



America's 95,000 miles of coastline are subject to natural and man-made processes that continually alter its shape and character. The accuracy, consistency, and currency of our national shoreline need to be frequently ensured, especially during this era of rapid coastal development.

Countless applications depend on NOAA's National Spatial Reference System to determine where the land meets the sea, including:

- producing state-of-the-art nautical charts for safe, efficient, and competitive maritime commerce;
- defining America's marine territorial limits;
- constructing safe buildings, roads, and bridges; and
- delineating property lines to minimize boundary disputes.

NOAA has led the way in developing new applications for GPS. For example, using GPS

with aerial photography, we can locate any point on the land below to within about a foot.

The remarkable efficiencies made possible by such precise positioning data can be magnified by feeding the data into a Geographic Information System (GIS). A GIS assembles information from a wide variety of sources, including ground surveys, existing maps, and aerial photos. In a GIS, specific information about a place – such as the locations of utility lines, roads, streams, and buildings – is layered over a set of geodetic control. With a computer, regional planners can use the layers individually or in various combinations – for example, to determine how to improve traffic flow, merge construction with existing utility systems, or protect the public from potential natural disasters. And because a GIS stores data digitally, information can be quickly and economically updated, easily reproduced, and made widely available.

*"The world is but a canvas to our imagination."*

*– Henry David Thoreau*



**This aerial photo of the Port of Long Beach was taken in 1954 as the basis for depicting the land features on NOAA's nautical charts.**



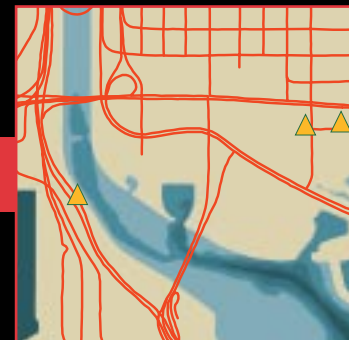
**This high-accuracy NOAA photo, taken in 1997, clearly shows radical changes in the port's shoreline during the 43-year period.**



**The first step in assembling a GIS involves creating a foundation "layer" of virtual geodetic control, shown above as ▲. These reference points serve as the basis – the "brass tacks" – for successive data layers, such as land and water boundaries.**



**In a stepwise fashion, additional layers are each referenced to NOAA's National Spatial Reference System. Here, the base geodetic control layer, plus the land and water demarcations, are used as a "backdrop" for additional features, such as roadways.**



**A bathymetric layer depicting the contours of the ocean bottom serves a variety of purposes, such as showing ships' captains the location of the deepest waters and indicating where marine life and habitats may need special protection.**