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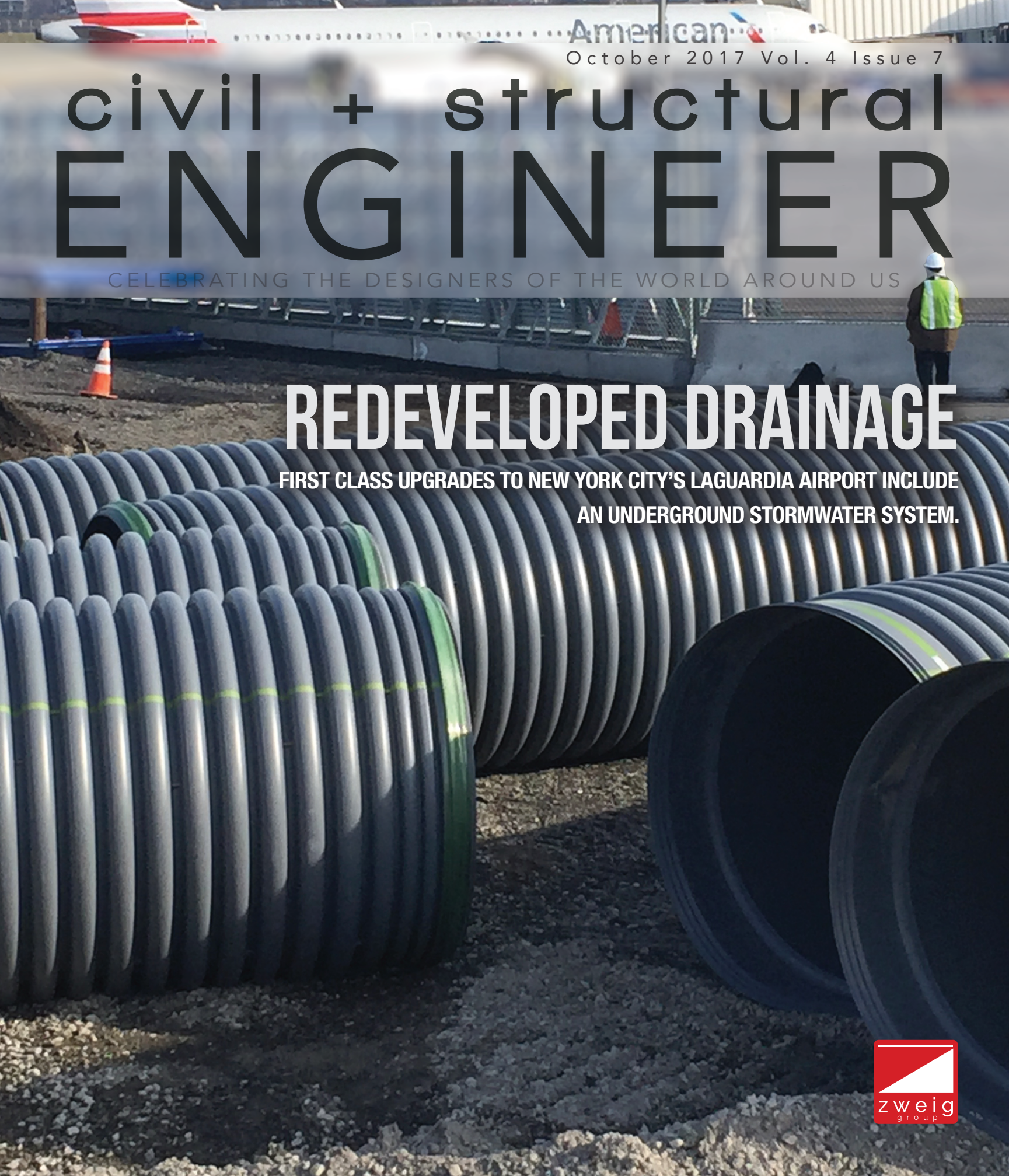
CELEBRATING THE DESIGNERS OF THE WORLD AROUND US



REDEVELOPED DRAINAGE

FIRST CLASS UPGRADES TO NEW YORK CITY'S LAGUARDIA AIRPORT INCLUDE AN UNDERGROUND STORMWATER SYSTEM.

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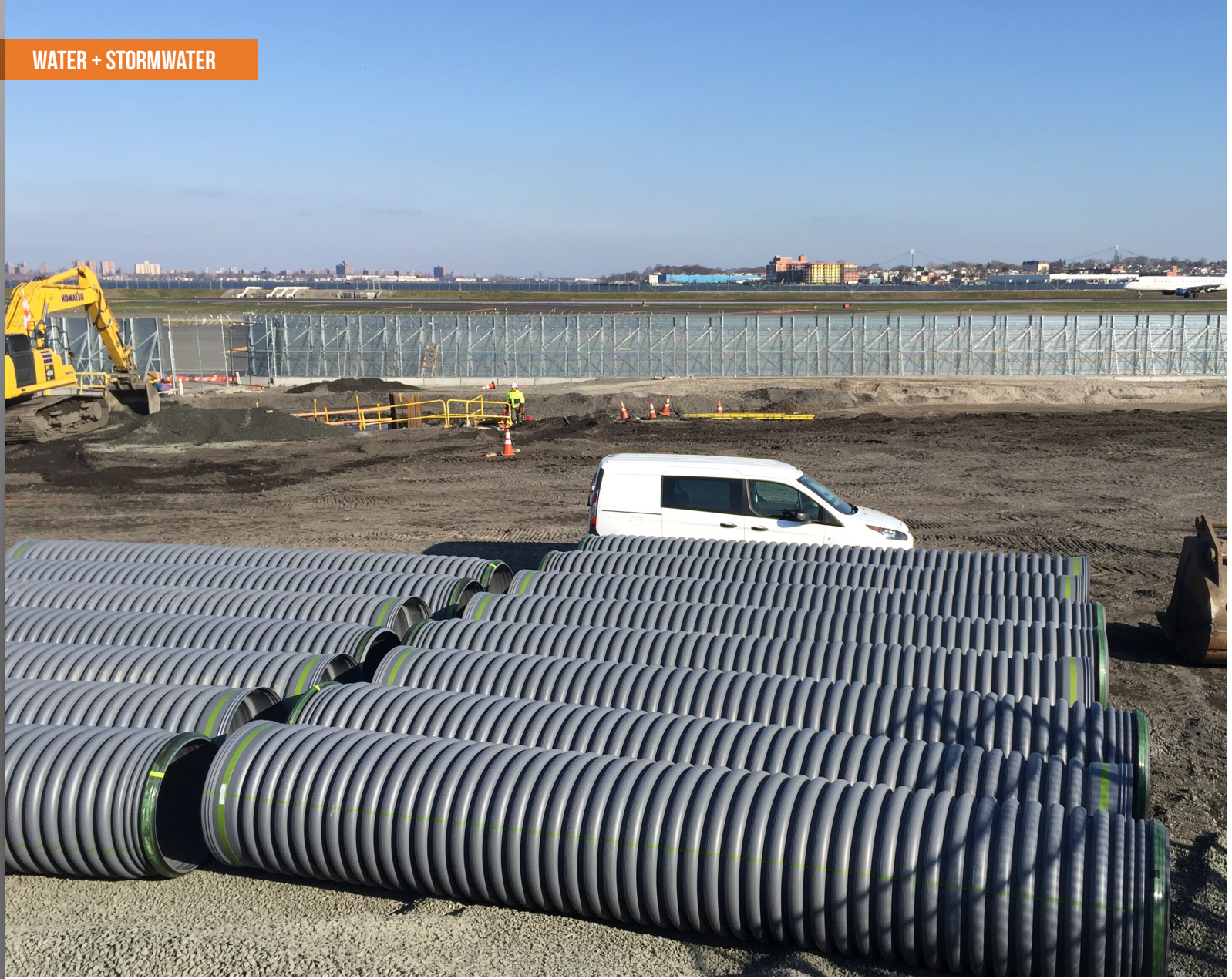


More than 50,000 feet of thermoplastic stormwater drainage pipe is being used to construct the new system at LaGuardia Airport in New York City.

REDEVELOPED DRAINAGE

FIRST CLASS UPGRADES TO NEW YORK CITY'S LAGUARDIA AIRPORT INCLUDE AN UNDERGROUND STORMWATER SYSTEM.

THE $8 BILLION REBUILDING of New York City's LaGuardia Airport is more than just a major renovation. It's really the creation of a state-of-art facility that includes new terminals, roads, parking lots, garages, plus retail shops and restaurants. Along with the aboveground work, an underground stormwater drainage system is being constructed using about 10 miles of two types of thermoplastic pipe during Phase I of the project. Scheduled to be completed in 2022, the $4 billion Phase I focuses mainly on Terminal B, the 1.3 million-square-foot central terminal with 35 gates. The Delta Airlines terminal will be rebuilt in Phase II.

Taking the nearly 80-year-old airport from third-world status, as described by former Vice President Joseph Biden, to a premium destination that could qualify for LEED Gold Certification is not an easy feat, especially since the airport will remain in operation during construction.

After a competitive RFP, the Port Authority of New York and New Jersey selected LaGuardia Gateway Partners, a consortium of firms with extensive experience in terminal operations, construction, design, and finances, to redevelop the airport. This group contracted Skanska Walsh, the design-build joint venture responsible for construction, including the underground infrastructure, to manage the construction operations on an expedited basis with operations at the airport continuing uninterrupted during the course of the project.

Skanska Walsh elected to use three types of pipe for the airport's new

stormwater drainage system for both the landside and airside. The main trunk line that encompasses both areas is 72-inch-diameter reinforced concrete pipe (RCP). For the laterals, two types of thermoplastic pipe are being used. For the airside — taxiways and de-icing pads — more than 23,000 feet of ADS HP Storm pipe, and on the landside — access roads, parking lots, and pedestrian areas — nearly 25,000 feet of ADS N-12 corrugated high-density polyethylene (HDPE) pipe ranging in diameter from 12 to 60 inches.

Founded in 1966, Advanced Drainage Systems, Inc. (ADS) is a global manufacturer of water management solutions with 61 manufacturing plants and 34 distribution centers. Pipe for the LaGuardia project comes from the company's plants in Ludlow, Mass., and Muncy, Pa.

The Federal Aviation Administration (FAA) has approved polypropylene (PP) pipe for subsurface water collection and disposal at civilian airports, and HDPE pipe for under pavement use in all airport areas, including de-icing pads, runways, and taxiways.

Importance of drainage first

The lighter weight and long lengths of both types of pipe from ADS enabled crews to install it faster. It was estimated that the installation of the company's thermoplastic pipe would take one-half the time that would be needed for RCP. On a project such as this, drainage leads the way because everything is built on top of the underground system. Completing it as quickly as possible would enable the rest of the project to be started faster, helping to ease scheduling constraints.

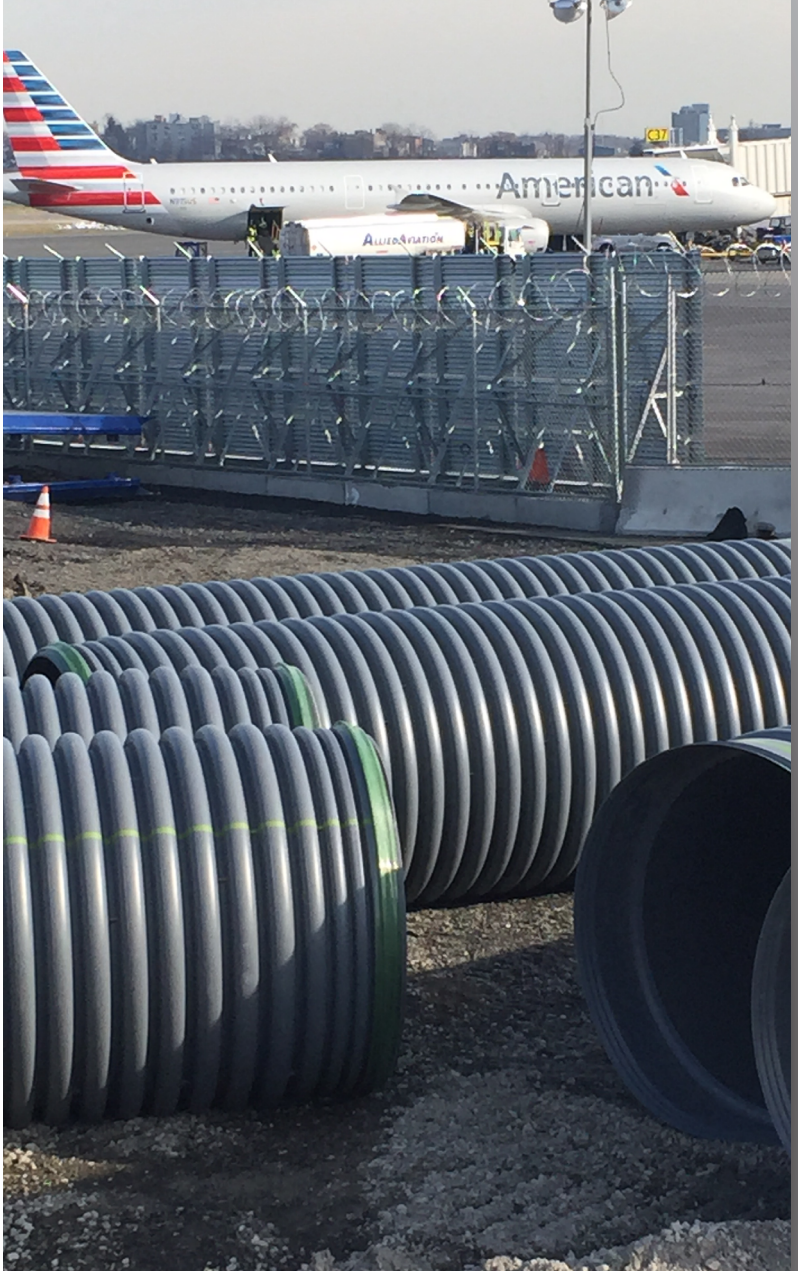
The ADS pipe comes in 20-foot lengths, which reduces the number of joints in a typical 200-foot run to nine versus 24 for 8-foot RCP sections, which can weigh as much as 9,672 pounds each in a 60-inch diameter. The longer length and lower weight of the thermoplastic pipe mean installation is easier and faster with an established RSMeans installation rate of 200 feet a day.

Under the airside

According to Adam Thompson, field engineer at LaGuardia for the Skanska Walsh joint venture, "Our team is responsible for the airside, which is where there is any plane or activities in and around a plane such as the taxiways and de-icing pads. We wanted to have an alternative to concrete drainage pipe because it is very expensive, very cumbersome, and very heavy, and comes in only 8-foot sections. So, we were doing research and found the ADS product with Metrofab, one of our suppliers.

"We discovered that not only does ADS HP Storm pipe come in 20-foot sections, but it's lighter, less expensive, and easier to lay in," he said. "A 200-foot run can save you two days of construction time, which could be about $10,000 per pipe run. Depending on the size, you're looking at $50 a foot for drainage pipe installation, and we're putting in miles of pipe. And since the ADS pipe is aircraft rated, we were able to use it and got it approved by the Port Authority. We're using any size from 15 inches up to 60 inches."

A high-performance PP pipe for gravity-flow storm drainage applications, HP Storm pipe provides stiffness and premium joint performance.



Use of ADS N-12 HDPE and HP Storm pipe allowed for faster installation and improved joint performance. This provided the contractor with flexibility in coordinating the drainage installation with other portions of the project that have less flexible schedules, which reduced installation costs while providing an improved drainage system with a life expectancy of more than 75 years.

The ADS design couples advanced polypropylene resin technology with a proven, dual-wall profile design for superior performance and durability. The pipe is corrosion resistant and is unaffected by salts, chemicals, and hot soils. Burial cover can range from 1 foot to 39 feet.

The pipe meets or exceeds ASTM F2881 and AASHTO M330. From a federal perspective, PP pipe is approved by the Army Corps of Engineers for storm drainage applications under Section 33 40 00 (Unified Facilities Guide Specifications). The Federal Aviation Authority (FAA) permits PP pipe under airfield pavements per Item D-701, Pipe for Storm Drains and Culverts in AC 150/5370-10G (Standards for Specifying Construction of Airports).

The pipe is installed in trenches from 5 to 8 feet deep. Self-compacting #67 stone is used for a 12-inch bed below, around, and above the pipe. Geotextile surrounds the pipe to separate the stone and fill material from the native soil.

"With this pipe, it comes with watertight gaskets and to connect to the manholes we didn't need any special gaskets, we just brick and mortar all around the manhole," Thompson said. "We just set the pipe, put in the mortar, and we're good to go."

Under the landside

Apart from the airplane area of the construction is the landside that includes parking lots and access roads. The pipe used to take stormwater drainage from this area is 72-inch-diameter RCP for the main trunk line, same as for the airside, and ADS N-12 corrugated HDPE pipe in sizes from 12 to 60 inches. It provides both strength and optimum hydraulic capacity with a Manning's "n" rating of 0.012. Its structural strength will support H-25 live loads and meets ASTM F2648 standard specifications.

Used to construct the network of pipe to take drainage from all roadways and areas around the terminal, the pipe meets FAA D701 and D705 requirements. Detention systems for collecting and storing deicing solutions have also been designed using N-12 WT watertight pipe. According to the company, buried even 25 feet underground, the detention system is unaffected by the Boeing 747 parked above it, or by the glycol solution it holds.

"It's in the Port Authority of New York and New Jersey's specifications to use corrugated HDPE pipe," said Kevin McClafferty, Skanska Walsh project engineer for the landside. "We went with that. It's easier than the reinforced concrete pipe with installation. It's a lot quicker to roll that into the hole than the RCP. The pipe is roughly 6 to 8 feet down from the top of the crown to grade.

"Typically, we have an engineer do a subgrade inspection to confirm the existing soil conditions and to tell us what backfill material to use," McClafferty said. "We have a couple of details on the plan depending on what we come across during the installation. For the most part, ASTM #67 stone is used."

The lateral runs of the N-12 and HP Storm pipe are connected to the main RCP trunk line using precast structures and manholes. Additionally, 6-, 8-, as well as 10- and 12-foot Downstream Defender vortex separator units are incorporated into both pipelines to remove hydrocarbons, total suspended solids (TSS), and associated pollutants, such as metals, from stormwater runoff. Because it is a low headloss separator, it can be used in flat areas that do not have a great amount of hydraulic drop available in the drainage profile.

Any delivery to an airport is closely examined by security, especially at New York City's LaGuardia, where space is also at a premium. By utilizing the ADS thermoplastic pipe, the different diameters could be nested so more linear feet could be delivered with each truckload. Compared with RCP, this enabled cutting the number of deliveries nearly 33 percent. An additional benefit is that the pipe, even the 60-inch-diameter, 20-foot sections, can be easily moved by the crew without extreme heavy equipment.

The LaGuardia project is expected to achieve LEED Gold certification for sustainable design. According to ADS, its N-12 and HP Storm pipe can help a project become certified through the USGBC Leadership in Energy and Environmental Design (LEED) program. For a project to qualify, it must be registered with USGBC and designed in accordance with green building techniques as prescribed by the LEED rating system. Due to the innovative design and high strength-to-weight ratio, ADS pipe produces a much smaller impact on the environment than traditional pipe materials like reinforced concrete or corrugated metal.

Carbon footprint is the most widely accepted measure of the environmental impact of activity or production in terms of greenhouse gases produced, measured in units of carbon dioxide. Reinforced concrete, for example, has a carbon footprint approximately three times that of HDPE pipe according to data from a study by the Department of Mechanical Engineering at the University of Bath in the United Kingdom.

LEED certification is recognized nationwide as proof that a building is environmentally responsible, profitable, and a healthy place to live and work. LEED-certified buildings qualify for tax rebates, zoning allowances, and other incentives in hundreds of cities.

Information provided by Advanced Drainage Systems (www.ads-pipe.com).