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THE FIRST LAW OF FOUNDATION STABILITY:

Buildings Built on Land Fill Will Settle

Renewable Energy Facility | Jackson County, Florida

THE PROJECT

This 20,000 square foot, single-story renewable energy facility was built in 2004 on land fill. The structure consists of a slab-on-grade foundation, concrete block walls, and steel truss roof supports.

The original construction documents showed the building was supported on a 30-inch wide continuous grade beam set 28 inches below the finished floor slab. Concrete pads were present under multiple large 16-cylinder Caterpillar generators and other heavy equipment.



Interior of the renewable energy facility with Caterpillar generators.

THE PROBLEM

Built on Landfill — And It Showed

Historical aerial imagery from Google Earth revealed the building straddles the west edge of a closed landfill cell. Although the original plans called for over-excavation of unsuitable landfill materials, evidence showed this step was skipped by the original contractor.

Over time, the building began showing clear signs of foundation movement and instability, including:

- Separations between walls and floor slab
- Stair-step fractures and vertical cracks in masonry
- Differential movement and cracks in the floor slab
- East wall lateral movement and wall rotation
- Roof joists pulling away from west wall bearing plates



Stair-step cracks in the masonry wall.



Differential movement and cracks in the floor slab.



Roof joists pulling away from the west wall bearing plates.

PREVIOUS REPAIRS

Partial Improvement — Movement Continued

In 2011, a competing foundation repair company installed 75 push piers under portions of the east wall and floor slab on the south half of the building. Patches were visible on the interior and exterior masonry and on the slab, but no foundation repairs were made on the north end of the building.

The plant manager reported that after the previous work, some areas improved while others worsened. The building continued to move — both in the areas of previous repairs and in other sections.

DETAILED INVESTIGATION | ENGINEERED SOLUTIONS | LASTING STABILITY

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THE SOLUTION

A Comprehensive Stabilization Plan

The owner hired Larry M. Jacobs & Associates in December 2016 to prepare a Geotechnical Exploration Report and requested Joe Derueil Associates, LLC to prepare plans in December 2018. Based on the engineers' findings, Foundation Professionals of Florida was engaged to inspect the facility and design a repair and restoration plan.



Historical aerial image showing the building straddling a closed landfill cell.

ENGINEERED APPROACH

The remediation was designed to vertically and laterally stabilize the foundation, recover lost floor elevation, and provide long-term structural stability. The solution used steel piers, tieback anchors and slab support systems to address both vertical settlement and lateral movement.

PRODUCTS INSTALLED

38 – PPB-350 Steel Piers
3-1/2" outer diameter pier pipe with TAF-150-84 12-12-12 Torque Anchor Tieback Assemblies.

36 – PPG-300 Steel Piers
2-7/8" outer diameter pipe (without tieback assembly).

20 – AB-288-HSB-T Torque Anchor Slab Brackets
with TAF-288-84 10-10-10 2-7/8" diameter tubular helical screw piles.



Previously installed push piers.



Installing a tieback anchor.



Over excavated footing.

OVERCOMING CHALLENGES

Foundation Professionals of Florida encountered several obstacles during the project:

- Massive concrete bollard foundations had to be removed to gain access for installation equipment.
- The original underpinning placement plan had to be modified multiple times due to conflicts with the 75 previously installed piers.
- Large amounts of garbage and debris were excavated from under the structure.
- Over-excavation of landfill areas, as originally specified, had not been performed. The building contractor failed to remove the debris and replace it with controlled fill.
- Sub-surface garbage, liquids, and major debris caused significant time delays.
- Over-excavated foundations under canopy supports were encountered, and some footings were larger than specified on plans, requiring additional removal and replacement work.



Filthy perched water flowing from below the structure.

THE RESULT

Despite the challenges, Foundation Professionals of Florida successfully stabilized the foundation, corrected the settlement and slab misalignments, and provided a long-term solution for the facility.

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