

Technical Report: Part Two



Rendering courtesy of Devroux & Purnell Architects

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Option: Mechanical

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Executive Summary

Technical Report Two evaluated the Elementary School One's mechanical system as designed. The design load, energy consumption and cost of operation were modeled in Trane Trace 700 using information gathered from drawings and specifications.

Load calculation was performed using input of building materials, weather, internal loads and equipment. The calculations were done by block loads. The blocks were determined by the units and systems serving the areas.

The building equipment was analyzed for their energy consumption along with the buildings total consumption. The energy usage was broken down for each type of equipment. The building emissions was also calculated to see the impact on the environment. Finally, a cost analysis was performed to see the building operational costs annually and monthly. Elementary School One consumes 4,845,829 kBtu/yr, which is an annual cost of \$47,581 for gas and electric. The building operational cost is on the cheaper side being only 0.85 \$/sq ft.

Building Overview

Building Name:	Elementary School One
Location and Site:	Town, Maryland
Dates of Construction:	2010 – August 2011
Size:	84,400 sq. ft.
Number of Stories:	3 above and 1 below grade

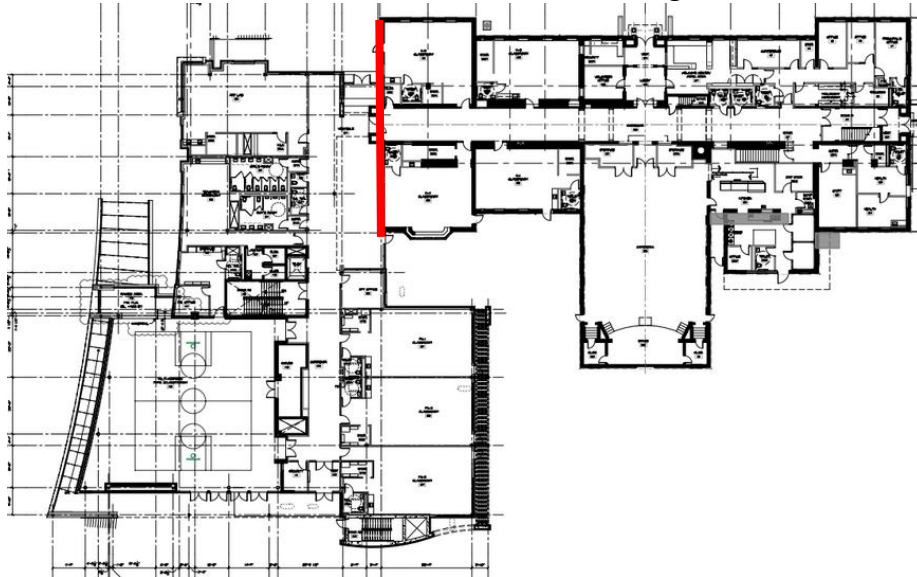


Figure 1: First Floor Plan.

The red line separates the existing building and the addition. The existing is on the right and the addition is on the left.

Mechanical Systems Summary

Elementary School One modernization involved a renovation of the existing building and adding an addition on the west side. All new mechanical systems were applied to both the existing and the addition. The mechanical system has three dedicated outside air RTUs that supply VAV boxes in each space. Each space then exhausts air back to the RTUs for heat wheel. There are three VRF systems that condition these spaces with dedicated outside area.

Two RTUs serve the cafeteria and two serve the multipurpose room. There are also base board radiators and cabinet heaters in some of the spaces near the exterior. In the administrative section of the existing building, an AHU conditions the spaces with its own outside air intake.

Design Load Estimation

To analyze the load on Elementary School One, Trane Trace 700 was used. This program analyzed the building based on location, envelope materials, occupancy, internal loads and equipment. The calculation accounts an entire year of data to find the peak heating and cooling loads. Below are the areas chosen for the block analysis.

Blue-	RTU-1 and 2 serve cafeteria
Orange-	RTU-3 and 4 DOAS serve the existing building (heat wheel)
Purple-	RTU-5 DOAS serve the addition (heat wheel)
Green-	RTU-6 and 7 serve the multipurpose room
Red-	AHU serves administrative offices

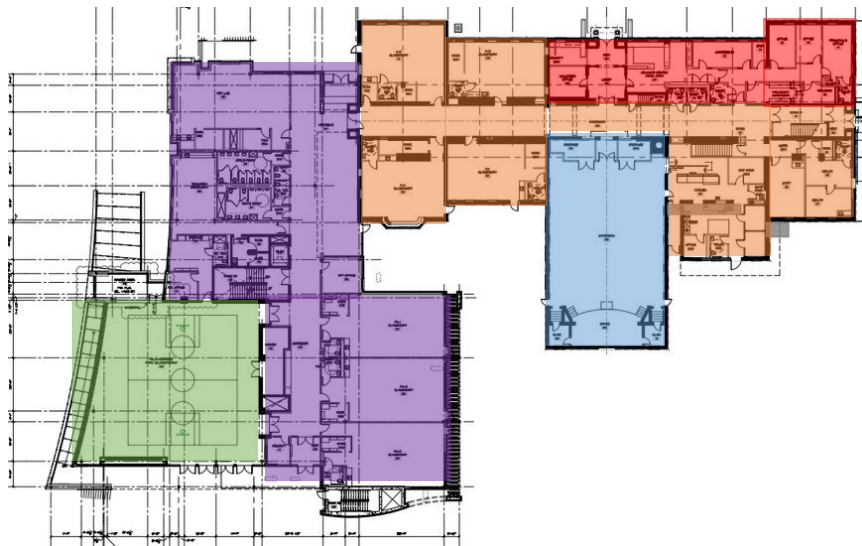


Figure 1: First Floor Block Layout

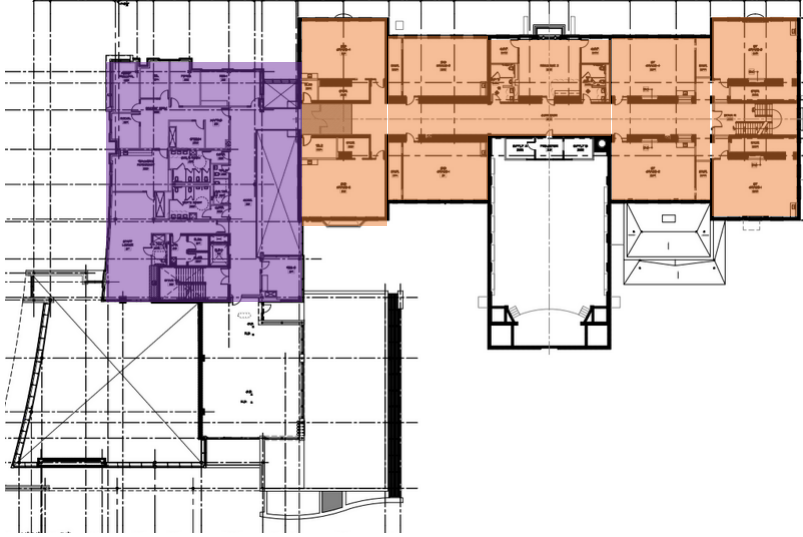


Figure 2: Second Floor Block Layout

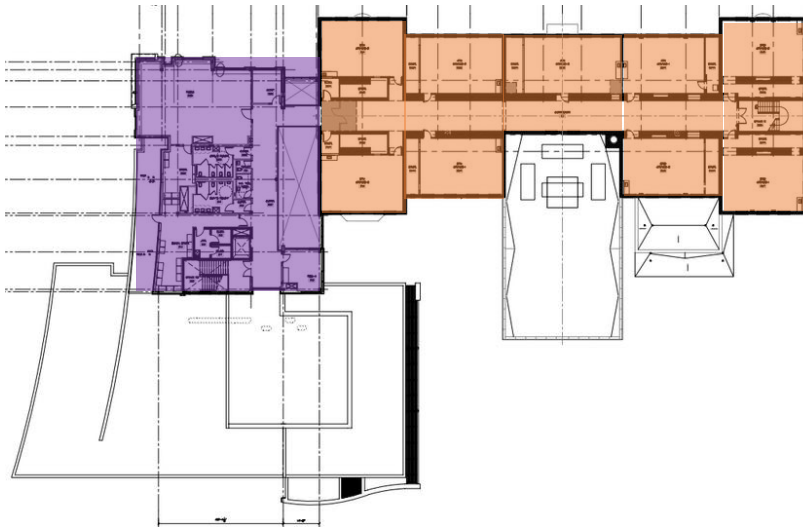


Figure 3: Third Floor Black Layout

Design Assumptions

The program allows input of internal loads such as lighting, occupancy and equipment loads. The actual design input were used when possible and some were assumed larger in the model to be precautionary. Lighting density was assumed at 2 W/ sf, which is larger for some spaces. Occupancy actual design was used for RTU-1, 2, 6 and 7. The other blocks occupancy was assumed classroom or office space density depending on primary use. Miscellaneous equipment loads were assumed for areas with high density computer and other office equipment. The schedule of building operation was based on average school hours.

	Summer	Winter
Designed Dry Bulb (°F)	91	13
Designed Wet Bulb (°F)	77	-
Indoor Air Temperature (°F)	75	72

Figure 4: Weather based on Baltimore, Maryland data.

Design Load Estimation Results

The estimated modeled loads are compared with the design loads in the figures below. The estimated loads are larger than the designed loads for a couple reasons. The location of the building has been moved to a colder climate and higher estimation of the internal loads. RTU 1, 2, 6 and 7 modeled are close to the designed capacities. These units serve the cafeteria and the multipurpose room and supply over 4 cfm/ sq ft because of the double height ceilings. There was no information on the design loads of AHU that serves the administrative offices, but 1.37 cfm/ sq ft seems to be high for that type of space. The administrative space should be closer to 1.0 cfm/ sq ft.

The RTU-3, 4 and 5 loads are largely off by a factor of 50%. This is due to the program limitations. Trane Trace 700 does not allow multiple systems to operate one space and those spaces have dedicated outdoor air (VAV) with VRF system to further condition the space. The system inputted into the program was a VRF with dedicated outdoor air in the same package unit. This adapted input is skewing my results for those spaces. Also, the controls of the designed system is very elaborate compared to the controls that could be inputted into Trane Trace in the simplified block estimation.

Modeled:

	Cooling Capacity (MBh)	Heating Capacity (MBh)	cfm/sq ft
AHU	57.8	112.1	1.37
RTU-1,2	344.8	118.3	4.47
RTU-3,4	1557.1	1542.11	1.54
RTU-5	1439.6	1181	1.54
RTU-6,7	527.1	145.3	4.07

Figure 5: Modeled load calculation results.

Designed:

	Cooling Capacity (MBh)	Heating Capacity (MBh)	cfm/sq ft
AHU	n/a	n/a	n/a
RTU-1,2	309.8	125.7	4.81
RTU-3,4	914.1	932.4	1.1
RTU-5	867.7	742.3	1.1
RTU-6,7	359.8	217.7	3.42

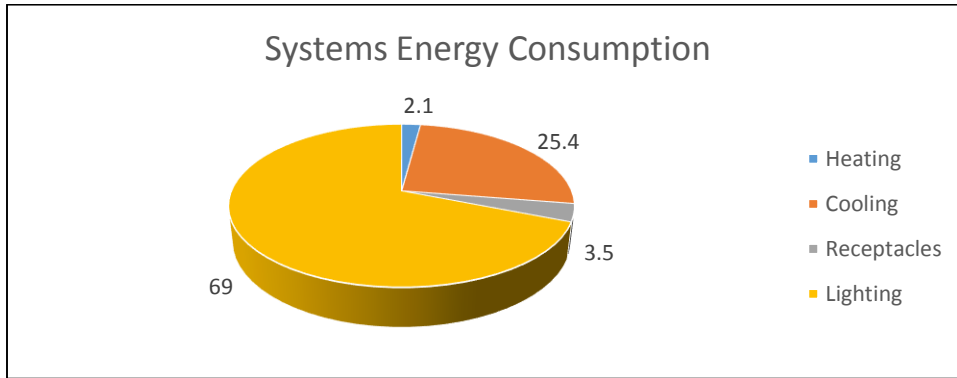
Figure 6: Designed load calculation from sponsor.

System Energy Consumption & Costs

System Comparison

Elementary School One consumes 4,845,829 kBtu/yr, which can be seen in Figure 7. Most of the energy consumed by the building is due to the lights. School only operates during normal school hours plus extracurricular activities after hours. The energy consumed cannot be decreased much because of the lighting requirements of ASHRAE. The second largest energy usage is mechanical cooling. This includes each RTU and AHU to cool the spaces. The school is not in full operation during the summer so the set temperature is higher so less cooling is needed. The operation spaces during the summer are mostly administrative offices which have their own AHU to condition that space.

Equipment Energy Consumption



	% of Total Building Energy	Total Building Energy (kBtu/yr)
Heating	2.1	99,919
Cooling	25.4	1,232,861
Receptacles	3.5	168,870
Lighting	69	3,344,179
Total	100	4,845,829

Figure 7: Equipment energy consumption modeled in Trane.

Monthly Energy Consumption

The monthly energy usage is mostly electricity because of the lights and equipment, seen in Figure 8. There is a small increase in electricity usage during the summer due to the increase in cooling. Gas is only used during the colder months for heating, but the energy usage of gas is very small compared to the electricity.

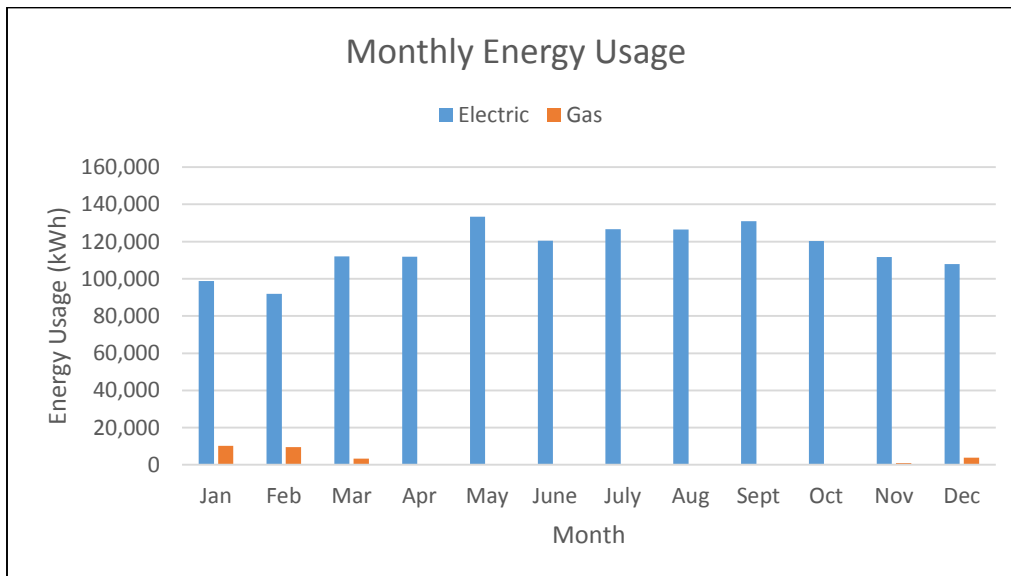


Figure 8: Monthly energy usage of electricity and gas.

Building Energy Cost Analysis

The energy cost was found from the areas electricity and gas providers. The cost of electricity currently in the area is 13.1 cents per kWh. The cost of gas is \$1.044 per therm currently and one therm is equal to 29.3 kWh.

The yearly estimated cost of electricity is \$46,979 and the estimated cost of gas is \$602. This brings the total operation cost of the equipment to \$47,581. The building conditioned spaces are 55,927 sq ft and the utility cost per area is 0.85 \$/sq ft.

Environmental Impact

The environmental impact of the building systems can be seen below in Figure 9. Electricity is inefficacy source of energy and it contributes most of the impact to the environment.

Environmental Impact Analysis	
CO2	1,862,997 lbm/yr
SO2	16,776 gm/yr
NOX	3,210 gm/yr

Figure 9: Gaseous emissions analysis from Trane model.

Mechanical Energy Break Down

The largest amount of energy used in the mechanical system is the air-cooled chiller which is a part of the VRF system that conditions most of the building. Next, largest is the packaged RTU that serve the cafeteria and the multipurpose room. The majority of the energy consumed by the mechanical system is to cool the spaces.

Annual Energy Usage per Equipment

	Energy (kWh)
Air-cooled chiller	312,662
Packaged RTU	47,742
Boiler	923
Boiler Fan	1,906
Control Panels	1,114

Figure 10: Distribution of energy usage among equipment.

References

ASHRAE (2013) Standard 62.1- Ventilation for Acceptable Indoor Air Quality

ASHRAE (2013) Standard 90.1- Energy Standard For building Except Low-Rise Residential Buildings

"Department of Public Works." *Department of Public Works*. N.p., n.d. Web. 06 Oct. 2014.

"U.S. Bureau of Labor Statistics." *U.S. Bureau of Labor Statistics*. U.S. Bureau of Labor Statistics, n.d. Web. 05 Oct. 2014.

Appendix A- Room Templates

Administrative

Alternative 1

Room description: Admin

Templates...

Room: Default | Floor...: 116 ft | 27.7 ft | Width: 27.7 ft

Internal: Default | Roof...: 0 ft | 0 ft | Equals floor

Airflow: Default

Tstat: Default

Constr: Default

Wall...

Description	Length (ft)	Height (ft)	Direction	% Glass or Qty	Length (ft)	Height (ft)	Window
north	116	12.5	0	0	0	0	<input type="checkbox"/>
west	6	12.5	270	0	0	0	<input type="checkbox"/>
east	32	12.5	90	0	0	0	<input type="checkbox"/>

Internal loads...

People: 143 | sq ft/person

Lighting: 2 | W/sq ft

Misc loads: 1 | W/sq ft

Airflows...

Cooling vent: 0 | cfm

Heating vent: 0 | cfm

Cooling VAV min: 30 | % Clg Airflow

Heating VAV max: 100 | % Clg Airflow

Single Sheet | Rooms | Roofs | Walls | Int Loads | Airflows | Partn/Floors

Cafeteria

Alternative 1

Room description: Cafeteria

Templates...

Room: Default | Floor...: 76 ft | 46 ft | Width: 46 ft

Internal: Default | Roof...: 0 ft | 0 ft | Equals floor

Airflow: Default

Tstat: Default

Constr: Default

Wall...

Description	Length (ft)	Height (ft)	Direction	% Glass or Qty	Length (ft)	Height (ft)	Window
west	54	15.5	270	0	0	0	<input type="checkbox"/>
south	46	15.5	180	0	0	0	<input type="checkbox"/>
east	54	15.5	90	0	0	0	<input type="checkbox"/>

Internal loads...

People: 249 | People

Lighting: 2 | W/sq ft

Misc loads: 0.5 | W/sq ft

Airflows...

Cooling vent: 5000 | cfm

Heating vent: 5000 | cfm

Cooling VAV min: 30 | % Clg Airflow

Heating VAV max: 100 | % Clg Airflow

Single Sheet | Rooms | Roofs | Walls | Int Loads | Airflows | Partn/Floors

Multipurpose

Alternative 1 Apply

Room description: Multi-purpose Close

Templates...

Room: Default Floor...: 60 ft 67 ft New Room

Internal: Default Roof...: 0 ft 0 ft Copy

Airflow: Default Equals floor Delete

Tstat: Default

Constr: Default

Wall...

Description	Length (ft)	Height (ft)	Direction	% Glass or Qty	Length (ft)	Height (ft)	Window
north	20	24	0	90 0	0	0	<input checked="" type="checkbox"/>
west	62	24	270	90 0	0	0	<input checked="" type="checkbox"/>
south	72	24	180	20 0	0	0	<input checked="" type="checkbox"/>

Internal loads...

People: 269 People

Lighting: 2 W/sq ft

Misc loads: 0.5 W/sq ft

Airflows...

Cooling vent: 5000 cfm

Heating vent: 5000 cfm

Cooling VAV min: 30 % Clg Airflow

Heating VAV max: 100 % Clg Airflow

Single Sheet Rooms Roofs Walls Int Loads Airflows Patrn/Floors

Addition- Lower Level

Alternative 1 Apply

Room description: Addition-Lower Close

Templates...

Room: Default Floor...: 35 ft 224.5 ft New Room

Internal: Default Roof...: 0 ft 0 ft Copy

Airflow: Default Equals floor Delete

Tstat: Default

Constr: Default

Wall...

Description	Length (ft)	Height (ft)	Direction	% Glass or Qty	Length (ft)	Height (ft)	Window
nw	40	12.6	270	0 3	8	8	<input checked="" type="checkbox"/>
north	9	12.6	0	90 0	0	0	<input checked="" type="checkbox"/>
sw	36	12.6	270	90 0	0	0	<input checked="" type="checkbox"/>

Internal loads...

People: 20 sq ft/person

Lighting: 2 W/sq ft

Misc loads: 0.5 W/sq ft

Airflows...

Cooling vent: 3095 cfm

Heating vent: 3095 cfm

Cooling VAV min: 30 % Clg Airflow

Heating VAV max: 100 % Clg Airflow

Single Sheet Rooms Roofs Walls Int Loads Airflows Patrn/Floors

Addition- First Level

Alternative 1

Room description: Addition- 1st

Templates...

Room: Default | Floor...: 70 ft | 116 ft | Roof...: 0 ft | 0 ft | Equals floor

Internal: Default | Airflow: Default | Tstat: Default | Constr: Default

Wall...

Description	Length (ft)	Height (ft)	Direction	% Glass or Qty	Length (ft)	Height (ft)	Window
north	103	12.6	0	0	6	8	✓
west	78	12.6	270	0	11	4	✓
south	67	12.6	180	0	2	9	✓

Internal loads...

People: 20 sq ft/person | Lighting: 2 W/sq ft | Misc loads: 0.5 W/sq ft

Airflows...

Cooling vent: 2960 cfm | Heating vent: 2960 cfm | Cooling VAV min: 30 % Clg Airflow | Heating VAV max: 100 % Clg Airflow

Single Sheet | Rooms | Roofs | Walls | Int Loads | Airflows | Partn/Floors

Addition- Second Level

Alternative 1

Room description: Addition- 2nd

Templates...

Room: Default | Floor...: 70 ft | 53 ft | Roof...: 0 ft | 0 ft | Equals floor

Internal: Default | Airflow: Default | Tstat: Default | Constr: Default

Wall...

Description	Length (ft)	Height (ft)	Direction	% Glass or Qty	Length (ft)	Height (ft)	Window
north	70	12.6	0	0	6	8	✓
west	89	12.6	270	0	11	4	✓
south	75	12.6	180	0	6	4	✓

Internal loads...

People: 20 sq ft/person | Lighting: 2 W/sq ft | Misc loads: 0.5 W/sq ft

Airflows...

Cooling vent: 1420 cfm | Heating vent: 1420 cfm | Cooling VAV min: 30 % Clg Airflow | Heating VAV max: 100 % Clg Airflow

Single Sheet | Rooms | Roofs | Walls | Int Loads | Airflows | Partn/Floors

Addition- Third Level

Alternative 1

Room description: Addition-3rd

Templates...

Room: Default | Floor...: 70 ft | 47 ft | Length | Width

Internal: Default | Roof...: 0 ft | 0 ft

Airflow: Default

Tstat: Default

Constr: Default

Roof...: 0 ft | 0 ft | Equals floor

Wall...

Description	Length (ft)	Height (ft)	Direction	% Glass or Qty	Length (ft)	Height (ft)	Window
north	70	12.6	0	0 6	8	8	<input checked="" type="checkbox"/>
west	90	12.6	270	0 8	3.3	9	<input checked="" type="checkbox"/>
south	65	12.6	180	0 2	6.5	10	<input checked="" type="checkbox"/>

Internal loads...

People: 20 sq ft/person

Lighting: 2 W/sq ft

Misc loads: 0.5 W/sq ft

Airflows...

Cooling vent: 1400 cfm

Heating vent: 1400 cfm

Cooling VAV min: 30 % Clg Airflow

Heating VAV max: 100 % Clg Airflow

Single Sheet | Rooms | Roofs | Walls | Int Loads | Airflows | Partn/Floors

Existing- First Level

Alternative 1

Room description: Existing-1st

Templates...

Room: Default | Floor...: 44 ft | 121 ft | Length | Width

Internal: Default | Roof...: 0 ft | 0 ft

Airflow: Default

Tstat: Default

Constr: Default

Roof...: 0 ft | 0 ft | Equals floor

Wall...

Description	Length (ft)	Height (ft)	Direction	% Glass or Qty	Length (ft)	Height (ft)	Window
north	70	12.6	0	0 7	5.5	7	<input checked="" type="checkbox"/>
west	22	12.6	270	0 0	0	0	<input type="checkbox"/>
south	136	12.6	180	0 12	5.5	7	<input checked="" type="checkbox"/>

Internal loads...

People: 20 sq ft/person

Lighting: 2 W/sq ft

Misc loads: 0.5 W/sq ft

Airflows...

Cooling vent: 2740 cfm

Heating vent: 2740 cfm

Cooling VAV min: 30 % Clg Airflow

Heating VAV max: 100 % Clg Airflow

Single Sheet | Rooms | Roofs | Walls | Int Loads | Airflows | Partn/Floors

Existing- Second Level

Alternative 1

Room description Existing-2nd

Templates...

Room: Default | Floor: 192 ft | Width: 43 ft

Internal: Default | Roof: 0 ft | 0 ft

Airflow: Default

Tstat: Default

Constr: Default

Equals floor

Wall...

Description	Length (ft)	Height (ft)	Direction	% Glass or Qty	Length (ft)	Height (ft)	Window
north	192	12.6	0	0	19	4.5	9
west	22	12.6	270	0	2	4.5	9
south	140	12.6	180	0	15	4.5	9

Internal loads...

People: 20 sq ft/person

Lighting: 2 W/sq ft

Misc loads: 0.5 W/sq ft

Airflows...

Cooling vent: 6440 cfm

Heating vent: 6440 cfm

Cooling VAV min: 30 % Clg Airflow

Heating VAV max: 100 % Clg Airflow

Single Sheet | Rooms | Roofs | Walls | Int Loads | Airflows | Partn/Floors

Existing- Third Level

Alternative 1

Room description Existing-3rd

Templates...

Room: Default | Floor: 192 ft | Width: 45 ft

Internal: Default | Roof: 0 ft | 0 ft

Airflow: Default

Tstat: Default

Constr: Default

Equals floor

Wall...

Description	Length (ft)	Height (ft)	Direction	% Glass or Qty	Length (ft)	Height (ft)	Window
north	192	12.6	0	0	19	4.5	9
west	46	12.6	270	0	2	4.5	9
south	192	12.6	180	0	17	4.5	9

Internal loads...

People: 20 sq ft/person

Lighting: 2 W/sq ft

Misc loads: 0.5 W/sq ft

Airflows...

Cooling vent: 5600 cfm

Heating vent: 5600 cfm

Cooling VAV min: 30 % Clg Airflow

Heating VAV max: 100 % Clg Airflow

Single Sheet | Rooms | Roofs | Walls | Int Loads | Airflows | Partn/Floors

Appendix B- Zone Check Sums

Elementary School One

Location Maryland
 Building owner
 Program user
 Company
 Comments

By ACADEMIC
 Dataset name X:_THESIS\TECH 2.trc

Calculation time 05:59 PM on 10/06/2014
 TRACE® 700 version 6.3

Location Baltimore, Maryland
 Latitude 39.0 deg
 Longitude 76.0 deg
 Time Zone 5
 Elevation 146 ft
 Barometric pressure 29.8 in. Hg

Air density 0.0756 lb/cu ft
 Air specific heat 0.2444 Btu/lb-°F
 Density-specific heat product 1.1091 Btu/h-cfm-°F
 Latent heat factor 4,881.9 Btu-min/h-cu ft
 Enthalpy factor 4.5371 lb-min/hr-cu ft

Summer design dry bulb 91 °F
 Summer design wet bulb 77 °F
 Winter design dry bulb 13 °F
 Summer clearness number 0.85
 Winter clearness number 0.85
 Summer ground reflectance 0.20
 Winter ground reflectance 0.20
 Carbon Dioxide Level 400 ppm

Design simulation period January - December
 Cooling load methodology TETD-TA1
 Heating load methodology UATD



Zone Checksums

By ACADEMIC

Additional-1st

COOLING COIL PEAK										CLG SPACE PEAK										HEATING COIL PEAK										TEMPERATURES				AIRFLOWS				ENGINEERING CKS			
Peaked at Time: Outside Air:					Mo/Hr: 7 / 18 OADBWB/Hr: 87 / 74 / 106					Mo/Hr: 7 / 18 OADB: 87					Mo/Hr: Heating Design OADB: 13					Cooling		Heating		Cooling		Heating		Cooling		Heating											
Envelope Loads	Space Sens. + Lat. Btu/h	Plenum Sens. + Lat. Btu/h	Net Total Btu/h	Percent Of Total (%)	Envelope Loads	Space Sensible Btu/h	Percent Of Total (%)	Space Peak Space Sens Btu/h	Coil Peak Tot Sens Btu/h	Percent Of Total (%)	SADB	Ra Plenum Return	Return/RA	Fm M/RTD	Fm B/D/TD	Fm Frict	Diffuser	Terminal	Main Fan	Sec Fan	Nom Vent	AHU Vent	Infil	MinStop/Rn	Return	Exhaust	Rm Exh	Auxiliary	Leakage Dwn	Leakage Ups	% OA	Chm/Fr	chn/ton	ft/ton	Btu/hr-ft²	No. People					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	53.0	85.0	10.031	10.031	10.031	0	2.960	2.960	0	3.009	10.031	10.031	2.960	0	0	29.5	1.24	176.94	143.23	83.78	406					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	76.1	69.0	10.031	10.031	10.031	0	2.960	2.960	0	3.009	10.031	10.031	2.960	0	0	29.5	1.24	176.94	143.23	83.78	406					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	78.567	68.0	10.031	10.031	10.031	0	2.960	2.960	0	3.009	10.031	10.031	2.960	0	0	29.5	1.24	176.94	143.23	83.78	406					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.905	52.5	10.031	10.031	10.031	0	2.960	2.960	0	3.009	10.031	10.031	2.960	0	0	29.5	1.24	176.94	143.23	83.78	406					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.220	0.0	10.031	10.031	10.031	0	2.960	2.960	0	3.009	10.031	10.031	2.960	0	0	29.5	1.24	176.94	143.23	83.78	406					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.099	0.0	10.031	10.031	10.031	0	2.960	2.960	0	3.009	10.031	10.031	2.960	0	0	29.5	1.24	176.94	143.23	83.78	406					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	10.031	10.031	10.031	0	2.960	2.960	0	3.009	10.031	10.031	2.960	0	0	29.5	1.24	176.94	143.23	83.78	406					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	10.031	10.031	10.031	0	2.960	2.960	0	3.009	10.031	10.031	2.960	0	0	29.5	1.24	176.94	143.23	83.78	406					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	10.031	10.031	10.031	0	2.960	2.960	0	3.009	10.031	10.031	2.960	0	0	29.5	1.24	176.94	143.23	83.78	406					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	10.031	10.031	10.031	0	2.960	2.960	0	3.009	10.031	10.031	2.960	0	0	29.5	1.24	176.94	143.23	83.78	406					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	10.031	10.031	10.031	0	2.960	2.960	0	3.009	10.031	10.031	2.960	0	0	29.5	1.24	176.94	143.23	83.78	406					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	10.031	10.031	10.031	0	2.960	2.960	0	3.009	10.031	10.031	2.960	0	0	29.5	1.24	176.94	143.23	83.78	406					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	10.031	10.031	10.031	0	2.960	2.960	0	3.009	10.031	10.031	2.960	0	0	29.5	1.24	176.94	143.23	83.78	406					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	10.031	10.031	10.031	0	2.960	2.960	0	3.009	10.031	10.031	2.960	0	0	29.5	1.24	176.94	143.23	83.78	406					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	10.031	10.031	10.031	0	2.960	2.960	0	3.009	10.031	10.031	2.960	0	0	29.5	1.24	176.94	143.23	83.78	406					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	10.031	10.031	10.031	0	2.960	2.960	0	3.009	10.031	10.031	2.960	0	0	29.5	1.24	176.94	143.23	83.78	406					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	10.031	10.031	10.031	0	2.960	2.960	0	3.009	10.031	10.031	2.960	0	0	29.5	1.24	176.94	143.23	83.78	406					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	10.031	10.031	10.031	0	2.960	2.960	0	3.009	10.031	10.031	2.960	0	0	29.5	1.24	176.94	143.23	83.78	406					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	10.031	10.031	10.031	0	2.960	2.960	0	3.009	10.031	10.031	2.960	0	0	29.5	1.24	176.94	143.23	83.78	406					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	10.031	10.031	10.031	0	2.960	2.960	0	3.009	10.031	10.031	2.960	0	0	29.5	1.24	176.94	143.23	83.78	406					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	10.031	10.031	10.031	0	2.960	2.960	0	3.009	10.031	10.031	2.960	0	0	29.5	1.24	176.94	143.23	83.78	406					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	10.031	10.031	10.031	0	2.960	2.960	0	3.009	10.031	10.031	2.960	0	0	29.5	1.24	176.94	143.23	83.78	406					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	10.031	10.031	10.031	0	2.960	2.960	0	3.009	10.031	10.031	2.960	0	0	29.5	1.24	176.94	143.23	83.78	406					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	10.031	10.031	10.031	0	2.960	2.960	0	3.009	10.031	10.031	2.960	0	0	29.5	1.24	176.94	143.23	83.78	406					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	10.031	10.031	10.031	0	2.960	2.960	0	3.009	10.031	10.031	2.960	0	0	29.5	1.24	176.94	143.23	83.78	406					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	10.031	10.031	10.031	0	2.960	2.960	0	3.009	10.031	10.031	2.960	0	0	29.5	1.24	176.94	143.23	83.78	406					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	10.031	10.031	10.031	0	2.960	2.960	0	3.009	10.031	10.031	2.960	0	0	29.5	1.24	176.94	143.23	83.78	406					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	10.031	10.031	10.031	0	2.960	2.960	0	3.009	10.031	10.031	2.960	0	0	29.5	1.24	176.94	143.23	83.78	406					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	10.031	10.031	10.031	0	2.960	2.960	0	3.009	10.031	10.031	2.960	0	0	29.5	1.24	176.94	143.23	83.78	406					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	10.031	10.031	10.031	0	2.960	2.960	0	3.009	10.031	10.031	2.960	0	0	29.5	1.24	176.94	143.23	83.78	406					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	10.031	10.031	10.031	0	2.960	2.960	0	3.009	10.031	10.031	2.960	0	0	29.5	1.24	176.94	143.23	83.78	406					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	10.031	10.031	10.031	0	2.960	2.960	0	3.009	10.031	10.031	2.960	0	0	29.5	1.24	176.94	143.23	83.78	406					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	10.031	10.031	10.031	0	2.960	2.960	0	3.009	10.031	10.031	2.960	0	0	29.5	1.24	176.94	143.23	83.78	406					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	10.031	10.031	10.031	0	2.960	2.960	0	3.009	10.031	10.031	2.960	0	0	29.5	1.24	176.94	143.23	83.78	406					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	10.031	10.031	10.031	0	2.960	2.960	0	3.009	10.031	10.031	2.960	0	0	29.5	1.24	176.94	143.23	83.78	406					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	10.031	10.031	10.031	0	2.960	2.960	0	3.009	10.031	10.031	2.960	0	0	29.5	1.24	176.94	143.23	83.78	406					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	10.031	10.031	10.031	0	2.960	2.960	0																	

Zone Checksums

By ACADEMIC

Additional-2nd

COOLING COIL PEAK										CLG SPACE PEAK										HEATING COIL PEAK										TEMPERATURES				AIRFLOWS				ENGINEERING CKS					
Packed at Time: Outside Air: OADBWB/Hr: 87 / 74 / 106					Mo/Hr: 7 / 18 OADBWB/Hr: 87 / 74 / 106					Mo/Hr: 8 / 17 OADB: 86					Mo/Hr: Heating Design OADB: 13					Cooling		Heating		Cooling		Heating		Cooling		Heating		Cooling		Heating									
Envelope Loads	Space Sens. + Lat. Btu/h	Plenum Sens. + Lat. Btu/h	Net Total Btu/h	Percent Of Total (%)	Space Sensible Btu/h	Percent Of Total (%)	Envelope Loads	Space Sens Btu/h	Percent Of Total (%)	Space Peak Space Sens Btu/h	Cool Peak Tot Sens Btu/h	Percent Of Total (%)	SADB	Ra Plenum Return	Rat/OA	Fm M/T/D	Fm B/T/D	Fm Frict	Diffuser	Terminal	Main Fan	Sec Fan	Nom Vent	AHU Vent	Infil	Min/Stop/Rtn	Return	Exhaust	Rm Exh	Auxiliary	Leakage Dwn	Leakage Ups	% OA	Cooling cfm/ft²	Heating cfm/ft²	No. People							
Skyline Soler	0	0	0	0	0	0	Skyline Soler	0	0	0	0	0.00	55.0	76.1	78.1	0.0	0.0	0.0	7.955	7.955	7.955	0	1.420	1.420	0	2.386	7.955	7.955	0	0	0	0	0	17.9	17.9	186							
Skyline Cond	0	0	0	0	0	0	Skyline Cond	0	0	0	0	0.00	76.1	69.0	59.0	0.0	0.0	0.0	7.955	7.955	7.955	0	1.420	1.420	0	7.955	7.955	0	0	0	0	0	0	0	0	2.14	2.14						
RooF Cond	0	0	0	0	0	0	RooF Cond	0	0	0	0	0.00	78.1	69.0	59.0	0.0	0.0	0.0	7.955	7.955	7.955	0	1.420	1.420	0	7.955	7.955	0	0	0	0	0	0	0	0	0	0	0					
Glass Soler	93.775	0	93.775	34	94.197	53	Glass Soler	0	0	0	0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	7.955	7.955	7.955	0	1.420	1.420	0	7.955	7.955	0	0	0	0	0	0	0	0	0	0	0	0				
Glass/Door Cond	9.753	0	9.753	4	8.178	5	Glass/Door Cond	0	0	0	0	0.00	18.80	0.0	0.0	0.0	0.0	0.0	7.955	7.955	7.955	0	1.420	1.420	0	7.955	7.955	0	0	0	0	0	0	0	0	0	0	0	0	0			
Wall Cond	3.136	0	3.136	1	2.929	2	Wall Cond	0	0	0	0	0.00	2.39	0.0	0.0	0.0	0.0	0.0	7.955	7.955	7.955	0	1.420	1.420	0	7.955	7.955	0	0	0	0	0	0	0	0	0	0	0	0	0			
Partition/Door	0	0	0	0	0	0	Partition/Door	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.955	7.955	7.955	0	1.420	1.420	0	7.955	7.955	0	0	0	0	0	0	0	0	0	0	0	0	0			
Floor	0	0	0	0	0	0	Floor	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.955	7.955	7.955	0	1.420	1.420	0	7.955	7.955	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Adjacent Floor	0	0	0	0	0	0	Adjacent Floor	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.955	7.955	7.955	0	1.420	1.420	0	7.955	7.955	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Infiltration	0	0	0	0	0	0	Infiltration	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.955	7.955	7.955	0	1.420	1.420	0	7.955	7.955	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Sub Total ==>	106.663	1.051	107.714	39	105.304	60	Sub Total ==>	-47.195	-48.578	21.19																																	
Internal Loads							Internal Loads																																				
Lights	20,260	5,065	25,324	9	20,260	11	Lights	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.955	7.955	7.955	0	1.420	1.420	0	2.386	7.955	7.955	0	0	0	0	0	0	0	0	0	0	0	0			
People	83,475	0	83,475	30	46,375	26	People	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.955	7.955	7.955	0	1.420	1.420	0	7.955	7.955	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Misc	1,519	0	1,519	1	3,229	2	Misc	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.955	7.955	7.955	0	1.420	1.420	0	7.955	7.955	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Sub Total ==>	105,254	5,065	110,319	40	69,863	40	Sub Total ==>	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.955	7.955	7.955	0	1.420	1.420	0	7.955	7.955	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Ceiling Load	1,322	-1,322	0	0	1,279	1	Ceiling Load	-1,164	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.955	7.955	7.955	0	1.420	1.420	0	7.955	7.955	0	0	0	0	0	0	0	0	0	0	0	0	0			
Ventilation Load	0	0	61,070	22	0	0	Ventilation Load	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.955	7.955	7.955	0	1.420	1.420	0	7.955	7.955	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Adj Air Trans Heat	0	0	0	0	0	0	Adj Air Trans Heat	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.955	7.955	7.955	0	1.420	1.420	0	7.955	7.955	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Dehumid. Ov Sizing	0	0	0	0	0	0	Dehumid. Ov Sizing	-83,976	-83,976	36.63	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.955	7.955	7.955	0	1.420	1.420	0	7.955	7.955	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
OV/Under Sizing	0	-1,771	0	0	0	0	OV/Under Sizing	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.955	7.955	7.955	0	1.420	1.420	0	7.955	7.955	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Exhaust Heat	0	0	0	0	0	0	Exhaust Heat	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.955	7.955	7.955	0	1.420	1.420	0	7.955	7.955	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Sup. Fan Heat	0	0	0	0	0	0	Sup. Fan Heat	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.955	7.955	7.955	0	1.420	1.420	0	7.955	7.955	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rel. Fan Heat	0	0	0	0	0	0	Rel. Fan Heat	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.955	7.955	7.955	0	1.420	1.420	0	7.955	7.955	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Duct Heat PkUp	0	0	0	0	0	0	Duct Heat PkUp	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.955	7.955	7.955	0	1.420	1.420	0	7.955	7.955	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Underlr Sup Ht PkUp	0	0	0	0	0	0	Underlr Sup Ht PkUp	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.955	7.955	7.955	0	1.420	1.420	0	7.955	7.955	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Supply Air Leakage	0	0	0	0	0	0	Supply Air Leakage	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.955	7.955	7.955	0	1.420	1.420	0	7.955	7.955	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total ==>	213,239	3,024	277,332	100.00	176,446	100.00	Grand Total ==>	-132,335	-229,278	100.00																																	

Project Name: Elementary School One
Dataset Name: TECH 2.txc

TRACED 700 v6.3 calculated at 05:59 PM on 10/06/2014
Alternative - 1 System Checksums Report Page 2 of 10

Zone Checksums

By ACADEMIC

Additional-3rd

COOLING COIL PEAK				CLG SPACE PEAK				HEATING COIL PEAK				TEMPERATURES					
Peaked at Time:		Mo/Hr: 7 / 18		Mo/Hr: 7 / 15		Mo/Hr: Heating Design		Cooling		Heating		Cooling		Heating			
Outside Air:		OADBWB/Hr: 87 / 74 / 106		OADB: 91		OADB: 13		SADB	55.0	85.0	SADB	55.0	85.0	Ra Plenum	76.1	69.0	
Space Sens. + Lat.	Plenum Sens. + Lat	Net Total	Percent Of Total	Space Sensible	Percent Of Total	Space Peak	Coil Peak	Return	76.1	69.0	Return	76.1	69.0	Rat/OA	77.9	60.3	
Btu/h	Btu/h	Btu/h	(%)	Btu/h	(%)	Space Sens Btu/h	Tot Sens Btu/h	Fm MtrTD	0.0	0.0	Fm MtrTD	0.0	0.0	Fm BltTD	0.0	0.0	
								Fm Frict	0.0	0.0	Fm Frict	0.0	0.0				
Envelope Loads																	
Skyline Solar	49,251	0	17	71,084	36	0	0	0	0	0	0	0	0	0	0	0	0
Skyline Cond	0	6,453	2	0	0	0	-31,465	12.81	0	0	0	0	0	0	0	0	0
Roof Cond	0	12,039	4	0	0	0	-10,421	4.24	0	0	0	0	0	0	0	0	0
Glass Solar	57,805	0	19	51,401	26	0	0	0	0	0	0	0	0	0	0	0	0
GlassDoor Cond	7,853	0	3	8,233	4	0	-34,409	14.01	0	0	0	0	0	0	0	0	0
Wall Cond	3,523	1,029	2	2,487	1	0	-4,537	-5.873	2.39	0	0	0	0	0	0	0	0
Partition/Door	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Floor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Adjacent Floor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Infiltration	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sub Total ==>	118,431	19,521	47	133,205	67	-38,946	-82,168	33.45									
Internal Loads																	
Lights	17,966	4,492	8	17,966	9	0	0	0.00									
People	74,025	0	25	41,125	21	0	0	0.00									
Misc	1,752	0	1	4,941	2	0	0	0.00									
Sub Total ==>	93,743	4,492	33	64,032	32	0	0	0.00									
Ceiling Load	1,172	-1,172	0	1,212	1	-1,032	0	0.00									
Ventilation Load	0	0	0	0	0	0	-88,502	36.03									
Adj Air Trans Heat	0	0	0	0	0	0	0	0									
Dehumid. Ov Sizing	0	0	0	0	0	-108,859	-108,859	44.32									
Ov/Under Sizing	0	0	0	0	0	0	1,538	-0.63									
Exhaust Heat	-1,746	-1,746	-1	0	0	0	0	0.00									
Sup. Fan Heat	0	0	0	0	0	0	0	0.00									
Ret. Fan Heat	0	0	0	0	0	0	0	0.00									
Duct Heat PkUp	0	0	0	0	0	0	0	0.00									
Underlr Sup Ht PkUp	0	0	0	0	0	0	32,364	-13.18									
Supply Air Leakage	0	0	0	0	0	0	0	0.00									
Grand Total ==>	213,346	21,094	100.00	198,449	100.00	-148,837	-245,628	100.00									

COOLING COIL SELECTION				HEATING COIL SELECTION			
Total Capacity	Sens Cap.	Coil Airflow	Enter DBWB/Hr	Leave DBWB/Hr	Gross Total	Glass Area	
ton	MBH	cfm	°F	°F	ft²	(%)	
Main Ctg	24.7	296.6	220.5	8,947	77.9	64.2	68.4
Aux Ctg	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Opt Vent	9.1	109.4	55.9	1,400	91.0	76.9	118.3
Total	33.8	406.0					

HEATING COIL SELECTION			
Capacity	Coil Airflow	Ent	Lvg
MBH	cfm	°F	°F
Main Htg	8,947	60.3	85.0
Aux Htg	0	0.0	0.0
Preheat	0	0.0	0.0
Humidif	0	0.0	0.0
Opt Vent	0	0.0	0.0
Total	8,947	60.3	85.0

ENGINEERING CKS			
% OA	Cooling	Heating	
cfm/ft²	15.6	15.6	
cfm/ton	2.72	2.72	
ft/ton	264.47	97.25	
Btu/hr-ft²	123.39	-74.66	
No. People	165		

AIRFLOWS			
	Cooling	Heating	
Diffuser	8,947	8,947	
Terminal	8,947	8,947	
Main Fan	8,947	8,947	
Sec Fan	0	0	
Norm Vent	1,400	1,400	
AHU Vent	1,400	1,400	
Infil	0	0	
Min/Stop/Rtn	2,684	8,947	
Return	8,947	8,947	
Exhaust	1,400	1,400	
Rm Exh	0	0	
Auxiliary	0	0	
Leakage Dwn	0	0	
Leakage Ups	0	0	

Project Name: Elementary School One
 Dataset Name: TECH 2.rvc

TRACED 700 v6.3 calculated at 05:59 PM on 10/06/2014
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Zone Checksums By ACADEMIC

COOLING COIL PEAK				CLG SPACE PEAK				HEATING COIL PEAK				TEMPERATURES					
Peaked at Time: Mo/Hr: 7 / 15 Outside Air: OADBWB/Hr: 91/77/118				Mo/Hr: 7 / 15 OADB: 91				Mo/Hr: Heating Design OADB: 13									
Space Sens. + Lat. Btuh	Plenum Sens. + Lat. Btuh	Net Total Btuh	Percent Of Total (%)	Space Sensible Btuh	Percent Of Total (%)	Space Peak Space Sens Btuh	Coil Peak Tot Sens Btuh	Percent Of Total (%)	SADB	Cooling	Heating	Ra Plenum	Return	Ra/OA	Fn M/TD	Fn Bld/TD	Fn Fict
Envelope Loads	0	0	0	0	0	0	0	0.00									
Skyline Solar	0	0	0	0	0	0	0	0.00									
Skyline Cond	0	0	0	0	0	0	0	0.00									
Roof Cond	0	0	0	0	0	0	0	0.00									
Glass Solar	0	0	0	0	0	0	0	0.00									
Glass/Door Cond	0	0	0	0	0	0	0	0.00									
Wall Cond	0	0	0	0	0	0	0	0.00									
Partition/Door	0	0	0	0	0	0	0	0.00									
Floor	0	0	0	0	0	0	0	0.00									
Adjacent Floor	0	0	0	0	0	0	0	0.00									
Infiltration	0	0	0	0	0	0	0	0.00									
Sub Total ==>	9,290	1,640	10,931	21	9,290	10	-37,789	-44,836	39.98								
Internal Loads																	
Lights	17,547	4,387	21,933	42	17,547	18	0	0.00									
People	10,111	0	10,111	19	5,617	6	0	0.00									
Misc	9,870	0	9,870	19	9,870	10	0	0.00									
Sub Total ==>	37,528	4,387	41,915	79	33,034	34	0	0.00									
Callng Load	1,041	-1,041	0	0	1,041	1	-1,217	0	0.00								
Ventilation Load	0	0	0	0	0	0	0	0.00									
Adj Air Trans Heat	0	0	0	0	0	0	0	0.00									
Dehumid. Ov Strng	0	0	0	0	54,151	56	0	0.00									
Ov/Under Strng	0	0	0	0	0	0	0	0.00									
Exhaust Heat	0	0	0	0	0	0	0	0.00									
Sup. Fan Heat	0	0	0	0	0	0	0	0.00									
Ret. Fan Heat	0	0	0	0	0	0	0	0.00									
Duct Heat PkUp	0	0	0	0	0	0	-67,308	60.02									
Underfr Sup Ht PkUp	0	0	0	0	0	0	0	0.00									
Supply Air Leakage	0	0	0	0	0	0	0	0.00									
Grand Total ==>	47,860	4,986	52,846	100.00	97,516	100.00	-39,007	-112,144	100.00								

COOLING COIL SELECTION				HEATING COIL SELECTION			
Total Capacity ton	Sens Cap. MBh	Coil Airflow cfm	Enter DBWB/Hr °F	Leave DBWB/Hr °F	Gross Total ft²	Glass (%)	
Main Cig	4.8	57.7	53.2	2,172	76.0	61.2	57.7
Aux Cig	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Opt Vent	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	4.8	57.7	53.2	2,172	76.0	61.2	57.7

AREAS			
Gross Total	Glass ft²	(%)	
Floor	3,213		
Part	0		
Int Door	0		
Exfr	0		
Roof	0		
Wall	1,925		
Ext Door	0		

ENGINEERING CKS			
No. People	Cooling chn/hr-ft²	Heating chn/hr-ft²	
	0.0	0.0	
	1.37	1.37	
	915.02		
	668.76		
	17.94		
	22		
			-34.90

AIRFLOWS			
	Cooling	Heating	
Diffuser	4,396	4,396	
Terminal	4,396	4,396	
Main Fan	4,396	4,396	
Sec Fan	0	0	
AHU Vent	0	0	
Infil	0	0	
Min/Stop/Rtn	0	0	
Return	4,396	4,396	
Exhaust	0	0	
Rm Exh	0	0	
Auxiliary	0	0	
Leakage Dwn	0	0	
Leakage Ups	0	0	

HEATING COIL SELECTION			
Capacity MBh	Coil Airflow cfm	Ent °F	Lvg °F
Main Htg	-112.1	4,396	55.0
Aux Htg	0.0	0	0.0
Preheat	0.0	0	0.0
Humidif	0.0	0	0.0
Opt Vent	0.0	0	0.0
Total	-112.1	4,396	55.0

Project Name: Elementary School One
 Dataset Name: TECH 2.irc

TRACE@ 700 v6.3 calculated at 05:59 PM on 10/06/2014
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Zone Checksums By ACADEMIC

Cafeteria

COOLING COIL PEAK										CLG SPACE PEAK										HEATING COIL PEAK										TEMPERATURES									
Packed at Time: Outside Air:					MoHr: 7/18 OADBWB/Hr: 87.74/106					MoHr: 7/17 OADB: 89					MoHr: Heating Design OADB: 13					SADB		Cooling		Heating															
Sens. + Lat		Space Bluh		Plenum Sens. + Lat		Plenum Bluh		Net Total Bluh		Of Total (%)		Space Sensible Bluh		Of Total (%)		Space Peak Sens Bluh		Coil Peak Bluh		Of Total (%)		Ra Plenum Return		Fm M/R/T/D		Fm Blh/T/D		Fm Fricl											
Envelope Loads										Envelope Loads										Envelope Loads																			
Skyllie Solar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0									
Skyllie Cond	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0									
Roof Cond	15,843	0	0	0	0	15,843	0	15,843	0	5	17,663	0	8	-13,570	0	-13,570	0	0	0	13.44	0	75.3	70.0	74.6	70.0	0.0	0.0	0.1	0.0	0.0									
Glass Solar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00									
Glass/Door Cond	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00									
Wall Cond	21,320	0	0	0	0	21,320	0	21,320	0	7	20,084	9	9	-55,784	0	-55,784	0	0	0	55.25	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00								
Partition/Door	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00									
Floor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00									
Adjacent Floor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00									
Infiltration	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00									
Sub Total ==>	37,163	0	0	0	0	37,163	0	37,163	0	12	37,747	17	17	-69,355	0	-69,355	0	0	0	68.69	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00									
Internal Loads										Internal Loads										Internal Loads																			
Lights	19,091	0	0	0	0	23,864	0	23,864	0	8	19,091	8	8	0	0	0	0	0	0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00								
People	136,950	0	0	0	0	136,950	0	136,950	0	44	68,475	30	30	0	0	0	0	0	0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00								
Misc	5,966	0	0	0	0	5,966	0	5,966	0	2	5,966	3	3	0	0	0	0	0	0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00								
Sub Total ==>	162,007	0	0	0	0	166,780	0	166,780	0	53	93,532	41	41	0	0	0	0	0	0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00								
Ceiling Load	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00									
Ventilation Load	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00									
Adj Air Trans Heat	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00									
Dehumid. OV Sizing	94,123	0	0	0	0	94,123	0	94,123	0	30	94,123	42	42	0	0	0	0	0	0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00								
OV/Under Sizing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00								
Sup. Fan Heat	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00								
Exhaust Heat	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00								
Rel. Fan Heat	7,412	0	0	0	0	7,412	0	7,412	0	2	7,412	2	2	0	0	0	0	0	0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00								
Duct Heat PkUp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00								
Underfr Sup Ht PkUp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00								
Supply Air Leakage	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00								
Grand Total ==>	293,293	0	0	0	0	312,889	0	312,889	0	100.00	225,402	100.00	100.00	-69,355	0	-100,963	0	0	100.00	-118.3	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00								

COOLING COIL SELECTION										HEATING COIL SELECTION										
Enter DBWB/Hr					Leave DBWB/Hr					Gross Total					Glass (%)					
Total Capacity	Sens Cap.	Coil Airflow	°F	DBWB/Hr	Total Capacity	Sens Cap.	Coil Airflow	°F	DBWB/Hr	Gross Total	Glass	°F	DBWB/Hr	Total	Glass	°F	DBWB/Hr	Total	Glass	
ton	MBh	cfm	°F	gr/lb	ton	MBh	cfm	°F	gr/lb	r ²	r ²	°F	cfm	r ²	r ²	°F	cfm	r ²	r ²	
Main Cig	28.8	345.7	244.4	15,634	75.3	65.2	77.4	61.6	58.2	3,496	0	0	0	15,634	68.2	75.0	0	0	0	0
Aux Cig	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0	0	0	0	0	0	0	0	0
Opt Vent	18.8	225.4	160.8	5,000	84.0	68.3	79.1	55.0	54.0	0	0	0	0	0	0	0	0	0	0	0
Total	47.6	571.1	244.4	15,634	75.3	65.2	77.4	61.6	58.2	3,496	0	0	0	15,634	68.2	75.0	0	0	0	0

AIRFLOWS				ENGINEERING CKS			
	Cooling	Heating		Cooling	Heating		
Diffuser	15,634	15,634		3.2	0.0		
Terminal	15,634	15,634		4.47	4.47		
Main Fan	15,634	15,634		328.48	73.45		
Sec Fan	0	0		163.37	-33.84		
Non Vent	500	0		249			
AHU Vent	500	0					
Infil	0	0					
MinStop/Rn	0	0					
Return	15,634	15,634					
Exhaust	500	0					
Rm Exh	0	0					
Auxiliary	0	0					
Leakage Dwn	0	0					
Leakage Ups	0	0					

Project Name: Elementary School One
Dataset Name: TECH 2irc

TRACEm 700 v6.3 calculated at 05:59 PM on 10/06/2014
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Zone Checksums

By ACADEMIC

Existing-2nd

COOLING COIL PEAK										CLG SPACE PEAK										HEATING COIL PEAK										TEMPERATURES			
Peaked at Time: Outside Air:					Mo/Hr: 7 / 18					Mo/Hr: 9 / 14					Mo/Hr: Heating Design																		
OADBWB/Hr: 87 / 74 / 106					OADB: 83					OADB: 13																							
Envelope Loads	Space Sems. + Lat. Bltwh	Plenum Sems. + Lat. Bltwh	Net Total Bltwh	Percent Of Total (%)	Space Sensible Bltwh	Percent Of Total (%)	Envelope Loads	Space Sems Bltwh	Space Peak Sems Bltwh	Coil Peak Tot Sems Bltwh	Percent Of Total (%)	SAOB	Cooling 55.0	Heating 85.0	RA Plenum	76.5	RA Return	76.5	RA Ret/OA	81.6	Fm Bltwh	0.0	Fm Bltwh	0.0	Fm Bltwh	0.0	Fm Frict	0.0					
Skyllie Solar	0	0	0	0	0	0	Skyllie Solar	0	0	0	0.00																						
Skyllie Cond	0	0	0	0	0	0	Skyllie Cond	0	0	0	0.00																						
Roof Cond	0	0	0	0	0	0	Roof Cond	0	0	0	0.00																						
Glass Solar	67,508	0	67,508	11	125,903	42	Glass Solar	0	0	-58,005	-8.01																						
Glass/Door Cond	13,244	0	13,244	2	5,145	2	Glass/Door Cond	0	0	-86,590	-13.46																						
Wall Cond	21,447	0	21,447	4	4,640	2	Wall Cond	0	0	0	0.00																						
Partition/Door	0	0	0	0	0	0	Partition/Door	0	0	0	0.00																						
Floor	0	0	0	0	0	0	Floor	0	0	0	0.00																						
Adjacent Floor	0	0	0	0	0	0	Adjacent Floor	0	0	0	0.00																						
Infiltration	0	0	0	0	0	0	Infiltration	0	0	0	0.00																						
Sub Total ==>	102,199	0	102,199	18	135,688	45	Sub Total ==>	-125,021	-125,021	-144,595	-22.47																						
Internal Loads										Internal Loads																							
Lights	45,084	11,271	56,355	9	45,084	15	Lights	0	0	0	0.00																						
People	185,760	0	185,760	30	103,200	35	People	0	0	0	0.00																						
Misc	4,396	0	4,396	1	12,398	4	Misc	0	0	0	0.00																						
Sub Total ==>	235,240	11,271	246,511	40	160,683	54	Sub Total ==>	0	0	0	0.00																						
Ceiling Load	3,947	-3,947	0	0	2,124	1	Ceiling Load	-4,228	-4,228	0	0.00																						
Ventilation Load	0	0	268,599	44	0	0	Ventilation Load	0	0	-407,110	-63.27																						
Adj/ Air Trans Heat	0	0	0	0	0	0	Adj/ Air Trans Heat	0	0	0	0.00																						
Dehumid. OV Sizing	0	0	0	0	0	0	Dehumid. OV Sizing	-94,549	-94,549	14,689	2.17																						
Exhaust Heat	0	-10,778	0	-2	0	0	Exhaust Heat	0	0	11,543	1.79																						
Sup. Fan Heat	0	0	0	0	0	0	Sup. Fan Heat	0	0	0	0.00																						
Rel. Fan Heat	0	0	0	0	0	0	Rel. Fan Heat	0	0	0	0.00																						
Duct Heat PkUp	0	0	0	0	0	0	Duct Heat PkUp	0	0	-8,767	-1.36																						
Underflr Sup Ht PkUp	0	0	0	0	0	0	Underflr Sup Ht PkUp	0	0	0	0.00																						
Supply Air Leakage	0	0	0	0	0	0	Supply Air Leakage	0	0	0	0.00																						
Grand Total ==>	341,387	2,460	612,445	100.00	298,494	100.00	Grand Total ==>	-223,798	-223,798	-643,478	100.00																						

COOLING COIL SELECTION										HEATING COIL SELECTION									
Total Capacity ton	Sens Cap. MBh	Coil Airflow cfm	Enter DBWB/Hr °F	Leave DBWB/Hr °F	Coil Airflow cfm	Enter DBWB/Hr °F	Leave DBWB/Hr °F	Gross Total	Glass Area ft² (%)	Main Htg	Aux Htg	Preheat	Humidif	Opt Vent	Total				
51.0	612.5	13,453	81.6	68.6	13,453	54.3	62.1	-643.5	13,453	41.9	85.0	0.0	0.0	0.0	0.0				
Aux Cig	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Opt Vent	41.9	503.1	257.1	64.40	91.0	76.9	118.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Total	93.0	1,115.6						-643.5											

ENGINEERING CKS			
Cooling	Heating	% OA	chaffr
47.9	47.9	1.63	1.63
144.71	144.71	88.81	88.81
135.12	-77.94	413	413

Project Name: Elementary School One
Dataset Name: TECH 2.rtc

TRACE® 700 v6.3 calculated at 05:59 PM on 10/06/2014
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Zone Checksums

By ACADEMIC

Existing-3rd

COOLING COIL PEAK										CLG SPACE PEAK										HEATING COIL PEAK										TEMPERATURES									
Peaked at Time:					Mo/Hr: 7 / 18					Mo/Hr: 9 / 15					Mo/Hr: Heating Design					Cooling					Heating														
Outside Air:					OADBWB/Hr: 87 / 74 / 106					OADB: 84					OADB: 13					SADB					Ra Plenum														
Space	Sens. + Lat.	Plenum	Net	Percent	Space	Sens. + Lat.	Plenum	Net	Percent	Space	Sens. + Lat.	Plenum	Net	Percent	Space	Sens. + Lat.	Plenum	Net	Percent	Space	Sens. + Lat.	Plenum	Net	Percent	Space	Sens. + Lat.	Plenum	Net	Percent										
Bluh	Bluh	Bluh	Bluh	(%)	Bluh	Bluh	Bluh	Bluh	(%)	Bluh	Bluh	Bluh	Bluh	(%)	Bluh	Bluh	Bluh	Bluh	(%)	Bluh	Bluh	Bluh	Bluh	(%)	Bluh	Bluh	Bluh	Bluh	(%)										
Envelope Loads	0	0	0	0	Envelope Loads	0	0	0	0.00	Envelope Loads	0	0	0	0.00	Envelope Loads	0	0	0	0.00	Envelope Loads	0	0	0	0.00	Envelope Loads	0	0	0	0.00										
Skyline Solar	0	0	0	0	Skyline Solar	0	0	0	0.00	Skyline Solar	0	0	0	0.00	Skyline Solar	0	0	0	0.00	Skyline Solar	0	0	0	0.00	Skyline Solar	0	0	0	0.00										
Skyline Cond	0	0	0	0	Skyline Cond	0	0	0	0.00	Skyline Cond	0	0	0	0.00	Skyline Cond	0	0	0	0.00	Skyline Cond	0	0	0	0.00	Skyline Cond	0	0	0	0.00										
Roof Cond	0	23,762	23,762	4	Roof Cond	0	23,762	23,762	3.36	Roof Cond	0	20,487	20,487	3.36	Roof Cond	0	20,487	20,487	3.36	Roof Cond	0	20,487	20,487	3.36	Roof Cond	0	20,487	20,487	3.36										
Glass Solar	75,578	0	75,578	12	Glass Solar	42	0	42	0.00	Glass Solar	0	0	0	0.00	Glass Solar	0	0	0	0.00	Glass Solar	0	0	0	0.00	Glass Solar	0	0	0	0.00										
Glass/Door Cond	13,903	0	13,903	2	Glass/Door Cond	2	6,259	6,259	10.04	Glass/Door Cond	3	0	0	0.00	Glass/Door Cond	3	0	0	0.00	Glass/Door Cond	3	0	0	0.00	Glass/Door Cond	3	0	0	0.00										
Wall Cond	29,408	7,462	36,870	6	Wall Cond	9,299	0	9,299	18.70	Wall Cond	0	0	0	0.00	Wall Cond	0	0	0	0.00	Wall Cond	0	0	0	0.00	Wall Cond	0	0	0	0.00										
Partition/Door	0	0	0	0	Partition/Door	0	0	0	0.00	Partition/Door	0	0	0	0.00	Partition/Door	0	0	0	0.00	Partition/Door	0	0	0	0.00	Partition/Door	0	0	0	0.00										
Floor	0	0	0	0	Floor	0	0	0	0.00	Floor	0	0	0	0.00	Floor	0	0	0	0.00	Floor	0	0	0	0.00	Floor	0	0	0	0.00										
Adjacent Floor	0	0	0	0	Adjacent Floor	0	0	0	0.00	Adjacent Floor	0	0	0	0.00	Adjacent Floor	0	0	0	0.00	Adjacent Floor	0	0	0	0.00	Adjacent Floor	0	0	0	0.00										
Infiltration	0	0	0	0	Infiltration	0	0	0	0.00	Infiltration	0	0	0	0.00	Infiltration	0	0	0	0.00	Infiltration	0	0	0	0.00	Infiltration	0	0	0	0.00										
Sub Total ==>	118,888	31,224	150,112	24	Sub Total ==>	148,972	47	149,019	32.10	Sub Total ==>	-151,114	-195,716	-346,830	-10.04	Sub Total ==>	-151,114	-195,716	-346,830	-10.04	Sub Total ==>	-151,114	-195,716	-346,830	-10.04	Sub Total ==>	-151,114	-195,716	-346,830	-10.04										
Internal Loads																																							
Lights	47,181	11,795	58,977	9	Lights	15	0	15	0.00	Lights	0	0	0	0.00	Lights	0	0	0	0.00	Lights	0	0	0	0.00	Lights	0	0	0	0.00										
People	194,400	0	194,400	31	People	34	0	34	0.00	People	0	0	0	0.00	People	0	0	0	0.00	People	0	0	0	0.00	People	0	0	0	0.00										
Misc	4,128	0	4,128	1	Misc	4	0	4	0.00	Misc	0	0	0	0.00	Misc	0	0	0	0.00	Misc	0	0	0	0.00	Misc	0	0	0	0.00										
Sub Total ==>	245,710	11,795	257,505	41	Sub Total ==>	188,451	53	188,504	0.00	Sub Total ==>	0	0	0	0.00	Sub Total ==>	0	0	0	0.00	Sub Total ==>	0	0	0	0.00	Sub Total ==>	0	0	0	0.00										
Ceiling Load	4,131	-4,131	0	0	Ceiling Load	1	0	1	0.00	Ceiling Load	0	0	0	0.00	Ceiling Load	0	0	0	0.00	Ceiling Load	0	0	0	0.00	Ceiling Load	0	0	0	0.00										
Ventilation Load	0	0	233,683	37	Ventilation Load	0	0	0	0.00	Ventilation Load	0	0	0	0.00	Ventilation Load	0	0	0	0.00	Ventilation Load	0	0	0	0.00	Ventilation Load	0	0	0	0.00										
Adj Air Trans Heat	0	0	0	0	Adj Air Trans Heat	0	0	0	0.00	Adj Air Trans Heat	0	0	0	0.00	Adj Air Trans Heat	0	0	0	0.00	Adj Air Trans Heat	0	0	0	0.00	Adj Air Trans Heat	0	0	0	0.00										
Dehumid. Ov Sizing	0	0	0	0	Dehumid. Ov Sizing	0	0	0	0.00	Dehumid. Ov Sizing	0	0	0	0.00	Dehumid. Ov Sizing	0	0	0	0.00	Dehumid. Ov Sizing	0	0	0	0.00	Dehumid. Ov Sizing	0	0	0	0.00										
Ov/Undr Sizing	0	0	0	0	Ov/Undr Sizing	0	0	0	0.00	Ov/Undr Sizing	0	0	0	0.00	Ov/Undr Sizing	0	0	0	0.00	Ov/Undr Sizing	0	0	0	0.00	Ov/Undr Sizing	0	0	0	0.00										
Exhaust Heat	0	-9,372	-9,372	-1	Exhaust Heat	0	0	0	0.00	Exhaust Heat	0	0	0	0.00	Exhaust Heat	0	0	0	0.00	Exhaust Heat	0	0	0	0.00	Exhaust Heat	0	0	0	0.00										
Sup. Fan Heat	0	0	0	0	Sup. Fan Heat	0	0	0	0.00	Sup. Fan Heat	0	0	0	0.00	Sup. Fan Heat	0	0	0	0.00	Sup. Fan Heat	0	0	0	0.00	Sup. Fan Heat	0	0	0	0.00										
Rel. Fan Heat	0	0	0	0	Rel. Fan Heat	0	0	0	0.00	Rel. Fan Heat	0	0	0	0.00	Rel. Fan Heat	0	0	0	0.00	Rel. Fan Heat	0	0	0	0.00	Rel. Fan Heat	0	0	0	0.00										
Duct Heat PkUp	0	0	0	0	Duct Heat PkUp	0	0	0	0.00	Duct Heat PkUp	0	0	0	0.00	Duct Heat PkUp	0	0	0	0.00	Duct Heat PkUp	0	0	0	0.00	Duct Heat PkUp	0	0	0	0.00										
Underfir Sup Ht PkUp	0	0	0	0	Underfir Sup Ht PkUp	0	0	0	0.00	Underfir Sup Ht PkUp	0	0	0	0.00	Underfir Sup Ht PkUp	0	0	0	0.00	Underfir Sup Ht PkUp	0	0	0	0.00	Underfir Sup Ht PkUp	0	0	0	0.00										
Supply Air Leakage	0	0	0	0	Supply Air Leakage	0	0	0	0.00	Supply Air Leakage	0	0	0	0.00	Supply Air Leakage	0	0	0	0.00	Supply Air Leakage	0	0	0	0.00	Supply Air Leakage	0	0	0	0.00										
Grand Total ==>	368,729	29,516	631,927	100.00	Grand Total ==>	319,919	100.00	Grand Total ==>	-239,940	Grand Total ==>	-609,763	100.00	Grand Total ==>	-609,763																									

Project Name: Elementary School One
Dataset Name: TECH 2.tvc

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Zone Checksums

By ACADEMIC

Multi-purpose

COOLING COIL PEAK				CLG SPACE PEAK				HEATING COIL PEAK				TEMPERATURES			
Peaked at Time:		Mo/Hr: 7 / 18		Mo/Hr: 7 / 18		Mo/Hr: 7 / 18		Mo/Hr: Heating Design				Cooling		Heating	
Outside Air:		OADBWB/Hr: 87 / 74 / 106		OADBWB/Hr: 87 / 74 / 106		OADBWB/Hr: 87 / 74 / 106		OADBWB/Hr: 87 / 74 / 106		OADBWB/Hr: 87 / 74 / 106		SADB	55.0	78.0	78.0
Envelope Loads	Space Sens. + Lat. Bluh	Plenum Sens. + Lat. Bluh	Net Total Bluh	Space Sensible Bluh	Envelope Loads	Space Peak Space Sens Bluh	Coil Peak Tot Sens Bluh	Percent Of Total (%)	Ra Plenum	75.0	70.0	70.0	70.0	70.0	70.0
Skyline Solar	0	0	0	0	Skyline Solar	0	0	0.00	Return	75.3	70.0	70.0	70.0	70.0	70.0
Road Cond	17,561	0	17,561	17,561	Road Cond	-15,604	-15,604	12.87	Rev/OA	75.3	70.0	70.0	70.0	70.0	70.0
Glass Solar	225,757	0	225,757	225,757	Glass Solar	0	-74,517	61.47	Fri M/RTD	0.0	0.0	0.0	0.0	0.0	0.0
Glass/Door Cond	16,859	0	16,859	16,859	Glass/Door Cond	-6,264	-74,517	5.17	Fri Bl/RTD	0.1	0.0	0.0	0.0	0.0	0.0
Wall Cond	5,565	0	5,565	5,565	Wall Cond	-6,264	-6,264	5.17	Fri Frict	0.3	0.0	0.0	0.0	0.0	0.0
Partition/Door	0	0	0	0	Partition/Door	0	0	0.00							
Floor	0	0	0	0	Floor	0	0	0.00							
Adjacent Floor	0	0	0	0	Adjacent Floor	0	0	0.00							
Infiltration	0	0	0	0	Infiltration	0	0	0.00							
Sub Total ==>	265,743	0	265,743	265,743	Sub Total ==>	-96,386	-96,386	79.51							
Internal Loads					Internal Loads										
Lights	21,952	5,488	27,441	21,952	Lights	0	0	0.00							
People	147,950	0	147,950	73,975	People	0	0	0.00							
Misc	1,846	0	1,846	1,846	Misc	0	0	0.00							
Sub Total ==>	171,549	5,488	177,037	97,574	Sub Total ==>	0	0	0.00							
Ceiling Load	0	0	0	0	Ceiling Load	0	0	0.00							
Ventilation Load	0	0	0	0	Ventilation Load	0	0	0.00							
Adj Air Trans Heat	0	0	0	0	Adj Air Trans Heat	0	0	0.00							
Dehumid. Ov Sizing	0	0	0	0	Ov/Undr Sizing	-24,845	-24,845	20.49							
Exhaust Heat	0	0	0	0	Exhaust Heat	0	0	0.00							
Sup. Fan Heat	0	0	0	0	RA Preheat Diff.	0	0	0.00							
Ret. Fan Heat	7,765	7,765	7,765	7,765	RA Preheat Diff.	0	0	0.00							
Duct Heat PkUp	0	0	0	0	Additional Reheat	0	0	0.00							
Underfr. Sup Ht PkUp	0	0	0	0	System Plenum Heat	0	0	0.00							
Supply Air Leakage	0	0	0	0	Underfr. Sup Ht PkUp	0	0	0.00							
Supply Air Leakage	0	0	0	0	Supply Air Leakage	0	0	0.00							
Grand Total ==>	437,291	13,253	458,310	100.00	Grand Total ==>	-121,230	-121,230	100.00							
COOLING COIL SELECTION				LEAVE DBWB/Hr				AREAS				HEATING COIL SELECTION			
Total Capacity	ton	Sens Cap. MBH	Coil Airflow cfm	Enter DBWB/Hr °F	gndb	Leave DBWB/Hr °F	Gross Total	Glass R²	Glass (%)	Main Htg	Capacity MBH	Coil Airflow cfm	Ent °F	LYG °F	
43.9	527.1	384.3	16,380	75.3	62.0	54.6	4,020	0	0	-145.3	16,380	70.0	78.0	78.0	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	
18.8	225.4	160.8	5,000	84.0	88.3	55.0	3,696	2,117	57	0.0	0.0	0.0	0.0	0.0	
62.7	752.5						0	0	0	0.0	0.0	0.0	0.0	0.0	
												ENGINEERING CKS			
												Cooling			
												% OA			
												ch/ft			
												cfm/ton			
												Btu/h-r²			
												No. People			
												187.19			
												269			
												-36.15			

Project Name: Elementary School One
Dataset Name: TECH 2.lrc

TRACER 700 v6.3 calculated at 05:59 PM on 10/06/2014
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Appendix C- Energy Consumption Output

MONTHLY ENERGY CONSUMPTION By ACADEMIC

----- Monthly Energy Consumption -----

Utility	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Alternative: 1 Elementary School One Analysis													
Electric													
On-Pk Cons. (kWh)	19,133	18,419	27,528	26,947	39,051	35,106	34,281	37,454	39,025	31,317	27,129	23,233	358,621
Off-Pk Cons. (kWh)	46,815	42,048	43,249	48,808	48,298	47,174	55,363	48,081	49,097	46,209	44,725	48,517	566,183
Mid-Pk Cons. (kWh)	33,070	31,483	41,346	38,170	46,046	38,188	37,037	41,015	42,904	42,721	39,783	36,181	467,945
On-Pk Demand (kW)	265	263	296	345	471	361	390	364	554	378	338	291	554
Off-Pk Demand (kW)	115	115	117	127	140	145	146	143	134	129	125	117	146
Mid-Pk Demand (kW)	307	309	358	358	404	320	363	342	473	358	358	358	473
Gas													
On-Pk Cons. (therms)	194	187	88	0	0	0	0	0	0	0	1	107	576
Mid-Pk Cons. (therms)	156	139	28	0	0	0	0	0	0	0	0	24	347
On-Pk Demand (therms/hr)	3	3	1	0	0	0	0	0	0	0	0	1	3
Mid-Pk Demand (therms/hr)	4	4	1	0	0	0	0	0	0	0	0	1	4
Energy Consumption													
Building Source	86,546	Btu/(ft ² -year)											
	256,747	Btu/(ft ² -year)											
Environmental Impact Analysis													
		CO2 1,862,997 lbm/year											
		SO2 16,776 gm/year											
		NOX 3,210 gm/year											
Floor Area	55,927	ft ²											

ENERGY CONSUMPTION SUMMARY By ACADEMIC

	Elect Cons (kWh)	Gas Cons (kBtu)	% of Total Building Energy	Total Building Energy (kBtu/yr)	Total Source Energy* (kBtu/yr)
Alternative 1					
Primary heating					
Primary heating		92,377	1.9 %	92,377	97,239
Other Htg Accessories	2,210		0.2 %	7,542	22,629
Heating Subtotal	2,210	92,377	2.1 %	99,919	119,867
Primary cooling					
Cooling Compressor	312,663		22.0 %	1,067,118	3,201,675
Tower/Cond Fans	47,742		3.4 %	162,945	488,884
Condenser Pump			0.0 %	0	0
Other Clg Accessories	820		0.1 %	2,798	8,395
Cooling Subtotal...	361,225		25.4 %	1,232,861	3,698,954
Auxiliary					
Supply Fans			0.0 %	0	0
Pumps			0.0 %	0	0
Stand-alone Base Utilities			0.0 %	0	0
Aux Subtotal...			0.0 %	0	0
Lighting					
Lighting	979,836		69.0 %	3,344,179	10,033,541
Receptacle					
Receptacles	49,479		3.5 %	168,870	506,661
Cogeneration					
Cogeneration			0.0 %	0	0
Totals					
Totals**	1,392,749	92,377	100.0 %	4,845,829	14,359,023

MONTHLY UTILITY COSTS By ACADEMIC

----- Monthly Utility Costs -----

Utility	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Alternative 1													
Electric													
On-Pk Cons. (\$)	2,506	2,413	3,606	3,530	5,116	4,599	4,491	4,906	5,112	4,102	3,554	3,043	46,979
Gas													
On-Pk Cons. (\$)	202	195	92	0	0	0	0	0	0	0	1	112	602
Monthly Total (\$):	2,709	2,608	3,698	3,530	5,116	4,599	4,491	4,906	5,112	4,102	3,555	3,155	47,581

Building Area = 55,927 ft²
 Utility Cost Per Area = 0.85 \$/ft²