Kyle Stephens

Tsunami Defense

After the Japanese tsunami, I wanted to determine which seawall, with or without a breakwater, would best defend a coastal community. My hypothesis was that a curved seawall would do the best in defending against a tsunami. The experiment required a 41-quart plastic tank, a plastic lid for pump, and pipes and wood to create seawalls and breakwaters. The seafloor was constructed of sand and pea gravel. A pocket transit was used to measure the slope of the sea floor. The tank was filled with water. The heights of the seawall, water level, and each wave were recorded using tape. A plastic lid was submerged into the tank on the opposite end from the seawall, to make the tsunami wave by a quick pull up and push down. Each wall was tested and wave heights recorded.

Recorded wave heights (14-16 mm) over the seawall were greatest for the curved wall. During the curved wall test, the front of the wave would stop at the curved wall but the back of the wave would wash over the seawall. Similar wave heights (12-13 mm) were recorded for the sloped seawall. The vertical seawall was somewhat successful (10-11 mm). The rock seawall shifted when the wave passed over the wall. To be more effective this type of wall would need interlocking blocks.

The vertical seawall with the staggered breakwater had the lowest recorded wave heights (7-8 mm). The staggered breakwater slowed the wave almost enough to completely stop the wave at the seawall.