

## *Curtain Grouting Stops Leaks*

### **Facilities Management for College Campus Credits Special Grouting Technology with Ending Recurring Groundwater Infiltration**

*Fluctuations in Water Table Level No Longer a Problem*



Basement infiltration affected the entire lower level of a college classroom building. A tissue dropped at the wall line would flow toward the center of the floor.



The curtain grouting contractor guaranteed he would stop the water in the classroom building. He did, in only four days, and in time for the new school term.

Hutchinson, KS — Plant facilities management for Hutchinson Community College and Area Vocational School have credited a gel-mix chemical grout, and its special “curtain grouting” application method, with solving a recurring groundwater infiltration problem that had seriously affected a classroom building, a residence hall, and an elevator shaft. They also appreciated completion of the project by the deadline, which was the start of a new semester.

“We hesitate to endorse anyone, but we do with this contractor and his grouting technology,” said Gene Allton, the director of plant facilities. “Eight years ago you wouldn’t have gotten a good reaction from me about the chances for this type of solution. Everybody and their brother was a waterproofer for some bucks. But this product and its application were a very successful method for helping us keep up the high standards we have for serving our campus community.”

The contractor, Mid Plains Waterproofing, also in Hutchinson, applied a special chemical grout according to training provided by the manufacturer, Avanti International of Webster, TX. The customized application technique was originally developed for national security applications such as protecting missile silos.

#### **Recurring Problem**

The now-protected classrooms are in a 7,000 sq. ft. lower level of a 1970 addition to a 1940 original campus building. The lower level of the addition is partitioned into 4 classrooms, 5 offices, a mechanical room, 3 closets, and a hallway, and sits about 30 in. below the original building.

Water infiltration, observed as seepage from the exterior walls into the classrooms, was first noticed about five years ago. It was assumed to be the result of a rise in the water table, according to analysis conducted for a similar problem in a neighboring museum. The water was sopped up and the carpeting vacuumed wet-dry, and the problem seemed solved as the groundwater table apparently retreated.

However, the infiltration “came back with a vengeance” about a year later, this time affecting the entire lower level of the building. Water flow could be discerned around the footing line, and carpeting in several areas was extremely saturated. When the carpet was removed, the water continued coming in, reaching 1/4 in. to 1/2 in., and popping floor tiles loose.

“You could drop a tissue at the wall line,” recalled Don Rose, the assistant director of plant facilities, “and see it flow toward the center of the floor. It was like what we had experienced a few years before in the mechanical room of a residence hall, which contains electrical boxes and conduit, and you could see water flowing across the concrete floor, and in a new elevator shaft in another location, where the pit was leaking before they started using it, and then got worse. We don’t have any of those problems anymore.”

Through access to a monitoring well at the neighboring museum, and

an irrigation well on campus, the latest rise in the water table was estimated at 14 in. to 16 in.

“Before that latest rise, the basement level where the classrooms are located was right on the water table, which is probably about 12 ft. below grade,” said Allton.

“When the infiltration subsided after the recurrence four years ago, we replaced the carpeting with a vinyl composition tile for the entire floor. We also replaced the bottom 4 ft. of the sheetrock for every wall. In addition, we had an abatement firm come in to assure we adhered to protocol. All that was a major expense for the facility.”

“When the infiltration recurred again a couple of years after that, and again a year ago,” he continued, “custodial staff was able to keep up, but we wanted a better solution than that. The episodes could last for months, and we couldn’t afford to have staff constantly on water patrol, because that meant other routines would get done only every other day instead of every day.”

“When you’re missing wiping down chalkboards and tables, those are the kind of things that can add up to undermine the standard we have for facility management at the schools. So we started talking about how we might fix this once and for all.”

### Seeking a Solution

There were two candidates to solve the problem: dewatering wells, or waterproofing.

A civil engineering consultant recommended a minimum of three dewatering wells, each capable of pumping at 400 gal./min., at a cost of \$30,000 for each well.

“The wells work fine when you have power, but not when there are power outages due to storms,” Allton noted. “You’ve also got to have someplace to go for the water they pump, which would quickly overwhelm our storm water system.”

“Our system --- including sewers, burp basins, and gutters --- is situated on very flat terrain, and drains away very slowly. So we opted to go for waterproofing that would seal us up so the rising water would go elsewhere underground. Then we began the process of convincing the board of trustees to support it.”

The school had hired John Bredvick and his Mid Plains Waterproofing company about 8 years ago to end the problem in the elevator shaft, and the mechanical room after that.

“We had made numerous attempts to have the elevator company take care of it with their own folks, and had made no headway,” Allton recalled. “John came in and took care of the shaft within a day, and later also the mechanical room within a day.”

“We showed the board what it was like in the shaft now, and also in the mechanical room,” he continued, “and that helped get us their unanimous vote to have the contractor take care of the latest problem in the classroom building, where we were really feeling the pressure of a new semester coming up.”

### Problem Solved

“He guaranteed he would stop the water in the classroom building, and he did, in only four days, and in time for the new school term,” Allton concluded. “98-99% of the infiltration is gone, and John stops by and routinely checks with our office to make sure any minor seepages are taken care of. For the elevator, and in the mechanical room, where there are special challenges from pipes going in and out and some hidden spaces, he has not needed to visit at all.”

Even though the option to install dewatering wells had effectively been ruled out by reliability and operational concerns, their installation

would have cost about 50% more than curtain grouting.

Bredvick said the chemical grout from Avanti is a polymeric gel type, and includes a catalyst. It was injected through hundreds of holes drilled through porous concrete, spreading into a “curtain” outside the previously leaking walls, that came back toward the walls to create a full mechanical lock.

“We didn’t have to do any excavating, nor did we have to worry about weather problems,” he noted. “The grout has a 35-40 second set time. It starts with the viscosity of water and then comes back and gels up. We drilled varying numbers of holes at each location, according to the size of the crack and other factors, into the cracks or on either side, starting at the bottom. By taking care to get it in the right places, we didn’t use more grout than was necessary.”

He said the grout was injected at 300-600 psi, with the hydraulic injection system capable of injecting up to 1000 psi. It features a 2-way, gravity-fed piston pump.

### Special Grout and Application Technology

The AV-100 chemical grout manufactured by Avanti is a gel mix that includes a catalyst, and is available in powder or liquid form. For more information regarding Avanti’s specialty chemical grouts, techniques, or applications, contact Avanti International, 822 Bay Star Blvd., Webster, Texas 77598, Tel. 800-877-2570, fax 281-486-7300, [www.avantigrout.com](http://www.avantigrout.com).



Elevator company had been unable to solve shaft flooding in campus building using their own personnel and resources.



Curtain grouting contractor fixed shaft flooding within a day, and later also a similar problem in a mechanical room within a day.