

Executive Summary

Technical Aspects

Project Scope and Base Price

[REDACTED]

You asked that we focus on the Intermediate and Elementary Schools, and energy conservation measures (ECM's) were identified [REDACTED]

[REDACTED]

Roofing

Both schools' sprayed foam system roofs were surveyed to identify solutions for roof replacements. [REDACTED]

Single pane glass systems at both schools were reviewed [REDACTED]

Elementary School HVAC

The Elementary School classroom numbers 10 through 16 are without mechanical ventilation but are equipped with operable windows. Operable windows are their source for fresh air and therefore no code violation exists. This is why the mini-split systems were originally installed in these spaces [REDACTED]. The mini-splits are beginning to be a maintenance cost issue with compressor replacements imminent due to age. Also, a mini-split in room 14 is already removed. [REDACTED]

Intermediate School HVAC

At Intermediate School, we were able to design a window upgrade [REDACTED]

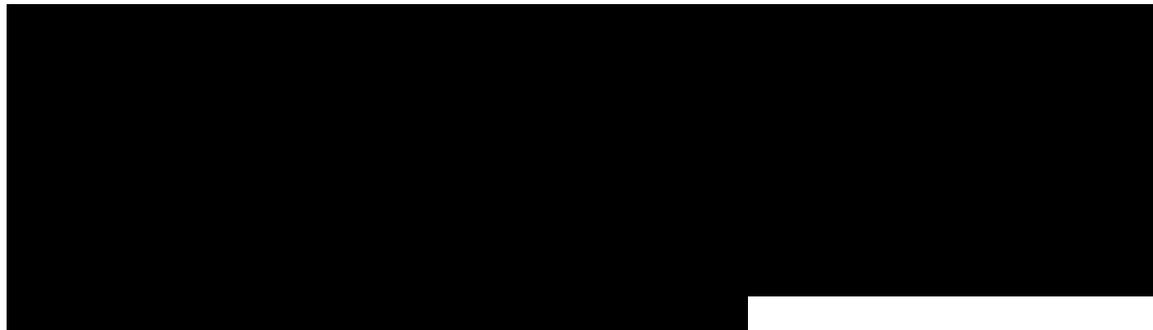
[REDACTED] Lastly, we developed [REDACTED] solutions that could replace mechanical systems at the Intermediate School.

Technical Approach

Existing Utility Costs

Precision Control Systems obtained energy data from the District and the following pages summarize that data. The District uses the Illinois Energy Consortium to purchase natural gas through Constellation Energy and electricity through Amren. The energy use and cost tables on the following pages indicate average cost per therm and per kilowatt hour for each of the building. Energy use and energy cost indices are calculated based upon our measured square footages at Intermediate School and Elementary School.

Utility Page 1 calculates the Energy Use Index and also the Energy Cost Index for each building. Elementary has slightly higher Energy Use at 70,377 btu/sf/yr, versus 64,576 btu/sf/yr for Intermediate, though the cost index for Elementary is at \$0.98 versus \$1.09 per square foot at Intermediate.



Attached are Utility Pages.

Coal City Elementary School

Age, Area and Building Envelope

Elementary School's main east wing was originally constructed in 1955. Additional construction projects expanded it in 1963, 1975, 1976, and 1995. The structure's footprint contains 67,466 square feet of conditioned space in a single story complex. The school serves approximately 300 students.



Masonry, Windows and Doors

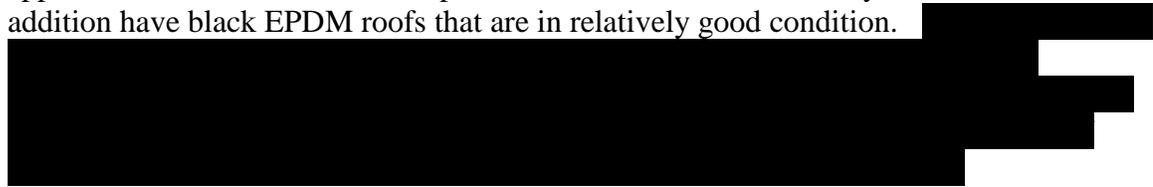
The facility's exterior walls are constructed of brick over concrete block with an air space within. Its window systems in the 1955, 1976 and 1995 wings are thermal pane glass in painted aluminum frames with a top fiberglass panel above a fixed glass over a project out window. Some original windows also have steel frames with single pane glass, such as at the Gym. We provide a window system inventory with our proposal. The building's exterior door systems are in good condition and consist primarily of aluminum style and rail units. At the 1995 south addition, some doors have hollow metal framed units and these are in fair condition. The north door of the 1955 wing has a wooden slab that should be considered for replacement to eliminate any water infiltration that may occur there.

Roofs

The roof at the Elementary School is a sprayed polyurethane foam system, much of which is showing signs of stress cracks, uneven surfaces, and ponding. This is especially true at the original 1955 wing, where pools of water are found above Rooms 15 and 16, the Boiler Room, Room 3, and around roof curbs for units serving the Nurses Office and Room 9. Minimal drains are evident on this original roof. At the Gymnasium upper wall, this roof also has a through-wall flashing that has been sprayed over with foam.

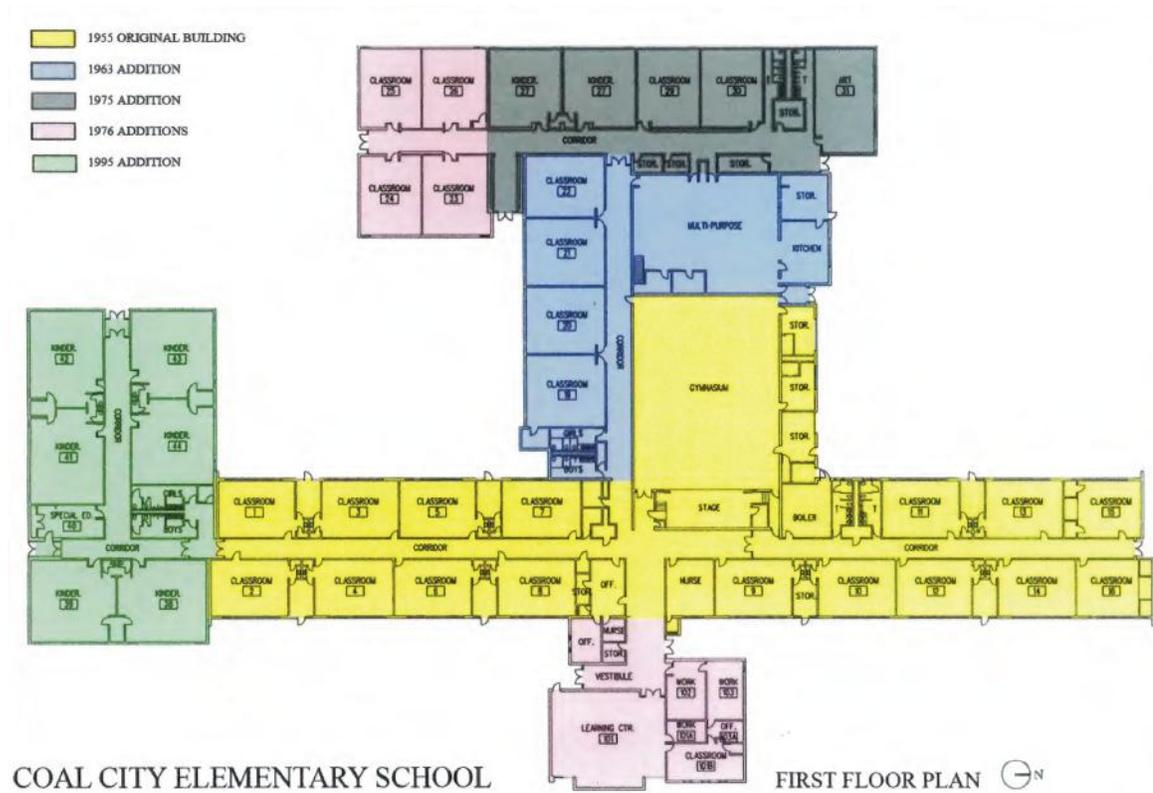
One other condition at the 1955 roof is the addition of sheet metal duct work for the Library and office wing. These roof top units are now mounted on lumber supports and would need to be supported correctly during any re-roof of the area.

The Elementary School has built up roofs with gravel ballast north and south of the Gym. New through-wall flashings were installed with these roofs, as 3 course of new brick are apparent. Other than these built up roofs and the foam roofs, the Gym and the south addition have black EPDM roofs that are in relatively good condition.



Elementary School

Building Area by Age



Occupancy Patterns

Academic Calendar

Precision obtained the District calendar along with the Elementary School monthly calendar.

The weekday class schedule at Elementary runs from 7:55 A.M. until 2:55 P.M. The teachers are typically in the school from 7:00 A.M. until 3:00 or 3:30 P.M. After school programs can occupy spaces up until 9:00 P.M. During the school year it is common that the building is opened on weekends for some activities. Some weekend special use areas are in use but not to an extremely high extent according to the staff.

Generally, the administrative offices are occupied from 7:00 A.M. to 3:30 P.M. during the school year and from about 8:00 A.M. to 3:00 P.M. during the summer months. The maintenance staff opens Elementary generally at 6:00 A.M. and custodial personnel are in the building until 10:00 P.M. during the school year.

Mechanical Systems

Heating Plant

The central heating plant consists of two natural gas fired Weil-McLain model 788, hot water boilers rated at 2,049 MBH input and 1,632 MBH output. The boilers are equipped with Power Flame Burners Model WCR2-G-15 controlled by Honeywell controllers. These boilers are in good condition with long service lives remaining.



The hot water system at the Elementary building serves classroom unit ventilators, cabinet heaters typically in corridors near entrances, perimeter radiation in the 1955 classrooms and other unit heaters in storage space. Below, a typical classroom in the

1955 wing has perimeter hot water radiant heat and a Sanyo wall mounted “mini-split” air conditioner. Since the Sanyo units provide no mechanical ventilation in these spaces, occupants must utilize the operable windows for fresh air.



Ventilation and Air Conditioning

As stated above, some of the Elementary classrooms (Rooms 10 through 16) are not ventilated and only have perimeter radiation, mini-splits, and operable windows. The balance of the 1955 wing is served by individual roof top units installed in 2009, replacing the mini-splits.



The balance of the classrooms have self-contained unit ventilators (SCUV) which are anywhere from 17 to 30 years old. Staff did not indicate any issues with these SCUV operations.

Exhaust fans are present for washrooms and custodial closets, and to neutralize building pressurization.

The units were equipped with pneumatic controls, and operate under a pneumatic day/night signal controlled digitally through the I/A building automation system. The units are typically 1000 to 1250 cfm. The units we inspected appeared to have filter changes up to date.

Precision surveyed run times of the equipment by way of the digital management system and some energy savings may be available by shortening run times.

Temperature Control System

The Elementary School has the Schneider Electric I/A Energy Management System (EMS) front end. The I/A system is a web-based temperature control and building automation system capable of supporting both BACnet and LonWorks devices, and it's architecture is built throughout the District.

Electrical Systems

Interior Lighting

We surveyed all of the lighting in the building and found most all of the linear fluorescent fixtures to have T8 lamps burning at 32 watts. Light fixtures range from the 2 lamp "egg crate" pendant hung fixtures at the 1955 wing (which are likely 57 year old fixtures), to 3 and 4 lamp recessed 2x4 prismatic lense fixtures within the ceiling grids. A minor number of recessed can lights are present.



Elementary lighting can be controlled with occupancy sensors and retrofit.

Exterior Lighting

Exterior lighting consists of metal halide wall pack units mounted at roof top level. Exterior lighting is controlled both by relays at the breaker panel and by time clocks.

[Redacted text block]

Coal City Intermediate School

Age, Area and Building Envelope

Intermediate School's original 1916 building was expanded several times to meet growing enrollment and use. Various Life and Safety or Capital Project remodeling projects have also taken place; most recently, the installation of packaged roof top units to replace distribution that previously was from multi-zone air handling units. The structure's footprint is 35,000 square feet and the complex contains 70,708 square feet of conditioned space within a partial two story building. Occupancy consists of approximately 310 students and 30 staff.



Masonry

The facility's exterior walls are masonry cavity walls with 4" face brick, an air space, and 8" CMU at the interior wall. Interior walls have gypsum board. Several areas of exterior face brick show deteriorated sealant, mortar joints that are cracked, losses or missing. Several parapet and roof walls have sprayed foam covering original weep and through-wall systems; and coping stones with cracked mortar or sealant. The entry of water to the wall systems has caused rusting and deterioration of steel lintels.

Windows

The window systems are entirely single pane 1/4" clear glass in non-thermally broken clear aluminum frames. The exterior caulking on most all windows is cracked and susceptible to water infiltration. This exterior caulk is also Asbestos Containing Material (ACM).



Especially at the 1916 original addition, steel lintels show rust and should be treated or replaced as necessary. Operable windows do not close tightly and air infiltration was evident in most units. The locking mechanisms for the units are loose and in disrepair. Several units were original to their respective building addition, including units that were of a 1972 vintage. Units at the cafeteria are installed in hollow metal frames which are rusting and not thermally broken. At the interior in classrooms, the District installed an assortment of window treatments to eliminate or reduce solar load. Also in several spaces, the top frames of the windows and insulated panels do not match acoustical ceiling grid heights. The western windows receive the brunt of sunlight load although it occurs later in the day when classes are more unoccupied.



The clear, single-pane glass at Intermediate School is mounted in non-thermally broken aluminum frames that leak air at their operable windows. These window systems suffer air infiltration and heat loss. The photo below right shows rusted steel lintels above the original 1916 window openings.



Doors

The building has a combination of aluminum framed and hollow metal doors. While the aluminum doors are in good condition, the clear aluminum style and rail frames hold single pane glass. The single pane glass exists apparently since interior vestibule doors were/are present (some vestibule door slabs have are removed). The cafeteria and gym doors are hollow metal units showing signs of rust. The approach and stairs at the Gym door could use new hand rails, if not direct ADA egress. Weather stripping has been added to some doors in an attempt to reduce air infiltration.

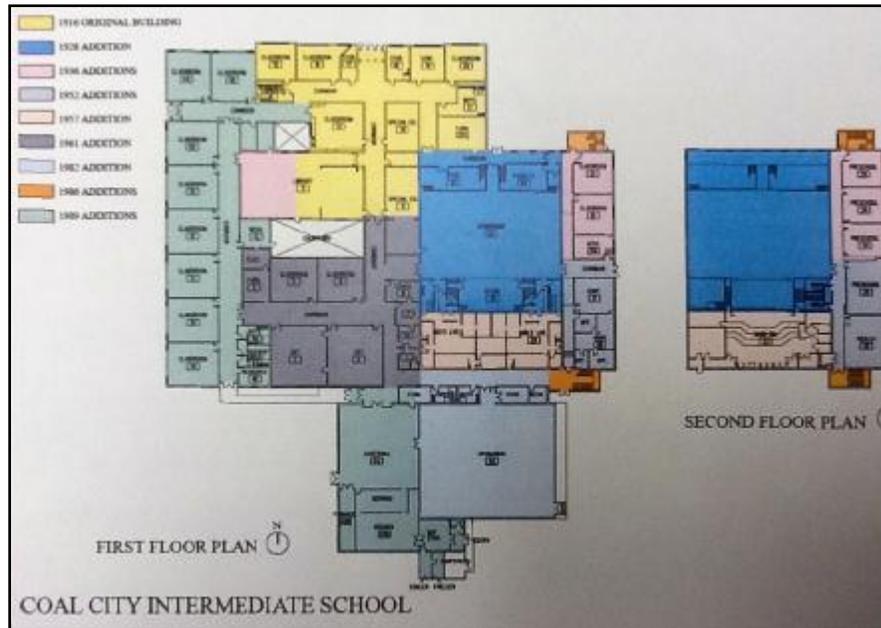
Roofs

Roof structure is wood joist at original 1916 structure, and metal deck, pre-cast insulated roof deck and bulb tees, or poured gypsum deck on steel joists. Intermediate's roof was covered approximately 15 to 18 years ago with a sprayed polyurethane foam (SPUF) roof system. The district indicates that the SPUF roof is not subject to remaining roof warranty. The SPUF surface shows signs of stress cracks and the roof survey performed by W.P. Hickman in 2007 proposed replacements occurring in 2010, 2013 and 2016 until the SPUF was removed entirely. Presently, the southeast stairwell roof is problematic with leaks. Two condensing units were installed in such a fashion that their curbs block the flow of water to drainage.

Additionally, foam was sprayed over through wall flashings at roof walls, contributing to the problem.

Intermediate School

Building Area by Age



Occupancy Patterns

Academic Calendar

Precision obtained the District calendar along with the Intermediate School monthly calendar.

The weekday class schedule at Intermediate runs from 7:55 A.M. until 2:55 P.M. The teachers are typically in the school from 7:00 A.M. until 3:00 or 3:30 P.M. After school programs can typically occupy spaces up until 9:00 P.M. During the school year it is common that the building is opened on weekends for community activities. Weekend use is usually limited to the gym or cafeteria areas, but use is not extremely heavy on weekends according to the staff.

Generally, the administrative offices are occupied from 7:00 A.M. to 3:30 P.M. during the school year and from about 8:00 A.M. to 3:00 P.M. during the summer months.

The maintenance staff opens Intermediate generally at 6:00 A.M. and custodial personnel are in the building until 11:00 P.M. during the school year and from 7:00 A.M. to 3:30 P.M. during the summer.

Summer School Calendar

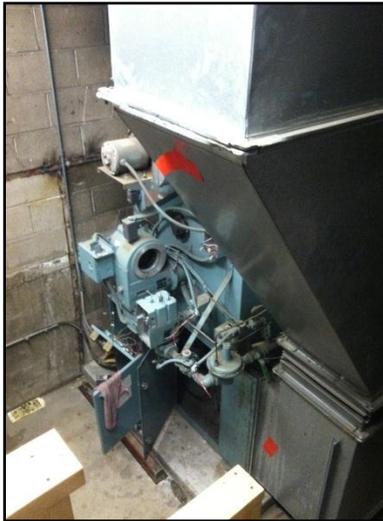
No summer school calendar was presented.

Mechanical Systems

Heating Plant(s)

Intermediate's central heating comes primarily from 9 Jackson Church multi-zone air handling units, each equipped with a gas-fired furnace for its hot deck.

Also present are 3 Carrier gas-fired packaged roof top units serving classroom, staff lounge and office space, and electric cabinet heaters serving vestibules.



The Jackson-Church multi-zone unit normally serving locker rooms has been taken apart and used for replacement parts needed on other multi-zone units.

Ventilation and Air Conditioning

The same Jackson-Church multi-zone units described above furnish ventilation and cooling to the majority of the school.

Exhaust fans serve washrooms, locker rooms, corridors, mechanical spaces and custodial closets, and also are present to neutralize ventilation fresh air.

Heating-only air handling units serve the Gym. Rooftop units installed in 2000 serve the Multi-purpose Room, Administrative Offices, Classrooms 208 and 210. The Faculty rooms 207A, B, and C are served by heating and cooling PTEC units.

Temperature Control System

Intermediate School's equipment is controlled pneumatically and a Schneider Electric TAC Building Automation System (BAS) provides energy management capabilities including optimal start/stop, scheduling, night set back and setup, duty cycling. The front end TAC graphical user interface provides staff with remote monitoring and alarming via an open protocol, web-based thin client capable of supporting both BACnet and LonWork devices. It should also be noted that the TAC I/A web-based graphical user interface is completely password protected with audit trail capabilities in place.

Refrigerated air dryers are present at each of three different pneumatic air stations [REDACTED]

The fan systems have pneumatic actuation with little direct digital control (DDC), with the exception of the packaged roof top units, which either have factory controls or DDC. The rooms have (in some instances multiple) pneumatic thermostats [REDACTED]

Electrical Systems

Interior Lighting

We surveyed all of Intermediate’s interior spaces and inventoried light fixture types, quantities, input wattages, and switch control. Our survey also took into account the number of lamp “burnouts” experienced in the school – lamps that failed to energize. The attached inventory shows a majority of the lighting is through T-8, 32 watt lamps in 2’x4’ fixtures with prismatic lenses, recessed in acoustical ceiling grids. Several spaces appear to be over lit – while de-lamping may be an option. The corridors typically have 2’x4’ fixtures. Also, we identified old fixtures above the existing grid which should be removed.



Gym lighting along with fluorescent lighting can be retrofit. Exit lighting and exterior lighting are also a source for savings, and grant money. [REDACTED]

Disclosure:
Coal City Community Unit School District 1

Section D

Coal City CUSD 1

Elementary School
300 N Broadway Street
Utility Summary



ELECTRICITY														NATURAL GAS															
Meter:		Provider: Amren and ComEd												Meter:		Provider: NIGAS and Constellation Energy												Natural Gas	
Account:		Rate: Trans												Footnotes:		Rate:												Footnotes:	
Year	Month	Begin	End	No. Days	Coincident Peak KW	Meter 141234359	Meter 141234360	Meter 141378386	Total KWH	MBTU of Electricity	All Costs	Average \$/kWh including Del & P.M.	Electricity Footnotes	Year	Month	Begin	End	No. Days	Program Gas	Mbtu of Natural Gas	Fuel Cost	Distribution Charge	Total Cost	Average \$/Therm including Transport	Natural Gas Footnotes				
2011	May	04/19/11	05/17/11	32	157.1	24,617	12,519	374	37,510	128	\$ 3,765	\$ 0.1004		2010	May	05/01/11	06/01/11	31	2,190	219	\$ 1,059.59	\$ 259.47	\$ 1,329.06	\$ 0.6069					
2011	April	03/19/11	04/19/11	29	144.4	22,023	18,344	346	40,713	139	3,792	0.0932		2010	April	04/01/11	05/01/11	31	-	-	20.00	281.71	301.71	-	-				
2011	March	02/17/11	03/17/11	28	153.1	23,144	29,688	333	52,166	178	4,479	0.0859		2010	March	03/01/11	04/01/11	31	3,971	397	2,121.85	343.47	2,465.32	-	-	0.6208			
2011	February	01/19/11	02/17/11	29	171.6	24,381	45,461	344	70,186	238	5,568	0.0798		2010	February	02/01/11	03/01/11	28	9,824	982	5,023.36	498.99	5,513.35	0.5612	-				
2011	January	12/14/10	01/19/11	36	198.3	25,977	57,603	428	84,008	287	6,565	0.0781		2010	January	01/01/11	02/01/11	31	5,818	582	2,850.46	359.99	3,210.45	0.5618	-				
2010	December	11/13/10	12/14/10	32	198.8	25,341	32,019	375	57,735	197	5,012	0.0868		2009	December	12/01/10	01/01/11	31	5,093	509	2,640.35	230.14	2,870.49	0.5836	-				
2010	November	10/14/10	11/12/10	29	117.9	23,404	9,038	343	32,785	112	3,185	0.0965		2009	November	11/01/10	12/01/10	30	1,872	187	884.30	175.53	1,059.83	0.5661	-				
2010	October	09/19/10	10/14/10	29	152.2	24,014	9,289	341	33,644	115	3,462	0.1029		2009	October	10/01/10	11/01/10	31	1,659	165	855.46	172.43	937.89	0.5444	-				
2010	September	08/19/10	09/15/10	30	199.7	26,483	10,077	348	45,908	157	4,457	0.0971		2009	September	09/01/10	10/01/10	30	-	-	20.00	164.85	184.85	-	-				
2010	August	07/19/10	08/16/10	31	114.6	15,743	18,363	356	34,462	118	3,344	0.0970		2009	August	08/01/10	09/01/10	31	-	-	20.00	154.33	184.33	-	-				
2010	July	06/19/10	07/16/10	30	106.3	10,378	9,738	345	20,461	70	2,477	0.1211		2009	July	07/01/10	08/01/10	31	-	-	20.00	165.81	185.81	-	-				
2010	June	05/19/10	06/16/10	30	177.4	15,402	9,847	350	25,399	87	2,954	0.1163		2009	June	06/01/10	07/01/10	30	-	-	20.00	189.59	209.59	-	-				
2010	May	04/19/10	05/17/10	31	113.4	24,051	6,772	356	31,189	108	2,657	0.0852		2009	May	05/01/10	06/01/10	31	2,263	226	1,049.44	226.87	1,276.31	0.5640	-				
2010	April	03/19/10	04/16/10	29	130.7	22,512	9,809	34	32,455	111	2,766	0.0862		2009	April	04/01/10	05/01/10	30	2,730	273	1,378.46	-	1,378.46	0.5049	-				
2010	March	02/17/10	03/19/10	29	162.0	27,256	26,551	343	54,150	185	4,122	0.0761		2009	March	03/01/10	04/01/10	31	-	-	-	-	-	-	-	-			
2010	February	01/19/10	02/17/10	29	-	66,109	-	-	66,109	226	4,769	0.0721		2009	February	02/01/10	03/01/10	28	5,522	552	3,481.88	-	3,481.88	0.6269	-				
2010	January	12/16/09	01/19/10	34	-	70,621	-	-	70,621	241	5,004	0.0721		2009	January	01/01/10	02/01/10	31	4,507	451	2,810.73	406.26	3,276.99	0.7271	-				
2009	December	11/19/09	12/16/09	33	-	55,882	-	-	55,882	191	4,244	0.0760		2008	December	12/01/09	01/01/10	31	5,525	553	2,853.73	281.73	3,135.46	0.5674	-				
2009	November	10/19/09	11/13/09	29	-	36,136	-	-	36,136	130	2,968	0.0776		2008	November	11/01/09	12/01/09	30	3,765	377	1,833.22	281.40	2,114.62	0.5617	-				
2009	October	09/16/09	10/15/09	29	-	35,387	-	-	35,387	121	2,973	0.0840		2008	October	10/01/09	11/01/09	31	5,432	543	2,400.30	159.57	2,559.87	0.4711	-				
2009	September	08/17/09	09/16/09	30	-	37,219	-	-	37,219	127	3,172	0.0852		2008	September	09/01/09	10/01/09	30	-	-	-	-	-	-	-	-			
2009	August	07/17/09	08/17/09	31	-	20,862	-	-	20,862	71	2,108	0.1010		2008	August	08/01/09	09/01/09	31	-	-	-	-	-	-	-	-			
2009	July	06/17/09	07/17/09	30	-	15,909	-	-	15,909	54	1,577	0.0991		2008	July	07/01/09	08/01/09	31	-	-	-	-	-	-	-	-			
2009	June**	05/17/09	06/17/09	31	-	25,359	-	-	25,359	87	2,954	0.1163		2008	June	06/01/09	07/01/09	30	-	-	-	-	-	-	-	-			
Annual Total*				365	-	250,907	269,798	4,283	634,676	1,825	\$ 49,070	-		Annual Total*				365	30,307	3,031	\$ 15,345	\$ 3,007	\$ 18,353	-					
Average						29,181			42,429	146	\$ 3,668	\$ 0.0911		Average					2,502	290	\$ 260	\$ 1,639	\$ 260	\$ 1,481	\$ 0.5741				
Maximum						70,621			84,008	287	\$ 6,565	\$ 0.1211		Maximum					9,824	982	\$ 5,023	\$ 490	\$ 5,513	\$ 0.7271					
Minimum						10,378			15,909	54	\$ 1,577	\$ 0.0721		Minimum					-	-	\$ 20	\$ 159	\$ -	\$ -	\$ 0.4711				

* Totals are for most recent 24 months studied.

Intermediate School
305 E. Division Street
Utility Summary



ELECTRICITY														NATURAL GAS															
Meter:		Provider: Amren and ComEd												Meter:		Provider: NIGAS and Constellation Energy												Natural Gas	
Account:		Rate: Trans												Footnotes:		Rate:												Footnotes:	
Year	Month	Begin	End	No. Days	Coincident Peak KW	Meter 141236977	Meter 141236977	Meter 141369539	Unmetered	Total KWH	MBTU of Electricity	All Costs	Average \$/kWh including Del & P.M.	Electricity Footnotes	Year	Month	Begin	End	No. Days	Program Gas	Mbtu of Natural Gas	Fuel Cost	Distribution Charge	Total Cost	Average \$/Therm including Transport	Natural Gas Footnotes			
2011	May	04/14/11	05/17/11	33	227.5	53,776	1,848	487	600	56,771	194	\$ 5,792	\$ 0.1020		2010	May	05/01/11	06/01/11	31	1,934	193	\$ 938.07	\$ 237.75	\$ 1,175.82	\$ 0.6080				
2011	April	03/19/11	04/14/11	27	152.1	37,287	1,464	116	591	39,458	135	4,160	0.1054		2010	April	04/01/11	05/01/11	30	-	-	20.00	281.14	301.14	-	-			
2011	March	02/17/11	03/18/11	29	195.0	46,222	1,809	285	716	49,332	167	4,796	0.0978		2010	March	03/01/11	04/01/11	31	2,210	221	1,189.75	332.53	1,522.28	0.6888	-			
2011	February	01/19/11	02/17/11	29	135.4	46,059	1,804	360	808	48,031	167	4,680	0.0954		2010	February	02/01/11	03/01/11	28	7,894	789	4,040.41	459.20	4,499.61	0.5700	-			
2011	January	12/19/10	01/19/11	35	133.8	49,361	2,056	498	1,028	52,881	180	5,081	0.0962		2010	January	01/01/11	02/01/11	31	4,575	458	2,246.74	346.75	2,593.49	0.5694	-			
2010	December	11/12/10	12/15/10	33	154.7	43,423	1,921	422	948	45,714	159	4,763	0.1025		2009	December	12/01/10	01/01/11	31	4,427	443	2,297.89	208.87	2,506.88	0.5662	-			
2010	November	10/14/10	11/12/10	29	200.6	47,304	1,662	242	795	50,003	171	5,068	0.1017		2009	November	11/01/10	12/01/10	30	1,682	168	796.58	180.60	977.18	0.5810	-			
2010	October	09/15/10	10/14/10	29	205.5	62,533	1,722	152	725	65,132	222	5,962	0.0918		2009	October	10/01/10	11/01/10	31	935	94	412.14	157.47	569.61	0.6092	-			
2010	September	08/13/10	09/15/10	33	226.7	83,200	2,722	473	714	87,109	297	7,409	0.0857		2009	September	09/01/10	10/01/10	30	-	-	20.00	153.54	173.54	-	-			
2010	August	07/16/10	08/16/10	31	-	54,000	-	-	54,000	194	4,800	0.0900		2009	August	08/01/10	09/01/10	31	-	-	20.00	180.49	190.49	-	-				
2010	July	06/19/10	07/16/10	31	205.8	54,882	2,888	630	-	56,500	200	5,001	0.0957		2009	July	07/01/10	08/01/10	31	-	-	20.00	164.48	184.48	-	-			
2010	June	05/17/10	06/15/10	29	191.0	32,823	2,422	467	557	35,259	124	3,892	0.1079		2009	June	06/01/10	07/01/10	30	-	-	20.00	196.87	216.87	-	-			
2010	May	04/16/10	05/17/10	31	174.8	50,034	2,412	105	564	53,115	181	4,300	0.0815		2009	May	05/01/10	06/01/10	31	1,998	200	\$ 928.99	\$ 234.20	\$ 1,163.09	0.5821	-			
2010	April	03/19/10	04/16/10	29	147.4	42,153	2,188	87	633	46,061	154	3,723	0.0826		2009	April													