SCHOOLS/LOCAL GOVERNMENT ENERGY MANAGEMENT PROGRAM

For

HUMBLE INDEPENDENT SCHOOL DISTRICT Humble, Texas

An Energy Efficient Partnership Service
of
COMPTROLLER of the STATE of TEXAS
STATE ENERGY CONSERVATION OFFICE
111 E. 17th Street
Austin, Texas 78774

Professional Engineering Services By:

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1.0 EXECUTIVE SUMMARY:

This **Energy Efficient Partnership Service** is provided to public school districts and hospitals as a portion of the state's ***Schools/ Local Government Energy Management Program***; a program sponsored by the **State Energy Conservation Office (SECO)**, a division of the **State of Texas Comptroller of Public Accounts**.

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The service assists these public, non-profit institutions to take basic steps towards energy efficient facility operation. Active involvement in the partnership from the entire administration and staff within the agencies and institutions is critical in developing a customized blueprint for energy efficiency for their facilities.

In October 2008, **SECO** received a request for technical assistance from *Mark Krueger*, Assistant Superintendent of Schools for Humble I.S.D. **SECO** responded by sending ESA **Energy Systems Associates, Inc.**, a registered professional engineering firm, to prepare this preliminary report for the school district. This report is intended to provide support for the district as it determines the most appropriate path for facility renovation, especially as it pertains to the heating and cooling systems around the facility. It is our opinion that significant decreases in annual energy costs, as well as major maintenance cost reductions, can be achieved through the efficiency recommendations provided herein.

This study has focused on energy efficiency and systems operations. To that end, an analysis of the utility usage and costs for **Humble ISD,** (hereafter known as HISD) was completed by ESA **Energy Systems Associates, Inc**., (hereafter known as *Engineer*) to determine the annual energy cost index (ECI) and energy use index (EUI) for each campus or facility. A complete listing of the Base Year Utility Costs and Consumption is provided in Appendix IV of this report.

Following the utility analysis and a preliminary consultation with John Conn, Energy Manager for HISD, a walk-through energy analysis was conducted throughout the campus. Specific findings of this survey and the resulting recommendations for both operation and maintenance procedures and cost-effective energy retrofit installations are identified in Section 6.0 of this report.

We estimate that as much as $**217,500** may be saved annually if all recommended projects are implemented. The estimated installed cost of these projects should total approximately **$1,428,000**, yielding an average simple payback of **6-1/2** years.

SUMMARY TABLE:

Recommended Project	Estimated Annual Energy Cost Avoidance	Estimated Installation Cost	Predicted Simple Payback Period (Years)
Humble ES	$ 12,000	$ 72,000	6
Lakeland ES	$ 20,000	$ 78,000	4
Oak Forest ES	$ 20,000	$ 74,000	3-3/4
Pine Forest ES	$ 17,500	$ 79,000	4-1/2
Timbers ES	$ 22,000	$ 177,000	8
Whispering Pines ES	$ 17,000	$ 77,000	4-1/2
Atascocita MS	$ 24,000	$164,000	7
Kingwood MS	$ 13,000	$110,000	8-1/2
Atascocita HS	$ 5,000	$ 10,000	2
Kingwood Park HS	$ 67,000	$ 587,000	8-3/4
Total:	$217,500	$1,428,000	6-1/2

(See Section 6.0 for a detailed description of each recommended project.)

Although additional savings from reduced maintenance expenses are anticipated, these savings projections are not included in the estimates provided above. As a result, the actual Return of Investment (ROI), for this retrofit program should be even faster than noted within these calculations.

Our final "summary" comment is that **SECO** views the completion and presentation of this report as a beginning, rather than an end, of our relationship with **HISD**. We hope to be ongoing partners in assisting you to implement the recommendations listed in this report. Please call us if you have further questions or comments regarding your Energy Management Issues.

*ESA Energy Systems Associates, Inc. James W. Brown (512) 258-0547

2.0 ENERGY ASSESSMENT PROCEDURE:

Involvement in this on-site analysis program was initiated through completion of a Preliminary Energy Assessment Service Agreement. This PEASA serves as the agreement to form a "partnership" between the client and the State Energy Conservation Office (SECO) for the purposes of energy costs and consumption reduction within owned and operated facilities.

After receipt of the PEASA, an on-site visit was conducted by the professional engineering firm contracted by SECO to provide service within that area of the state. A summary of *HISD's* most recent twelve months of utility bills was provided to the engineer for the preliminary assessment of the Energy Performance Indicators. ESA, accompanied by John Conn, Energy Manager, and Robert Wind, Maintenance Technician for HISD, then toured the facilities to evaluate changes in maintenance, operations and/or equipment which would produce potential savings in energy consumption and cost.

3.0 DISTRICT / CAMPUS DESCRIPTIONS:

Humble ISD operates thirty-seven school campuses. There are five 5A High Schools, one 4A High School, seven Middle Schools and twenty-four Elementary Schools. In addition to the school facilities, the district utilizes eleven ancillary campuses including Administration, Maintenance, Purchasing, Transportation, Warehouse, District Police facilities and several instructional support centers. In all, the district serves over 33,000 students from the communities of Humble, Kingwood, Atascocita and parts of Houston.

General District Observations

1. The district has a standing energy policy that is periodically updated to account for observed changes in facility use and changes in district energy rates.

2. Lighting is accomplished at all campuses with energy efficient T8 lamp and electronic ballast fixtures. Newer facilities utilize dual switching and occupancy sensors in classrooms in order to reduce consumption and eliminate lights being left operating in vacant spaces.

3. The district has a direct digital control (DDC) energy management system which is programmed to begin turning systems on one hour before students arrive on campus and turn systems off 45 minutes after classes are scheduled to end. Gymnasiums, auditoriums and special systems are allowed to operate for as long as necessary with after school activities. Many facilities are leased from the district on weekends for community events, but energy charges are recovered in the rental rates charged by the district. There a standing district-wide policy that no HVAC equipment will be scheduled after hours on Wednesdays in order to save energy. Students may still have activities, but no extracurricular programming will be made to account for these activities.

4. Twenty-six of the thirty-seven campuses have thermal storage systems that were installed in the late 1990s or 2000. All of the systems, except for Kingwood MS, have been abandoned in place and are not currently in operation. The systems were mostly abandoned as a result of time-of-use rate schedules being virtually eliminated by deregulation in 2001. Facility planners for Quest HS are requesting that the thermal storage tower be removed to make way for a building addition planned for that particular area of the property.

General District Recommendations

1. *Hot Water Reheat*
   The VAV systems currently operate allowing hot water reheat 100% of the time. The system should be programmed to only allow reheat during the early morning hours, especially during the summer.

2. *VFD Throttling Range*
   Variable Frequency Drives (VFDs) save energy by slowing motors to provide only the work required for comfort at any given condition. The range over which the drives can be throttled are adjustable and should range from the energy required to provide minimal flow conditions to the work required at 100% of the capacity of the motors. There were drives discovered during the survey which have been programmed to only throttle back the motors a small portion of the throttling range that should be available in the system. This minimizes the savings opportunity that the drives should be offering the district.

3. *Heat Producing Equipment Located Below EMS Sensors*
   There were several instances of computers being located directly below the EMS (Energy Management System) sensors in the conditioned space. The heat radiated from the monitor gives the EMS a false sampling of the actual space temperature and results in the room being over-conditioned during the cooling season and under-conditioned during the heating season.

4. *Utilize Makeup Air Units at Kitchen*
   Some of the makeup air units for the Kitchen Exhaust Hoods were found to be turned off because the staff reports that unit operation causes condensation on the interior surfaces as a result of the humid outdoor air brought in by the supply air fan. If the makeup air fan is off, the conditioned air for the kitchen is being exhausted directly from the Kitchen which creates comfort issues for the Kitchen staff and forces the Kitchen to operate at a much higher negative pressure than the system was designed to produce. There are several options to mediate the condensation issue:
   A. Redirect the air flow from the makeup air fan so it does not discharge directly on cool metal surfaces.
   B. Increase the area of the makeup air supply grills to reduce the velocity of the air stream exiting the ductwork and minimize the distance the air stream travels.

C. Pre-treat the makeup air to dehumidify the air before it is brought into the Kitchen. This can be accomplished with a DX pre-treatment unit or energy recovery ventilator that is capable of transferring humidity to the exhaust air stream.

D. Operate Exhaust/Makeup Air Fans only when needed for exhausting of fumes.

5. *Outside Air Schedule Verified and Programmed*

Almost all outside air dampers were separately controlled at air handlers around the district, but several were not correctly programmed to be open during student occupied hours at many campuses. As the program was changed during the survey, the dampers opened correctly at the units.

6. *Install Larger Natural Gas Booster Heaters for Dishwashing*

Many campuses circulate domestic hot water at 140-160°F throughout the building and utilize a booster heater at the Kitchen to achieve the required 180°F water for dishwashing. It would be more energy efficient to increase the size of the booster heater at the Kitchen to maintain 180°F water for dishwashing purposes and decrease the temperature of the rest of the domestic hot water to 120°F. Nearly all of the energy lost in a hot water system is lost from the water piping as the hot water circulates throughout the building. The amount of energy lost is proportional to the difference between the temperature of the water and the temperature of the surrounding space.

7. *Sizing Chillers to Allow for Turndown*

A few campuses have backup condensing units that allow the parts of the building that operate 12 months per year, such as the administration areas, to operate without requiring the large central system components to be turned on. This opportunity results in significant demand savings during the summer months as the units with the highest power requirements can be left in the off position. This philosophy can be extended to the central systems themselves, as well as buildings that do not have staging capability, by sizing chillers for separate load requirements. Currently, most schools have two equivalent chillers in the HVAC plant. For example, Atascocita HS has two each 770 ton water cooled chillers. In future installations, the district should consider having one 500-ton chiller, one 770-ton chiller and one 1000-ton chiller. With individually sized chillers and an intelligent staging strategy, 90-95% of the load conditions would be accomplished with only one or two of the three chillers, thereby saving on demand charges and maximizing chiller efficiency.

8. *Continue Use of Pre-filters.*

All of the HVAC internal unit filters were clean and adequately protecting the HVAC equipment. Mixing boxes were relatively clean with no obvious buildup of dirt in the ductwork that was visible during the survey. Many of the campuses are utilizing pre-filters to extend the useful life of the 2” pleated filters installed internal to the units. Some of the pre-filters were dirty and in need of replacement, but their usefulness to extend the life of the more expensive pleated filters was readily apparent. The pre-filters consist of rolled filter media that is clipped in place across the return air intake on the air handlers. HISD Maintenance staff reported that the district may discontinue use of these pre-filters as a cost reduction measure. *We recommend that the district continue to utilize the pre-filters.* By changing the pre-filters every 30 to 60 days and replacing the pleated filters every 90 to 120 days, the district continues to adequately protect the equipment and support good indoor air quality while deriving twice the life from the more expensive pleated filters.

9. *"Sleep Program" for the computers*
   Allow computer monitors to utilize "sleep mode" during periods of inactivity.
   It was noted during the survey that many computers in the classrooms were displaying screen savers when there were no students in the classroom. There is substantial energy savings available by allowing the monitors in the very least, and the entire computer in some cases, to go into "sleep mode" during periods of no classroom activity. Please refer to the Wattwatcher insert "Sleep is Good" included in Appendix VIII.

Campus Descriptions

Humble Elementary

Humble Elementary was originally built in 1998. The single story building has a flat single membrane roof. The interior has carpet in the corridors and many of the classrooms. Weatherstripping is in good shape at windows and egress doors.

The primary HVAC system for the school is a 4-pipe hydronic design, which pumps both chilled and hot water to various air handling devices throughout the building. Chilled water is provided by a pair of York 125-ton water-cooled rotary chillers and a Marley single cell cooling tower (see picture to the right) which has begun to show signs of scaling and should be cleaned at the earliest convenience for the district.

Space heating water is provided by a Patterson Kelly natural gas fired boiler (1 MMBTUH, pictured to the right). There are no VFDs installed on the hot water loop pump. We recommend that VFDs be installed to allow the pumps to throttle back on output and energy consumption as the loads decrease in the building and maximize the savings opportunity that the VAV system has to offer.

Some of the mechanical equipment is controlled by a direct digital control (DDC) system, but all water valves and air dampers are controlled by the original pneumatic control system. Some of the pneumatic controls have been disabled and dampers are running uncontrolled. These controls should be reconnected to give the system full functionality. *We recommend that the district convert all of these pneumatic controls to DDC.* Expanding the DDC system to include all equipment, valves and dampers will improve the overall system efficiency and eliminate the maintenance required to maintain the pneumatic system. Air leaks in a pneumatic control system can be a major source of maintenance and energy costs.

Humble ES Energy Conservation Recommendations Summary:

1. Expand DDC system to control all equipment, dampers and valves throughout campus.
2. Install VFDs on hot water loop pump.
3. Evaluate location of some sensors in computer rooms.

Installed Cost	=	$ 72,000
Estimated Energy Cost Savings	=	$ 12,000
Simple Payback Period	=	6 Years

Lakeland Elementary

Lakeland Elementary was originally built in 1960 with additions and renovations in 1994 and 2003. Lighting has been recently updated, and many of the air handling units and other mechanical equipment are all relatively new. Despite the new equipment and recent updates, this school is one of the lower energy performers in the district. Each wing in the building has a unique HVAC system; some of these systems provide for better comfort than others.

The primary HVAC system for the school is a 4-pipe hydronic design, which pumps both chilled and hot water to various air handling devices throughout the building. Chilled water is provided by a pair of relatively new air-cooled McQuay chillers. Hot water is provided by a pair of boilers located in separate service wings at opposite ends of the building.

A variety of HVAC systems serve various wings throughout the campus with noticeable differences in comfort. A mixture of variable air volume (VAV) and constant volume (CV) air handlers serve two of the wings of the building while rooftop units serve another two wings and the cafeteria. An energy recovery ventilator is located at the far end of one wing, serving only a few rooms. The staff claims that the air handler that serves the main office and the 100 wing of classrooms over-conditions the space and does not provide much individual control to teachers. The areas served by the rooftop units are significantly warmer and more humid, creating a stuffier atmosphere.

The air cooled chillers (two each 150-ton units) are adequately sized to handle the load for the entire school, but the district has elected to utilize the DX rooftop unit system in two wings of the school. A new DX system with an EER of 12 operates at an electrical power consumption of approximately 1 kW/ton of cooling. A well-maintained variable volume water cooled central system will operate at approximately 0.8 to 0.85 kW per ton of cooling. The chillers at this facility are air cooled and when combined with the pumps and other equipment necessary to operate the system, its power requirement is approximately 0.95 kW per ton, or just slightly better than the DX system. In regards to the difference in levels of perceived comfort between the wings, these differences lie in the way each system is controlled. The programming for the central system components is separate from the programming used for DX units; these two programs seem to be designed with different setpoints and parameters. *We recommend that the DX program be evaluated for compatibility with the central system program in regards to temperature setpoints and outside air damper control.*

Some of the mechanical equipment is controlled by a direct digital control (DDC) system, but all water valves and air dampers are controlled by the original pneumatic control system. Some of the pneumatic controls have been disabled and dampers are running uncontrolled. These controls should be reconnected to give the system full functionality. *We recommend that the* *district convert all of these pneumatic controls to DDC.* Expanding the DDC system to include all equipment, valves and dampers will improve the overall system efficiency and eliminate the maintenance required to operate the pneumatic system. Air leaks in a pneumatic control system can be a major source of maintenance and energy costs.

It was noted during the survey that some of the chilled and hot water piping insulation is damaged or missing (see the picture to the left). The same condition applies to some of the domestic hot water piping in the facility. Most energy losses in closed loop heating and cooling systems occur through piping losses. *We recommend that the district replace or repair this insulation to help reduce energy costs.*

Lakeland ES Energy Conservation Recommendations Summary:

1. Expand DDC system to control all equipment, dampers and valves throughout campus.
2. Repair or replace insulation on domestic hot water, chilled water and space heating hot water piping.
3. Evaluate setpoints and outcomes for the DX energy management program for compatibility with the central system programming.

Installed Cost	=	$ 78,000
Estimated Energy Cost Savings	=	$ 20,000
Simple Payback Period	=	4 Years

<u>Oak Forest Elementary School</u>

Oak Forest Elementary was originally built in 1995. The building has one single story and a flat built-up tar and gravel roof. Windows are double pane glass and are not so abundant as to allow excessive solar gain into the educational spaces. Flooring is a combination of tile and carpeting. The interior ceiling is acoustical tile and there is no insulation installed above the ACT.

The primary HVAC system for the school is a 4-pipe hydronic design, which pumps both chilled and hot water to various air handling devices throughout the building. Chilled water is provided by a pair of air-cooled McQuay 140-ton air cooled chillers and hot water is provided by a Power Flame boiler. The Administration area has a redundant DX condensing unit (1995 York H1CE180 15-ton CU) that allows this area to be conditioned without requiring operation of the central system components during non-occupied student hours. All equipment is controlled by a DDC energy management system.

The air distribution system consists of constant volume air handlers that distribute air to terminal units equipped with hot water reheat coils. The terminal units have dump dampers that divert the air from the AHUs to the plenum as the space becomes satisfied. The system's greatest inefficiency involves the dumping of the conditioned air to the plenum, allowing conditioned air to be tempered with return air before returning to the unit only to be re-conditioned. *We recommend that the system be converted from this "bypass VAV" system to a true variable air volume system.* This is accomplished by blocking off the dump damper in each terminal unit and installing a modulating damper controller on each unit's supply air damper. A variable speed drive will need to be installed on the zone's AHU and both the chilled and hot water building loop pumps. A differential pressure sensor needs to be installed in the supply ductwork at a location approximately 2/3 of the length of the supply duct and in both the hot and chilled water supply lines. In this system, as the classroom spaces become satisfied, the supply dampers in each terminal box begin to close and the differential pressure sensor in the supply duct senses higher duct pressures. The VFD responds to the increased supply duct pressure by throttling back both the supply fan in the AHU (fan energy savings) and the chilled water or hot water coil flow control valve at the AHU. The water supply piping differential sensor also samples higher water pressures and instructs the secondary water pumps to reduce output (hot or chilled water savings). In an air cooled chiller system like the one installed at this school, the reduced demand from the variable volume system allows the chiller to stage down during cooling season (additional fan energy savings). As spaces become unsatisfied, the system reverses itself and increases output from each component as necessary to satisfy the new conditions.

The school has a thermal storage tank (135,000 gallon chilled water storage capacity installed in 2000) which is not currently utilized in the HVAC system.

Domestic hot water is provided by a natural gas fired water heater. Water was sampled at one of the Kitchen faucets at 120°F. Dishwashing requires 180°F water and this is provided by a Precision Temp booster heater at the Kitchen itself.

The space heating boiler is a 1995 PVI 1000 gallon unit that is oversized for the load conditions experienced at this school. Staff reports that the unit will likely be replaced with smaller modular boilers in the near future as has been done at other campuses. These new boilers will integrate well with the proposed variable volume HVAC system as the units can be staged to meet the load requirements and offer significant energy savings from the existing boiler.

Oak Forest ES Energy Conservation Recommendations Summary:

1. Review outside air schedule to ensure dampers are open when air handlers are running.
2. Renovate existing constant volume air distribution system to variable volume system.
3. Reconnect TSS to chilled water loop with proper isolation valves to store chilled water to minimize chiller demand load.

Installed Cost	=	$ 74,000
Estimated Energy Cost Savings	=	$ 20,000
Simple Payback Period	=	3-3/4 Years

Pine Forest Elementary School

Pine Forest Elementary was originally built in 1985. The single story brick school has a flat built-up tar and gravel roof. The interior has CMU walls and tile flooring.

The primary HVAC system is a 4-pipe hydronic design that pumps chilled and hot water to air handlers throughout the building. Chilled water is provided by a pair of recently replaced 143-ton air-cooled McQuay chillers. Many of the air handlers throughout the building are nearing the end of their useful life and need to be replaced soon.

Some of the mechanical equipment is controlled by a direct digital control (DDC) system, but all water valves and air dampers are controlled by the original pneumatic control system. Some of the pneumatic controls have been disabled, and dampers are running uncontrolled, such as the outside air damper at the cafeteria unit. These controls should be reconnected to give the system full functionality. *We recommend that the district convert all of these pneumatic controls to the DDC system.* Expanding the DDC system to include all equipment, valves and dampers will improve overall system efficiency.

Much of the equipment such as the secondary chilled water pumps and variable air volume (VAV) air handlers are equipped with variable frequency drives (VFDs). Many of the VFDs throughout the building have been programmed to run at one specific frequency instead of allowing the equipment to adjust operational frequency based upon the load conditions required, eliminating the benefit of installing the variable speed drive. These VFDs should be allowed to operate within a wider range of frequencies to improve operational flexibility at partial loads.

The school has a 106,500 gallon chilled water thermal storage tank which is not currently utilized in the HVAC system. *We recommend that the district consider recommissioning the thermal storage system in order to minimize demand costs.*

It was noted during the survey, that the building vestibules, designed to serve as an "air break" between the conditioned areas of the building and the exterior space is conditioned by supply air grills from the HVAC system. By ducting conditioned air to this space, the intended "air break" is compromised. *We recommend the district seal off ducts to these areas and replace the supply grills with ACT or gypsum board as necessary.*

It was also noted during the survey that custodial and maintenance staff may be storing chemicals and machinery inappropriately close to the air handling equipment. As pictured to the right, cleaning and pesticide equipment and supplies are stored directly in front of the air handler intake grills.

Pine Forest ES Energy Conservation Recommendations Summary:

1. Refrain from storing chemicals in air handling equipment rooms.
2. Expand DDC system to control all equipment, dampers and valves throughout campus.
3. Reconnect thermal storage system to chilled water loop with proper isolation valves to chill and store water overnight when demand is lower.
4. Open operable range for VFDs controlling air handlers throughout the building.

Installed Cost	=	$ 79,000
Estimated Energy Cost Savings	=	$ 17,500
Simple Payback Period	=	4-1/2 Years

Timbers Elementary

Timbers Elementary has undergone a major renovation in 2005 which updated lighting and replaced much of the HVAC equipment throughout the building. The single story brick structure has a sloped shingled roof. Most of the flooring is carpet and the ceiling is acoustical tile.

The primary HVAC system for the school is a 4-pipe hydronic design, which pumps both chilled and hot water to various air handling devices throughout the building. Chilled water is provided by a 1999 140-ton air-cooled Carrier chiller. Hot water is provided by an aging Rite boiler. *This boiler is nearing the end of its useful life and should be replaced soon.*

Variable air volume (VAV) air handlers serve most areas of the building. These systems have chilled water coils to provide cool, dry air to terminal units for each classroom. Each terminal unit has a hot water coil that serves both to reheat the air if it has been over-cooled for dehumidification and to provide the main heating during the winter months. *We recommend that re-heat be limited to early morning hours only to reduce the number of hours the boiler must operate in the summer months.*

Most air handling units throughout the building were replaced within the last 5 years or so. However AHU-5, a 3hp constant volume air handler located in the boiler room, is quite old and should be replaced soon (shown at left). The unit has both a hot water and chilled water coil.

A new direct digital control (DDC) system was installed with the most recent HVAC renovation. Some air dampers and water valves are still controlled by a pneumatic control system. *We recommend that the district convert all of these pneumatic controls to the DDC system.* Expanding the DDC system to include all equipment, valves and dampers will improve overall system efficiency.

The school has a thermal storage system (TSS) which is not currently operating. The 106,500 gallon storage tank was installed in 1999 and was designed for 1000 ton-hours of chilled water storage. *We recommend that the district recommission the thermal storage system and use the system in conjunction with one chiller during daytime cooling, thereby reducing overall peak demand.*

It was noted during the survey, that the building vestibules, designed to serve as an "air break" between the conditioned areas of the building and the exterior space, is conditioned by supply air grills from the HVAC system. By ducting conditioned air to this space, the intended "air break" is compromised. *We recommend the district seal off ducts to these areas and replace the supply grills with ACT or gypsum board as necessary.*

It was noted during the survey that many of the outside air dampers were closed during occupied hours despite the dampers being controlled with the energy management system. *We recommend that the programming be evaluated for proper sequencing of the outside air dampers.*

This school is one of the HISD facilities that had the makeup air fan turned off at the Kitchen exhaust hood. As per the general district recommendations, we recommend that the condensation problem be resolved.

The domestic hot water is provided by a 91 gallon natural gas fired water heater installed in 1994. Hot water is circulated in a 160°F loop with a booster heater that raises the temperature to 190°F for dishwashing. It was noted during the survey that some of the domestic hot water piping insulation is damaged or missing. Most energy losses in closed loop heating systems occur through piping losses. *We recommend that the district replace or repair this insulation to help reduce energy costs.*

Space heating water is generated by a Rite natural gas fired boiler. The unit is oversized for much of the load the building produces. *We recommend that the boiler be replaced by two modular boilers that can be staged and therefore reduce natural gas costs by better matching output with load requirements.*

Timbers ES Energy Conservation Recommendations Summary:

1. Expand DDC system to control all equipment, dampers and valves throughout the campus.
2. Reconnect TSS to chilled water loop with proper isolation valves to chill and store water overnight when electrical demand is lower.
3. Review outside air damper schedule and control sequence to ensure dampers are opening as intended.
4. Eliminate supply ducts and air devices in vestibules.
5. Address supply air grill condensate problem on kitchen exhaust hoods so that make-up air can be utilized.
6. Replace insulation on domestic hot water piping.
7. Replace the space heating boiler.

Installed Cost	=	$ 177,000
Estimated Energy Cost Savings	=	$ 22,000
Simple Payback Period	=	8 Years

Whispering Pines ES

Whispering Pines Elementary was originally built in 1991. The single story brick structure has a flat tar and gravel roof. The flooring is mostly tile and the ceilings are acoustical tile.

The primary HVAC system for the school is a 4-pipe hydronic design, which pumps chilled and hot water to various air handlers and terminal units throughout the building. The 143-ton McQuay air cooled chillers, which were installed in 2003, are in good shape. Isolation valves were installed with these units, which can help save energy by only pumping water through whichever chiller is running.

Much of the equipment is tied into a new direct digital controls (DDC) system. This system allows the district office to operate equipment such as chillers or air handlers on a schedule, and gives remote access to manually override or control any units on the DDC system. Water valves and air dampers are all still controlled pneumatically, which gives them limited functionality and relatively poor performance as compared to the DDC controls. Additionally, some of the pneumatic controls have been disabled, while others are not functioning properly. *Expanding the DDC system to include all valves, dampers and other HVAC equipment throughout the campus will help to improve the overall system efficiency.*

The facility has VFDs installed on the secondary chilled water pump and variable air volume (VAV) air handlers. These drives allow such equipment to operate at partial loads when those systems need to be on but do not need be running at full capacity. Many of the VFDs throughout the building had been set to run at only a specific frequency, which compromises the advantages of the variable speed drive. These VFDs should be allowed to operate in a wider range of speeds to give the systems the ability to run at partial loads.

The school has a thermal storage system (TSS) which is not currently operating. The 135,000 gallon tank is designed to supply 1,250 ton-hours of chilled water storage capacity. *We recommend that the district recommission the thermal storage system and use the system in conjunction with one chiller during daytime cooling, thereby reducing overall peak demand.*

Whispering Pines ES Energy Conservation Recommendations Summary:

1. Expand DDC system to control all equipment, dampers and valves throughout campus.
2. Open operable range for VFDs controlling air handlers throughout the building.
3. Reconnect TSS to chilled water loop with proper isolation valves to chill and store water overnight when demand is lower.
4. Change sequence of operation so re-heat only in early morning in Summer.

Installed Cost	=	$ 77,000
Estimated Energy Cost Savings	=	$ 17,000
Simple Payback Period	=	4-1/2Years

Atascocita MS

Atascocita Middle School was originally built in 1983. The single story brick structure has a flat tar and gravel roof. The flooring is mostly tile and the ceilings are acoustical tile.

The primary HVAC system for the school is a 4-pipe hydronic design, which pumps chilled and hot water to various air handlers and terminal units throughout the building. One of the Carrier 121-ton air cooled reciprocating chillers was installed in 1997 and the other three were installed in 1999. Space heating hot water is provided by an Ajax 3,000 MBH input natural gas fired boiler. The primary chilled water pumps do not have isolation valves installed; the pumps themselves are in poor condition and should be replaced soon. *We recommend that isolation valves be incorporated into the primary chilled water pumping scheme when the pumps are replaced in order to limit water flow through operating pumps and chillers only.*

The domestic hot water is provided by an RBI natural gas fired water heater. Hot water is circulated in a 160°F loop with a booster heater that raises the temperature to 190°F for dishwashing. It was noted during the survey that some of the domestic hot water piping insulation is damaged or missing in the mechanical room. Most energy losses in closed loop heating systems occur through piping losses. *We recommend that the district replace or repair this insulation to help reduce energy costs. We also recommend that the district increase the size of the booster heater so that the recovery rate can be maintained from 120°F water instead of 160°F water.*

Much of the equipment is tied into a new direct digital controls (DDC) system. This system allows the district office to operate equipment such as chillers or air handlers on a schedule, and gives remote access to manually override or control any units on the DDC system. Water valves and air dampers are all still controlled pneumatically, which gives them limited functionality and relatively poor performance as compared to the DDC controls. Additionally, some of the pneumatic controls have been disabled, while others are not functioning properly. Expanding the DDC system to include all valves, dampers and other HVAC equipment throughout the campus will help to improve the overall system efficiency.

The school has a thermal storage system (TSS) which is not currently operating. The 314,665 gallon tank is designed to supply 3,500 ton-hours of chilled water storage capacity. *We recommend that the district recommission the thermal storage system and use the system in conjunction with one chiller during daytime cooling, thereby reducing overall peak demand.*

The corridor lighting is currently 3-lamp T8 fixtures. Recommended light levels can be met with 2-lamp fixtures, therefore we recommend that the district remove the center lamp from the existing fixtures and only utilize the outboard tombstones for lighting. This practice will not harm the electronic circuitry of the existing 3-lamp ballast and result in significant energy savings for corridor illumination.

This school is one of the HISD facilities that had the makeup air fan turned off at the kitchen exhaust hood. As per the general district recommendations, we recommend that the condensation problem be resolved.

Atascocita MS Energy Conservation Recommendations Summary:

1. Expand DDC system to control all equipment, dampers and valves throughout campus.
2. Replace four primary chiller pumps and install isolation valves to limit flow through operating chillers.
3. Replace booster heater with a larger unit to allow domestic water to be circulated at 120°F.
4. Reconnect TSS to chilled water loop with proper isolation valves to chill and store water overnight when demand is lower.
5. De-lamp corridor fixtures to 2-lamp.
6. Install energy recovery ventilator to allow operation of kitchen make-up air fan.

Installed Cost	=	$ 164,000
Estimated Energy Cost Savings	=	$ 24,000
Simple Payback Period	=	7 Years

<u>Kingwood MS</u>

Kingwood Middle School was originally built in 1977. The facility had a major renovation in 2004. The single story brick structure has a flat membrane roof. The flooring is mostly tile and the ceilings are acoustical tile. Weatherstripping is in good condition.

This is the only HISD facility in which the thermal storage system remains operational. The 166,500 gallon tank was installed in 1997 and designed to store 2,500 ton-hours of chilled water. The tank supplements or replaces the chiller load from 1300 to 2000 hours. We recommend that this schedule be analyzed for maximum chiller assistance as it appears to be a schedule designed for the antiquated time-of-use rate that was offered by utilities prior to deregulation. The new concept for thermal storage since the demise of time-of-use rates has to be to limit the chiller operation by one chiller at all times in order to limit the peak demand set by the facility each month. It only takes one day on which all of the chillers operate to ruin an entire month's demand reading (eleven months worth if there is a ratchet charge in the demand schedule). Therefore, the operation of the thermal storage must be flexible enough to allow the tank to supplement chiller loads throughout the day and not just at certain times of the day.

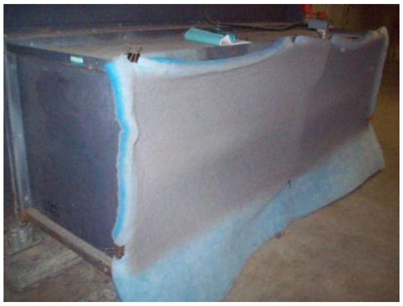
The primary HVAC system for the school is a 4-pipe hydronic design, which pumps chilled and hot water to various air handlers and terminal units throughout the building. The York 123-ton centrifugal chillers were installed in 1997. The cooling tower showed signs of the media being scaled up (see picture to

the right). Space heating water is provided by an Ajax 5.25 MMBH input natural gas fired boilers.

Domestic hot water is provided by two PVI 1 MMBH input natural gas fired boilers. Hot water is circulated in a 140°F loop with a booster heater that raises the temperature to 180°F for dishwashing. *We recommend that the district increase the size of the booster heater so that the recovery rate can be maintained from 120°F water instead of 140°F water.*

Much of the equipment is tied into a new direct digital controls (DDC) system. This system allows the district office to operate equipment such as chillers or air handlers on a schedule, and gives remote access to manually override or control any units on the DDC system. Water valves and air dampers are all still controlled pneumatically, which gives them limited functionality and relatively poor performance as compared to the DDC controls. Additionally, some of the pneumatic controls have been disabled, while others are not functioning properly. *Expanding the DDC system to include all valves, dampers and other HVAC equipment throughout the campus will help to improve the overall system efficiency.*

This school is one of the HISD facilities that had the makeup air fan turned off at the kitchen exhaust hood. As per the general district recommendations, we recommend that the condensation problem be resolved and the makeup air unit turned back on.



The facility has three Engineered Air dedicated outdoor air conditioning units that are in good condition. The distribution air handlers themselves utilize rolled media pre-filters and pleated internal filters. The pre-filters (see picture to the right) were dirty and in need of replacement, but the pleated filters were clean and in good shape.

The gymnasium was found to be extremely cool (~65°F) at the time of the inspection (1430 hours on a 68°F afternoon). The programming should be checked for the setpoint of the HVAC system in the gymnasium. It should be reset to concur with the energy policy mandated indoor cooling setpoint temperature of 76°F for gymnasiums.

Kingwood MS Energy Conservation Recommendations Summary:

1. Expand DDC system to control all equipment, dampers and valves throughout campus.
2. Replace booster heater with a larger unit to allow domestic water to be circulated at 120°F.
3. Install energy recovery ventilator to allow operation of Kitchen make-up air fan.
4. Check gymnasium cooling setpoints in energy management system.

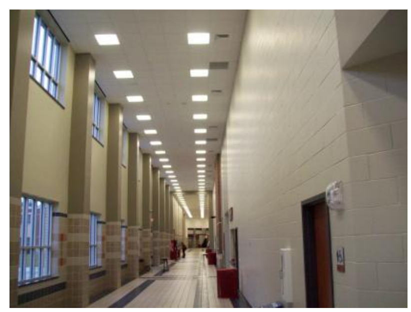
Installed Cost	=	$ 110,000
Estimated Energy Cost Savings	=	$ 13,000
Simple Payback Period	=	8-1/2 Years

Atascocita HS

Atascocita High School was originally built in 2006. The facility had a major addition in 2008. The two story brick structure has flooring of mostly tile and the ceilings are acoustical tile. Weatherstripping is in good condition. Windows are double pane and seals are in excellent condition.

The primary HVAC system for the school is a 4-pipe hydronic design, which pumps chilled and hot water to various air handlers and terminal units throughout the building. The equipment is in excellent condition given the age of the school and the great care that the staff has given the equipment to date. Two Trane 600-ton centrifugal chillers are paired with a Marley 2-cell cooling tower to provide chilled water for the facility. Space heating water is provided by a Sellers 16.738 MMBH input natural gas fired boiler. Domestic hot water (120°F) is produced by a pair of staged 800 MBH modular boilers.

The equipment is tied into a new direct digital controls (DDC) system. Air handlers are a mixture of McQuay units in the 2008 addition and Trane units in the original 2006 buildings. Toshiba VFDs allow the variable volume systems to save energy. The natatorium is served by a large Dectron combination pool water and air conditioning unit designed to keep the pool water temperature within 3°F of the air temperature.



The main corridors of the building are significantly overlit during daytime hours. The quarter-mile long two-story main corridor has wall sconces and 4-lamp F17T8 corridor fixtures all operating while the skylights and transom windows are providing ample daylighting in the space. The skylight wells themselves have linear fluorescent fixtures that are operating during daylight hours. These fixtures are circuited with the Library display cases through one contactor which was what has limited the staff from turning off the unnecessary fixtures to date. We recommend that the district separate the wall sconces, the skylight well fixtures and ½ of the 4-lamp F17T8 fixtures from the lighting contactor ELD#8 and put them under photocell control so that they can be automatically activated during evening hours that the fixtures are programmed to operate. In addition to the energy savings available from turning off unnecessary fixtures during daylight hours, there will be additional maintenance savings by extending the life of the wall sconce ballasts ($90 for each replacement) by a factor of at least two.

Atascocita HS Energy Conservation Recommendations Summary:

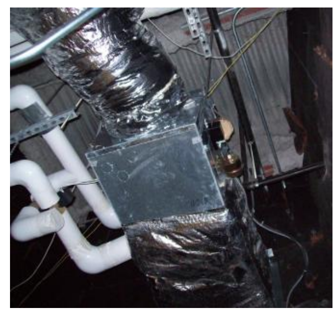
1. Turn off the ½ of the existing hall fixtures, plus the corridor wall sconces and skylight well fixtures during the daytime hours.

Installed Cost	=	$ 10,000
Estimated Energy Cost Savings	=	$ 5,000
Simple Payback Period	=	2 Years

Kingwood Park HS

KPHS was originally built in 1992. The facility had a major addition in 2008. Formerly a ninth grade center only, this is currently the only 4A High School in HISD. The two story brick structure has flooring of carpet and tile and the ceilings are acoustical tile. Weatherstripping appears to be in good condition. The roof is low slope single ply membrane. Tinted single-pane windows are limited to less than 10% of the wall area and are in good condition.

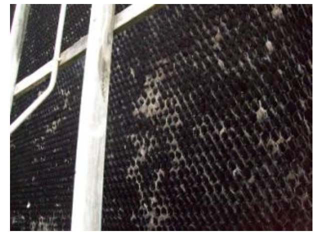
The school has a thermal storage system (TSS) which is not currently operating. The 267,000 gallon tank, installed in 2000, is designed to supply 2,500 ton-hours of chilled water storage capacity. At the time, the facility had not had the significant expansion performed in 2008 and the TSS equated to about seven hours of cooling assistance for the central plant. The facility is currently twice as large as the original conditioned area and is therefore not sufficiently sized to reduce the peak demand effectively as are the systems at other schools. Shaving peak demand for four hours will not offer any peak demand benefit if the full chiller load has to be turned on at any time in the month because the TSS is too small.



The HVAC system is a combination of constant volume and variable volume air handlers that distribute conditioned air to classroom terminal units equipped with hot water reheat coils (see picture to the right). The system is controlled with a DDC control system. Water valves and air dampers are all still controlled pneumatically, which gives them limited functionality and relatively poor performance as compared to the DDC controls. Additionally, some of the pneumatic controls have been disabled, while others are not functioning properly. Expanding the DDC system to include all valves, dampers and other HVAC equipment throughout the campus will help to improve the overall system efficiency.

Much of the energy savings opportunities of the VAV system are not being taken advantage of at KPHS due to the fact that the cooling tower, plus the hot water and condenser water pumps do not have VFDs installed to throttle back their operation during low load conditions. We recommend that VFDs be installed for these devices, plus differential pressure sensors in the necessary piping to instruct the pumps when to throttle back on output and energy consumption.

The temperature sensor in the Boy's dressing room near the gym is served by only one sensor that is not located in an area conducive to quality temperature control. We recommend that the district relocate the sensor to an area that will produce better control of area temperatures. The chilled water is supplied to the AHUs by three chillers working in combination with a 3-cell Marley cooling tower. Two of the chillers, both 1992 Trane units, are original to the building plant. The third chiller, a York Optiview, appears to have been installed in 2002. At the time of the survey, one Trane chiller and the York chiller were both operating. At the time of the survey, it was noted that one of the 40hp split-case condenser water pumps and one cell of the cooling tower were manually turned off at the electrical disconnects. The pump was leaking a considerable amount of water and the staff reports that the pump only leaks when it is turned off. Apparently, one of the seals is tight enough to hold up under operating pressures but not the pressures resulting from the water dead-heading when the unit is off. *We recommend that the district service the pump to not leak when it is turned off to reduce the waste of treated water.*



The cooling tower showed signs of significant scaling at the media (see picture to the right). We recommend that the tower be cleaned at the next available time.

It was noted during the survey that the primary chilled water pumps do not have isolation valves to prevent water from circulating through inoperable chillers. *We recommend that isolation valves be installed to prevent the chilled water from absorbing energy as it travels through off-line chillers.*

The air handlers utilize rolled media pre-filters and pleated internal filters. The pre-filters were dirty and in need of replacement, but the pleated filters were clean and in good shape, which demonstrated the effectiveness of the pre-filter arrangement. The air handlers in the 1992 buildings are themselves 1992 units. They are nearing the end of their anticipated useful life (15-20 years) and should be considered for replacement in the near future. The squirrel cage or the bearings on the 25hp AHU#7, in particular, was in such poor balance at the time of the survey that it was shaking the entire mechanical room floor.

One of the small practice gymnasiums was found to be extremely cool (~65°F) at the time of the inspection (1300 hours on a 65°F afternoon). The programming should be checked for the setpoint of the HVAC system in the gymnasium. It should be reset to concur with the energy policy mandated indoor cooling setpoint temperature of 76°F for gymnasiums.

Domestic hot water is provided by a 1992 Sellers 1,490 gallon input natural gas fired boiler. Hot water is circulated in a 140°F loop with a booster heater that raises the temperature to 180°F for dishwashing. *We recommend that the district increase the size of the booster heater so that the recovery rate can be maintained from 120°F water instead of 140°F water. We also recommend that the boiler be replaced by two smaller staged modular boilers that will offer increased opportunity to only operate as much boiler as necessary for the hot water load.*

Kingwood Park HS Energy Conservation Recommendations Summary:

1. Increase the size of the booster heater to allow 120°F hot water loop.
2. Renovating the control system to 100% DDC.
3. Evaluate gymnasium cooling setpoint programming within the DDC control system.
4. Replace all 1992 AHUs.
5. Install VFDs on cooling tower fans, secondary hot water and condenser water pumps.
6. Install isolation valves on primary chilled water and condenser water pumps.
7. Repair leak at condenser water pump.
8. Replace domestic hot water boiler with modular boilers.

Installed Cost	=	$ 587,000
Estimated Energy Cost Savings	=	$ 67,000
Simple Payback Period	=	8-3/4 Years

4.0 ENERGY PERFORMANCE INDICATORS:

In order to easily assess the *Partner's* energy utilization and current level of efficiency, there are two key "Energy Performance Indicators" calculated within this report.

1. **Energy Utilization Index**

The Energy Utilization Index (EUI) depicts the total annual energy consumption per square foot of building space, and is expressed in "British Thermal Units" (BTU's).

To calculate the EUI, the consumption of electricity and gas are first converted to equivalent BTU consumption via the following formulas:

ELECTRICITY Usage
[Total KWH /yr] x [3413 BTUs/KWH] = __________ BTUs / yr

NATURAL GAS Usage
[Total MCF/yr] x [1,030,000 BTUs/MCF] = ________ BTUs / yr

After adding the BTU consumption of each fuel, the total BTU's are then divided by the building area.

EUI = [Electricity BTU's + Gas BTU's] divided by [Total square feet]

2. **Energy Cost Index**

The Energy Cost Index (ECI) depicts the total annual energy cost per square foot of building space.

To calculate the ECI, the annual costs of electricity and gas are totaled and divided by the total square footage of the facility:

ECI = [Electricity Cost + Gas Cost] divided by [Total square feet]

These indicators may be used to compare the facility's current cost and usage to past years, or to other similar facilities in the area. Although the comparisons will not provide specific reasons for unusual operation, they serve as indicators that problems may exist within the energy consuming systems.

THE CURRENT ENERGY PERFORMANCE INDICATORS FOR :

HUMBLE ISD

CAMPUS	ENERGY UTILIZATION INDEX (EUI) (Btu/sf-year)		ENERGY COST INDEX (ECI) ($/sf-year)	
Atascocita HS Campus	**97,905**	*+72%*	**$2.28**	*+90%*
Kingwood Park HS	**85,506**	*+51%*	**$2.05**	*+71%*
2006 Region 4 Average High School:	56,814		$1.20	
Atascocita MS	**49,116**	*-18%*	**$1.46**	*+34%*
Kingwood MS	**51,183**	*-15%*	**$1.52**	*+39%*
2006 Region 4 Average Middle School:	60,050		$1.09	
Humble ES	**38,536**	*-22%*	**$1.25**	*+18%*
Lakeland ES	**60,961**	*+23%*	**$1.84**	*+74%*
Oak Forest ES	**52,095**	*+6%*	**$1.51**	*+42%*
Pine Forest ES	**54,698**	*+11%*	**$1.62**	*+53%*
Timbers ES	**47,701**	*-3%*	**$1.44**	*+36%*
Whispering Pines ES	**57,014**	*+15%*	**$1.69**	*+59%*
2006 Region 4 Average Elementary:	49,365		$1.06	

Comparison to Average: From the **EUI** and **ECI** comparisons with other school facilities *within the region*, several energy related issues are apparent: (Note that the regional average is data obtained from SECO for the 2006 school year. Subsequently, the ECI does not represent increases in energy costs experienced over the past two years and will be low as compared to the cost of energy in 2008, the time period from which these bills were analyzed).

High School campuses –
Both consumption (EUI) and the cost to operate (ECI) is *considerably higher* than the regional average.

Middle School campuses –
The EUIs for these schools are both below the regional average (AMS -18%; KMS -15%). AMS's ECI is 34% higher than regional average; KMS has an ECI that is 39% higher.

Elementary School campuses –
Consumption (EUI) is *higher* than the regional average for all facilities except Timbers and Humble. Cost to operate (ECI) is *higher* than the regional average for all campuses.

In general, the ECIs for the facilities are the greatest source of concern in this analysis. In addition to the regional average not taking into account the energy cost increases of the last two years, HISD is paying some of the higher cost of utilities in the State. The electricity rate that HISD has with GLO-Reliant is $0.08451 per kWh. Many school districts in this region have contracted rates from the same time period in the $0.07 to $0.08 range.

HISD consumed 21,640,129 kWh of electricity during the analyzed billing cycle for these ten facilities. Using the flat rate energy charge for consumption only (21,640,129 kWh * $0.08451/kWh), this equates to an annual energy charge of $1,828,807. Assuming conservatively that HISD had been able to contract for an even $0.08 per kWh at the time the contract with GLO was initiated, the same energy consumption would have only cost the district $1,731,210. That represents a savings of $97,597 by nothing more than fortuitous contractual negotiations and timing.

The Base Year Utilities Consumption History is included in Appendix IV of this report.

5.0 RATE SCHEDULE ANALYSIS:

ELECTRIC UTILITY: GLO - Reliant

ELECTRIC RATE: Secondary General Service ≥ 10 kW

ENERGY CHARGE:	=	$0.084510 per kWh

TRANSMISSION AND DISTRIBUTION CHARGES:

Customer Charge	=	$5.27 per meter
Delivery Point Charge	=	$116.89
Transmission Charge (TUOS)	=	$1.4709 per kVA
Distribution Charge (DUOS)	=	$3.132645 per kVA
Utility – Other Credit	=	$-0.016314 per kVA
Transmission Cost Recovery Factor	=	$0.335909 per kVA
System Benefit Fund (SBF)	=	$0.000657 per kWh
Transition Charge 1	=	$0.405 per kVA
Nuclear Decommissioning (NDF)	=	$0.012087 per kVA
Competition Transition Charge	=	$0.000145 per kWh
Transition Charge 2	=	$0.002452 per kWh
Transition Charge 3	=	$0.000978 per kWh

Average Savings for consumption:	**=**	**$0.088742 / kWh**
Average Savings for demand:	**=**	**$5.46 / kVA**

PROPANE UTILITY: Centerpoint / Entex
GAS RATE:

Rate Schedule Unavailable: Savings Determined from Billing Data

Total cost for natural gas in Billing period	=	$433,664
Total consumption in Billing Period	=	39,420 MCF
Average Cost per MCF	=	$11.00112 / MCF
Average Savings for consumption:	**=**	**$11.00 per MCF**

6.0 RECOMMENDATIONS:

A. MAINTENANCE AND OPERATIONS PROCEDURES

1. Review energy management system parameters for compliance with existing energy policy. Sequences of operation and setpoints can be changed in the system to accommodate temporary circumstances but they are frequently never changed back to the policy standards after the temporary condition has been mediated. There were several gymnasiums surveyed during this report in which the setpoint had obviously been changed from the energy policy standard setpoint of 76°F. Outside air damper sequencing had been adjusted so that the dampers were closed during student occupied hours.

B. CAPITAL EXPENSE PROJECTS

I. HVAC Renovation

Many of the campuses surveyed for this report have equipment that is symbolic of a variable volume distribution system, but does not take advantage of the energy savings that variable volume systems offer. Some of the air handlers deliver constant volumes of conditioned air to terminal units that simply divert the conditioned air into the return plenum when the classroom spaces are satisfied. These air handlers can be easily modified to deliver variable volumes of conditioned air appropriate for the exact load requirements at the time. This results in energy savings for both the air and water side of the system.

Even some systems with variable volume equipment in operation are not taking full advantage of the energy savings available with VAV systems. VFDs have been programmed to operate at one specific frequency instead of allowing the drive to modulate between minimum flow and maximum flow settings. Many secondary chilled and hot water loop pumps do not have drives installed on them to derive the water side energy savings available when the VAV system is satisfied on the air side.

Almost all of the campuses surveyed have thermal storage tanks that were installed within the last ten years that have been decommissioned and taken out of operation as of March, 2008. In most cases, we recommend that the district re-commission these systems and use them to supplement the existing chillers to reduce peak demand loads.

II. Lighting Renovation

All of the surveyed campuses have been renovated with T8 lamps and electronic ballasts. The district has the most energy efficient lamps and ballasts available for their existing fixtures in these facilities and are therefore compliant with House Bill, HB-3693, passed in June, 2007.

The district has begun renovating gymnasiums from metal halide fixtures to new T5 linear fluorescent fixtures to improve overall light quality and eliminate problems with re-strike that are inherent to metal halide fixtures. This retrofit will allow gymnasiums to have their lights turned off during unoccupied periods instead of the current common practice to leave the metal halides on for 10-12 hours per day. We recommend that the district continue the transition to T5 high bay linear fluorescent fixtures in place of metal halide fixtures in gymnasiums.

Atascocita High School, along with any other high school in the district with a similar floor plan to AHS, has a significant number of interior corridor fixtures that could be turned off during daylight hours. We recommend that the district consider the recommended daylighting strategies for these campuses.

III. Controls Renovation

Many of the surveyed campuses had combination DDC and pneumatic control systems. Typically, the equipment was controlled with the DDC system, while dampers and valves were controlled with the pneumatic system. We recommend that the district begin to replace the pneumatic system at these campuses with DDC control at the dampers and valves. The schools would be able to remove the air compressor form the mechanical rooms and the district would no longer have to maintain the labor intensive pneumatic system.

SUMMARY:	***IMPLEMENTATION COST***	***ESTIMATED SAVINGS***	***SIMPLE PAYBACK***
TOTAL PROJECTS	*$ 1,428,000*	*$ 217,500*	*6-1/2 Years*

Financing of these projects may be provided using a variety of methods as Bond Programs, municipal leases, or state financing programs.

Some of the programs, however, like the SECO LoanSTAR program may be particularly appealing to HISD. The district may borrow up to five million dollars at 3% interest for energy efficiency projects with a cumulative payback of 10 years or less.

In-House Funding	=	$1,428,000		
10 year commercial (5%) loan principal	=	$1,428,000		
10 year commercial loan interest paid	=	$ 389,539		
10 year commercial loan TOTAL	=	$1,817,539		
Commercial Loan Annual Payment	=	$ 181,754	=	$ 181,754
Annual Payment Minus Annual Energy Cost Savings = $181,754 – $217,500			=	$ - 35,746
Annual Savings to ISD (without considering Maintenance Cost Reduction)			**=**	**$ 35,746**

More information regarding financial programs available to HISD can be found in:

APPENDIX I: *SUMMARY OF FUNDING AND PROCUREMENT OPTIONS FOR CAPITAL EXPENDITURE PROJECTS*

APPENDIX I

SUMMARY OF FUNDING AND PROCUREMENT OPTIONS FOR CAPITAL EXPENDITURE PROJECTS

SUMMARY OF FUNDING OPTIONS FOR CAPITAL EXPENDITURE PROJECTS

Several options are available for funding retrofit measures which require capital expenditures.

LoanSTAR Program:
The Texas LoanSTAR program is administered by the State Energy Conservation Office (SECO). It is a revolving loan program available to all public school districts in the state as well as other institutional facilities. SECO loans money at 3% interest for the implementation of energy conservation measures which have a combined payback of eight years or less. The amount of money available varies, depending upon repayment schedules of other facilities with outstanding loans, and legislative actions. Check with Theresa Sifuentes of SECO (512-463-1896) for an up-to-date evaluation of prospects for obtaining a loan in the amounts desired.

TASB (Texas Association Of School Boards) Capital Acquisition Program:
TASB makes loans to school districts for acquiring personal property for "maintenance purposes". Energy conservation measures are eligible for these loans. The smallest loan TASB will make is $100,000. Financing is at 4.4% to 5.3%, depending upon length of the loan and the school district's bond rating. Loans are made over a three year, four year, seven year, or ten year period. The application process involves filling out a one page application form, and submitting the school district's most recent budget and audit. Contact Cheryl Kepp at TASB (512-467-0222) for further information.

Loans On Commercial Market:
Local lending institutions are another source for the funding of desired energy conservation measures. Interest rates obtainable may not be as attractive as that offered by the LoanSTAR or TASB programs, but advantages include "unlimited" funds available for loan, and local administration of the loan.

Leasing Corporations:
Leasing corporations have become increasingly interested in the energy efficiency market. The financing vehicle frequently used is the municipal lease. Structured like a simple loan, a municipal leasing agreement is usually a lease-purchase agreement. Ownership of the financed equipment passes to the district at the beginning of the lease, and the lessor retains a security interest in the purchase until the loan is paid off. A typical lease covers the total cost of the equipment and may include installation costs. At the end of the contract period a nominal amount, usually a dollar, is paid by the lessee for title to the equipment.

Bond Issue:
The may choose to have a bond election to provide funds for capital improvements. Because of its political nature, this funding method is entirely dependent upon the mood of the voters, and may require more time and effort to acquire the funds than the other alternatives.

SUMMARY OF PROCUREMENT OPTIONS FOR CAPITAL EXPENDITURE PROJECTS

State Purchasing:
The General Services Commission has competitively bid contracts for numerous items which are available for direct purchase by school districts. Contracts for this GSC service may be obtained from Sue Jager at (512) 475-2351.

Design/Bid/Build (Competitive Bidding):
Plans and specifications are prepared for specific projects and competitive bids are received from installation contractors. This traditional approach provides the district with more control over each aspect of the project, and task items required by the contractors are presented in detail.

Design/Build:
These contracts are usually structured with the engineer and contractor combined under the same contract to the owner. This type team approach was developed for fast-track projects, and to allow the contractor a position in the decision making process. The disadvantage to the district is that the engineer is not totally independent and cannot be completely focused upon the interest of the district. The district has less control over selection of equipment and quality control.

Purchasing Standardization Method:
This method will result in significant dollar savings if integrated into planned facility improvements. For larger purchases which extend over a period of time, standardized purchasing can produce lower cost per item expense, and can reduce immediate up-front expenditures. This approach includes traditional competitive bidding with pricing structured for present and future phased purchases.

Performance Contracting:
Through this arrangement, an energy service company (ESCO) using in-house or third party financing to implement comprehensive packages of energy saving retrofit projects. Usually a turnkey service, this method includes an initial assessment of energy savings potential, design of the identified projects, purchase and installation of the equipment, and overall project management. The ESCO guarantees that the cost savings generated will, at a minimum, cover the annual payment due over the term of the contract. The laws governing Performance Contracting for school districts are detailed in the Texas Education Code, Subchapter Z, Section 44.901. Senate Bill SB 3035, passed by the seventy-fifth Texas Legislature, amends some of these conditions. Performance Contracting is a highly competitive field, and interested districts may wish to contact Theresa Sifuentes of State Energy Conservation Office, (SECO), at 512-463-1896 for assistance in preparing requests for proposals or requests for qualifications.

Solution Center

How to Finance Your Energy Program

Cost and financing issues are pivotal factors in determining which energy-efficiency measures will be included in your final energy management plan. Before examining financing options, you need to have a reasonably good idea of the measures that may be implemented. For this purpose, you will want to perform cost/benefit analyses on each candidate measure to identify those with the best investment potential. This document presents a brief introduction to cost/benefit methods and then suggests a variety of options for financing your program.

Selecting a Cost/Benefit Analysis Method

Cost/benefit analysis can determine if and when an improvement will pay for itself through energy savings and to help you set priorities among alternative improvement projects. Cost/benefit analysis may be either a simple payback analysis or the more sophisticated life cycle cost analysis. Since most electric utility rate schedules are based on both consumption and peak demand, your analyst should be skilled at assessing the effects of changes in both electricity use and demand on total cost savings, regardless of which type of analysis is used. Before beginning any cost/benefit analyses, you must first determine acceptable design alternatives that meet the heating, cooling, lighting, and control requirements of the building being evaluated. The criteria for determining whether a design alternative is "acceptable" includes reliability, safety, conformance with building codes, occupant comfort, noise levels, and space limitations. Since there will usually be a number of acceptable alternatives for any project, cost/benefit analysis allows you to select those that have the best savings potential.

Simple Payback Analysis

A highly simplified form of cost/benefit analysis is called simple payback. In this method, the total first cost of the improvement is divided by the first-year energy cost savings produced by the improvement. This method yields the number of years required for the improvement to pay for itself.

This kind of analysis assumes that the service life of the energy-efficiency measure will equal or exceed the simple payback time. Simple payback analysis provides a relatively easy way to examine the overall costs and savings potentials for a variety of project alternatives. However, it does not consider a number of factors that are difficult to predict, yet can have a significant impact on cost savings. These factors may be considered by performing a life-cycle cost (LCC) analysis.

Simple Payback

As an example of simple payback, consider the lighting retrofit of a 10,000-square-foot commercial office building. Relamping with T-8 lamps and electronic, high-efficiency ballasts may cost around $13,300 ($50 each for 266 fixtures) and produce annual savings of around $4,800 per year (80,000 kWh at $0.06/kWh). This simple payback for this improvement would be

$$\frac{\$13,300}{\$4,800/\text{year}} = 2.8 \text{ years}$$

That is, the improvement would pay for itself in 2.8 years, a 36% simple return on the investment (1/2.8 = 0.36).

Life-Cycle Cost Analysis

Life-cycle cost analysis (LCC) considers the total cost of a system, device, building, or other capital equipment or facility over its anticipated useful life. LCC analysis allows a comprehensive assessment of all anticipated costs associated with a design alternative. Factors commonly considered in LCC analyses include initial capital cost, operating costs, maintenance costs, financing costs, the expected useful life of equipment, and its future salvage values. The result of the LCC analysis is generally expressed as the value of initial and future costs in today's dollars, as reflected by an appropriate discount rate.

The first step in this type of analysis is to establish the general study parameters for the

continued

How to Finance Your Energy Program *continued*

project, including the base date (the date to which all future costs are discounted), the service date (the date when the new system will be put into service), the study period (the life of the project or the number of years over which the investor has a financial interest in the project), and the discount rate. When two or more design alternatives are compared (or even when a single alternative is compared with an existing design), these variables must be the same for each to assure that the comparison is valid. It is meaningless to compare the LCC of two or more alternatives if they are computed using different study periods or different discount rates.

Decision makers in both the public and private sectors have long used LCC analysis to obtain an objective assessment of the total cost of owning, operating, and maintaining a building or building system improvement over its useful life. Nevertheless, an LCC analysis does require a good understanding of acceptable alternatives, useful life, equipment efficiencies, and discount rates.

Selecting the "Best" Alternatives

Generally, all project alternatives should be screened using simple payback analyses. A more detailed and costly LCC analysis should be reserved for large projects or those improvements that entail a large investment, since a detailed cost analysis would then be a small part of the overall cost. Both simple payback and LCC analyses will allow you to set priorities based on measures that represent the greatest return on investment. In addition, these analyses can help you select appropriate financing options:

- Energy-efficiency measures with short payback periods, such as one to two years, are economically very attractive and should be implemented using operating reserves or other readily available internal funds, if possible.
- Energy-efficiency measures with payback periods from three to five years may be considered for funding from available internal capital investment monies, or may be attractive candidates for third-party financing through energy service companies or equipment leasing arrangements.
- Frequently, short payback measures can be combined with longer payback measures (10 years or more) in order to increase the number of measures that can be cost-effectively included in a project. Projects that combine short- and long-term paybacks are recommended to avoid "cream-skimming" (implementing only those measures that are highly cost effective and have quick paybacks) at the expense of other worthwhile measures. A selected set of measures with a combination of payback periods can be financed either from available internal funds or through third party alternatives.

If simple payback time is long, 10 or more years, economic factors can be very significant and LCC analysis is recommended. In contrast, if simple payback occurs within three to five years, more detailed LCC analysis may not be necessary, particularly if price and inflation changes are assumed to be moderate.

Weighing Non-Cost Impacts

Some factors related to building heating, air conditioning, and lighting system design are not considered in either simple payback or LCC analyses. Examples include the thermal comfort of occupants in a building and the adequacy of task lighting, both of which affect productivity. A small loss in productivity due to reduced comfort or poor lighting can quickly offset any energy cost savings.

Conventional cost/benefit analyses also normally do not consider the ancillary societal benefits that can result from reduced energy use (e.g., reduced carbon emissions, improved indoor air quality). In some cases, these ancillary benefits can be assigned an agreed upon monetary value, but the values to be used are strongly dependent on local factors. In general, if societal benefits have been assigned appropriate monetary values by a local utility, they can be easily considered in your savings calculations. However, your team should discuss this issue with your local utility or with consultants working on such values in your area.

Finally, in any cost analysis, it can be very important to include avoided cost as part of the benefit of the retrofit. When upgrading or replacing building equipment, the avoided cost of maintaining existing equipment should be considered a cost savings provided by the improvement.

How to Finance Your Energy Program *continued*

Financing Mechanisms

Capital for energy-efficiency improvements is available from a variety of public and private sources, and can be accessed through a wide and flexible range of financing instruments. While variations may occur, there are five general financing mechanisms available today for investing in energy-efficiency:

- **Internal Funds.** Energy-efficiency improvements are financed by direct allocations from an organization's own internal capital or operating budget.
- **Debt Financing.** Energy-efficiency improvements are financed with capital borrowed directly by an organization from private lenders.
- **Lease or Lease-Purchase Agreements.** Energy-efficient equipment is acquired through an operating or financing lease with no up-front costs, and payments are made over five to ten years.
- **Energy Performance Contracts.** Energy-efficiency measures are financed, installed, and maintained by a third party, which guarantees savings and payments based on those savings.
- **Utility Incentives.** Rebates, grants, or other financial assistance are offered by an energy utility for the design and purchase of certain energy-efficient systems and equipment.

These financing mechanisms are not mutually exclusive (i.e., an organization may use several of them in various combinations). The most appropriate set of options will depend on the size and complexity of a project, internal capital constraints, in-house expertise, and other factors. Each of these mechanisms is discussed briefly below, followed by some additional funding sources and considerations.

Internal Funds

The most direct way for the owner of a building or facility to pay for energy-efficiency improvements is to allocate funds from the internal capital or operating budget. Financing internally has two clear advantages over the other options discussed below -- it retains internally all savings from increased energy-efficiency, and it is usually the simplest option administratively. The resulting savings may be used to decrease overall operating expenses in future years or retained within a revolving fund used to support additional efficiency investments. Many public and private organizations regularly finance some or all of their energy-efficiency improvements from internal funds.

In some instances, competition from alternative capital investment projects and the requirement for relatively high rates of return may limit the use of internal funds for major, standalone investments in energy-efficiency. In most organizations, for example, the highest priorities for internal funds are business or service expansion, critical health and safety needs, or productivity enhancements. In both the public and private sectors, capital that remains available after these priorities have been met will usually be invested in those areas that offer the highest rates of return. The criteria for such investments commonly include an annual return of 20 percent to 30 percent or a simple payback of three years or less.

Since comprehensive energy-efficiency improvements commonly have simple paybacks of five to six years, or about a 12 percent annual rate of return, internal funds often cannot serve as the sole source of financing for such improvements. Alternatively, however, internal funding can be used well and profitably to achieve more competitive rates of return when combined with one or more of the other options discussed below.

Debt Financing

Direct borrowing of capital from private lenders can be an attractive alternative to using internal funds for energy-efficiency investments. Financing costs can be repaid by the savings that accrue from increased energy-efficiency. Additionally, municipal governments can often issue bonds or other long-term debt instruments at substantially lower interest rates than can private corporate entities. As in the case of internal funding, all savings from efficiency improvements (less only the cost of financing) are retained internally.

Debt financing is administratively more complex than internal funding, and financing costs will vary according to the credit rating of the borrower. This approach may also be restricted by formal debt ceilings imposed by municipal

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How to Finance Your Energy Program *continued*

policy, accounting standards, and/or Federal or state legislation.

In general, debt financing should be considered for larger retrofit projects that involve multiple buildings or facilities. When considering debt financing, organizations should weigh the cost and complexity of this type of financing against the size and risk of the proposed projects.

Lease and Lease-Purchase Agreements

Leasing and lease-purchase agreements provide a means to reduce or avoid the high, up-front capital costs of new, energy-efficient equipment. These agreements may be offered by commercial leasing corporations, management and financing companies, banks, investment brokers, or equipment manufacturers. As with direct borrowing, the lease should be designed so that the energy savings are sufficient to pay for the financing charges. While the time period of a lease can vary significantly, leases in which the lessee assumes ownership of the equipment generally range from five to ten years. There are several different types of leasing agreements, as shown in the sidebar. Specific lease agreements will vary according to lessor policies, the complexity of the project, whether or not engineering and design services are included, and other factors.

Energy Performance Contracts

Energy performance contracts are generally financing or operating leases provided by an Energy Service Company (ESCo) or equipment manufacturer. The distinguishing features of these contracts are that they provide a guarantee on energy savings from the installed retrofit measures, and they provide payments to the ESCo from the savings, freeing the customer from any need of up-front payments to the ESCo. The contract period can range from five to 15 years, and the customer is required to have a certain minimum level of capital investment (generally $200,000 or more) before a contract will be considered.

Under an energy performance contract, the ESCo provides a service package that typically includes the design and engineering, financing, installation, and maintenance of retrofit measures to improve energy-efficiency. The scope of these improvements can range from measures that affect a single part of a building's energy-using

Types of Leasing Agreements

Operating Leases are usually for a short term, occasionally for periods of less than one year. At the end of the lease period, the lessee may either renegotiate the lease, buy the equipment for its fair market value, or acquire other equipment. The lessor is considered the owner of the leased equipment and can claim tax benefits for its depreciation.

Financing Leases are agreements in which the lessee essentially pays for the equipment in monthly installments. Although payments are generally higher than for an operating lease, the lessee may purchase the equipment at the end of the lease for a nominal amount (commonly $1). The lessee is considered the owner of the equipment and may claim certain tax benefits for its depreciation.

Municipal Leases are available only to tax-exempt entities such as school districts or municipalities. Under this type of lease, the lessor does not have to pay taxes on the interest portion of the lessee's payments, and can therefore offer an interest rate that is lower than the rate for usual financing leases. Because of restrictions against multi-year liabilities, the municipality specifies in the contract that the lease will be renewed year by year. This places a higher risk on the lessor, who must be prepared for the possibility that funding for the lease may not be appropriated. The lessor may therefore charge an interest rate that is as much as 2 percent above the tax-exempt bond rate, but still lower than rates for regular financing leases. Municipal leases nonetheless are generally faster and more flexible financing tools than tax-exempt bonds.

Guaranteed Savings Leases are the same as financing or operating leases but with the addition of a guaranteed savings clause. Under this type of lease, the lessee is guaranteed that the annual payments for leasing the energy-efficiency improvements will not exceed the energy savings generated by them. The owner pays the contractor a fixed payment per month. If actual energy savings are less than the fixed payment, however, the owner pays only the small amount saved and receives a credit for the difference.

How to Finance Your Energy Program *continued*

infrastructure (such as lighting) to a complete package of measures for multiple buildings and facilities. Generally, the service provider will guarantee savings as a result of improvements in both energy and maintenance efficiencies. Flat-fee payments tend to be structured to maintain a positive cash flow to the customer with whom the agreement is made. With the increasing deregulation of conventional energy utilities, several larger utilities have formed unregulated subsidiaries that offer a full range of energy-efficiency services under performance agreements.

An energy performance contract must define the methodology for establishing the baseline costs and cost savings and for the distribution of those savings among the parties. The contract must also specify how those savings will be determined, and must address contingencies such as utility rate changes and variations in the use and occupancy of a building. While several excellent guidance documents exist for selecting and negotiating energy performance contracts, large or complicated contracts should be negotiated with the assistance of experienced legal counsel.

Utility Incentives

Some utilities still offer financial incentives for the installation of energy-efficient systems and equipment, although the number and extent of such programs appears to be decreasing as utility deregulation proceeds. These incentives are available for a variety of energy-efficient products including lighting, HVAC systems, energy management controls, and others. The most common incentives are equipment rebates, design assistance, and low-interest loans.

In general, the primary purpose of utility incentives is to lower peak demand; overall energy-efficiency is an important, but secondary consideration. Incentives are much more commonly offered by electric utilities than by natural gas utilities.

Additional Financing Sources and Considerations

State and Federal Assistance. Matching grants, loans, or other forms of financial assistance (in addition to those listed above) may be available from the Federal government or state governments. If your community is considering energy-efficiency improvements for public or assisted multifamily housing, your program could be eligible to receive assistance through various programs of the U.S. Department of Housing and Urban Development. A variety of state-administered programs for building efficiency improvements may also be available, some of which are funded through Federal block grants and programs. Federal assistance available through states include Federal block grants and State Energy Conservation Program funds. An example of individual state programs is the Texas LoanSTAR program, which provides low-interest loans for state agencies and schools.

Utility Assistance

Equipment Rebates. Some utilities offer rebates on the initial purchase price of selected energy-efficient equipment. The amount of the rebate varies substantially depending on the type of equipment. For example, a rebate of $.50 to $1 may be offered for the replacement of an incandescent bulb with a more efficient fluorescent lamp, while the installation of an adjustable speed drive may qualify for a rebate of $10,000 or more.

Design Assistance. A smaller number of utilities provide direct grants or financial assistance to architects and engineers for incorporating energy-efficiency improvements in their designs. This subsidy can be based on the square footage of a building, and/or the type of energy-efficiency measures being considered. Generally, a partial payment is made when the design process is begun, with the balance paid once the design has been completed and installation has commenced.

Low-Interest Loans. Loans with below-market rates are provided by other utilities for the purchase of energy-efficient equipment and systems. Typically, these low-interest loans will have an upper limit in the $10,000 to $20,000 range, with monthly payments scheduled over a two- to five-year period.

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How to Finance Your Energy Program *continued*

Bulk Purchasing. Large organizations generally have purchasing or materials procurement departments that often buy standard materials in bulk or receive purchasing discounts because of the volume of their purchases. Such organizations can help reduce the costs of energy-efficiency renovations if their bulk purchasing capabilities can be used to obtain discounts on the price of materials (e.g., lamps and ballasts). While some locales may have restrictions that limit the use of this option, some type of bulk purchasing can usually be negotiated to satisfy all parties involved.

Project Transaction Costs. Certain fixed costs are associated with analyzing and installing energy measures in each building included in a retrofit program. Each additional building, for example, could represent additional negotiations and transactions with building owners, building analysts, energy auditors, equipment installers, commissioning agents, and other contractors. Similarly, each additional building will add to the effort involved in initial data analysis as well as in tracking energy performance after the retrofit. For these reasons, it is often possible to achieve target energy savings at lower cost by focusing only on those buildings that are the largest energy users. One disadvantage with larger buildings is that the energy systems in the building can be more difficult to understand, but overall, focusing on the largest energy users is often the most efficient use of your financial resources.

Direct Value-Added Benefits. The primary value of retrofits to buildings and facilities lies in the reduction of operating costs through improved energy-efficiency and maintenance savings. Nevertheless, the retrofit may also directly help address a variety of related concerns, and these benefits (and avoided costs) should be considered in assessing the true value of an investment. A few examples of these benefits include the improvement of indoor air quality in office buildings and schools; easier disposal of toxic or hazardous materials found in energy-using equipment; and assistance in meeting increasingly stringent state or Federal mandates for water conservation. Effective energy management controls for buildings can also provide a strong electronic infrastructure for improving security systems and telecommunications.

Economic Development Benefits. In addition to direct savings on operating costs and the added-value benefits mentioned above, investments in energy-efficiency can also support a community's economic development and employment opportunities. Labor will typically constitute about 60 percent of a total energy investment, and about 50 percent of equipment can be expected to be purchased from local equipment suppliers; as a result, about 85 percent of the investment is retained within the local economy. Additionally, funds retained in urban areas will generally be re-spent in the local economy. The Department of Commerce estimates that each dollar retained in an urban area will be re-spent three times. This multiplier effect results in a three-fold increase in the economic benefits of funds invested in energy-efficiency, without even considering the savings from lower overall fuel costs.

For more information contact the Rebuild America Clearinghouse at 252-459-4664 or visit www.rebuild.gov

Rebuild America
U.S. Dept. of Energy

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APPENDIX II

ELECTRIC UTILITY RATE SCHEDULE

Chapter 6: Company Specific Items

Sheet No. 6.3
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CenterPoint Energy Houston Electric, LLC
Applicable: Entire Service Area

CNP 8017

6.1.1.1.3 SECONDARY SERVICE GREATER THAN 10 KVA

AVAILABILITY
This schedule is applicable to Delivery Service for non-residential purposes at secondary voltage with demand greater than 10 kVA when such Delivery Service is to one Point of Delivery and measured through one Meter.

TYPE OF SERVICE
Delivery Service will be single or three-phase, 60 hertz, at a standard secondary voltage. Delivery Service will be metered using Company's standard Meter provided for this type of Delivery Service. Any Meter other than the standard Meter will be provided at an additional charge and/or will be provided by a Meter Owner other than the Company pursuant to Applicable Legal Authorities. Where Delivery Service of the type desired is not available at the Point of Delivery, additional charges and special contract arrangements may be required prior to Delivery Service being furnished, pursuant to Section 6.1.2.2, Construction Services, in this Tariff.

MONTHLY RATE

I. Transmission and Distribution Charges:

	Standard Class	Subclass Exception	
Customer Charge	$5.27	$0.00	per Retail Customer per Month
Metering Charge			
Non-IDR Metered	$31.86	$17.07	per Retail Customer per Month
IDR Metered	$116.89	$116.89	per Retail Customer per Month
Transmission System Charge			
Non-IDR Metered	$1.1027	$1.1027	per NCP kVA
IDR Metered	$1.4709	$1.4709	per 4CP kVA
Distribution System Charge	$3.132645	$3.132645	per Billing kVa

The following charges are applicable to both the Standard Class and the Subclass Exception

II.	**System Benefit Fund:**	See Rider SBF
III.	**Transition Charge:**	See Schedules TC, TC2, and TC3
IV.	**Nuclear Decommissioning Charge:**	See Rider NDC
V.	**Transmission Cost Recovery Factor:**	See Rider TCRF

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VI.	**Excess Mitigation Credit:**		Not Applicable
VII.	**State Colleges and Universities Discount:**		See Rider SCUD
VIII.	**Competition Transition Charge:**		See Rider CTC
IX.	**Competitive Metering Credit:**		See Rider CMC
X.	**Other Charges or Credits:**		
	A. Municipal Account Franchise Credit (see application and explanation below)	$(.002207)	per kWh
	B. Rate Case Expenses Surcharge		See Rider RCE
	C. Rider UCOS Retail Credit		See Rider RURC
	D. Advanced Metering System Surcharge		See Rider AMS

COMPANY SPECIFIC APPLICATIONS

DETERMINATION OF BILLING DEMAND FOR TRANSMISSION SYSTEM CHARGES

Determination of NCP kVA The NCP kVA applicable under the Monthly Rate section shall be the kVA supplied during the 15 minute period of maximum use during the billing month.

Determination of 4 CP kVA The 4 CP kVA applicable under the Monthly Rate section shall be the average of the Retail Customer's integrated 15 minute demands at the time of the monthly ERCOT system 15 minute peak demand for the months of June, July, August and September of the previous calendar year. The Retail Customer's average 4CP demand will be updated effective on January 1 of each calendar year and remain fixed throughout the calendar year. Retail Customers without previous history on which to determine their 4 CP kVA will be billed at the applicable NCP rate under the "Transmission System Charge" using the Retail Customer's NCP kVA.

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Chapter 6: Company Specific Items

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DETERMINATION OF BILLING DEMAND FOR DISTRIBUTION SYSTEM CHARGES

Determination of Billing kVA The Billing kVA applicable to the Distribution System Charge shall be the higher of the NCP kVA for the current billing month or 80% of the highest monthly NCP kVA established in the 11 months preceding the current billing month (80% ratchet). The 80% ratchet shall not apply to seasonal agricultural Retail Customers.

OTHER PROVISIONS

Secondary Service Greater Than 10 kVA. This Rate Schedule is applicable only to Retail Customers whose peak demand for the current month is greater than 10 kVA, as measured in the fifteen minute period of highest demand, or whose peak demand exceeded 10 kVA in any of the previous eleven months, and that otherwise qualify under this Rate. This Rate Schedule is applicable to Delivery Service provided for Electric Power and Energy supplied by Retail Customer's REP for Temporary service subject to provisions of Section 6.1.2.2, Construction Services. The Electric Power and Energy delivered may not be re-metered or sub-metered by the Retail Customer for resale except pursuant to lawful sub-metering regulations of Applicable Legal Authorities. Retail Customer's previous metered usage under this or any other Rate Schedule will be used, as needed, in determining the billing determinants under the Monthly Rate section.

Subclass Exception. The Subclass Exception is applicable only to Retail Customers who otherwise qualify for the Secondary Service Greater Than 10 kVA rate schedule and either: (1) whose highest NCP kVa for the most recent 12 months is equal to or less than 50 kVA; or (2) whose highest NCP kVa for the most recent 12 months is greater than 50 kVA but less than or equal to 400 kVA and whose load factor was less than or equal to 10% for each of the most recent 12 months. The most recent 12 months ends with and includes the current month. The monthly load factor is determined as follows:

load factor = billing kWh for the month/ (NCP kVA X number of days in billing period X 24)

Service Voltages. Company's standard service voltages are described in 6.2.2, Standard Voltages and in the Company's Service Standards.

Municipal Account Franchise Credit. A credit equal to the amount of franchise fees included in the Transmission and Distribution Charges will be applied to municipal accounts receiving service within the incorporated limits of such municipality which imposes a municipal franchise fee upon the Company based on the kWh delivered within that municipality and who have signed an appropriate Franchise Agreement.

Adjustment To The Charges Applied To Retail Customer's Demand Measurement If data to determine the Retail Customer's *Demand Measurement* becomes no longer available, the Company

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APPENDIX III

UTILITIES CONSUMPTION HISTORY

OWNER: Humble ISD **BUILDING:** Humble ES

MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
MONTH	YEAR	CONSUMPTION KWH	METERED KW/KVA	CHARGED KW/KVA	COST OF DEMAND	TOTAL ALL ELECTRICAL COSTS $	CONSUMPTION MCF	$ COSTS
JANUARY	2008	54,642	288	288	0	6,303	93	$1,070
FEBRUARY	2008	65,585	374	374	0	7,579	110	$1,312
MARCH	2008	67,591	403	403	0	7,869	88	$1,056
APRIL	2008	74,145	403	403	0	8,083	59	$713
MAY	2008	81,080	403	403	0	9,028	41	$514
JUNE	2008	47,148	403	403	0	8,236	7	$126
JULY	2008	13,824	374	374	0	5,969	0	$21
AUGUST	2008	41,384	374	374	0	5,720	6	$106
SEPTEMBER	2008	66,737	374	374	0	4,540	16	$234
OCTOBER	2008	101,484	374	374	0	12,176	8	$117
NOVEMBER	2008	64,651	322	322	0	7,701	56	$819
DECEMBER	2008	38,462	322	322	0	7,420	78	$1,141
TOTAL		716,733	4,414	4,414	0	$90,624	562	$7,229

Annual Total Energy Cost = $97,853 Per Year

Total KWH x 0.003413 = 2,446.21 x 106
Total MCF x 1.03 = 578.86 x 106
Total Other x ____ x 106
Total Site BTU's/yr 3,025.07 x 106

Floor area: 78,500 s.f.

Electric Utility GLO - Reliant **Account #** **Meter#**

Energy Use Index:
Total Site BTU's/yr / Total Area (sq.ft.) 38,536 BTU/s.f.yr

Energy Cost Index:
Total Energy Cost/yr / Total Area (sq.ft.) $1.25 $/s.f. yr

Gas Utility CenterPoint/Entex **Account #**

OWNER: Humble ISD **BUILDING:** Lakeland ES

MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
MONTH	YEAR	CONSUMPTION KWH	METERED KW/KVA	CHARGED KW/KVA	COST OF DEMAND	TOTAL ALL ELECTRICAL COSTS $	CONSUMPTION MCF	$ COSTS
JANUARY	2008	98,303	461	461	0	12,018	175	$2,013
FEBRUARY	2008	90,361	461	461	0	10,603	182	$2,171
MARCH	2008	98,488	461	461	0	11,621	141	$1,692
APRIL	2008	108,172	461	461	0	11,690	102	$1,233
MAY	2008	116,539	461	461	0	12,108	67	$840
JUNE	2008	87,799	499	499	0	12,379	1	$18
JULY	2008	65,023	499	499	0	7,728	2	$35
AUGUST	2008	94,612	422	422	0	9,887	0	$21
SEPTEMBER	2008	123,280	399	399	0	10,108	47	$687
OCTOBER	2008	130,319	399	399	0	16,268	76	$1,112
NOVEMBER	2008	73,911	399	399	0	9,804	44	$644
DECEMBER	2008	41,382	399	399	0	7,935	30	$439
TOTAL		1,128,189	5,321	5,321	0	$132,149	867	$10,904

Annual Total Energy Cost = $143,053 Per Year

Total KWH x 0.003413 = 3,850.51 x 106
Total MCF x 1.03 = 893.01 x 106
Total Other x ____ x 106
Total Site BTU's/yr 4,743.52 x 106

Floor area: 77,812 s.f.

Electric Utility GLO - Reliant **Account #** **Meter#**

Energy Use Index:
Total Site BTU's/yr / Total Area (sq.ft.) 60,961 BTU/s.f.yr

Energy Cost Index:
Total Energy Cost/yr / Total Area (sq.ft.) $1.84 $/s.f. yr

Note: Unit costs for gas borrowed from Humble ES Specific cost data was missing

Gas Utility CenterPoint/Entex **Account #**

OWNER: Humble ISD **BUILDING:** Oak Forest ES

MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
MONTH	YEAR	CONSUMPTION KWH	METERED KW/KVA	CHARGED KW/KVA	COST OF DEMAND	TOTAL ALL ELECTRICAL COSTS $	CONSUMPTION MCF	$ COSTS
JANUARY	2008	64,848	526	526	0	7,749	125	$1,428
FEBRUARY	2008	72,182	526	526	0	9,025	142	$1,682
MARCH	2008	74,003	526	526	0	8,497	104	$1,239
APRIL	2008	91,773	598	598	0	9,807	33	$409
MAY	2008	102,632	598	598	0	11,185	19	$294
JUNE	2008	70,054	589	589	0	11,491	28	$438
JULY	2008	23,499	549	549	0	7,702	0	$23
AUGUST	2008	84,474	549	549	0	9,155	3	$60
SEPTEMBER	2008	91,211	532	532	0	10,954	4	$525
OCTOBER	2008	89,969	532	532	0	9,942	60	$1,351
NOVEMBER	2008	76,700	478	478	0	9,312	138	$1,866
DECEMBER	2008	46,564	478	478	0	8,146	925	$12,508
TOTAL		887,909	6,481	6,481	0	$112,965	1,581	$21,823

Annual Total Energy Cost = $134,788 Per Year

Total KWH x 0.003413 = 3,030.43 x 106
Total MCF x 1.03 = 1,628.43 x 106
Total Other x ____ x 106
Total Site BTU's/yr 4,658.86 x 106

Floor area: 89,431 s.f.

Energy Use Index:
Total Site BTU's/yr / Total Area (sq.ft.) 52,095 BTU/s.f.yr

Energy Cost Index:
Total Energy Cost/yr / Total Area (sq.ft.) $1.51 $/s.f. yr

Electric Utility GLO - Reliant **Account #** **Meter#**

Gas Utility CenterPoint/Entex **Account #**

OWNER: Humble ISD **BUILDING:** Pine Forest ES

MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
MONTH	YEAR	CONSUMPTION KWH	METERED KW/KVA	CHARGED KW/KVA	COST OF DEMAND	TOTAL ALL ELECTRICAL COSTS $	CONSUMPTION MCF	$ COSTS
JANUARY	2008	67,134	476	476	0	7,699	236	$2,658
FEBRUARY	2008	76,795	476	476	0	9,423	244	$2,861
MARCH	2008	74,476	539	539	0	8,588	203	$2,386
APRIL	2008	86,281	548	548	0	9,484	151	$2,107
MAY	2008	96,965	548	548	0	10,368	117	$2,277
JUNE	2008	69,477	543	543	0	11,283	19	$781
JULY	2008	21,189	476	476	0	9,535	10	$170
AUGUST	2008	70,610	476	476	0	8,229	12	$183
SEPTEMBER	2008	68,552	459	459	0	8,295	40	$557
OCTOBER	2008	80,144	445	445	0	8,465	124	$1,670
NOVEMBER	2008	74,766	438	438	0	9,228	169	$2,273
DECEMBER	2008	42,198	438	438	0	7,475	97	$1,305
TOTAL		828,587	5,862	5,862	0	$108,072	1,422	$19,228

Annual Total Energy Cost = $127,300 Per Year

Total KWH x 0.003413 = 2,827.97 x 106
Total MCF x 1.03 = 1,464.66 x 106
Total Other x ____ x 106
Total Site BTU's/yr 4,292.63 x 106

Floor area: 78,478 s.f.

Energy Use Index:
Total Site BTU's/yr / Total Area (sq.ft.) 54,698 BTU/s.f.yr

Energy Cost Index:
Total Energy Cost/yr / Total Area (sq.ft.) $1.62 $/s.f. yr

Electric Utility GLO - Reliant **Account #** **Meter#**

Gas Utility CenterPoint/Entex **Account #**

OWNER: Humble ISD **BUILDING:** Timbers ES

MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
MONTH	YEAR	CONSUMPTION KWH	METERED KW/KVA	CHARGED KW/KVA	COST OF DEMAND	TOTAL ALL ELECTRICAL COSTS $	CONSUMPTION MCF	$ COSTS
JANUARY	2008	64,299	384	384	0	7,568	120	$1,370
FEBRUARY	2008	69,416	369	369	0	8,360	132	$1,573
MARCH	2008	69,970	408	408	0	7,963	89	$1,068
APRIL	2008	80,297	440	440	0	8,641	46	$563
MAY	2008	84,937	440	440	0	9,627	45	$561
JUNE	2008	61,329	432	432	0	8,547	5	$73
JULY	2008	52,113	394	394	0	5,721	3	$0
AUGUST	2008	76,780	441	441	0	8,529	8	$0
SEPTEMBER	2008	81,062	441	441	0	8,996	10	$34
OCTOBER	2008	91,359	424	424	0	10,366	35	$398
NOVEMBER	2008	70,903	411	411	0	8,311	93	$1,153
DECEMBER	2008	42,980	411	411	0	7,297	76	$942
TOTAL		845,445	4,995	4,995	0	$99,926	662	$7,735

Annual Total Energy Cost = $107,661 Per Year

Total KWH x 0.003413 = 2,885.50 x 106
Total MCF x 1.03 = 681.86 x 106
Total Other x ____ x 106
Total Site BTU's/yr 3,567.36 x 106

Floor area: 74,786 s.f.

Energy Use Index:
Total Site BTU's/yr / Total Area (sq.ft.) 47,701 BTU/s.f.yr

Energy Cost Index:
Total Energy Cost/yr / Total Area (sq.ft.) $1.44 $/s.f. yr

Electric Utility GLO - Reliant **Account #** **Meter#**

Gas Utility CenterPoint/Entex **Account #**

OWNER: Humble ISD **BUILDING:** Whispering Pines ES

MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
MONTH	YEAR	CONSUMPTION KWH	METERED KW/KVA	CHARGED KW/KVA	COST OF DEMAND	TOTAL ALL ELECTRICAL COSTS $	CONSUMPTION MCF	$ COSTS
JANUARY	2008	71,797	454	454	0	8,531	250	$3,082
FEBRUARY	2008	80,234	454	454	0	9,883	167	$2,274
MARCH	2008	79,940	507	507	0	9,374	147	$2,039
APRIL	2008	90,756	531	531	0	10,121	150	$2,089
MAY	2008	92,086	563	563	0	10,693	70	$1,211
JUNE	2008	55,825	563	563	0	9,895	12	$491
JULY	2008	19,079	454	454	0	6,776	10	$467
AUGUST	2008	72,868	541	541	0	7,748	28	$677
SEPTEMBER	2008	90,940	541	541	0	10,862	43	$768
OCTOBER	2008	104,570	533	533	0	10,791	303	$4,448
NOVEMBER	2008	106,288	501	501	0	12,567	232	$3,108
DECEMBER	2008	63,862	450	450	0	10,804	99	$1,326
TOTAL		928,245	6,092	6,092	0	$118,045	1,511	$21,980

Annual Total Energy Cost = $140,025 Per Year

Total KWH x 0.003413 = 3,168.10 x 106
Total MCF x 1.03 = 1,556.33 x 106
Total Other x ____ x 106
Total Site BTU's/yr 4,724.43 x 106

Floor area: 82,864 s.f.

Energy Use Index:
Total Site BTU's/yr / Total Area (sq.ft.) 57,014 BTU/s.f.yr

Energy Cost Index:
Total Energy Cost/yr / Total Area (sq.ft.) $1.69 $/s.f. yr

Electric Utility GLO - Reliant **Account #** **Meter#**

Gas Utility CenterPoint/Entex **Account #**

OWNER: Humble ISD **BUILDING:** Atascocita MS

MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
		CONSUMPTION	METERED	CHARGED	COST OF	TOTAL ALL ELECTRICAL	CONSUMPTION	$
MONTH	YEAR	KWH	KW/KVA	KW/KVA	DEMAND	COSTS $	MCF	COSTS
JANUARY	2008	159,772	734	734	0	16,956	296	$3,346
FEBRUARY	2008	95,286	734	734	0	0	338	$3,952
MARCH	2008	230,367	734	734	0	18,576	252	$2,956
APRIL	2008	186,512	951	951	0	16,627	150	$1,772
MAY	2008	207,133	998	998	0	20,479	57	$728
JUNE	2008	139,609	998	998	0	23,079	29	$462
JULY	2008	436	798	798	0	15,684	31	$485
AUGUST	2008	177,529	960	960	0	13,086	28	$423
SEPTEMBER	2008	171,109	962	962	0	20,279	72	$988
OCTOBER	2008	185,607	858	858	0	18,665	176	$2,519
NOVEMBER	2008	151,372	858	858	0	21,160	232	$3,393
DECEMBER	2008	0	0	0	0	15,956	155	$2,267
TOTAL		1,704,732	9,585	9,585	0	$200,547	1,816	$23,291

Annual Total Energy Cost = $223,838 Per Year

Total KWH x 0.003413 = 5,818.25 x 106
Total MCF x 1.03 = 1,870.48 x 106
Total Other x ____ x 106
Total Site BTU's/yr 7,688.73 x 106

Floor area: 156,542 s.f.

Energy Use Index:
Total Site BTU's/yr
Total Area (sq.ft.) 49,116 BTU/s.f.yr

Energy Cost Index:
Total Energy Cost/yr
Total Area (sq.ft.) $1.43 $/s.f. yr

Electric Utility GLO - Reliant **Account #** **Meter#**

Gas Utility CenterPoint/Entex **Account #**

OWNER: Humble ISD **BUILDING:** Kingwood MS

MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
		CONSUMPTION	METERED	CHARGED	COST OF	TOTAL ALL ELECTRICAL	CONSUMPTION	$
MONTH	YEAR	KWH	KW/KVA	KW/KVA	DEMAND	COSTS $	MCF	COSTS
JANUARY	2008	133,363	678	678	0	13,677	322	$3,897
FEBRUARY	2008	151,280	678	678	0	17,118	240	$3,722
MARCH	2008	153,466	677	677	0	15,735	63	$2,744
APRIL	2008	181,877	688	688	0	18,214	212	$2,823
MAY	2008	178,511	688	688	0	18,807	118	$1,765
JUNE	2008	105,494	680	680	0	16,369	32	$788
JULY	2008	34,815	559	559	0	11,682	28	$735
AUGUST	2008	130,280	679	679	0	12,519	20	$813
SEPTEMBER	2008	157,055	679	679	0	16,955	101	$1,933
OCTOBER	2008	178,655	650	650	0	17,798	212	$3,161
NOVEMBER	2008	154,818	630	630	0	17,237	201	$2,999
DECEMBER	2008	93,864	609	609	0	14,802	130	$1,940
TOTAL		1,653,478	7,895	7,895	0	$190,913	1,679	$27,320

Annual Total Energy Cost = $218,233 Per Year

Total KWH x 0.003413 = 5,643.32 x 106
Total MCF x 1.03 = 1,729.37 x 106
Total Other x ____ x 106
Total Site BTU's/yr 7,372.69 x 106

Floor area: 144,045 s.f.

Energy Use Index:
Total Site BTU's/yr
Total Area (sq.ft.) 51,183 BTU/s.f.yr

Energy Cost Index:
Total Energy Cost/yr
Total Area (sq.ft.) $1.52 $/s.f. yr

Electric Utility GLO - Reliant **Account #** **Meter#**

Gas Utility CenterPoint/Entex **Account #**

OWNER: Humble ISD **BUILDING:** Atascocita HS

MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
MONTH	YEAR	CONSUMPTION KWH	METERED KW/KVA	CHARGED KW/KVA	COST OF DEMAND	TOTAL ALL ELECTRICAL COSTS $	CONSUMPTION MCF	$ COSTS
JANUARY	2008	727,694	1,282	1,282	0	78,517	1,202	$13,642
FEBRUARY	2008	730,474	1,282	1,282	0	77,265	1,233	$14,532
MARCH	2008	736,391	1,364	1,364	0	77,457	3,547	$11,681
APRIL	2008	817,686	1,364	1,364	0	88,534	5,036	$9,783
MAY	2008	951,717	1,482	1,482	0	51,731	413	$13,173
JUNE	2008	162,038	1,482	1,482	0	46,920	831	$8,305
JULY	2008	643,679	1,186	1,186	0	81,561	838	$12,753
AUGUST	2008	876,614	1,322	1,322	0	83,361	849	$12,468
SEPTEMBER	2008	644,669	1,359	1,359	0	94,012	691	$9,502
OCTOBER	2008	773,142	1,359	1,359	0	62,899	701	$9,608
NOVEMBER	2008	673,783	1,359	1,359	0	85,717	1,055	$14,231
DECEMBER	2008	152,412	1,264	1,264	0	71,519	763	$10,292
TOTAL		7,890,299	16,105	16,105	0	$899,493	17,159	$139,970

Annual Total Energy Cost =	$1,039,463	Per Year	**Energy Use Index:** Total Site BTU's/yr / Total Area (sq.ft.)	97,905 BTU/s.f.yr
Total KWH x 0.003413 =	26,929.59	x 106		
Total MCF x 1.03 =	17,673.77	x 106	**Energy Cost Index:** Total Energy Cost/yr / Total Area (sq.ft.)	$2.28 $/s.f. yr
Total Other x ____		x 106		
Total Site BTU's/yr	44,603.36	x 106		
Floor area:	455,579	s.f.		
Electric Utility GLO - Reliant	**Account #**	**Meter#**	**Gas Utility** CenterPoint/Entex	**Account #**

OWNER: Humble ISD **BUILDING:** Kingwood Park HS

MONTH / YEAR		ELECTRIC					NAT'L GAS / FUEL	
			DEMAND					
MONTH	YEAR	CONSUMPTION KWH	METERED KW/KVA	CHARGED KW/KVA	COST OF DEMAND	TOTAL ALL ELECTRICAL COSTS $	CONSUMPTION MCF	$ COSTS
JANUARY	2008	458,696	1,383	1,383	0	46,232	1,923	$21,392
FEBRUARY	2008	522,442	1,519	1,519	0	55,175	1,743	$20,353
MARCH	2008	474,819	1,660	1,660	0	49,667	1,440	$16,898
APRIL	2008	538,294	1,780	1,780	0	54,290	1,128	$13,359
MAY	2008	549,812	1,780	1,780	0	60,832	830	$10,711
JUNE	2008	14,486	1,424	1,424	0	0	505	$7,824
JULY	2008	410,843	1,526	1,526	0	49,224	247	$4,007
AUGUST	2008	538,091	1,784	1,784	0	41,959	680	$10,049
SEPTEMBER	2008	593,135	1,784	1,784	0	53,153	727	$9,966
OCTOBER	2008	519,189	1,601	1,601	0	28,714	900	$12,226
NOVEMBER	2008	436,705	1,567	1,567	0	0	1,140	$15,326
DECEMBER	2008	0	0	0	0	119,709	898	$12,073
TOTAL		5,056,512	17,808	17,808	0	$558,955	12,161	$154,184

Annual Total Energy Cost =	$713,139	Per Year	**Energy Use Index:** Total Site BTU's/yr / Total Area (sq.ft.)	85,506 BTU/s.f.yr
Total KWH x 0.003413 =	17,257.88	x 106		
Total MCF x 1.03 =	12,525.83	x 106	**Energy Cost Index:** Total Energy Cost/yr / Total Area (sq.ft.)	$2.05 $/s.f. yr
Total Other x ____		x 106		
Total Site BTU's/yr	29,783.71	x 106		
Floor area:	348,324	s.f.		
Electric Utility GLO - Reliant	**Account #**	**Meter#**	**Gas Utility** CenterPoint/Entex	**Account #**

APPENDIX IV

ENERGY POLICY

ENERGY POLICY

[Name of Institution]

Recognizing our responsibility as Trustees of ______________________________,
we believe that every effort should be made to conserve energy and natural resources. As a result, we are establishing this Energy Management Policy which shall be implemented within each of our facilities. We believe that this policy will be beneficial for taxpayers and community residents in the prudent management of our financial and energy resources.

The fulfillment of this policy shall be the joint responsibility of the trustees, administrators, staff and support personnel. The success of the policy is dependent upon total cooperation from all levels within the system.

The board will designate an Energy Manager to coordinate and implement the overall Energy Policy. The Energy Manager will also maintain accurate records of energy consumption and cost on a monthly and annual basis. Energy audits will be conducted annually at each facility and recommendations will be made for updating and improving the energy program. Energy efficiency guidelines and procedures will be reviewed and accepted or rejected by the board. In addition, the procedures required for implementation of the program, and the results achieved from its administration, will be published for administrative and staff information.

Adopted this_________day of _________________________, 200 .

____
President, Board of Trustees

Attest: _______________________________
Secretary, Board of Trustees

APPENDIX V

Preliminary Energy Assessment Service Agreement

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OFFICE OF THE COMPTROLLER TEXAS

SECO State Energy Conservation Office

Preliminary Energy Assessment Service Agreement

Investing in our public schools, colleges and non-profit hospitals through improved energy efficiency in public buildings is a win-win opportunity for our communities and the state. Energy-efficient buildings reduce energy costs, increase available capital, spur economic growth and improve working and living environments. The Preliminary Energy Assessment Service provides a viable strategy to achieve these goals.

Description of the Service

The State Energy Conservation Office (SECO) will analyze electric, gas and other utility data and work with HUMBLE ISD, hereinafter referred to as Partner, to identify energy cost-savings potential. To achieve this potential, SECO and Partner have agreed to work together to complete an energy assessment of mutually selected facilities.

SECO agrees to provide this service at no cost to the Partner with the understanding that the Partner is ready and willing to consider implementing the energy savings recommendations.

Principles of the Agreement

Specific responsibilities of the Partner and SECO in this agreement are listed below.

- Partner will select a contact person to work with SECO and its designated contractor to establish an Energy Policy and set realistic energy efficiency goals.
- SECO's contractor will go on site to provide walk through assessments of selected facilities. SECO will provide a report which identifies no cost/low cost recommendations, Capital Retrofit Projects, and potential sources of funding. Portions of this report may be posted on the SECO website.
- Partner will schedule a time for SECO's contractor to make a presentation of the assessment findings key decision makers.

Acceptance of Agreement

This agreement should be signed by your organization's chief executive officer or other upper management staff.

Signature: Mark A Krueger
Name (Mr./Ms./Dr.) MARK A KRUEGER
Organization: HUMBLE ISD
Street Address: 20200 EASTWAY VILLAGE DRIVE
Mailing Address: HUMBLE, TX 77338

Date: 3-5-08
Title: ASST. SUPERINTENDENT
Phone: 281-641-8711
Fax: 281-641-1014
E-Mail: mark.Krueger@humble.k12.tx.us
County: HARRIS

Contact Information:

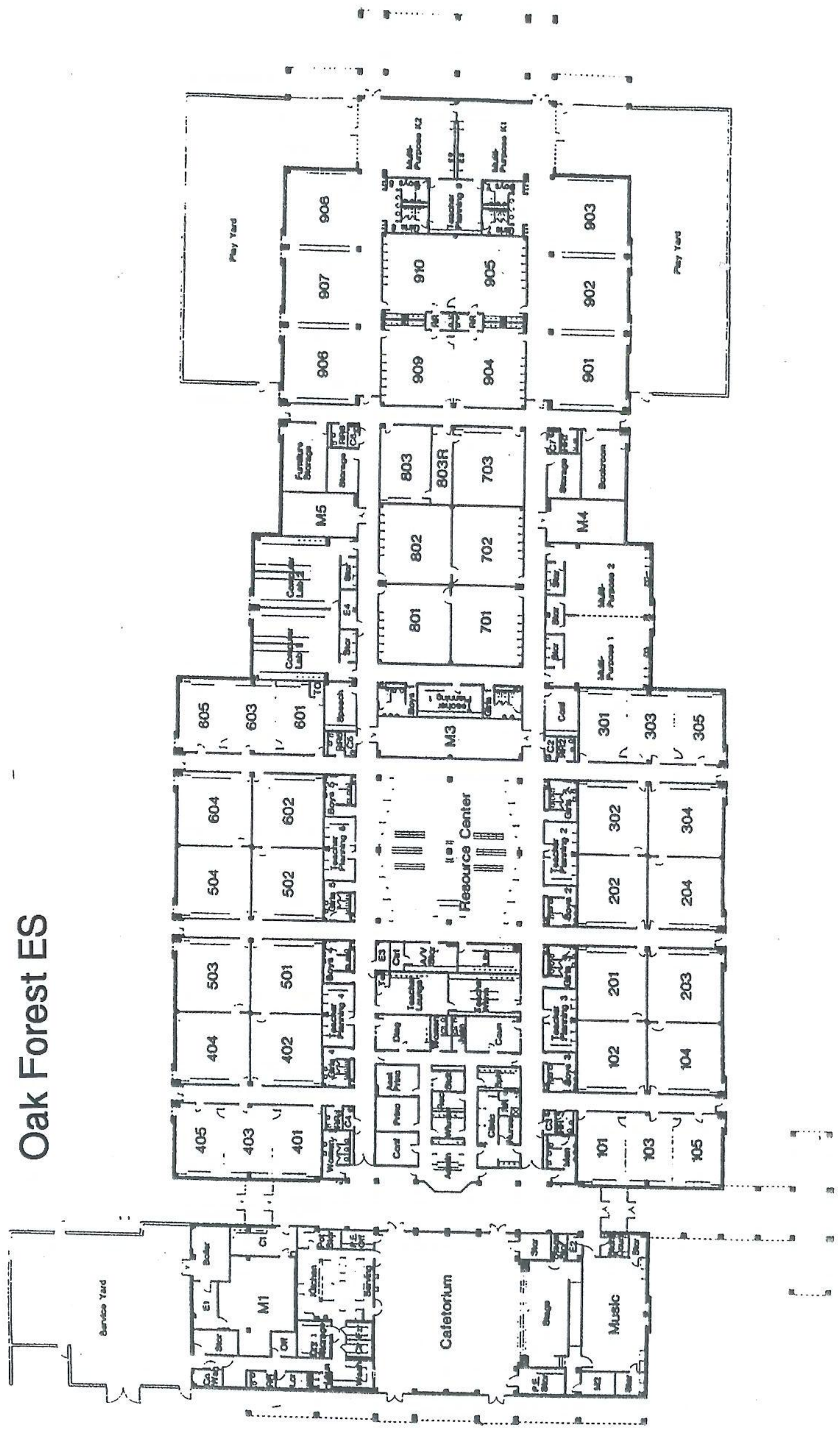
Name (Mr./Ms./Dr.): JOHN CONN
Phone: 281-641-8350
E-Mail: JOHN.CONN@HUMBLE.K12.TX.US

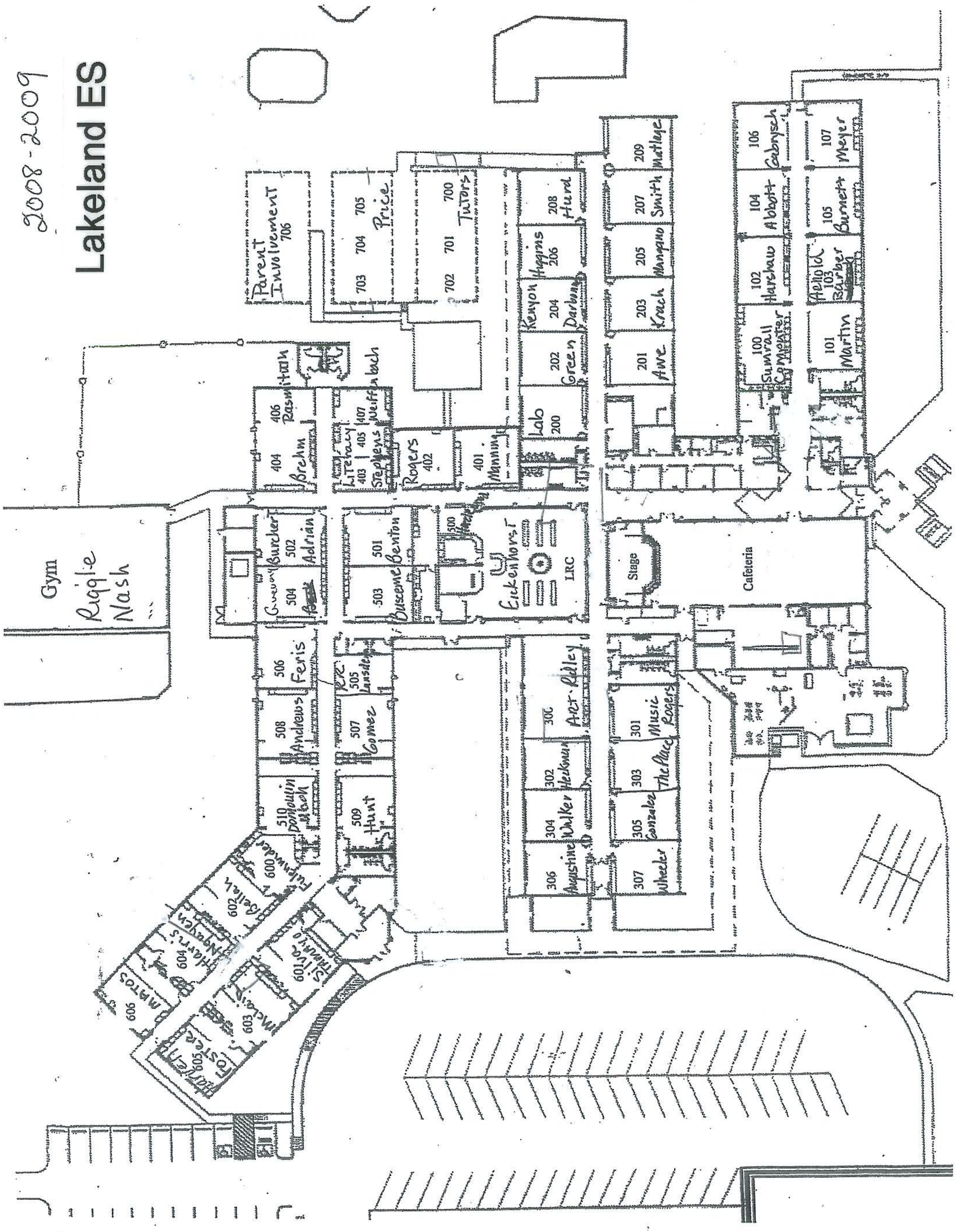
Title: ENERGY MANAGER
Fax: 281-641-1097
County: HARRIS

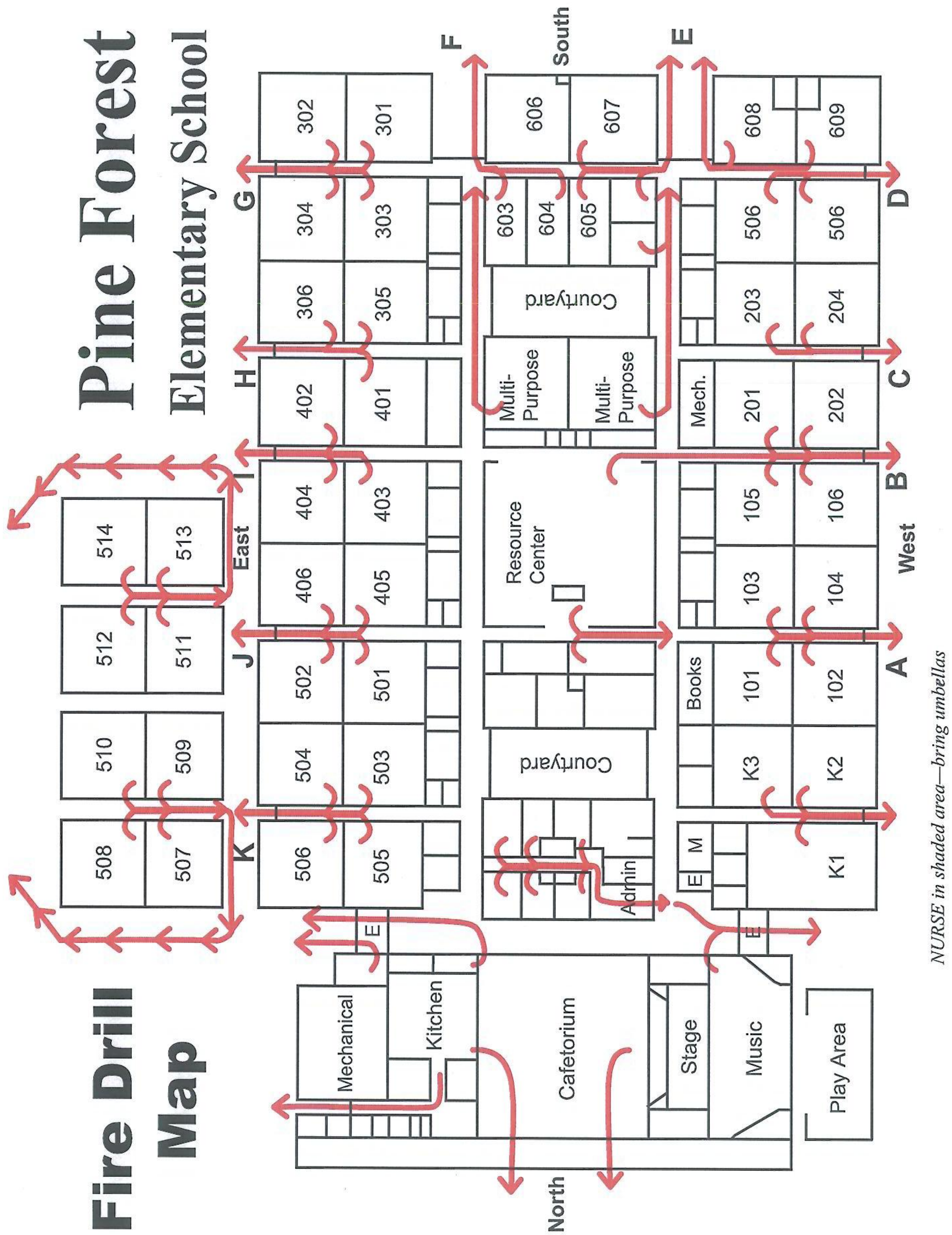
Please sign and mail or fax to: Glenda Baldwin, State Energy Conservation Office, 111 E. 17th Street, Austin, Texas 78774. **Fax 512-475-2569.** Phone: 512-463-1731.

APPENDIX VI

Building Schematic Drawings


Oak Forest ES
Resource Center
Cafetorium
Music
M1
M3
M4
M5


Lakeland ES
2008-2009
Gym
Stage
Cafeteria
LRC


Pine Forest
Elementary School
Fire Drill
Map
North
South
East
West
A
B
C
D
E
F
G
H
I
J
K
302
301
304
303
306
305
402
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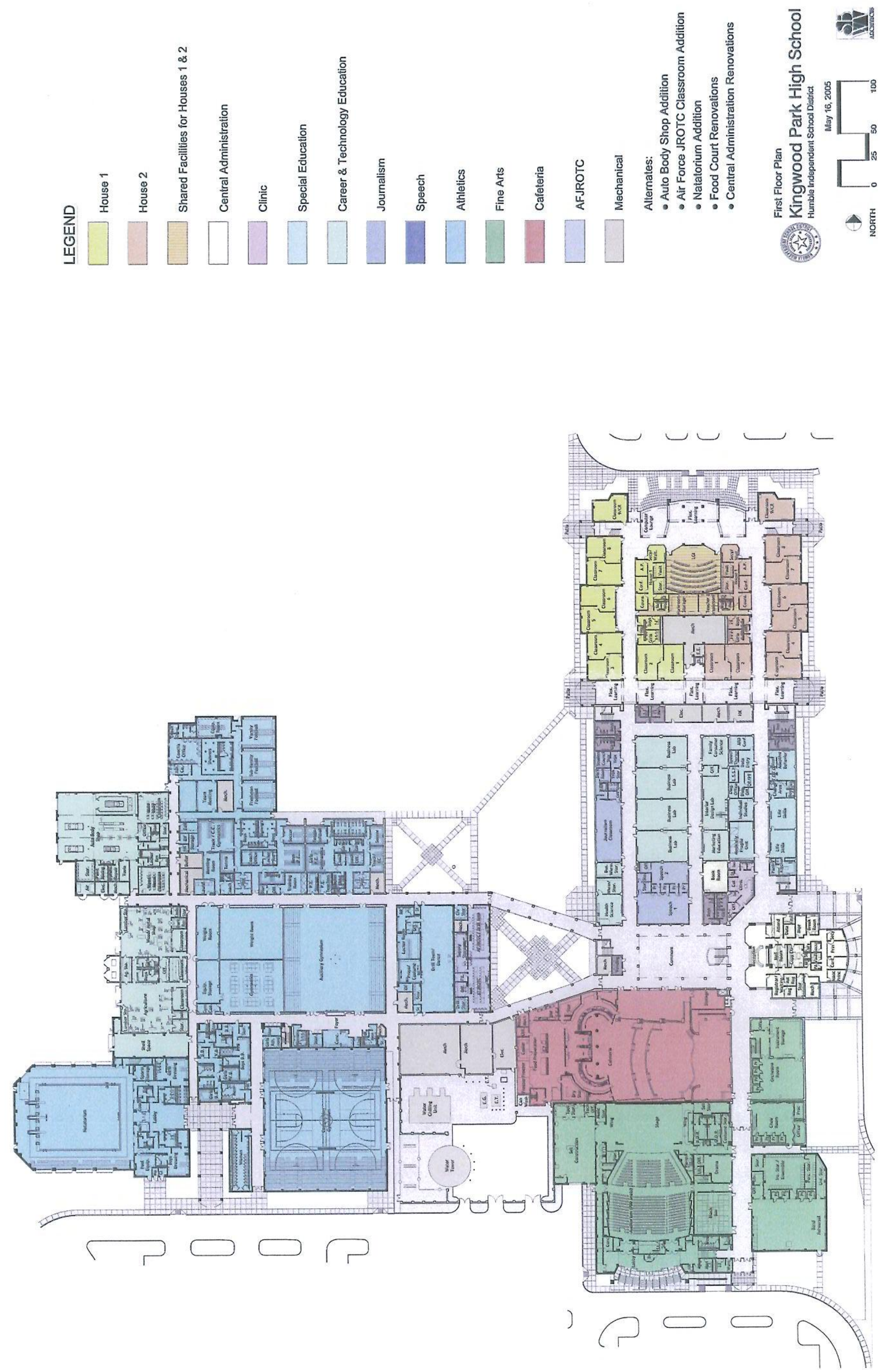
605
608
609
506
506
203
204
201
202
105
106
103
104
101
102
K3
K2
K1
Mech.
Books
E
M
Courtyard
Multi-Purpose
Multi-Purpose
Resource Center
Courtyard
Admin
Mechanical
Kitchen
Cafetorium
Stage
Music
Play Area
NURSE in shaded area—bring umbellas


LEGEND
House 1
House 2
Shared Facilities for Houses 1 & 2
Central Administration
Clinic
Special Education
Career & Technology Education
Journalism
Speech
Athletics
Fine Arts
Cafeteria
AFJROTC
Mechanical
Alternates:
• Auto Body Shop Addition
• Air Force JROTC Classroom Addition
• Natatorium Addition
• Food Court Renovations
• Central Administration Renovations
First Floor Plan
Kingwood Park High School
Humble Independent School District
May 16, 2005
0 25 50 100
NORTH

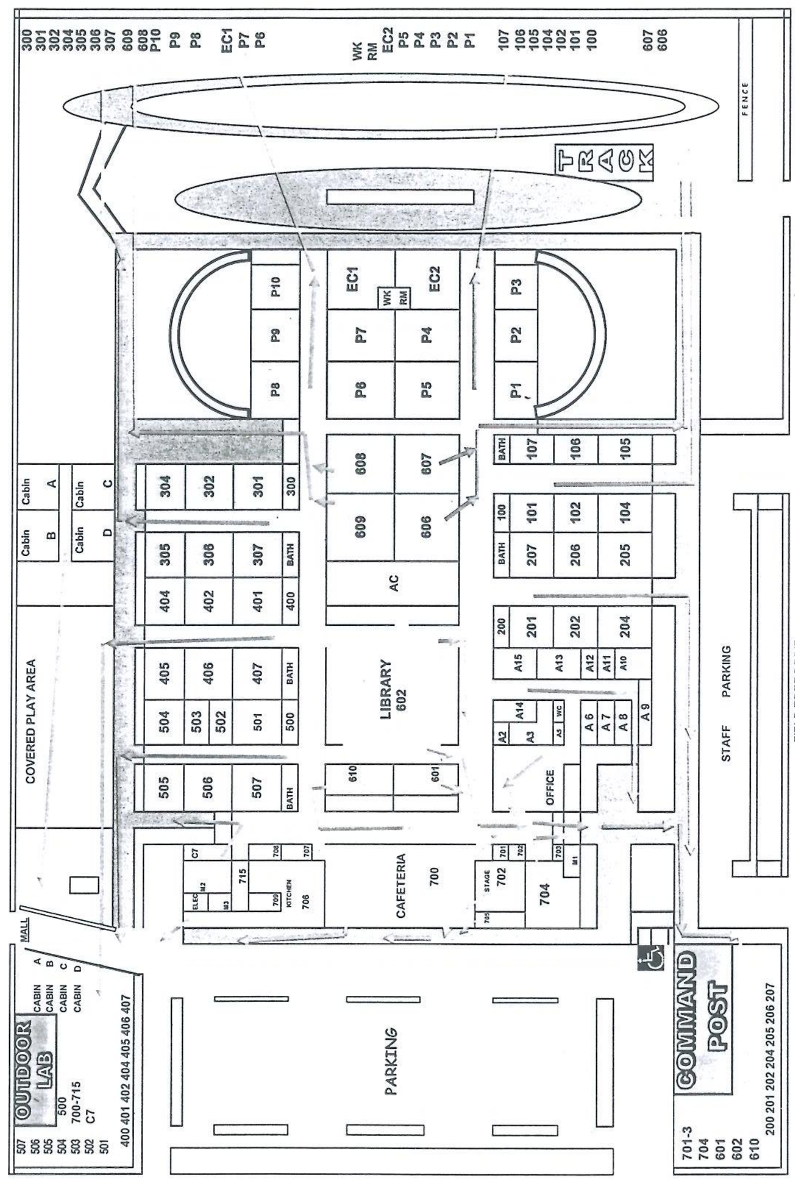
CONTINUOUS SIREN/BLINKING STROBES — CODE B

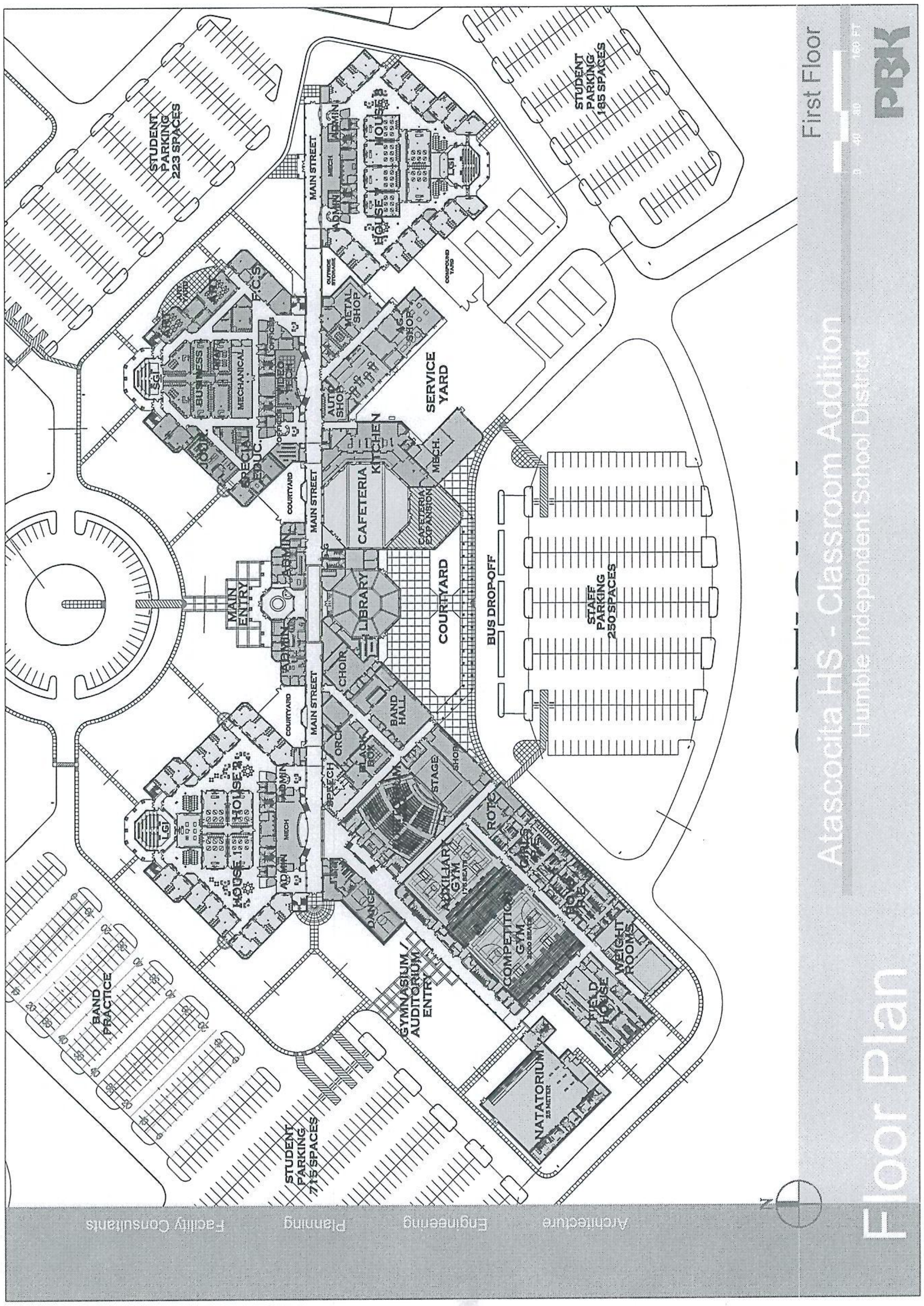
FIRE — **BOMB THREAT**

1. Lights off ; door closed. 2. Take students and red folder quickly to assigned area. 3. Students single file, quiet, and calm.
4. Report attendance to Counselor 5. Be seated WHEN accounted for.

Humble ES

EMERGENCY EVACUATION PLAN




Floor Plan
Atascocita HS - Classroom Addition
Humble Independent School District
First Floor
Architecture
Engineering
Planning
Facility Consultants
MAIN ENTRY
CAFETERIA
LIBRARY
COURTYARD
SERVICE YARD
BUS DROP-OFF
STAFF PARKING 250 SPACES
STUDENT PARKING 223 SPACES
STUDENT PARKING 185 SPACES
STUDENT PARKING 715 SPACES
BAND PRACTICE
NATATORIUM
COMPETITION GYM
AUXILIARY GYM
WEIGHT ROOMS
FIELD HOUSE
GYMNASIUM / AUDITORIUM ENTRY
MAIN STREET
KITCHEN
BAND HALL
CHOIR
STAGE
ROTC
DANCE
AUTO SHOP
METAL SHOP
MECHANICAL
BUSINESS
SPECIAL EDUC.


Atascocita Middle School Floor Plan
2008 – 2009
230
228
ISS 226
ISS 224
227
225
AP OFC
TB OFC
Science Lab 222
Nur 220
218
RR
RR
223
221
219
217
216
214
212
210
208
206
204
202
Amphitheater
100
101
103
105
RR
RR
RR
RR
102
104
106
108
215
213
211
209
207
205
203
201
301
303
305
307
418
416
414
412
410
408
406
404
402
Library
302
304
306
308
310
415
413
411
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407
405
403
401
501
503
505
507
616
614
612
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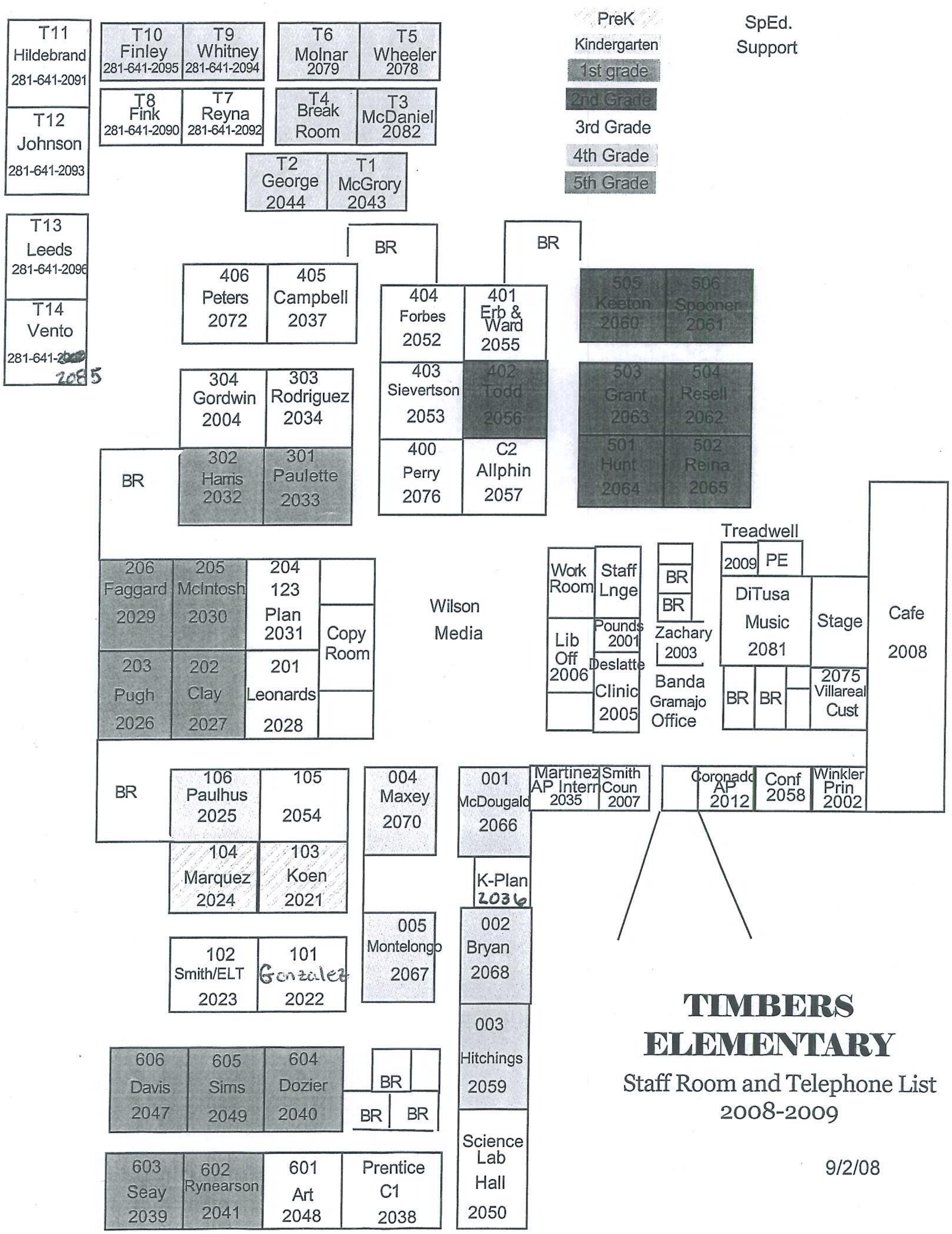
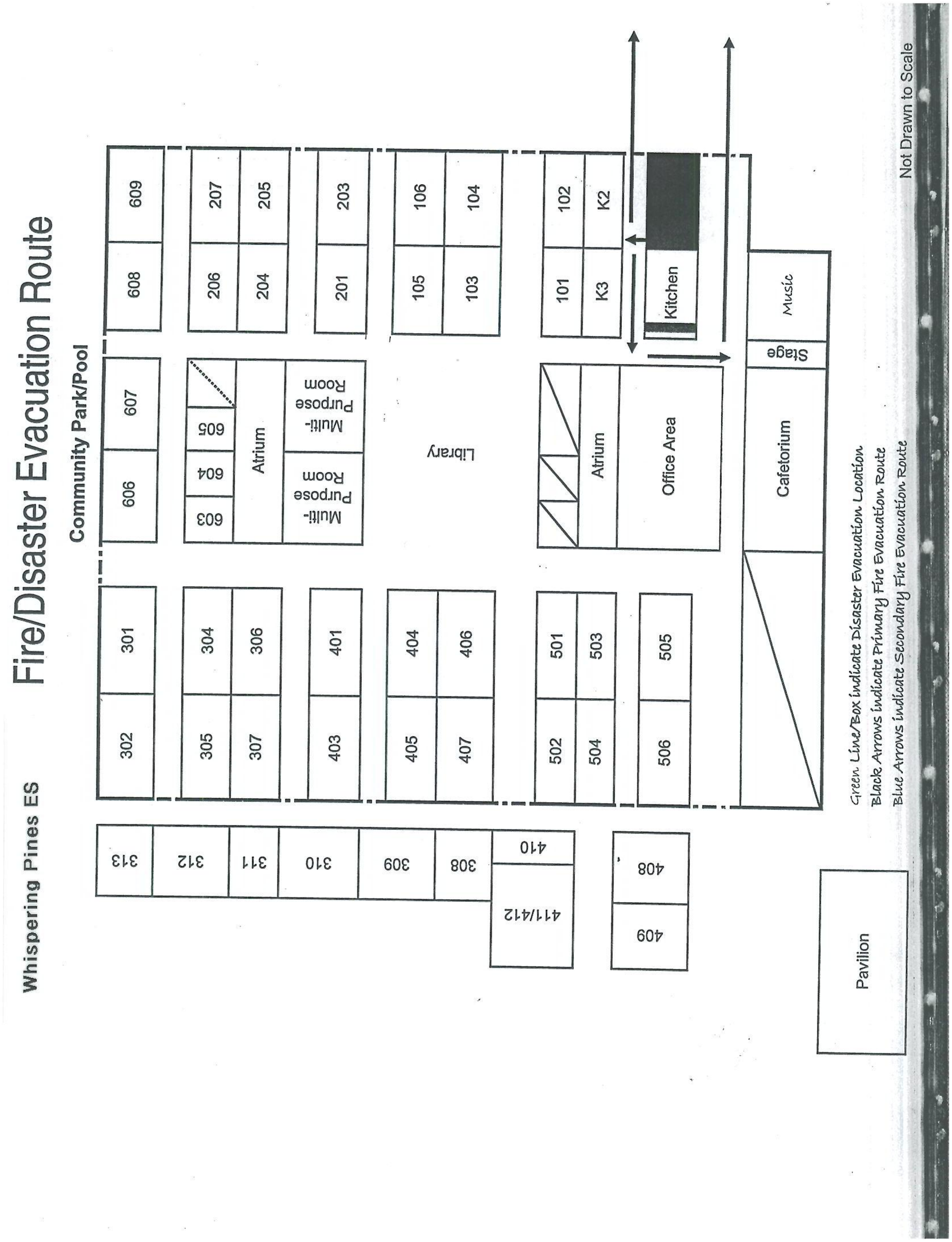
608
606
604
602
RR
RR
RR
502
504
506
508
Ofc
615
613
611
609
607
605
603
601
600
RR
RR
701
703
705
707
709
A – Teacher's Lounge
B – Diagnostician
C – Office
D – Workroom
E – Faculty Restrooms
F – Nurse
G – Office
H – Office
I – Office
J – Principal's Office
K – Conference Room
L – Boys' RR
M – Girls' RR
N – Attendance Office
Boys' Locker Room
Gym 802
Girls' Locker Room
Cafeteria
Kitchen
Primary Route
Secondary Route
A
B
C
D
E
Main Office
F
H
J
G
I
K
L
M
N
Commons
Counseling Office
Assistant Principal's Office
Band 901
Choir 903
Orchestra 902
Satellite Café 904


T11 Hildebrand 281-641-2091
T12 Johnson 281-641-2093
T13 Leeds 281-641-2096
T14 Vento 281-641-2085
T10 Finley 281-641-2095
T9 Whitney 281-641-2094
T8 Fink 281-641-2090
T7 Reyna 281-641-2092
T6 Molnar 2079
T5 Wheeler 2078
T4 Break Room
T3 McDaniel 2082
T2 George 2044
T1 McGrory 2043
PreK
Kindergarten
1st grade
2nd Grade
3rd Grade
4th Grade
5th Grade
SpEd. Support
BR
406 Peters 2072
405 Campbell 2037
404 Forbes 2052
401 Erb & Ward 2055
505 Keeton 2060
506 Spooner 2061
304 Gordwin 2004
303 Rodriguez 2034
403 Sievertson 2053
402 Todd 2056
503 Grant 2063
504 Resell 2062
302 Harris 2032
301 Paulette 2033
400 Perry 2076
C2 Allphin 2057
501 Hunt 2064
502 Reina 2065
206 Faggard 2029
205 McIntosh 2030
204 123 Plan 2031
Copy Room
Wilson Media
203 Pugh 2026
202 Clay 2027
201 Leonards 2028
Work Room
Staff Lnge
Lib Off 2006
Pounds 2001
Deslatte
Clinic 2005
Zachary 2003
Banda Gramajo Office
Treadwell 2009
PE
DiTusa Music 2081
Stage
Cafe 2008
2075 Villareal Cust
106 Paulhus 2025
105 2054
004 Maxey 2070
001 McDougald 2066
Martinez AP Intern 2035
Smith Coun 2007
Coronado AP 2012
Conf 2058
Winkler Prin 2002
104 Marquez 2024
103 Koen 2021
K-Plan 2036
005 Montelongo 2067
002 Bryan 2068
102 Smith/ELT 2023
101 Gonzalez 2022
003 Hitchings 2059
606 Davis 2047
605 Sims 2049
604 Dozier 2040
Science Lab Hall 2050
603 Seay 2039
602 Rynearson 2041
601 Art 2048
Prentice C1 2038
TIMBERS ELEMENTARY
Staff Room and Telephone List
2008-2009
9/2/08


Fire/Disaster Evacuation Route
Whispering Pines ES
Community Park/Pool
Library
Atrium
Office Area
Cafetorium
Kitchen
Stage
Music
Pavilion
Green Line/Box indicate Disaster Evacuation Location
Black Arrows indicate Primary Fire Evacuation Route
Blue Arrows indicate Secondary Fire Evacuation Route
Not Drawn to Scale

APPENDIX VII

AMORTIZATION SCHEDULE

Loan Amortization Schedule

vertex42

HELP

Loan Information	
Loan Amount	$ 1,428,000
Annual Interest Rate	5.00%
Compound Period	Monthly
Term of Loan in Years	10
First Payment Date	6/1/2009
Payment Frequency	Monthly
Payment Type	End of Period

Summary	
Rate (per period)	0.417%
Number of Payments	120
Total Payments	$ 1,817,538.54
Total Interest	$ 389,538.54
Est. Interest Savings	$ 0.13

Monthly Payment **$15,146.16**

Amortization Schedule

☑ Rounding On

No.	Due Date	Payment	Additional Payment	Interest	Principal	Balance
						$1,428,000.00
1	6/1/09	15,146.16		5,950.00	9,196.16	1,418,803.84
2	7/1/09	15,146.16		5,911.68	9,234.48	1,409,569.36
3	8/1/09	15,146.16		5,873.21	9,272.95	1,400,296.41
4	9/1/09	15,146.16		5,834.57	9,311.59	1,390,984.82
5	10/1/09	15,146.16		5,795.77	9,350.39	1,381,634.43
6	11/1/09	15,146.16		5,756.81	9,389.35	1,372,245.08
7	12/1/09	15,146.16		5,717.69	9,428.47	1,362,816.61
8	1/1/10	15,146.16		5,678.40	9,467.76	1,353,348.85
9	2/1/10	15,146.16		5,638.95	9,507.21	1,343,841.64
10	3/1/10	15,146.16		5,599.34	9,546.82	1,334,294.82
11	4/1/10	15,146.16		5,559.56	9,586.60	1,324,708.22
12	5/1/10	15,146.16		5,519.62	9,626.54	1,315,081.68
13	6/1/10	15,146.16		5,479.51	9,666.65	1,305,415.03
14	7/1/10	15,146.16		5,439.23	9,706.93	1,295,708.10
15	8/1/10	15,146.16		5,398.78	9,747.38	1,285,960.72
16	9/1/10	15,146.16		5,358.17	9,787.99	1,276,172.73
17	10/1/10	15,146.16		5,317.39	9,828.77	1,266,343.96
18	11/1/10	15,146.16		5,276.43	9,869.73	1,256,474.23
19	12/1/10	15,146.16		5,235.31	9,910.85	1,246,563.38
20	1/1/11	15,146.16		5,194.01	9,952.15	1,236,611.23
21	2/1/11	15,146.16		5,152.55	9,993.61	1,226,617.62
22	3/1/11	15,146.16		5,110.91	10,035.25	1,216,582.37
23	4/1/11	15,146.16		5,069.09	10,077.07	1,206,505.30
24	5/1/11	15,146.16		5,027.11	10,119.05	1,196,386.25
25	6/1/11	15,146.16		4,984.94	10,161.22	1,186,225.03
26	7/1/11	15,146.16		4,942.60	10,203.56	1,176,021.47
27	8/1/11	15,146.16		4,900.09	10,246.07	1,165,775.40
28	9/1/11	15,146.16		4,857.40	10,288.76	1,155,486.64
29	10/1/11	15,146.16		4,814.53	10,331.63	1,145,155.01
30	11/1/11	15,146.16		4,771.48	10,374.68	1,134,780.33
31	12/1/11	15,146.16		4,728.25	10,417.91	1,124,362.42
32	1/1/12	15,146.16		4,684.84	10,461.32	1,113,901.10
33	2/1/12	15,146.16		4,641.25	10,504.91	1,103,396.19
34	3/1/12	15,146.16		4,597.48	10,548.68	1,092,847.51
35	4/1/12	15,146.16		4,553.53	10,592.63	1,082,254.88
36	5/1/12	15,146.16		4,509.40	10,636.76	1,071,618.12
37	6/1/12	15,146.16		4,465.08	10,681.08	1,060,937.04

☑ Rounding On

No.	Due Date	Payment	Additional Payment	Interest	Principal	Balance
38	7/1/12	15,146.16		4,420.57	10,725.59	1,050,211.45
39	8/1/12	15,146.16		4,375.88	10,770.28	1,039,441.17
40	9/1/12	15,146.16		4,331.00	10,815.16	1,028,626.01
41	10/1/12	15,146.16		4,285.94	10,860.22	1,017,765.79
42	11/1/12	15,146.16		4,240.69	10,905.47	1,006,860.32
43	12/1/12	15,146.16		4,195.25	10,950.91	995,909.41
44	1/1/13	15,146.16		4,149.62	10,996.54	984,912.87
45	2/1/13	15,146.16		4,103.80	11,042.36	973,870.51
46	3/1/13	15,146.16		4,057.79	11,088.37	962,782.14
47	4/1/13	15,146.16		4,011.59	11,134.57	951,647.57
48	5/1/13	15,146.16		3,965.20	11,180.96	940,466.61
49	6/1/13	15,146.16		3,918.61	11,227.55	929,239.06
50	7/1/13	15,146.16		3,871.83	11,274.33	917,964.73
51	8/1/13	15,146.16		3,824.85	11,321.31	906,643.42
52	9/1/13	15,146.16		3,777.68	11,368.48	895,274.94
53	10/1/13	15,146.16		3,730.31	11,415.85	883,859.09
54	11/1/13	15,146.16		3,682.75	11,463.41	872,395.68
55	12/1/13	15,146.16		3,634.98	11,511.18	860,884.50
56	1/1/14	15,146.16		3,587.02	11,559.14	849,325.36
57	2/1/14	15,146.16		3,538.86	11,607.30	837,718.06
58	3/1/14	15,146.16		3,490.49	11,655.67	826,062.39
59	4/1/14	15,146.16		3,441.93	11,704.23	814,358.16
60	5/1/14	15,146.16		3,393.16	11,753.00	802,605.16
61	6/1/14	15,146.16		3,344.19	11,801.97	790,803.19
62	7/1/14	15,146.16		3,295.01	11,851.15	778,952.04
63	8/1/14	15,146.16		3,245.63	11,900.53	767,051.51
64	9/1/14	15,146.16		3,196.05	11,950.11	755,101.40
65	10/1/14	15,146.16		3,146.26	11,999.90	743,101.50
66	11/1/14	15,146.16		3,096.26	12,049.90	731,051.60
67	12/1/14	15,146.16		3,046.05	12,100.11	718,951.49
68	1/1/15	15,146.16		2,995.63	12,150.53	706,800.96
69	2/1/15	15,146.16		2,945.00	12,201.16	694,599.80
70	3/1/15	15,146.16		2,894.17	12,251.99	682,347.81
71	4/1/15	15,146.16		2,843.12	12,303.04	670,044.77
72	5/1/15	15,146.16		2,791.85	12,354.31	657,690.46
73	6/1/15	15,146.16		2,740.38	12,405.78	645,284.68
74	7/1/15	15,146.16		2,688.69	12,457.47	632,827.21
75	8/1/15	15,146.16		2,636.78	12,509.38	620,317.83
76	9/1/15	15,146.16		2,584.66	12,561.50	607,756.33
77	10/1/15	15,146.16		2,532.32	12,613.84	595,142.49
78	11/1/15	15,146.16		2,479.76	12,666.40	582,476.09
79	12/1/15	15,146.16		2,426.98	12,719.18	569,756.91
80	1/1/16	15,146.16		2,373.99	12,772.17	556,984.74
81	2/1/16	15,146.16		2,320.77	12,825.39	544,159.35
82	3/1/16	15,146.16		2,267.33	12,878.83	531,280.52
83	4/1/16	15,146.16		2,213.67	12,932.49	518,348.03
84	5/1/16	15,146.16		2,159.78	12,986.38	505,361.65
85	6/1/16	15,146.16		2,105.67	13,040.49	492,321.16
86	7/1/16	15,146.16		2,051.34	13,094.82	479,226.34
87	8/1/16	15,146.16		1,996.78	13,149.38	466,076.96
88	9/1/16	15,146.16		1,941.99	13,204.17	452,872.79
89	10/1/16	15,146.16		1,886.97	13,259.19	439,613.60
90	11/1/16	15,146.16		1,831.72	13,314.44	426,299.16
91	12/1/16	15,146.16		1,776.25	13,369.91	412,929.25
92	1/1/17	15,146.16		1,720.54	13,425.62	399,503.63

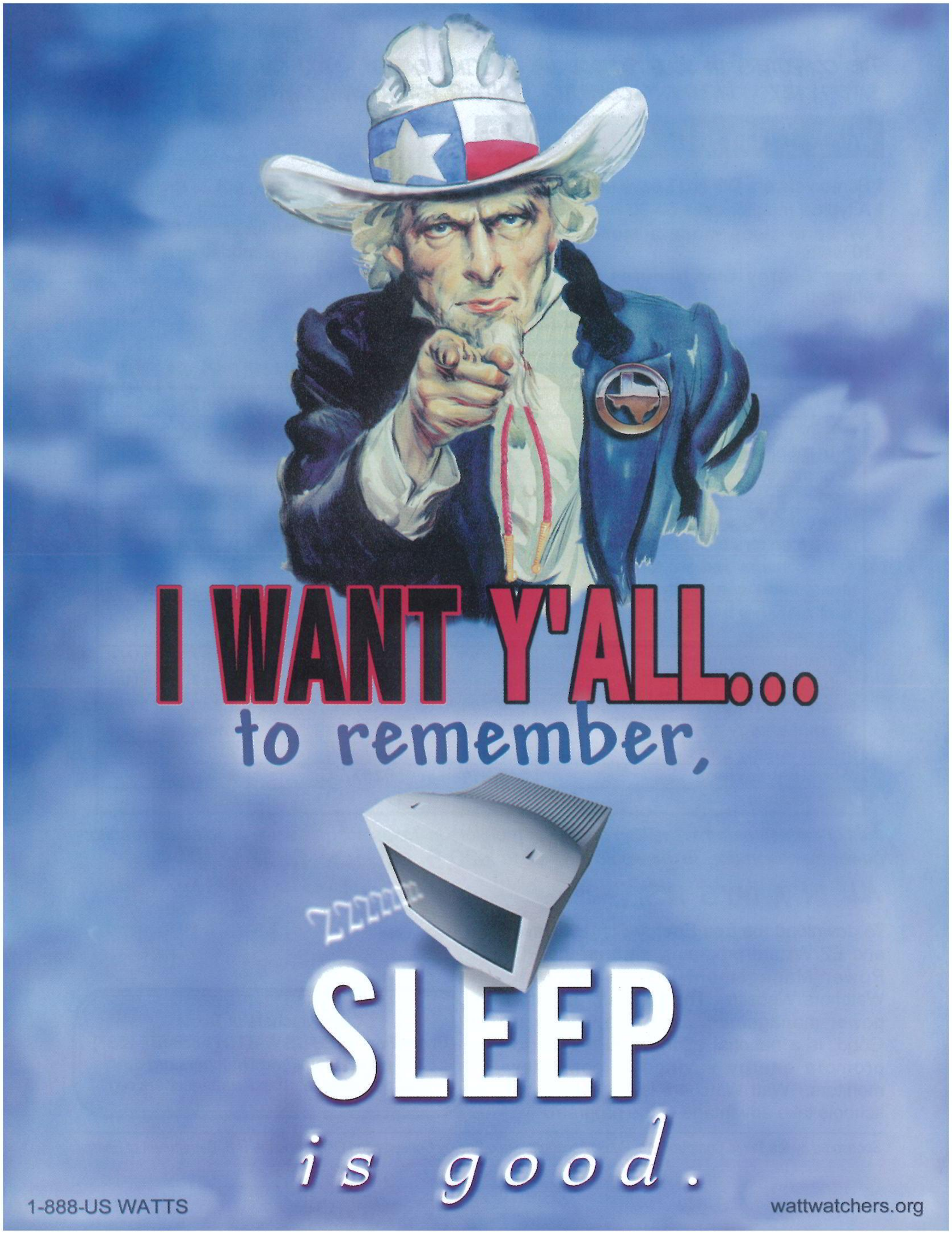
http://www.vertex42.com/ExcelTemplates/loan-amortization-schedule.html

☑ Rounding On

No.	Due Date	Payment	Additional Payment	Interest	Principal	Balance
93	2/1/17	15,146.16		1,664.60	13,481.56	386,022.07
94	3/1/17	15,146.16		1,608.43	13,537.73	372,484.34
95	4/1/17	15,146.16		1,552.02	13,594.14	358,890.20
96	5/1/17	15,146.16		1,495.38	13,650.78	345,239.42
97	6/1/17	15,146.16		1,438.50	13,707.66	331,531.76
98	7/1/17	15,146.16		1,381.38	13,764.78	317,766.98
99	8/1/17	15,146.16		1,324.03	13,822.13	303,944.85
100	9/1/17	15,146.16		1,266.44	13,879.72	290,065.13
101	10/1/17	15,146.16		1,208.60	13,937.56	276,127.57
102	11/1/17	15,146.16		1,150.53	13,995.63	262,131.94
103	12/1/17	15,146.16		1,092.22	14,053.94	248,078.00
104	1/1/18	15,146.16		1,033.66	14,112.50	233,965.50
105	2/1/18	15,146.16		974.86	14,171.30	219,794.20
106	3/1/18	15,146.16		915.81	14,230.35	205,563.85
107	4/1/18	15,146.16		856.52	14,289.64	191,274.21
108	5/1/18	15,146.16		796.98	14,349.18	176,925.03
109	6/1/18	15,146.16		737.19	14,408.97	162,516.06
110	7/1/18	15,146.16		677.15	14,469.01	148,047.05
111	8/1/18	15,146.16		616.86	14,529.30	133,517.75
112	9/1/18	15,146.16		556.32	14,589.84	118,927.91
113	10/1/18	15,146.16		495.53	14,650.63	104,277.28
114	11/1/18	15,146.16		434.49	14,711.67	89,565.61
115	12/1/18	15,146.16		373.19	14,772.97	74,792.64
116	1/1/19	15,146.16		311.64	14,834.52	59,958.12
117	2/1/19	15,146.16		249.83	14,896.33	45,061.79
118	3/1/19	15,146.16		187.76	14,958.40	30,103.39
119	4/1/19	15,146.16		125.43	15,020.73	15,082.66
120	5/1/19	15,145.50		62.84	15,082.66	0.00

APPENDIX VIII

SECO PROGRAM CONTACTS
WATT WATCHERS OF TEXAS


I WANT Y'ALL...
to remember,
SLEEP
is good.
1-888-US WATTS
wattwatchers.org

THE COMPUTERS IN YOUR SCHOOL ARE WASTING ENERGY. YOU CAN HELP YOUR SCHOOL SAVE MONEY. IMPLEMENT COMPUTER MONITOR POWER MANAGEMENT.

WHAT Y'ALL NEED TO REMEMBER:

- Screen savers **DO NOT** save energy!
- A typical monitor uses 60-90 watts
- While in sleep mode a monitor uses 2-10 watts
- Your Energy Star features may not be enabled
- Use free Energy Star software to capture savings
- Utilize your network, put all monitors to sleep at once
- Turn off your monitor at night
- Save energy, save money, prevent pollution

SOME ACTUAL EXAMPLES FROM DISTRICTS THAT ALREADY SET THEIR MONITORS TO SLEEP:

	District A	District B	District C
# of computers	3,000	10,000	15,000
% of monitors enabled	55	0	50
% of monitors enabled after mandate	100	100	100
Cost of electricity	7.5¢	5.8¢	6.0¢
Hours monitors are used per week	9	9	9
Days monitors are used per week	5	5	5
% of monitors that are turned off at night and weekends	35	35	35
% of monitors turned off after mandate	65	65	65
Current energy use	953,620 kWh	5,522,790 kWh	5,087,745 kWh
Future energy use	349,479 kWh	1,164,930 kWh	1,747,395 kWh
Energy savings	**604,141 kWh**	**4,357,860 kWh**	**3,340,350 kWh**
Current energy costs	$71,522	$320,322	$305,265
Future energy costs	$26,211	$67,566	$104,844
Monetary savings	**$45,311**	**$252,756**	**$200,421**
% of savings	63	79	65

If all of the estimated 1.2 million computer monitors in Texas schools were enabled for monitor power management, Texas would save up to **$20.5 MILLION EACH YEAR!**

ALL IN A DAY'S REST...

To download the free Energy Star EZ Save and EZ Wizard programs, click on the PC Power Management link on the Watt Watchers Website. The computer monitor power management campaign, Sleep is Good, is a national effort by EPA/DOE to promote energy savings in computer monitors. Watt Watchers is helping Texas schools take advantage of the program.

Watt Watchers of Texas
Phone/Fax 1-888-US WATTS (1-888-879-2887)
e-mail info@wattwatchers.org
Visit our website http://wattwatchers.org

Sponsored by the Texas Comptroller of Public Accounts, State Energy Conservation Office, and the U.S. Department of Energy.


I WANT Y'ALL
FOR WATT WATCHERS
1-888 US WATTS
wattwatchers.org
SPONSORED BY THE TEXAS STATE ENERGY CONSERVATION OFFICE

-IT'S FREE!-IT'S SIMPLE!-IT WORKS!-

START YOUR PROGRAM TODAY!

Watt Watchers of Texas is a FREE energy efficiency program for Texas schools sponsored by the Texas Comptroller of Public Accounts, State Energy Conservation Office, and the U.S. Department of Energy. The program is designed to help school districts save energy and money by getting students involved. It is simple and effective! Students patrol the halls of the schools reducing energy waste by turning off lights and leaving "tickets" for empty classrooms with the lights on. Turning out the lights in a classroom during two unoccupied hours per day (lunch & after school) can save $50 over a school year.

GET STARTED

Call 1-888-USWATTS or

Sign up for a free kit. Call 1-800-USWATTS or go on-line at http://wattwatchers.org to enroll. You will receive a free kit which includes a set of 4 Watt Watchers binders, 4 name badges and 4 name tags with 4 lanyards, 4 pencils, a complete instruction manual on CD-ROM, plus a supply of forms, sample tickets and thank you notes. Everything you need — open your kit and get started today! Not only will your school be provided with all of the materials listed above (approximately a $25 value), Watt Watchers will provide free support for the program, including:

- *WATTS NEWS* — Quarterly 20 page Newspaper
- Toll Free Phone & Toll Free Fax support line
- Website and e-mail support
- E-Mail Update – Monthly news for Watt Watchers
- Workshops – Watt Watchers sponsors regional workshops
- Conferences – Watt Watchers attends educational conferences – see you there.
- CD-ROM with all the materials – 0ver 450MB!
- Five Year Lapel Pins for dedicated Watt Watchers sponsors
- Watt Watchers Certificates for participation and Zero Hero Awards

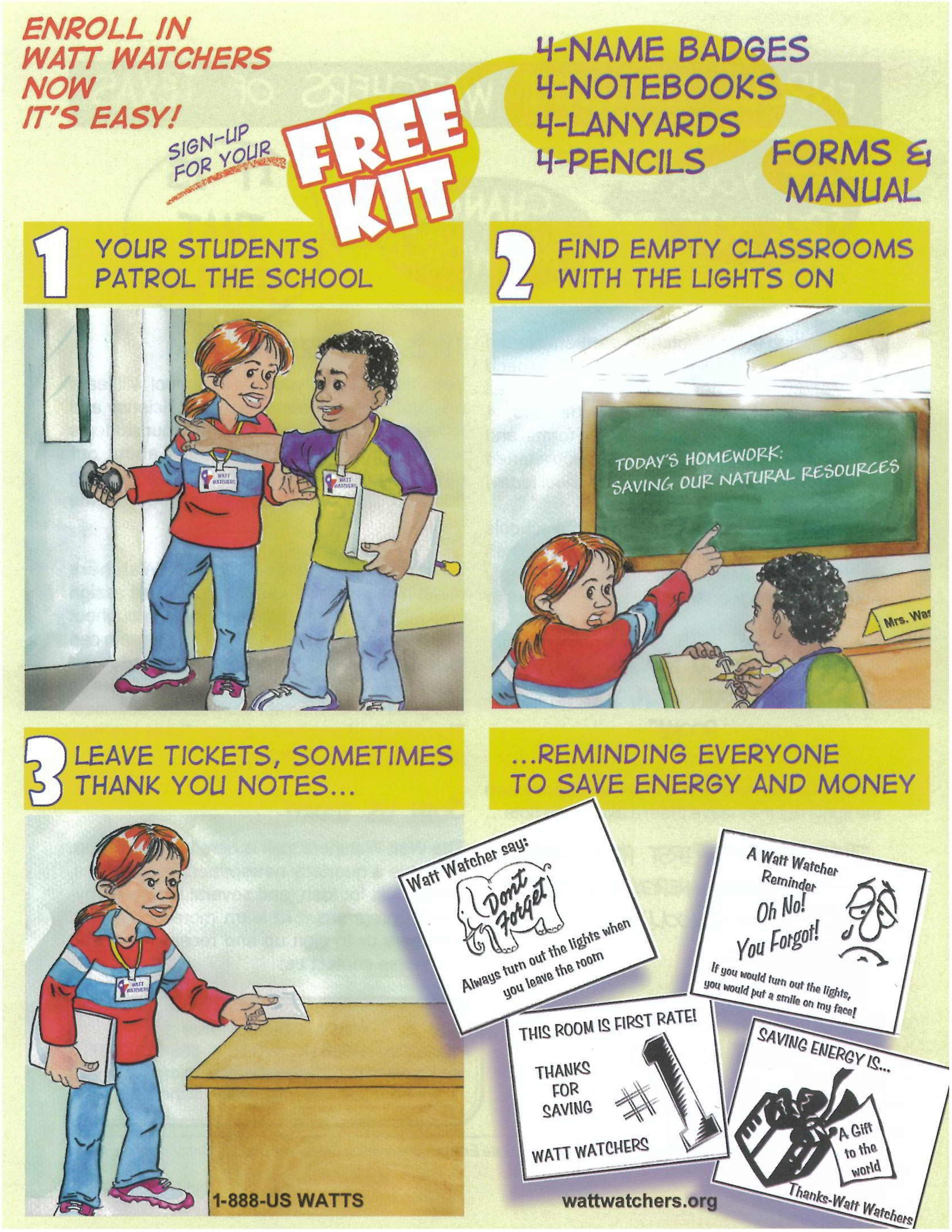
BUT THAT'S NOT ALL, Y'ALL!

In addition to student energy patrols that find waste and raise awareness, Watt Watchers also has additional programs for your school:

- Traveling Energy Exploration Stations – free loans of hands-on kits for classes
- Knowledge is Power – an energy efficiency curriculum supplement
- Sleep Is Good – a computer monitor power management program
- Junior Solar Sprint – a model solar race car project
- Energy Encounter – a one day workshop for high school students
- District Energy Council – students assisting energy managers
- The Weatherization Project – a residential community energy project
- Benchmarking – compare your school district energy use nationally

Watt Watchers of Texas
Phone/Fax 1-888-US WATTS (1-888-879-2887)
e-mail info@wattwatchers.org
Visit our website http://wattwatchers.org

Sponsored by the Texas Comptroller of Public Accounts, State Energy Conservation Office, and the U.S. Department of Energy.


ENROLL IN
WATT WATCHERS
NOW
IT'S EASY!
SIGN-UP
FOR YOUR
FREE
KIT
4-NAME BADGES
4-NOTEBOOKS
4-LANYARDS
4-PENCILS
FORMS & MANUAL
1 YOUR STUDENTS PATROL THE SCHOOL
2 FIND EMPTY CLASSROOMS WITH THE LIGHTS ON
TODAY'S HOMEWORK:
SAVING OUR NATURAL RESOURCES
3 LEAVE TICKETS, SOMETIMES THANK YOU NOTES...
...REMINDING EVERYONE TO SAVE ENERGY AND MONEY
Watt Watcher say:
Dont Forget
Always turn out the lights when you leave the room
A Watt Watcher Reminder
Oh No! You Forgot!
If you would turn out the lights, you would put a smile on my face!
THIS ROOM IS FIRST RATE!
THANKS FOR SAVING
#1
WATT WATCHERS
SAVING ENERGY IS...
A Gift to the world
Thanks-Watt Watchers
1-888-US WATTS
wattwatchers.org

ENROLL IN WATT WATCHERS OF TEXAS

GET YOUR FREE KIT → CHANGE THE WORLD → IT IS THAT SIMPLE!

Getting a Watt Watchers program started in your school is so simple. All you need to do is order the FREE kit! Your kit comes complete with 4 name badges, 4 lanyards, 4 notebooks, 4 pencils, the forms, and a CD-ROM with a manual to get you started saving energy and money for your school today!

Your students will patrol the halls of the schools to see where energy is being wasted. When they locate a classroom or office that is empty and the lights are on they will leave a reminder ticket …

"OH, NO –YOU FORGOT TO TURN YOUR LIGHTS OUT WHEN YOU LEFT THE ROOM!"

If they notice classrooms that consistently turn the lights out they leave them a thank-you note…

"THIS ROOM IS FIRST RATE –THANKS FOR SAVING ENERGY FOR OUR SCHOOL!"

IT IS THAT SIMPLE.

Your students and your entire school will learn a valuable lesson about energy efficiency and its benefits that will last a lifetime. Your students will change habits and attitudes about our environment while saving money and preventing pollution. You will change the world for the better.

Teachers, just place the Watt Watchers materials in a bin at your front door and assign your students a time to go on patrols throughout the day and the work is done. The program can be adapted to fit your teaching needs and demands. The Watt Watchers program is designed not to interrupt daily school activities. Thousands of programs across Texas are now patrolling quickly and quietly.

JOIN US TODAY!

The Watt Watchers staff is here to support you. We have a quarterly newspaper, lesson plans, energy kits for loan, and several more energy-related programs. To learn more about Watt Watchers or to sign up and receive your free kit, please contact us:

Watt Watchers of Texas
Phone/Fax 1-888-US WATTS (1-888-879-2887)
e-mail info@wattwatchers.org
Visit our website http://wattwatchers.org

Sponsored by the Texas Comptroller of Public Accounts, State Energy Conservation Office, and the U.S. Department of Energy

APPENDIX IX

UTILITY CHARTS ON DISKETTE