Vertical Datum Change for Riverside County, CA

A new digital Flood Insurance Rate Map (FIRM) will be produced for Riverside County, California and incorporated areas. Because one of FEMA's goals is to convert all flood maps to the North American Vertical Datum of 1988 (NAVD88), this new FIRM as well as the accompanying Flood Insurance Study will reflect the newer, more accurate vertical datum.

What Is a Vertical Datum?

A vertical datum is a set of constants that defines a system for comparison of elevations. A vertical datum is important because all elevations need to be referenced to the same system. Otherwise, surveys using different datums would have different elevations for the same point. The current FIRMs for Riverside County reference the National Geodetic Vertical Datum of 1929 (NGVD29). FEMA, however, desires to update to the most accurate vertical datum - NAVD88.

Why Is the Vertical Datum Changing?

A datum needs to be updated periodically because geologic changes to the surface of the earth occur; these changes are due to subsidence and uplift or gradual changes in sea level. In addition, the older vertical datum (NGVD29) was flawed because of erroneous assumptions that mean sea level at different tidal stations represented the same elevation (zero). With the outdated vertical datum, points at 0.0 foot NGVD29 have, in fact, different elevations for a variety of reasons. We can now more accurately measure these elevation differences with an expanded geodetic network, further warranting the use of the new vertical datum. Digital conversion mapping efforts provide an opportunity to produce new maps using NAVD88 and to expedite the use of the newer vertical datum.

When Is the Vertical Datum Changing and Who Will Be Impacted?

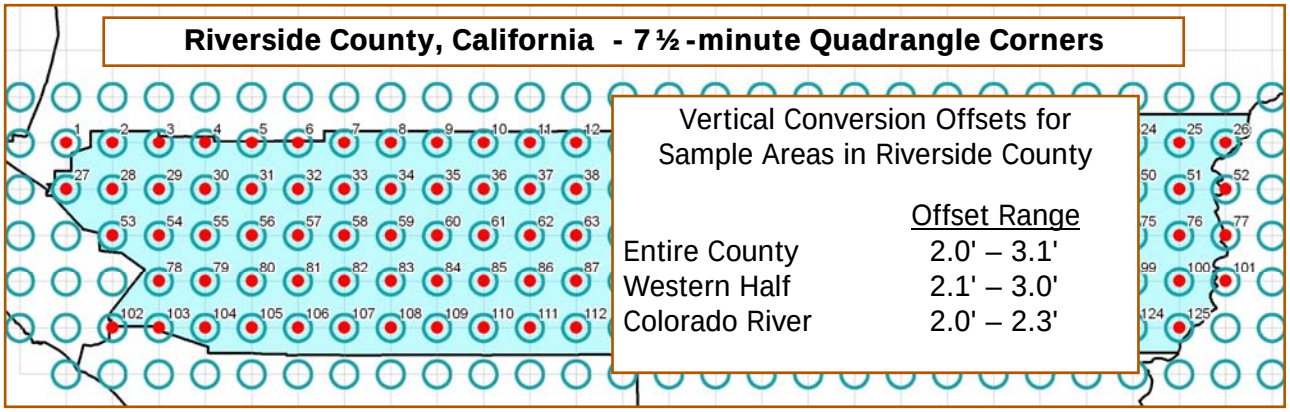
Elevations in NAVD88 should be used for floodplain management and flood insurance purposes (e.g., elevation certificates) the day that a new FIRM becomes effective. FEMA is still in the initial stages of map production for Riverside County, but a target effective date is 2007. This change should be noted by anyone who uses a Riverside County FIRM panel, particularly when comparing elevation data on a new FIRM panel with data from an old FIRM that was produced in NGVD29. The vertical datum change impacts those who work with elevation data, such as engineers and surveyors, as well as community floodplain administrators across the area.

How are Unrevised NGVD29 Flood Elevations Converted to NAVD88?

To ensure that all the elevations used are based on a common reference system, a FIRM must reference a single vertical datum. Therefore, MAPIX-Mainland will establish conversion factors (offsets) to be applied to unrevised 1% annual chance (100-year) flood elevations in Riverside County. The most precise way of converting between NGVD29 and NAVD88 is to compute a different offset value for each set of horizontal coordinates, but this would yield an infinite number of different offsets. Current FEMA guidelines, however, dictate that conversion factors between NGVD29 and NAVD88 be determined at 7½-minute quadrangle corners located in or within 2.5 miles from the jurisdiction receiving a new FIRM.

How are Unrevised NGVD29 Flood Elevations Converted to NAVD88? (con't)

The U.S. Army Corps of Engineers' CORPSCON software is used to determine the vertical offsets between the two vertical datums that differ as a function of horizontal location. Current FEMA procedure determines offsets at 7½-minute quadrangle corners, as shown below for Riverside County. To simplify the process for converting unrevised elevation data from old flood studies into new flood studies, FEMA allows either 1) a uniform offset to be applied to an entire county when the maximum error in using a standard offset value is no more than 0.25 foot (3 inches) for that county, or 2) if the offset from the average conversion factor falls outside of the acceptable range of 0.25 foot from the average, an alternative vertical datum conversion process is used, such as calculation of a watershed-by-watershed or stream-by-stream offsets. For Riverside County, a uniform offset cannot be applied to the entire county because the variations between NGVD29 and NAVD88 are too great.



The figure above depicts the coordinate points used to preliminarily calculate conversion factors (offsets) from NGVD29 to NAVD88 for Riverside County, California. As can be seen, Riverside County is a large county with 125 quadrangle corners. The lowest offsets (i.e., smallest variation between NGVD29 and NAVD88) are at the eastern end of the county. The highest offsets are farther west, but not at the westernmost end of the county.

Is Further Information Available?

This fact sheet was produced by MAP IX-Mainland, a joint venture of:

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For more information on the MAP IX-Mainland projects underway, please visit http://www.map9-m.com/.

FEMA's guidelines and specifications regarding vertical datum conversions can be found online at http://www.fema.gov/pdf/fhm/frm_gsab.pdf. Additional information on vertical datums can be found by contacting the National Geodetic Survey, Vertical Network Branch, Coast and Geodetic Survey, National Oceanic and Atmospheric Administration, Rockville, MD (http://www.ngs.noaa.gov).