The Wide Open Channel Flume (WOCF) is designed to model coastal waters, rivers, estuaries, the littoral zone of lakes, and more generally any environment where the horizontal length scales are long relative to the depths. The aspect of the facility that makes it truly unique is its width, which allows the natural instabilities in the lateral to grow, leading to features such as the lateral meandering of plumes as they advect downstream and scale dependent dispersion.

It is a recirculating type open channel flume. The test section is constructed entirely of plate glass and is 2.00 m wide, 0.64 m deep and 15.0 m long. It is supported by a tubular steel frame allowing excellent optical access from all sides, including from below. The inlet and outlet sections are reinforced molded polyethylene with a return loop constructed from two 16" polyvinyl chloride (PVC) pipes. The outlet section is isolated from the inlet and test sections to prevent the transmission of vibrations into the facility. The inlet section has a nominally 4:1 contraction in the vertical to aid in conditioning the turbulent flow. The test section terminates with a removable broad crested weir designed to force the flow critical, ensuring that any wave energy propagates out of the test section and is not reflected back upstream.

The facility is equipped with two custom 316 stainless steel impeller based pumps. A variable frequency controller drives each pump. All the materials used in the two custom pumps, and elsewhere in the facility, are specified for marine environments, providing a corrosion free and non-toxic environment for marine and freshwater life. The sealants used are NSF approved potable water sealants.

Funding for this facility was provided by the Office of Naval Research, N00014-98-1-0774, Program Manager Dr. Keith Ward.
Figure 4: View from above with inlet section in foreground.

Figure 5: Looking downstream in all-glass test section.

Figure 6: Side view of bottom fluorescent dye source in upstream end of test section.

Figure 7: End of test section terminates in a sharp-crested weir.

Figure 8: Two custom designed and built variable frequency control driven pumps.

Figure 9: Stainless steel impeller. These impellers are housed within the 16” PVC pipe return loop.

Figure 10: Twin 16” PVC pipe return loop located in approximately 36” deep trench beneath flume. Cameras can be located in trench providing excellent viewing options through glass bed of test section.