U.S. Army Photo

Dry Under PRESSURE

Story by Grant Sattler

Construction of the largest project in the Wye River program has achieved a key milestone with the successful pressure testing of the pilot dry storage building at the Nachshonim Storage Base.

The pilot building recently passed a test procedure performed to American Society for Testing and Materials E 779-99 standards for both pressurization and depressurization, achieving results three times better than the target, said Jody Blackburn, Central Resident Engineer with the Israel Program Office. "In fact, the independent observer [from the Building Services Research and Information Association, England] said it was the tightest building he's ever tested," Blackburn said.

Yair Shani with the Israel Program Office oversaw the testing as he and other Foreign Service National employees picked up the extra work load while Corps engineers were relocated outside Israel during the initial months of Operation Iraqi Freedom.

Construction at the site began in September 2001 and is being accomplished by a U.S./Israeli Joint Venture firm of ABB SUSA, A. Arenson, and Baran Group as a design-build project. Israel Defense Forces, Corps of Engineers, and contractor designers are working closely together. Now almost a third complete, the base is expected to be finished in summer 2005.

Dry storage buildings, or DSBs in construction industry parlance, are a key feature of the $125-million base east of Tel Aviv that is designed for maintenance and long-term, low-humidity storage of Israel Defense Forces equipment and vehicles.

More than half of the 205 structures on the base are dry storage buildings. The 119 DSBs are built of common components, but in 14 different configurations, Blackburn said.

Most of the DSBs are placed at varied elevations on the hills around the base's circular layout, something like a pie sliced into 10 wedges. Roadways, like spokes in a wheel, connect interior and exterior ring roads. Built at the hub of the base are a logistics center for equipment maintenance and administrative space, dining halls, and support facilities for a cadre of about 500.

But it is the DSB that is key to the base's mission.

Built to support an Army reserve armored division, the Nachshonim Storage Base will store the supplies, vehicles, weapons, ammunition, and materiel for artillery, infantry, and armored brigades that would "fall in" on their equipment during a call up, start up their vehicles, and roll out ready to fight.

"The 119 dry storage buildings are the most important element of the base," explained Project Engineer Mike Roach. "Their importance is threefold: first, they protect the equipment from the elements; second, they keep the equipment secure; and third, they keep the equipment ready for service."

◄ Nachshonim Storage Base, located east of Tel Aviv.

Keeping the equipment ready to use over the long term is achieved through humidity control, Roach said. "Rust is the problem, even in a desert," he said. While providing shelter from sun, wind, and rain is commonplace, and providing a secure concrete building with intrusion detection is fairly routine, the true challenge is creating a building envelope that controls the exchange of air, he said.

Chief of Technical Coordination, Israel Program, Ezra Abraham said the basic DSB concept is that of a sealed envelope with military equipment inside that is accessed when needed through a large roll up door sealed around its perimeter. "… The concept is that there are dehumidifying units inside that take the moisture content of that air down to a low relative humidity that is ideal for the long-term storage of equipment," he said. "If you have too much air infiltration or exfiltration, it makes the dehumidifiers run longer than they should and consumes too much electricity."

Determining the rate of air exchange through testing also helps engineers choose the correct capacity dehumidifier for each DSB.

Although the Nachshonim Storage Base is inland from the coastal plain, the difference between desired humidity for long-term storage and the ambient outside air can be significant, Abraham said

"That's why this test was so critical. Because over the life of the facility, 20-30-40 years, the electrical bill could be very high," he said.

Abraham said designers borrowed heavily from cold storage building concepts in developing the DSBs, but that they are not insulated. "This is a very unique application to the dry storage building type," Abraham said.

Several critical areas to the buildings' success are the assembly and joining of wall and roof panels, the connection to the foundation stem walls, and of course, the seals for the personnel and roll up doors.

"Those had to be designed specifically for these buildings types," Abraham said of the segmented doors that are large enough to drive tanks through.

Roach said the concrete floors and walls are coated with special sealants, electrical and plumbing connections to the buildings are sealed, and vehicle exhaust extraction systems have motorized dampers.

Metal wall and roof panels feature a sandwiched polymer sheet that seals around fastening screws. Critical though, is the alignment between panels. Panel joints are sealed with gaskets and special flexible polymer tape at the corners.

"We inspect heavily during construction to see that all alignments are correct," Roach said. "The DSB is designed to control humidity both effectively and efficiently."

Blackburn said Israel Defense Forces, Corps of Engineers, and the contractor are achieving that aim by working closely together. "The IDF is intimately involved in all phases of the Design-Build project," he said. That teamwork includes engineering expertise from Europe District. For example, Louie Brackett reviewed electrical design and specifications and Ragan Glendon worked in concert with IDF designers on mechanical systems. Glendon has continued to be involved in the project, even after his move to Albuquerque District.

"The result is a building that performed in accordance with the accepted criteria," Blackburn said.

Larry Lucken, a mechanical engineer with Europe District, arranged the Quality Assurance testing. Lucken said the standard agreed to is three to four times the air tightness required for an air-conditioned office building. "We did meet and exceed the standard," he said.

U.S. Army Photo

Nigel Potter, an independent observer, verifies the results of the pressure test.