Titus
Redefine your comfort zone.™

CASE STUDY PROJECTS

APPLICATIONS

07

ADVANCING THE SCIENCE OF AIR DISTRIBUTION

K-12 EDUCATION

Rethink what air management systems can be.
Revise your notion of functionality.
Redefine your comfort zone.™

Comfort, Redefined.

Since 1946, Titus has focused on technologically advanced products that create the highest degree of comfort.

We've consistently led the industry by breaking the barriers of expectation and convention when it comes to technology. We've redefined how technology drives, influences and supports air management. And by being first to market with the most innovative approaches to air distribution, we're proud to say that the marketplace has taken notice, and is counting on us to lead the way into the next decade. A challenge we're more than happy to accommodate.

Titus has raised the bar on design, proving that functional can also be beautiful. And we've redefined what it means to be energy efficient, with a collection of smart technology products that optimize the use of natural resources.

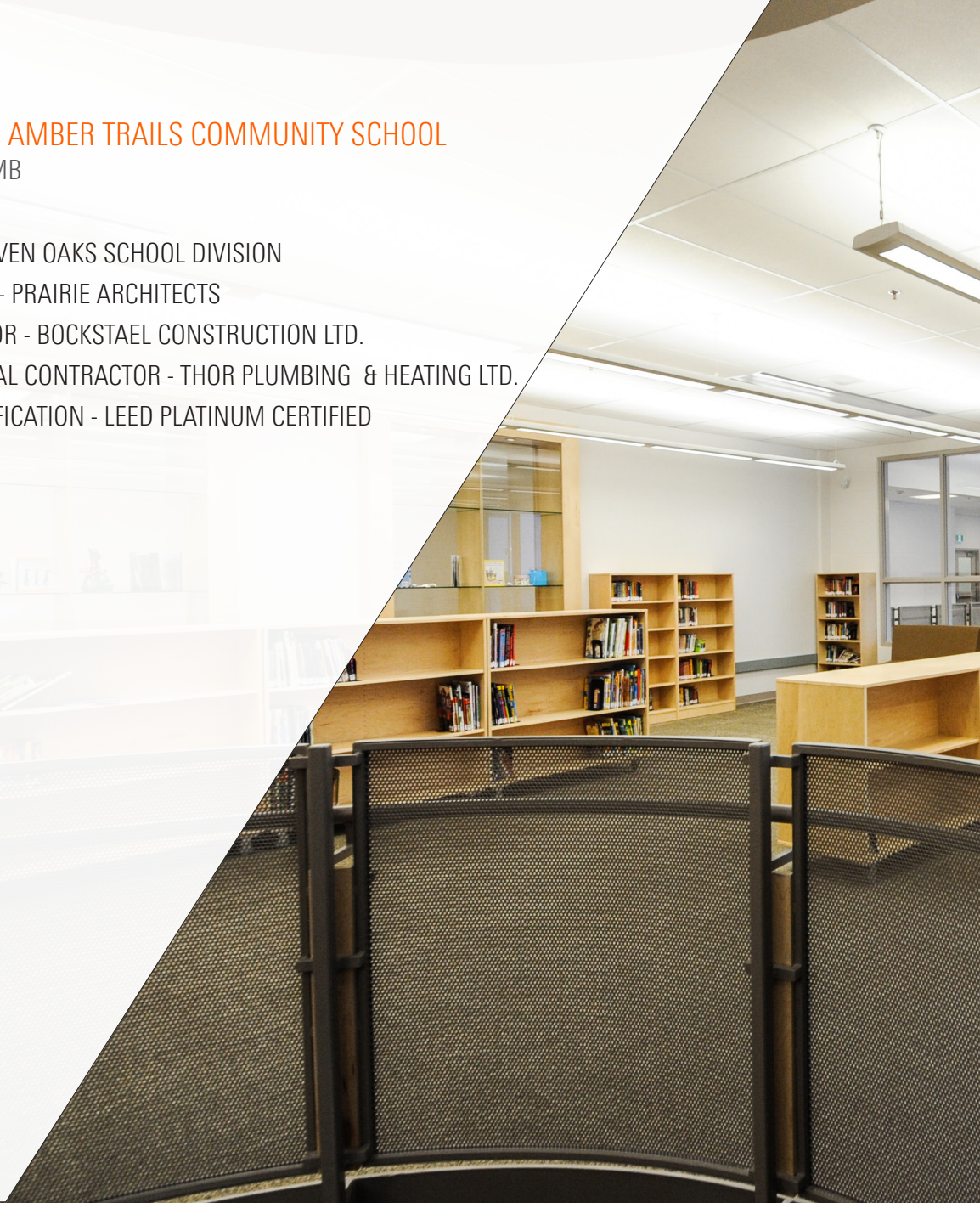
Titus has also redefined what it means to work with an air management products partner. We pride ourselves on listening and responding so that we can not only meet expectations, but also exceed them. Service has been, and will always be, our main focus at Titus. And, it's why so many of our customers keep coming back.

Welcome to your new comfort zone. It starts here.

PROJECT - AMBER TRAILS COMMUNITY SCHOOL

Winnipeg, MB

CLIENT - SEVEN OAKS SCHOOL DIVISION
ARCHITECT - PRAIRIE ARCHITECTS
CONTRACTOR - BOCKSTAEL CONSTRUCTION LTD.
MECHANICAL CONTRACTOR - THOR PLUMBING & HEATING LTD.
LEED CERTIFICATION - LEED PLATINUM CERTIFIED



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

CBAL-24

FEATURED PRODUCTS

AMBER TRAILS COMMUNITY
interior photos

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.

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 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.

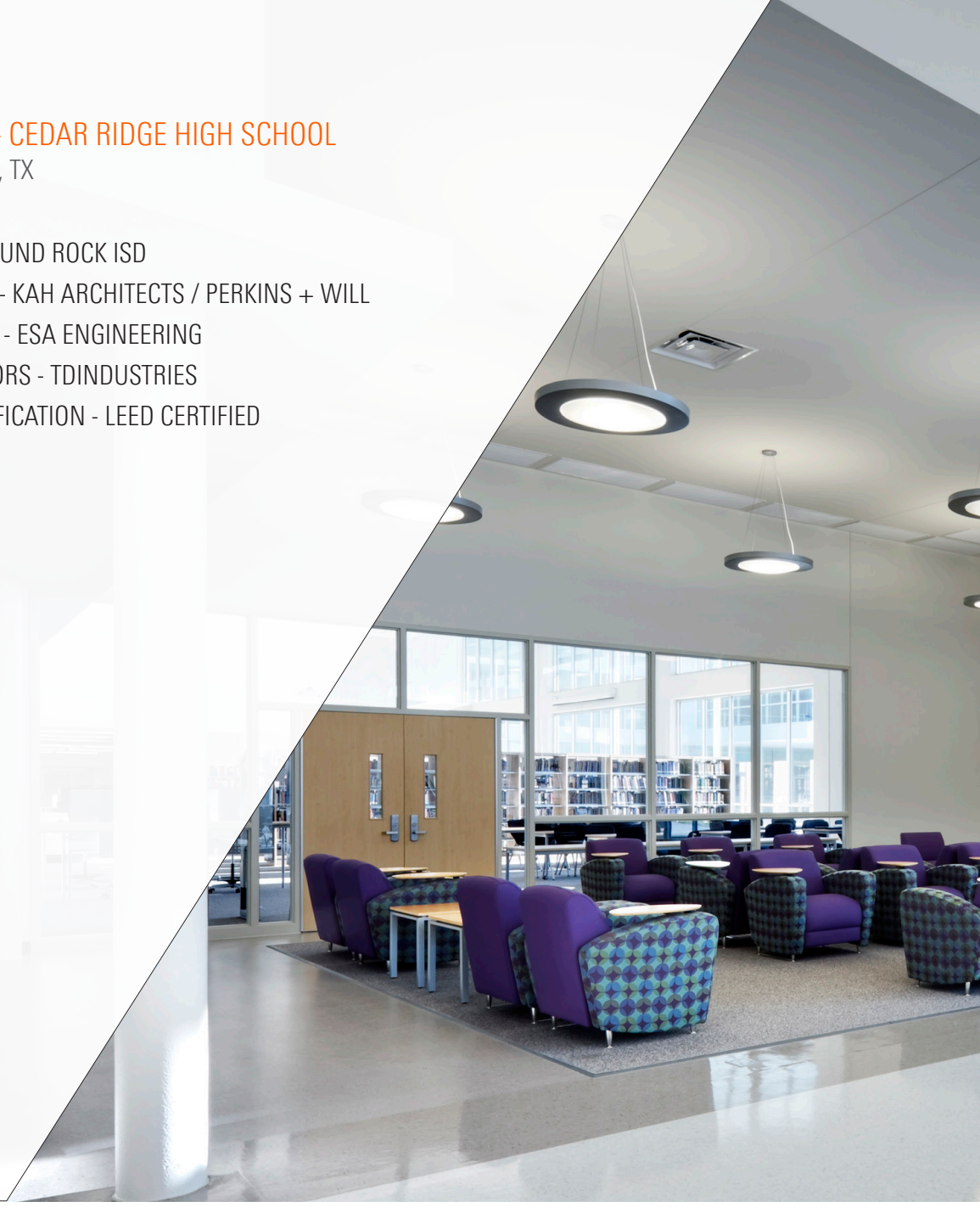
THE END RESULT

The new school, which opened its doors in January 2015 was designed to meet the requirements for LEED Gold but actually achieved LEED Platinum 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.

PROJECT - CEDAR RIDGE HIGH SCHOOL

Round Rock, TX

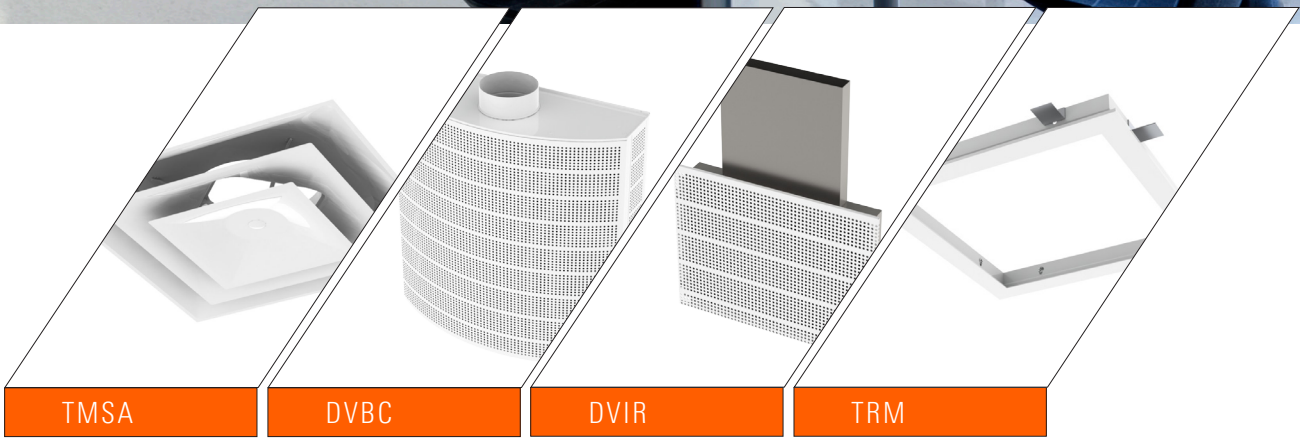
CLIENT - ROUND ROCK ISD
ARCHITECT - KAH ARCHITECTS / PERKINS + WILL
ENGINEERS - ESA ENGINEERING
CONTRACTORS - TDINDUSTRIES
LEED CERTIFICATION - LEED CERTIFIED



ABOUT THE PROJECT

Round Rock ISD envisioned a sleek, modern new campus that would foster growth and development for its students. They wanted a high school capable of unlocking the hidden abilities of their students and one that would aid their teachers in preparing their students for the next chapter of their lives. Cedar Ridge High School is the result.

Cedar Ridge High School is a unique two-story, 375,000 square-foot high school divided into four distinct academies: Academy of International Business and Economics, Academy of Professional Studies, Academy of Science, Technology, Engineering, and Mathemathics, and the Academy of Visual and Performing Arts. Each academy houses its own media center, administration suites and planning areas for teachers. The common areas



FEATURED PRODUCTS

CEDAR RIDGE HIGH SCHOOL
interior photos

for all students are the cafeteria, the athletic facility and the outdoor courtyard which is considered the heart of campus and is home to several multi-purpose events.

The design team and Round Rock ISD wanted this school to be an environmentally friendly facility. This LEED Certified school has several sustainable elements featured. It uses local limestone materials on the exterior of the buildings and offers an abundance of natural light. All the windows allow natural light to penetrate deep into the occupied spaces.

THE TITUS SOLUTION

The HVAC system featured in the high school also contributed toward it achieving LEED Certification. Titus has an abundance of products installed that provide energy savings for the school. Several areas in the new high school utilize displacement ventilation, which is a unique alternative for air distribution.

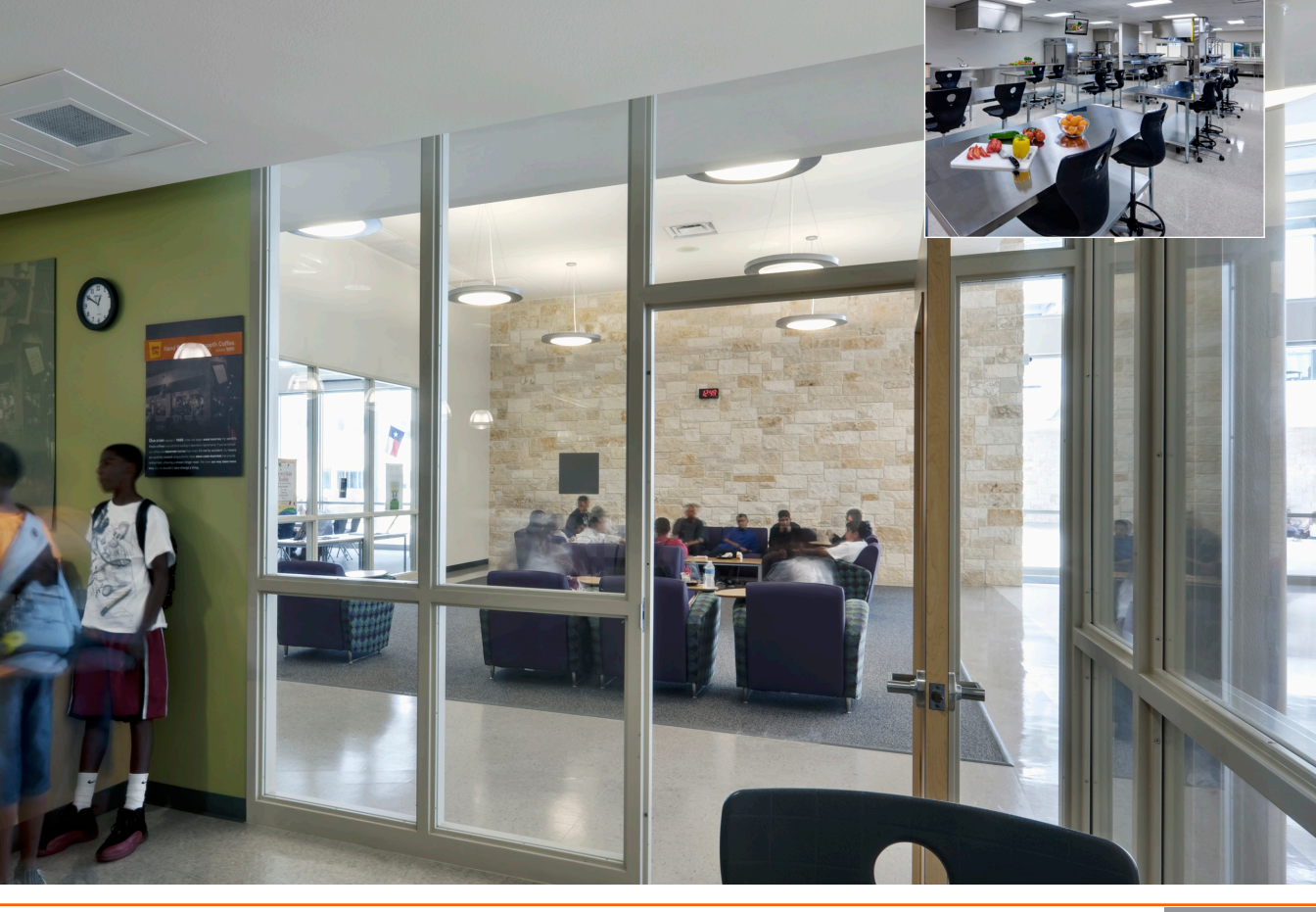
The DVIR and DVBC are rectangular displacement diffusers. The DVIR is a unidirectional discharge diffuser designed for flush mount applications. The DVBC has a curved face and discharges air via a three-way pattern. Both units provide air distribution by supplying large volumes of air at low velocities into the occupied zone. Easily adjustable air pattern controllers inside the units can create different airflow patterns in the space to optimize occupant comfort. Some additional products featured in the school are the

TMS diffuser and the TRM mounting frame.

The Titus TMSA is a steel diffuser that features adjustable vanes which vary the discharge pattern between vertical and horizontal for heating and cooling applications. These diffusers deliver supply air in 360º pattern and are designed to protect ceilings from smudging. All sizes have 3 cones providing a uniform appearance. The TRM is an aluminum mounting frame used to make installation of grilles & diffusers and other ceiling components in plaster and sheet rock ceilings as simple as inserting them in a standard T-bar type ceiling. For typical applications, the frame has adjustable fastening clips which adapt to a variety of plaster and sheet rock ceiling thicknesses.

THE END RESULT

There have been numerous studies on the importance of proper ventilation in our schools. Cedar Ridge High School has a state-of-the-art HVAC system that provides superior performance for its students and faculty. The new high school is also a beautiful campus that has created the best learning environment for the students of Round Rock, Texas. The teachers, staff and administration now have a technologically advanced partner that will assist them in molding the future leaders for the next generation.



PROJECT - HEROD ELEMENTARY SCHOOL

Houston, TX

CLIENT - HOUSTON ISD
ARCHITECT - KIRKSEY ARCHITECTS
MEP ENGINEER - DBR ENGINEERING
CIVIL ENGINEER - KLOTZ ASSOCIATES
CONSTRUCTION - ANSLOW BRYANT CONSTRUCTION
LEED CERTIFICATION - LEED SILVER CERTIFIED

ABOUT THE PROJECT

Since 1965, the Gary L. Herod Elementary School has been serving the Southwest Houston area by developing and molding young minds. As time and more importantly technology has developed over the years, the community and school distict determined that a new building was needed to replace the existing school to usher in a new generation of learning and growth for the students. In 2011, the new LEED Silver Certified Herod Elementary School opened its doors.

The design team at Kirksey Architecture incorporated numerous sustainable elements throughout this project. Outside the school, preferential parking is offered to those who have low emitting vehicles while covered parking is available for others. The roof is designed to reflect heat which works in

R-OMNI | DTFS | TMSA-AA | PAR-AA

FEATURED PRODUCTS

HEROD ELEMENTARY SCHOOL
interior photos

conjuction with the light-colored concrete. It reduces the amount of heat absorbed on the site as well. Inside the building, low-VOC paint was used, water reducing devices in bathrooms and showers and the abundance of natural light that can now penetrate the school is simply amazing.

THE TITUS SOLUTION

The HVAC system in the school also features several Green Building concepts. The R-OMNI is a round, steel, adjustable diffuser that is designed for architectural ceilings and facilities with exposed ductwork. The smooth face is adjustable in three positions for horizontal or vertical flow. The R-OMNI can be used effectively in heating or cooling applications and is an excellent choice in Variable Air Volume (VAV) systems. The TMSA-AA diffuser features adjustable vanes which vary the discharge pattern between vertical and horizontal airflow for heating and cooling applications. This aluminum diffuser delivers supply air in 360° air pattern and is designed to protect ceilings from smudging. All sizes of the unit have 3 cones which provides a uniform appearance. The PAR-AA is a perforated return diffuser with an aluminum face and steel backpan. Its discharge pattern is easily adjustable either before or after installation from the face of the diffuser. The PAR-AA is an excellent choice for VAV systems.

Additional grille and diffuser products from Titus were selected and installed in the school as well.

The only terminal unit selected for this project was the TFS terminal unit. The TFS terminal unit is an energy efficient series fan powered terminal that provides constant air delivery and temperature blending. By combining the unit with an ECM motor, the TFS delivers superior performance and maintains the VAV energy savings at the central fan.

THE END RESULT

The new Gary L. Herod Elementary School even incorporates a green education program that discusses all of the sustainable elements found within the school grounds. Kids from all walks of life will continue to learn and develop in a beautifully designed school that also teach them about saving their environment while simultaneously giving them the skillset needed to be our future leaders of tomorrow.

PROJECT - WILLARD ELEMENTARY SCHOOL

Concord, MA

CLIENT - CONCORD PUBLIC SCHOOLS

ARCHITECT - OMR ARCHITECTS

LEED CERTIFICATION - NONE

ABOUT THE PROJECT

The new Willard Elementary School, which opened its doors for the first time this year, is a state-of-the-art building designed by the Office of Michael Rosenfeld, Inc (OMR) Architects. This award winning, full-service architectural firm listened to and incorporated many design elements from the clients to create a new education facility for young minds to grow and prosper.

The students, faculty and staff wanted their new building to be something that their previous one wasn't - to be an energy efficient and safe structure that everyone would be proud of. OMR created a green learning environment for all students, grades K-5 to learn from. The students have created and produced podcasts and brochures that highlight additional

FEATURED PRODUCTS

WILLARD ELEMENTARY SCHOOL
interior photos

sustainable features. Touch screens monitor the elementary school's energy consumption. The library, located in the heart of the school, benefits from an abundance of natural light. The natural light is able to penetrate deep into the building by light shelves that are located in the classroom.

THE TITUS SOLUTION

When designing and building an energy efficient facility, the HVAC systems are extremely important and cannot be overlooked. OMR not only relied on utilizing diffusers and grilles, but wanted to create a unique HVAC system that would have all other elementary facilites green with envy. Displacement Ventilation, a unique method of air distribution, was selected and Titus had the perfect product - DVIR. Displacement Ventilation is a great alternative to conventional overhead ceiling supply systems. Displacement ventilation provides design flexibility, energy savings, and the highest level of indoor air quality (IAQ). The higher supply temperature and smaller air handler/ system can generate energy savings. Also, the addition of more free cooling days from bringing outside air in contributes toward energy savings. On the IAQ side, DV has a ventilation effectiveness factor of 1.2 which translates to a 20% bonus when designing for ventilation requirements per ASHRAE Standard 62.1.

The DVIR is a rectangular displacement diffuser with a unidirectional discharge designed for flush mount applications. It provides air distribution by supplying a large volume of air at a low velocity to the occupied zone.

Adjustable air nozzles inside the unit can create different airflow patterns in the space to optimize occupant comfort.

The DVIR displacement unit wasn't the only Titus product used in the elementary school. Williard Elementary also has several other high performance grilles and diffusers to provide a total air distribution solution.

The OMNI diffuser can be seen in various locations as well as the FlowBar. The OMNI is an architecturally pleasing unit that delivers a uniform 360 degree horizontal air pattern. The FlowBar architectural linear diffuser system maximizes engineering performance without sacrificing aesthetic considerations of the designer. FlowBar's outstanding performance allows higher air flows than conventional linear diffusers and produces lower noise levels.

THE END RESULT

Willard Elementary School is a remarkable achievement in Green Building design and community cooperation. The local community received an impressive school that has energy-efficient technology both inside and out while creating the perfect learning environment for their children to grow and develop. The future looks extremely bright for Concord, Massachusetts.

PROJECT - BETHEL PARK HIGH SCHOOL

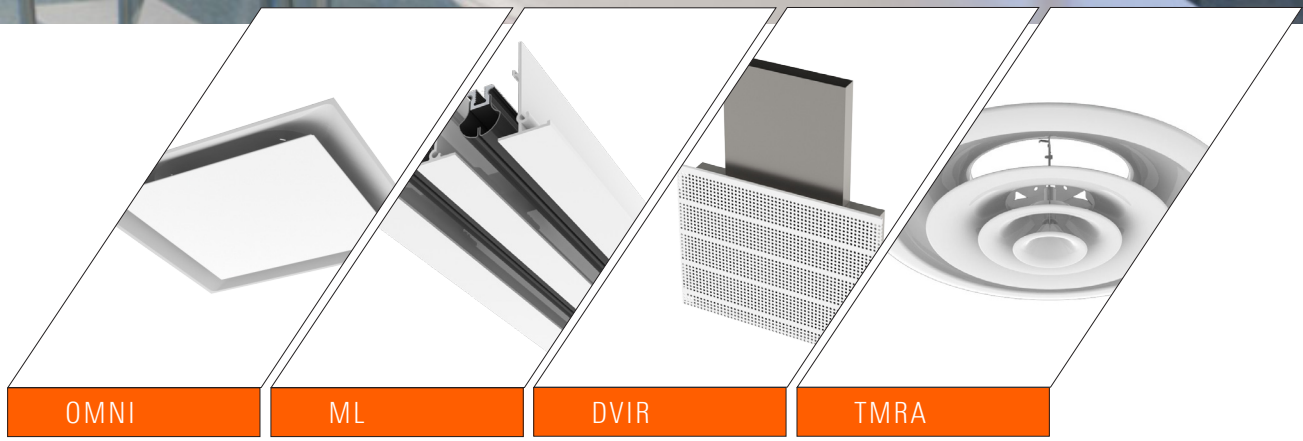
Bethel Park, PA

CLIENT - BETHEL PARK ISD
ARCHITECT - WEBER-MURPHY-FOX
ASSOCIATE ARCHITECTS - HAYES DESIGN GROUP
ENGINEERS - TOWER ENGINEERING
CONSTRUCTION - MASCARO CONSTRUCTION
CERTIFICATION - GREEN GLOBE 3 CERTIFICATION

ABOUT THE PROJECT

Bethel Park ISD is committed to providing the community the best learning environments that promote safety, occupant health and well-being, and preparedness for the future. When accessing the needs of their students and teachers, it was clear that a new high school facility was needed to position Bethel Park as a leader in educating the next generation.

The new Bethel Park High School replaced several outdated buildings with an impressive and breathtaking learning environment for students to grow and prosper for years to come. The design team of Weber-Murphy-Fox and Hayes Design Group created a 321,000 square foot facility that is not only safe and environmentally friendly, but is actually built on the existing footprint of the old structures. Other sustainable features included in the



FEATURED PRODUCTS

BETHEL PARK HIGH SCHOOL
interior photos

design are the white reflective roof design which reduces the school's overall solar heat gain, utilizing low VOC content materials throughout the building, daylight harvesting to reduce energy usage and the ability to conserve water resources through low flow fixtures and metering. All of these features along with other sustainable design elements allowed Bethel Park High School to achieve Green Globe Level 3 Certification. Principal Zeb Jansante is extremely proud of all the accolades Bethel Park has received.

THE TITUS SOLUTION

The focus on sustainable design was not limited to just those areas, but also included the layout and design of the HVAC system. Project Engineer, Tom Gorski's main goal was to create healthier classroom environments with low energy costs. It has been documented that students perform better in classrooms where an abundance of fresh air and natural light are present. Bethel Park incorporates several high performing and energy saving products to create this type of learning environment for its occupants.

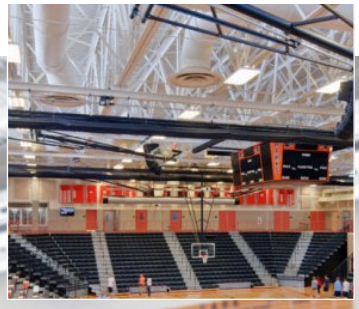
One of the main systems featured inside the classrooms is Displacement Ventilation. Displacement Ventilation is a great alternative to conventional overhead ceiling supply systems. It provides design flexibility, energy savings, and the highest level of indoor air quality (IAQ). The higher supply temperature and smaller air handler/system can generate energy savings. Also, the addition of more free cooling days from bringing outside air in contributes toward energy savings. On the IAQ side, DV has a ventilation

effectiveness factor of 1.2 which translates to a 20% bonus when designing for ventilation requirements per ASHRAE Standard 62.1. The DVIR is a rectangular displacement ventilation product that introduces fresh air into the occupied zone. A unique and beneficial advantage of this product is the easily adjustable pattern controllers that can be positioned to change the direction of the airflow after installation has been completed.

Additionally, the Titus ML, TMRA and OMNI diffusers along with a myriad of other Titus products comprise to create the perfect HVAC system for Bethel Park's new school. The OMNI is a steel plaque face diffuser that delivers a uniform 360 degree horizontal air pattern, without excessive noise or pressure drop. The Titus ML Modulinear diffuser is a high performance, high quality linear slot diffuser. The unique "ice tong" deflector blades allows for both changes in air volume and direction from the face of the diffuser. Finally, the TMRA is an adjustable round ceiling diffuser designed for both heating and cooling applications that delivers a uniform 360 degree air discharge pattern and exhibits excellent performance.

THE END RESULT

After years of planning and inconvenience, the community of Bethel Park can rest assured that they have a school that was designed with their well-being in mind. The new high school contains the latest technology and more importantly the building itself has now become a teaching tool about the environment and how buildings can impact the community in which they are built in either a positive or negative way. Teachers have always had the ability to inspire their students to achieve more and new facilities tend to influence greatness. Bethel Park ISD is hoping their new school has the same influence on its students for years to come.



PROJECT - STEINBACH REGIONAL SECONDARY SCHOOL

Steinbach, MB

CLIENT - HANOVER SCHOOL DIVISION
ARCHITECT - STANTEC ARCHITECTURE
ENGINEERS - STANTEC CONSULTING LTD
CONTRACTOR - PENN-CO CONSTRUCTION CANADA
MECHANICAL - WESTWOOD MECHANICAL INC
LEED CERTIFICATION - LEED GOLD CANDIDATE

ABOUT THE PROJECT

Class is back in session and the teachers have a little more help this year. The newly renovated Steinbach Regional Secondary School in Steinbach, Manitoba is assisting the faculty with a great lesson for the students on the environment and the impact buildings make. Stantec Architecture and the Hanover School Division envisioned a school built to serve as a learning tool for its existing student population as well as the growing community. The new high school serves grades 9-12 and will offer more chances for students to learn and develop skills that will prepare them for life after high school. After the renovation and new addition, the students now have the opportunity to learn real-world skills to gain employment in fields such as cosmetology, construction, power mechanics, and welding.

CBAL-24

FEATURED PRODUCTS

STEINBACH REGIONAL SEC.
interior photos

The sustainable design elements and the abundance of natural light now present in the school will not only teach the students about sustainability, but also help them study by providing a healthy learning environment. On top of housing the 9-12 grade students, the 300,000 square foot facility also serves as a neighborhood daycare for the ever-growing population in Steinbach.

THE TITUS SOLUTION

ALIGNING WITH SUSTAINABILITY

To align with the sustainable design elements already in use, the high school incorporates 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.

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.

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THE FRESH AIR ADVANTAGE IN SCHOOLS - CHILLED BEAMS

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THE END RESULT

Having opened its doors in August 2014, Steinbach is designed to meet the requirements for LEED Gold Certification. Thanks to a sustainable design and an energy efficient HVAC system, this multipurpose building serves as a daily reminder to students, teachers and the overall community about how buildings can have a positive impact on neighborhoods as they continue to grow over time.

Titus
Redefine your comfort zone.™

CASE STUDY PROJECTS

ADVANCING THE SCIENCE OF AIR DISTRIBUTION

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