

DIFFERENCES BETWEEN ELLIPSOID AND GEOID

ASSUMPTIONS CORRESPONDING TO A CHOICE OF A GEOID MODEL:

- **For a first approximation, the difference between the ellipsoid and geoid can be assumed to be zero. On a global basis, the error of such an assumption could be as much as 100 meters. In the United States the geoid height (error of this assumption) ranges from approximately -7 meters to about -52 meters (Marc Cheves, Professional Surveyor, Vol. 17, No. 1, page 50).**
- **Another assumption is the world is flat (for a small area) and that the ellipsoid and geoid are two parallel planes. Under this assumption, if the geoid height at one place is known, the geoid height at nearby locations is the same. For some applications this assumption is appropriate but, in the big picture, this assumption is also deficient.**
- **A better assumption is that the two planes are not parallel, but that one plane is tilted with respect to the other. If geoid heights are known for at least three points (required to define a plane) in a specified area, other geoid heights within the same area can be obtained by linear interpolation techniques. Extrapolation may provide reasonable answers in the same general area, but uncontrolled extrapolation is to be avoided. If geoid heights are known for more than three points scattered throughout the project area, a local "best fit" geoid model may be an appropriate choice.**
- **An even better assumption is that the two surfaces are both curved and not concentric. Curvature of the ellipsoid is well defined mathematically and can be computed. One complexity of this assumption is the difficulty of reliably defining the curvature of the geoid surface because it (related to gravity) has irregular curvature. This is the arena in which the "best" geoid model are built.**