

## LESSONS LEARNED

### CONSTRUCTION FACTORS

Construction of the Administration Building commenced at the start of what has since become a very busy period for contractors in Alberta. Issues arose as to the availability and quality of various interior finish trades. At the time, the client felt that the speed of the construction schedule was slow. Today, the building would have taken much longer to build and likely would have been approximately twice the cost.

Waste reduction targets were not achieved and construction waste inadvertently ended up in landfills. It is essential to ensure waste diversion and reduction occurs during the construction process. For future projects, the general contractor should be asked to provide recycling weigh bills with progress claims.

Yellowhead County was very happy with the transition of Manasc Isaac from Project Architect to the role of Post-Construction Services. This was the first project for which Manasc Isaac used a "paperless" construction administration procedure. All correspondence, shop drawings, site instructions, etc. were created e-mailed in PDF format. This saved substantial courier fees, printing and copying costs as well as the carbon emissions involved in the transportation of the paperwork. This success has since been used on most of the firm's subsequent projects.

### OPERATIONS & MAINTENANCE FACTORS

Contract closeout and commissioning encountered some challenges. Although Basic LEED® commissioning was undertaken, few of the report's commissioning recommendations were implemented. Careful and timely review of the commissioning report and follow-up action by building operation and maintenance personnel would have addressed some of the building comfort issues. A more effective process of communicating the commissioning process should be developed for future projects.

After substantial completion, Yellowhead County did not have a planned maintenance schedule for the Administration Building. A scheduled maintenance program was recommended. For this to be performed adequately, a qualified controls maintenance service provider should be retained on a quarterly basis to ensure the heat pumps and controls are working as designed and are adjusted to optimize performance and energy savings. An improvement in the process would be to include a one-year controls maintenance program in the specifications of base building tender, so that this is automatically in place once the building is in operation.

The proper location of floor diffusers is a critical factor affecting occupant comfort. The design intent was to maintain at least a 1 m separation between occupant seating and the nearest floor diffuser. Some diffusers were placed directly under workstations and desks and needed to be relocated to avoid uncomfortable drafts.

There is an abundance of stored rainwater with the cistern provided. Unlike most other provinces, Alberta legislation does not allow toilets to be flushed with untreated rainwater. Rainwater collection needs to be better integrated into the



everyday use of the building. Rainwater is being used to refill the tanks of water trucks, but only when trucks are in the vicinity of the Administration Building.

Trees on the southeast corner of the building had to be replaced in the warranty period. It is suspected that too much water was being retained in the area. The County has since cut a drainage trench to allow water to escape.

### COMMUNITY VALUE

The floor plan and overall functionality of the building are well designed and successful. The separation of private office space from public spaces such as Council Chambers and the reception area is especially appreciated. The secluded meeting room in the public area is practical and well used for meetings requiring privacy. The lobby is adaptable enough to be used as crush room when Council goes 'in camera'. In fact, the building as a whole is very flexible. It has been used for Election Central, as a Polling Station, a teaching space and for retirement parties and Council functions.

The building design is well liked and the appearance is attractive, especially the grand entrance, exposed wood structure and open ceilings. Operable windows are appreciated by the occupants, as is the open plan design concept. The building is filled with light and is roomy, bright and airy. Members of the public and building occupants alike enjoy the landscaping.

The air quality is a noticeable improvement compared with the previous space for those with allergies and those who suffer from migraines.

Staff of Yellowhead County have embraced the green building ideas implemented in their workplace and some have installed low-flow toilets and other sustainable ideas in their homes.

### GOING FORWARD

Following the *Lessons Learned* Workshop, Manasc Isaac made a number of recommendations to Yellowhead County to enhance the Administration Building.

As a result of lessons learned during both the project and Post Occupancy Evaluation, Manasc Isaac has made several changes to its process for ensuring waste reduction in construction sites and commitment to paperless contract administration.

Overall, the building seems to be well received by staff and visitors. Manasc Isaac will continue to be a resource to the operations and maintenance staff of the Yellowhead County Administration Building to ensure the building is operating at optimum performance.

### DESIGN TEAM

Architectural	Manasc Isaac
Structural	RJC Consulting Engineers
Mechanical/Electrical	Stantec Consulting
Civil	GPEC Consulting
Landscape Architect	Gibbs Brown Johansson
Client	Yellowhead County



# YELLOWHEAD COUNTY ADMINISTRATION BUILDING

## POST OCCUPANCY EVALUATION



Manasc Isaac Architects completed the feasibility study, planning, functional programming, design and construction services for the new Yellowhead County Administration Building located in Edson, Alberta. The new facility replaces a former cramped administration building and houses the majority of the County's 50 administrative staff. Within the 1831 m<sup>2</sup> facility is a dramatic Council Chamber, a public gathering space and lobby, offices and workplaces as well as a number of small meeting rooms that can be used by staff and committees. The building exterior is designed to evoke the diversity of Yellowhead County, reflecting both industrial and agricultural roots. The building has been occupied since December 2005 and is LEED® Silver certified by the Canada Green Building Council.

### SUSTAINABLE DESIGN INTEGRATION

The building and site were designed to meet the County's requirements for the foreseeable future, with the flexibility to allow for future expansion of the building at a minimal cost.

- Building orientation is along an east-west axis to optimize daylight and views and minimize energy costs.
- Geothermal heating is integrated with energy efficient, cost effective, and environmentally sensitive mechanical systems. The building does not in fact have a gas supply line to it, an unusual and innovative solution on this site.
- Solar hot water heating provides most of the building's domestic hot water needs, with a back-up electric boiler providing hot water during cloudy periods.
- High-performance building envelope and windows provide thermal comfort and optimize energy performance.
- Underfloor air distribution provides flexibility for changing operational needs, as well as occupant control of ventilation levels.
- Low-flow infrared lavatories reduce hot and cold-water consumption.
- Wheat board made from wheat chaff, an agricultural by-product, and a formaldehyde-free binder is used for all millwork and doors.
- Operable windows are controlled by building occupants and clerestory windows provide daylight into the centre areas of the building.
- Sunshades on the south façade reduce heat gain while providing a sense of enclosure at the building face.
- Naturalized landscape includes wild grasses and drought tolerant plants.
- Rainwater cistern incorporated into the building to capture all roof rainwater.

### POST OCCUPANCY EVALUATION

Post Occupancy Evaluation (POE) is a formal way of evaluating the actual performance of an occupied building compared to the design goals. Manasc Isaac has made POE a standard practice in its sustainable building strategy.

This report examines the performance results of the Yellowhead County Building and highlights the satisfaction of the occupants two years into the building's occupancy.

Representatives from Yellowhead County and the design team participated in a one-day *Lessons Learned* workshop to discuss the integrated design process, successes, and opportunities to improve the building's operation. All occupants of the building were invited to report on their experience by means of a voluntary web-based survey. Energy usage is based on data compiled directly from utility bills.



## TOTAL LEED® SCORECARD

Sustainable building design and building performance, including occupant comfort and satisfaction go hand in hand. As such, the Leadership in Energy and Environmental Design (LEED®) Canada rating system is an important part of the post occupancy evaluation process.

ENVIRONMENTAL CATEGORY	POSSIBLE POINTS	POINTS ACHIEVED
Sustainable Sites	14	5
Water Efficiency	5	4
Energy & Atmosphere	17	10
Materials & Resources	13	2
Indoor Environmental Quality	15	9
Innovation & Design	5	5
<b>TOTAL</b>	<b>69</b>	<b>35</b>

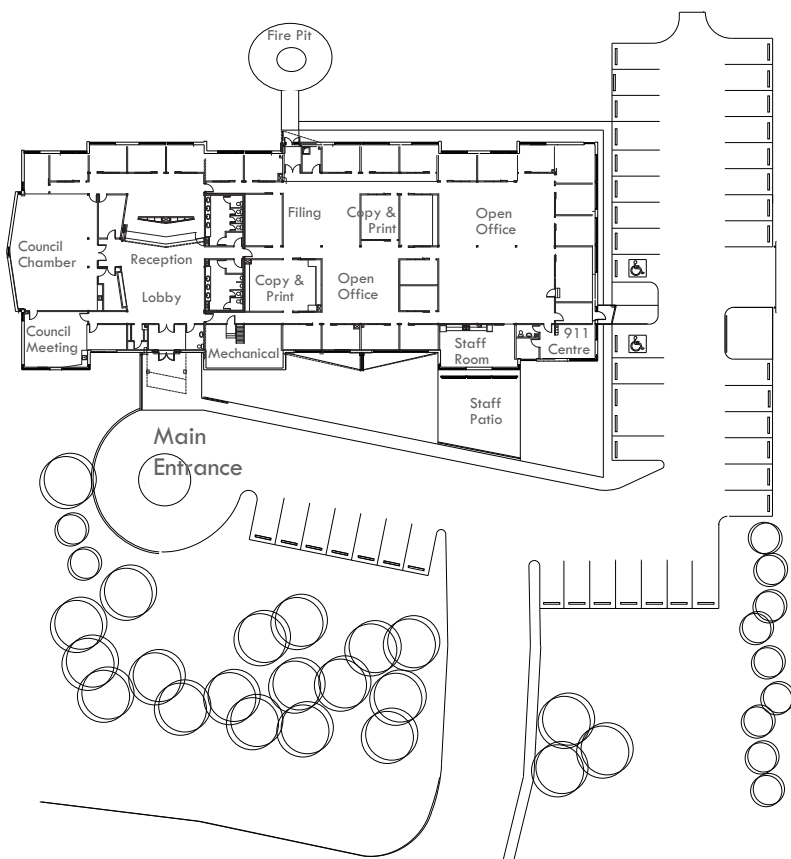
## CO<sub>2</sub> EMISSIONS

The Yellowhead County Administration Building is zero CO<sub>2</sub> emissions building. There are no fuel fired mechanical systems and thus no natural gas line to the building. Even the hot water system is using a solar heating array and has an electric back up. It is hoped that in the future, a photovoltaic array can be installed on the sloped mechanical room wall to further bring the County's building closer to a net-zero building.

"I find this building to be a very comfortable and enjoyable work environment."

Occupant comment from survey

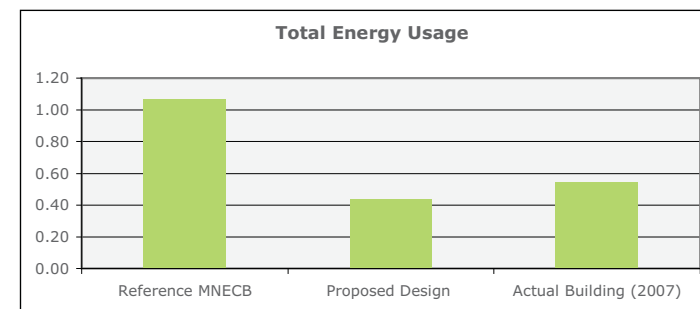
## MAIN FLOOR & SITE PLAN



## ENERGY PERFORMANCE FOR 2007

The design aimed to provide cost effective, energy and resource efficient design solutions. An assessment of energy consumption found that the old building consumed 18 cents/ft<sup>2</sup> while the new administration building consumes only 11 cents/ft<sup>2</sup>. The County is spending less on electricity despite the increase in space, including the green energy premium and energy required for geothermal pumps.

Energy modeling projected that the building would have a total annual energy consumption of 0.44 GJ/m<sup>2</sup> or 60% below MNECB. Based on electricity utility invoices from January to December 2007, the actual total annual energy consumption of the Administration building was 0.55 GJ/m<sup>2</sup>. Although slightly higher than designed, it is important to note that LEED® models are intended to estimate the value of the building's energy efficiency measures and not necessarily to accurately predict the absolute level of total utility usage in a building. The models do not include non-regulated components such as plug loads, process energy, garage ventilation, exterior lighting, elevators and other miscellaneous energy uses, which are included in the total actual energy consumption of the Yellowhead Building.



Interior of Council Chamber

## OCCUPANCY SURVEY & INTERVIEW

All occupants working in the building were invited to participate in a web-based survey. The five-minute survey provided occupants with the opportunity to comment on their satisfaction with various elements of the building, including layout, temperature, air quality, lighting and acoustics.

The survey generated a response rate of 49 per cent (23 occupants out of a possible 47) within the week it was open. Of those who responded to the survey, 74 per cent have worked in their space for one year or more. More than 75 per cent of respondents spend 21 hours or more per week in their workspace.

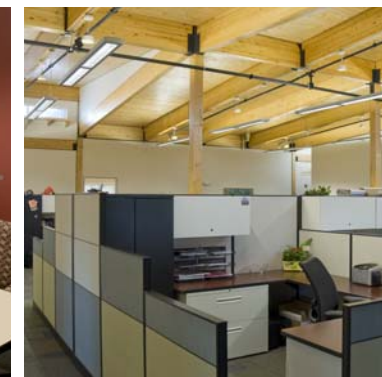
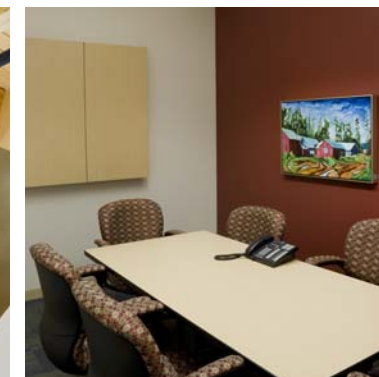
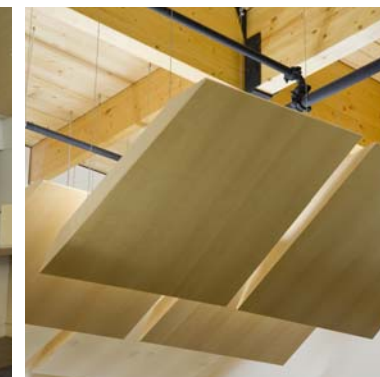


## KEY FINDINGS : LIGHTING & DAYLIGHT

- 67% of occupants who responded to the survey rated the amount of light in their workspace as adequate or better.
- Only 22% of respondents use task lighting in their workspace while 39% make use of window blinds or shades to control the amount of light in their space.
- Occupants with workspaces located on the west side and in the core of the building had the highest percentage of poor ratings for the amount of light in their workspace. One occupant located on the west end of the building commented, "for such a large area I find that the room is a little dark - beautiful but dark".

## KEY FINDINGS : THERMAL COMFORT

- The controls maintenance strategy recommended by Manasc Isaac during the commissioning phase has not yet been adopted. Some controls were not properly calibrated, a challenge exacerbated by staffing difficulties in Alberta over the past 2 years.
- The office furniture layout required more careful coordination with the floor mounted air diffusers. Moving the air diffusers from under desks and furniture has greatly improved occupant comfort.
- According to an independent audit of the geothermal system, there is more than enough capacity for heating and cooling for the building.
- The thermostat located in the lunch room was mis-programmed. Once it was reset, the zone stabilized in less than 2 hours. Staff report that the temperature in this once cool area is now quite comfortable.



## KEY FINDINGS : ACOUSTIC QUALITY

- 73% of those who have cubicles as their workspace rated noise level as poor. However, respondents in the private enclosed offices were generally happy with the noise level.
- Acoustics are a challenge in the open space, as is often the case with open office environments.

## KEY FINDINGS : AIR QUALITY & HEALTH

- Slightly less than 40% of occupants responded that they control operable windows. Although all windows are operable, only those occupants seated directly next to a window control the opening and closing of the window.
- Less than half the respondents make use of the air vents located in the access floor, a surprisingly high number, as occupants have been prohibited from controlling their air diffusers.
- Yellowhead County controls the chemicals used for cleaning the building, limiting the cleaning products to those less hazardous to occupant health and to the environment. A green housekeeping plan has been adopted successfully.
- Four occupants of the Administration Building used to suffer from chronic migraines. In the new space their migraines are both less frequent and less intense than in their previous workspace. People with allergies have also noticed improvements in air quality in the new building.