Kid's Prank Responsible for Big Sewer Repair Bill

A SEEMINGLY simple kid's prank of throwing rocks and other material down a storm drain resulted in a major emergency repair job to prevent the collapse of a 42-in. sanitary sewer main in Spokane, Washington.

In a short period of time, a group of kids completely blocked an 18-in. pipe leading to the city's combined sanitary/storm drain system. The drain soon began to overflow, sending water streaming down the 800-ft, 33° west facing slope of Spokane's Latah Creek. Within a few short hours, the rushing water cut a large eroding trench 12 to 15 ft wide and deep at the top of the slope, and 3 ft wide by 6 to 8 ft deep at the bottom.

As the trench continued to erode the top portion of the slope, a 42-in. sanitary sewer main was exposed. Eventually, the highly erodible gravel-loam sand soil cut away ground support under the sewer main by 8 to 10 ft. As the trench widened, the exposed main threatened to collapse if its soil support was not replaced promptly.

The erosion was discovered within a few hours by a jogger, who contacted the city water department. City officials dispatched Waste Water Senior Engineer Bill Peacock, who immediately assessed the potential danger. Emergency crews consisting of 60 to 70 Spokane municipal employees were quickly assembled. The plugged drain was cleared to stop further runoff into the eroding trench. This would allow the storm drain system to stop any additional water from running down the slope. The manhole's damaged masonry work, a broken shoulder ring and manhole cover, were repaired and replaced a few days later.

"The location of the exposed sanitary sewer main was 150 ft below the access road in an area where equipment could not be used," said Peacock, "so a human chain was organized among all available personnel and positioned about every 2 to 3 feet to move about 100 cubic yards of sand in 1,300 sand bags, down the slope to the exposed sewer main. The crews worked 8 to 10 hours throughout the night, to pack the sand bags under the sewer main for temporary pipe support until we could design a permanent fix and install it."

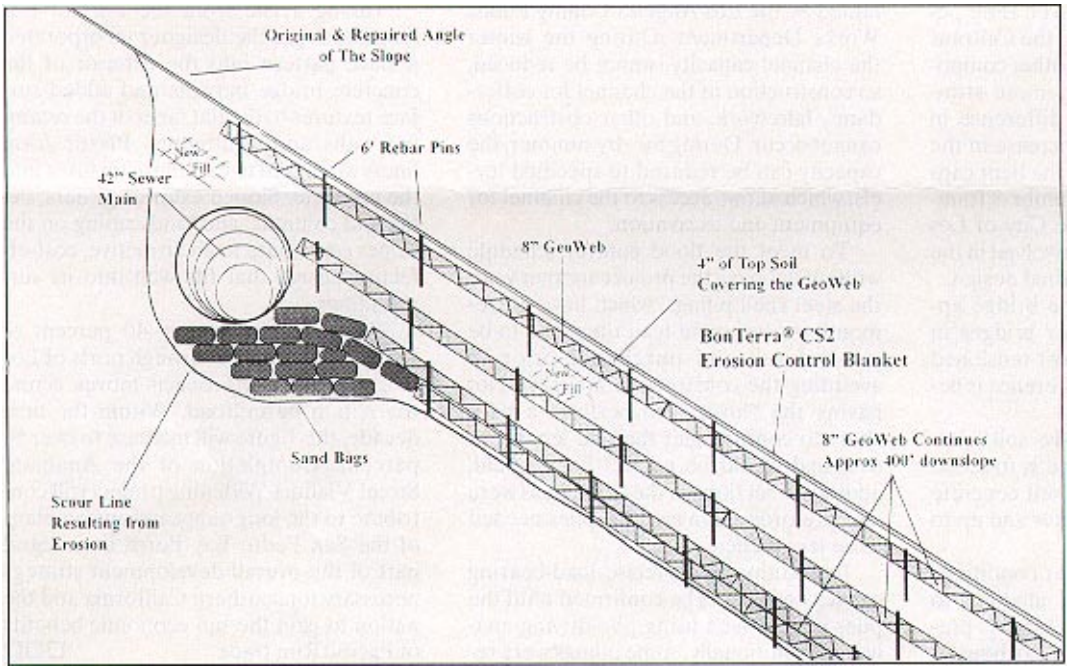
Next came the task of designing a method for rebuilding the slope, which had to be done quickly to prevent further undermining of the temporary support. Peter Vaughn of Terra Enterprises, Inc., Genessee, Idaho, was in Spokane for the 1994 Road Builders Clinic and saw a TV news report on the emergency sandbagging work. He contacted Peacock about some ideas for repairing the slope damage. The two met at the site the next morning to review the project first hand. Together they developed a restoration plan. Several solutions were proposed but subsequently rejected because of the location, slope angle, and limited access of equipment to the area.

Vaughn, who specializes in soil stabilization and erosion control problems, suggested a cellular confinement system manufactured by Presto Products of Appleton, Wisconsin. "We decided to use the Geoweb system," said Peacock, "because there was no way to get equipment up the side of the slope, so we couldn't compact the soil material. This was the only way we could lock the repaired area into the existing undamaged slope sides."

The proposed solution filled the eroded trench with soil and stabilized the slope with the Geoweb Cellular Confinement System, and revegetated the damaged area by broadcast seeding and applying BonTerra® CS2™ (30 percent coconut fiber, 30 percent straw) erosion control blankets. "This was the perfect solution for us," said Peacock.

The first step was to expand the smooth-wall Geoweb panels (8 ft x 20 ft x

■ **CHANNEL cut by erosion ran entire length of hill. Below, slope repair schematic.**



8 ft) and place them in position at the bottom of the erosion channel. The panels were easily cut to fit the eroded channel width, rather than having to enlarge the channel to fit the panels. Number 4 rebar stakes and six ft steel fence posts were used to anchor the panels to the undisturbed subgrade material. The stakes were installed at each joint and in the middle of the panels. The posts were driven four feet laterally into the slope, leaving two ft exposed to help anchor the next Geoweb layer. Using this method, the first two layers of soil-filled panels were locked into the slope. Each subsequent panel was attached to the adjoining panels with staples.

Next, a 2- to 3-ft layer of soil was placed over the already filled panels. Then, another section of Geoweb was positioned on top of the soil layer. This section was filled and anchored in the same way as the first two Geoweb layers. This method was repeated until the top level of the soil matched the contour level of the uneroded soil surfaces. The final lift of the backfill consisted of soil filled panels covered by a minimum of 2 in. of soil.

Because of the area and the severe angle of the damaged slope, just getting the 500 to 550 cubic yards of sandy-loam clay mixed soil to the location was a challenge. The soil was delivered down the slope to the crews installing the panels and filling the trench via a gravity-fed 15-in. PVC pipe. Access holes had been cut into the top of the pipe for cleaning if it became plugged. However, the length and angle of the slope allowed the soil to move fast enough through the pipe that plugging rarely occurred. Because of the abrasiveness of the fill soil, the pipe sections were nearly worn completely through by the end of the project.

The final grade of the repaired section was broadcast seeded with "hard red fescue" and covered with BonTerra American CS2 erosion control blankets. These 7.5-ft by 90-ft blankets maintained the seed, soil fines, and moisture during seed germination and plant development A 28-14-14 fertilizer was used prior to blanket installation. Planting was completed within three months after slope repair in May 1994.

"The entire Geoweb layered system was installed with little additional slope damage," said Peter Vaughn. "Site visits in May of 1995 and again in May of 1996 showed a well vegetated and stabilized slope, with no surface cracks or evidence of slumping in the repaired area. It looked as natural as it did prior to the erosion."

The entire project was installed and completed using Spokane municipal personnel consisting of six employees and one supervisor. (Not counting the 50 to 60 employees used for the emergency sand bagging operation on the first day of the erosion problem.) The repair work took 28 days to complete at a cost of approximately $82,000.