

LNG Storage Tanks Bonny Island, Nigeria

In association with PMB Systems Engineering, Inc., Ben C. Gerwick, Inc. prepared a study to investigate the feasibility using a prestressed concrete outer tank, as a secondary containment barrier, for the Bonny LNG project in Nigeria, for Phillips Petroleum Gas Services, Ltd. The study considered a sudden massive rupture of 75.6 m (248 ft) diameter, 24.4 m (80 ft) high primary inner steel tank, releasing liquefied natural gas (LNG) against the concrete secondary outer tank. It was concluded that the concept is feasible.

A preliminary design utilizing a 760 mm (30 inches) thick prestressed concrete wall and a similar thickness conventionally reinforced concrete base mat was developed to the point where its feasibility and constructibility were clearly demonstrated. Linear elastic finite element analyses were performed with a computer for several important load cases, and parametric studies were performed to assess the sensitivity of the design to various loading characteristics.

Services Performed:

- Feasibility Study
- Structural Analyses
- FEM Modeling
- Cryogenic Concrete
- Concrete Durability
- Pre-stressed Concrete

Year of Completion: 1980

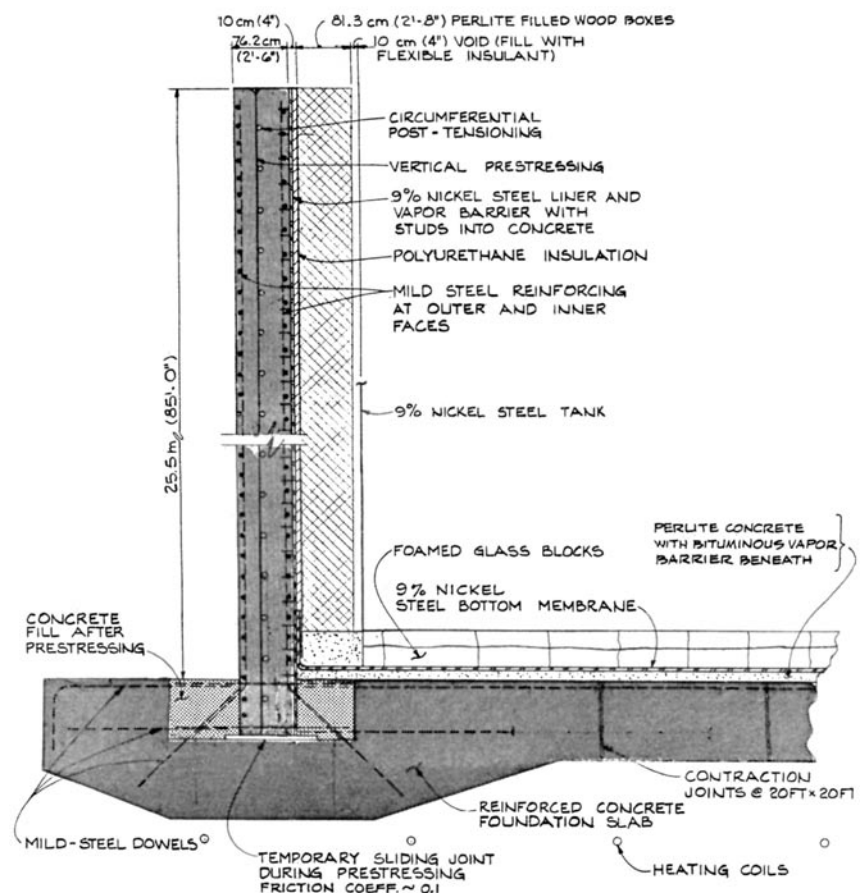
Client:
Phillips Petroleum Gas Services, Ltd.



Tank farm at Bonny Island, Nigeria.

The study also summarized data regarding the behavior of concrete, prestressing steel and reinforcing steel at cryogenic temperatures. This data and past experience indicate that prestressed concrete is well-suited for

cryogenic uses; however, it is essential that temperature-induced changes in material properties be accounted for when designing.



Typical wall section of LNG storage tank.