

LESSONS LEARNED

DESIGN FACTORS

The integrated design process worked well. ABSA CEO Gordon Campbell and his team feel as though they communicated their needs clearly and Manasc Isaac did a good job of keeping them “in the loop”. Selecting higher performance building envelope and windows, especially on the south side, could have reduced overheating on the hottest days. The amount of natural ventilation and cooling are inadequate on really hot days and staff are using supplemental fans. We anticipate that when the trees on the south side grow in, some of this south-facing over-heating will be reduced and fan use will go down.

MAINTENANCE FACTORS

The ABSA building does not have a dedicated building operator, contributing to the building’s success, according to Campbell. Maintenance is a shared responsibility, and the ABSA staff, including the CEO, have been intimately involved in making the trade-offs between energy savings and comfort for occupants, and ease of maintenance. The building was operated with the goal of minimizing energy use during the initial period of occupancy. Campbell now operates the building to optimize occupant comfort. Additions include the installation of blinds in the south and west. Despite this, energy performance in the building is within reasonable limits.

SUCCESS FACTORS

Occupants appear to be happier if they understand how the building is supposed to work, either because the design intent is made clear and/or because the controls are easy to understand and work well (Leaman). Occupants really enjoy the work environment. Nearly 50 per cent of occupants rated their space as more than adequate, compared to the space they previously occupied. Visitors often remark, “This must be a nice place to work!” Underground parking is an all-around success. The once contested parkade is a staff favourite. Campbell adds that despite his initial objection to an unheated outdoor ramp accessing the parking garage, it was a sound idea that is working.



"Visitors often remark 'this must be a nice place to work'"
Gordon Campbell, CEO, ABSA

GOING FORWARD

Good green buildings build on the experience of the earlier successes and mistakes. Post occupancy evaluations are increasingly a fundamental part of meeting sustainable design objectives. The use of post occupancy evaluations to close the loop on building performance to develop forward views is crucial for further development of successful sustainable buildings. The willingness of designers and clients to share experiences and findings will enable lessons to be learned more quickly and applied more broadly, furthering the importance of post occupancy evaluations of sustainable buildings (Leaman).



ABSA Post Occupancy Evaluation



In 2004, ABSA, the pressure equipment safety authority for Alberta, recruited Manasc Isaac Architects to design a building that would communicate a certain stability and permanence to their clients and the public. To embody the values of ABSA, the Edmonton Headquarters was distinctively designed to reflect Safety, Leadership and Education. The 1995 m² facility combines functionality with a unique aesthetic that reflects the organization’s forward-looking attitude and environmental consciousness.

SUSTAINABLE DESIGN ELEMENTS

Using sustainable architectural features has given ABSA the opportunity to lead by example. By integrating environmental principles into the design and construction of the building, ABSA has demonstrated its dedication to the long-term success of not only their own organization and clients, but to the community as a whole.

Sustainable design elements intended to increase employee comfort and productivity were incorporated into the building’s design:

- Floor plan designed to enhance communication between departments, thereby strengthening the organization. Workstations with low partitions promote interaction and enhance access to daylight.
- The narrow-floor plate building is oriented along the east-west axis in order to better capture breezes and harness sunlight, allowing the majority of workstations to be situated near windows, maximizing the use of natural light.
- Shading devices are incorporated as part of the architectural design to ensure daylight is most effectively used without undue glare or overheating.
- Daylight sensors control electric light when daylight levels are sufficient for work.
- A natural ventilation system, with opening windows, is controlled by the building occupants.
- Source of heat for the building is a high efficiency condensing gas fired boiler plant.
- An underfloor air distribution system (access floor) allows for flexible access to ventilation.
- Reusable and recyclable materials were used to construct the building.
- Change rooms with showers for staff members who wish to bike to work or exercise during lunch. A patio area and plenty of green space is provided for staff and visitors to enjoy.

POST OCCUPANCY EVALUATION

Post occupancy evaluation (POE) is a formal way of determining whether a recently occupied building is performing as was intended in its programming and design. The POE of ABSA set out to explore how the building is performing, what is working and potential lessons learned. The POE is used to evaluate the actual performance of the occupied building against the design goals and strategies. ABSA is the first building to be evaluated by Manasc Isaac. The firm has made it a standard practice in its sustainable building design.

This report takes a look at the actual performance results of the ABSA building and highlights the satisfaction of the occupants two years into the building’s occupancy. ABSA CEO Gordon Campbell sat down to discuss the integrated design process, successes and opportunities for improvement in building operation. The POE also involved a survey of building occupants to assess their perception and level of satisfaction with various aspects of the building, including thermal comfort, acoustics, indoor air quality and lighting. All occupants of the building were invited to report on their experience by means of the web-based survey. This report also summarizes energy usage in relation to initial modeling and takes a look at indoor water usage. The comparisons shown between actual energy usage and initial design modeling give an estimate of energy efficiency savings based on data compiled directly from utility bills. Actual energy and water usage came from one year of utility billing records of the entire 1995 m² building, including the parkade.

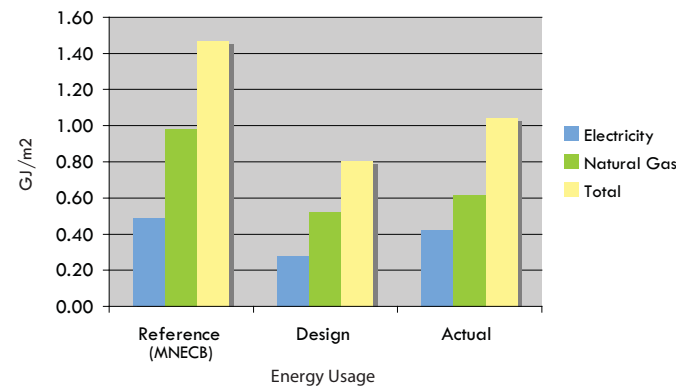


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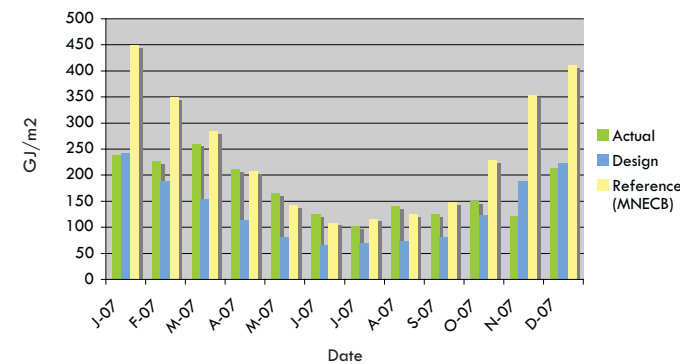
ENERGY PERFORMANCE FOR 2007

The building was designed to have a total annual energy consumption of 0.80 GJ/m². Our energy modeling indicated that if the ABSA building had been constructed to the Model National Energy Code of Canada for Buildings (MNECB), the total annual energy consumption (electricity and natural gas) would be 1.47 GJ/m². Based on the utility invoices from January to December 2007, the actual total energy consumption was 1.04 GJ/m². The building still consumed 29% less energy than the MNECB. Electricity, natural gas and total energy usage for 2007 is presented in the graph below.

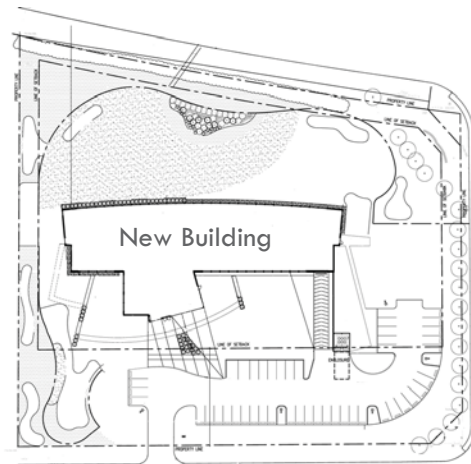


ENERGY CONSUMPTION ON A MONTHLY BASIS FOR 2007

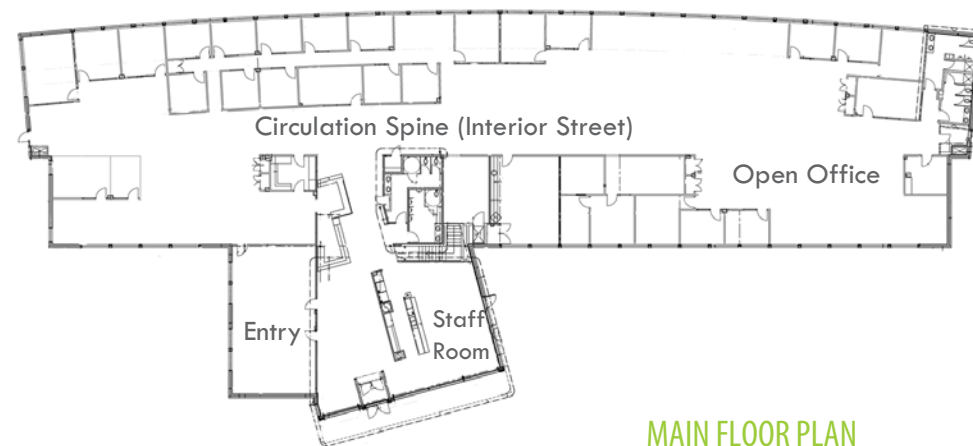
The graph below illustrates the total energy consumption on a monthly basis – actual vs. design performance targets. Analysis of the energy loads and the building itself would be required to indicate the discrepancy between the targets and actual performance. Possible explanations include higher-than-anticipated electricity plug loads, high domestic hot water consumption and boiler/space heating system controls. The building is maintained at a constant 22°C, while the energy model assumed a year-round set back temperature of 18°C. In addition, the occupant survey revealed that 44% of occupants who responded to the survey use portable fans at their desks. The summer in 2007 in Canada was warmer than average and that's becoming the norm according to Environment Canada (CBC News). The change is consistent with what scientists predict will happen as the world becomes warmer as a result of climate change.



"I love the fact that we can open windows. On a summer day, there's nothing better than breathing fresh air."
Occupant comment from survey



SITE PLAN



MAIN FLOOR PLAN

LIGHT LEVELS

The interior of the building was designed to use two basic types of lighting: daylighting and electrical lighting. The building was oriented to take advantage of perimeter daylighting opportunities, while providing views and light for the building occupants, with a clerestory providing daylight into the centre of the building. Electrical lighting was designed to supplement the daylighting, when required, and to provide all lighting in the evening. The electric lighting was designed to attain 300 lux (27.87 foot candles), with task lighting at each desk supplying additional lighting as required. Of the ten workspaces where light level measurements were taken, the vast majority attained a reading of 300 lux or greater.

WATER CONSUMPTION

The metered annual building water consumption in 2007 was 481 cubic metres (m³) with a monthly average of 40 m³.

Waterless urinals have been a point of contention in the building. They have been negatively received by staff due to their perceived uncleanliness. Despite this, Campbell concedes the use of waterless urinals has been an important contribution to the building's low water consumption. The design daily domestic water consumption estimate was 3.95 m³, while the actual daily average during the year 2007 was 1.32 m³.

KEY FINDINGS : LIGHTING & DAYLIGHT

- Results indicate the amount of light in occupant workspaces is more than adequate. The survey affirmed occupant satisfaction with the light levels in the building.
- 63% cited the visual comfort of the lighting as good or better with 54% stating their access to daylight as excellent and 87% rating access to daylight as better than adequate.
- Inside offices do not have as much access to natural light as other workspace locations in the building. To enhance the light levels in these spaces, we have added more interior windows and some task lighting to the interior offices. Continuous clerestory lighting above the central interior street also provides natural light for people located away from perimeter windows.
- Only 7% of respondents use task lighting in their workspace. The majority of occupants make use of window blinds or shades to control the amount of light in their space.
- Occupants with workspaces located on the north side of the building had the highest percentage of 'poor' ratings for amount of light in their workspace, while their counterparts on the south side of the building had the highest percentage of 'excellent' ratings. 60% of those on the east end of the building rated the amount of lighting in their workspaces as more than adequate. Access to daylight was most highly rated by those occupants with workspaces located on the east end of the building.

KEY FINDINGS : ACOUSTIC QUALITY

- The open floor plan is a source of noise in the building. However, the openness of the hallway is viewed as one of the successes of the building.
- 69% of the respondents in open environment workspaces rated the noise level as poor. Of all survey respondents, 33% rated the noise level as poor.
- Acoustical conditions were the most negatively rated in the building, primarily due to lack of conversational privacy associated with the open work environment.
- 55% of respondents in offices rated noise level in their workspace as adequate or better.

KEY FINDINGS : THERMAL COMFORT

- 44% of survey respondents make use of a portable fan in their workspace.
- Only 8% of building occupants control the temperature in their workspace via a thermostat.
- There is limited mechanical cooling in the building. Operable windows were decided upon instead of air conditioning for the ten days of the year when air conditioning would be needed.
- The south exposure is very warm, despite the shading devices and window blinds.
- The HVAC system does not react fast enough to changes in temperature. In winter, the building is not operated with a set back temperature as it takes too long to heat the building.

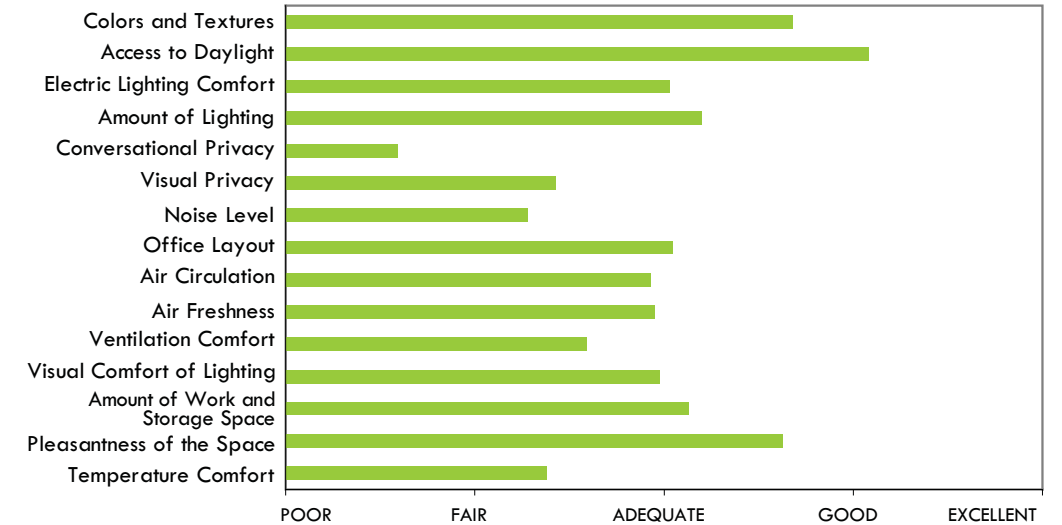
KEY FINDINGS : AIR QUALITY

- Slightly less than 50% of surveyed occupants control operable windows. Although all windows are operable, typically, only occupants seated next to a window control the opening and closing of the window.
- 74% of respondents make use of air vents located in the access floor.
- Air quality was identified as problematic by some occupants, described as "stuffy" in interior offices. Adjustment of vents in access floors is being studied to seek ways to improve air flow.
- Occupants are knowledgeable about how to open and close the vents but they often seem to be closed. The flexibility of vent relocation is appreciated by occupants.
- Increasing fresh air volumes was seen to be desirable and ways to achieve this are being examined.

OCCUPANCY SURVEY & INTERVIEW

All occupants working in the building were invited to participate in a web-based survey. The brief survey provided occupants with the opportunity to comment on their satisfaction with building layout, temperature, air quality, lighting and acoustics. The survey generated a response rate of 51% (40 occupants out of a possible 78).

Of those who responded to the survey, 85% have worked in their space for one year or more. Most responses (67%) came from those occupants working in open plan spaces. More than 75% of respondents spend 21 or hours or more per week in their workspace.



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Gordon Campbell, CEO, ABSA

CROSS SECTION SKETCH

