

Port Everglades Facility Upgrades

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Liftech Consultants Inc. is a consulting engineering firm, founded in 1964, with special expertise in the design and procurement of dockside container handling cranes and other complex structures. Our experience includes design for wharves and wharf structures, heavy lift structures, buildings, container yard structures, and container handling equipment. We provide structural, mechanical, and electrical engineering services. Our national and international clients include owners, engineers, operators, manufacturers, and riggers.

Ms. Dix is a registered structural engineer in California with nearly 20 years of experience in the design and analysis of various steel and concrete structures. She received her bachelor's degree in civil engineering at Virginia Tech, and her master's degree in civil engineering at UC, Berkeley. Her professional focus is on ship-to-shore cranes and other structures that reside next to, in, or on top of the water, such as heavy lift and container handling equipment, wharves, and floating cranes. She loves earthquake and fatigue engineering topics, working with clients, and being a small part of enriching global trade. Outside of work, she raises and manages a small flock of humans, dogs, and chickens.

This presentation discusses selected key features of the Port Everglades (PED) facilities upgrade project in Fort Lauderdale, Florida, which is a huge port improvement that began before 2013 and is still ongoing.

Outline

- Port Everglades master plan
- Facilities overview
- Challenges and key decisions
 - FAA clearance
 - Parallel crane girders
 - Facility power
 - Project coordination
 - Maintain port operations
- New ZPMC cranes
- Samsung crane upgrades
- Summary



Port Everglades Master Plan

[https://www.porteverglades.net/
development/mastern-vision-
plan/](https://www.porteverglades.net/development/mastern-vision-plan/)

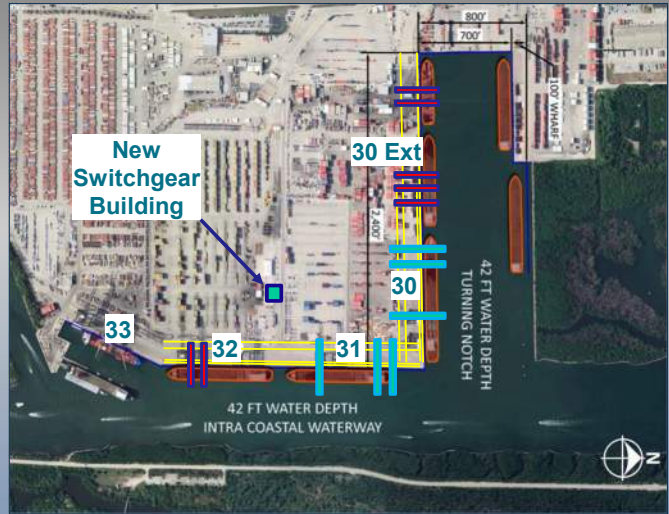
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Please follow the link to read more about PED's master plan.

Facilities Overview



Before upgrades



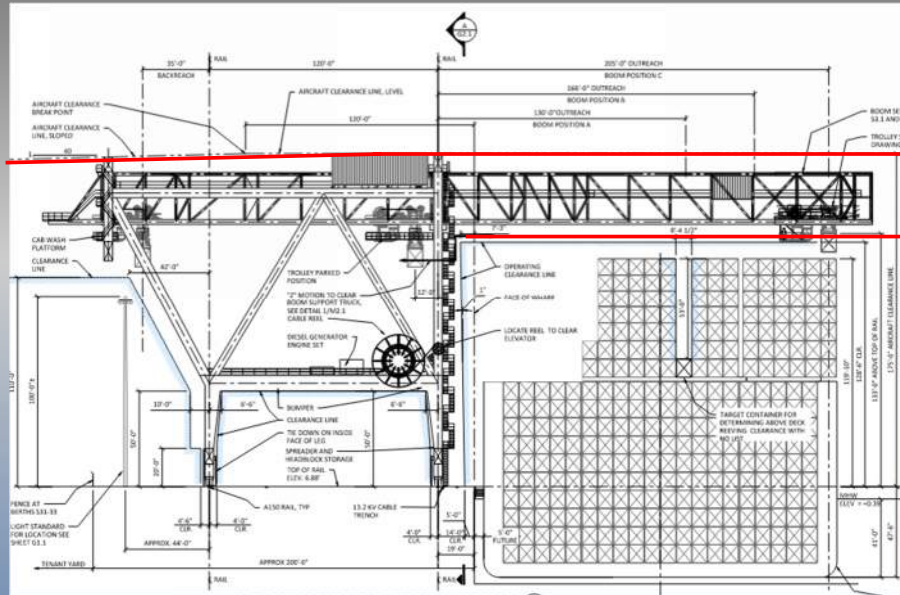
After upgrades

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Before the upgrade project, the Southport facilities at Port Everglades consisted of 3,700 ft (1.1 km) of container berths with seven low profile ship-to-shore (STS) cranes manufactured by Samsung Heavy Industries between 1993 and 2000. Berths 31-33 run North-South along the waterway and Berth 30 runs East-West along the turning notch.

The facility upgrades include extending Berth 30 by 1,500 ft (0.5 km), adding new girders at Berths 30-32, procuring six new cranes manufactured by ZPMC, upgrading and painting the seven Samsung cranes, and building a new switchgear building. As of today, all projects are complete or nearly complete, except the Samsung crane upgrades, which are ongoing.

FAA Clearance



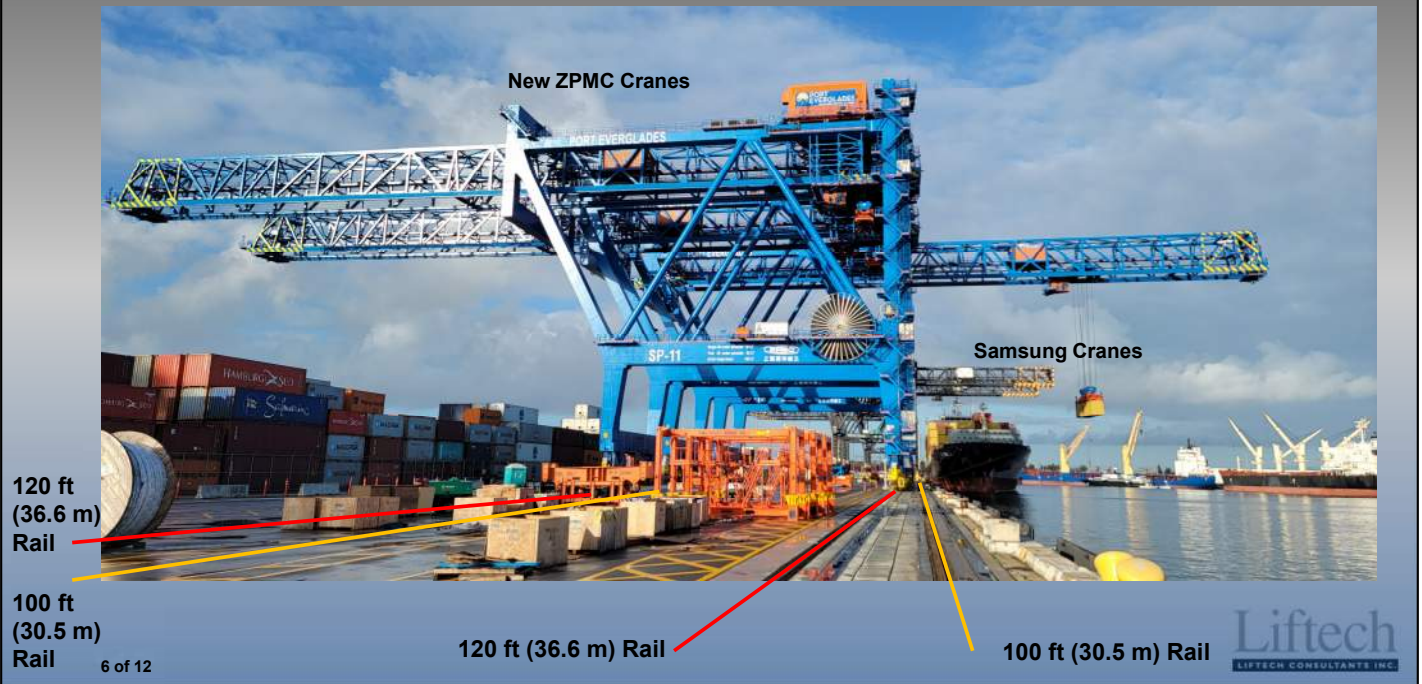
Maximum Height

Lift Height

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There are several challenges and key decisions with the project. First, PED's container terminal is adjacent to the Fort Lauderdale airport. Elevation clearance was initially restricted by the Federal Aviation Administration (FAA) to only 151 ft (46 m) above the rails. PED wanted to be able to service larger ships, so they requested an increase for Berths 30-32 to 175 ft (53.3 m). This was approved, clearing the path for procuring taller low profile post-Panamax cranes. You can see in this image that the envelope is pretty small for the structure. Based on Liftech's early feasibility studies, we determined that it was possible to achieve a lift height of 133 ft (40.5 m) with the low profile crane arrangement.

Parallel Crane Girders



The original 100 ft (30.48 m) span crane girders were designed for the Samsung cranes. They were inadequate for larger cranes, which have significantly larger wheel loads and tie-down loads. Even the crane rails were inadequate. Liftech decided that the best approach was to not upgrade the existing infrastructure, and instead to build a parallel set of crane girders to the original, with a rail span of 120 ft (36.6 m). This decision was an important advancement for many aspects of the project. Some of the benefits include (1) not having to retrofit the Samsung crane wheels for the wider rail, (2) allowing for a greater rail span to improve stability and wheel loads for the new cranes, (3) physically restricting the new cranes to areas where the FAA clearance has been increased, and (4) allowing PED to maintain operations while the new girders were being built.

Facility Power



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Early in the project, Liftech provided a power demand study that indicated that the electrical system was inadequate to support the new cranes.

The power supplied to the terminal is 13.2 kV, which is stepped down to 4,160 V at the switchgear building, but the capacity of the electrical system was not enough to support additional cranes.

The results of the study led to the decision to build a new switchgear building and to provide new electrical vaults and cable runs. PED also had to work with the local utility, Florida Power and Light, to deliver the new demands.

Project Coordination



Phase 1

Phase 2

Phase 3

Phase 1: New 120 ft girders and piles at B31-32, and switchgear building

Phase 2: New 100 ft and 120 ft girders and piles at B30 Extension, electrical infrastructure, coordination with turning notch project

Phase 3: New 120 ft girders and piles at B30

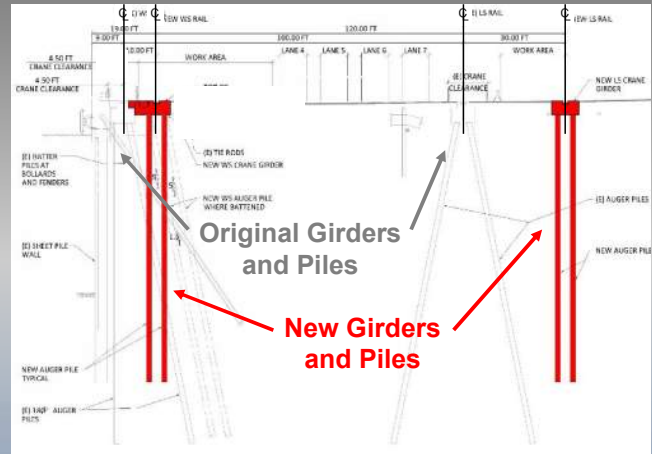
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With so many projects going on simultaneously, Port Everglades made a wise decision to hire a CM@risk. This team identified potential conflicts in construction early in the design phase. This led to the construction phasing shown for the crane girder construction.

There was also coordination among PED, engineers, and the tenants early in the design process that continued through the wharf construction.

Liftech hosted weekly coordination meetings to facilitate this plan.

Maintain Port Operations



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A key parameter for design and construction was to reduce the amount of downtime the port experiences. For the infrastructure work, the construction was sequenced such that only 300 ft (90 m) of the wharf would be unavailable at any given time. Because of the decision to construct parallel girders, the work area could be shut down for pile installation, then reopened, then closed again to construct the new girders. The Samsung cranes on the wharf could easily pass the construction area with coordination, as needed.

New ZPMC Cranes



Rail Span	120 ft (36.6 m)
Lift Height	133 ft (40.5 m)
Outreach	205 ft (62.5 m)
Backreach	35 ft (10.7 m)
Boom Height	26 ft (7.9 m)
Rated Load	66 t (spreader)
Wind Speed	180 mph (80 m/s)

Special features:

- Saddle-type machinery house
- Hoist "Z-motion"
- Boom stowage system
- Boom/crane anti-collision system



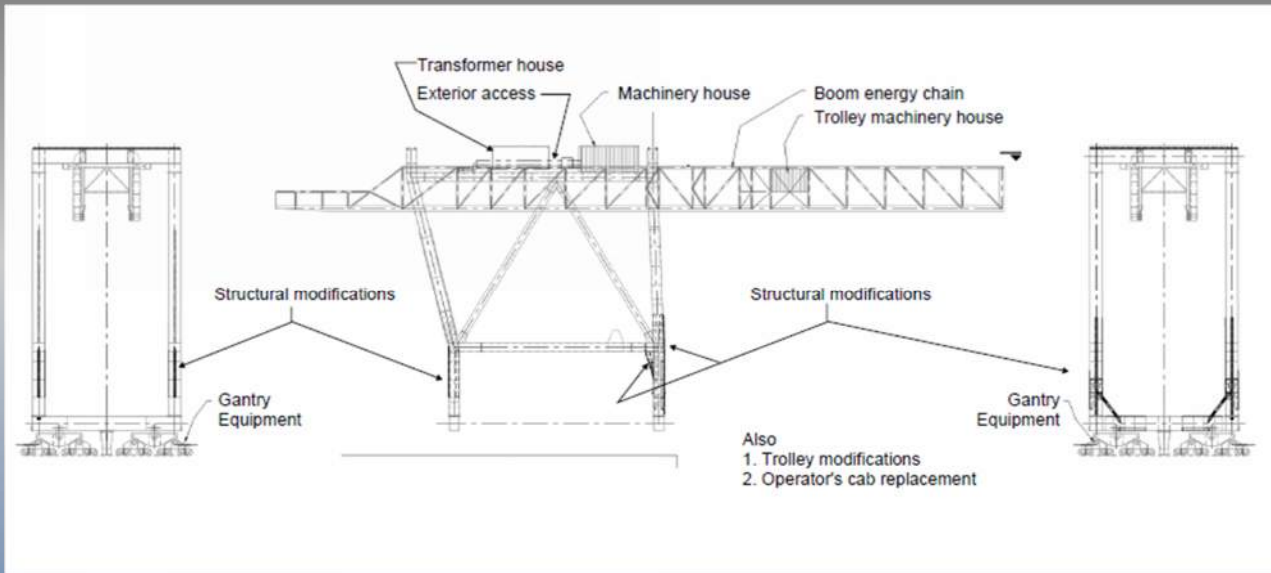
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Liftech helped PED procure six new cranes, in two batches, from ZPMC, delivered in 2020 and 2023. At the time of the crane order, these were the largest low profile cranes in the world. Liftech coordinated closely with ZPMC engineers to develop concept designs and to address some of the structural, mechanical, and electrical challenges.

We continued to coordinate closely with PED, Liftech Shanghai, and ZPMC throughout construction and commissioning.

The coordination was especially important during the COVID lockdowns and travel restrictions because instead of PED staff being able to visit their cranes, test them, and make comments, we had to adapt and provide comments with video calls. Liftech Shanghai provided a critical link in this chain and ZPMC worked extra hard to recover delayed schedules caused by the pandemic.

Samsung Crane Upgrades



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Liftech is also providing support to PED for the Samsung crane upgrade project. The contractor is ZPMC North America. This project began earlier this year and is expected to wrap up around 2028.

The main upgrades to the cranes include updating the structure for the current wind code, upgrading the rated load from 41 t to 66 t, replacing DC drives with AC drives, and replacing electrical systems, transformers, control systems, and control panels. PED's goal is to be able to share as many spare parts with the new cranes as possible.

Thank you

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In summary, Port Everglades has been gracefully undertaking a major facility upgrade and is reaping the rewards of their investments with the help of their well-coordinated team.

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