PENETRON NEWSLETTER

December 2021

Dear reader,

Welcome to the latest edition of the *Penetron Concrete Durability Update* from the world's leading brand in concrete protection.

In this issue we are taking a closer look at the significant role of the concrete cover when it comes to durability design. Just a few centimeters of concrete that can determine if your structure lasts 30 years or 100 years. Find out how to ensure the latter.

As some countries are successfully battling the ongoing pandemic, live exhibitions are back on the calendar. We take a glance at MADE expo 2021, where Penetron participated in the 10th edition of Italy's most popular exhibition in the construction sector.

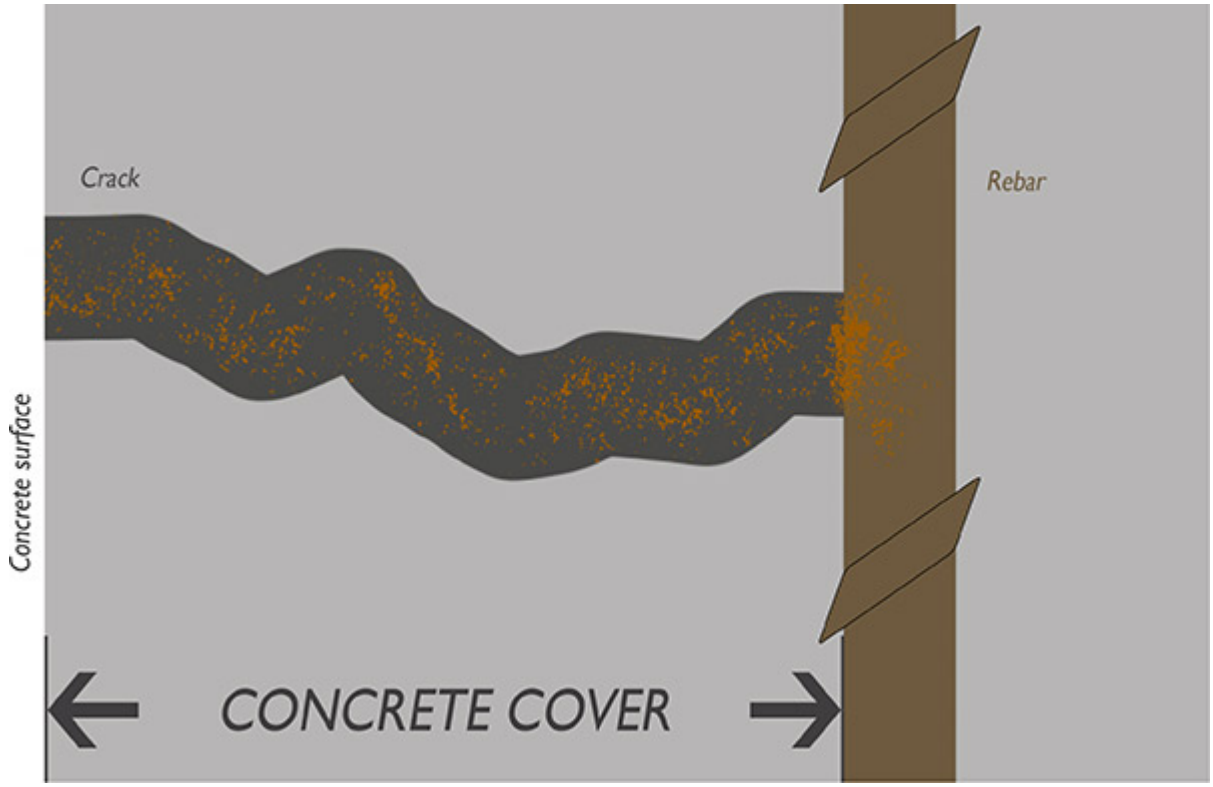
Penetron Italia has long been a trusted name in the Italian engineering and building community and just celebrated its 20th anniversary – albeit with a one-year delay. A little celebration was in order to thank customers and the Penetron network of supporters.

In the PENETRON Worldwide section, we highlight a few of the latest projects that benefited from Penetron solutions.

Stay safe, stay healthy,

Florian Klouda
Director, International Account Coordination
PENETRON INTERNATIONAL LTD.

Defending Concrete Durability – the Importance of an Impermeable Concrete Cover



Designing a concrete structure that is able to maintain its serviceability and performs according to specifications in a certain environment for the duration of its service life means choosing suitable materials, an appropriate design and detailing, as well as quality control procedures for the production and placement of the concrete.

Concrete needs protection from many threats of deterioration associated with chloride ion ingress, carbonation, chemical attacks, freeze-thaw damage, aggregate and alkali-silica reactions, and others. All of these contribute to the deterioration of a structure by increasing the permeability of concrete and causing corrosion of the reinforcement steel, ultimately resulting in a shorter service life.

Because it is widely accepted that deterioration of the concrete begins once corrosion of the reinforcement is initiated, protection of the steel reinforcement is of significant importance. In this context the concrete cover – as the only barrier between the reinforcement and the concrete surface – plays a critical role. Unfortunately, higher proneness to cracking and higher porosity (due to poor or no curing) makes the concrete cover the weakest link of the concrete structure.

Water-borne contaminants such as chlorides migrate through the pores, capillaries and microcracks of the concrete cover and towards the reinforcement. The thinner and more permeable the concrete cover is, the faster chlorides can reach the reinforcement and induce corrosion. A more permeable concrete is therefore directly associated with a shorter service life.

Read the full article and see how Penetron supports the protection of the concrete cover to ensure concrete durability and a longer service life, click here.

PENETRON WORLDWIDE

Penetron at MADE expo, Milan, Italy

Celebrating Two Decades of Success: Penetron Italia

San Jose Hospital, Melpilla, Chile

Aleksey Leonov International Airport, Kemerovo, Russia

Spence Mine, Antofagasta, Chile

Riviera Maya Nickelodeon Resort, Quintana Roo, Mexico

North Benghazi Court Building, Benghazi, Libya

Strata Wynwood, Miami, USA

Universal Studios, Beijing, China

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Penetron at MADE expo, Milan, Italy

After a two-year hiatus, MADE expo returned live to Milan to showcase the latest and greatest in construction technologies. At the same time, 2021 also marked the 10th anniversary of the popular trade fair, which revolves around the aspects of good living - comfort, innovation, safety and sustainability.

This years' edition of MADE expo hosted four specialist segments including MADE Building Envelope and Windows, MADE Constructions and Materials, MADE Interiors and Finishes, and MADE Software, Technologies and Services.

As a long-term supporter of Italy's biggest construction fair, Penetron was a main exhibitor. At the Penetron booth, visitors saw firsthand the advantages of the Penetron System, based on a proven crystalline technology for sustainable concrete waterproofing and durability solutions.

Celebrating Two Decades of Success: Penetron Italia

The success story of Penetron in Italy began more than 20 years ago in 2000. From its base in Turin just south of the Alps, a small, but dedicated team of partners set out to firmly establish Penetron's crystalline technology in Italy and become a trusted resource in concrete waterproofing and durability solutions.

Marking initial successes with major projects such as Milan Sud (Depuratore Sud di Milano) and Metro Torino, the team quickly expanded through a national network of direct representatives and distributors. As a results of these efforts Penetron Italia soon emerged as a reliable, and respected supplier to the Italian construction and engineering community.

By combining end-to-end services with the unmatched performance of the world's most advanced crystalline system, Penetron Italia constantly advanced concrete durability research and formed strategic alliances. Under the leadership of Arch. Enricomaria Gastaldo Brac, the company quickly established the Penetron brand as a recognized name in the Italian building sector.

Today, the Penetron Italia team and national network acknowledges the support of a growing customer base with a "sincero grazie"!

And "avanti tutta" into the next 20 years…

Mr. Enricomaria Gastaldo Brac, CEO/Managing Director of Penetron Italia srl and Mr. Florian Klouda, Director, International Account Coordination of Penetron International Ltd. at the award ceremony of Penetron Italia's 20th anniversary.

San Jose Hospital, Melpilla, Chile

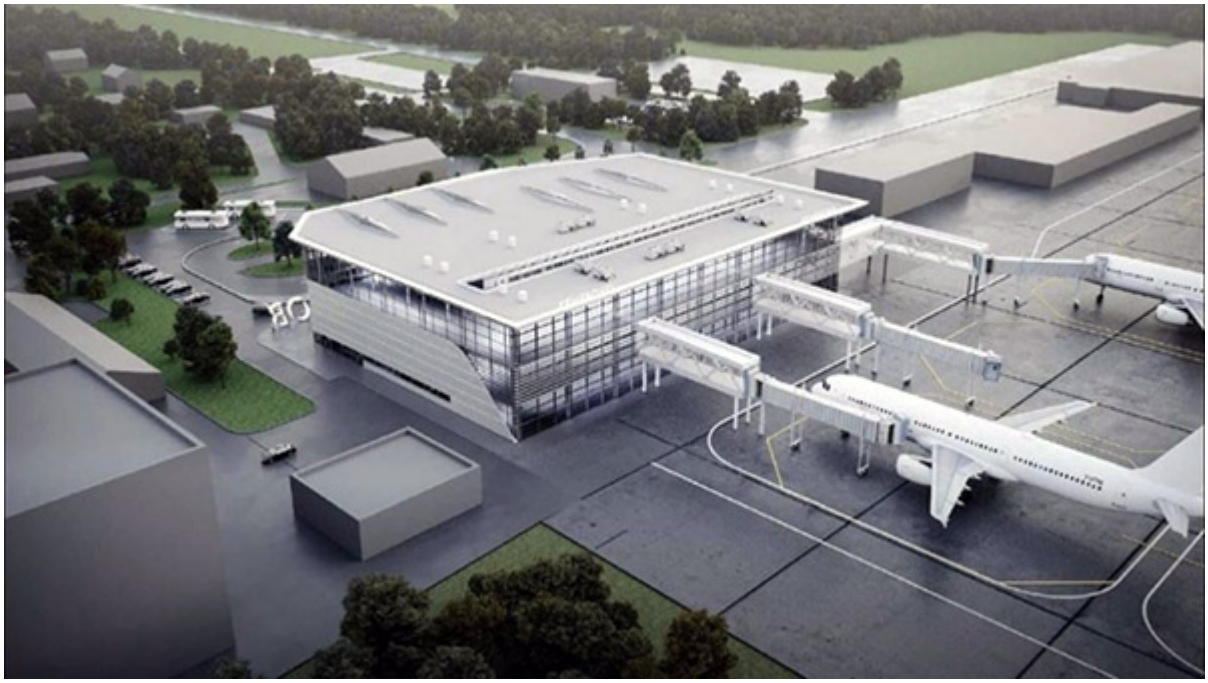
Healthcare in Melipilla has a long history. Its first medical facility – essentially a room with 12 beds – was built in 1865. Since then, successive hospitals were continually rebuilt and expanded. The most recent hospital, a US$134 million project for a significantly larger medical facility, was commissioned by the Chilean Ministry of Health and designed by the architect, Hugo Silva Soto. The new Hospital San José replaced the previous care center (9,814 m²) with a full-service hospital (60,834 m² / 660,000 ft²) with 239 beds, 7 surgical pavilions, and 410 parking spaces (350 underground).

Because of Chile's dramatic seismic history, the new facility incorporated a system of seismic isolators to help significantly reduce vibrations to the buildings during an earthquake. This will help avoid major structural damage in the future.

Initially, San José Constructora, the general contractor, specified a competitive waterproofing solution. But once the Penetron Chile team showed how PENETRON ADMIX would more effectively reduce concrete permeability and provide a lower-cost waterproofing solution, the Penetron solution was specified.

Ready-Mix Hormigones, the ready-mix supplier, treated 13,000 m^3 of concrete with PENETRON ADMIX, which was added during the batching phase. The treated concrete was used for the retaining walls and foundation slabs of the new hospital.

Aleksey Leonov International Airport, Kemerovo, Russia



The Kuznetsk Basin in southwestern Siberia, also known as Kuzbass, is one of the largest coal-mining regions in Russia. The Basin covers an area of around 10,000 square miles (26,000 km²) and possesses some of the most extensive coal deposits in the world. Kemerovo is the economic hub of the region.

Originally built in the 1960s with two modest-sized ground-floor terminals, the expansion and modernization of the Kemerovo airport was long overdue. The newly completed project, developed by GK Spectrum in collaboration with ASADOV Architectural Bureau, adds an expansive glass and concrete terminal with two telescopic passageways. The arrivals and departures zones are now on different levels, and capacity was increased from 200 to 460 passengers per hour. The new terminal also includes special service and business class lounges.

The new, expanded larger airport is named after Aleksey Leonov, a famous Soviet cosmonaut, who was the first person to walk in space in 1965. He also commanded the Soyuz capsule in the Soyuz–Apollo mission, which docked in space for two days with an American Apollo capsule in 1975.

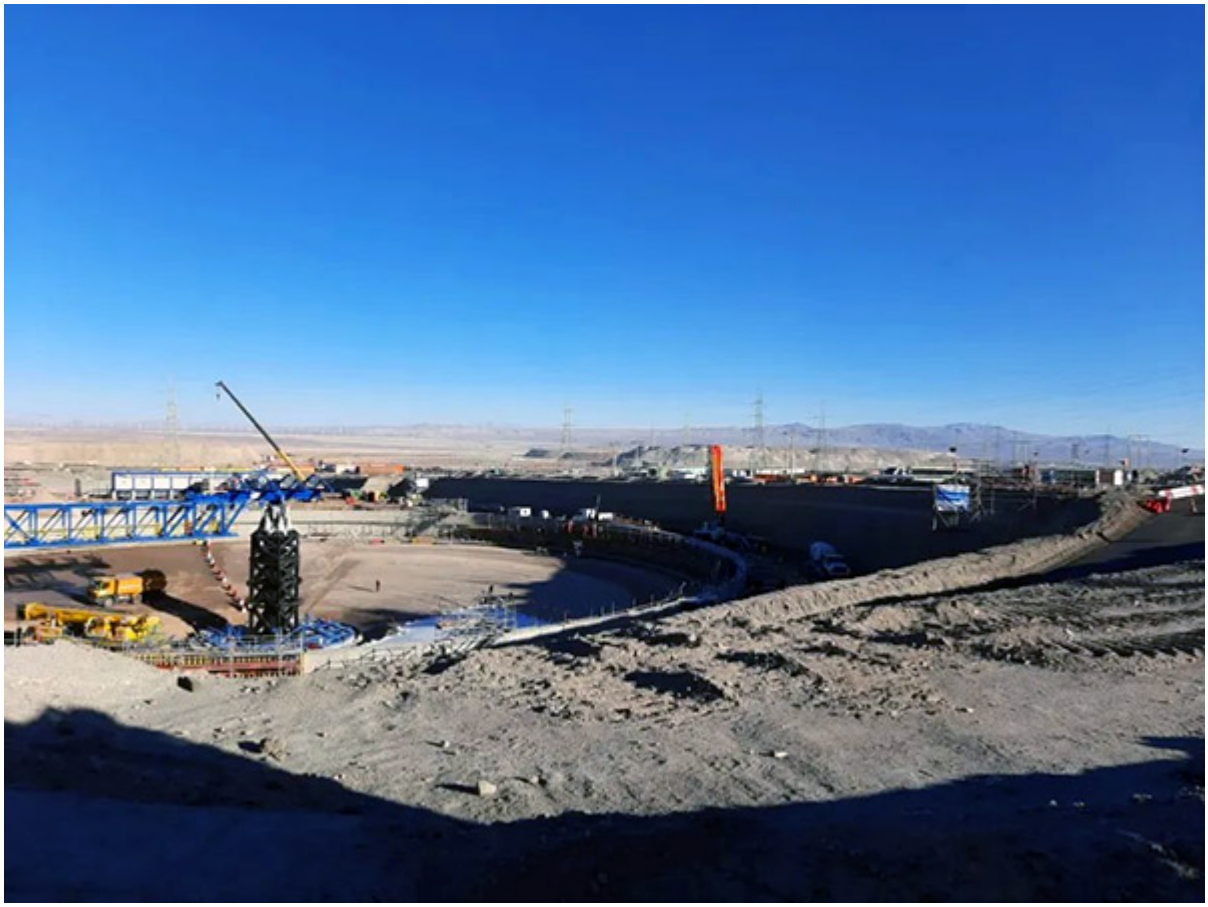
Because of the well-known challenges of the cold Siberian climate, Penetron Kuzbass, the local Penetron representative in Kemerovo, was asked to provide a robust concrete waterproofing solution for the reinforced concrete structures of the terminal's basement structures and to protect any exposed concrete from damage caused by freeze-thaw cycles common to the region.

The Penetron System was recommended to provide the concrete basement structures with the much-needed protection. A combination of PENECRETE MORTAR, a crystalline waterproofing mortar used to repair cracks, and PENETRON, a topical crystalline waterproofing material applied as a slurry, was used to provide durability and permanent protection for the new airport terminal structures.

Built by the Limak Marash Group, the project's general contractor, the new airport terminal features three above-ground floors and a below-grade basement floor, which houses the pumping stations, various tunnels, and rooms for technical and supply infrastructure.

Today, Kemerovo's Alexey Leonov International Airport (KEJ) is one of two major airports in the Kemerovo Oblast area of southwestern Siberia. The expanded facility can accommodate small and medium-sized airliners, as well as military aircraft. Annual passenger volume at the new airport is expected to reach 2 million passengers by 2028.

Spence Mine, Antofagasta, Chile



Broken Hill Proprietary (BHP), formerly known as BHP Billiton, is an Anglo-Australian multinational mining, metals and petroleum company headquartered in Melbourne, Australia. As the owner of Escondida, the world's biggest copper mine, the company is one of the largest copper producing companies in the world.

BHP's $52 million infrastructure project to expand the Spence open-cut copper mine in northern Chile, also known as the Spence Growth Option (SGO), will extend the service life of the mine by approximately 50 years. The SGO project upgraded the mine pit, the mine's waste dump, the concentrator plant, and the powder magazine. In particular, the project included the design, engineering, and construction of a conventional, large-scale sulfide concentrator for both copper and molybdenum ore. The concentrator's concrete tank is exposed to a variety of chemicals, including but not limited to copper sulfide, iron, and a series of salts of other metals.

Because of the aggressive physical and electro-chemical processes used to extract copper from its ores, the technical specifications for permeability of the concentrator's concrete tank were rigorous. The originally specified waterproofing solution, a pore sealer product, did not meet the project's required permeability standards, which led to a search for a more robust alternative.

The ready-mix supplier, Petreos Society, recommended PENETRON ADMIX-treated concrete as the only waterproofing solution capable of meeting the project's permeability specifications. Salfa Corporation, the project's general contractor, specified PENETRON ADMIX to treat 13,000 m^3 of concrete for the concentrator tank.

Thanks to the excellent performance of the PENETRON ADMIX-treated concrete, the general contractor subsequently decided to expand the use of PENETRON ADMIX to other structures planned for the SGO upgrade project.

Riviera Maya Nickelodeon Resort, Quintana Roo, Mexico

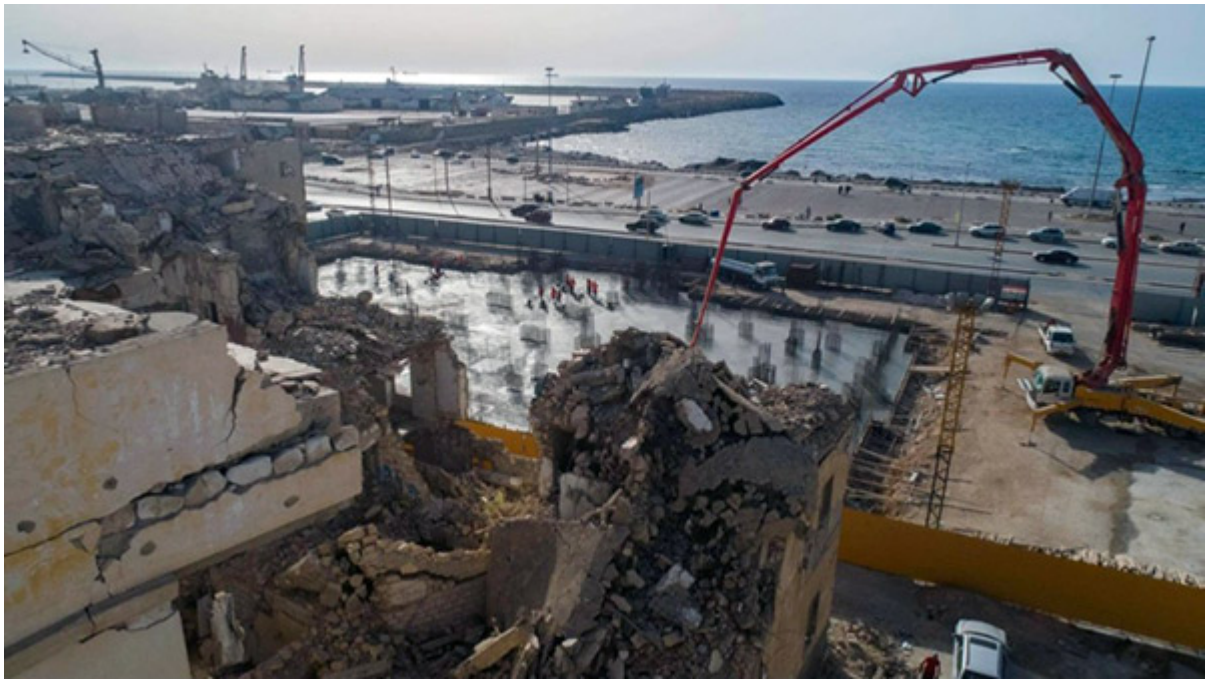
Located just 17 miles (27 km) south of Cancun International Airport, México's first Nickelodeon Resort is a family beach vacation destination with a playful Nickelodeon twist. The resort's 280 suites all offer panoramic views of the Caribbean Ocean and have direct access to the pool area. In addition, the resort has six restaurants, three bars, a spa, an oceanfront pool, and the 6-acre Aqua Nick™ water park with over 20 water slides (total length: >600 m / >2,000 feet) and 555 meters (1,830 feet) of rivers.

Nickelodeon resorts play off the network's most popular characters. For example, the Pineapple Suite is inspired by SpongeBob's pineapple-shaped home under the sea; the rooftop Lair Suite is designed as an underground lair dedicated to the Ninja Turtles; and the Big Kahuna Suite is an homage to the history of Nickelodeon animation.

Penetron México worked together with Benau Comercial, the Penetron distributor for the Caribbean region of México, and the general contractor to develop a complete range of waterproofing solutions, as both the below-grade and above-grade structures of the Nickelodeon complex needed protection from the coastal environment, high groundwater levels, and exposure to the tropical climate of the Yucatan Peninsula.

Local ready-mix suppliers provided PENETRON ADMIX-treated concrete for the pools (the wading pool, children's pool, and main pool), hot tubs, the tanks of the wastewater treatment plant, and the hotel's planter boxes. Penetron's topical products – PENECRETE MORTAR and PENETRON – were applied to waterproof and repair the concrete roof slabs, the water slides, the pool drains of the main pool, the Lazy River and Rapid River concrete linings, the water compensation tanks, pumping tanks, machine room roof, and water park fountains.

North Benghazi Court Building, Benghazi, Libya



The April 2022 completion of a new North Benghazi Court Building sets a positive and hopeful sign for the rebuilding of war-torn Libya. PENETRON ADMIX was specified to protect the below-grade concrete structures of the complex from the saltwater environment of the nearby Mediterranean Sea.

The North Benghazi Court Building functioned as the headquarters of the Revolutionary Council of Libya after the overthrow of Colonel Ghaddafi in 2011. However, the Court complex was

destroyed during the ensuing civil war that wracked the country. In 2021, the Revolutionary Council launched a project to build a new complex.

The project's general contractor, Ahel al Thika Construction, worked with the Libyan Center for Engineering Consultants, who provided structural design and technical support, to build the new North Benghazi Court Building. The new complex comprises three above-ground floors housing the courts and various offices, and a below-grade basement floor for the court archives.

Because the new Court complex is situated immediately adjacent to the Benghazi beach and the Mediterranean Sea, a reliable solution to prevent chloride ion penetration and the resulting corrosion of the Court's reinforced concrete structures was required.

Based on the results of various Penetron projects that successfully met the challenge of building in a marine environment – in northern Africa and around the world – the project's technical consultant specified PENETRON ADMIX and PENEBAR SW-45A swellable waterstop strips.

Elmothida Concrete, the concrete ready-mix supplier, delivered the PENETRON ADMIX-treated concrete for the basement slab and retaining walls. PENEBAR SW-45A was used to permanently seal the construction joints.

Strata Wynwood, Miami, USA

The $71 million Strata Wynwood project was developed by CIM Group and One Real Estate Investment. Located in Miami's popular Arts District, the 1.78-acre site spans a full city block. The multi-use development comprises 27,000 ft² (2,455 m²) of street level retail and studio space, with three office floors (approximately 60,000 ft²/5,455 m²) above. The site is topped by two eight-story towers housing 257 apartment units (with studio to three-bedroom layouts) overlooking the amenity areas, which include a business center and computer lab, outdoor pool with cabañas and a clubhouse, a fitness center, and a residents' lounge and grill. Strata Wynwood also has a garage with 480 parking spaces.

Penetron was asked to provide a more reliable – and cost effective – alternative to the originally specified membrane system. The local Penetron expert worked together with Stantec Consulting Services, the project's structural engineer, and Paramount, the waterproofing consultant, to come up with an optimal concrete waterproofing solution. Cemex, the ready-mix concrete supplier, provided a PENETRON ADMIX-treated concrete mix for the below-grade pad foundation footings and elevator pits of the Strata Wynwood project. PENEBAR SW-55, a swellable waterstop, was installed along the construction joints and around penetrations found in the elevator pits.

Universal Studios, Beijing, China

Upon its opening, Universal Beijing Resort became the third Universal Studios theme park in Asia (after Osaka, Japan, and Singapore), and the fifth Universal Studios theme park in the world. The new ¥20 billion (US$3.15 billion) theme park in Beijing covers an area of 120 hectares (296 acres) with numerous "Chinese elements" tailored for the domestic market. Over 10 million tourists a year are expected, with a peak of 15 million visitors per year.

The Universal Beijing Resort comprises seven theme parks, with more than 20 entertainment attractions, including: "Kung Fu Panda Land of Awesomeness," "Transformers Metrobase," "Minion Land," “The Wizarding World of Harry Potter," "Jurassic World Isla Nublar," "Hollywood," and "WaterWorld." Thanks to the popularity of the Kung Fu Panda film franchise in China, the Kung Fu Panda Land of Awesomeness attraction is now an independent theme park for the first time.

During the planning phase of the project, the Universal Parks & Resort engineers met with Penetron China to learn about Penetron-based solutions for concrete waterproofing and durability. The Penetron team introduced the range of Penetron products, their non-toxic certification (NSF-61-approved), and highlighted the many successful theme park projects around the world – and similar projects in China over the past 20 years.

Subsequently, PENETRON ADMIX was selected for the construction of the waterways and pools for both the WaterWorld and Kung Fu Panda Land of Awesomeness theme parks.

The product was added to the concrete mix at the concrete ready-mix plant. China Construction First Group Construction & Development, the general contractor for the two theme parks, used PENETRON ADMIX-treated concrete for the huge water pool and waterways alongside the pool’s edge of WaterWorld, and the large network of waterways in the Kung Fu Panda Land of Awesomeness.

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