

NEWTOWN CREEK WASTEWATER TREATMENT FACILITY

Space Oddity

By day, the egg shaped digester towers of the Newtown Creek Wastewater Treatment Facility barely show up in the glint of Greenpoint’s industrialized waterfront. But by night, their stainless steel cladding bathed in a diaphanous blue glow, the monolithic egg towers and their steel and glass aerial walkways stand out fabulously, seemingly poised for an interstellar evacuation of the city’s five boroughs rather than the vital daily mission of treating 310 million gallons of its wastewater.

Fed by 180 miles of sewers and serving over 1 million residents in a drainage area of more than 15,000 acres, the treatment towers at Newtown Creek couldn’t afford to go offline at anytime during a carefully planned upgrade to this system of anaerobic digestion. So while interstellar evacuation might have been easier, steel’s malleability and structural integrity were inherent advantages in achieving the unearthly look of the towers and their elevated walkways, most importantly allowing the speed and ease of erection that was essential to the success of the project.

Sci-fi aesthetics weren’t always included in the Department of Environmental Protection’s \$2.2 billion expansion and upgrade of the Newtown Treatment facility.

Richard Olcott and Greg Clawson of the highly acclaimed Polshek Partnership Architects, the project’s designers, recall the early days of their firm’s role as overseeing architects for the continuous 16-year renovation project. The project is a collaboration between Polshek Partnership and a triverture of engineering firms, Greenley Hansen, Hazen and Sawyer, and Malcom Pirnie.

“Back when we were designing this, there was a movement from the local folks around the area, the engineers and the DEP, trying to push us to make the plant out of brown brick,” explains project architect Clawson. “Obviously, they were trying to hide it from view, and it just wasn’t going to happen.”

“It’s hard to hide a 110ft tall building,” concedes Olcott, design partner for the project. “So, rather than hiding it we thought we should do the opposite: We should really show the thing off and make something everyone would look at and go—‘Wow! What’s that?’”

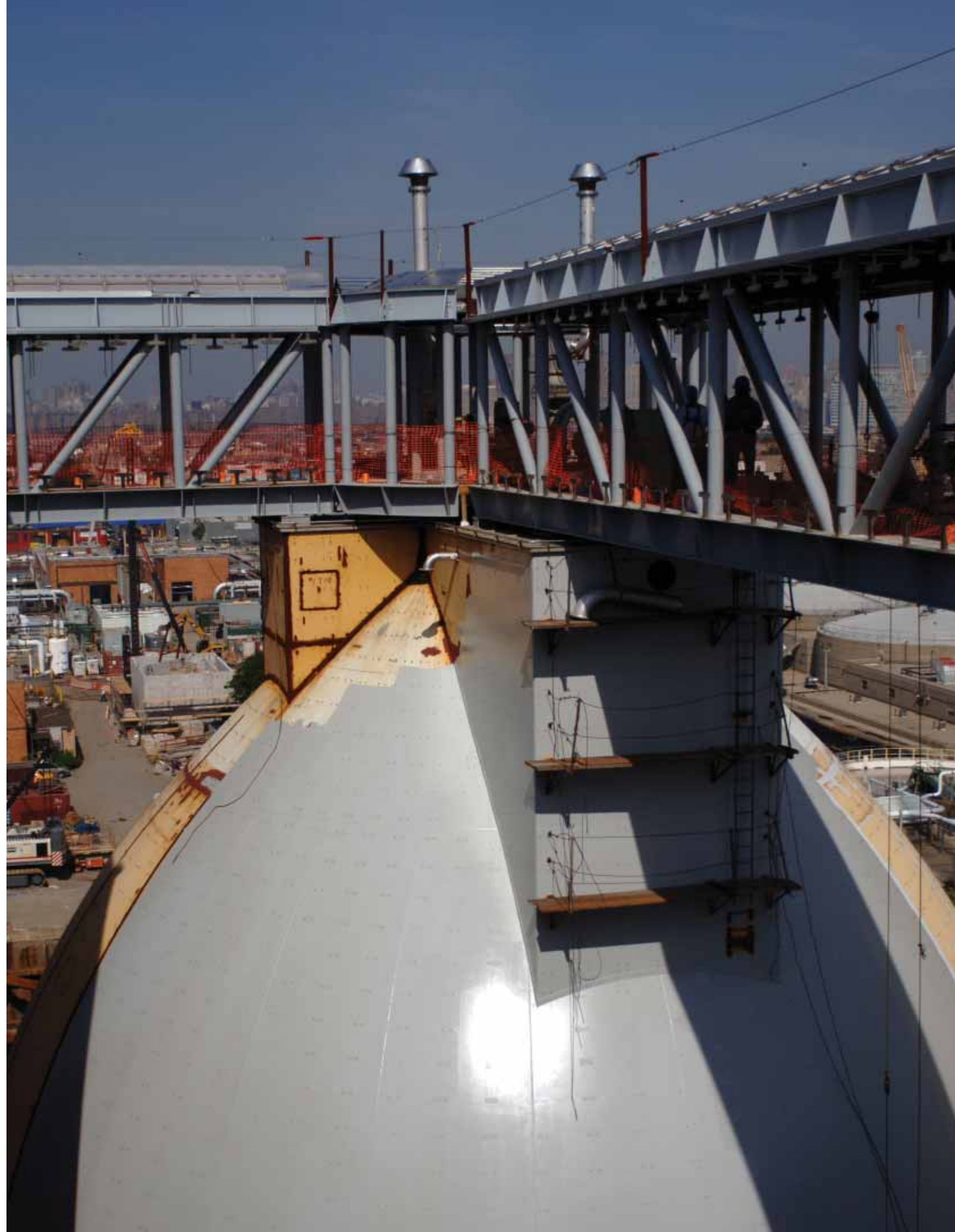
Engineering marvels in and of themselves, the German-designed double curvature of the egg shaped digesters (ESDs) encourages an improved mixture of sludge, the organic material removed from sewage for anaerobic treatment, by concentrating grit at the bottom

Right Rather than try to hide the 110-foot-tall digester eggs, Polshek decided to celebrate them, cladding the exotic forms in stainless steel and commissioning a startling nighttime lighting scheme from L’Observatoire International.





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of the tank, virtually eliminating dead zones and scum buildup—elements which force conventional tanks off-line for costly periodic cleaning. Though early ESD facilities were constructed of poured-in-place concrete, the difficulty and cost of forming the complex shapes necessary for such construction finalized the DEP’s decision to shift the primary material to steel throughout.

At the Newtown Creek facility, Polshek crowned and linked the ESDs with steel and glass aerial walkways and turrets that glow like lanterns at night. Steel’s speed of construction, flexibility, and lighter load weight were pivotal factors in the construction phase, as the congested conditions of the 24-hour site required a constant coordination of logistics between architects, engineers, contractors, and facility technicians. With steel, sections of the aerial walkways could be pre-fabricated and assembled on location with minimal scaffolding and workmanship, allowing connections to be welded and bolted in an efficient and convenient way.

The aerial walkways and turrets are made up of a variety of steel members, including structural tubes of ASTM A500 Grade B steel, structural pipe of ASTM A53 Grade B steel, and other shapes and plates of ASTM A36 U.O.N. steel. The turrets are framed with W10x15, W10x33, and W24x68 wide flange members, while the walkways spanning the distance between them are composed of steel trusses made up of W8x15 diagonal braces, W10x22 cross beams, and W24x104 main beams. Each truss weighs approximately 30 tons.

Originally intended as a pedestrian concourse around the ground floor of the plant, architects chose to elevate the walkway due security concerns and the impracticality of foot traffic between the wide-bases of the ESD’s. But life at the top is not without its challenges. To equalize air pressure and wind loading, the aerial walkways’ enclosure is composed of a series of independent, non-connecting components; a slight separation between the stunning metal roof and the glass paneled siding creates a kind of vented cladding system that allows sufficient air to move in and out of the enclosure under applied air pressure.

“These things we knew from the beginning were going to be structural steel elements; there are movement joints in the aerial walkway system that keeps them from cracking at the ends,” says Polshek architect Greg Clawson. “They’re bridges, basically.” Each walkway section has a pinned connection at one end and a sliding connection at the other end. The sliding connection sits on a ¾-inch bearing plate with a ¼-inch Teflon bearing pad.

The walkways were delivered to the site in mainly pre fabricated, shop welded sections. In some instances, other sections were shipped loose for field welding, then fastened in place with structural grade bolts. The main structural work of the aerial walkways was set in place one month after the completion of the digester tanks, which took 102 weeks to complete, at an average of about three months per egg.

With diameters of 84 feet and heights of 90 feet, each of the eight egg digesters is clad in S31600 stainless steel, with a low-reflectivity proprietary finish. Similarly, the aerial walkways are clad in an epoxy finish that offers exceptional resistance to atmospheric corrosion and oxidation—key strengths for a facility meant to process 1.8 million gallons of sludge per day.

“All the materials throughout are selected to be incredibly durable because it’s a very corrosive environment.” explains Richard Olcott. “Not only because of the salt air and the river air, but because the materials need to last for hundreds of years. Like any other of the projects that were constructed a hundred years ago, you have to build these things to last.”

Thanks to steel’s ability to integrate form and function, Newtown Creek’s egg digester towers and their aerial walkways transcend and demystify what otherwise might have been concealed, contributing yet another unparalleled sight to New York’s skyline. “It’s a twenty-four hour facility; we don’t want it to appear like a black hole at night,” says Olcott. “You can see this thing from the Kosciuszko Bridge, apparently.” “You can see it from the L.I.E.,” continues Clawson. “When you come out of the tunnel you just look to your right and it’s all right there, in front of you.” Beam me up Scotty! **M**



Previous The steel trusses of the catwalks were delivered on site, hoisted into place by three tower cranes, and pinned in place.

Above The stainless steel cladding offers exceptional corrosion resistance, an important quality in a facility that processes 1.8 million gallons of sludge per day.

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Location: **320 Greenpoint Avenue, Brooklyn, NY**
Owner: **NYC Department of Environmental Protection, New York, NY**
Architect: **Polshek Partnership Architects, New York, NY**
Structural and Mechanical Engineers: **Greeley Hansen, New York, NY;**
Hazen and Sawyer, New York, NY; Malcolm Pirnie, New York, NY
Joint Contractors: **AJ Pegno, Oyster Bay, NY; Tully Construction, Flushing, NY;**
Skanska USA Civil, Whitestone, NY; Slattery Skanska, New York, NY;
Gottlieb Skanska, Valley Stream, NY and
Underpinning & Foundation Skanska, Maspeth, NY;
Picone/McCullagh JV, Brooklyn, NY; and Perini Corporation, Framingham, MA
Structural Steel Erector: **Budco Enterprises, Hauppauge, NY**
Stainless Steel Cladding Fabricator: **Overly Manufacturing Company, Greensburg, PA**