CASE STUDY

David L. Lawrence Convention Center South Terrace

JOB PROFILE

PROJECT LOCATION:
Pittsburgh, PA

CARLISLE APPLICATOR:
Cuddy Roofing

CONSULTANT:
Structure Tec

ROOF GARDEN SIZE:
22,400 sq. ft.

ROOFING SYSTEM:
Extensive and intensive vegetative green roof, water-jet cut glass pavers, fully adhered FleeceBACK® PVC membrane, leak detection system, tapered polyiso insulation below membrane, reverse tapered EPS insulation above membrane where pavers are located.

When David L. Lawrence was elected mayor of Pittsburgh, PA in 1945, the city had the reputation of being the most polluted in America. The thick, sooty smog that always hung in the air was a combination of coal smoke from thousands of furnaces and the pollution given off by iron and steel plants, which were the staples of the local economy. The smog was so pervasive that on many days, the sky was dark by 9 A.M. and streetlights had to be kept on during the daytime. The three rivers that flowed through the city were polluted and acidic, and often reached temperatures of 130 degrees due to the barges and steamships that crowded their waters. Mayor Lawrence, an early environmentalist, developed an urban renewal plan for Pittsburgh during his first days in office, making him one of the first civic leaders in U.S. history to do so. Within 24 hours of being elected, he announced that he would begin taking steps immediately to clean up the environment in his city.

Fast forward to the year 2000, when the Sports & Exhibition Authority of Pittsburgh and Allegheny County (SEA) broke ground on the new 1.5-million-square foot David L. Lawrence Convention Center. In keeping with the beliefs of Mayor Lawrence, the convention center was built to the highest environmental standards. When it opened in 2003, it immediately earned Gold certification in the U.S. Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED) program; at the time, it was the world's largest LEED-certified building.

Throughout the years, the unique design and environmentally friendly features of the facility have proven to be tremendously successful in attracting clients.

In 2009, the White House selected the convention center as the site of the G-20 Summit, in part because of the building's Gold LEED certification. In 2007, it was the location of the Pittsburgh Steelers' 75th anniversary gala. The convention center has held presidential addresses, National Rifle Association Conventions, and American Idol auditions, not to mention countless meetings, conventions, trade shows, corporate events, and wedding receptions, including that of the Pittsburgh Steelers' star quarterback, Ben Roethlisberger.

CONTINUOUS IMPROVEMENT

Despite the convention center's success and popularity as an event location, SEA is committed to continually improving the building and its eco-friendliness. In October 2011, SEA worked with Pittsburgh-based Cuddy Roofing and Carlisle SynTec Systems to design, engineer, and install a vegetative green roof for the 22,400 square foot south terrace of the building. The new roof garden would feature more than 20 species of plants, flowers, and grasses, as well as water-jet cut glass pavers. Along with being aesthetically pleasing and providing numerous environmental benefits, the roof garden would provide a unique and beautiful outdoor area in which events could be held.

Cuddy Roofing began by removing the existing overburden, which consisted of artificial green turf and insulation, much of which was donated and repurposed. After preparing the concrete roof deck for its new vegetative green roof system, Cuddy Roofing installed tapered polyiso insulation, followed by a coverboard adhered with Carlisle's low-rise urethane FAST adhesive, and again used FAST adhesive to adhere the 115 mil FleeceBACK PVC membrane to the coverboard.

For this job, FleeceBACK membrane was chosen because of its toughness, puncture resistance, and durability; and FAST adhesive was selected due to its superior wind uplift properties and because it can be installed quickly with minimal disruption to building occupants. SEA also had Cuddy Roofing install an Electric Field Vector Mapping® (EFVM) system within the roofing assembly. EFVM is a leak detection system that will pinpoint the exact location of a leak, in the event one should ever occur.

After the membrane was laid and Cuddy finished the details and penetration work on the system, a Carlisle inspector came to examine the integrity and workmanship of the new roof. It passed Carlisle's inspection with flying colors, which

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> *Director of Marketing, Cuddy Roofing*

came as no surprise since Cuddy Roofing has more than 20 years of experience installing Carlisle roofing systems.

ROOF GARDEN INSTALLATION

Once the membrane roofing system was installed, Cuddy began work on the vegetative roof system. First, they laid down a root barrier on top of the FleeceBACK PVC, then installed Carlisle's Miradrain G4 drainage mat over the root barrier. G4 was chosen because it greatly simplified the vegetative roof installation. G4 is filter fabric, moisture retention mat, drainage mat, and heavy-duty protection fabric, all in one easy-to-apply product. Using G4 greatly cut down on the time and labor required for the installation. In order to create a level walking surface, Cuddy installed a reverse tapered Insulfoam EPS insulation system on the roof areas where the walkways and pavers would eventually be.

Metal edging, both curved and straight, was then installed to separate the walkway and paver areas from the vegetative areas, and bulk growth media was blown into the vegetative areas by a powerful blower truck parked one story below. Cuddy installed drip irrigation lines, which use non-potable aquifer water to irrigate the vegetation on the roof. The irrigation system is intelligent; it senses the moisture in the growth media and will adjust its watering schedule based on that moisture content. Therefore, if the soil is wet, no water will be wasted by irrigating.

Cuddy then rolled out the sedum mats and planted the plugs in the growth media. Care was taken to plant species that are drought-tolerant and native to Western Pennsylvania, which thrive on natural rainfall levels and will only need to be watered in the event of a severe drought. The last step of the project was putting down the water-jet cut glass pavers, a task that turned out to be a particular challenge. The blue glass pavers were designed to have wavy edges to resemble water running through the space, which, while aesthetically beautiful, made the paver installation process similar to putting together a huge puzzle.

CHALLENGES AND REWARDS

TJ Willetts from Cuddy Roofing elaborated on the project, "The largest challenge on this job was logistics. The convention center is in an urban area, and there was limited access via crane to the roof deck. All the materials used on the job had to be carted to the roof using freight elevators." In spite of the challenges, Willetts went on to say, "This system was a great choice because Carlisle consolidated the complete system, from deck to plants. It simplifies the process to have a single supplier and a comprehensive warranty on the roof system and the overburden, and we received excellent support from Carlisle."

Willetts continued, "The environmental benefits were also very satisfying to see. The added insulation will help mitigate heat gain and loss. The roof garden will help absorb up to 80 percent of rainwater from an average rainfall event so it doesn't become run-off, and it will decrease heat flux and the urban heat island effect by reducing the temperature on the roof by as much as 50 degrees on hot days. In addition, the plants on the rooftop help remove particulate matter from the air and absorb carbon. SEA made a commitment that this facility would be as green as possible, in every way possible. It

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was a huge priority to them that the roof be a sustainable asset to the building as well as the environment. Cuddy Roofing is proud to be a part of this unique project."

COMMUNITY REACTION

The job was completed in March 2012 and in May 2012, the green roof was unveiled. SEA announced that the David L. Lawrence Convention Center had earned Platinum LEED certification under the Existing Buildings: Operations and Maintenance rating system. Platinum is the highest certification a building can receive from the USGBC, and the convention center is the first building of its kind to receive Platinum LEED certification. "You are a shining example of what a meeting and events facility can be about," stated USGBC Vice President Kimberly Lewis, who was present at the ribbon-cutting ceremony for the new green roof. Mayor Luke Ravenstahl added, "Pittsburgh stakeholders are committed to the environment, and as a result…the story of Pittsburgh's environmental transformation will continue to be heard around the world."

The David L. Lawrence Convention Center is a fitting tribute to a man who was a pioneer of the environmental movement. He was a man before his time, committed to improving the lives of the residents of his city by cleaning up the environment at a time when such a concept was new and different. Mayor Lawrence would hardly recognize his city today; the air and rivers are clean, recycling is mandatory, and vacant lots have been turned into green space. Today Pittsburgh is a nationwide leader in green buildings, and has provided an example to the rest of the country of how eco-friendly buildings can reduce energy demand, cut down on global warming emissions, and fuel a green economy. The David L. Lawrence Convention Center is proof that all of these things are possible and that Mayor Lawrence's dream continues to be realized in the city of Pittsburgh.

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