King Fahd Causeway, Saudi Arabia

This international strait crossing consists of a series of bridges alternating with embankment fills. The five bridges are characterized by their long length and the uncertain foundation conditions consisting of sand, silty sands, cap rock (sand cemented by coral and molluscs), coral line and limestone, all varying in extent and density from pier to pier.

This project is notable because of the successful use of mass production techniques for fabrication and installation of vertical prestressed concrete cylinder piles 3.5 m in diameter, placed and grouted into drilled sockets. The lengths of the piles were varied from bent to bent to fit the geotechnical conditions as determined by boring and/or penetration testing at each pier. Over 500 piles were so installed.

Also notable was the emphasis on durability in the notorious environment of the Arabian Gulf. A recent inspection carried out five years after completion showed no corrosion of reinforcing steel.

King Fahd Causeway.

Placement of deck panels.

Such high quality and resistance was attained by (a) use of a specially – selected cementitious blend of Blast Furnace Slag and Portland cement (b) a very low water – cement ratio obtained by use of a high-range water-reducing admixture (c) external coating of the piles in the splash zone with epoxy.

The problems of rock-boring molluscs which have been encountered in previous concrete piles in this area of the Arabian Gulf have been so far successfully averted by the use of igneous aggregate rather than limestone.

This concept enabled mass production techniques to be adopted for both fabrication and installation and is marked by its simplicity and adaptability to a range of water depths and geotechnical conditions.

Services Performed:

- **Expert Advice**
- **Alternative Design**
- **Inspection**
- **Durability Assessment**

Year of Completion: 1985

Construction Cost: $500M

Client:
King Fahd Causeway Authority

Ben C. Gerwick, Inc. 01-071e-02a