Susan Combs
Texas Comptroller of Public Accounts

Facility Technical Assistance: Meter Consolidation

Laredo ISD

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Laredo, Texas 78040

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1/31/2013

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SECO
State Energy Conservation Office

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1.0 EXECUTIVE SUMMARY

Laredo Independent School District, now referred to as the District, requested that Texas Energy Engineering Services, Inc. (TEESI) perform an analysis of Martin High School, Christen Middle School, and Leyendecker Elementary School, in order to identify opportunities for energy cost savings through possible meter consolidation. This report documents that analysis.

This service is provided at no cost to the District through the Schools Energy Management and Technical Assistance Program as administered by the Texas Comptroller of Public Accounts, State Energy Conservation Office (SECO). This program promotes and encourages an active partnership between SECO and Texas schools for the purpose of planning, funding, and implementing energy saving measures, which will ultimately reduce the District's annual energy costs.

In summary, potential meter consolidation is estimated to give a total of **$26,750** in utility cost savings per year. In addition, combining existing outdoor lighting accounts with building meters could save an estimated **$14,700** per year. However, the costs for site work and materials, as well as electrical capacity limitations, likely would make most meter combinations unfeasible. Some of the savings attainable from meter consolidation could be achieved through a rate schedule change alone. Preliminary analysis shows a potential **$24,200** utility cost savings per year for various rate changes. These changes could be implemented with little to no cost to the District pending a more detailed analysis from AEP. Finally, power factor correction was found to have utility savings potential of **$5,500** per year. The estimated implementation costs for power factor correction are $40,000, giving a simple payback of 7.3 years. Individual Utility Cost Reduction Measures, (UCRMs) are summarized in Section 5.0 of this report.

This report includes a summary of the facilities surveyed, their utility rate structures, and their energy consumption/costs. Preliminary analysis of and recommendations on energy cost savings opportunities are also provided. A follow-up visit to the District will be scheduled to address any questions pertaining to this report, or any other aspect of this program.

SECO is committed to providing whatever assistance the District may require in planning, funding and implementing the recommendations of this report. The District is encouraged to direct any questions or concerns to either of the following contact persons:

SECO / Mr. Stephen Ross	TEESI / Saleem Khan
(512) 463-1770	(512) 328-2533

2.0 FACILITY METER DESCRIPTIONS

This section provides a brief description of the current electrical metering at the facilities analyzed.

Buildings:	Raymond & Tirza Martin High School
Area (estimated):	309,569 SF
Existing Meters:	13
Metering Description:	Five (5) meters serve outdoor lighting fixtures. Two (2) meters serve guardhouses with very little use. A meter serving the Health Science and Wellness Center (gym) is located on the east side of the campus. The new science building is combined with the new Shirley football field east meter. Another meter serves the Shirley field west side. The vocational building and special education building are each served by separate meters. Finally, a primary voltage meter serves the main building.

Buildings:	Louis J. Christen Middle School
Area (estimated):	215,347 SF
Existing Meters:	10
Metering Description:	Five (5) meters serve outdoor lighting fixtures. One meter serves an old guard house with no usage for the past several months. Two (2) meters on the east side of campus serve the old gym and band hall. Finally, two (2) meters serve the main building.

Buildings:	John Z. Leyendecker Elementary School
Area (estimated):	99,255 SF
Existing Meters:	7
Metering Description:	Six (6) meters serve outdoor lighting fixtures. One (1) meter serves the main building.

3.0 ENERGY CONSUMPTION AND PERFORMANCE

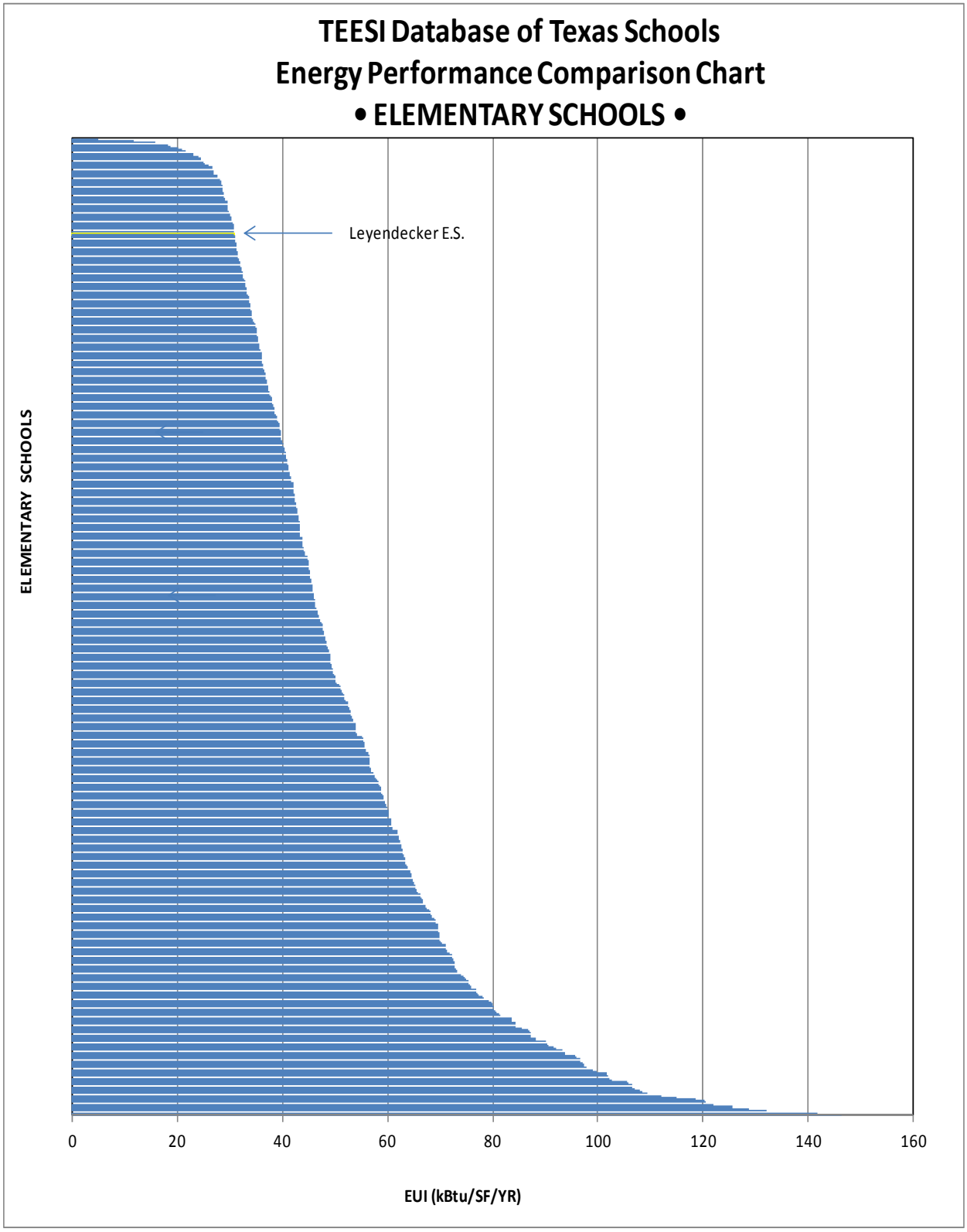
Martin High School, Christen Middle School, and Leyendecker Elementary School were analyzed for potential electric meter consolidation opportunity. The facilities surveyed comprised a total gross area of approximately 624,171 square feet.

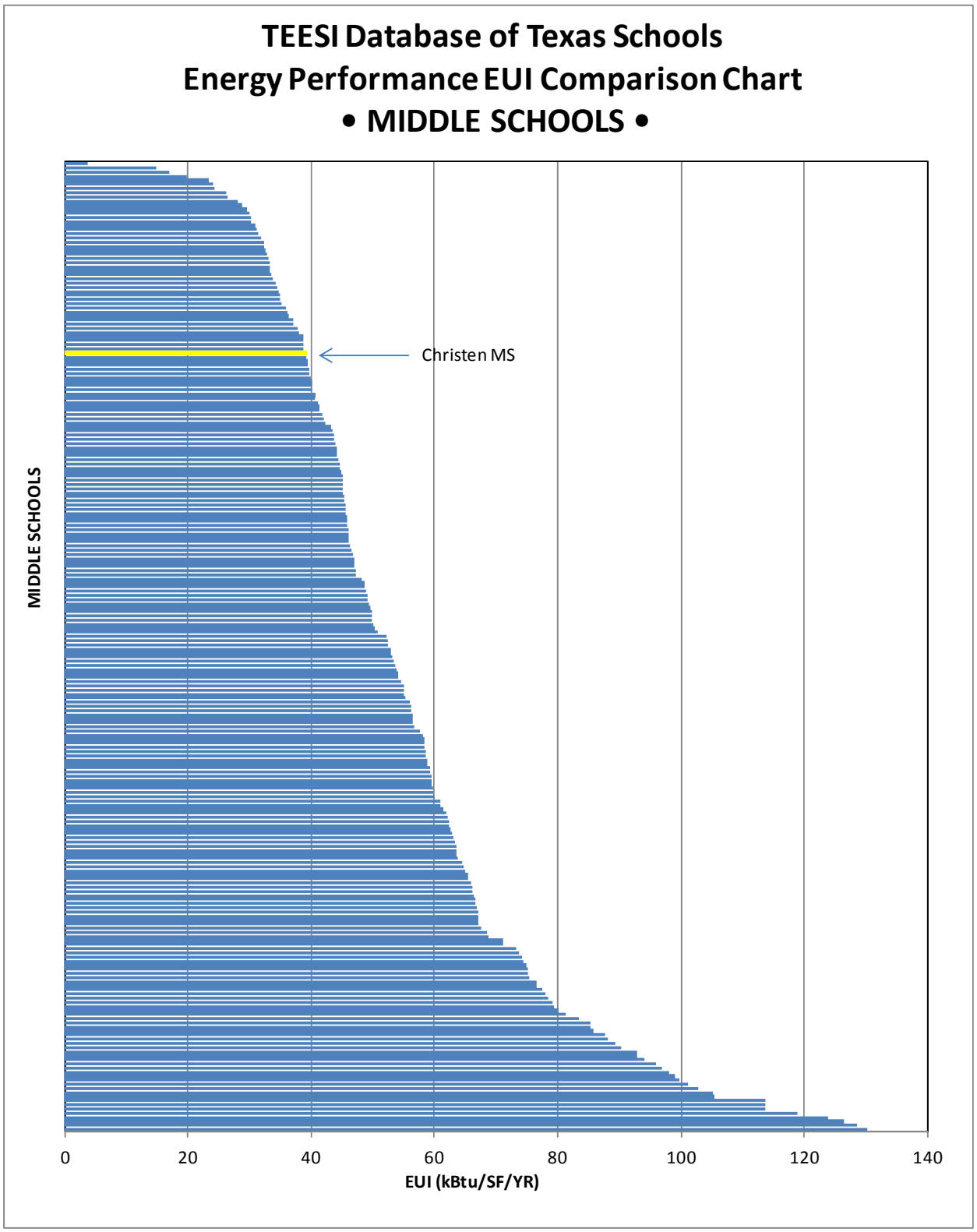
Annual electric invoices for the campuses analyzed totaled $934,663 for the 12-month period ending July 2012. A summary of annual utility costs is provided in **Appendix A**, Base Year Consumption History.

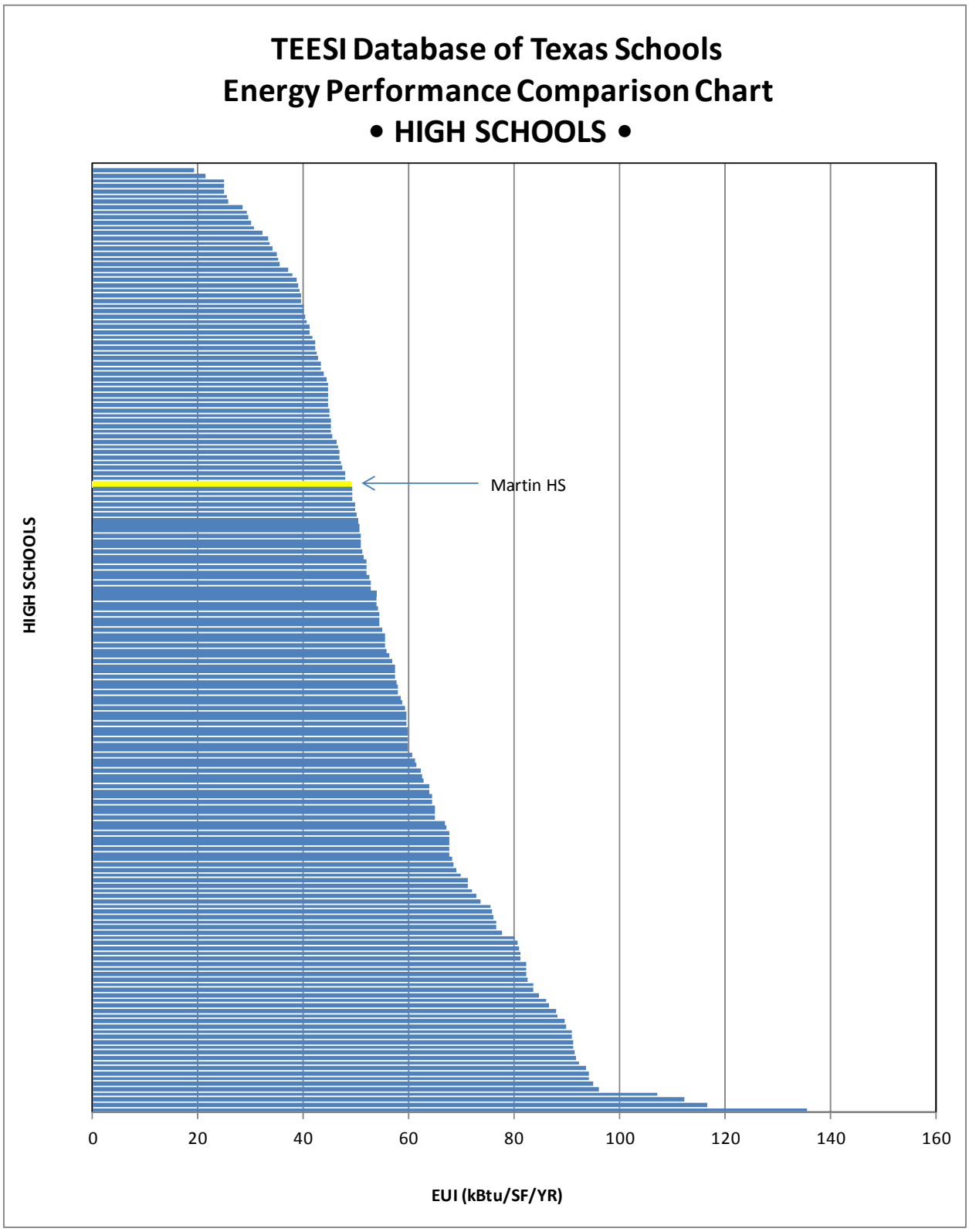
To help the District evaluate the overall energy performance of its facilities TEESI has calculated their Energy Utilization Index (EUI) and Energy Cost Index (ECI). The EUI represents a facility's annual energy usage per square foot; it is measured in thousands of BTUs per square foot per year (kBTU/SF/Year). Similarly, ECI is measured as cost per square foot per year ($/SF/Year). The EUI and ECI for selected facilities are listed below:

Energy Cost and Consumption Benchmarks										
		Electric					Total	EUI	ECI	Approx.
	Building	kWh/Yr	MMBTU/Yr	kWh/SF	$Cost/Yr	$Cost/kWh	MMBTU/Yr	kBTU/SF/Yr	$/SF/Yr	SF
1	Leyendecker Elementary	894,324	3,052	9.01	106,146	$0.119	3,052	31	1.07	99,255
2	Christen Middle School	2,471,125	8,434	11.48	296,864	$0.120	8,434	39	1.38	215,347
3	Martin High School	4,435,180	15,137	14.33	531,653	$0.120	15,137	49	1.72	309,569
		kWh/Yr	MMBTU/Yr	kWh/SF	$Cost/Yr	$Cost/kWh	MMBTU/Yr	kBTU/SF/Yr	$/SF/Yr	SF
		7,800,629	26,624	12.50	934,663	$0.120	26,624	43	1.50	624,171

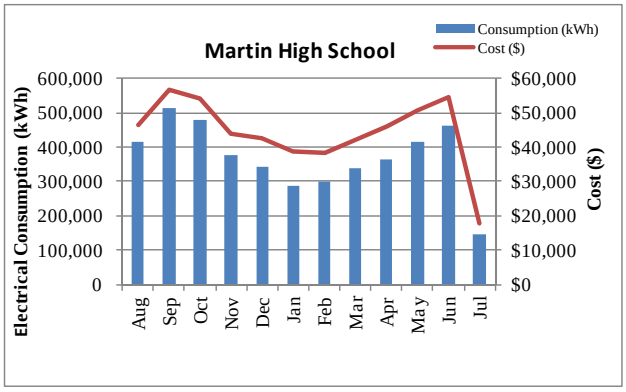
Knowing the EUI and ECI of each facility is useful to help determine the District's overall energy performance, as well as to assess the cost effectiveness of its energy usage. The following charts show how the EUIs at these schools compares to other schools across Texas.

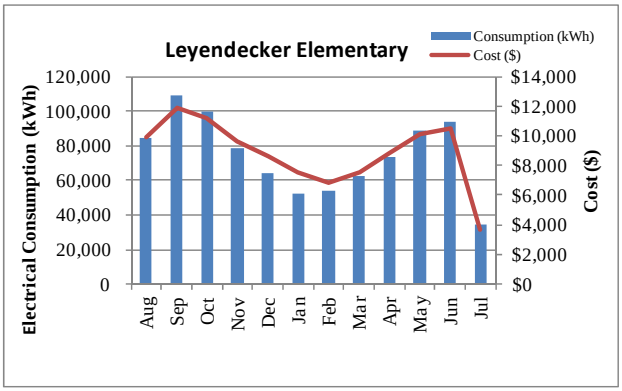

TEESI Database of Texas Schools
Energy Performance Comparison Chart
• ELEMENTARY SCHOOLS •
Leyendecker E.S.
ELEMENTARY SCHOOLS
0
20
40
60
80
100
120
140
160
EUI (kBtu/SF/YR)

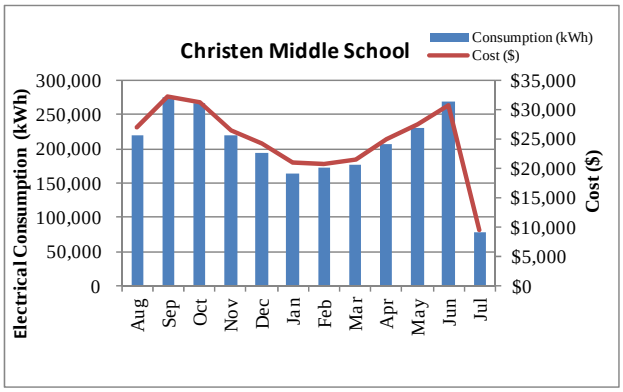

TEESI Database of Texas Schools
Energy Performance EUI Comparison Chart
• MIDDLE SCHOOLS •
Christen MS
MIDDLE SCHOOLS
0
20
40
60
80
100
120
140
EUI (kBtu/SF/YR)


TEESI Database of Texas Schools
Energy Performance Comparison Chart
• HIGH SCHOOLS •
Martin HS
HIGH SCHOOLS
0
20
40
60
80
100
120
140
160
EUI (kBtu/SF/YR)

The following charts summarize the each campus monthly utility data (all meters). See **Appendix A** for further detail.







4.0 ELECTRICAL RATE STRUCTURES

The District's electric bills consist of an energy charge from Just Energy and a transmission and distribution (TDSP) charge from AEP. The energy charge is the same for all accounts: $0.0685/kWh. The TDSP charges vary by account type and size and consist of many components and riders. Some of these charges are on a per-kWh consumption basis, but the majority are charged based on the peak kW demand throughout the year. Following are some terms and definitions used in calculating TDSP charges.

Rate Schedule Unit	Definition
"per kW"	Highest average kW across a 15-minute window during the billing period.
"per 4CP kW"	Average of the facility's kW demand recorded at the peak time for the *entire grid* for June, July, August, and September of the previous calendar year. Requires Interval Data Recorder (IDR) meter.
"per NCP kW"	The higher of: the peak kW in the billing period OR 80% of the highest peak kW for the previous 11 months (80% ratchet). Adjusted for Power Factor (PF) if lower than 95% according to: (NCP kW) × 95% ÷ PF

Campus Buildings Electrical Service

The TDSP rate structures currently serving Martin HS, Christen MS, and Leyendecker ES campus buildings are described below. See Section 5.0 for ESI and account numbers corresponding to each rate.

<u>TDSP Rate: Rate 842, Primary Voltage Service</u>

Meters: Martin HS main building.

- Service charge: $183.03 per month
- Transmission charge: $1.925 per 4CP kW
- Distribution charge: $2.945 per NCP kW
- Energy riders: $0.0009 per kWh
- Demand riders:
    - $0.863 per 4CP kW
    - $4.165 per kW

TDSP Rate: Rate 829, Secondary Voltage Service Less than 10 kW

Meters: Martin HS south guardhouse, Martin HS east guardhouse and parking lot, Christen MS guardhouse.

- Service charge: $11.05 per month
- Energy charges (T&D plus riders): $0.0525 per kWh

TDSP Rate: Rate 855, Secondary Voltage Service Greater than 10 kW

Meters: Christen MS south main building, Christen MS old gym, Martin HS special ed., Christen MS band hall, Martin HS gym and health magnet.

- Service charge: $21.12 per month
- Transmission & Distribution charge: $4.60 per NCP kW
- Energy riders: $0.0332 per kWh
- Demand riders: $0.545 per kW

TDSP Rate: Rate 857, Secondary Voltage Service Greater than 10 kW

Meters: Martin HS vocational building, Leyendecker ES main building, Martin HS science building and east Shirley Field, west Shirley Field.

- Service charge: $21.12 per month
- Transmission & Distribution charge: $4.60 per NCP kW
- Energy riders: $0.0010 per kWh
- Demand riders: $4.656 per kW

TDSP Rate: Rate 858, Secondary Voltage Service Greater than 10 kW

Meters: Christen MS north main building.

- Service charge: $42.33 per month
- Transmission charge: $1.793 per 4CP kW
- Distribution charge: $3.314 per NCP kW
- Energy riders: $0.0010 per kWh
- Demand riders:
    - $0.504 per 4CP kW
    - $4.148 per kW

Outdoor Lighting Electrical Service

As noted in Section 2.0, several of the existing meters are for outdoor lights (16 in total). AEP has several different TDSP rate structures for outdoor lights, depending on the lamp type. Outdoor lighting rate schedules typically consist of a "per month per light" charge, as well as transmission, distribution, and rider charges per kWh. The monthly kWh consumption is stipulated (constant month to month assuming approximately 12 hrs of usage per night) based on the lamp type, and thus the entire rate can be viewed as either a monthly charge per light or per stipulated kWh. The outdoor lighting rates present at the campuses studied are as follows.

TDSP Rate: Rate 902, Non-roadway Lighting: 400W Mercury Vapor

- Energy charges (T&D plus riders): $0.0787 per kWh

TDSP Rate: Rate 905, Non-roadway Lighting: 250W High Pressure Sodium

- Energy charges (T&D plus riders): $0.0860 per kWh

TDSP Rate: Rate 907, Non-roadway Lighting: 250W High Pressure Sodium Floodlight

- Energy charges (T&D plus riders): $0.0897 per kWh

TDSP Rate: Rate 908, Non-roadway Lighting: 400W High Pressure Sodium Floodlight

- Energy charges (T&D plus riders): $0.0844 per kWh

TDSP Rate: Rate 909, Non-roadway Lighting: 1,000W High Pressure Sodium Floodlight

- Energy charges (T&D plus riders): $0.0668 per kWh

TDSP Rate: Rate 949, Municipal Street Lighting: 400W High Pressure Sodium

- Service charge: $3.20 per month
- Energy charges (T&D plus riders): $0.0798 per kWh

TDSP Rate: Rate 955, Municipal Street Lighting: 1,000W High Pressure Sodium

- Service charge: $3.20 per month
- Energy charges (T&D plus riders): $0.0551 per kWh

TDSP Rate: Rate 962, Municipal Street Lighting: 400W Metal Halide

- Service charge: $3.20 per month
- Energy charges (T&D plus riders): $0.0869 per kWh

5.0 METER CONSOLIDATION AND UTILITY SAVINGS OPPORTUNITIES

The table below summarizes the TDSP billing for the studied building electrical meters (excluding outdoor lighting meters). The "Meter" designation in the table below is for purposes of this report only, and is used in describing the various proposed projects.

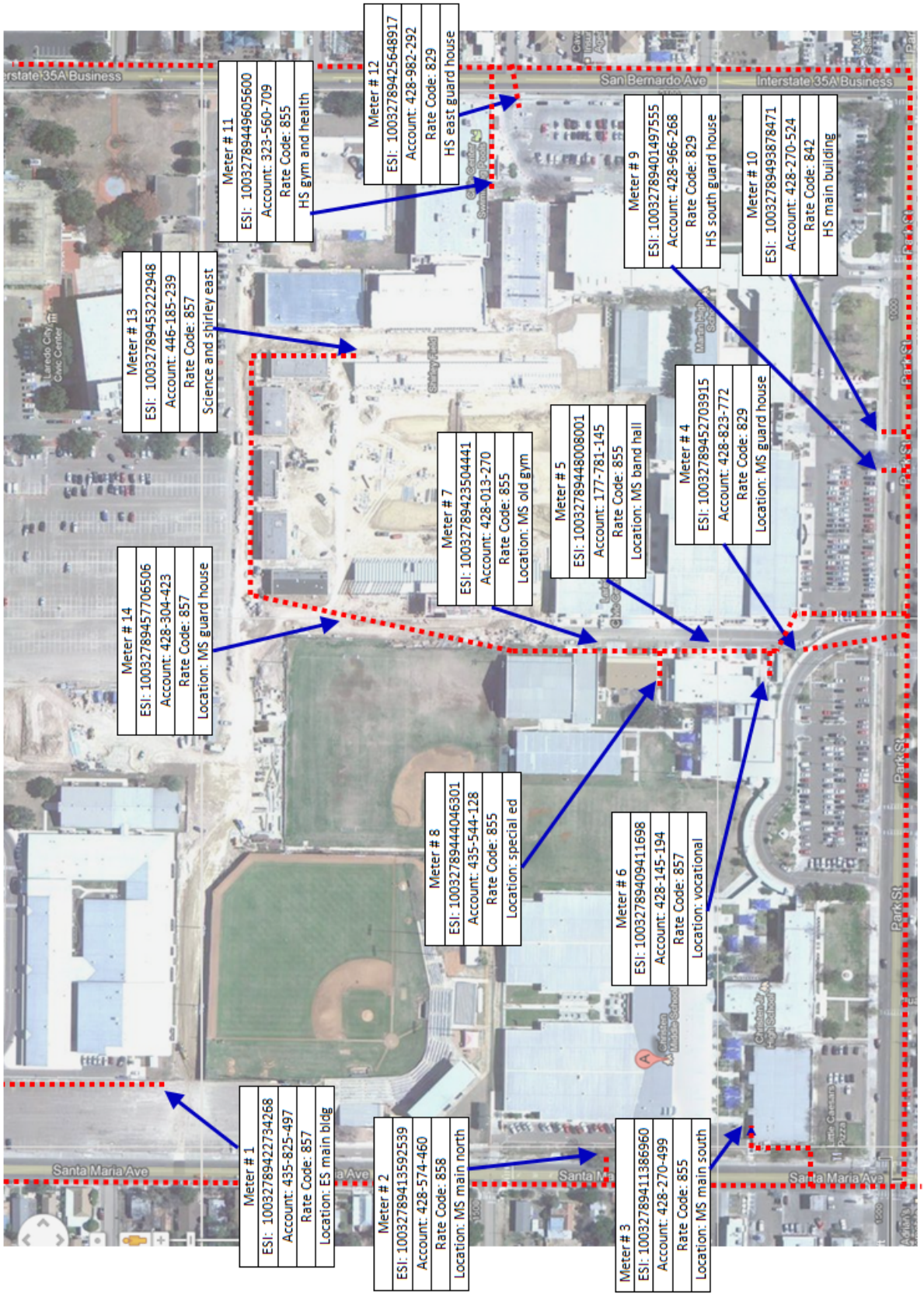
Meter	ESI	Location	Rate Code	kW-mo/yr (billed)	kWh/yr	TDSP $/yr	Avg. Load Factor
1	10032789422734268	ES main bldg	857	5,269	917,280	$42,529	24%
2	10032789413592539	MS main north	858	8,115	1,537,920	$61,377	26%
3	10032789411386960	MS main south	855	3,062	483,000	$28,429	22%
4	10032789452703915	MS guard house	829	0	0	$133	0%
5	10032789448008001	MS band hall	855	1,974	249,600	$16,189	17%
6	10032789409411698	Vocational	857	5,649	1,094,400	$45,968	27%
7	10032789423504441	MS old gym	855	1,520	246,800	$14,767	22%
8	10032789444046301	Special ed	855	601	49,597	$4,346	11%
9	10032789401497555	HS south guard house	829	1	4	$133	1%
10	10032789493878471	HS main bldg	842	9,522	1,870,500	$85,329	27%
11	10032789449605600	HS gym and health	855	4,273	894,960	$45,800	29%
12	10032789425648917	HS east guard house	829	79	27,804	$1,445	48%
13	10032789453222948	Science and Shirley east	857	2,510	442,800	$20,516	24%
14	10032789457706506	Shirley west	857	3,767	285,840	$27,551	10%

Note: Many utilities offer some type of consolidation of metering without consolidation of power distribution. A few utilities will permit the customer to have two or more services spread around a campus, but compute the bill as if all usage was on one meter. More frequently, however, the utility will only allow two or more services to be billed from one meter if all of the service points are physically close enough together to facilitate using one meter to read all of the usage. Any arrangement under which the District can receive several smaller services and be billed as if they were all one relieves the District of two large costs; large distribution equipment to break the power into smaller feeds, and more expensive circuit protectors that can withstand the high fault currents available from a larger utility service. Multiple services under one meter should always be sought where one combined service would be larger than about 500 kVA.

The Load Factor (LF) noted above for each meter is defined as the average demand divided by the peak demand over a given period, and represents the consistency of a facility's energy usage. It is calculated from the equation:

$$\mathrm{LF} = \frac{\text{kWh in billing period}}{\text{Peak kW} \times \text{Hours in billing period}}.$$

The map on the following page shows the locations of all meters referenced above, as well as the approximate layout of AEP service lines (dashed red).


Meter # 1
ESI: 1003278942273426 8
Account: 435-825-497
Rate Code: 857
Location: ES main bldg
Meter # 2
ESI: 1003278941359253 9
Account: 428-574-460
Rate Code: 858
Location: MS main north
Meter # 3
ESI: 1003278941138696 0
Account: 428-270-499
Rate Code: 855
Location: MS main south
Meter # 4
ESI: 1003278945270391 5
Account: 428-823-772
Rate Code: 829
Location: MS guard house
Meter # 5
ESI: 1003278944800800 1
Account: 177-781-145
Rate Code: 855
Location: MS band hall
Meter # 6
ESI: 1003278940941169 8
Account: 428-145-194
Rate Code: 857
Location: vocational
Meter # 7
ESI: 1003278942350444 1
Account: 428-013-270
Rate Code: 855
Location: MS old gym
Meter # 8
ESI: 1003278944404630 1
Account: 435-544-128
Rate Code: 855
Location: special ed
Meter # 9
ESI: 1003278940149755 5
Account: 428-966-268
Rate Code: 829
HS south guard house
Meter # 10
ESI: 1003278949387847 1
Account: 428-270-524
Rate Code: 842
HS main building
Meter # 11
ESI: 1003278944960560 0
Account: 323-560-709
Rate Code: 855
HS gym and health
Meter # 12
ESI: 1003278942564891 7
Account: 428-982-292
Rate Code: 829
HS east guard house
Meter # 13
ESI: 1003278945322294 8
Account: 446-185-239
Rate Code: 857
Science and shirley east
Meter # 14
ESI: 1003278945770650 6
Account: 428-304-423
Rate Code: 857
Location: MS guard house
Santa Maria Ave
San Bernardo Ave
Interstate 35A Business
Park St
Laredo City Civic Center
Shirley Field

PROPOSED PROJECTS

The following subsections discuss various opportunities for saving on utility costs through projects such as meter consolidation and rate schedule changes.

CONSOLIDATE ELECTRIC METERS

The District requested that TEESI investigate the energy cost savings implications of combining various electric meters at Martin HS, Christen MS, and Leyendecker ES. Potential savings from such a project stem primarily from non-coincident demand peaks among multiple meters. That is, the individual peak monthly demands do not "stack" when meters are combined. This yields some demand cost savings relative to the individually billed demands, the magnitude of which depends on the size of the prospective meters to be consolidated. Some minor savings are also gained from reduced service charges resulting from fewer meters.

The exact potential for demand savings requires analysis of 15-minute interval data to identify peak periods. These data were not available for all of the District's accounts. A predictive model was used to estimate potential savings based on the relative sizes of accounts to be combined. This model was applied to various LISD meter combinations to estimate the potential yearly savings shown in the table below.

METER CONSOLIDATION	
Project Description	**Estimated Cost Savings**
Combine Meters 1, 2, and 3	$8,700
Combine Meters 5, 6, 7, and 8	$4,600
Combine Meters 10, 11, 12, 13, and 14	$13,200
Combine Meters 4 and 9 with any meter	$250
TOTAL	**$26,750**

Note that the estimates above are theoretical, and intended only to give a relative scale of the achievable savings. TEESI met with AEP and LISD representatives on site to assess the potential combinations above. The following conclusions were generally agreed upon.

Combining meter 1, 2 and 3

- Meter/transformer 1- 1000 kva, 480/277 volt is at Leyendecker about 1000 ft from meter 2.
- Meter/transformer 2- 1500 kva 480/277 volt is the north meter at Christian Middle.
- Meter/transformer 3- 1000 kva 208Y/120 volt is the south meter at Christian.

  - Transformer 3 is a 1000 kva 208/120 volt while the other two are 480/277. This would require a step down transformer at this location. The stepdown transformer would be owned by LISD, who would have to maintain it.
  - The distance between meter 2 and 3 is 250 feet and the distance to meter 1 is about 1000 ft. This would require expensive secondary runs to combine the three transformers into

one. The cable size and trenching through concrete and parking lots would also be expensive.

- AEP allows 8 conductor/phase connections on the secondary side. Depending on what exists at the moment, combining these three locations would probably go over the limit.

Combining meters 10, 11, 12, 13 and 14

- Meter/transformer 10 is a primary meter with two transformers (1600 kva, 480/277 volt and 500 kva, 480/277 volt) serving the cafeteria and main building.
- Meter /transformer 11 is a 750 kva 480/277 volt at the Wellness Center (new gym).
- Meter/transformer 13 is a 1000 kva 480/277 serving the east side football stadium, dressing rooms and the new science building.
- Meter/transformer 14 is a 1000 kva 480/277 serving the west side football stadium, dressing rooms, and field offices.

  - The distance between meter 14 and 13 is over 250 feet and the distance to meter 10 is about 500 ft. This would require expensive secondary runs to combine the three transformers into one. The cable size and trenching through concrete and parking lots would also be expensive.
  - AEP allows 8 conductor/phase connections on the secondary side. Depending on what exists at the moment, combining these three locations would probably go over the limit.

Combining meters 5, 6, 7, and 8

- Meter/transformer 5 is a 750 kva 208/120 volt serving Christian middle school band hall.
- Meter/transformer 6 is a 1500 kva 480/277 volt serving the vocational building.
- Meter/transformer 7 is a 300 kva 120/208 volt serving the Christian middle gym.
- Meter/transformer 8 is a 2- 25 kva 240/120 volt overhead transformers called an open delta serving the special education building.

  - AEP's opinion is that #5 and 6 can be combined with a step down transformer and #7 and #8 can be combined.

Meter 4 and 9

  - Meters 4 and 9 are metering guard houses and meter 12 is metering parking lot lighting in addition to the east guardhouse. These can be eliminated (combined with other meters) by running an overhead or underground line to the nearest building panel.

It should be noted that certain rate schedule changes could yield savings with little to no associated costs. In-depth analysis from AEP would be required. A preliminary rate change analysis is provided in the following section.

OPTIMIZE RATE SCHEDULES

Some cost savings may be gained through rate schedule changes alone, without the need for combining meters or the expense that comes with it. Such rate changes would need to be discussed with and analyzed further by AEP. A preliminary analysis is provided here.

Most of the accounts analyzed for this report were classified "Secondary Voltage Service Greater than 10kW". However, within this category, several rate schedules exist, which were explained in detail in Section 4.0. Of particular interest is TDSP Rate 855. While the other Secondary Voltage >10kW rate schedules have riders focused on demand, rate 855 riders bill mostly on energy consumption. For accounts with large demand peaks relative to total consumption (i.e. low load factor), a consumption-based rate is more cost effective (i.e. Rate 855). This would include accounts that are used infrequently, but that might have high loads when in use, such as a sports field. For accounts with "flatter", load profiles (i.e. high load factor), a demand based rate is more cost effective (i.e. Rate 857). This would include buildings with more standard and consistent operating hours.

After a preliminary analysis of the TDSP rates, it was found that the breakeven point between Rate 855 and 857 is around a load factor of 17%. That is, accounts with average load factors significantly below 17% will in general be more cost-effective on Rate 855, while those significantly above will in general be more cost-effective on Rate 857. In looking at the Martin HS, Christen MS, and Leyendecker ES accounts, it appears that Meters 3, 7, and 11, representing the Christen MS south main building, Christen MS old gym, and Martin HS gym and health magnet, respectively, may be better suited on Rate 857 rather than 855 as currently billed. Conversely, it was found that Meter 14, representing Shirley Field West, may be more cost-effective on Rate 855 rather than 857 as currently billed. The potential yearly cost savings estimates for each of these rate switches are shown in the table below. Note that some of the estimated savings below could also be achieved through consolidating meters, but that rate schedule changes offer immediate savings with little to no capital investment necessary.

RATE SCHEDULE CHANGES	
Project Description	**Estimated Cost Savings**
Meter 3: Christen MS Main South	$3,300
Meter 7: Christen MS Old Gym	$2,200
Meter 11: Martin HS Gym and Health	$12,700
Meter 14: Shirley Field West	$6,000
TOTAL	**$24,200**

COMBINE BUILDING AND OUTDOOR LIGHTING METERS

Martin HS, Christen MS, and Leyendecker ES have several meters that serve outdoor lighting, billed under outdoor lighting rates as described in Section 4.0 of this report. These rates essentially bill for consumption only, ranging from around $0.05 to $0.09 per kWh, *in addition to the $0.0685/kWh consumption charge from Just Energy*. If these lights were added to a demand-metered building service, the TDSP charge for energy would drop to just $0.001/kWh. Moreover, the addition of the outdoor lighting to the building meters would likely not impact peak demand at all, since the lights ostensibly operate at night during off-peak periods. The estimated yearly TDSP consumption cost savings from adding all outdoor lighting to demand metered building meters (Rate 857) is summarized in the table below.

OUTDOOR LIGHTING METER CONSOLIDATION	
Project Description	**Estimated Cost Savings**
Outdoor Lighting Meters	$14,700
TOTAL	**$14,700**

Note that lights billed under outdoor lighting rates are owned and maintained by AEP. Adding these accounts to existing building meters would not only entail the meter consolidation costs discussed previously (trenching, cable, transformers, etc.), but also added expenses for the District to own and maintain the lights. This would likely make such a project cost prohibitive in this retrofit case. **However, serving site lighting behind building meters is a recommendation for future new construction projects (given proper analysis) in order to save on utility costs.**

INSTALL POWER FACTOR CORRECTION CAPACITORS

While analyzing the utility data for Martin HS and Christen MS main accounts, it was observed that the power factor was consistently lower than the limit of 95% below which demand penalties occur (See Section 4.0). TEESI recommends the District install capacitor banks at the electrical service entrance or particular loads at these locations (Meters 2 and 10). Installing a capacitor bank will condition the power and reduce additional costs. Capacitor banks vary in cost with the size required, which is dependent on the facility's electrical demand and the amount of power factor correction elected. If the source of low power factor is a few large motors that always have the same low power factors, it may be most cost effective to connect the capacitors to the system between the motor starter and the load, so that the correction is only applied to the system while the offending motors are enabled. The following estimated implementation costs refer to installing capacitors at the electrical service entrances, and are based off preliminary utility data review. Detailed analysis would determine actual size of capacitors necessary.

POWER FACTOR CORRECTION			
Building	**Estimated Implementation Cost**	**Estimated Annual Savings ($/yr)**	**Simple Payback (years)**
Christen Middle School	$20,000	$3,500	5.7
Martin High School	$20,000	$2,000	10.0
TOTAL	**$40,000**	**$5,500**	**7.3**

6.0 CONCLUSIONS AND RECOMMENDATIONS

Potential building meter consolidation and routing separately metered outdoor lighting through building meters could save an estimated $26,750 and $14,700 per year, respectively. Implementation costs and annual savings estimates are based on a preliminary examination of the facilities. An accurate estimate of implementation cost would require careful analysis of existing electrical distribution systems, cost quotations from the electric utility, and construction cost estimates by electrical and site work contractors. However, it is readily apparent that the new electrical infrastructure, upgrades to existing electrical panels and feeders, trenching/core drilling, possible interference with underground utilities, new primary wiring and pad modifications in general will make these projects economically not feasible.

For future new projects and major renovations, consideration should be given to minimizing the use of small services by extending power from larger services. However, separate small services for remote loads may still be the most cost effective solution in many cases, especially where those small services already exist.

Another possible means of achieving the benefits of meter consolidation without the cost of major electrical renovation would be negotiating an agreement with the utility to combine meter readings or metering circuits from several services, especially if they are or can be close together. In any case where meters are consolidated, the District may consider including its own system of sub-meters for tracking purposes.

This report reveals that for some services, a significant electrical cost savings can be achieved without any expenditure. This is possible, with the agreement of the utility, by petitioning for a change of rate classification. Preliminary analysis showed a total potential savings of $24,200 per year for various rate changes. For this, a detailed analysis from an AEP rate specialist will be required.

In addition, power factor correction at Christen Middle School and Martin High School was found to have a utility savings potential of $5,500 per year. The estimated implementation costs for power factor correction capacitors is $40,000, giving a simple payback of 7.3 years for this project. Since power factor correction is much less expensive to achieve when installing new service equipment, it should always be considered for new construction or major renovations involving new services over a few hundred kVA. The capacitors themselves can be sized and installed after the actual power factor is known, but current transformers and space for a branch breaker in the main switchboard should be included in the original construction.

APPENDICES

APPENDIX A

BASE YEAR CONSUMPTION HISTORY

Energy Cost and Consumption Benchmarks										
		Electric					Total	EUI	ECI	Approx.
	Building	kWh/Yr	MMBTU/Yr	kWh/SF	$Cost/Yr	$Cost/kWh	MMBTU/Yr	kBTU/SF/Yr	$/SF/Yr	SF
1	Leyendecker Elementary	894,324	3,052	9.01	106,146	$0.119	3,052	31	1.07	99,255
2	Christen Middle School	2,471,125	8,434	11.48	296,864	$0.120	8,434	39	1.38	215,347
3	Martin High School	4,435,180	15,137	14.33	531,653	$0.120	15,137	49	1.72	309,569
		kWh/Yr	MMBTU/Yr	kWh/SF	$Cost/Yr	$Cost/kWh	MMBTU/Yr	kBTU/SF/Yr	$/SF/Yr	SF
		7,800,629	26,624	12.50	934,663	$0.120	26,624	43	1.50	624,171

10032789416308831 10032789416308832
10032789416308833 10032789422734268
10032789484913341 10032789484913342

District: Laredo ISD

ACCOUNT# 10032789484913343 Electric

Gas

BUILDING: Leyendecker Elementary

FLOOR AREA: 99,255 estimated

		ELECTRICAL					NATURAL GAS / FUEL	
			DEMAND			TOTAL ALL		
		CONSUMPTION	METERED	CHARGED	COST OF	ELECTRIC	CONSUMPTION	TOTAL
MONTH	YEAR	KWH	KW	KW	DEMAND ($)	COSTS ($)	MCF	COSTS ($)
Aug	2011	84,118		455		$9,952	0	$0
Sep	2011	109,318		455		$11,861	0	$0
Oct	2011	99,958		455		$11,161	0	$0
Nov	2011	78,358		455		$9,583	0	$0
Dec	2011	63,958		455		$8,579	0	$0
Jan	2012	52,438		455		$7,556	0	$0
Feb	2012	53,878		361		$6,805	0	$0
Mar	2012	62,518		361		$7,545	0	$0
Apr	2012	73,318		361		$8,796	0	$0
May	2012	88,438		384		$10,097	0	$0
Jun	2012	93,674		392		$10,488	0	$0
Jul	2012	34,350		390		$3,722	0	$0
TOTAL		894,324				$106,146	0.0	$0

Annual Total Energy Cost = 106,146 $/year

Total KWH/yr x 0.003413 = 3,052.33 MMBTU/year
Total MCF/yr x 1.03 = 0.00 MMBTU/year
Total Other x_____ = 0.0 MMBTU/year
Total Site MMBTU's/yr = 3,052 MMBTU/year

Energy Use Index:

Total site BTU's/Yr ÷ Total Area (SF) = 31 kBTU/SF/year

Energy Cost Index:

Total Energy Cost/Yr ÷ Total Area (SF) = 1.07 $/SF/year

District: Laredo ISD

ACCOUNT# 10032789410833950 10032789411386960
10032789413592539 10032789423504441
10032789430918921 10032789430918922
10032789430918923 10032789434576300 Electric
10032789448008001 10032789452703915
Gas

BUILDING: Christen Middle School

FLOOR AREA: 215,347 estimated

		ELECTRICAL					NATURAL GAS / FUEL	
			DEMAND			TOTAL ALL		
		CONSUMPTION	METERED	CHARGED	COST OF	ELECTRIC	CONSUMPTION	TOTAL
MONTH	YEAR	KWH	KW	KW	DEMAND ($)	COSTS ($)	MCF	COSTS ($)
Aug	2011	218,643		1,219		$27,014	0	$0
Sep	2011	275,783		1,307		$32,203	0	$0
Oct	2011	267,023		1,287		$31,199	0	$0
Nov	2011	218,863		1,170		$26,421	0	$0
Dec	2011	193,363		1,148		$24,185	0	$0
Jan	2012	163,003		1,166		$20,962	0	$0
Feb	2012	172,863		1,043		$20,684	0	$0
Mar	2012	177,623		1,063		$21,449	0	$0
Apr	2012	206,823		1,081		$25,032	0	$0
May	2012	230,923		1,127		$27,527	0	$0
Jun	2012	268,500		1,172		$30,768	0	$0
Jul	2012	77,715		1,085		$9,422	0	$0
TOTAL		2,471,125				$296,864	0.0	$0

* Natural Gas service not included in this summary.

Annual Total Energy Cost = 296,864 $/year

Total KWH/yr x 0.003413 = 8,433.95 MMBTU/year
Total MCF/yr x 1.03 = 0.00 MMBTU/year
Total Other x_____ = 0.0 MMBTU/year
Total Site MMBTU's/yr = 8,434 MMBTU/year

Energy Use Index:
Total site BTU's/Yr ÷ Total Area (SF) = 39 kBTU/SF/year

Energy Cost Index:
Total Energy Cost/Yr ÷ Total Area (SF) = 1.38 $/SF/year

District: Laredo ISD

ACCOUNT# 10032789401497555 10032789402326619
10032789409411698 10032789417220746
10032789421669080 10032789421669081
10032789421669082 10032789425648917
10032789444046301 10032789449605600
10032789453222948 10032789493878471
10032789457706506

Electric

Gas

BUILDING: Martin High School

FLOOR AREA: 309,569 estimated

		ELECTRICAL					NATURAL GAS / FUEL	
			DEMAND			TOTAL ALL		
		CONSUMPTION	METERED	CHARGED	COST OF	ELECTRIC	CONSUMPTION	TOTAL
MONTH	YEAR	KWH	KW	KW	DEMAND ($)	COSTS ($)	MCF	COSTS ($)
Aug	2011	416,091		1,690		$46,537	0	$0
Sep	2011	512,428		2,064		$56,708	0	$0
Oct	2011	480,760		2,076		$54,047	0	$0
Nov	2011	377,217		1,933		$43,759	0	$0
Dec	2011	340,391		1,929		$42,782	0	$0
Jan	2012	286,620		2,005		$38,685	0	$0
Feb	2012	298,870		1,888		$38,164	0	$0
Mar	2012	336,003		2,048		$41,945	0	$0
Apr	2012	365,122		1,989		$46,137	0	$0
May	2012	414,229		2,065		$50,554	0	$0
Jun	2012	461,897		2,071		$54,408	0	$0
Jul	2012	145,552		2,035		$17,928	0	$0
TOTAL		4,435,180				$531,653	0.0	$0

Annual Total Energy Cost = 531,653 $/year

Total KWH/yr x 0.003413 = 15,137.27 MMBTU/year
Total MCF/yr x 1.03 = 0.00 MMBTU/year
Total Other x_____ = 0.0 MMBTU/year
Total Site MMBTU's/yr = 15,137 MMBTU/year

Energy Use Index:
Total site BTU's/Yr ÷ Total Area (SF) = 49 kBTU/SF/year

Energy Cost Index:
Total Energy Cost/Yr ÷ Total Area (SF) = 1.72 $/SF/year

APPENDIX B

REQUEST FOR ENERGY ASSISTANCE

State Energy Conservation Office

Public Schools, Colleges and Non-Profit Hospitals

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 Laredo Independent School District, 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: R.V.

Date: May 2, 2012

Name (Mr./Ms./Dr.) Mr. Raymundo Villarreal

Title: Executive Director of Plant Facilities

Organization: Laredo Independent School District

Phone: (956) 795-4107

Street Address: 900 E. Lyon St.

Fax: (956) 795-3605

Mailing Address: 900 E. Lyon St.

E-Mail: reyvillarreal@laredoisd.org

Laredo, Texas 78040

County: Webb

Contact Information:

Name (Mr./Ms./Dr.): Mr. Angel E. Velazquez

Title: Director of Operations

Phone: (956) 795-3600

Fax: (956) 795-3605

E-Mail: Avelazquez@laredoisd.org

County: Webb

Please sign and mail or fax to: (A) Stephen Ross, **Schools and Education** Program Administrator, State Energy Conservation Office, 111 E. 17th Street, Austin, Texas 78774. Phone: 512-463-1770. **Fax 512-475-2569. OR** (B) Saleem Khan, Texas Energy Engineering Services, Inc. 1301 Capital of TX HWY, B-325, Austin, TX 78746. **FAX 512-328-2533**