

# Keeping Disasters in Check...

## A Strong Defense for New Hockey Arena

To the University of North Dakota (UND) ice hockey team and its fans, scoring a new state-of-the-art ice arena is as exciting as winning multiple national hockey championships.

The new facility, named Ralph Engelstad Arena, will be a breakaway success for sure. When it opens in Grand Forks, North Dakota, in the fall of 2001, it'll be big, beautiful and have amenities galore.

But what most people won't be able to see are the number of built-in features that will better protect the arena in the future from the kinds of disasters that have hit Grand Forks in the past.

It was a \$100 million gift from former UND hockey goaltender Ralph Engelstad and his wife Betty that made the new \$80 million arena a reality. But it was the eight blizzards and record flooding that pummeled Grand Forks in late 1996 and early 1997 that influenced the decision to add disaster-resistant features, according to Jim Kobetsky, architectural designer for the project.

"These special features are definitely a result of Grand Forks being flooded in 1997," said Kobetsky of Schoen Associates, the architectural firm that designed the project. "If we hadn't flooded like that, we wouldn't have designed it to the extent that we did to protect it from future flooding and other types of disasters."

The facility, more than 400,000 square feet spread among five stories, will have a seating capacity of 11,400 and will be used for UND hockey games and other ice events. It will include a premier, recessed ice rink; a second practice rink; locker and weight-training rooms; 48 luxury suites; two large club rooms; a press area; and several concession and souvenir areas.

### Better Defense Along the Blueline

The site of the new arena, on 50 acres along the north side of the university's campus, is not in a floodplain. But it's close enough for discomfort. And there is a naturally high water table below ground.

So several flood-proofing measures are being added to protect the facility. Before construction began, the entire site was raised 4 feet. The new level puts the arena's main concourse above the 1997 flood level in that area. And, because the concourse encircles the recessed rink, the difference in elevation creates a "self-supporting dike system" inside the building, Kobetsky said. Outside the arena, the site also is slightly sloped to help water drain away from the structure.



*The new Engelstad Arena will better weather future storms because of several added disaster-resistant features.*

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Beneath the facility's 100,000-square-foot foundation an extensive "dewatering system" has been installed to keep groundwater from seeping into the structure. The system uses thousands of feet of hard-plastic, perforated piping covered with a fine, mesh screen and set in 2 feet of rock. As groundwater rises, it is intercepted by the piping and drained by gravity flow to sump pumps in each corner of the facility. The water then is pumped into the city's stormwater system. The mesh screen keeps silt and other foreign materials from clogging the pipes and interfering with drainage.



*Artist rendering of the new arena, scheduled to open in 2001. Courtesy of Schoen Associates.*

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The dewatering system already has been proven to work as designed, Kobetsky said. Periodic rainfall in the spring of 2000 during the rink excavation enabled the architects and contractors to actually see the drainage system handle the water. The impromptu tests were a success.

To further protect against seepage, a rubber membrane is being added to the foundation walls around the entire facility. The membrane will extend 18 feet up the walls to waterproof the structure, but will not be visible from the outside.

For added wind resistance, a heavier metal is being used for the roof to minimize the chance of damage from high winds.

"We know there have been problems with roofs on other buildings of this nature," Kobetsky said. "They've lost the metal protection of the roof and that's expensive. So we used a more stringent roof material that is designed to remain intact even in the case of very strong winds."

And to handle the big snowfalls common during North Dakota winters, extra features are being added to the roof. Because of the roof size, there is a danger of "snowslides"—large amounts of snow sliding down the roof and dropping onto passers-by. So a 3-foot-high galvanized steel fence has been added around the roof edge to catch the snow. Just inside the fence is a trough, 6 feet wide and 2 feet deep, which is lined with an electric melting system. Once the snow hits the fence, it drops into the trough where it melts and then drains into the building's gutter system.

### **Playing to Win**

The disaster-resistant features are important to Engelstad, who made his fortune as a contractor and real estate investor. In fact, they're so important that Engelstad ordered a design change after the arena construction had begun when he learned that flash flooding in the city of Fargo caused about \$10 million in damage to a public sports/events center there.

That facility, the Fargodome, filled with about 8 feet of water in June 2000 when heavy rains poured down a wide service ramp that led to the bottom level of the building.

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The new arena has the same kind of ramp, Engelstad said. And even though the initial ramp design utilized a naturally higher ground elevation to prevent flooding, another flood barrier is being added for more protection. Steel posts will be set into concrete on each side of the ramp. If there is a flood danger, double-thick plywood forms can be slipped down into the posts to shut off the ramp and prevent water from running down into the building.

Engelstad says he's successfully used that same technique 10 to 15 times at his hotel in Las Vegas during past flash flood events in that city.

"We've held back water up to about four-and-a-half feet high at the Imperial Palace," Engelstad said. "And that's water flowing about 20 to 25 miles per hour."

According to Schoen Associates, the extra disaster-resistant features have added about \$1.5 million to the overall project cost. It's an investment that Engelstad wouldn't dream of forgoing.

"We've tried to do everything we know within reason to protect the facility," Engelstad said. "There are certain things you can't stop. But it's cheaper to spend money now than to spend a whole bunch later. You can do it for pennies compared to what it's going to cost to do it afterwards or to repair the damage."

UND officials say they, too, are pleased with the added disaster protection. The campus sustained about \$40 million in damage from the 1997 floods, making it a painful but worthy lesson.

"The flood gave us a much better appreciation for how we build things and how we look at infrastructure," said Peter Johnson, university spokesperson. "We know there is a potential for another flood in this area. So these extra design features mean a lot. As a steward of the public's property, we want to make sure that property is protected. We'll sleep better, not only because that building is state of the art, but because it's protected in a state-of-the-art way."

For that, credit a former goaltender who still can make a spectacular save.