
CRITICALITY/SEVERITY ASSESSMENT CATEGORIES

RANKING	EFFECT	COMMENT
1	None	No reason to expect failure to have any effect on safety, health, environment, or mission.
2	Very Low	Minor disruption to facility function. Repair to failure can be accomplished during trouble call.
3	Low	Minor disruption to facility function. Repair to failure may be longer than trouble call but does not delay mission.
4	Low to Moderate	Moderate disruption to facility function. Some portion of the mission may need to be reworked or process delayed.
5	Moderate	Moderate disruption to facility function. 100% of the mission may need to be reworked or process delayed.
6	Moderate to High	Moderate disruption to facility function. Some portion of the mission is lost. Moderate delay in restoring function.
7	High	High disruption to facility function. Some portion of the mission is lost. Significant delay in restoring function.
8	Very High	High disruption to facility function. All of mission is lost. Significant delay in restoring function.
9	Hazard	Potential safety, health, or environmental issue. Failure may occur with warning.
10	Hazard	Potential safety, health, or environmental issue. Failure will occur without warning.

SOURCE: National Aeronautics and Space Administration, Reliability Centered Maintenance Guide for Facilities and Collateral Equipment, February 2000.

materials needed. Some problems will be simple and the appropriate corrective action can be included among the other information in the task list. Other problems may not have an obvious solution, and in these cases the responsibility and process for addressing the problems should be clear.

Once a comprehensive list of maintenance tasks is developed, it may be necessary to again look at the prioritization of items or adjust the frequency of tasks to fit staff availability. Because resources are finite, the Director of Warehouse and Maintenance will need to use some judgment about which tasks are most important. When setting these priorities it is important to keep in mind the criticality rankings previously determined, so as to not overlook and reduce maintenance on mission critical systems.

The fiscal impact of creating a comprehensive maintenance program is limited to the internal allocation of resources to inventory and set up the job plans, and the purchase of industry standard job plans if the district does not already have access to these resources. On newer buildings, pertinent equipment information should be able to be abstracted from construction documents with relative ease and the associated maintenance tasks and times are provided by industry standard publications.

If internal resources are not capable or able to accomplish this task, additional resources (i.e. consultants) could be hired to aide in the program set up. Outside consultants could typically be procured for $.05/square foot to aide in the program setup. Multiplying $.05/ square foot times the district's total square footage (7,244,455 square feet) equates to approximately $362,223.

Computerized Maintenance Management Systems (CMMS) focus on such preventive maintenance programs for school districts of all sizes. These systems can not only help schedule services on equipment, they can also track costs and activities associated with each asset entered into the system. The right system will help management identify the particular skills they need at various times of the year, allowing them to manage and balance workloads.

FACILITIES CONDITION ASSESSMENT PROGRAM

Finding #9 – There is a process in place to identify facility conditions and capital needs. However, it is consensus-based and lacks a means of credibly and objectively assessing facility needs. It appears to be inefficient through redundancy of assessors. This may also make it difficult to justify.

Recommendation 6: Consider revisions to the current facility condition assessment (FCA) process to prepare credible and defensible annual asset management plans and forecasts of facility capital needs (facility needs assessment).

YISD has been proactive in assessing the needs of their facilities over the past five years in relation to a 2004 bond. The process included an ad-hoc committee composed of both district staff and community representatives using a unique and somewhat consensus-based approach to identify needs. The ad-hoc committee was assembled to help identify conditions of building components in preparation for the 2004 bond. The following building component categories were used:

- building structure;
- safety/circulation;
- heating/air conditioning;
- plumbing facilities;
- electrical features;
- instructional rooms;
- special rooms;
- general areas;
- administration rooms;
- operational features; and
- site adequacy.

The ad-hoc committee used a thousand point value score with variable weighting of different aspects or features of a school, as applied in the School Plant Factor Profile, to assign a general condition to each category. Each member of the committee individually assessed the building components. Scores were totaled and averaged, and comments compiled. Upon review of the score sheets and methodology, the review team found major inconsistencies among the scores of the various assessors. There was frequently a wide variation in scores of overall system average conditions between assessors. These system average conditions were then averaged. This averaging of averages, with such a wide disparity of scores, would be difficult to justify. This consensus-based approach may present credibility issues and questions regarding the objectivity of assessing facility needs. It appears to be inefficient through redundancy of assessors. Based on review of the data, this may also make it difficult to defend. YISD should conduct a careful review of the process with respect to the guidelines presented in this section to enhance the overall process. It is possible to continue the needs assessments using internal staff if done so with caution and training.

During the same time period as the ad-hoc committee assessment in 2003, YISD contracted with a professional consulting firm to assess facility conditions, identify deferred maintenance backlogs, and educational suitability. This needs assessment identified over $500 million in project needs. Half of the identified needs were included in the 2004 bond that was approved by voters for $250 million. Project priority was determined through consensus between the ad-hoc committees and the professional consulting firm assessments. All final decisions regarding which projects would be included in the bond are made by the Board of Trustees.

The results from the assessments included these major findings:

- a need to reduce the number of portable classrooms on the campus;
- a need to improve physical and educational environments, including air quality and air flow issues, acoustics, and temperature ranges;
- a need to provide better learning environments, since the perceived levels of quality learning environments is not equitable and some buildings are in danger of being unable to support current and future program demands; and
- energy conservation and maintenance, due to escalating costs, will require increased attention in the building program.

The district continues to face these same issues today.

Finally, in preparation for the review team's assessment, maintenance teams prepared a deferred maintenance list based on their experience with the facilities in their purview. Secondary and independent methods with no correlation to the previous assessments add another challenge to defending the data.

Despite these assessment efforts, the Director of Warehouse and Maintenance lacks confidence in the complete and true nature of the deferred maintenance backlog the district faces. There is also limited ability to prioritize the needs effectively.

While the programs the district has implemented in preparation for the 2004 bond are somewhat valuable, YISD should review the process and restructure to incorporate elements presented herein. The primary tenants of an asset management program are to conduct facility condition assessments and create a facility investment plan that is:

- rational (based on objective and tested algorithms);
- repeatable (consistently produces results and can themselves be reproduced);
- recognizable (follows industry standards and best practices); and
- credible (defensible and justifiable based on quality data).

Concern about the deterioration of educational environments led to a number of collaborative studies by both educational and government associations. The identification and reduction of deferred maintenance has been the primary driving force of asset management programs for educational facilities. The study also led to the development of the Facility Condition Index (FCI), one of the most recognized metrics for facilities asset management performance measurement.

Most public and private school systems generally use some form of facility condition assessment or life cycle analysis to determine backlogs of maintenance and repair and assess their facility needs. Findings and recommendations of best practices in facilities asset management (and facility condition assessments) have been researched and reported by the National Research Council independent of the specific approach. Key components to an asset management program include:

- standardized documented process that provides accurate, consistent, and repeatable results;
- detailed ongoing evaluation of real property assets that is validated at predetermined intervals;
- standardized cost data based on industry-accepted cost estimating systems (repair/replacement); and
- user-friendly information management system that prioritizes deferred maintenance (DM) and capital renewal (CR).

YISD should consider the following steps:

- Agree on the desired outcomes of the needs assessments.
- Review industry standard and recognized assessment methodology.
- Select an appropriate approach.
- Select and train independent assessors (internal or external) on the approach.
- Calibrate the assessors using a pilot study.
- Develop and incorporate industry standards for system identification (Uniformat/Omniclass), cost estimating (RS Means/Whitestone), prioritization schema, and general lexicon.
- Review available maintenance histories and previous evaluations.
- Objectively and consistently assess building systems and collect data.
- Test and validate the data and calculate appropriate indexes.
- Incorporate a quality assurance program.
- Develop a project justification approach.
- Package the results to position the school district to effectively use and defend the data.

Asset management plans should independently validate funding requests and provide consistent and credible information to aid in appropriately allocating funding for facility major maintenance projects. The plans should support funding decisions to ensure equitable distribution of funds among schools and ensure proper stewardship of the facilities.

Comprehensive facilities needs assessments and master plans should include the following elements:

- a review of the district construction and improvement plans;
- five- to ten-year projections of enrollment by school, grade, and year;
- an analysis of school capacity over the planning period;
- a public input process to obtain community desires and needs;
- a five- or ten-year capital plan for existing facility maintenance and repair;
- a review of funding strategies; and
- an ongoing review and monitoring process for the plan.

The benefits of preparing facility asset management plans by conducting baseline facility condition assessments (FCAs) include:

- obtaining objective and credible data to make informed facilities investment decisions through prioritizing needs;
- streamlining facilities management processes and reducing the total cost of ownership;
- improving the condition of school facilities;

- extending the life of assets through proper maintenance and repair funding and decisions;
- minimizing safety and security risks at school facilities;
- minimizing the disruption to teachers and students caused by facility system failures;
- enabling optimal use of facilities and infrastructure in support of the educational mission; and
- finally, improving overall stewardship of facilities and maximizing return-on-investment for district stakeholders.

Because of the cost of performing ongoing comprehensive assessments (consultants typically charge $.10/square foot; $.10/ square foot X 7,244,455 square feet = $724,456), the review team recommends revising the current methodology implemented with the ad hoc committee to begin formalizing a more rational, repeatable, recognizable, and credible methodology.

If internal resources are not capable or able to accomplish this task, additional resources could be hired to aide in the approach set up. Outside consultants could typically be procured for $50,000 to aide in the approach development and training.

COMPREHENSIVE TRAINING AND PROFESSIONAL DEVELOPMENT PROGRAM

Finding #10 – The Director of Maintenance and Warehouse indicated that the department had money allocated for training, but there was no formal internal training program or tracking mechanism for external training completed.

Recommendation 7: Initiate a comprehensive training program by developing individual training plans to minimize possible on-the-job-accidents, staff inefficiencies, and repeat work.

YISD does not currently have a formal training or professional development program. Limited training is offered outside of basic safety training and required certification training. YISD's Director of Warehouse and Maintenance indicated the maintenance budget had funds specifically set aside for training.

Not investing in ongoing training can result in increased on-the-job accidents, inefficient staff, and required repeat work. Adequate and continuous training is a key step in the development of individual performers.

Best practices show that between two and 5 percent of a facility department's overall operating budget should be spent on training and development. Although most organizations do not spend to this level, this best practice indicates the importance of training. YISD should initiate a comprehensive training program by developing individual training plans to minimize possible on-the-job-accidents, staff inefficiencies, and repeat work.

Training is the opportunity to educate the employees in the most effective way to utilize the available resources and to ensure that people understand the environmental rules and regulations regarding facilities and grounds. Information can be shared not only about the facilities and spaces, but also about the larger district environment and the industry in general.

Generally, there are four basic areas of training focus:

- training new employees in the maintenance and use of the facilities and grounds;
- training current employees who have changed task or function;
- training all employees when new statutes need to be enforced; and
- training all employees when new equipment or tools are purchased.

Managers must think creatively about how to provide high-quality training opportunities in the face of time and budget constraints. *The Planning Guide for Maintaining School Facilities* (NCES, 2003) makes the following suggestions:

- sharing training costs with other organizations on a collaborative basis (e.g., training may be sponsored by several neighboring school districts or jointly by the school facilities department and the public works department in the same community);
- hiring expert staff or consultants to provide on-site supervision during which they actively help staff improve their skills while still on-the-job;
- developing training facilities, such as training rooms in which equipment and techniques can be demonstrated and practiced;
- offering tuition reimbursement programs which provide educational opportunities to staff who

might not otherwise be motivated to improve their knowledge and skills; and

- building training into contracts so that vendors are obligated to provide training at either an on-site or off-site training center as a condition of the purchase of their products.

Additional suggestions include:

- utilizing current staff to perform training with respect to their expertise; and
- compounding the effects of training by having employees who have attended training report to those who were unable to attend due to resource restrictions.

Training typically refers to learning opportunities specifically designed to help an employee do his or her job better. "Professional Development" has a broader meaning which includes expanding participant's knowledge and awareness to areas outside their specific job duties, yet still related to the overall well-being of the organization.

Such topics might include:

- asbestos awareness;
- energy systems;
- building knowledge;
- first aid;
- emergency response;
- biohazard disposal;
- technology use;
- universal precautions;
- right-to-know;
- first responder awareness;
- first responder operations; and

Finally, ongoing evaluation of training efforts, including all aspects of the experience, should be built into the program for educating employees about the facilities and grounds. Good training is timely, informative, effective, and keeps teachers, staff, students, and visitors healthy and safe.

The best training evaluations are the summaries of work orders related to the focus of the training (see Recommendation 8 regarding implementation of a Work Order System). Have the numbers of requests for "the problem area" decreased since training was instituted in regards to that area? Have safety incidents related to facilities decreased? Those items in the work plan that can be directly tied to training issues should be set up on a tracking system to monitor on a regular basis.

This monitoring can serve multiple functions; one, to track the effectiveness of the training; two, to be able to lobby for more money to do more training when the results are good; and finally, to help identify areas where further training may be required.

YISD should develop individual staff training plans for each employee. The Director of Warehouse and Maintenance should conduct formalized training specific to all job operations and safety related to their staff's functions. Clear documentation of training should be referred to and reviewed periodically to ensure that consistent and updated training is provided and to measure safety improvement practices. It is also recommended that facility management staff document all safety related training conducted and that these documents be stored at a designated document center for easy access and reference for management and employees alike. Any training provided to the facility organization should be videotaped for future reference and training opportunities.

Industry best practices show that between two and five percent of a facility department's overall personnel budget should be spent on training and development. Based on five percent of the district's personnel budget for the Maintenance Department ($5,722,298), YISD should spend approximately $286,115 annually on training for the department.

Exhibit 6 identifies what training is typically included in a comprehensive training program, as well as indications of how such training is generally delivered and who should receive it. This should be used as a guideline to prioritize and select appropriate topics to meet the needs of YISD.

SERVICE CENTER/CENTRAL WORK CONTROL

Finding #11 – Maintenance supervisors receive work orders and administer maintenance paperwork limiting their ability to truly supervise actual work being accomplished.

Recommendation 8: Implement a service center/central work control to free up maintenance supervisors to spend more time supervising/training and providing Quality Assurance/Quality Control.

EXHIBIT 6
TRAINING RECOMMENDATIONS
AUGUST 2008

	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	x	x	x	x	x	x	x	x				Regulatory	x			
Bloodborne Pathogens Safety	x	x	x	x	x	x	x	x	x	x	x		x	x	x	
Combustible & Flammable Liquids	x	x	x	x	x	x	x	x	x	x			x	x		
Confined-Space Entry	x	x	x	x	x		x						x	x		
Hazard Communications	x	x	x	x	x	x	x	x	x	x	x		x		x	
HAZ-MAT Spill Prevention & Control	x	x	x	x	x	x	x	x	x	x			x			
Lock-Out/Tag-Out	x	x	x	x	x		x						x		x	
Materials Handling, Storage, Use & ID	x	x	x	x	x	x	x	x	x	x	x		x			
Alcohol-Free Workplace	x	x	x	x	x	x	x	x	x	x	x	General Training	x			
Back Injury Prevetion	x	x	x	x	x	x	x	x	x	x			x		x	
Building Evacuation & Emergencies	x	x	x	x	x	x	x	x	x	x	x				x	
Emergency Response	x	x	x	x	x	x	x	x	x	x	x				x	
CPR Academic	x	x	x	x	x	x	x	x	x	x			x		x	x
Disaster Preparedness	x	x	x	x	x	x	x	x	x	x	x		x		x	
Electrical Safety	x	x	x	x	x	x	x						x	x	x	
Eye Safety	x	x	x	x	x	x	x	x	x	x			x	x	x	
Fall Protection	x	x	x	x	x	x	x	x					x	x		
Fire Extinguisher Safety	x	x	x	x	x	x	x	x	x	x	x		x	x	x	
Fire Prevention Safety	x	x	x	x	x	x	x	x	x	x	x		x	x		
General Contruction Safety	x	x	x	x	x	x	x	x					x	x		
General First Aid	x	x	x	x	x	x	x	x	x	x	x		x		x	x
Golf Cart	x	x	x	x	x	x	x	x	x	x	x			x	x	
Forklift		x	x	x	x	x	x	x	x	x				x	x	
Bucket Truck		x	x	x	x	x								x	x	
Job Specific Equipment		x	x	x	x	x	x	x	x	x				x	x	
Hand & Power Tool Safety	x	x	x	x	x	x	x	x	x	x			x	x	x	
Hearing Conservation	x	x	x	x	x	x	x	x	x	x			x	x		
Ladder & Scaffolding Safety	x	x	x	x	x	x	x	x	x	x	x		x	x		
Office Safety	x	x	x	x	x	x	x	x	x	x	x		x	x	x	
Cultural Differences	x	x	x	x	x	x	x	x	x	x	x				x	x
Personal Protective Equipment	x	x	x	x	x	x	x	x	x	x			x	x		
Sexual Harassment	x	x	x	x	x	x	x	x	x	x	x					x
Slips, Trips, & Falls Prevention	x	x	x	x	x	x	x	x	x	x	x		x	x		
H.S. Diploma/GED	x	x	x	x	x				x		x	Certification/ Licenses				x
College Degree	x															x
Technical Degree		x	x	x	x											x
Electrical -Master/Journeyman				x												x
Plumbing -Master/Journeyman					x											x
HVAC Certificate			x													x
On-the-Job						x		x		x						x
Department Procedures	x	x	x	x	x	x	x	x	x	x	x	General Personnel Practices			x	
Work Practices - Time Management/Organization	x	x	x	x	x	x	x	x	x	x	x		x			x
Supervision	x	x						x								x
Employee Relations - Counseling, Performance Evaluation	x	x						x								x
Work Order System	x	x	x	x	x	x			x		x		x		x	x

SOURCE: Facility Engineering Associates, Inc., July 2008.

Work requests are currently received, coordinated, and closed via the supervisor of each team. The review team feels that this function is better served via implementing a service center/central work control to free up maintenance supervisors to spend more time supervising, training, and providing quality assurance. The district should consider developing a central work control or service center to manage the workflow of facilities requests and maintenance efforts.

Currently, schools submit work orders to their corresponding team supervisor. The supervisor receives the request, approves it, and assigns the work order to the appropriate tradesperson within their team. The work order is printed and placed in the assigned tradesperson's envelope for pick-up and execution. After execution of the appropriate work, the work order is turned back into the maintenance supervisor for close-out via a status change and input of time and materials expended.

It is the review team's opinion that the current role of maintenance supervisor is strictly an administrative function. The only supervisory role observed was that of assisting the team leader with performance reviews of the various trades staff. The maintenance supervisor's talents and expertise could better serve the organization by spending more time in the field supervising/training employees and providing quality assurance and quality control. The position would be integral in helping to identify inefficiencies and recommending process improvements (see Recommendation 2).

The current function could easily be consolidated into a service center/central work control where administrative staff received, coordinated, and closed work orders. This approach has proven successful at institutions of all sizes throughout the country. It helps streamline processes to customers making the request process more transparent by having a single point of reference for all work requests. It also helps to eliminate the appearance of inequality in response.

Additional functionality could be incorporated into the service center to provide added benefits. The following represent additional opportunities that should be explored:

- financial management – where they can develop shared tools to minimize redundant data entry, cross-train to be able to back each other up, collaborate on improving the processes of financial management and analysis, and provide a deeper pool of analytical support;
- technical document management – consolidating the responsibility for creating and maintaining technical documents, therefore providing a useful link to help overcome typical difficulties in the hand-off of documentation as facilities transition from construction to maintenance and operations;
- facilities maintenance information technology management – maintaining central data standards and rationalize externally downloaded data into standard formats that can be used by Financial Management and Planning and Performance Management;
- planning and performance measurement – improving performance through identifying goals and standards and measuring performance against them and provide line managers with technical assistance on continuous improvement of their core processes helping to identify your primary training issues; and
- training – providing a centralized location to track and develop training regime geared towards technology optimization and performance improvement because as you increase performance measurement, specific performance issues will arise.

SAFETY INSPECTIONS

Finding #12 – There is a lack of coordination in performing building safety inspections.

Recommendation 9: Identify the resources to perform safety inspections and develop processes to ensure completion and compliance.

Although the District utilizes several methods of identifying and correcting safety hazards, the review team observed disconnects between what YISD thought was being done with regards to quarterly safety/audit self-inspections and what was actually being done. Due to some changes in personnel assignments, the performance and documentation of the quarterly safety/audit self-inspections are irregular and not standardized. It is prudent for the district to clearly identify an individual who can and will have the majority of the responsibility in overseeing the program. The individual should be responsible for providing inspections following these general guidelines:

- Identify safety concerns.
- Determine the potential danger posed by each safety concern. If the item poses an immediate threat of injury then it should be corrected immediately. Otherwise, determine a reasonable length of time for correcting each item.

- Submit any work orders required to "fix" the problem, and indicate it is a "safety inspection item." On high priority safety issues immediately follow up with the director of warehouse and maintenance.
- Review the completed inspection form with the school/department administrator, and develop a plan for correcting all identified safety concerns.
- Monitor to make sure the identified safety item(s) are corrected.
- Report any delay or problem in resolving safety concerns to the Associate Superintendent of Operations and to the Executive Director of Facilities and Construction.
- A copy of all completed inspections, including a list of the safety concerns identified, and a description of the actions taken to correct the problem should be forwarded to the Risk Management office.
- It is recommended that schools and departments maintain copies of their quarterly inspection results for use in tracking and resolving identified safety concerns.

Inspections should focus on identifying issues affecting fire and life safety, egress, and security of all individuals as they are on district grounds. YISD should identify the resources to perform safety inspections and develop processes to ensure completion and compliance.

INCREASED ENERGY CONSERVATION

Recommendation 10: Continue to invest in identifying and implementing opportunities for additional energy conservation; provide methodologies for measurement and verification.

The district has made an excellent start at energy and resource conservation; however, numerous other opportunities remain for significant additional progress. Experience shows that school age youth are increasingly interested in energy conservation. Their energies can provide lively and enthusiastic support to any initiative intent on reducing carbon footprints and protecting their environment. YISD should focus on developing energy and resource conservation curricula and working with teachers to develop conservation programs focused on education. Additional educational opportunities exist as new teachers, staff or administrators are hired. Energy conservation education should be incorporated into the district's new employee orientation. Continuing to provide education to students, teachers, administration and staff will pay dividends as general awareness increases.

YISD has significant opportunities for conservation as capital funds become available to add additional controls. Having said that, greater controls only provide increased conservation if maintained properly. In order to provide the controls, the proper attention of dedicated maintenance resources may need to be applied. Increasing levels of service in regards to maintenance and, specifically preventive maintenance of equipment, will also provide for greater efficiency in equipment operations resulting in energy conservation. Finally, retro-commissioning systems following the same guidelines as outlined in Recommendation 3 for commissioning can improve the buildings performance and help reduce operating costs.

PROTOTYPE SCHOOLS

Recommendation 11: Identify opportunities to use prototype designs to reduce upfront design and engineering costs and decrease construction turn-around time during any high construction periods the district may experience.

The district has utilized prototypical designs in the current bond program. YISD constructed 14 middle school projects reflecting prototypical kitchen designs and 6 High School fieldhouses. Thought should be given to greater implementation of school prototypes across a larger range of facilities to reduce upfront design and engineering costs and decrease construction turn-around time during any high construction periods the district may experience. This can be accomplished in conjunction with the development of procedural standards.

The use of prototype schools has been proven effective across the country for districts experiencing the need for multiple schools spread over short durations with limited site restrictions. Prototype designs have often led to achieving the least expensive construction costs (cost/square foot) of peer areas. The use of prototype designs often eliminates much of the time consuming design elements and the unknown in the construction process minimizing change-orders and therefore delivering a less expensive school to the community quicker.

Good design, incorporating good functional flexibility and materials, has aided other districts in successful implementation. Taking steps to try and provide alternatives

in regards to aesthetic components helps to maintain individual school identity.

Caution should always be taken to determine the feasibility of a prototype approach as it is not prudent in every case.

FISCAL IMPACT

RECOMMENDATION		2009–10	2010–11	2011–12	2012–13	2013–14	5-YEAR (COSTS) OR SAVINGS	ONE TIME (COSTS) OR SAVINGS
1.	Increase maintenance and repair funding levels.	($2,100,892)	($2,100,892)	($2,100,892)	($2,100,892)	($2,100,892)	($10,504,460)	$0
2.	Evaluate maintenance processes and staffing levels.							$0
3.	Evaluate, improve and document facilities planning and maintenance policies and procedures.	$2,094,943	$2,094,943	$2,094,943	$2,094,943	$2,094,943	$10,474,715	$0
4.	Develop a strategic technology plan.	$0	$0	$0	$0	$0	$0	$0
5.	Continue to implement a comprehensive planned maintenance program.	$0	$0	$0	$0	$0	$0	($362,223)
6.	Consider revisions to the current facilities condition assessment process.	$0	$0	$0	$0	$0	$0	($50,000)
7.	Initiate a comprehensive training program.	($286,115)	($286,115)	($286,115)	($286,115)	($286,115)	($1,430,575)	$0
8.	Implement a service center/ central work control.	$0	$0	$0	$0	$0	$0	$0
9.	Identify the resources to perform safety inspections and develop processes.	$0	$0	$0	$0	$0	$0	$0

FISCAL IMPACT (CONTINUED)

RECOMMENDATION	2009–10	2010–11	2011–12	2012–13	2013–14	5-YEAR (COSTS) OR SAVINGS	ONE TIME (COSTS) OR SAVINGS
10. Continue to invest in identifying and implementing opportunities for additional energy conservation; provide methodologies for measurement and verification.	$0	$0	$0	$0	$0	$0	$0
11. Identify opportunities to use prototype designs.	$0	$0	$0	$0	$0	$0	$0
TOTAL	**($292,064)**	**($292,064)**	**($292,064)**	**($292,064)**	**($292,064)**	**($1,460,320)**	**($412,223)**

YSLETA INDEPENDENT SCHOOL DISTRICT INSTRUCTIONAL FACILITIES ALLOTMENT

Ysleta Independent School District (YISD) is part of the City of El Paso, in El Paso County in western Texas. The El Paso area is a commercial and industrial hub of a mining and agricultural region producing cotton, fruit, pecans, vegetables, and livestock. As El Paso is located on the U.S.-Mexico border, tourism is an important aspect of the economy as is trade with neighboring Ciudad Juarez. Several federal facilities add to the economic base of the city to include Fort Bliss, La Tuna Correctional Institution, and numerous offices relating to immigration and naturalization such as the U.S. Department of Homeland Security's Immigration and Customs Enforcement function.

The district has seen a decline in student enrollment of 3.5 percent from 2003–04 through 2007–08. During the same period, property tax values have grown by $1,457,195,893 or 33.4 percent. **Exhibit 7** presents the enrollments and taxable values from 2003–04 through 2007–08.

Growth is expected to increase in the coming years as the Base Realignment and Closure (BRAC) process prepares neighboring Fort Bliss to add approximately 20,000 1st Armored Division soldiers and 27,000 family members relocating from Germany. The BRAC is part of the Defense Department's re-posturing strategy. The Army's modernization effort includes the relocation of the 1st Armored Division Headquarters, four brigade combat teams, and a combat aviation brigade to Fort Bliss within the next three years. As a result, the five local school districts in the El Paso area are expected to absorb approximately 9,600 school-age children from Fort Bliss and from business developers, homebuilders, realtor associations, and transportation officials relocating to the area. YISD is in the process of conducting a demographic study, but administrators indicate they anticipate a substantial influx of students over the next three years as Fort Bliss continues to transform.

The interim superintendent, in a previous assignment, contracted a study of the facilities. The Board of Trustees then recognized the need for construction of new facilities and renovations of existing buildings, and upon hiring a superintendent, asked that action be taken. An ad hoc committee was assembled consisting of YISD administrators and teachers appointed by the superintendent and community members appointed by Board members to conduct an in-depth assessment of the district's facility needs. Field evaluations were derived through comprehensive site visits conducted by the ad hoc committee in addition to two evaluations conducted by professional facility planning, construction, and management firms or individuals. As a result, the district's current long-range facility plan is a summary of the three separate assessments.

Analysis of the data generated from the assessments revealed a number of major findings. In November 2003, a presentation was made to the board indicating the following problems with YISD facilities:

- Largest problem is age of the facilities;
- 74% of facilities are over 20 years old;
- 32% of facilities are 40 years or older;
- Inappropriate application of programs at facilities;
- No bond issue in over 20 years, compounding the problems;
- Structural damages;
- Inadequate and out of date electrical and HVAC systems;
- Inadequate dining facilities and unsafe kitchens;
- Lack of ADA compliant facilities;
- Insufficient science and arts facilities;
- Broken playground equipment;
- Overcrowding; and
- Drainage/landscaping issues.

EXHIBIT 7
YISD ENROLLMENTS AND TAXABLE VALUES
2003–04 THROUGH 2007–08

DESCRIPTION	2003–04	2004–05	2005–06	2006–07	2007–08
Enrollment	46,668	46,349	46,115	45,242	45,049
Taxable Value	$4,368,292,371	$4,621,336,436	$4,750,212,888	$5,315,938,361	$5,825,488,264

SOURCE: Texas Education Agency, CPTD Tax Final, Summary of Finance and Student Enrollment, 2003–04 through 2007–08.

The assessments indicated the need for approximately $500 million in new construction projects and renovations to existing instructional facilities across the district. However, the Board of Trustees did not feel that a bond of that magnitude would be favorably met by the community. The bond proposal package was reduced and in January 2004, the voters passed a single $250 million bond proposition. The district enlisted the assistance of community representatives, parents, and staff to serve on a bond oversight committee (BOC) to voluntarily oversee the proper implementation of the bond.

Proposed by the bond program was the construction of 5 new campuses, several classroom wing additions, roofing upgrades, new field houses, new libraries and fine arts wings, new gyms and kitchens/cafeterias, gym floor renovations, new tennis courts and running tracks, site drainage improvements, new playground equipment at all elementary schools, student drop-off zones, and other miscellaneous facility improvements. **Exhibit 8** shows a high level summary of the projects proposed in the 2004 bond.

The district currently has seven feeder patterns and additional special campuses. **Exhibit 9** presents the full listing of all regular campuses to include square footage added by the 2004 bond, total square footage, capacity and number of portables. The figures do not include square footage or capacity for the district's special campuses, which are supported by 115 additional portable buildings.

YISD administrators indicate the district's preference to use a competitive bidding process in order to award construction and renovation work to a larger number of local vendors. As such, the 2004 bond projects were designed by several different architects and the construction work was completed by several different firms using a variety of construction delivery methods. **Exhibit 10** presents the reported architectural fees for design and construction management of the five new campuses at YISD.

Construction costs have increased significantly in recent years due to demand for a variety of products used in the construction of buildings. The cost of steel, copper, concrete, and oil based products has risen significantly. Oil prices have increased the cost of site development work and transportation costs for delivery of products to the construction site. All Texas school districts have faced the escalation of costs related to construction. YISD had included inflation in the budget for the projects, but the actual costs for some of the projects were above budget. **Exhibit 11** compares the allocated project cost and the revised project cost for new facilities.

For all projects completed in years one and two of the bond program, **Exhibit 12** presents the cost per square foot for new facilities.

Additional bond issuance costs include fees paid to the district's financial advisor and bond counsel. The financial advisor's fee schedule for the issuance of bonds is presented in **Exhibit 13**. For bond counsel services, YISD pays $5,000

EXHIBIT 8
PROPOSED CONSTRUCTION/RENOVATION PROJECTS
2004 BOND PROGRAM

CAMPUS	PROJECT(S)	ALLOCATED PROJECT COST
Eastwood Middle School, Lower Valley Elementary School, North Loop Elementary School, Parkland Elementary School, Ysleta Pre-Kindergarten	New Construction	$70,200,000
District-Wide	Additions – New Field Houses, Kitchens/Cafeterias, Libraries, Gyms, Classrooms, Drop-Off Zones, Site Drainage, Tennis Courts, Playgrounds	$71,600,000
District-Wide	Renovations – Tennis Courts, Playgrounds, Energy Management, Classroom Remodels, Administrative Areas, Running Tracks, Roofing, Drinking Fountains, Drop-Off Zones and Fire Alarms. (Existing Fire Alarms were modified to receive additional new devices associated with the added buildings. A district-wide upgrade was not part of the 2004 Bond program.)	$95,600,000
District-Wide	Technology, Asbestos Abatement, Demolition, Safety/Security, Site Acquisition, Project Administration	$12,600,000
	TOTAL	**$250,000,000**

SOURCE: YISD, Internal Bond Plan Financial Breakdown, April 2008.

EXHIBIT 9
YISD INSTRUCTIONAL FACILITIES
SQUARE FEET, CAPACITY, AND ENROLLMENT BY FEEDER PATTERN
SPRING 2008

SCHOOL	ADDED AREA SQUARE FEET (2004 BOND)	TOTAL SQUARE FEET	BUILDING CAPACITY (STUDENTS)	ENROLLMENT (STUDENTS)	NUMBER OF PORTABLES
Bel Air High School	31,956	387,770	2,675	2,065	6
Hillcrest Middle School	0	123,665	1,056	621	0
Ranchland Hills Middle School	0	65,725	638	400	6
Constance Hulbert Elementary School	0	64,500	638	404	1
Del Norte Heights Elementary School	0	61,768	836	554	5
Hacienda Heights Elementary School	0	71,325	600	587	4
Loma Terrace Elementary School	25,680	92,000	1,000	864	7
Mesa Vista Elementary School	9,249	64,484	680	478	2
North Loop Elementary School	86,733	86,733	860	456	0
Sageland Elementary School	0	66,505	580	500	7
Subtotals for Bel Air High School Feeder Pattern	**153,618**	**1,084,475**	**9,563**	**6,929**	**38**
Del Valle High School	80,178	356,608	2,275	1,897	16
Valley View Middle School	0	102,755	900	665	0
Lancaster Elementary School	0	73,980	850	665	8
LeBarron Park Elementary School	5,132	80,919	1,080	1,056	16
Marian Manor Elementary School	0	78,995	814	554	2
Mission Valley Elementary School	0	70,052	940	570	10
Subtotals for Del Valle High School Feeder Pattern	**85,310**	**763,309**	**6,859**	**5,407**	**52**
Eastwood High School	16,440	302,945	2,090	2,151	11
Eastwood Middle School	263,000	215,000	1,500	832	0
Eastwood Knolls Elementary School	0	141,704	620	730	9
East Point Elementary School	0	73,987	990	803	7
Eastwood Heights Elementary School	8,785	97,880	748	715	6
Edgemere Elementary School	8,224	107,789	960	786	3
Scotsdale Elementary School	8,642	90,016	880	813	10
Subtotals for Eastwood High School Feeder Pattern	**305,091**	**1,029,321**	**7,788**	**6,830**	**46**
Hanks High School	82,076	386,473	2,150	2,239	4
Desert View Middle School	33,620	141,368	924	616	0
Indian Ridge Middle School	0	102,755	1,034	541	0
Glen Cove Elementary School	7,360	115,650	980	1,084	5
Pebble Hills Elementary School	9,485	96,276	1,232	959	3
R.E.L. Washington Elementary School	0	81,300	640	549	2
Tierra Del Sol Elementary School	0	91,476	796	680	3
Vista Hills Elementary School	15,159	83,471	836	742	10
Subtotals for Hanks High School Feeder Pattern	**147,700**	**1,098,769**	**8,592**	**7,410**	**27**

EXHIBIT 9 (CONTINUED)
YISD INSTRUCTIONAL FACILITIES
SQUARE FEET, CAPACITY, AND ENROLLMENT BY FEEDER PATTERN
SPRING 2008

SCHOOL	ADDED AREA SQUARE FEET (2004 BOND)	TOTAL SQUARE FEET	BUILDING CAPACITY (STUDENTS)	ENROLLMENT (STUDENTS)	NUMBER OF PORTABLES
Parkland High School	43,620	285,432	1,525	1,256	8
Parkland Middle School	33,620	125,958	528	705	11
Desertaire Elementary School	10,664	81,747	880	596	6
Dolphin Terrace Elementary School	14,500	104,749	875	712	1
North Star Elementary School	0	80,512	814	599	0
Parkland Elementary School	102,100	102,100	720	691	0
Subtotals for Parkland High School Feeder Pattern	**204,504**	**780,498**	**5,342**	**4,559**	**26**
Riverside High School	60,078	316,233	1,975	1,407	16
Riverside Middle School	45,948	140,290	968	657	2
Ascarate Elementary School	0	62,911	600	477	0
Cadwallader Elementary School	14,732	79,595	600	345	0
Cedar Grove Elementary School	20,200	72,572	792	654	6
Ramona Elementary School	0	63,473	500	367	0
Thomas Manor Elementary School	0	79,949	900	493	0
Subtotals for Riverside High School Feeder Pattern	**140,958**	**815,023**	**6,335**	**4,400**	**24**
Ysleta High School	0	334,385	1,975	1,717	14
Camino Real Middle School	0	75,349	1,078	689	2
Ysleta Middle School	33,620	136,375	968	402	1
Rio Bravo Middle School	0	71,301	800	379	2
Alicia R. Chacon International	10,434	93,449	600	736	8
Capistrano Elementary School	9,248	87,940	840	701	5
Pasodale Elementary School	13,035	96,241	898	786	6
Presa Elementary School	8,956	61,858	450	499	1
South Loop Elementary School	0	64,702	520	441	7
Ysleta Elementary School	0	79,106	660	600	3
Subtotals for Ysleta High School Feeder Pattern	**75,293**	**1,100,706**	**8,789**	**6,950**	**49**
REGULAR FACILITIES TOTAL	1,112,474	6,672,101	53,268	42,485	**262**

SOURCE: YISD, Facilities Information, April 2008.

plus $1 for each $1,000 of par value of obligations issued for amounts up to $50 million, and thereafter $0.80 for each $1,000 of par value of obligations issued, with a minimum of $7,500.

Texas school districts have three major funding sources to repay bond funds used for facilities construction: revenues from local taxes, the existing debt allotment (EDA), and the instructional facilities allotment (IFA). Local interest and sinking (I&S) taxes are levied based on the amount required to fund the district's debt service payments after any funding received from EDA or IFA.

State revenues consist of three tiers. The first two Foundation Program Tiers, I and II, are for operating expenses and go in a district's General Fund. The Tier III allotment, or EDA, was introduced in 1999–2000 and provides financial assistance for certain outstanding debt issued by school

EXHIBIT 10
YISD NEW CONSTRUCTION ARCHITECT FEES
2004 BOND PROGRAM

PROJECT	CONSTRUCTION COST	ARCHITECT FEE	ARCHITECT FEE AS A PERCENTAGE OF CONSTRUCTION COST
Eastwood Middle School	$29,505,600	$2,258,242	7.65%
Lower Valley Elementary School	$9,200,000*	$757,000	8.23%
North Loop Elementary School	$8,608,000	$774,400	9.00%
Parkland Elementary School	$9,761,000	$637,408	6.53%
Ysleta Pre-Kindergarten	$9,503,126	$537,200	5.65%
TOTALS	**$66,577,726**	**$4,964,250**	**7.46%**

*Budget amount only.
SOURCE: YISD, Internal Bond Plan Financial Breakdown, April 2008.

EXHIBIT 11
YISD CONSTRUCTION COSTS
2004 BOND PROJECTS

COST COMPONENT	EASTWOOD MIDDLE SCHOOL	LOWER VALLEY ELEMENTARY SCHOOL	NORTH LOOP ELEMENTARY SCHOOL	PARKLAND ELEMENTARY SCHOOL	YSLETA PRE-KINDERGARTEN
Allocated Project Cost	$29,608,849	$10,635,229	$10,696,167	$10,635,229	$9,500,000
Surveyor	$32,500	$15,000	$18,965	$19,470	$22,500
Architect	$2,258,242	$757,000	$774,400	$637,408	$537,200
Construction Cost	$29,505,600	$9,200,000	$8,608,000	$9,761,000	$9,503,126
Total Change Orders	($217,067)	$0	$218,091	($152,918)	$0
Architect Amendments	$0	$11,082	$30,315	$0	$684
Contingency	$372,000	$0	$0	$0	$0
Testing	$240,195	$15,000	$108,656	$59,037	$27,000
Cabling	$192,455	$0	$57,010	$90,966	$0
Miscellaneous	$566,916	$8,171	$475,650	$84,188	$25,626
Furniture/Equipment	$1,863,320	$132,800	$275,000	$222,295	$197,950
Revised Project Cost	$34,839,174	$11,795,053	$12,561,965	$10,987,999	$10,637,176
Amount Over Budget	$5,230,325	$1,159,824	$1,835789	$352,770	$1,137,176

SOURCE: YISD, Internal Bond Program Financial Breakdown, April 2008.

EXHIBIT 12
YISD UNIT COSTS FOR BOND PROJECTS
2004 BOND PROGRAM

PROJECT	SQUARE FEET ADDED	CONSTRUCTION COST	COST PER SQUARE FOOT
Classroom Wings	71,313	$10,251,025	$143.75
Science Wing	32,000	$5,062,923	$158.22
Fine Arts Wings	132,309	$20,022,704	$151.33
Field Houses	49,920	$6,728,533	$134.79
Gyms/Kitchens/Cafeterias	248,181	$38,763,091	$156.19
Libraries	43,818	$8,309,730	$189.64
New Campuses	451,833	$47,504,766	$105.14
Expansions	4,750	$459,606	$96.76
TOTALS	**1,034,124**	**$137,102,378**	**$132.58**

SOURCE: YISD, Unit Costs Bond Projects Updated Spring 2008, Updated March 10, 2008.

EXHIBIT 13
YISD BOND FINANCIAL ADVISORY SERVICES
FEE SCHEDULE

FEE		INCREMENT		
$10,000		Minimum for each issue		
plus	$4 per $1,000	for the first	$5,000,000	of bonds issued
plus	$3.50 per $1,000	for the next	$7,500,000	of bonds issued
plus	$2.75 per $1,000	for the next	$10,000,000	of bonds issued
Plus	$1.50 per $1,000	for the next	$15,000,000	of bonds issued
plus	$0.75 per $1,000	thereafter		

SOURCE: YISD, Financial Advisory Agreement, February 26, 2001.

districts to produce a guaranteed yield of $35 in revenue per student in average daily attendance (ADA) per penny of tax effort. By providing a guaranteed yield on I&S taxes levied to pay the principal and interest on eligible bonds, the program guarantees a specific amount of state and local funds per student for each cent of tax effort per $100 of assessed valuation. The EDA program operates without applications, has no award cycles, and is available only to repay bonded debt.

The IFA program became effective in September 1997 and provides assistance to school districts in making debt service payments on eligible bond obligations issued to construct, acquire, renovate, or expand instructional facilities. A district uses this funding to make debt service payments on qualifying bonds and lease-purchase agreements. In order to receive IFA funding, a district must apply to the Texas Education Agency before issuing bonds to be paid with state assistance. The IFA program operates with applications, has award cycles, and has selection criteria based primarily on a district's property wealth per student.

YISD levied a $0.18 interesting and sinking (I&S) tax rate per hundred dollars valuation in 2007–08 to pay the district's debt service payments. In 2007–08, the district received $14,857,377 in EDA funding and $2,270,456 in IFA funding to assist in making the district's debt service payments. The IFA funding received by YISD is from Round 3 for the district's lease-purchase program. The district applied for but did not receive funding from Round 7 (June 2004) of $4,567,563 and Round 8 (June 2006) of $5,581,850. **Exhibit 14** presents the interest and sinking fund (I&S) tax rate, taxable values, and a calculated tax levy for YISD from 2003–04 through 2007–08.

YISD collected an average of 99 percent of calculated property taxes from 2003–04 through 2006–07. In addition, the district received the IFA and EDA funding to assist in the payment of debt service.

Exhibit 15 presents the debt service fund expenditures and revenue for 2003–04 through 2007–08.

IMPACT

YISD reported that not receiving the IFA had no direct impact on the capital improvement plan as the district did not promote the 2004 bond program contingent on receiving IFA funds.

EXHIBIT 14
YISD INTEREST AND SINKING (I&S) TAX RATE, TAXABLE VALUES, AND I&S TAX LEVY
2003–04 THROUGH 2007–08

DESCRIPTION	2003–04	2004–05	2005–06	2006–07	2007–08
Tax Rate	$0.07	$0.25	$0.23	$0.21	$0.18
Taxable Values	$4,368,292,371	$4,621,336,436	$4,750,212,888	$5,315,938,361	$5,825,488,264
Tax Levy	$3,057,805	$11,553,341	$10,925,490	$11,163,471	$10,485,879

SOURCE: YISD, Tax Rate Resolution, CPTD Taxable Value and Summary of Finance, Calculation by Consultant, July 2008.

EXHIBIT 15
YISD DEBT SERVICE FUND
2003–04 THROUGH 2007–08

DESCRIPTION	2003–04	2004–05	2005–06	2006–07	2007–08
Debt Payments	$8,239,425	$13,768,548	$20,306,191	$23,631,304	$23,996,636
State Revenue	$4,786,328	$5,842,975	$14,039,516	$8,978,108	$17,127, 833
Local Revenue	$2,887,032	$10,956,329	$10,584,942	$10,932,625	$8,422,534

SOURCE: YISD and Texas Education Agency, Annual Audit Reports, 2007–08 Budget and Summary of Finance, July 2008.