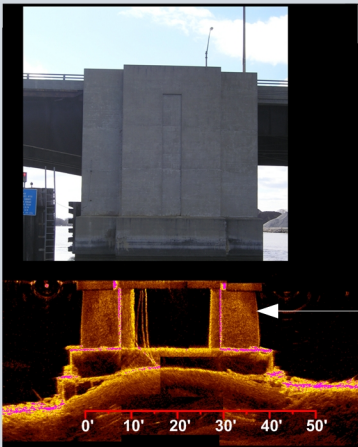




Upstream Bull Nose



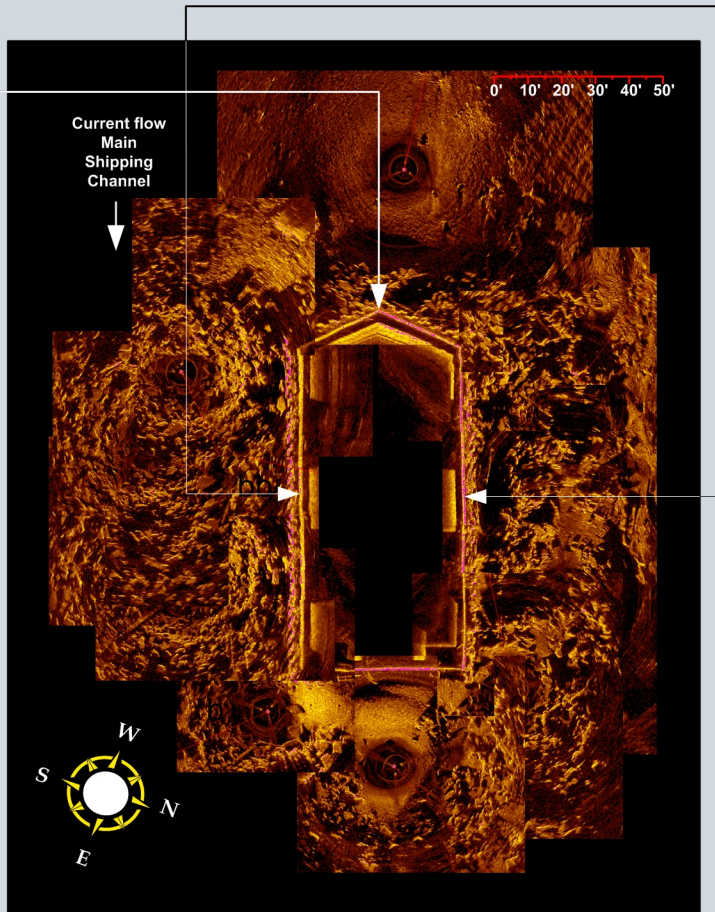
Downstream Bull Nose



Acoustic distortion on both underwater sides of the pier is due to the close proximity of the sonar head to the structure



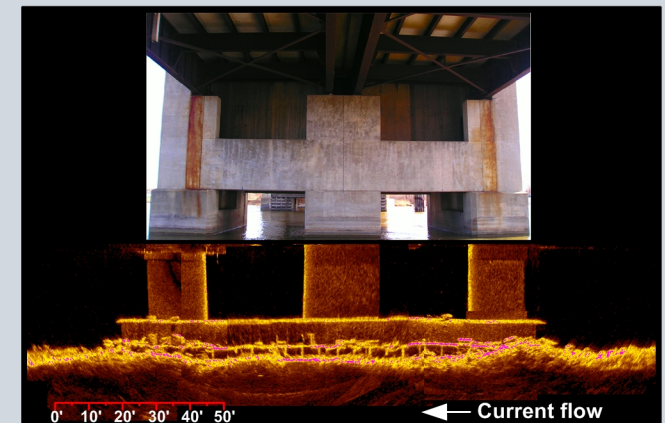
Pier 4 Independence Bridge, Bay City, Michigan



Main Channel View



North View



Sonar images created using a Kongsberg Mesotech High Resolution Scanning Sonar Head with a 0.9° X 30° beam; the sonar head was both tripod and pole mounted to achieve the riverbed and vertical scans.



Typical tripod MS 1000 scanning sonar system with the high-resolution sonar head and Kevlar deployment cable



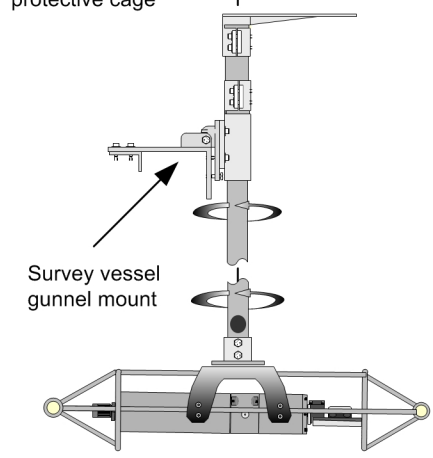
Equipment configuration for riverbed and vertical visualization of structures:

- Laptop computer with MS 1000 PC-based Sonar Software
- MS 1000 Interface Unit
- Kevlar deployment cable
- 675 kHz High Resolution Scanning Sonar Head with fan beam transducer (or Multi Frequency High Resolution Sonar Head)
- Tripod
- Sonar Pole Mount

Additional equipment considerations:

- Surveyors tape
- Marker
- Daylight-viewable second monitor
- ½" high quality rope (several 100' lengths) to wrap around the pier if needed
- DGPS
- 15 pound lead weights (3)

Horizontally mounted High Resolution Scanning Sonar in protective cage



Scanning Sonar Pole Mount

Additional information:

- For vertical visualization of the sub-structural elements the sonar transducer is typically positioned 3'-4' away; **the body of the sonar head needs to be normal to the plane being imaged.**
- Record a waterline elevation measurement at each scan location so the sonar data can be referenced to a local vertical datum level.

To scan a vertical structure the sonar head is mounted horizontal and is typically positioned 3' - 5' (1- 1.6m) below the water surface.

