City of Coos Bay

Public Works and Development Department

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INTERNAL TECHNICAL MEMORANDUM
FOR
VERTICAL DATUM INFORMATION FOR THE CITY OF COOS BAY REGION

BACKGROUND

In general, a datum is a base elevation used as a reference from which to reckon heights or depths. It is important to understand the vertical datum in which the plans were prepared and submitted, especially when there are several different sources of information referenced. Once all of the topographic and/or elevation information has been gathered for a project, the datum or datums need to be verified and if necessary the difference between datums reconciled (reconcile the difference between datums). Over the years, the Coos Bay region has been subject to many different vertical datums. This technical memorandum has been created to provide clarification and definitions of these datums and to provide approximate datum conversions.

Vertical Datum Definitions

The following is a brief overview of the different datums that have been commonly utilized in this region:

MLLW - Mean Low Level Water – This datum is one of several tidal datums in which the average of the lower low water height of each tidal day observed over the National Tidal Datum Epoch. For stations with shorter series, simultaneous observational comparisons are made with a control tide station in order to derive the equivalent datum of the National Tidal Datum Epoch.

MSL - Mean Sea Level – This datum is one of several tidal datums in which it recognizes the arithmetic mean of hourly heights observed over the National Tidal Datum Epoch. Shorter series are specified in the name; e.g. monthly mean sea level and yearly mean sea level. This datum is commonly assumed to be the same as NGVD 29. This however is not correct; NGVD 29 and MSL are two separate and different types of vertical datums and should not be confused with one another.

NGVD 29 - National Geodetic Vertical Datum of 1929- Also known as the **Sea Level Datum of 1929** was the vertical control datum established for vertical control surveying in the United States by the General Adjustment of 1929. The datum was used to measure elevation (altitude) above, and depression (depth) below, mean seal level (MSL). Since the Sea Level Datum of 1929 was a hybrid model, it was not a pure model of mean sea level, the geoid, or any other equipotential surface. Therefore, it was renamed the National Geodetic Vertical Datum of 1929 (NGVD 29) in 1973. The NGVD 29 was subsequently replaced by the North American Vertical

Datum of 1988 (NAVD 88) based upon the General Adjustment of the North American Datum of 1988.

NAVD 88 - The North American Vertical Datum of 1988 – This vertical control datum was established in 1991 by the minimum-constraint adjustment of the Canadian-Mexican-U.S. leveling observations. It held fixed the height of the primary tidal bench mark, referenced to the new International Great Lakes Datum of 1985 local mean sea level height value, at Father Point/Rimouski, Quebec, and Canada. Additional tidal bench mark elevations were not used due to the demonstrated variations in sea surface topography, i.e., the fact that mean sea level is not the same equipotential surface at all tidal bench marks.

VERTICAL DATUM CONVERSATION FACTORS

The following information is an approximate conversion. The project location within the City of Coos Bay will depend on the exact conversion factor. Prior to starting a project it is recommended that a licensed land surveyor provide the conversion factor based on the project's location. Additionally, the engineering department has historic files in which this information may be available.

$$\text{Elevation}_{\text{NAVD 88}} = \text{Elevation}_{\text{NGVD 29}} + 3.6$$

$$\text{Elevation}_{\text{NGVD 29}} = \text{Elevation}_{\text{NAVD 88}} - 3.6$$

Utilizing these approximate conversion factors a person can convert between the two most common vertical datums utilized today. Currently the City is requiring that all new projects have topographic information and proposed grading and building plans be prepared with the vertical datum of NAVD 88. If the project is not intending to comply with this requirement, it is recommended that the project's representative discuss this with City Staff prior to submitting a permit application.

CONCLUSION

As stated previously, the conversion factors presented in this technical memorandum are approximate and should only be utilized for preliminary design and investigation. Upon formal design the City recommends that the project's licensed land surveyor provide the conversions that are directly related to the location of the project within the City. Additionally, all new plans and information presented to the City must utilize the vertical datum of NAVD 88.

The City has LiDAR information and Benchmark information both of which are based on NAVD 88. This benchmark information was obtained in the mid-1990s. Twenty (20) permanent benchmarks were established. However, not all of the benchmark monuments still exist today; they have been covered, overlaid, vandalized, etc. Currently, City staff is investigating options to improve the quantity of benchmarks as well as update the benchmark information. If you should have any questions regarding this memorandum please contact the Engineering Department.