University of New Hampshire

The Living Bridge Project

at the Memorial Bridge

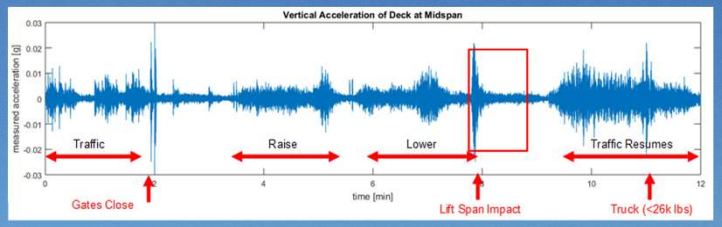
The Living Bridge Project demonstrates an "Estuarine Bridge of the Future" at the Memorial Bridge in Portsmouth, NH. Researchers at the University of New Hampshire are analyzing data, developing models, and designing systems that combine smart user-centered infrastructure with emerging renewable energy systems and can lead to a more resilient and sustainable community. Structural health monitoring and environmental sensors are installed on the bridge and in the river below, and are powered by a locally available renewable resource, tidal energy.
Visit our website to learn more: livingbridge.unh.edu

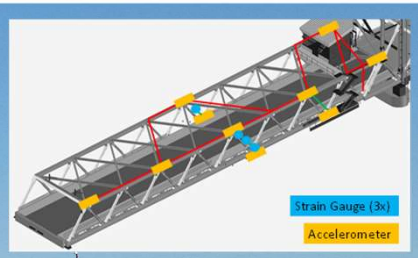
To Kittery, ME

To Portsmouth, NH

Structural Health Monitoring Sensors

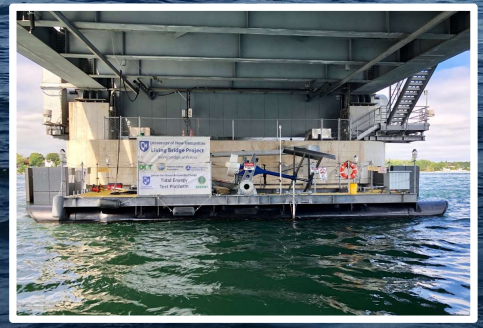
- Unique gusset-less connections replace traditional bridge connections
- Strain gages and accelerometers installed on the bridge measure stress and vibration in the structural members and connections
- Structural health data allows the bridge to be studied and modeled to reduce the maintenance costs and increase the lifespan of bridges



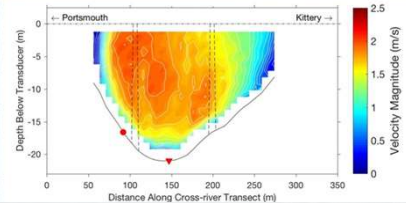


Tidal Energy Conversion System

- A vertical axis crossflow turbine harnesses the power of the tidal currents: the instantaneous power is proportional to the cube of the tidal current velocity
- Approximately two New Hampshire households (on average) can be powered by the electric energy generated
- They system produces carbon free energy for the electric grid and to power the sensor systems on the bridge



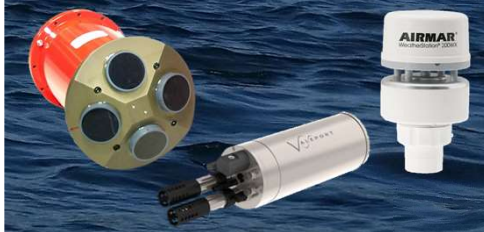
Spatial distribution of tidal current speeds at the Memorial Bridge at spring ebb tide.



Polar plot showing the current speed [m/s] and direction [deg] at the turbine deployment location.

Environmental Sensors

- Tidal current speeds are measured from the surface down to the estuary bottom
- Water temperature, salinity, and turbidity measurements monitor the estuary's health
- Wind speed, air temperature, and humidity measurements provide weather conditions



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