

PREPRUFE®, BITUTHENE®, HYDRODUCT® Structural Waterproofing Solutions

Waterproofing Las Vegas McCarran International Airport's New Terminal 3



Architect's rendering of the new Terminal 3 at McCarran International Airport in Las Vegas, Nevada

The project includes a 1.8 million sq. ft. terminal building on three levels. Terminal 3 will be linked to existing Concourse D by an underground, automated people-mover system (ATS). A total of 887,000 sq. ft. of Grace Preprufe® and 441,000 sq. ft. of Bituthene® waterproofing membrane along with Hydroduct® drainage composite protect the new terminal building, underground ATS tunnel and station, central plant and utilidor from ground water and hydrocarbon runoff from aircraft operations.

A Rich History and Booming Future

Nearly half of all visitors to Las Vegas arrive by air at McCarran International Airport, making it one of the 10 busiest airports in

the United States. Airside improvements have enabled the airport to safely handle the growing number of aircraft operations, but the two existing terminals, airport roadway and parking facilities could not handle its annual capacity target of 53.6 million passengers. A \$2.4 billion improvement plan was initiated that features the construction of Terminal 3, the addition of 14 more gates, and a new automated people-mover system that connects Terminal 3 with McCarran's existing Terminal 1 via an underground tunnel, maximizing the use of the limited space available on the landlocked site.

"Grace sales representative Dan Kuball and the whole Grace team have been very supportive during design process and have been an excellent technical resource. I would recommend that Grace waterproofing products be specified on similar projects in the future."

David Moss
Principal, Pierce Goodwin Alexander & Linville, Inc.



Grace Preprufe® Pre-Applied Waterproofing System



Grace Bituthene® Self-Adhesive Membrane Waterproofing

Designed by Pierce Goodwin, Alexander & Linville, Inc. (PGAL) architects, Terminal 3 has its own central plant, roadway, parking garage, ticketing counters and baggage claim. Passengers will be conveyed in comfort by the underground people-mover system to and from the existing D Gates Concourse of Terminal 1, about 900 feet to the south.

No Gambling with the “Water Table”

While bustling McCarran International currently has more than 1,300 slot machines located throughout its existing terminal buildings, the Department of Aviation isn’t gambling with the Terminal 3 project. Because the train station and utilidor tunnel are in the water table, waterproofing is

critical. The materials specified must provide trouble-free resistance to hydrostatic pressure from the groundwater – and would have to be installed during cold and severely hot weather. In addition, notes David Moss, a PGAL Principal, “Aircraft will be parking directly above the train station and the tunnel and it was very critical that the waterproofing system withstand water and also hydrocarbons that may leak from the ramp.”

Product Selection Criteria

After consulting with Grace representatives, Moss chose to use the Grace Preprufe® Pre-Applied Waterproofing System, Grace Bituthene® Self-Adhesive Membrane Waterproofing, and Hydroduct® Drainage Composite systems because they are “tested and proven products” that were used in an existing tunnel to the D Gates that was built just prior to the September 11, 2001 attacks. “The previous use of similar Grace products met the owner’s expectations, and their comfort level with this high-performing compatible waterproofing system was another consideration,” he said. In addition, Grace also provided single-source warranty responsibility for the specified Grace Preprufe and Bituthene membranes and Hydroduct drainage composite. The specifications include 3rd party inspection and a 10-year warranty.

Shelly Hayden, the Manager of Airport Architecture for the Dept. of Aviation reported: “Other products don’t compare to Grace’s Preprufe pre-applied waterproofing system.”

“Grace Preprufe, Bituthene, and Hydroduct products were tested and proven products. The previous use of similar Grace products met the owner’s expectations, and their comfort level with this high-performing compatible waterproofing system was another consideration.”

David Moss
Principal,
Pierce Goodwin Alexander & Linville, Inc. (PGAL)

Construction

Together, the station and the tunnel comprise the “Early Site Package” of the Terminal 3 project and represent about 600,000 square feet of excavation and construction, requiring 275,000 sq. ft. of Preprufe and 370,000 sq. ft. of Bituthene waterproofing membrane along with Hydroduct drainage composite. Subsequent stages—the terminal building foundation, central plant-utilidor package, and roadway package require 612,000 sq. ft. of Preprufe and 71,000 sq. ft. of Bituthane.

After excavation, a mud slab, or raft, about 2 inches (5.08 cm) thick was poured to provide a smooth, level subsurface for the underground floor slab. Then Grace Preprufe 300R

“We have had no problems. The Grace products are going down real well, excellent.”

Bruce Martin
Senior Project Manager,
Commercial Roofers, Inc., Las Vegas, NV

membrane, specifically designed for use below slabs, was installed. Preprufe 300R is a 46 mil (1.2 cm) thick membrane, comprising a high tensile strength, puncture-resistant HDPE film, coated with Grace’s patented Advanced Bond Technology™ (an aggressive adhesive that bonds securely to poured concrete). Preprufe forms a permanent, seamless seal against water, unlike conventional non-adhering membranes, which cannot prevent water ingress between the membrane and the concrete structure. Preprufe’s high tensile strength withstands the stress of ground settlement.

The Preprufe 300R membrane was installed on the mud raft, adhesive-side-up, and ready to bond to the poured concrete. After reinforcing steel was put into place, concrete was poured to form the floor slab, which varies from 12 to 48 inches (30.5 to 121.9 cm) thick. Below the station floor, a maintenance area was built to allow work under the tram. At Sublevel 0, just below that, a 20 foot



Grace Bituthene® Deck Prep

(6.1 m) wide utilidor carries all the hydronic piping for Terminal 3 to the central plant, a distance of about 3/4 mile (1.2 km). The entire utilidor is wrapped in Grace Preprufe and Bituthene waterproofing.

Forms for the utilidor walls were then installed. After the wall concrete was poured, Grace Bituthene 4000 membrane was applied to the outside of the walls and sealed to the Preprufe by overlapping at the floor slab. Grace Hydroduct 225 hydrocarbon resistant drainage composite, another critical component of the system, was utilized to provide an escape for groundwater,



Grace Bituthene® Self-Adhesive Membrane & Grace Hydroduct® Drainage Composite

preventing hydrostatic pressure from building up on walls. A 1 1/2 inch (3.8 cm) thick polystyrene backboard protection layer was then installed on the Hydroduct before backfilling.

The installation of the formwork for the top lid of the utilidor followed and the top lid concrete was poured. Grace Bituthene Deck System was used for this critical section. Bituthene Deck System, a combination of Bituthene Deck Prep and Bituthene 4000,



Grace Preprufe® Pre-Applied Waterproofing System

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Shelly Hayden
Manager of Airport Architecture, Clark County
Dept. of Aviation (CCDOA)

As the gateway for one of the world's most popular travel destinations, we want to ensure we achieve that objective by building and maintaining state-of-the-art facilities, maximizing existing resources, and capitalizing on new and innovative technology.”

was selected due to its system performance as liquid and sheet waterproofing. It was covered by Hydroduct 660 drainage mat before backfilling.

In addition, the new Terminal 3 building foundation is waterproofed with 550,000 sq. ft. of Preprufe and 50,000 sq. ft. of Bituthane. The new central plant and utilidor is waterproofed with 45,000 sq. ft. of Preprufe and 21,000 sq. ft. of Bituthane.

As Randall Walker, Director of Aviation at McCarran, sums up: “The airport continues to be a reflection of the community's growth.

PROJECT CREDITS:

Owner: Clark County, Nevada, Department of Aviation (CCDOA)

Architect/Designer: Pierce Goodwin Alexander & Linville, Inc. (PGAL), Las Vegas Nevada

Waterproofing Contractor: Commercial Roofers, Inc., Las Vegas, Nevada

Grace Products: Preprufe® 300R & 160R membrane, Bituthene® 4000 membrane, Bituthene® Deck Prep® and Hydroduct® 220, 225, and 660 drainage composites

www.graceconstruction.com

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