

1.4 Primary Level of Inclination of Geoid Correction

The primary level of inclination of geoid inclination used for geoid correction has been calculated in the order of 1) -> 2) -> 3).

1) Calculation of geoid undulation of WGS84 coordinate system

By using the program “Geoid 96” developed by Geographical Survey Institute, Ministry of Construction, the geoid undulation of WGS84 coordinate system has been calculated respectively at the points approximately 500 meters north, south, east and west to the station datum at each observation station, so that all the surveying points at every observation station are within its range.

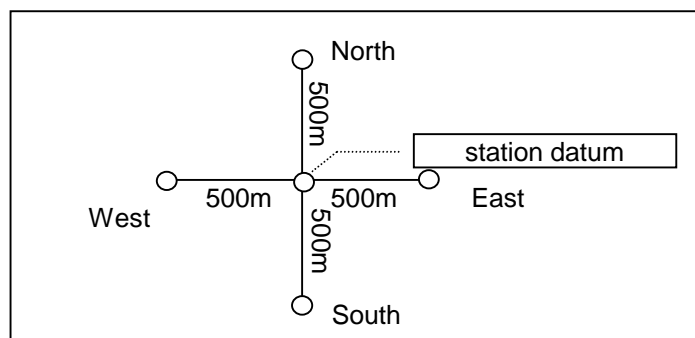


Figure 3 Map of geoid undulation calculation points

2) Determination of the geoid undulation of GRS80 coordinate system

Since the ellipsoidal element and central position of both WGS 84 and GRS80 coordinate systems did not differ significantly, the same values calculated in 1) as the geoid undulations of WGS 84 coordinate system are used as the geoid undulations of GRS80 coordinate system.

3) Calculation of the primary level of inclination of geoid undulation

As shown in Table 7, the primary level of inclination of geoid undulation (component ξ for north-south direction and component η for east-west direction) have been calculated respectively on the basis of the difference of the geoid undulation at both ends of east-west direction and north-south direction (relative geoid undulation difference) at each observation station which respectively is one kilometer (1000m) long.

Table 7 Primary level of inclination of geoid undulation at each station

	Koganei station	Kashima station	Miura station	Tateyama station
Component xi for north-south direction	11.4 seconds	16.4 seconds	-1.9 seconds	-4.5 seconds
Component eta for east-west direction	-17.4 seconds	-24.3 seconds	-9.3 seconds	-13.6 seconds

4) Verification of the geoid undulation by “Geoid 96”

At Kashima station, the geoid undulation at point (X8) has been determined by calculating the difference between the relative ellipsoidal height by GPS survey and the orthometric height by leveling (first class leveling). The discrepancy between this value and the geoid undulation by “Geoid 96” has been confirmed to be just 8mm and therefore these two values are thought to be consistent.