HASTINGS PIER CHARITY

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Waves Around Pier

Hastings seafront 1908, (HPC041.063)

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Waves Around Pier

The waves at Hastings beach are highest at high tide and in storm conditions can be up to three meters high. Typically, however waves are much lower, less than a metre in height from crest to trough.

The Sea is constantly moving and waves represent the dispersal of energy through the whole body of the sea. Each wave has a crest at the top and a trough at the bottom and the height between them is called the wavelength.

Waves begin with wind blowing against the water, at first creating small wavelets called capillary waves which are almost ripples along the surface of the sea.
With an increase in the force of the wind the amount of energy increases, catching the sides of the small waves and increasing their height. Above a couple of centimetres, the capillary waves become large enough to have their own gravity momentum.

The wave increases in height as it builds, but when becoming steep at a ratio of 7 to 1 the crest begins to collapse under the influence of gravity. White surf and foam appears as the structure of the wave top becomes unstable.

Water molecules move in a circular pattern as the energy of a wave passes through them, and beneath the base (trough) of a wave the water remains calm. The deeper sea waves experience through gravity an acceleration of 9.8 mtrs per second squared.

As the tide comes in under the Pier the waves have the character of shallow water waves and the water particles have an elliptical orbit as the wave structure comes against the sea floor and shallow outer beach. The speed of the wave slows as the bottom reacts against the beach surface. The top of the wave continues to travel while the base experiences friction, disrupting the orbital movement of the seawater. The wave begins to lean forward and then break onto the shore.

The gently sloping beach absorbs the energy coming from the collapsing wave. As the wave collapses the curling crest captures a pocket of air. The collapsing waves release huge amounts of energy and this is absorbed by the beach. Otherwise the coast is defended by promenades and groynes. Here, as with a sea cliff, the sea at high tide strikes the coast with great force because it meets a barrier before it has properly collapsed. Erosion can be significant. Because of prevailing winds the sea here approaches the beach at an angle. The process of wave breaking is influenced by refraction as they come against the shape of the coast.

At Hastings, we can watch wave interference as breaking waves drop back at an angle equal to their arrival, striking other incoming waves. Wind speed, the amount of time the wind is blowing and also the distance over which the waves are being created all affect the power of the waves. During a period of prolonged gales over the sea the height and power of waves can be developed to the level of a storm. In a turbulent sea off the Pier the sea is covered by white horses of foam and waves crash into the troughs of those ahead, creating additional friction and turbulence. Because waves break as a function of their height this means that during stormy weather the bigger waves are beginning to break further out to sea.

For every speed of wind there is a corresponding wind duration and area which creates a fully developed sea state. Long sea waves are generated out at sea by strong winds and create swell as they are fast travelling. During a strong swell the strength of a storm system can be appreciated as the sea takes on a uniform appearance of long strong waves. They are an imposing spectacle as they have created a uniform sea by outrunning smaller slower waves and travelling over a long distance to produce a rhythmically running and powerful sea.