

## 5.7 WHARF

A **wharf**, **quay** or **staith(e)** is a structure on the shore of a harbour or on the bank of a river or canal where ships may dock to load and unload cargo or passengers.<sup>[2][3]</sup> Such a structure includes one or more berths (mooring locations), and may also include piers, warehouses, or other facilities necessary for handling the ships. Wharves are often considered to be a series of docks at which boats are stationed.

A wharf commonly comprises a fixed platform, often on pilings. Commercial ports may have warehouses that serve as interim storage: where it is sufficient a single wharf with a single berth constructed along the land adjacent to the water is normally used; where there is a need for more capacity multiple wharves, or perhaps a single large wharf with multiple berths, will instead be constructed, sometimes projecting over the water. A pier, raised over the water rather than within it, is commonly used for cases where the weight or volume of cargos will be low.

Smaller and more modern wharves are sometimes built on flotation devices (pontoons) to keep them at the same level as the ship, even during changing tides.

In everyday parlance the term *quay* is common in the United Kingdom, Canada, Australia, and many other Commonwealth countries, and the Republic of Ireland, whereas the term *wharf* is more common in the United States. In some contexts *wharf* and *quay* may be used to mean pier, berth, or jetty.

In old ports such as London (which once had around 1700 wharves) many old wharves have been converted to residential or office use.

Certain early railways in England referred to goods loading points as "wharves". The term was carried over from marine usage. The person who was resident in charge of the wharf was referred to as a "wharfinger".

## JETTIES

**Jetties** protect the shoreline of a body of water by acting as a barrier against erosion from currents, tides, and waves. **Jetties** can also be used to connect the land

with deep water farther away from shore for the purposes of docking ships and unloading cargo. This type of **jetty** is called a pier.

### **For regulating rivers**

Another form of jetties, wing dams are extended out, opposite one another, *from each bank of a river*, at intervals, to contract a wide channel, and by concentration of the current to produce a deepening.

### **For berthing at docks**

Where docks are given sloping sides, openwork timber jetties are generally carried across the slope, at the ends of which vessels can lie in deep water or more solid structures are erected over the slope for supporting coal-tips. Pilework jetties are also constructed in the water outside the entrances to docks on each side, so as to form an enlarging trumpet-shaped channel between the entrance, lock or tidal basin and the approach channel, in order to guide vessels in entering or leaving the docks. Solid jetties, moreover, lined with quay walls, are sometimes carried out into a wide dock, at right angles to the line of quays at the side, to enlarge the accommodation; and they also serve, when extended on a large scale from the coast of a tideless sea under shelter of an outlying breakwater, to form the basins in which vessels lie when discharging and taking in cargoes in such a port as Marseille.

### **At entrances to jetty harbor**

The approach channel to some ports situated on sandy coasts is guided and protected across the beach by parallel jetties. In some cases, these are made solid up to a little above low water of neap tides, on which open timber-work is erected, provided with a planked platform at the top raised above the highest tides. In other cases, they consist entirely of solid material without timber-work. The channel between the jetties was originally maintained by tidal scour from low-lying areas close to the coast, and subsequently by the current from sluicing basins; but it is now often considerably deepened by sand-pump dredging. It is protected to some extent by the solid portion of the jetties from the inroad of sand from the adjacent beach, and from the levelling action of the waves; while the upper open portion serves to indicate the channel and to

guide the vessels. The bottom part of the older jetties, in such long-established jetty ports as Calais, Dunkirk and Ostend, was composed of clay or rubble stone, covered on the top by fascine-work or pitching, but the deepening of the jetty channel by dredging and the need that arose for its enlargement led to the reconstruction of the jetties at these ports. The new jetties at Dunkirk were founded in the sandy beach, by the aid of compressed air, at a depth of 22.75 feet (6.93 m). below low water of spring tides; and their solid masonry portion, on a concrete foundation was raised 50 feet (15 m). above low water of neap tides.

### **At lagoon outlets**

A small tidal rise spreading tidal water over a large expanse of lagoon or inland backwater causes the influx and efflux of the tide to maintain a deep channel through a narrows no longer confined by a bank on each side, becomes dispersed, and owing to the reduction of its scouring force, is no longer able at a moderate distance from the shore effectually to resist the action of tending to form a continuous beach in front of the outlet. Hence a bar is produced that diminishes the available depth in the approach channel. By carrying out a solid jetty over the bar, however on each side of the outlet, the tidal currents are concentrated in the channel across the bar, and lower it by scour. Thus the available depth of the approach channels to Venice through the Malamocco and Lido outlets from the Venetian Lagoon have been deepened several feet (metres) over their bars by jetties of rubble, carried out across the foreshore into deep water on both sides of the channel. Other examples are provided by the long jetties extended into the sea in front of the entrance to Charleston harbour, formerly constructed of fascines weighed down with stone and logs, but subsequently of rubble stone, and by the two converging rubble jetties carried out from each shore of Dublin Bay for deepening the approach to Dublin harbour. Jetties have the adverse effect of endangering Surf Culture as a whole with their ability to destroy surf breaks.

### **At the outlet of tideless rivers**

Jetties have been constructed on each side of the outlet river of some of the rivers flowing into the Baltic, with the objective of prolonging the scour of the river and

protecting the channel from being shoaled by the littoral drift along the shore. The most interesting application of parallel jetties is in lowering the bar in front of one of the mouths of a deltaic river flowing into a tide — a virtual prolongation of its less sea, by extending the scour of the river out to the bar by banks. Jetties prolonging the Sulina branch of the Danube into the Black Sea, and the south pass of the Mississippi River into the Gulf of Mexico, formed of rubble stone and concrete blocks, and respectively, have enabled the discharge of these rivers to scour away the bars obstructing the access to them; and they have also carried the sediment-bearing waters sufficiently far out to come under the influence of littoral currents, which, by conveying away some of the sediment, postpone the eventual formation of a fresh bar farther out

### **At the mouth of tidal rivers**

Where a river is narrow near its mouth, has a generally feeble discharge and a small tidal range, the sea is liable on an exposed coast to block up its outlet during severe storms. The river is thus forced to seek another exit at a weak spot of the beach, which along a low coast may be at some distance off; and this new outlet in its turn may be blocked up, so that the river from time to time shifts the position of its mouth. This inconvenient cycle of changes may be stopped by fixing the outlet of the river at a suitable site, by carrying a jetty on each side of this outlet across the beach, thereby concentrating its discharge in a definite channel and protecting the mouth from being blocked up by littoral drift. This system was long ago applied to the shifting outlet of the river Yare to the south of Yarmouth, and has also been successfully employed for fixing the wandering mouth of the Adur near Shoreham, and of the Adour flowing into the Bay of Biscay below Bayonne. When a new channel was cut across the Hook of Holland to provide a straighter and deeper outlet channel for the river Meuse, forming the approach channel to Rotterdam, low, broad, parallel jetties, composed of fascine mattresses weighted with stone, were carried across the foreshore into the sea on either side of the new mouth of the river, to protect the jetty channel from littoral drift, and cause the discharge of the river to maintain it out to deep water. The channel, also, beyond the outlet of the river Nervion into the Bay of Biscay has been regulated by jetties; and by extending the south-west jetty out for nearly 0.5 miles (0.80 km) with a

curve concave towards the channel the outlet has not only been protected to some extent from the easterly drift, but the bar in front has been lowered by the scour produced by the discharge of the river following the concave bend of the southwest jetty. As the outer portion of this jetty was exposed to westerly storms from the Bay of Biscay before the outer harbour was constructed, it has been given the form and strength of a breakwater situated in shallow water.

