BATTLE McCARTHY©
Consulting Engineers & Landscape Architects

PROJECT:
Barreiro Ferry Terminal, Lisbon

CLIENT:
Cauminhos de Ferro Portugues

ARCHITECTS:
Terry Farrell & Partners

BM SERVICES:
Multi-disciplinary Engineering

VALUE:
£5million (approx)

DESIGN BRIEF

To design a new terminal for the ferry route between Barreiro and Lisbon, which handles 15,000 passengers per hour. The new ferry terminal was designed to replace the existing one and provide a greater capacity to cope with the increased passenger flow, which will be created from the major residential and commercial developments.

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DESIGN INITIATIVES/ACTIONS UNDERTAKEN

The design challenge for this low budget project was to use the structural form and materials as a climatic moderator to eliminate the need for air conditioning and heating during the extreme summer and winter periods.

Thermal analysis of the ferry terminal was assessed with particular attention to:

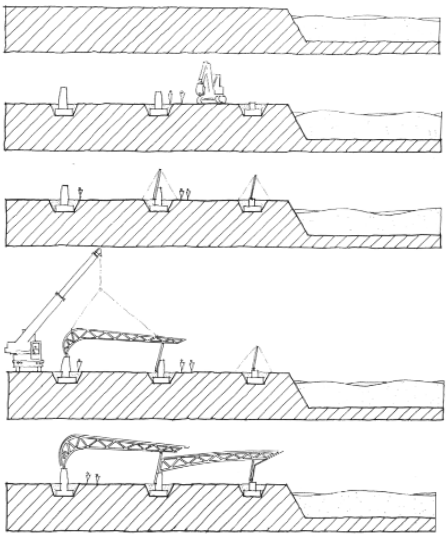
- A temperature analysis of the proposed design - both air and radiant temperatures
- A comparison of different roof constructions
- The thermal conditions expected under the proposed roof light arrangement
- An assessment of the thermal environment throughout the year

Innovative Design Element

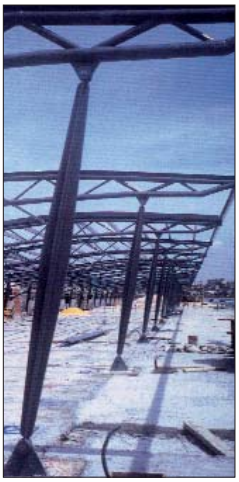
The form and detailing of the steel frame and metal cladding of the 200m long Barreiro Ferry terminal is a response to external climate and internal comfort demand. The building is a unique use of structural form and materials to moderate the climatic extremes. The structural engineering excellence is expressed in the low energy aspects of the design created by the structural forms and materials including:

- Efficient use of structural materials and thus minimising embodied energy.
- Repetitive elements reducing wastage and thus minimising embodied energy and construction energy.
- Structural form and profile controls solar penetration (shading in summer yet allowing solar penetration in the winter) thus eliminating the need for cooling and heating.
- Structure allowing for a balanced distribution of daylight and thus avoiding the need for artificial lighting during daylight hours.
- Structural mass of the ground floor slab is used as a thermal store - storing the 'coolth' of the cool night air in summer and the solar heat of the winter to provide a free source of cooling and heating throughout the year.

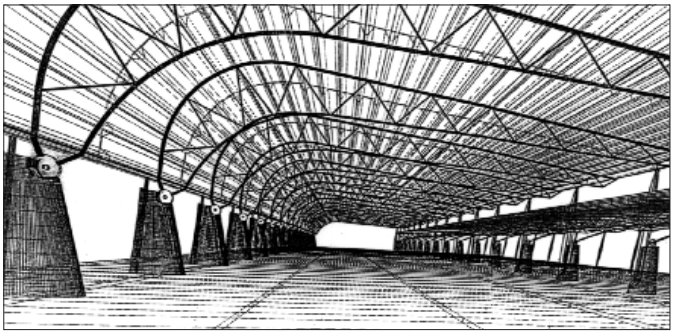
Steel Truss Section



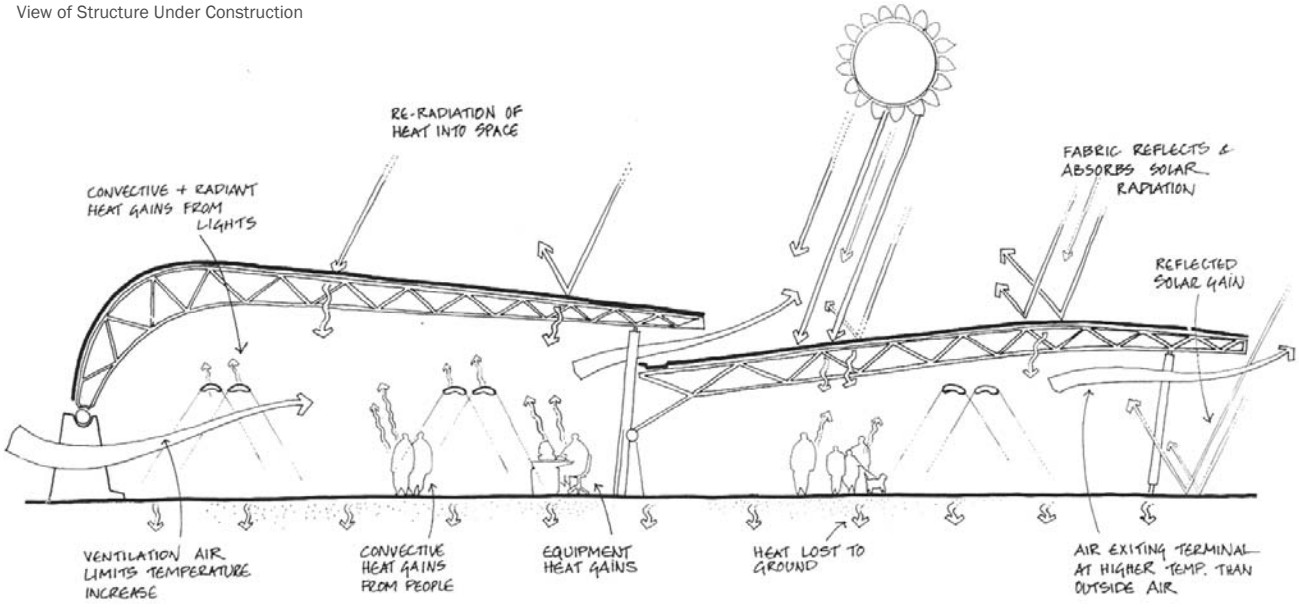
The terminal was completed in 1995. It's simple yet elegant structure reflects the dymanic nature of its use and has distinct urban and waterfront characteristics.



View of Structure Under Construction



Detailed computer analysis to ensure that the structure is the optimum shape



Stack Ventilation Principles