

Highway & Airport  
Paving Equipment

Concrete Batching  
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Canal Construction  
Equipment

Trenching  
Equipment



# Stringless Paving Systems

Stringless Solutions for G&Z Paving Equipment



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# HIGHWAY AND AIRPORT CONCRETE PAVING EQUIPMENT

Guntert & Zimmerman's (G&Z's) Slipform Paving Equipment are the most trusted machines in the business. In 1956, G&Z pioneered and introduced the first concrete highway and airport slipform paver mounted on crawler tracks with automatic line and grade control. Today, G&Z offers a wide range of concrete slipform paver models along with other support equipment, such as mechanical Dowel Bar Inserters, Placer Spreaders and Texture Cure Machines to suit your present and anticipated future needs.

These equipment designs are based on G&Z's more than half a century of experience. G&Z paving equipment is built to last under the rigors of job site use, transport, and configuration changes. Unique productivity features are incorporated in the machine design to reduce the time required to transport, maneuver, and change paving widths without sacrificing the performance advantages contractors have come to expect from a G&Z.

# *Leica*

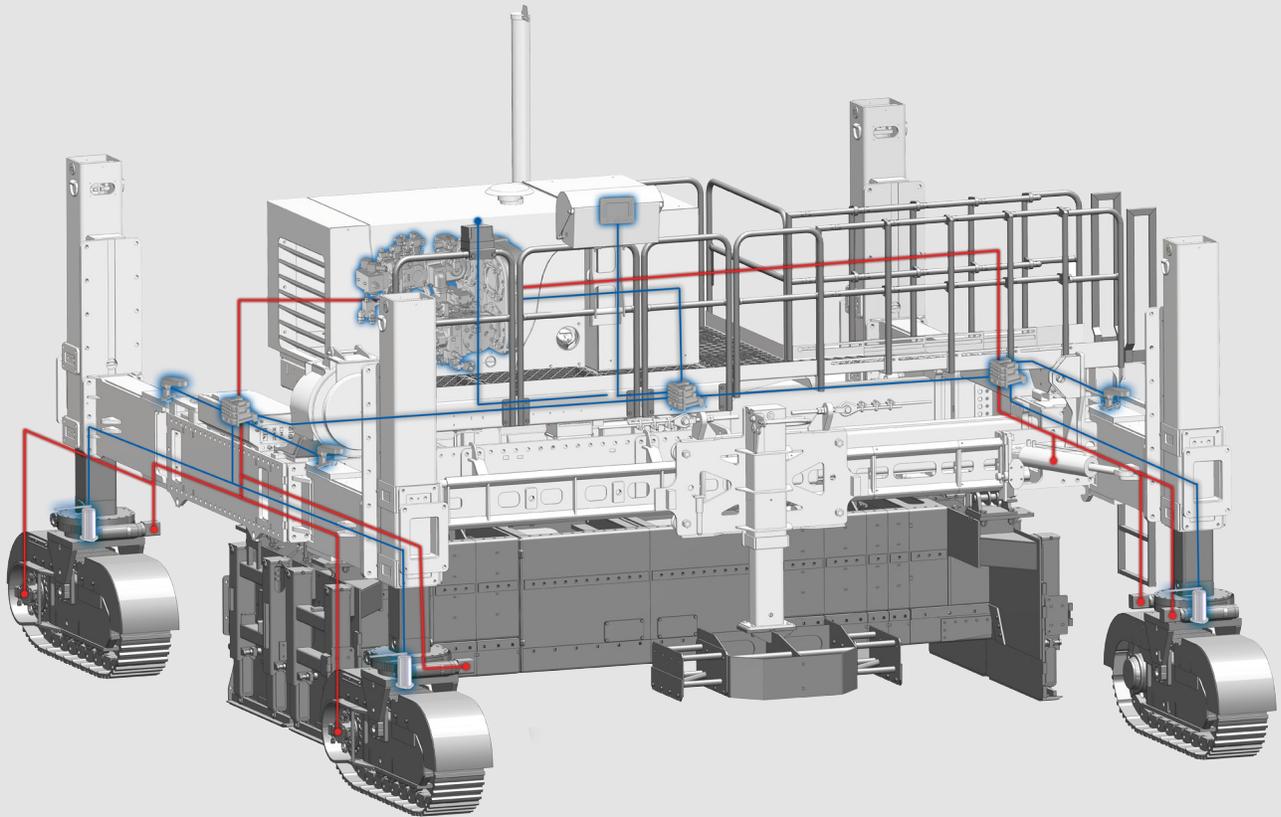
## *Geosystems*

With close to 200 years of pioneering solutions experience to measure the world, Leica Geosystems products and services are trusted by professionals worldwide to help them capture, analyze, and present spatial information. Leica Geosystems is best known for its broad array of products that capture accurately, model quickly, analyze easily, and visualize and present spatial information.

Those who use Leica Geosystems products every day trust them for their dependability, the value they deliver, and the superior customer support. Based in Heerbrugg, Switzerland, Leica Geosystems is a global company with tens of thousands of customers supported by more than 3,500 employees in 28 countries and hundreds of partners located throughout more than 120 countries around the world. Leica Geosystems is a member of the Hexagon Group, Sweden.

# OPERATION SOFTWARE

For Concrete Slipform Paving Equipment



G&Z's Concrete Slipform Paving Equipment Operation Software is a cutting edge Operator Control System that incorporates user friendly operator features and networked micro-controllers to allow extensive monitoring and performance tuning capabilities. G&Z's software engineering team has taken paver operation and reconfiguration to a new level. With automated processes for many features and configurations it's never been easier to operate a piece of slipform paving equipment. The Operator Console features intuitively organized switches making this an extremely durable, easy to use interface. This system is available standard on the S600, S850, S1500, TC1500, and PS1200. With current advances to the Operator Control System, Stringless Guidance is available with the Leica 3D Stringless System by utilizing G&Z's NoLine: Stringless Preparation Kit.

# NoLINE

## Stringless Preparation Kit



The NoLine: Stringless Preparation Kit can be included as an option on all G&Z Pavers and Support Equipment. NoLine is comprised of a software upgrade and a hardware kit. The NoLine Software Upgrade integrates the use of stringless technology directly into the machine's CANBus network. The NoLine Hardware Kit provides telescopic masts for the total station prisms (only necessary on pavers) and battery backup. NoLine makes paving stringless easy through reliable, proven and integrated software.

# LEICA MACHINE CONTROL

Software and Hardware for Machine Control

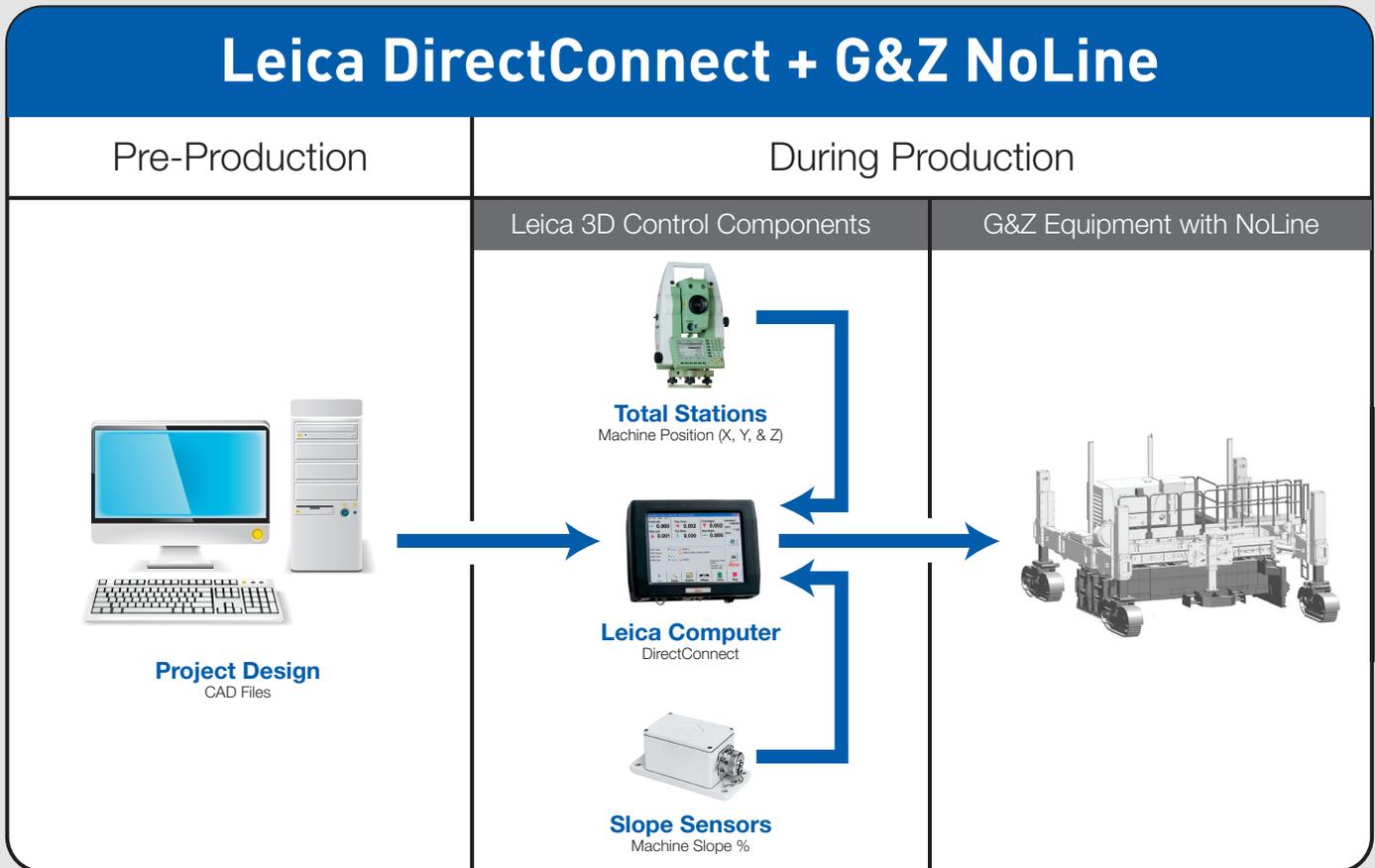


Leica Geosystems is proud to be the industry's first one-stop-shop provider for earthmoving, grading, milling and paving solutions. Leica Geosystems' PaveSmart 3D (LMGS-S) allows contractors to dispense entirely with the need to set stringline for concrete placing/spreading and slipform paving. By having the 3-dimensional digital jobsite plans onboard the machine, these "virtual stringlines" eliminate all the logistical, cost and accuracy-related issues associated with setting & maintaining physical stringline. PaveSmart 3D allows you to minimise outlay on engineering staff & materials, and most importantly stay ahead of your competitors in today's ever more competitive market.

What's more, PaveSmart 3D uses Leica total stations and GNSS receivers which can also power all your site survey and engineering tasks, as well as control scrapers, excavators, bulldozers, motorgraders and fine-grade trimmers when used with Leica's full range of machine control solutions, offering you rapid return-on-investment in machine control technology.

# LEICA PAVESMART 3D

Stringless Paving Solution



Leica Geosystems' unique, world's-first 3D paving control system, was successfully launched over a decade ago, and is continuously refined, based on Leica's worldwide user community's feedback to save contractors time and money, increase site safety and optimize paving jobsite logistics.

Replacing stringlines, Leica Geosystems total stations precisely track the machine's position and elevation. A PC mounted on the machine calculates and compares to the design model's grade and position. Steer and elevation corrections are sent to the G&Z microcontroller via the NoLine Software Upgrade, which regulates the paver's hydraulics for precise control resulting in smooth pavements.

# CONCRETE SLIPFORM PAVERS

Leica PaveSmart 3D (LMGS-S) with Total Stations



**S600**



**S850**



**S1500**



G&Z and Leica have worked closely together to ensure that the G&Z Concrete Slipform Pavers work seamlessly with the Leica PaveSmart 3D (LMGS-S) System. G&Z supplies its NoLine: Stringless Preparation Kit which includes: NoLine Software Upgrade, Stringless Prism Masts (prisms not included), and battery backup system. With the NoLine Kit installed, the G&Z Paver is prepared to accept the Leica steering and elevation commands. Leica will supply the contractor with the total stations, Leica machine PC and PaveSmart 3D (LMGS-S) software, Slope Sensors, and Prisms. With these components, the G&Z Paver is ready to pave stringless.

# PS1200 PLACER SPREADER

Leica PaveSmart 3D with GPS



The PS1200 equipped with Leica PaveSmart3D can utilize the worldwide GNSS (GPS + GLONASS) satellite network for stringless steering commands. GNSS combines extremely robust satellite receivers with advanced GNSS technology to deliver accurate steering. With Leica GNSS receivers accessing both GPS and GLONASS satellite constellations, and ready for the forthcoming GALILEO constellation, the satellite coverage is unsurpassed in the industry. Premium satellite coverage means increased productivity, less downtime, and better reliability for the machine operator.

The PS1200 has the option of using either a ski for elevation reference or providing the operator with manual control. As elevation is less critical in the spreading operation, manual control is typically all that is necessary to ensure consistent paving production.

# TC1500 TEXTURE CURE MACHINE

Sauer Danfoss UltraSonic Sensors



An UltraSonic Sensor has been developed to replace the elevation sensor on the TC1500 and eliminates the need for a stringline. The sensor element of the UltraSonic Sensor generates an ultrasonic wave and receives a signal reflected back from the target surface. The time difference between sending and receiving the signal is proportional to the distance between the sensor and the targeted surface. The sensor then outputs a distance signal to the TC1500 Operation Console and automatically adjusts the elevation.

The TC1500 steering can be controlled by either using the steering wand on the edge of concrete or, like the PS1200, elevation commands can be controlled by the Leica Global Navigation Satellite Sensor (GNSS) eliminating the need for a stringline.

# INTERSTATE 80

Hawkins Construction // Omaha, NE, USA



With just a few days of training, Hawkins Construction Co. is up and running with stringless concrete paving technology. “We’ve had minimal training with it,” says Ron Mockelman, Paving Equipment Manager for Hawkins, based in Omaha, Nebraska. “We pretty much just dove into it. A lot of companies would have bought more training than we did, so I think we’re doing pretty well and it’s only going to get better.”

This year Hawkins started running stringless on two Interstate highway paving projects – with a total contract value of \$78 million USD – located on I-80 between Omaha and Lincoln, Nebraska. We visited Hawkins in mid-July, when the company had completed paving more than half of one I-80 project: a 6-mile,

60-foot-wide stretch of 13-inch-thick concrete pavement – all with no stringline.

Hawkins elected to buy the NoLine: Stringless Preparation Kit from Guntert & Zimmerman. The contractor now owns two G&Z pavers, an S850 and the new S600 concrete paver, and both are fitted with the NoLine kit. “We invested a substantial sum for the set-ups for two pavers, four robotic total stations, an on-board computer/monitor and a stringless trimmer,” says Todd Allen, a Hawkins superintendent. The robotic total stations and on-board computer are manufactured by Leica Geosystems, and come ready to “plug-and-play” for the G&Z pavers.

“We decided to make the switch to stringless to improve our speed and

efficiency, and to shrink our labor costs,” Allen said. And that’s not to mention the human error that occurs when a truck hits a stringline or somebody breaks the string. What’s more, we get improved access to the site and more choices in how we pave.”

Mockelman says the stringless technology improves paving production. “Trucks can cycle through the site faster, because there’s no stringline,” he says. Precise control

Hawkins paves with four robotic total stations. One total station stays behind the paver, to check the pavement surface as-built, and to do any diagnostics that might be needed for ride quality. A technician back-sights each of the three robotic total

stations to three known control points. That fixes the location of the total station relative to the digital terrain model that is contained in the computer on-board the paver.

The robotic total stations can then read the location of the paver by seeing two prisms mounted on masts above the paver. The prisms have a precise spatial relation to the pan of the concrete paver. Then the total stations relay that location information, by radio waves, to the computer on-board the paver. The computer compares the actual location of the paver to the design location in the model, and makes adjustments in northing, easting and elevation of the paver.

When we visited the I-80 project, the Guntert & Zimmerman S850 was paving 24 feet wide to form two driving lanes. Dowel baskets for concrete joints were set at 16.5-foot intervals. A second 24-foot pass, adjacent to the first, would follow to form a third driving lane and a 12-foot tied concrete shoulder. On the opposite side of the driving lanes, Hawkins would then pave a 12-foot shoulder separately. The new pavement widened the old one from two driving lanes to three.

"Our smoothness results with the stringless system are better than we have averaged with a stringline," says Allen. "But we're just scratching the surface of what we can do. Mockelman said Hawkins has put up actual profilograph readings as low as 2.6 inches of deviation on a one-tenth blanking band.

The Nebraska Department of Transportation awards incentive payments for extra-smooth pavements. For 0 to 4 inches of deviation the contractor gets 106 percent of pay; for 4 to 8 inches the incentive payment is 104 percent and for 8 to 12 inches it's 102 percent of pay.

"Both of our Guntert & Zimmerman pavers are fantastic machines, for ride quality and

maneuverability," says Allen. "They're like having a Cadillac instead of a Chevy."

"We like the different steering modes on both of our G&Z Pavers," Allen says. "You can crab-steer the paver, and you can turn it in a circle within its own length. The paver can move sideways out of a pour, which is fantastic for tight locations. The maneuverability of these pavers lets us use a four-track paver where somebody else would normally use a two-track paver."

Mockelman appreciates the ability of the Guntert & Zimmerman S850 to change paving widths to increments between 20 and 26 feet without dropping the paving kit out. Instead of a two-day job on other pavers it's a two- to three-hour job on the S850. A contractor can simply add or remove inserts to change paving widths. The tractor frame and the paving kit telescope in and out together to change widths.

The fast width change is an idea that Hawkins' Terry Kirsch and Mockelman had, and Guntert followed up. "Guntert designed it and engineered it for us and got us what we wanted," says Mockelman. "We could take this 24-foot paver and drop 4 feet out real quickly and pave a 20-foot ramp without having to disconnect the paving kit."

"They're very reliable pavers," Allen says. "We hardly ever have anything go wrong with them. And the support we get from Guntert is top-notch."

Mockelman agrees. "So far Guntert's service has been excellent," he says. "From my experience it's probably the best service in the concrete paving industry."

Prior to paving, subcontractor Koss Construction milled the old asphalt from the underlying concrete pavement, said project superintendent Kurt Gregor. Another subcontractor, Pink Grading, broke the concrete and graded the dirt in preparation for lime stabilization. Hawkins

stabilized the earth subgrade with lime, and Recycled Materials Co., Arvada, CO, crushed the old concrete on grade. A motor grader spread the crushed concrete, and Hawkins trimmed it with a stringless trimmer.

Both Allen and Mockelman said G&Z's NoLine stringless system using Leica equipment is easy to use and friendly to learn. "We're cross-training three or four different guys on the crew," said Allen. "And we find that with absolutely no computer experience they can set the system up and they're competent to run it within a week to a week and a half.

Getting the stringless system ready to pave in the morning takes about 45 minutes, Mockelman says. "In the morning we attach the computer monitor and the three radios to the paver," he says. "There are five connections. There's a power connection, and the two slope sensors are tied into one connection, plus the three radios. Then you put your machine in 3D mode, turn the monitor on, pull up the project file to the screen, and the paver is ready."

"Then we back-sight the robotic total stations to three known control points," Mockelman says. "Three points give you a tighter re-section on your total station. The total stations can calculate where they're at on the job. Now they can relay that information to the paver. We set up three total stations in the morning, and a fourth one to run the check on the slab."

We asked Mockelman what the biggest challenge of the project is. "Right now our big push is to get this Greenwood project finished so that we can get to the second I-80 project and pave the mainline on it," he said.

# HIGHWAY 65

Flynn Company // Mason City, IA, USA



The stringless benefits are undeniable: less survey costs, fewer man hours setting stakes and string, and no more office types tripping over “hard to see” stringline on jobsites. For a paving contractor, the savings associated with stringless technology simply doesn’t outweigh the cost of grinding out of specification pavements. As the technology has progressed, the paving market has become more and more interested. Is it finally time to see the broad use of stringless technology in the paving market? Once again, the constantly innovative Iowa DOT has set out to be a leader in the application and use of new technology.

On September 2, a national open house for concrete overlays was held in Worth County, IA. Over 100 state DOT employees (9 states), county engineers, engineering consultants, contractors, and suppliers attended the one day event. One of the jobs featured was a concrete overlay project by Flynn Co. Inc. Flynn’s 10.5 mile (16.9 km) Iowa Department of Transportation project

on Hwy 65 near Mason City, IA was a 32 ft (9.75 m) wide, 5 in (12.7 cm) thick unbonded concrete overlay using a stringless system. The original 24 ft (7.3 m) pavement was widened 4 ft (1.2 m) in each lane, and Flynn elected to pour at half width to facilitate local traffic. Iowa DOT specified the use of stringless technology on this portion of Hwy 65. Flynn’s G&Z S850 was equipped with Leica Total Station machine controls. As the name implies, stringless technology replaces the traditional stringline with an electronic tracking process that controls the horizontal and vertical operation of the paver. At times, Flynn paved up to 18 fpm (5.48 mpm) achieving smoothness on zero blanking band as low as 6 in per mile and averaging in low teens for the project which earned them full bonus incentive.

With the savings in materials and labor, concrete overlays will be equal to or lesser than asphalt’s initial costs but will always perform better over the long run. This could result in more jobs bid for concrete rather than asphalt. With the elimination of stringline, the use of stringless technology

holds special potential for increasing the application of concrete overlays. Also seen for the first time was Ames Engineering’s prototype, a real time on board smoothness measuring device.

Jeff Flynn and his team should be congratulated for paving the way to a brighter future with stringless paving technology. Based on the extremely positive reaction of county officials and attendees at this event, the future of concrete overlays and stringless technology looks very promising. Iowa alone is building over 200 miles of concrete overlays in 2009. The Flynn Company’s constant attention to detail from the project planning phase through installation is one of the reasons that they are considered a quality paving contractor.

# SPACEPORT AMERICA

David Montoya Construction // Truth or Consequence, NM, USA



Spaceport America (formerly named Southwest Regional Spaceport) is the “first purpose-built commercial spaceport” in the world, although initial construction is not yet complete. As of October 2009, eight suborbital missions have been launched from the port. The spaceport has attracted four aerospace mavericks — including Virgin Galactic.

Virgin Galactic will establish its headquarters and operate its space flights from Spaceport America. Spaceport America will provide cutting edge facilities and a wonderful location for fledgling astronauts to realize their dreams. Virgin Galactic has managed to reduce drastically the price of getting to space and over time will reduce it still further. The starting price for flights is US \$200,000 with refundable deposits starting from US \$20,000. If you’re ready, willing, and looking to spend the money, space is now the open final frontier.

The runway and taxiways on the Spaceport are being paved by David Montoya Construction, Inc. (DMCI) based

in Alameda, New Mexico. The Spaceport Construction Project is where the future becomes reality. To compliment the futuristic design of the terminal, DMCI is paving the runway with the latest in concrete paving technology. Employing a full Guntert & Zimmerman (G&Z) Paving Train and G&Z 12 cyd (9.2 m<sup>3</sup>) Mobile Concrete Plant (MCP), Montoya has set out to lay down a quality product on this high profile project. G&Z’s dedication to innovation has made it the most trusted name in the market. Their innovative and productive machines have been proven on job sites across the globe to produce high quality, smooth pavements.

DMCI’s entire paving spread is being controlled without stringline. DMCI is using Leica Geosystems’ PaveSmart 3D (LMGS-S) Machine Control System to control steering and elevation on its S850 Slipform Paver using total stations for maximum precision and smoothness. The G&Z PS1200 Placer Spreader’s elevation and steering control is GPS-controlled. Starting from the project slab design data, the machine’s position, elevation and

heading is measured in real-time by total station(s) and transmitted to the Leica Machine Computer (MPC). Precision machine-mounted slope sensors provide mainfall, draft, and cross-slope for the slipform’s paving kit. Position, elevation, draft, and slope corrections required to keep the machine precisely on-line and on-grade are sent to the G&Z Control System, typically allowing paving accuracy of  $\pm 3\text{mm}$ , and steer within  $\pm 10\text{mm}$ .

When complete, the runway will be 10,000 ft (3,048 m) long and 200 ft (70 m) wide. DMCI is paving the runway in six 33.3 ft (10.1 m) passes. Runway construction began with DMCI using the G&Z S850 to place 6 in (152 mm) of soil-cement base completely stringless. The soil cement layer is followed by a 4 in (101 mm) asphalt layer placed by other means that serves as a separation layer. The final concrete slab being slipformed is 14 in (355 mm) thick.

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