Amvic® Building System
Warehouse Energy Study

Presented to:
Gary Brown
Amvic® Building System

Stantec

File: 112120108

300 – 1708 Dolphin Ave
Kelowna, BC V1Y 9S4

October, 2006

Contact: Shane Lapp, EIT

Amvic® Building System

Warehouse Energy Study

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AMVIC® BUILDING SYSTEM
WAREHOUSE ENERGY STUDY

1.0 Introduction

Stantec Consulting Ltd. (Kelowna office) was commissioned by Amvic® to provide an outline of the energy savings provided by the energy efficient construction materials in the Okanagan Strata Development warehouses. The Okanagan Strata Development warehouses are constructed with Amvic® insulated concrete form (ICF) walls, which are stated to have an effective R-value of R40 to R50. Other energy saving features includes increased performance windows, roofs and overhead doors.

Opinions stated in this report are based upon conversations with David MacPherson and energy modeling of the construction options.

Lead Stantec Consulting personnel participating in this study included:

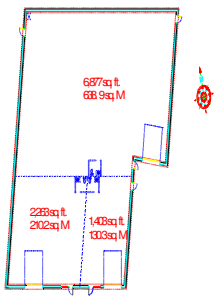
- Shane Lapp, EIT
- Emmanuel Lavoie, EIT, LEED AP

The contact for this report is Mr. Shane Lapp, EIT (250-860-3225).

2.0 Study Description

The Okanagan Strata Development facility is currently under construction and will consist of two new commercial warehouses, each 10,000ft^2.

For the purpose of this study, building #2 was modeled in Trace®700 energy modeling software. This model will serve as the basis of the energy study.



The mechanical system is constant in all scenarios and is modeled to reflect the 80% efficient gas fired unit heaters from the Okanagan Strata Development warehouse. As of October 2006, the current price of gas is $10.56/GJ and this cost is used in calculating the operating costs.

The study is divided into two phases:

- Phase 1: Comparing strictly the different wall constructions. Other construction features remain the same.
- Phase 2: Comparing the Okanagan Strata Development high efficiency warehouse with Amvic® walls to other standard warehouse construction envelops.

.1 PHASE 1 – WALL CONSTRUCTION

This phase of the study compares the different wall constructions and the resulting heat losses and expected energy consumption for a typical year. The following are the comparison models:

1.) Okanagan Strata Development High Efficiency Warehouse with Amvic® Walls

- Insulated concrete form Amvic® walls (R23)
    - 6" concrete, 2 ½" foam on either side
- Low E-windows, argon filled (U 0.3)
- R30 roof construction
- R17.9 overhead doors with weather seals

2.) Okanagan Strata Development High Efficiency Warehouse with Tilt-up Walls

- 6" concrete tilt-up walls (R2.6)
- Low E-windows, argon filled (U 0.3)
- R30 roof construction
- R17.9 overhead doors with weather seals

3.) Okanagan Strata Development High Efficiency Warehouse with Concrete Block Walls

- 8" Concrete block walls (R9.1)

- Foam filled cores

- Low E-windows, argon filled (U 0.3)
- R30 roof construction
- R17.9 overhead doors with weather seals

.2 PHASE 2 – OVERALL BUILDING ENVELOPE

The second phase of this study compares the expected energy usage for a typical year of the Okanagan Strata Development high efficiency warehouse to other warehouses with standard construction. The following are the comparison models:

1.) Okanagan Strata Development High Efficiency Warehouse with Amvic® Walls

- Insulated concrete form Amvic® walls (R23)
  - 6" concrete, 2 ½" foam on either side
- Low E-windows, argon filled (U 0.3)
- R30 roof construction
- R17.9 overhead doors with weather seals

2.) Standard Tilt-up Wall Warehouse

- 6" concrete tilt-up walls (R2.6)
- Standard double pain windows (U 0.6)
- R15 roof construction
- R7 overhead doors

3.) Standard Concrete Block Wall Warehouse

- 8" Concrete Tilt-up walls (R9.1)
  - Foam filled cores
- Standard double pain windows (U 0.6)
- R15 roof construction

- R7 overhead doors

The results presented below are for comparison purposes only. The energy costs presented in this report do not necessarily represent future energy consumption and costs. Actual energy consumption and costs will vary with the type of occupancy, yearly temperature variations, amount of infiltration, etc.

The information provided has been determined from a preliminary review of the current drawings, in-house research and energy modeling.

3.0 Effective R-value Performance

The true R-value of a typical ICF wall is R23, however they are commonly regarded as having an effective performance rating of R40 to R50. This is not a true R-value of the wall but a comparison of the R-value required by a wooden frame wall to meet the same performance.

Wooden frame walls are comprised of framing, insulation material, electrical outlets and wires. These walls are typically based on the insulation R-value but thermal bridging though the framing and voids in the insulation results in a reduced R-value of the wall. For example, a typical 2x4 wood frame wall would be a nominal R14 but due to thermal bridging this is reduced to an actual R11. The R-value of an ICF wall is the true R-value as there is no thermal bridging through the walls.

Concrete's large thermal mass evens out the temperature fluctuations so less heating is required in the colder hours. This increases the effective performance of the ICF Amvic® walls.

Since ICF Amvic® walls are constructed of concrete and foam, the only places for air to infiltrate into the building is around doors and windows. This again reduces the amount of heating required and increases the effective performance.

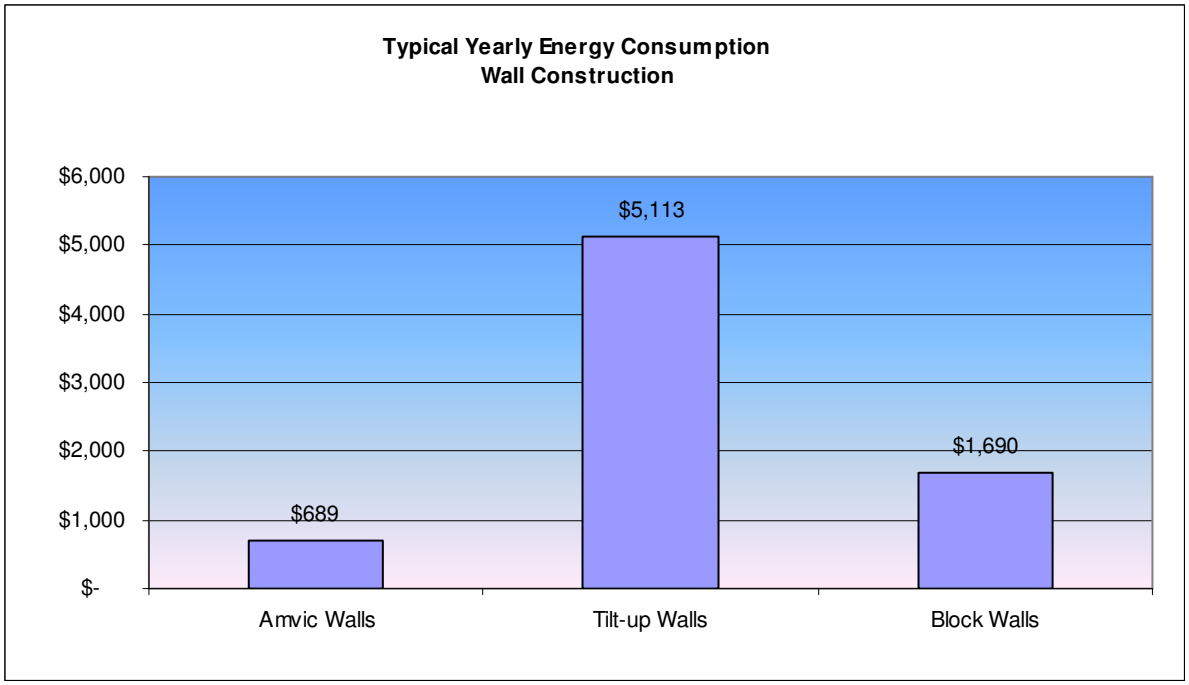
These characteristics combined create a very efficient wall and would require a nominal R40 or R50 wooden frame wall to meet the same performance.

4.0 Energy Comparison

.1 PHASE 1 – WALL CONSTRUCTION

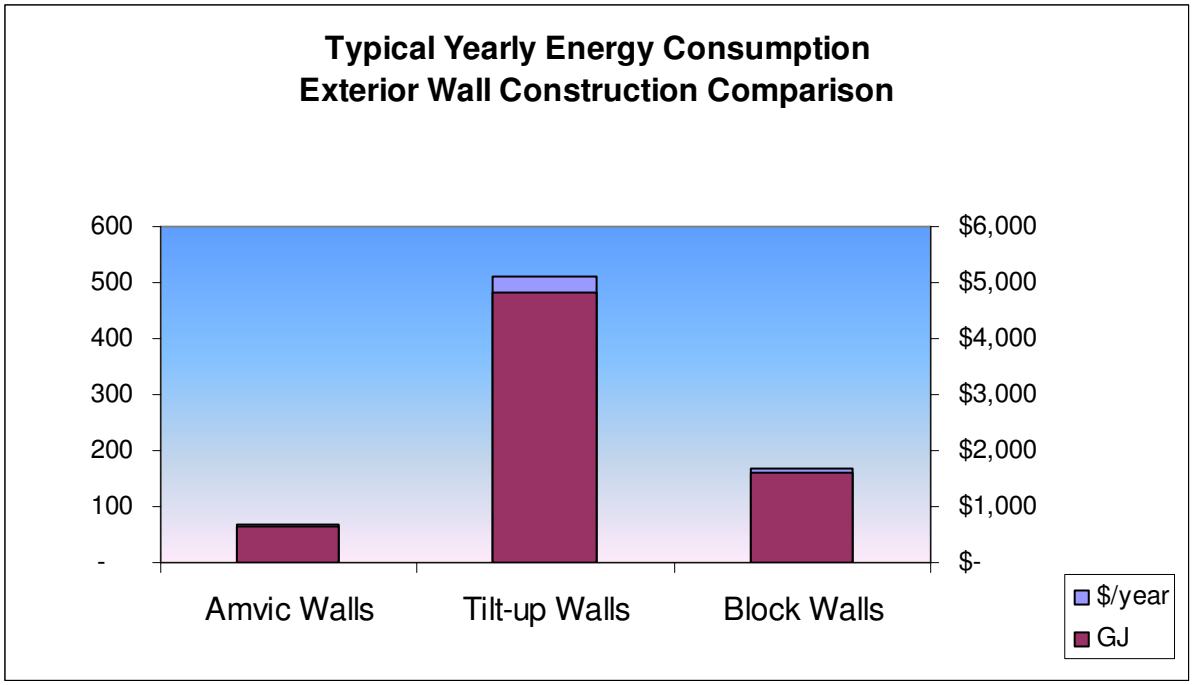
This first phase of the study compares the Okanagan Strata Development warehouse with different wall constructions and the expected energy consumption for a typical year.

The type of wall construction determines the amount of heat loss that will occur through the walls. The following chart shows the amount of heat loss through the exterior walls for the different wall construction types.



The energy required to operate the warehouse with the various wall constructions is shown in the table below.

Wall Construction	GJ per year	Energy Cost per year	Peak Wall Heat Loss (btu/hr)	Peak building Heat Loss (btu/hr)
OSD Warehouse - Amvic Walls	65	$ 700	33,000	70,500
OSD Warehouse - Tilt-up Walls	483	$ 5,100	271,000	308,400
OSD Warehouse - Block Walls	160	$ 1,700	83,000	120,700

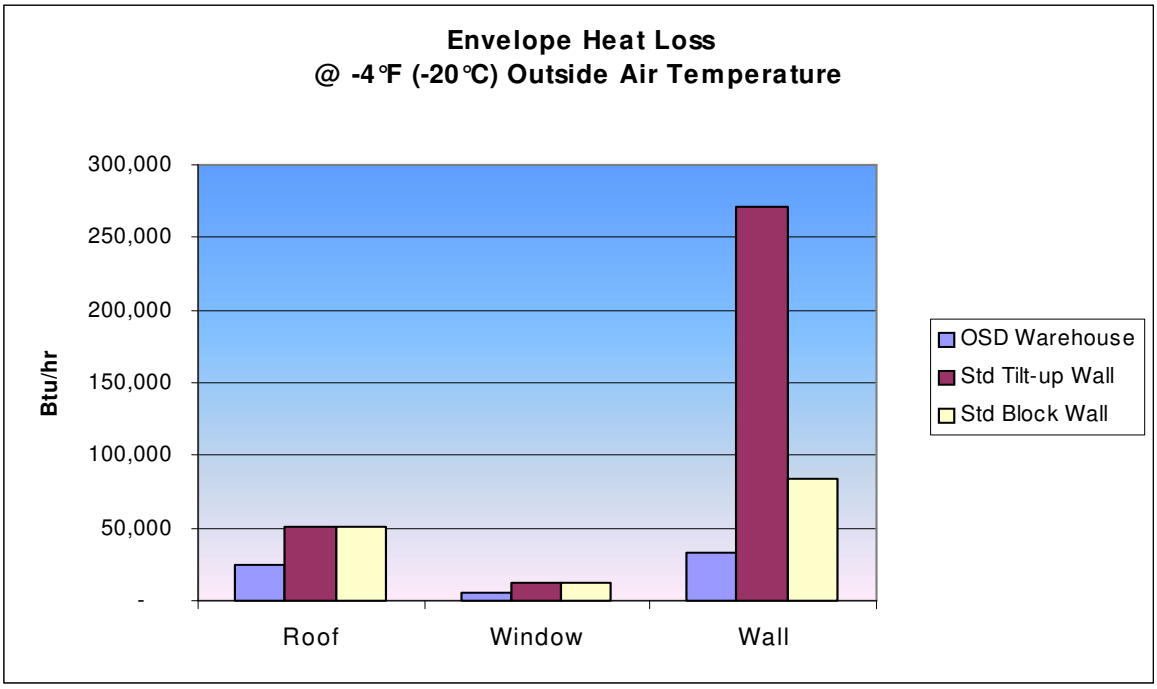


The ICF Amvic® walls reduce the heat loss by 77% over the tilt-up walls and 42% over the concrete block walls. This relates to an approximate savings of $4,400 annually over the tilt-up walls and $1,000 annually over the concrete block walls.

.2 PHASE 2 – OVERALL BUILDING ENVELOPE

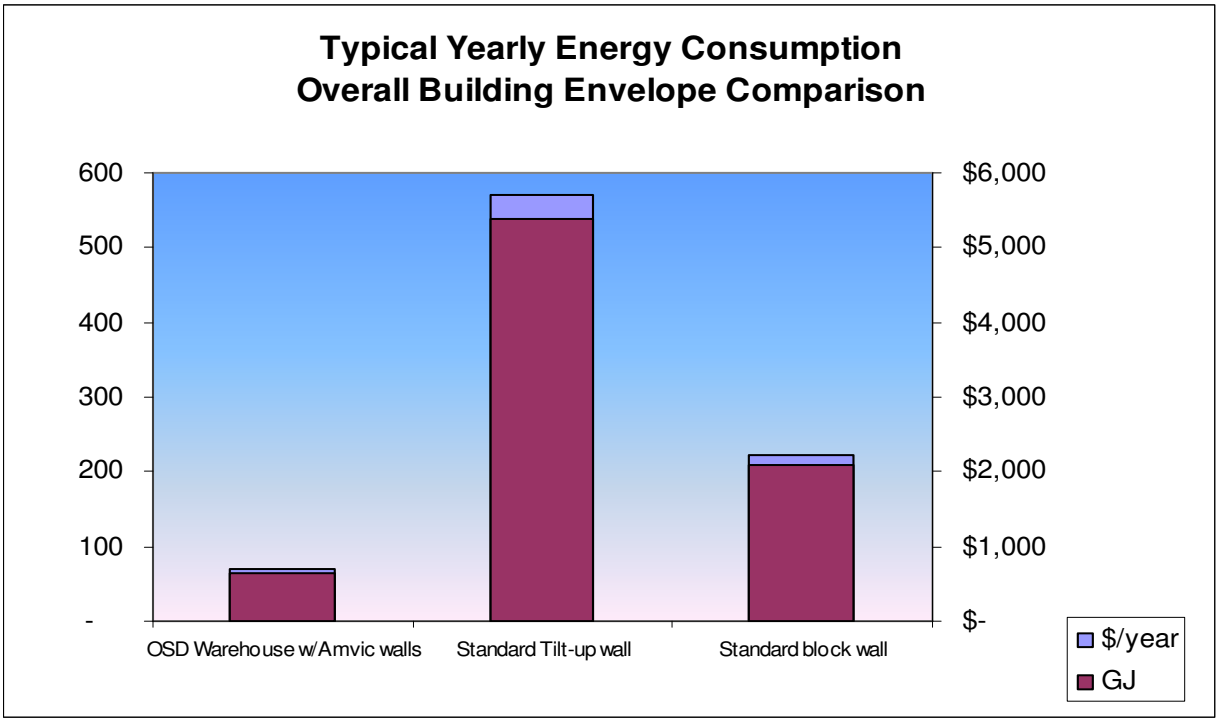
This second phase of the study compares the overall building envelope of the Okanagan Strata Development warehouse with standard construction and the expected energy consumption for a typical year.

Incorporating energy efficient building envelope features reduces the amount of heat loss from the Okanagan Strata Development warehouses. The following chart illustrates the envelope heat losses of the different building constructions.



The energy required to operate the various building envelopes is shown in the table below.

Overall Building Envelope	GJ per year	Energy Cost per year	Peak Building Heat Loss (btu/hr)
OSD Warehouse with Amvic walls	65	$ 700	70,500
Standard Tilt-up wall Warehouse	540	$ 5700	348,000
Standard block wall warehouse	210	$ 2,200	153,400



The Okanagan Strata Development high efficiency warehouse reduces the energy usage by 88% over standard tilt-up wall warehouses and 69% over standard concrete block wall warehouses. This relates to an approximate savings of $5,000 annually over standard tilt-up wall warehouses and $1,500 annually over standard concrete block wall warehouses.

Reducing the amount of natural gas consumed in the warehouse is directly related reducing the amount of CO2 released to the atmosphere. The CO2 reductions over the standard tilt-up wall warehouse amount to 26 tons or the equivalent of driving 54,500 km's in a 2004 Ford Explorer. The CO2 reductions over the standard concrete block wall warehouse amount to 8 tons or the equivalent of driving 16,600 km's in a 2004 Ford Explorer.

5.0 Conclusion

Amvic® commissioned Stantec Consulting to study the energy efficient construction features in their new warehouses. These construction features were:

- Amvic® Insulated Concrete Form (ICF) walls
- Low E – Argon filled windows
- R30 roof
- High efficiency overhead doors

ICF wall manufacturers claim an effective R-value of R40 to R50. This claim only refers to the nominal R-value of wooden framed walls to achieve the same insulating performance and does not represent the actual R-value of ICF walls. ICF walls have a true R-value of approximately R23.

The ICF Amvic® walls reduce the heat loss by 77% over the tilt-up walls and 42% over the concrete block walls. This relates to an approximate savings of $4,400 annually over the tilt-up walls and $1,000 annually over the concrete block walls.

The OSD high efficiency warehouse reduces the energy usage by 88% over standard tilt-up wall warehouses and 69% over standard concrete block wall warehouses. This relates to an approximate savings of $5,000 annually over standard tilt-up wall warehouses and $1,500 annually over standard concrete block wall warehouses.

The CO2 reductions over the standard tilt-up wall warehouse amount to 26 tons or the equivalent of driving 54,500 km's in a 2004 Ford Explorer. The CO2 reductions over the standard concrete block wall warehouse amount to 8 tons or the equivalent of driving 16,600 km's in a 2004 Ford Explorer.

Appendix A – Trace Output files

ICF

System Checksums

By Stantec Consulting Ltd.

Unit Heaters **Unit Heaters**

COOLING COIL PEAK

Peaked at Time: Mo/Hr: 0 / 0
Outside Air: OADB/WB/HR: 0 / 0 / 0

	Space Sens. + Lat. Btu/h	Plenum Sens. + Lat Btu/h	Net Total Btu/h	Percent Of Total (%)
Envelope Loads				
Skylite Solar	0	0	0	0
Skylite Cond	0	0	0	0
Roof Cond	0	0	0	0
Glass Solar	0	0	0	0
Glass Cond	0	0	0	0
Wall Cond	0	0	0	0
Partition	0		0	0
Exposed Floor	0		0	0
Infiltration	0		0	0
Sub Total ==>	0	0	0	0
Internal Loads				
Lights	0	0	0	0
People	0		0	0
Misc	0	0	0	0
Sub Total ==>	0	0	0	0
Ceiling Load	0	0	0	0
Ventilation Load	0	0	0	0
Dehumid. Ov Sizing			0	0
Ov/Undr Sizing	0		0	0
Exhaust Heat		0	0	0
Sup. Fan Heat			0	0
Ret. Fan Heat		0	0	0
Duct Heat Pkup		0	0	0
Reheat at Design			0	0
Grand Total ==>	0	0	0	100.00

CLG SPACE PEAK

Mo/Hr: 0 / 0
OADB: 0

	Space Sensible Btu/h	Percent Of Total (%)
Envelope Loads		
Skylite Solar	0	0
Skylite Cond	0	0
Roof Cond	0	0
Glass Solar	0	0
Glass Cond	0	0
Wall Cond	0	0
Partition	0	0
Exposed Floor	0	0
Infiltration	0	0
Sub Total ==>	0	0
Internal Loads		
Lights	0	0
People	0	0
Misc	0	0
Sub Total ==>	0	0
Ceiling Load	0	0
Ventilation Load	0	0
Ov/Undr Sizing	0	0
Grand Total ==>	0	100.00

HEATING COIL PEAK

Mo/Hr: Heating Design
OADB: -4

	Space Peak Space Sens Btu/h	Coil Peak Tot Sens Btu/h	Percent Of Total (%)
Envelope Loads			
Skylite Solar	0	0	0.00
Skylite Cond	0	0	0.00
Roof Cond	-25,281	-25,281	35.83
Glass Solar	0	0	0.00
Glass Cond	-5,326	-5,326	7.55
Wall Cond	-33,132	-33,132	46.95
Partition	0	0	0.00
Exposed Floor	0	0	0.00
Infiltration	-6,826	-6,826	9.67
Sub Total ==>	-70,566	-70,566	100.00
Internal Loads			
Lights	0	0	0.00
People	0	0	0.00
Misc	0	0	0.00
Sub Total ==>	0	0	0.00
Ceiling Load	0	0	0.00
Ventilation Load	0	0	0.00
Ov/Undr Sizing	0	0	0.00
Exhaust Heat		0	0.00
OA Preheat Diff.		0	0.00
RA Preheat Diff.		0	0.00
Additional Reheat		0	0.00
Grand Total ==>	-70,566	-70,566	100.00

TEMPERATURES

	Cooling	Heating
SADB	0.0	125.0
Plenum	0.0	68.0
Return	0.0	68.0
Ret/OA	0.0	68.0
Fn MtrTD	0.0	0.0
Fn BldTD	0.0	0.0
Fn Frict	0.0	0.0

AIRFLOWS

	Cooling	Heating
Vent	0	0
Infil	0	87
Supply	0	1,134
MinStop/Rh	0	0
Return	0	1,221
Exhaust	0	87
Rm Exh	0	0
Auxiliary	0	0

ENGINEERING CKS

	Cooling	Heating
% OA	0.0	0.0
cfm/ft²	0.00	0.11
cfm/ton	0.00	
ft²/ton	0.00	
Btu/hr·ft²	0.00	-6.69
No. People	0	

COOLING COIL SELECTION

	Total Capacity ton	Total Capacity MBh	Sens Cap. MBh	Coil Airflow cfm	Enter DB °F	Enter WB °F	Enter HR gr/lb	Leave DB °F	Leave WB °F	Leave HR gr/lb
Main Clg	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aux Clg	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	0.0	0.0	0.0
Total	0.0	0.0								

AREAS

	Gross Total ft²	Glass ft²	Glass (%)
Floor	10,544		
Part	0		
ExFlr	0		
Roof	10,544	0	0
Wall	10,794	280	3

HEATING COIL SELECTION

	Capacity MBh	Coil Airflow cfm	Ent °F	Lvg °F
Main Htg	-70.6	1,133.7	68.0	125.0
Aux Htg	0.0	0	0	0
Preheat	0.0	0	0	0
Humidif	0.0	0	0.0	0.0
Opt Vent	0.0	0	0.0	0.0
Total	-70.6			

OSD - Tilt-up.

System Checksums

By Stantec Consulting Ltd.

Unit Heaters

Unit Heaters

COOLING COIL PEAK

Peaked at Time: Mo/Hr: 0 / 0
Outside Air: OADB/WB/HR: 0 / 0 / 0

	Space Sens. + Lat. Btu/h	Plenum Sens. + Lat Btu/h	Net Total Btu/h	Percent Of Total (%)
Envelope Loads				
Skylite Solar	0	0	0	0
Skylite Cond	0	0	0	0
Roof Cond	0	0	0	0
Glass Solar	0	0	0	0
Glass Cond	0	0	0	0
Wall Cond	0	0	0	0
Partition	0		0	0
Exposed Floor	0		0	0
Infiltration	0		0	0
Sub Total ==>	0	0	0	0
Internal Loads				
Lights	0	0	0	0
People	0		0	0
Misc	0	0	0	0
Sub Total ==>	0	0	0	0
Ceiling Load	0	0	0	0
Ventilation Load	0	0	0	0
Dehumid. Ov Sizing			0	0
Ov/Undr Sizing	0		0	0
Exhaust Heat		0	0	0
Sup. Fan Heat			0	0
Ret. Fan Heat		0	0	0
Duct Heat Pkup		0	0	0
Reheat at Design			0	0
Grand Total ==>	0	0	0	100.00

CLG SPACE PEAK

Mo/Hr: 0 / 0
OADB: 0

	Space Sensible Btu/h	Percent Of Total (%)
Envelope Loads		
Skylite Solar	0	0
Skylite Cond	0	0
Roof Cond	0	0
Glass Solar	0	0
Glass Cond	0	0
Wall Cond	0	0
Partition	0	0
Exposed Floor	0	0
Infiltration	0	0
Sub Total ==>	0	0
Internal Loads		
Lights	0	0
People	0	0
Misc	0	0
Sub Total ==>	0	0
Ceiling Load	0	0
Ventilation Load	0	0
Ov/Undr Sizing	0	0
Exhaust Heat		
OA Preheat Diff.		
RA Preheat Diff.		
Additional Reheat		
Grand Total ==>	0	100.00

HEATING COIL PEAK

Mo/Hr: Heating Design
OADB: -4

	Space Peak Space Sens Btu/h	Coil Peak Tot Sens Btu/h	Percent Of Total (%)
Envelope Loads			
Skylite Solar	0	0	0.00
Skylite Cond	0	0	0.00
Roof Cond	-25,281	-25,281	8.20
Glass Solar	0	0	0.00
Glass Cond	-5,326	-5,326	1.73
Wall Cond	-271,004	-271,004	87.86
Partition	0	0	0.00
Exposed Floor	0	0	0.00
Infiltration	-6,826	-6,826	2.21
Sub Total ==>	-308,437	-308,437	100.00
Internal Loads			
Lights	0	0	0.00
People	0	0	0.00
Misc	0	0	0.00
Sub Total ==>	0	0	0.00
Ceiling Load	0	0	0.00
Ventilation Load	0	0	0.00
Ov/Undr Sizing	0	0	0.00
Exhaust Heat		0	0.00
OA Preheat Diff.		0	0.00
RA Preheat Diff.		0	0.00
Additional Reheat		0	0.00
Grand Total ==>	-308,437	-308,437	100.00

TEMPERATURES

	Cooling	Heating
SADB	0.0	125.0
Plenum	0.0	68.0
Return	0.0	68.0
Ret/OA	0.0	68.0
Fn MtrTD	0.0	0.0
Fn BldTD	0.0	0.0
Fn Frict	0.0	0.0

AIRFLOWS

	Cooling	Heating
Vent	0	0
Infil	0	87
Supply	0	4,955
MinStop/Rh	0	0
Return	0	5,042
Exhaust	0	87
Rm Exh	0	0
Auxiliary	0	0

ENGINEERING CKS

	Cooling	Heating
% OA	0.0	0.0
cfm/ft²	0.00	0.47
cfm/ton	0.00	
ft²/ton	0.00	
Btu/hr·ft²	0.00	-29.25
No. People	0	

COOLING COIL SELECTION

	Total Capacity ton	Total Capacity MBh	Sens Cap. MBh	Coil Airflow cfm	Enter DB °F	Enter WB °F	Enter HR gr/lb	Leave DB °F	Leave WB °F	Leave HR gr/lb
Main Clg	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aux Clg	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	0.0	0.0	0.0
Total	0.0	0.0								

AREAS

	Gross Total	Glass ft²	Glass (%)
Floor	10,544		
Part	0		
ExFlr	0		
Roof	10,544	0	0
Wall	10,794	280	3

HEATING COIL SELECTION

	Capacity MBh	Coil Airflow cfm	Ent °F	Lvg °F
Main Htg	-308.4	4,955.3	68.0	125.0
Aux Htg	0.0	0	0	0
Preheat	0.0	0	0	0
Humidif	0.0	0	0.0	0.0
Opt Vent	0.0	0	0.0	0.0
Total	-308.4			

Project Name: Building #1
Dataset Name: C:\CDS\TRACE700\Projects\Strata_energy.trc

OSD- Block Wall

System Checksums

By Stantec Consulting Ltd.

Unit Heaters **Unit Heaters**

COOLING COIL PEAK

Peaked at Time: Mo/Hr: 0 / 0
Outside Air: OADB/WB/HR: 0 / 0 / 0

	Space Sens. + Lat. Btu/h	Plenum Sens. + Lat Btu/h	Net Total Btu/h	Percent Of Total (%)
Envelope Loads				
Skylite Solar	0	0	0	0
Skylite Cond	0	0	0	0
Roof Cond	0	0	0	0
Glass Solar	0	0	0	0
Glass Cond	0	0	0	0
Wall Cond	0	0	0	0
Partition	0		0	0
Exposed Floor	0		0	0
Infiltration	0		0	0
Sub Total ==>	0	0	0	0
Internal Loads				
Lights	0	0	0	0
People	0		0	0
Misc	0	0	0	0
Sub Total ==>	0	0	0	0
Ceiling Load	0	0	0	0
Ventilation Load	0	0	0	0
Dehumid. Ov Sizing			0	0
Ov/Undr Sizing	0		0	0
Exhaust Heat		0	0	0
Sup. Fan Heat			0	0
Ret. Fan Heat		0	0	0
Duct Heat Pkup		0	0	0
Reheat at Design			0	0
Grand Total ==>	0	0	0	100.00

CLG SPACE PEAK

Mo/Hr: 0 / 0
OADB: 0

	Space Sensible Btu/h	Percent Of Total (%)
Envelope Loads		
Skylite Solar	0	0
Skylite Cond	0	0
Roof Cond	0	0
Glass Solar	0	0
Glass Cond	0	0
Wall Cond	0	0
Partition	0	0
Exposed Floor	0	0
Infiltration	0	0
Sub Total ==>	0	0
Internal Loads		
Lights	0	0
People	0	0
Misc	0	0
Sub Total ==>	0	0
Ceiling Load	0	0
Ventilation Load	0	0
Ov/Undr Sizing	0	0
Grand Total ==>	0	100.00

HEATING COIL PEAK

Mo/Hr: Heating Design
OADB: -4

	Space Peak Space Sens Btu/h	Coil Peak Tot Sens Btu/h	Percent Of Total (%)
Envelope Loads			
Skylite Solar	0	0	0.00
Skylite Cond	0	0	0.00
Roof Cond	-25,281	-25,281	20.94
Glass Solar	0	0	0.00
Glass Cond	-5,326	-5,326	4.41
Wall Cond	-83,270	-83,270	68.99
Partition	0	0	0.00
Exposed Floor	0	0	0.00
Infiltration	-6,826	-6,826	5.66
Sub Total ==>	-120,704	-120,704	100.00
Internal Loads			
Lights	0	0	0.00
People	0	0	0.00
Misc	0	0	0.00
Sub Total ==>	0	0	0.00
Ceiling Load	0	0	0.00
Ventilation Load	0	0	0.00
Ov/Undr Sizing	0	0	0.00
Exhaust Heat		0	0.00
OA Preheat Diff.		0	0.00
RA Preheat Diff.		0	0.00
Additional Reheat		0	0.00
Grand Total ==>	-120,704	-120,704	100.00

TEMPERATURES

	Cooling	Heating
SADB	0.0	125.0
Plenum	0.0	68.0
Return	0.0	68.0
Ret/OA	0.0	68.0
Fn MtrTD	0.0	0.0
Fn BldTD	0.0	0.0
Fn Frict	0.0	0.0

AIRFLOWS

	Cooling	Heating
Vent	0	0
Infil	0	87
Supply	0	1,939
MinStop/Rh	0	0
Return	0	2,026
Exhaust	0	87
Rm Exh	0	0
Auxiliary	0	0

ENGINEERING CKS

	Cooling	Heating
% OA	0.0	0.0
cfm/ft²	0.00	0.18
cfm/ton	0.00	
ft²/ton	0.00	
Btu/hr·ft²	0.00	-11.45
No. People	0	

COOLING COIL SELECTION

	Total Capacity ton	Total Capacity MBh	Sens Cap. MBh	Coil Airflow cfm	Enter DB °F	Enter WB °F	Enter HR gr/lb	Leave DB °F	Leave WB °F	Leave HR gr/lb
Main Clg	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aux Clg	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	0.0	0.0	0.0
Total	0.0	0.0								

AREAS

	Gross Total	Glass ft²	Glass (%)
Floor	10,544		
Part	0		
ExFlr	0		
Roof	10,544	0	0
Wall	10,794	280	3

HEATING COIL SELECTION

	Capacity MBh	Coil Airflow cfm	Ent °F	Lvg °F
Main Htg	-120.7	1,939.2	68.0	125.0
Aux Htg	0.0	0	0	0
Preheat	0.0	0	0	0
Humidif	0.0	0	0.0	0.0
Opt Vent	0.0	0	0.0	0.0
Total	-120.7			

Std. tilt-up.

System Checksums

By Stantec Consulting Ltd.

Unit Heaters **Unit Heaters**

COOLING COIL PEAK

Peaked at Time: Mo/Hr: 0 / 0
Outside Air: OADB/WB/HR: 0 / 0 / 0

	Space Sens. + Lat. Btu/h	Plenum Sens. + Lat Btu/h	Net Total Btu/h	Percent Of Total (%)
Envelope Loads				
Skylite Solar	0	0	0	0
Skylite Cond	0	0	0	0
Roof Cond	0	0	0	0
Glass Solar	0	0	0	0
Glass Cond	0	0	0	0
Wall Cond	0	0	0	0
Partition	0		0	0
Exposed Floor	0		0	0
Infiltration	0		0	0
Sub Total ==>	0	0	0	0
Internal Loads				
Lights	0	0	0	0
People	0		0	0
Misc	0	0	0	0
Sub Total ==>	0	0	0	0
Ceiling Load	0	0	0	0
Ventilation Load	0	0	0	0
Dehumid. Ov Sizing			0	0
Ov/Undr Sizing	0		0	0
Exhaust Heat		0	0	0
Sup. Fan Heat			0	0
Ret. Fan Heat		0	0	0
Duct Heat Pkup		0	0	0
Reheat at Design			0	0
Grand Total ==>	0	0	0	100.00

CLG SPACE PEAK

Mo/Hr: 0 / 0
OADB: 0

	Space Sensible Btu/h	Percent Of Total (%)
Envelope Loads		
Skylite Solar	0	0
Skylite Cond	0	0
Roof Cond	0	0
Glass Solar	0	0
Glass Cond	0	0
Wall Cond	0	0
Partition	0	0
Exposed Floor	0	0
Infiltration	0	0
Sub Total ==>	0	0
Internal Loads		
Lights	0	0
People	0	0
Misc	0	0
Sub Total ==>	0	0
Ceiling Load	0	0
Ventilation Load	0	0
Ov/Undr Sizing	0	0
Grand Total ==>	0	100.00

HEATING COIL PEAK

Mo/Hr: Heating Design
OADB: -4

	Space Peak Space Sens Btu/h	Coil Peak Tot Sens Btu/h	Percent Of Total (%)
Envelope Loads			
Skylite Solar	0	0	0.00
Skylite Cond	0	0	0.00
Roof Cond	-50,563	-50,563	14.82
Glass Solar	0	0	0.00
Glass Cond	-12,731	-12,731	3.73
Wall Cond	-271,004	-271,004	79.44
Partition	0	0	0.00
Exposed Floor	0	0	0.00
Infiltration	-6,826	-6,826	2.00
Sub Total ==>	-341,123	-341,123	100.00
Internal Loads			
Lights	0	0	0.00
People	0	0	0.00
Misc	0	0	0.00
Sub Total ==>	0	0	0.00
Ceiling Load	0	0	0.00
Ventilation Load	0	0	0.00
Ov/Undr Sizing	0	0	0.00
Exhaust Heat		0	0.00
OA Preheat Diff.		0	0.00
RA Preheat Diff.		0	0.00
Additional Reheat		0	0.00
Grand Total ==>	-341,123	-341,123	100.00

TEMPERATURES

	Cooling	Heating
SADB	0.0	125.0
Plenum	0.0	68.0
Return	0.0	68.0
Ret/OA	0.0	68.0
Fn MtrTD	0.0	0.0
Fn BldTD	0.0	0.0
Fn Frict	0.0	0.0

AIRFLOWS

	Cooling	Heating
Vent	0	0
Infil	0	87
Supply	0	5,480
MinStop/Rh	0	0
Return	0	5,567
Exhaust	0	87
Rm Exh	0	0
Auxiliary	0	0

ENGINEERING CKS

	Cooling	Heating
% OA	0.0	0.0
cfm/ft²	0.00	0.52
cfm/ton	0.00	
ft²/ton	0.00	
Btu/hr·ft²	0.00	-32.35
No. People	0	

COOLING COIL SELECTION

	Total Capacity ton	Total Capacity MBh	Sens Cap. MBh	Coil Airflow cfm	Enter DB °F	Enter WB °F	Enter HR gr/lb	Leave DB °F	Leave WB °F	Leave HR gr/lb
Main Clg	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aux Clg	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	0.0	0.0	0.0
Total	0.0	0.0								

AREAS

	Gross Total	Glass ft²	Glass (%)
Floor	10,544		
Part	0		
ExFlr	0		
Roof	10,544	0	0
Wall	10,794	280	3

HEATING COIL SELECTION

	Capacity MBh	Coil Airflow cfm	Ent °F	Lvg °F
Main Htg	-341.1	5,480.4	68.0	125.0
Aux Htg	0.0	0	0	0
Preheat	0.0	0	0	0
Humidif	0.0	0	0.0	0.0
Opt Vent	0.0	0	0.0	0.0
Total	-341.1			

Std. Block Wall.

System Checksums

By Stantec Consulting Ltd.

Unit Heaters **Unit Heaters**

COOLING COIL PEAK

Peaked at Time: Mo/Hr: 0 / 0
Outside Air: OADB/WB/HR: 0 / 0 / 0

	Space Sens. + Lat. Btu/h	Plenum Sens. + Lat Btu/h	Net Total Btu/h	Percent Of Total (%)
Envelope Loads				
Skylite Solar	0	0	0	0
Skylite Cond	0	0	0	0
Roof Cond	0	0	0	0
Glass Solar	0	0	0	0
Glass Cond	0	0	0	0
Wall Cond	0	0	0	0
Partition	0		0	0
Exposed Floor	0		0	0
Infiltration	0		0	0
Sub Total ==>	0	0	0	0
Internal Loads				
Lights	0	0	0	0
People	0		0	0
Misc	0	0	0	0
Sub Total ==>	0	0	0	0
Ceiling Load	0	0	0	0
Ventilation Load	0	0	0	0
Dehumid. Ov Sizing			0	0
Ov/Undr Sizing	0		0	0
Exhaust Heat		0	0	0
Sup. Fan Heat			0	0
Ret. Fan Heat		0	0	0
Duct Heat Pkup		0	0	0
Reheat at Design			0	0
Grand Total ==>	0	0	0	100.00

CLG SPACE PEAK

Mo/Hr: 0 / 0
OADB: 0

	Space Sensible Btu/h	Percent Of Total (%)
Envelope Loads		
Skylite Solar	0	0
Skylite Cond	0	0
Roof Cond	0	0
Glass Solar	0	0
Glass Cond	0	0
Wall Cond	0	0
Partition	0	0
Exposed Floor	0	0
Infiltration	0	0
Sub Total ==>	0	0
Internal Loads		
Lights	0	0
People	0	0
Misc	0	0
Sub Total ==>	0	0
Ceiling Load	0	0
Ventilation Load	0	0
Ov/Undr Sizing	0	0
Grand Total ==>	0	100.00

HEATING COIL PEAK

Mo/Hr: Heating Design
OADB: -4

	Space Peak Space Sens Btu/h	Coil Peak Tot Sens Btu/h	Percent Of Total (%)
Envelope Loads			
Skylite Solar	0	0	0.00
Skylite Cond	0	0	0.00
Roof Cond	-50,563	-50,563	32.96
Glass Solar	0	0	0.00
Glass Cond	-12,731	-12,731	8.30
Wall Cond	-83,270	-83,270	54.29
Partition	0	0	0.00
Exposed Floor	0	0	0.00
Infiltration	-6,826	-6,826	4.45
Sub Total ==>	-153,390	-153,390	100.00
Internal Loads			
Lights	0	0	0.00
People	0	0	0.00
Misc	0	0	0.00
Sub Total ==>	0	0	0.00
Ceiling Load	0	0	0.00
Ventilation Load	0	0	0.00
Ov/Undr Sizing	0	0	0.00
Exhaust Heat		0	0.00
OA Preheat Diff.		0	0.00
RA Preheat Diff.		0	0.00
Additional Reheat		0	0.00
Grand Total ==>	-153,390	-153,390	100.00

TEMPERATURES

	Cooling	Heating
SADB	0.0	125.0
Plenum	0.0	68.0
Return	0.0	68.0
Ret/OA	0.0	68.0
Fn MtrTD	0.0	0.0
Fn BldTD	0.0	0.0
Fn Frict	0.0	0.0

AIRFLOWS

	Cooling	Heating
Vent	0	0
Infil	0	87
Supply	0	2,464
MinStop/Rh	0	0
Return	0	2,551
Exhaust	0	87
Rm Exh	0	0
Auxiliary	0	0

ENGINEERING CKS

	Cooling	Heating
% OA	0.0	0.0
cfm/ft²	0.00	0.23
cfm/ton	0.00	
ft²/ton	0.00	
Btu/hr·ft²	0.00	-14.55
No. People	0	

COOLING COIL SELECTION

	Total Capacity ton	Total Capacity MBh	Sens Cap. MBh	Coil Airflow cfm	Enter DB °F	Enter WB °F	Enter HR gr/lb	Leave DB °F	Leave WB °F	Leave HR gr/lb
Main Clg	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aux Clg	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	0.0	0.0	0.0
Total	0.0	0.0								

AREAS

	Gross Total ft²	Glass ft²	Glass (%)
Floor	10,544		
Part	0		
ExFlr	0		
Roof	10,544	0	0
Wall	10,794	280	3

HEATING COIL SELECTION

	Capacity MBh	Coil Airflow cfm	Ent °F	Lvg °F
Main Htg	-153.4	2,464.3	68.0	125.0
Aux Htg	0.0	0	0	0
Preheat	0.0	0	0	0
Humidif	0.0	0	0.0	0.0
Opt Vent	0.0	0	0.0	0.0
Total	-153.4			