



## Topcon products aid Corps in flood control

The New Orleans District Corps of Engineers recently tried to determine if a stage control structure built near Zachary, La., in East Baton Rouge Parish was constructed according to design tolerances. The construction contractor's surveyor had collected 12,000 shots on the structure surface with a total station without being able to determine if it was within the strict tolerances required. Something more powerful was needed—and laser scanning turned out to be the answer.

The Amite River and its tributary, the Comite River, are the major causes of catastrophic flooding in the Baton Rouge metro area. The Lilly Bayou Control Structure, part of a regional solution called the Comite River Diversion Canal Project, will dissipate the energy of water flowing between the Comite and the Mississippi from a higher to lower elevation by traveling over a spillway featuring an elevated weir. The \$27.6 million second phase of the project consists of excavation and the construction of the concrete control structure, a stilling basin and an outflow

channel. The main surface slab was designed to have a 1 to 5 (1v: 5h) slope, a several-foot-thick substructure of mass concrete and large baffle blocks filling the stilling basin at the bottom constructed of 3,000-psi concrete. A 1-foot-thick, 5,000-psi concrete overlay was also placed on top of the substructure to handle the compressive force and abrasion generated by rushing flood waters.

At no more than 1/8 inch of deviation for every 10 feet of surface, the elevation tolerance on the structure is uncommonly tight to handle flow velocities that exceed 40 feet per second that could damage the structure. After the structure was built, though, deviations from the elevation tolerance on the sloped face were plainly visible using a straight edge.

Dale Stockstill & Associates (DS&A), agreed to perform the scan with a GLS-1000 laser scanner and perform the data analysis without a task order. The elevation did not adhere to tolerance throughout the structure surface, but the X and Y axes were fairly close to tolerance. So the crew performed the scans

**Company:** Dale Stockstill & Associates

**Location:** Carriere, Mississippi

**Project:** Lilly Bayou stage control structure

**Location:** Near Zachary, La.

**Project Scope:** Estimated \$187 million project includes 12-mile-long diversion channel from the Comite River to the Mississippi River, a diversion structure at the Comite River, guide levees, the Lilly Bayou stage control structure and several drop structures where the diversion channel intersects with roads, railroad bridges and bayous.

**Topcon Products:**

GLS-1000 laser scanner

AT-G1 AutoLevel

GPT-3105W Reflectorless Total Station

DL-500 digital level

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# AT WORK

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'They scanned the entire surface of this flume surface—I think it took them two to four hours—and they had something like seven and a half million points. It took about three days to collect about 12,000 points with the conventional total station.'

- Rick Tillman, structural engineer, U.S. Army Corps of Engineers

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from the existing control point, which was in place at the top and bottom of the large structure, knowing that the two scans could be corrected during the cloud registration process. After the initial scan was completed at the top of the structure, the data file was downloaded for the engineers to view in the construction trailer while the second scan was being taken.

DS&A technicians used a special software program to "color map" the deviations as related to the design plane. A specially designed ascii-type EM file that converts the point cloud data to a grid every foot laterally and half a foot longitudinally going down the slope was developed. The file extracted traditional points (point number, Northing, Easting, elevation and code) from the cloud at the specified intervals and Corps engineers and technicians evaluated the 3D structure. The Corps engineers also requested a CAD drawing that depicted the 1v: 5h slope as horizontal and contours that were related to the design plane.

The Corps made the project official and issued a task order for DS&A to survey and scan the structure. DS&A's crew returned to the project site and started from scratch, checking the project Permanent Bench Mark (PBM) with their Topcon GPS units, running precise three-wire level loops from the PBM to the PK nails on the



Left : Several million points were collected with the GLS-1000.  
Top: Topcon total stations, auto and digital levels were used for the project.



top and bottom of the structure with its Topcon AT-G1 AutoLevel, and using its Topcon GPT-3105W Reflectorless Total Station and its Topcon DL-500 digital level to obtain data under water and mud covering the stilling basin that could not be pumped out.

The laser scanner used to scan the Lilly Bayou Control Structure does not represent the fastest available technology. Recently Topcon unveiled the GLS-1500, which speeds up point cloud collection at a rate of 30,000 points per second and a range of 150 meters.

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## Topcon's GLS-1500

**Topcon's GLS-1000 has been upgraded to the new GLS-1500 so data can be collected even faster than before.**

- 30,000 precise points per second.
- Precise Scan Technology for industry-leading clean point cloud data
- Lens array optics technology to maintain distance accuracy from 1-150 meters
- Additional ranging past 330 meters
- Onboard scan control software stores scan data and images to a standard SD card for easy download
- Eye-safe and invisible Class 1 laser.

