

A brief explanation of the North American Vertical Datum of 1988 (NAVD '88)

Vertical is defined by the National Geodetic Survey (NGS) as: *The direction in which the force gravity acts. It is the direction indicated by a plumb line of infinitesimal length.* In other words, up and down.

Datum is defined by (NGS) as: *Any quantity or set of such quantities that may serve as a referent or basis for calculation of other quantities.* In other words, a known compared to unknowns.

An example of a datum would be what is used to measure temperatures. Fahrenheit and Celsius are different datums with different scales and different numbers assigned to the point where water freezes and boils. The relationship between these two standards can be a source of confusion especially for temperatures near freezing – UNLESS IT IS **VERY** CLEAR WHICH DATUM IS BEING USED.

The reasonable questions then are: what is 0.00 feet NAVD '88; why was that vertical location chosen; and why would there be a change in datums? To begin to understand these questions, another datum must first be explained.

The National Geodetic Vertical Datum of 1929 (NGVD '29) was established by the Federal government using 26 tidal gauges around the United States and Canada. Every high and low tide was measured and recorded at each station for a complete tidal datum epoch (19 years) with a mean elevation eventually being determined. At the same time, high precision level runs were made between the various stations to compare the values. It was thought that the mean sea level value of 0.00 feet at one station would be the same or close to all the other stations. In reality zero at one station was significantly different from all the others and from the East coast to the West coast of the United States there was a difference of four or five feet. With this "error", the decision was made to warp or adjust the numbers in between to maintain the zero value at each of the 26 stations.

For local considerations that approach worked and flood maps were prepared based on NGVD '29 to help the public estimate potential flood risks. Additionally, methods were established to identify local Mean High Water (MHW) elevations which determine the line separating private property ownership from State lands. (In the state of Florida, the Department of Environmental Protection [DEP] – along with the work of a licensed Surveyor and Mapper – is the State agency which has authority to determine the MHW elevation).

With advances in technologies – particularly GPS, the known inaccuracies in NGVD '29 began to cause problems that only a new datum definition could solve. NAVD '88 actually utilizes a calculated position for the center of the Earth's gravitational mass and holds the tidal station at Father's Point – Rimouski, Quebec, Canada as the basis of zero. It is beyond the scope of this paper to explain the basis for this decision; however, this standard caused the least disruption to the largest geographic area of the Country (particularly the Great Lakes and the Mississippi River Valley) and minimized the discrepancies with earlier created Topographic maps of the Continental United States.

The practical impact to Manatee County is that *value* of elevations will decrease by an average of 0.97 feet. For example, a home with a floor elevation of 10.0 feet NGVD '29 will have a value of around 9.0 feet NAVD '88. Just as 32° Fahrenheit is the same a 0° Celsius, there is a datum change but no actual change in elevation. In no way does the decrease in value of elevations reflect the subsidence of land or rising sea levels; it is simply a change in datums. At this time it is unknown if the base flood elevations will also shift by the same amount.

To meet the needs of the public for reliable and durable benchmarks, the Survey Division has been working to establish a dense network of high quality, high precision marks around the County. When the project is complete, the County and municipalities within the County will have set 500 to 600 new marks. These new marks will assist the homeowner and the surveyor with the utilization of the new datum. Horizontal Geodetic values will also be included on some of these monuments.

Respectfully,



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