

# Portishead B Power Station

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## Buildings and Civil Engineering

The turbine house, annexe, bunker bay, and boiler house are grouped into one building. The building is steel framed and the structural steel is of welded construction and is encased in brickwork faced with golden brown engineering bricks. The window frames are of aluminium set in artificial stonework dressings. The turbine house brickwork is 18 inches thick. The remainder is in 13½ inches thick brickwork. Sand-lime and buff facing bricks are used inside the building to give the maximum light. The roofs are of precast concrete slabs, while floors generally are of *in situ* concrete, overlaid with granolithic concrete, with the exception of the operating floor which is covered by quarry and adamantine tiles. In the boiler house open steel flooring is in general use, for light and ventilating considerations.

Around the main power station are the concrete framed ancillary buildings. On the east side are the operations and the welfare blocks. The former houses the laboratory, offices, and the main control room. This is linked to the operating floor of the turbine house by a footbridge over a roadway and a section of the transformer pens. The welfare block provides canteen and washing facilities with a plenum heating system serving the clothing lockers.

On the west side of the station close to the boiler house wall are the electrostatic precipitators. A 20 foot wide road separates the precipitators and induced draught fans from the main flue supporting structure under which are housed various ancillary departments such as ash pump house, oil store, machine shop, etc. To the north of the main buildings lies the screen house containing the screening equipment for the cooling water system. Other structures in connection with the coal handling equipment are sited on the south side of the main buildings. All these have lightweight cladding in the form of asbestos sheeting fixed direct to the steel structure.

The twin chimneys are sited on the west side of the power station: they are 380 feet above ground level. The top level of these chimneys corresponds to the level of the chimneys of the A station, i.e. 410 feet Ordnance datum. The chimney stools are of reinforced concrete and the barrel is of brick construction lined with acid resisting bricks. The chimneys have an internal diameter tapering from 26 feet 6 inches to 20 feet and a wall thickness tapering from 5 feet 3 inches to 13½ inches.

Foundations for both chimneys consist of a concrete slab 50 feet square and 6 feet thick, bearing on Lower Carboniferous strata at 23 feet above Ordnance datum.

The extremely high tidal range that prevails in the Severn Estuary (the second highest in the world) affected the design of the circulating water system and made for considerable civil construction at Portishead. Four culverts are driven through rock out to a dredged channel in the Estuary. These culverts connect to three 45-foot diameter Pump pits 79 feet deep in the turbine house, each pit being associated with two turbo-alternator sets. The culverts, which are concrete lined, are each about a third of a mile in length. The invert levels are at —37.5 Ordnance datum in order to ensure that the circulating water pump suction is drowned at the lowest tide.

The tunnel portals at the dredged channel consist of precast reinforced concrete units. Each unit is cylindrical in shape 15 feet long and 9 feet internal diameter. The face of the unit, in contact with greenheart doors, is formed of granite blocks to ensure a high degree of water

tightness necessary for de-watering the tunnel.

The weight of one portal unit with its doors is just over 50 tons. Since the unit was to be handled by a 10 ton derrick, the sub-merged dead weight of the unit was reduced to less than 10 tons by packing the unit with 750 cubic feet of 'Onozote'.

The units were lowered into their locations and the line of the channel bed made good in concrete.

Circulating water conditions in the Severn estuary necessitate reversal of flow characteristics, and a manifold system of pipework in the bottom of each pit permits the selection of any culvert for inlet or discharge. The valves for this operation are remotely controlled hydraulically.

The power station requires some 18,000,000 gallons of cooling water per hour to be taken from the Severn estuary. The water passes through the culverts from the dredged channel to the screen house. Here each culvert is intersected by a 21 feet diameter 70 feet deep screen shaft which contains two 72 inches wide vertical band screens fitted with variable speed drives.

From here the screened water passes to the pump pits and via the manifold pipework to the four circulating water pumps which are located at the bottom of each pump pit and driven by four 460 horsepower motors at +30 feet level Ordnance datum through long vertical shafts and deliver the water through the condensers. The position of the condensers on the — 11 feet Ordnance datum level floor is such that they give maximum advantage to the siphonic action of the return water to the culverts under low water conditions.

Two cableways under the lock at the entrance to the Portishead Dock, which involved further tunnelling, accommodate the 132,000-volt cables from the six turbo-alternators via 72,000-kilovoltampere transformers to the outdoor switching station which is sited to the east of the dock. These cable tunnels each have two vertical shafts 12 feet in diameter, 83 feet deep and the horizontal tunnels are each 8 feet in diameter and 345 feet long. The vertical shafts and the horizontal tunnels are lined with cast iron segments bolted together and caulked, forming watertight joints.

Consequent on the decision to make a section of the station suitable for burning either coal or oil, further civil engineering works were necessary to accommodate, below ground level, two circular steel oil storage tanks of 9,200 and 13,200 tons capacity, together with an oil transfer pump house.

Other civil engineering work comprises the rectangular treated water tank which has a capacity of 500,000 gallons. This tank, the top of which is at 85 feet Ordnance datum and approximately level with the ground forms the foundation for the water treatment plant house which covers nearly half the tank. The other half is available for additional water treatment plant if required.

*Extracted from CEGB booklet published 1960.*