ANNEX G

ELLIPSOID HEIGHT ORDER-AND-CLASS (OC) CODES

This annex contains ellipsoid height Order and Class (OC) codes. Effective July 1, 2012, these codes were replaced by ellipsoid height network and local accuracies, which are recorded in the *91* and *92* records, respectively, as described in Chapter 2 of the Bluebook. Network and local accuracies have been determined for all GPS projects loaded into the NGS Integrated Data Base since the 2011 national adjustment. Annex G is provided as documentation of legacy data; ellipsoid height codes are no longer used for current geodetic control.

The two-digit ellipsoid height codes were used to classify each ellipsoid height value observed and adjusted at horizontal control points. The first character of the OC code indicates the order and the second character the class, in accordance with the following classification:

OC Code	Classification	b = Maximum Height Difference Accuracy
11	First Order, Class I	0.5
12	First Order, Class II	0.7
21	Second Order, Class I	1.0
22	Second Order, Class II	1.3
31	Third Order, Class I	2.0
32	Third Order, Class II	3.0
41	Fourth Order, Class I	6.0
42	Fourth Order, Class II	15.0
51	Fifth Order, Class I	30.0
52	Fifth Order, Class II	60.0

The ellipsoid height difference accuracy **(b)** is computed from a minimally constrained, correctly weighted, least squares adjustment by the formula:

$$b = s / \sqrt{d}$$

where: **d** = horizontal distance in kilometers between control points.
s = propagated standard deviation of ellipsoid height difference in millimeters between control points obtained from the least squares adjustment.

The following table lists the standard errors of ellipsoid height differences at various distances:

Standard Error (mm)

	OC Code									
Distance (km)	11	12	21	22	31	32	41	42	51	52
1	.5	.7	1.0	1.3	2	3	6	15	30	60
5	1.1	1.6	2.2	2.9	4.5	6.7	13	34	67	134
10	1.6	2.2	3.2	4.1	6.3	9.5	19	47	95	190
25	2.5	3.5	5.0	6.5	10	15	30	75	150	300
50	3.5	4.9	7.1	9.2	14	21	42	106	212	424
75	4.3	6.1	8.7	11	17	26	52	130	260	520
100	5.0	7.0	10	13	20	30	60	150	300	600