



NHERI Experimental Facility, NSF Award 1519679



Oregon State University

Natural Hazards Engineering Research Infrastructure  
Coastal Wave/Surge and Tsunami Experimental Facility

NHERI-CWST-EF

O.H. Hinsdale Wave Research Laboratory

Large Wave Flume and Directional Wave Basin



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## O.H. Hinsdale Wave Research Laboratory

Resources:

Large Wave Flume and Directional Wave Basin



## Resources: Large Wave Flume and Directional Wave Basin



### Large Wave Flume:



### Applications:

- Cross-shore sediment suspension and transport
- Wave forces on offshore and coastal structures
- Nearshore hydrodynamics, wave breaking, swash dynamics, and undertow
- Tsunami inundation and overland flow
- Tsunami structure impact, debris and scour
- Pollutant mixing and transport
- Scour, pipeline stability and outfalls
- Liquefaction, cohesive sediments
- Wave runup, reflection, and overtopping
- Ocean wave energy systems



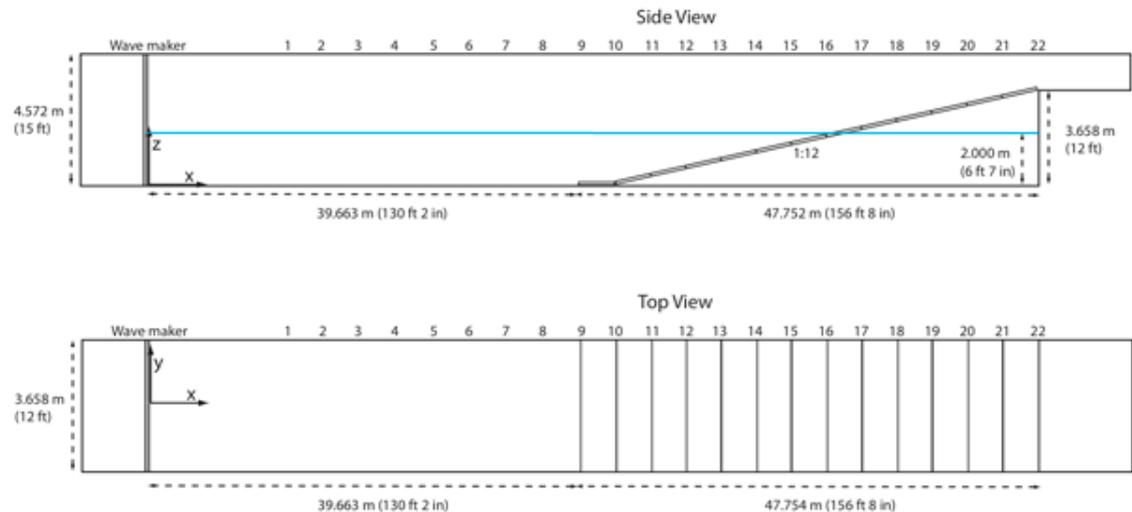
## Resources: Large Wave Flume and Directional Wave Basin



### Large Wave Flume:

#### Specifications:

- Length: 104 m (342ft)
- Width: 3.7 m (12ft)
- Height: 4.6 m (15ft)
- Max water depth: 2 m (6.5 ft) for tsunami, 2.7 m (9 ft) for wind/storm waves
- Movable adjustable bathymetry/beach



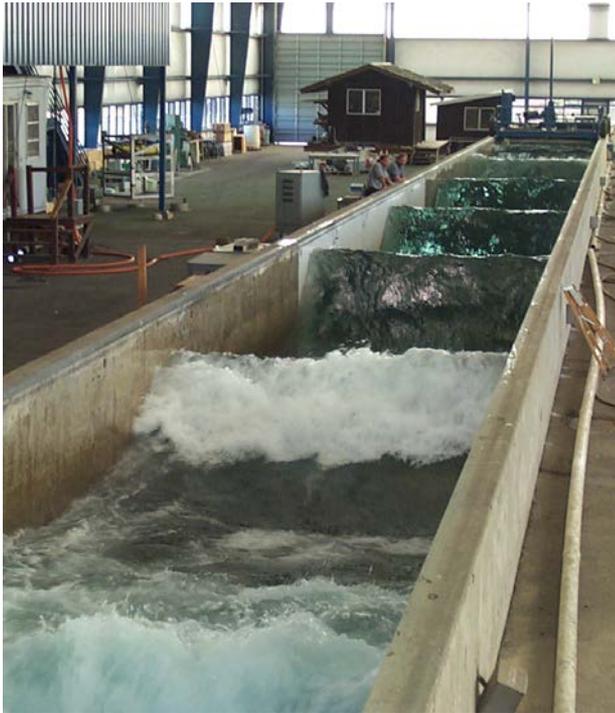


## Resources: Large Wave Flume and Directional Wave Basin

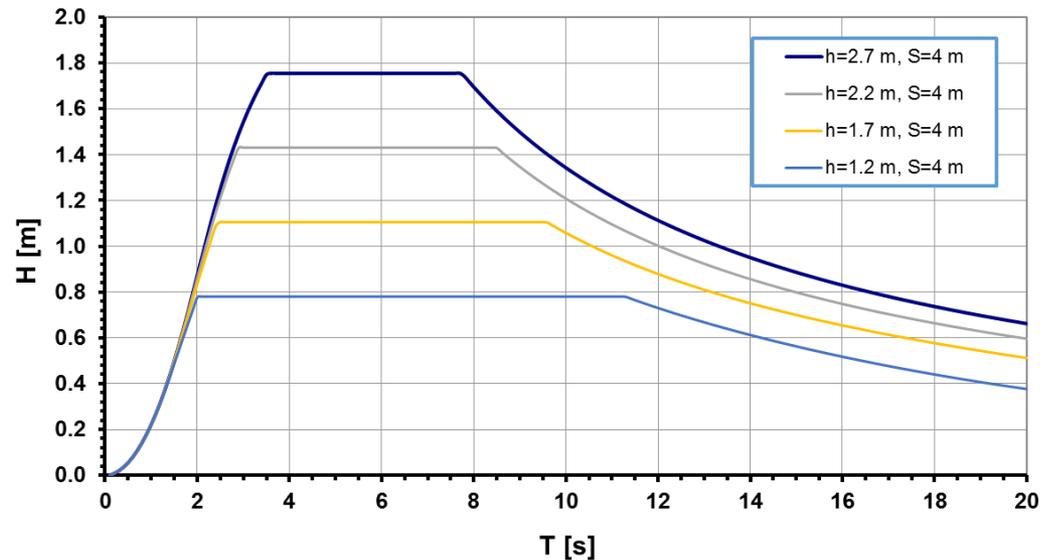
### Large Wave Flume:

#### Wave maker specifications:

- Type: Piston-type, Hydraulic Actuator Assembly
- Wave Types: Regular, Irregular, Tsunami, User Defined
- Period Range: 0.8 to 12 seconds
- Max Wave: 1.7 m (5.6 ft) @ 5 sec in max 2.7 m water
- 1.4 m (3.9ft) tsunami in max 2.0 m water
- Max Stroke: 4 m (13.1 ft) at 4 m/s (13.1 ft/s)



Large Wave Flume, HWRL - Oregon State University  
Wave Height Performance





## Resources: Large Wave Flume and Directional Wave Basin



### Directional Wave Basin:



Previously known as the Tsunami Wave Basin, was designed to understand the fundamental nature of:

- Tsunami inundation
- Tsunami-structure impact
- Harbor resonance
- 3D wave propagation

The facility is particularly suited for:

- General testing of coastal infrastructures
- Nearshore processes research
- Wave hydrodynamics
- Floating structures
- Renewable energy devices



## Resources: Large Wave Flume and Directional Wave Basin



### Directional Wave Basin:



### Specifications

- Length: 48.8 m (160 ft)
- Width: 26.5 m (87 ft)
- Height: 2.1 m (7 ft) Max water depth: 1.36 m (4.46 ft)
- Beach: 1:10 removable steel beach



## Resources: Large Wave Flume and Directional Wave Basin



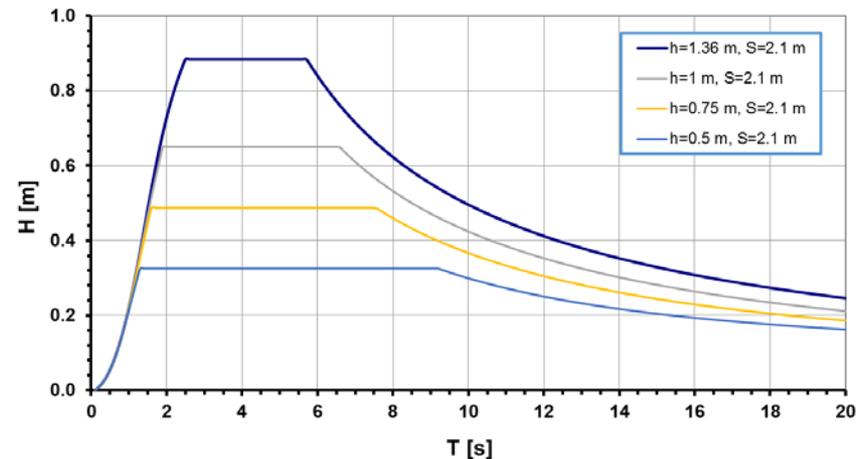
### Directional Wave Basin:

### Wave Maker Specifications

- Snake-type system
- Type: Piston-type, electric motor
- Wave boards: 29, 2.0 m (6.6 ft) high
- Wave types: Regular, Irregular, Tsunami, Multidirectional, User defined
- Period range: 0.5 to 10 seconds
- Max Wave: 0.85 m (2.5 ft) in 1.36m (4.5 ft) water; Max solitary wave: 0.7m in 1.0m water depth
- Max Stroke: 2.1 m (6.9 ft)
- Max Velocity: 2.0 m/s (6.6 ft/s)



Directional Wave Basin, HWRL - Oregon State University  
Wave Height Performance





## Resources: Large Wave Flume and Directional Wave Basin

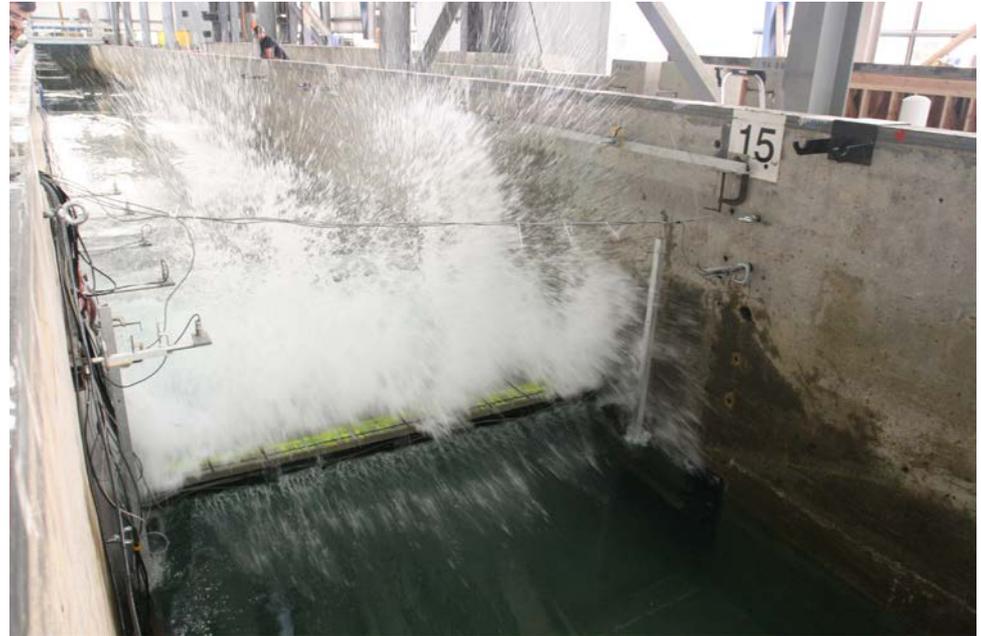


### Bathymetry construction

- None
- Idealized
- Realistic
- Fixed and/or mobile bed

### Testing conditions

- Tsunamis
- Wind/storm waves
- Long-waves
- Non-linear/special waves
- Idealized waves (monochromatic,...)
- Currents (add-on)



### Instrumentation

- Hydrodynamic conditions (surface elevation, pressure, velocity, turbidity, ...)
- Structure loads (load cells, strain gauges, ...)
- Structure response (vibrations, displacements, damage, deformations, ...)