

**BATHYMETRIC SURVEY REPORT
GOWANUS CANAL
BROOKLYN, NEW YORK**

ADDENDUM 1

**Comparison of Gowanus Canal Bottom Elevations
June 2003 versus January 2010**

CR Environmental, Inc. compared Gowanus Canal bottom elevations recorded during bathymetric survey efforts conducted in 2003 and 2010 to estimate areas of sedimentation and erosion within the canal. The sections that follow provide the methods used to compare the elevation data, and briefly describe the results of the comparison.

Methods

Prior to conducting the elevation data comparison, the June 25, 2003 data were re-processed to adjust soundings to estimated NAVD88 elevations using correction factors detailed in Section 2.3 of the *April 2010 Bathymetric Survey for Gowanus Canal, Brooklyn, New York* report. These data were acquired along cross-sections spaced 25 to 200 feet apart (see Figure A1). The root mean squared (RMS) error of the reprocessed data was calculated as approximately 0.3 feet using Army Corps of Engineers (ACOE) methods (see Section 3.0), similar to the error value calculated for data collected in 2010. The reprocessed 2003 data were then gridded using a 20-foot node interval. The extent of the grid (surface model) was limited to the boundary of the 2010 survey effort.

The approximate thalweg (deepest continuous line) of the Canal as interpreted from the 2010 data was digitized. Points from the 2003 and 2010 grids which intersected the thalweg were extracted and exported in ASCII text format. These points were used to generate comparative profiles of thalweg elevation differences between the two surveys. The points have been delivered digitally in MS Excel tabular format.

The grids from each survey were next converted to an ASCII format suitable for analysis using IVS3D Fledermaus software. This software was used to compare the two surface models. The elevation values from 2003 were subtracted from co-located values on the 2010 surface model, resulting in a new surface for which positive values indicated shallower 2010 depths (sedimentation) and negative values indicated portions of the canal which were deeper in 2010 (erosion, scour, dredging or other anthropogenic activities). This elevation comparison grid was used to generate a contour map of elevation differences (Figure A2). The map was imported to GIS in DXF and TIF formats for comparison with bathymetry. These layers have been delivered electronically.

Results

The distribution of bathymetric data points for the two surveys are shown on Figure A1. Detailed maps of the 2010 data distribution have been provided on Figures 1A and 1B in CR Environmental's *April 2010 Bathymetric Survey Report for the Gowanus Canal*,

Brooklyn, New York). The substantially lower data density specified for the 2003 survey effort is readily apparent, and is important to acknowledge during examination of the surface model comparison results. The 2003 data density was highest upstream of the Carroll Street Bridge where transect spacing was approximately 25 feet (Figure A1).

Figure A2 is a plan view comparison of the 2003 and 2010 surface models. Elevation differences along the thalweg are depicted on Figures A3 and A4. The data comparisons shown on Figures A2 and A4 highlight the area of highest uncertainty as +/- 0.6 feet, the combined RMS error estimates for the two surveys. Despite efforts to minimize modeling artifacts, the surface model comparison shown on Figure A2 shows regularly spaced positive elevation difference “lobes” along each shoreline at intervals that mirror the distance between the 2003 cross-sections. CR recommends that users of these data simultaneously evaluate model data relative to sounding distribution in GIS to minimize the likelihood of misinterpretation. Data comparisons along the thalweg are less subject to grid interpolation errors.

Elevation differences appeared minor upstream of the floating boom adjacent to Sackett Street (about 530 feet downstream of the head of the Canal). Some erosion was indicated along the western shoreline (see Figure A2). Approximately 2 to 3 feet of sediment accumulation was suggested between the boom and the Carroll Street Bridge (about 1,400 feet downstream of the head of the Canal). Data comparisons within this upper portion of the Canal are considered robust from shore to shore due to the higher 2003 data density upstream of the Carroll Street Bridge.

Comparison of the two model surfaces along the thalweg suggests approximately 1 to 2 feet of sediment accumulation at the northern end of the Canal between Carroll Street and 3rd Street (see Figures A3 and A4).

Elevation differences of approximately -1 to 1 foot dominated most of the reach between 3rd Street and Interstate 278. Highest confidence is given to areas of elevation differences greater than the summed RMS uncertainty of ± 0.6 feet (see Figure A4). Erosion in this reach is suggested in an area subject to frequent tug and barge traffic adjacent to a gravel shipping yard between 5th Street and Huntington Street.

At the southern end of the Canal, the surface comparison suggests a wide (approximately 80,000 square foot) region of sediment accumulation along the thalweg adjacent to Halleck Street (Figures A2 and A4). Also suggested in this southern reach were many smaller areas of substantial elevation difference either erosional or depositional (Figure A2).

Confidence for many of these areas decreases with increasing distance from the 2003 longitudinal centerline due to anomalies associated with interpolation between survey transects spaced approximately 150 feet apart.