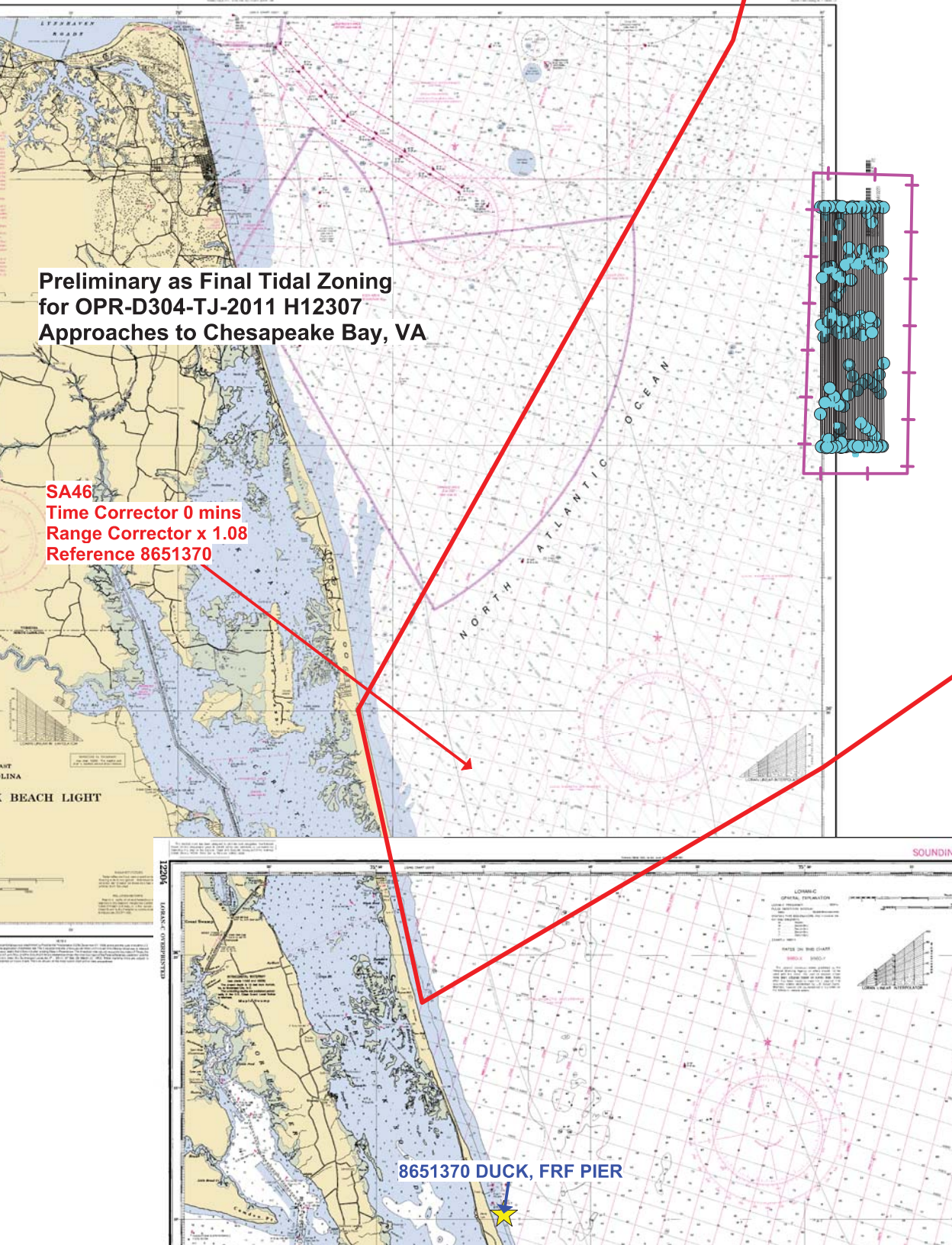
Preliminary as Final Tidal Zoning
for OPR-D304-TJ-2011 H12307
Approaches to Chesapeake Bay, VA
SA46
Time Corrector 0 mins
Range Corrector x 1.08
Reference 8651370
NORTH ATLANTIC OCEAN
BEACH LIGHT
8651370 DUCK, FRF PIER

C.5 Tides and Water Levels

C.5.1 Description of Correctors

C.5.2 Methods and Procedures

Discrete tidal zoning is a methodology used by the National Ocean Service (NOS) to provide tide reducers for hydrographic surveys. Analyses of historical tide data, models, and other research are used to describe the tidal characteristics of a given survey area. Co-tidal charts are constructed to define GIS maps of co-range and co-time lines. The co-tidal maps are used to construct a discrete tidal zoning scheme. Survey areas are divided up into geographic zones or areas which have defined times of tide and ranges of tide. The number of zones for a particular survey depends upon the complexity of the tide in the area. Each zone is described by a range ratio or a time correction to a tide station in operation during the survey. Tide reducers are compiled by applying the appropriate time and range corrections to the observed data relative to Mean Lower Low Water (MLLW).

Soundings are initially reduced to Mean Lower-Low Water (MLLW) using preliminary (observed) water level data. Data may be obtained from the primary tide gauge through the Center for Operational Oceanographic Products and Services (CO-OPS) website. Observed water level files are converted to CARIS tide files (.tid) and/or text files and applied to all sounding data using either discrete tidal zoning

in CARIS HIPS or the TCARI module in Pydro. The type of water level correction used in a survey is specified in the Water Level Instructions, provided by CO-OPS.

When discrete tidal zoning is specified in the Tide Note, THOMAS JEFFERSON personnel use verified water levels and final tidal zoning from the Zone Definition File (ZDF) provided by CO-OPS for hydrographic product generation.

TCARI works by separating the astronomic tide, residual, and datum difference components and treating them differently. First, the method spatially interpolates each tidal constituent's amplitude and phase throughout the region, based on data at the water level stations and makes a tidal prediction. The amplitude and phase of constituents at water level stations must have been previously determined by analysis of historical records. This predicted tide is then added to the residual component, which is computed by spatially interpolating the non-tidal values observed at the water level stations at the time of the survey. Finally, the datum offset, or difference between MSL and MLLW based on historical data, is interpolated throughout the region and added to the prediction.

Tidal Constituents and Residuals Interpolator (TCARI) grid files, when applicable, are submitted to THOMAS JEFFERSON as part of the Project Instruction package. A TCARI grid is computed using the shoreline, a limiting boundary, and the positions of two or more water level gauges. Harmonic constants, residual water levels, and gauge weights are interpolated for each grid point, using the data from the water level gauges as control points. Water level corrections are applied in Pydro using the TCARI tools found in Pydro 7.3 and beyond. When using TCARI for datum reduction, water level corrections are not applied to echosounder data in CARIS. Following TCARI water level correction in Pydro, data is merged and processed.