

# THE American Surveyor

A FOOT IN THE PAST... AN EYE TO THE FUTURE

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## Monuments of Sand

### **Tractor Pull!**

Surveying instruments provide precise distance measurements in mega-horsepower tractor pulling contests.

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A longtime user of Maptech's Terrain Navigator Pro tells why he's hooked.

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How one Motor City firm uses a laser scanner for traditional surveying tasks.

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Satellite data saves time and money in supplementing aerial orthophotography.

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# VROOM!

>> By Paul Moody, LS

If you've never attended a tractor pull contest, you've missed a real treat. These are not your basic farm tractors, mind you, but souped up, mega-horsepower monsters with a roar you can hear from miles away.

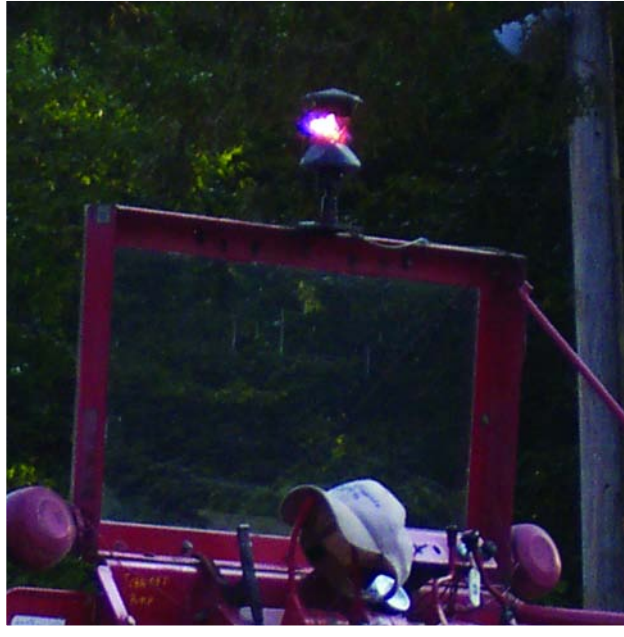


The Leica robotic total station made it possible to take precise instantaneous measurements of the distance traveled by each competitor.

The basic concept behind a tractor pull is simple. The object is to see who can drag a heavy sled the farthest on a 300-foot dirt track. The flat-bed sled has a huge steel and concrete weight mounted on the back. As the tractor takes off down the track, the weight begins to slide forward, thereby increasing the load, making it heavier and heavier as it is pulled down the track. Eventually, the vehicle slows to a stop, and the distance is measured.

That being said, in July 2004, our company, Lane Engineering, was contacted by the Tuckahoe Steam and Gas Association to ask for our help in making precise distance measurements for the ATPA East Coast Tractor Pull in Easton, Maryland. After discussing their requirements, we determined that our Leica robotic total station could do the job. Our offer was accepted, and on July 16, we drove over to Easton. I was accompanied by Bill Murphy from Leica Geosystems.

The competitors were divided into four classes, ranging from two-wheel drive and four-wheel modified single-engine



A prism was mounted on the sled, where it would be visible to the total station throughout the run. The total station tracked the prism and calculated the distance as each tractor made its run.





## TRACTOR PULLING 101

According to the American Tractor Pullers Association (ATPA), the concept of tractor pulling is based on the concept of who can drag a weighted sled the longest distance on a dirt track. The track is 300 feet long with white lines on each side as boundaries. If a tractor crosses the side lines it is disqualified. A puller gets two attempts to make a pull only if he or she aborts the pull before the 100-foot barrier (after which the puller can try again immediately or opt to be placed several pulls down in the order). The minimum qualifying distance is 100 feet. If more than one competitor travels more than 300 feet, more weight is added to the sled, and a "pull off" takes place.

The sled is hooked to the pulling vehicle with a chain. The sled consists of a box and pan. The box contains lead weights weighing a ton or more. The pan slides on the ground without much resistance at the beginning of the pull. The friction increases as the box, which is chain-driven, comes forward toward the front of the sled. Eventually the pulling vehicle slows to a stop, and the distance is measured.

**"I've done a lot of unusual jobs in my career as a surveyor, but this one ranks as one of the most unique."**

trucks with 2,000+ horsepower up to super-modified tractors with diesel, aircraft, or multiple engines. When these ground-pounding monsters get going, the roar is deafening.

In addition, there was a crowd-pleasing display of "minis", which are basically modified riding lawn mowers with enormous souped up engines. These were great fun to watch. There's nothing quite like seeing a little mower tractor that can do a wheel stand.

Upon arrival at the track, Bill and I set up the Leica TCRA1105 robotic total station, which we interfaced with an Allegro RCS remote controller with Carlson SurvCE data collection software. We used the application "Stake to Line/Arc" to set up the baseline that would be used to calculate distance traveled down the track. We mounted a prism on the sled where it would be visible to the total station. As each tractor hooked up to the sled and was staged at the starting line, we locked onto the prism. The robot then tracked the prism as the tractor roared its way down the run. Once the tractor bogged down and could go no further, we would stop the measurement and store the results. We would then radio the results to the announcer in the booth, who would announce the results to the audience.

The event organizers said they were very glad to have us there. They told us the robotic total station made measuring a lot faster and safer. In the past, a team of three or four people took the measurements using a 200-foot cloth tape, while enormous tractors moved up and down the track in the semi-dark-

ness. In contrast, we were able to determine the distance before the tractor was unhooked to move the sled back to the starting point. Our measurements were also more precise; for each competitor we measured to the same point fixed on the sled rather than relying on someone's estimate of a perpendicular line to the sidelines or a best guess.

The pullers were also happier. On several occasions at past events there were tie scores between two competitors, since the measurements with cloth tape were only accurate to an inch. Using the robot, we were giving them the distance to the nearest hundredth of a foot. This avoided the necessity for tie-breaking re-pulls. The competitors explained to us that they hate re-pulls because they don't allow sufficient time to cool down the equipment, increasing the likelihood of a breakdown.

In case you're interested, the winner of the Modified class this year was Nancy Howard Weller of Taneytown, Maryland, pulling a 7,500-lb tractor called "Hot Damn." The tractor is powered by a 1,710 cubic inch Allison Aircraft engine. In her profile, she said her hobbies (besides pulling) are cooking, baking and preserving.

I've done a lot of unusual jobs in my career as a surveyor, but this one ranks as one of the most unique. I'm already looking forward to next year's pull, but next time I'll pack extra ear protection. *A*

*Note: If you'd like to learn more about the sport of tractor pulling, visit the American Tractor Pullers Association website at [www.atpullersonline.com](http://www.atpullersonline.com).*

Paul Moody is Survey Manager at Lane Engineering, Inc. in Easton, Maryland. His survey experience since 1986 in the Washington, D.C. metro area has included projects for residential, highway and bridge construction, military bases and the Pentagon.