

Las Vegas CityCenter: Dry from **top** to **bottom**



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At first glance, it seems to run against common sense. Why would anyone need to waterproof construction in the Nevada desert? In Las Vegas, there is far less than an inch of rain a month, even in the wettest month of February. But when the owners and developers of Las Vegas's massive new CityCenter development were planning construction, waterproofing was a high priority.

Unbeknownst to most of the 30 million tourists who

pour into Las Vegas every year, the famous Las Vegas Strip sits atop a shallow aquifer created mostly because of excess irrigation runoff. Drill down 50 ft and you'll hit groundwater trapped near the surface by impermeable clay and sedimentary hardpan. This human-caused aquifer runs most of the length of the Las Vegas Strip, a densely built environment of high-stakes real estate.

That aquifer posed a problem for the builders of

APPLICATION ON SITE

the new Las Vegas CityCenter, the largest privately financed construction project in the history of the United States. CityCenter, which opened officially in late 2009, is a grouping of five separate buildings and landscaping covering 76 acres on the "Strip." The showpiece of this new complex is the Aria Hotel and Casino. Also joining the project are the Mandarin Oriental Hotel, Vdara Hotel and Spa, the Harmon Hotel and Veer Towers. These buildings encircle The Crystals, an ultra high-end retail and entertainment district. In total, the project cost about US\$11 billion.

CityCenter is more than a collection of buildings. A valet tunnel that is significantly below grade connects the entire development. Some 72 elevator pits were constructed in the main tower alone to service the buildings. Swimming pools dot the landscape at ground level, overtop parking lots, and water features throughout

the complex provide respite during the 100° F summer months as well as add to the luxury ambiance. The Aria Hotel, which boasts 4004 guest rooms, 16 restaurants and a 150,000 sq ft casino, is also permanent home to Cirque du Soleil, the acrobatic theatre troupe. The troupe performs in an 1800-seat theatre and water features on stage form part of the show. Even more impressive, the water tank that holds the water for the performance is nestled deep in the ground, into the middle of the active aquifer under the Strip.

Many of those elements posed a threat of water leakage and damage. Gensler, the world's largest global design and architecture firm, headquartered in San Francisco, was the executive architect overseeing the project. Because Gensler had previous experience on several projects using Kryton International Inc.'s crystalline waterproofing admixtures, Kryton was asked



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to waterproof the valet tunnel, the 72 elevator pits in the main tower plus the elevator pits in all the other buildings, all other critical below-grade structures and areas, the swimming pools and the water tank that would support the water features during Cirque du Soleil's show.

Kryton developed the world's first integral crystalline waterproofing admixture, Krystol Internal Membrane or KIM, over 30 years ago. The product offers builders a guaranteed waterproofing solution by turning the concrete itself into the water barrier. When combined with water, KIM's proprietary chemicals react to form millions of needle-like crystals within the concrete itself. These crystals grow and fill the capillary pores and micro-cracks in the concrete, blocking the passage of water.

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advantages over surface applied products. Products like KIM are invulnerable to damage in that they cannot be scraped, punctured or torn. There are also no workmanship issues to be concerned with because installation of a membrane is not required. By eliminating the installation process, the general contractor also removes an entire trade from the jobsite along with the scheduling and access requirements. Additionally, because time is not wasted on surface preparation and membrane installation, backfilling and other crucial construction processes can proceed without delay. Given the time frame for this massive development, from concept to completion in five years, time savings were important.

A key advantage of using KIM is that if minor cracks form in the concrete at any point in the future and water enters the crack, the chemicals reactivate to form new



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additional crystals to block the water. This self-sealing effect is one of KIM's best and most unique features. The superior long-term reliability that this affords means that integral crystalline waterproofing systems can save a significant amount of worry and an enormous amount of money as compared to surface applied systems.

Another important consideration for the builders of CityCenter was the environmental benefits of their waterproofing choice. From the outset, the project aimed to achieve LEED (Leadership in Energy and Environmental Design) gold-level certification from the US Green Building Council. Kryton's KIM is an environmentally friendly alternative for creating waterproof concrete. It extends the life of concrete structures, reduces jobsite waste by being available in pulpable bags and enables the future recycling of concrete materials. Unlike most membranes and some other integral waterproofers, KIM contains no volatile organic compounds and is non-toxic and safe for contact with potable water. Kryton's integral crystalline admixture promised not only to save time and money but also to contribute to the overall environmental sustainability of the project.

One of the many interesting challenges of the project

was the substantial water tank built to support the extravagant water features of the on stage performance. Not only was the tank nestled in the path of the aquifer, but it was also situated directly above the control centre that would house all the electronics that governed the show. Leaking of any kind, whether by product malfunction or natural cracking and settling, would be disastrous. Kryton's KIM was used to waterproof the tank, keeping the water for the show securely inside and contaminants from the aquifer out.

With five buildings going up at different rates, all with a common foundation, and a need to interface these elements with the existing Las Vegas structures, the waterproofing needs were both numerous and challenging. Kryton products, using their unique Krystol technology, were used throughout the construction project to help overcome these challenges.

The CityCenter project was the first major construction in many years in Las Vegas and is a stunning visual achievement. And while the accolades pour in, the construction team can be confident that the water will not.

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