



**DEPARTMENT OF PUBLIC WORKS
ENGINEERING PROGRAM
Surveyor's Office**

**OFFICE OF THE COUNTY SURVEYOR
VERTICAL DATUMS USED IN CLARK COUNTY**

The following document was originally created in July, 1990, by then County Surveyor, Monte Monteith, PLS, in July, 1990. The content appears in its entirety, unedited. It was updated in March, 2009, only to the extent of showing the current organizational description, address and County logo.

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EARLY LEVELING

The first leveling in Clark County was done by the USGS in its first mapping projects, beginning about 1895 and continuing on into the 1920's. The datum used in these early surveys is unknown.

NGVD 1929

The National Geodetic Vertical Datum of 1929 was established by the U.S. Coast and Geodetic Survey holding mean sea at various tide gages on both coasts fixed and adjusting the interconnecting level lines. In Clark County, these old first-order bench marks are located along the railroads following the Columbia River. In the late 1930's, third-order levels were run for mapping purposes in the interior of the county by USGS and the Army Corps of Engineers. In most cases, benchmarks from this era have the elevations stamped directly on the disks.

1947 ADJUSTMENT

The Pacific Northwest Supplementary Adjustment was made by C&GS in 1947, presumably to incorporate better leveling and tidal data. The 1947 adjustment raised the elevations of benchmarks in the Clark County area by a variable factor ranging from 0.38 to 0.42 feet. Since this was an adjustment, not the result of a new datum, the **adjusted elevations are still on NGVD '29**; the old elevations have no status at **all** relative to the national network. NGVD 29, as adjusted, is still the current national vertical datum. It is the basis for the USGS quadrangle maps, and for the FEMA Flood Insurance Rate maps.

However, great care must be taken in using old level notes: many agencies including the State of Washington still used the superseded 1929 elevations as late as the 1960's, and a great deal of confusion still exists today in cases where existing level networks are based on these old elevations.

CITY OF VANCOUVER DATUM

By 1947, the City of Vancouver had established a vertical network based on the old elevations, and elected not to adjust it with the national network. The City of Vancouver Datum has now been extended into some areas of unincorporated Clark County where the City provides water and sewer service, and is the vertical datum for the City of Vancouver aerial topographic mapping program. In many cases City and County (see below) benchmarks are present in the same area, but on different datums.

CLARK COUNTY DATUM

Clark County's present vertical control network dates from the early 1970's when single-wire levels were run to control aerial mapping in the developed areas of the county. These levels are based on the current (1947 adjustment) elevations of first-order bench marks. The network has proved in many areas to be consistent with Third-Order closure specifications, although no third-order procedures were followed. "Clark County datum" is the vertical datum of most public and private mapping and development outside the City limits. The published elevations should be used with care, however, since there has been no systematic program of benchmark maintenance; many of the benchmarks were spikes in poles that may have been moved, or boxed monuments that may have been raised.

NEW LEVELING

In 1987 the National Geodetic Survey ran a First-Order level line from Portland to Olympia as part of the readjustment of the national network. The line crossed the Columbia River on the railroad bridge, ran through a series of the old first-order benchmarks in the downtown Vancouver area, and then followed Interstate 5 north through the county. Benchmarks set were generally stainless steel rods driven into the ground, or brass disks set in bridge abutments. NGS did not publish the adjusted elevations of these benchmarks, awaiting the national readjustment (see "NAVD 88" below). However, in May 1990, at the request of the Clark County Surveyor's office, NGS did perform a special adjustment of the line from Portland to Kelso to NGVD 29.

In 1989 and 1990, as part of the Washington State GPS Project ("Supernet") the Clark County Surveyor's office ran a series of level lines through the interior of the county and near Vancouver Lake. These originated on first-order benchmarks, utilized calibrated invar rods and a micrometer, and fully met NGS standards for Second-Order Class II leveling. Benchmarks set were either brass disks in concrete curbs, or disks in concrete monuments. Benchmark descriptions and leveling data were submitted to NGS for inclusion in the national network.

NAVD 88

NGS is currently readjusting the national vertical network to an entirely new datum, to be called the North American Vertical Datum of 1988. This is being done because NGVD 1929 held mean sea level fixed on both coasts, when in reality the two sea levels differ by about 4.5 feet. The new adjustment, which will incorporate large amounts of new leveling and many refinements, will be a true "equipotential surface", and will give better results when used with GPS (satellite surveying) techniques.

Clark County's second-order leveling will be adjusted by NGS to the new datum.

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