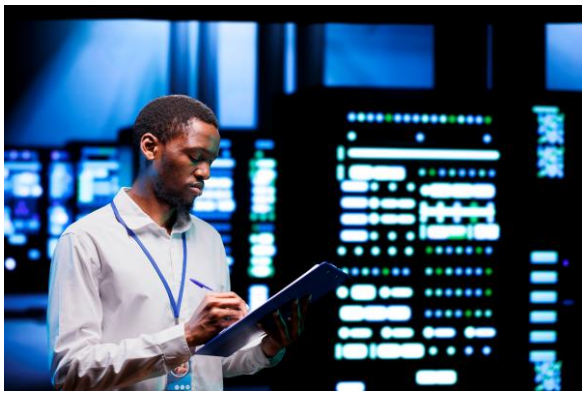
Case Study – Prestigious Data Center, Bahrain

Redesigning for Efficiency and Sustainability

Project Overview



Geneire Management Consultancy WLL has been entrusted with the construction a Prestigious Data Center in Bahrain. Initially designed with cast-in-situ construction, the building underwent a thorough review during the transition from Detailed Design (DD) to Issued for Construction (IFC) drawings and subsequent Shop Drawing development.

Key Challenge

While converting the client's consultant-provided DD drawings, our team identified opportunities to optimize the design through Value Engineering (VE). The goal was to improve construction efficiency, reduce environmental impact, and align with sustainability objectives without compromising structural integrity or performance.

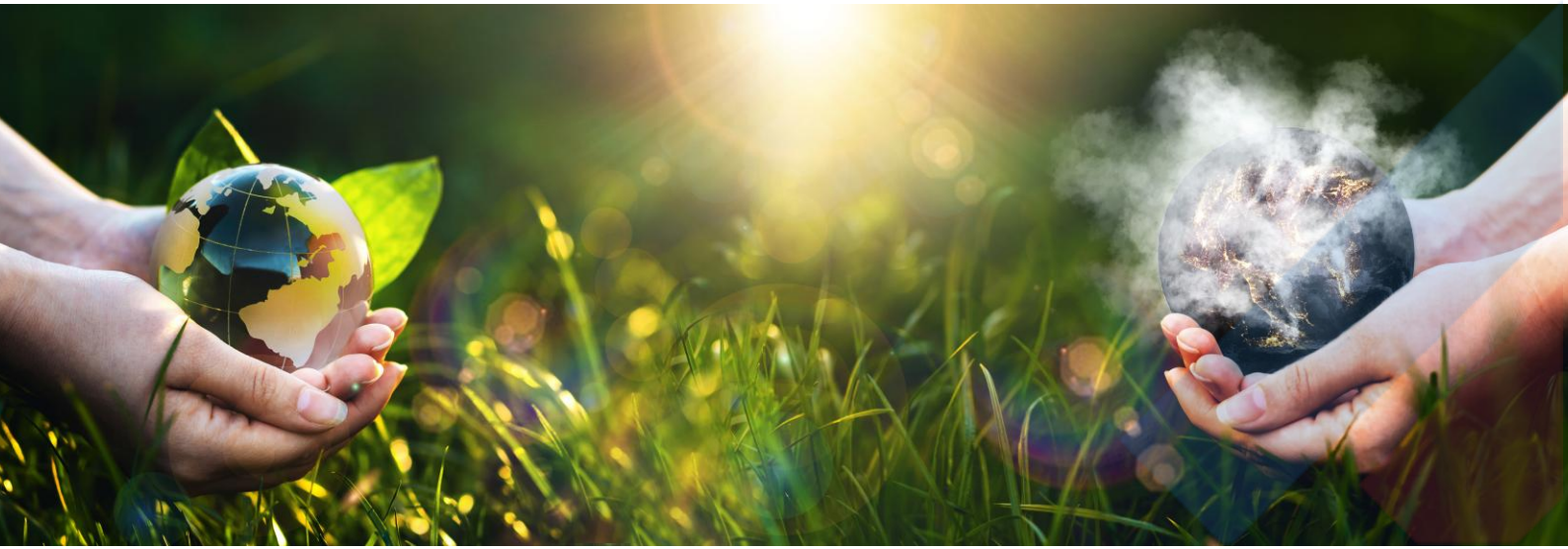
Solution: Transition to a Precast Design

Through the VE phase, Geneire proposed a redesign of the structure from a **cast-in-situ** system to a **precast solution** with **isolated footings**. This innovative approach delivered significant advantages:

- **Time Savings:** The construction timeline was reduced by **2.5 months**, allowing earlier project completion.
- **Concrete Savings:** Over **5,000 tons** of concrete usage was eliminated, resulting in reduced material costs and environmental benefits.
- **Environmental Impact Reduction:** A shift to precast construction significantly reduced embedded carbon and CO_2 emissions during construction.

Environmental Impact Analysis

Concrete production is a carbon-intensive process, with an estimated **410 kg of CO_2 emissions per ton of concrete** produced (source: World Business Council for Sustainable Development). By eliminating 5,000 tons of concrete, the redesign achieved the following reductions:



1. **CO_2 Emission Reduction:**
    - **Calculation:** 5,000 tons×410 kg CO_2 = 2,050 metric tons of CO2 saved.
    - Equivalent to the annual CO_2 absorption of approximately **95,000 mature trees** (assuming each tree absorbs 22 kg CO_2/year).
2. **Embedded Carbon Reduction:**
    - Embedded carbon refers to the total greenhouse gas emissions associated with a material's life cycle. Precast concrete manufacturing typically has **10-20% lower embedded carbon** than cast-in-situ construction due to controlled processes and reduced waste.
    - The redesign reduced embedded carbon by an estimated **20%,** further supporting the project's sustainability goals.

Additional Benefits

- **Logistical Efficiency:** Precast components reduced the number of deliveries to the site, lowering transportation emissions.
- **Waste Minimization:** Precast production in a controlled environment minimized material wastage compared to on-site casting.
- **Improved Quality Control:** Factory production ensured uniformity and high-quality finishes, reducing rework and associated environmental costs.

Outcomes

- **Timeline Impact:** Completion accelerated by **2.5 months.**
- **Material Savings:** 5,000 tons of concrete eliminated, reducing costs and resource consumption.
- **Sustainability Achievement:** A **55% reduction** in concrete usage contributed to significant CO_2 and embedded carbon savings.
- **Environmental Leadership:** The redesign demonstrated Geneire's commitment to sustainable construction, aligning with global ESG (Environmental, Social, and Governance) standards.