Amber Trails Community School

Winnipeg, Manitoba

CASE STUDY | k-12 education

Client - Seven Oaks School Division

Rep Office - BPL Sales

Architect - Prairie Architects

Engineers - Wolfrom Engineering Ltd

Contractor - Bockstael Construction Ltd

Mechanical Contractor - Thor Plumbing & Heating Ltd

LEED Certification - LEED Gold Candidate

Project Highlights:

- 78,000 square feet
- Sustainable design elements incorporated into the school
- Community public library
- Daycare for early childhood care
- Opened January 2015

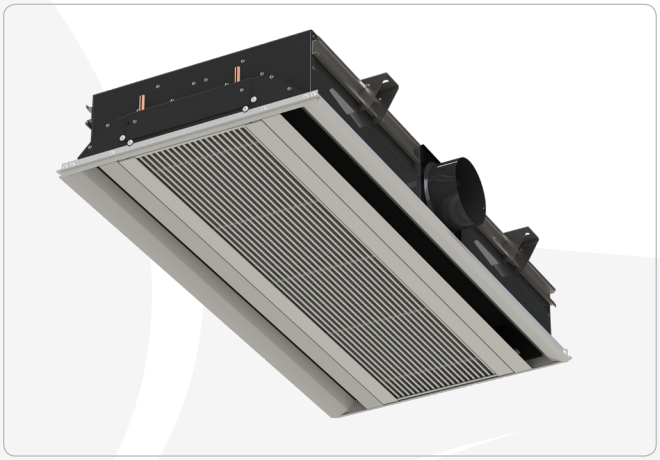
ABOUT THE PROJECT

Students at Amber Trails Community School in Winnipeg, Manitoba, are being taught by a new teacher – the building itself. Prairie Architects and the Seven Oaks School division designed the school to serve as a teaching tool for its students, one that highlights the impact facilities have on their communities. The new school is intended to challenge the existing standards about school design and to create exciting new visions for education based on a welcoming entrance, family home-like scale, natural daylight, atelier spaces, transparency courtyards, flexibility, and a fusion of inside and outside environments. The abundance of fresh air, sustainable design elements and natural light not only teach the students about sustainability but also help them study by providing a healthy learning environment. On top of housing K-8 students, the 78,000 square foot facility also serves as a neighborhood daycare and public library.

THE TITUS SOLUTION

HVAC SYSTEM BOLSTERS SUSTAINABILITY

To match its sustainable design, the building uses chilled beam products as its primary source of air distribution. The beams feature the aerodynamic properties of Titus' ceiling diffusers and benefit from the use of using hydronic coils and induced air, reducing energy consumption associated with removing sensible thermal loads.



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After being discharged through nozzles located along the beams, the primary air is supplied to the beam's mixing chamber. The nozzles inject this air into the mixing chamber at velocities capable of inducing room air through one or two coils and where it mixes with the primary supply air. This air mixture is then discharged through the ceiling slot diffusers into the space, providing high cooling outputs with low amounts of primary air. The reduced volume of air leads to smaller (and less expensive) air handlers and ducts and less energy consumption.

The supplied air from the air handling unit is tempered and dehumidified to handle the latent load. The remaining loads in the space are addressed via the chilled beam's heat exchanger. Applications with low latent cooling loads could potentially use 100 percent outdoor air, allowing for a dedicated outdoor air system with energy recovery that would further reduce total system energy consumption.

The chilled beams used for this project can be used for both heating and cooling and are offered in multiple sizes – 12-inch and 24-inch widths and 2ft to 10ft lengths. They can be easily integrated into different grids styles within a suspended ceiling or even in drywall ceilings. The low overall height of these chilled beams make them ideal for reducing space required for false ceilings.

Additional air distribution products helped to complete an impressive school for the community. Chilled beams provide a great alternative to conventional overhead heating and cooling.

THE CHILLED BEAM ADVANTAGE IN SCHOOLS

Studies have shown that excessive noise levels can adversely affect student performance. Conventional HVAC systems typically used in schools today (fan-powered VAV, fan coils, unit ventilators), rarely meet prescribed background noise level requirements - ANSI standard S12.60 for classroom acoustics requires a maximum background noise level of 35 dBA (about NC-27) – this is difficult, if not near impossible to attain with traditional equipment.

Furthermore, student performance is affected by space humidity and ventilation levels. HVAC systems whose primary airflow rate is modulated while the classroom is occupied often do not comply with the requirements of ASHRAE 62.1. Ventilation airflow rates are difficult to maintain at part load conditions with modulating the primary airflow rates. Chilled beams are systems where zoned based hydronic-heating and/or cooling devices compliment the conditioning of the primary air ventilation system, allowing for optimization of all heating, cooling and ventilation functions and providing opportunities for savings in energy, ceiling cavity space and maintenance as well as increased occupant performance.

Most conventional HVAC systems depend on the delivery of large volumes of air to condition the classroom. Chilled beam systems typically reduce ducted air requirements by as much as 60% by relying on their integral heat transfer coils to offset most of the space sensible cooling and heating requirements. Since water is more efficient for space cooling and heating than air, chilled

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beams use considerably less overall energy than the other options available, such as VAV, VRF, and fan coil units.

Since chilled beams allow classroom ducted airflow rates to be reduced to that which is required for space ventilation and latent cooling, they are ideal for use with 100% (DOAS) outside air systems. This allows the beams to provide a constant volume of ventilation air to the classroom at all times. Chilled beans also contribute toward achieving LEED certification.

THE END RESULT

The new school, which opened its doors in January 2015 is designed to meet the requirements for LEED Gold Certification and now has a total occupancy of 775 students and staff. With dedicated spaces allotted for day care, early childhood education, play areas and a public library, Amber Trails Community School is a vital piece of a Winnipeg community's puzzle. Thanks to a sustainable design and energy efficient HVAC system, the multipurpose space serves as a daily reminder to students, teachers and the overall community about how buildings can have a positive impact on communities beyond their intended uses.

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