### New Coding System of Grid Squares in the Republic of Indonesia

### <Reason introducing new coding system>

Current coding system of grid squares in the Republic of Indonesia is based on similar system as employed in Japan locating in the zone of north latitude where the number of degree in latitude increases from south to north. On the other hand, most principal parts of the Republic of Indonesia are located in the zone of south latitude where the number of degree in latitude increases from north to south. However, the number of code increases from south to north in the current coding system. Actually, this is inconvenient in using Excel software for making analysis, because the arrangement of columns is done from the uppermost row to downward rows. In addition to this inconvenience, current system is face to further inconvenience of complexity in converting the grid square code to the latitude and the longitude in such zone of north latitude in the Republic of Indonesia as the parts of Sumatra, Kalimantan, Sulawesi, etc. Also, the digit number used in coding is 8 digits in new system, while it is 11 digits including "sheet number code" in current system. In this context, new coding system of grid squares is proposed. However, introduction of new system does not mean the reform of current grid square system but alteration of the code number only. Current system is applicable for the territory of Java island and its neighbor islands located in the zone of south latitude but it is inappropriate for the whole territory of the Republic of Indonesia. So, the following new coding system of grid squares is proposed..

#### <New coding system of grid squares>

**Basic Grid Square** is defined as a quadrangular shaped area delineated by dissecting at every 30 seconds on the latitude line and at every 30 seconds on the longitude line and .it forms a territorial area of about one square kilometer. It is delineated in the following way:

At first, the position of 10 degrees of North Latitude is regarded as 0 degree in the hypothetical latitude, Equator is assumed as that of 10 degrees, that of10 degrees of S. Latitude as 20 degrees, and 20 degrees of S. Latitude as

30 degrees. Also, 90 degrees of East Longitude is regarded as 0 degree in the hypothetical longitude, 100 degrees of E. Longitude is as 10 degrees, and number of hypothetical longitude increases proportionally to eastward.

At second, being based on the hypothetical latitude and longitude system described above **the Primary Grid Square Division** is delineated as a quadrangular shaped area delineated by dissecting at every 1 degree on the latitude line and at every 1 degree on the longitude line.

At third, within a Primary Grid Square Division the Secondary Grid Square Division is delineated as a quadrangular shaped area delineated by dissecting at every 5 minutes on the latitude line and at every 5 minutes on the longitude line.

At forth, within a Secondary Grid Square Division the Tertiary Grid Square Division is defined as the Basic Grid Square which is a quadrangular shaped area delineated by dissecting at every 30 seconds on the latitude line and at every 30 seconds on the longitude line

The coding is done as follows. The Primary Grid Square Division starting at 0 degree in the hypothetical latitude and 0 degree in the hypothetical longitude is coded as "0000", the Division starting at 0 degree in the hypothetical latitude and 1 degree in the hypothetical longitude is coded as "0001", and so on. Also, The Primary Grid Square Division starting at 1 degree in the hypothetical latitude and 0 degree in the hypothetical latitude and 1 degree in the hypothetical longitude is coded as "0100", the Division starting at 1 degree in the hypothetical latitude and 1 degree in the hypothetical longitude is coded as "0100", the Division starting at 1 degree in the hypothetical longitude is coded as "0100", the Division starting at 1 degree in the hypothetical latitude and 1 degree in the hypothetical latitude and 1 degree in the hypothetical latitude is coded as "0100", the Division starting at 1 degree in the hypothetical latitude and 1 degree in the hypothetical latitude and 1 degree in the hypothetical latitude is coded as "0100", the Division starting at 1 degree in the hypothetical latitude and 1 degree in the hypothetical latitude is coded as "0100", the Division starting at 1 degree in the hypothetical latitude and 1 degree in the hypothetical longitude is coded as "0101", and so on.

		5 110			, or, 9.		uuroi					
100° E = <b>10°</b>												
5° N = <b>5°</b>												
	0510	0511	0512	0513	0514	0515	0516	0517	0518	0519		
	0610	0611	0612	0613	0614	0615	0616	0617	0618	0619		
	0710	0711	0712	0713	0714	0715	0716	0717	0718	0719		
	0810	0811	0812	0813	0814	0815	0816	0817	0818	0819		
Equator = <b>10°</b>	0910	0911	0912	0913	0914	0915	0916	0917	0918	0919		
	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019		
	1110	1111	1112	1113	1114	1115	1116	1117	1118	1119		
	1210	1211	1212	1213	1214	1215	1216	1217	1218	1219		
	1310	1311	1312	1313	1314	1315	1316	1317	1318	1319		
	1410	1411	1412	1413	1414	1415	1416	1417	1418	1419		

# Here is the origin of each grid square.

## Fig 1. Example of the Coding of the Primary Grid Square Divisions

The Secondary Grid Square Division within the Primary Grid Square Division of "0000" which starts at 0 degree in the hypothetical latitude and 0 degree in the hypothetical longitude is coded as "000000", the Secondary Grid Square Division starting at 0 degree in the hypothetical latitude and 1 degree 5 minute in the hypothetical longitude is coded as "000101", and so on. On the other hand, The Secondary Grid Square Division starting at 1 degree in the hypothetical latitude and 0 degree in the hypothetical longitude is coded as "010000", the Division starting at 1 degree in the hypothetical latitude and 1 degree 5 minutes in the hypothetical longitude is coded as "010101", and so on. Further, the Secondary Grid Square Division starting at 0 degree in the hypothetical latitude and 1 degree 50 minutes in the hypothetical longitude is coded as "00010X", the Division starting at 1 degree in the hypothetical latitude and 0 degree 55 minutes in the hypothetical longitude is coded as "01000Y", while the Division starting at 1 degree 55 minutes in the hypothetical latitude and 1 degree 5 minutes in the hypothetical longitude is coded as "0101X1", and so on.

		0	°											1°
			5	5'				0000						
								_		_				
1°			0	1	2	3	4	5	6	1	8	9	Х	Y
I	5' —	0	00	01	02	03	04	05	06	07	08	09	0X	0Y
	0	1	10	11	12	13	14	15	16	17	18	19	1X	1Y
		2	20	21	22	23	24	25	26	27	28	29	2X	2Y
		3	30	31	32	33	34	35	36	37	38	39	3X	3Y
		4	40	41	42	43	44	45	46	47	48	49	4X	4Y
		5	50	51	52	53	54	55 01	56 00	57	58	59	5X	5Y
		6	60	61	62	63	64	65	66	67	68	69	6X	6Y
		7	70	71	72	73	74	75	76	77	78	79	7X	7Y
		8	80	81	82	83	84	85	86	87	88	89	8X	8Y
		9	90	91	92	93	94	95	96	97	98	99	9X	9Y
		Х	X0	X1	X2	Х3	X4	X5	X6	X7	X8	X9	XX	XY
2°		Y	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	YX	YY

Fig 2. Example of the Coding of the Secondary Grid Square Divisions

The Tertiary Grid Square Division, or the Basic Grid Square, within the Secondary Grid Square Division of "000000" which starts at 0 degree in the hypothetical latitude and 0 degree in the hypothetical longitude is coded as "00000000", the Tertiary Grid Square Division starting at 0 degree in the hypothetical latitude and 1 degree 0 minute 30 seconds in the hypothetical longitude is coded as "00010001", and so on. On the other hand, The Tertiary Grid Square Division starting at 1 degree in the hypothetical latitude and 0 degree 5 minutes 0 second in the hypothetical longitude is coded as "01000100",

the Division starting at 1 degree in the hypothetical latitude and 1 degree 5 minutes 30 seconds in the hypothetical longitude is coded as "01010101", and so on.

	000001							0°	10'				
			3	0"									
1°0'			0	1	2	3	4	5	6	7	8	9	
	30"	0	00	01	02	03	04	05	06	07	08	09	
		1	10	11	12	13	14	15	16	17	18	19	
		2	20	21	22	23	24	25	26	27	28	29	
		3	30	31	32	33	34	35	36	37	38	39	
		4	40	41	42	43	44	45	46	47	48	49	
		5	50	51	52	53	<b>010</b> 54	<b>001</b> 55	56	57	58	59	
		6	60	61	62	63	64	65	66	67	68	69	
		7	70	71	72	73	74	75	76	77	78	79	
		8	80	81	82	83	84	85	86	87	88	89	
1°	5'	9	90	91	92	93	94	95	96	97	98	99	

Fig 3. Example of the Coding of the Tertiary Grid Square Divisions

° 5				1724								1725				
5'	05	06	07	08	09	ох	OY	00	01	02	03	04	05	06	07	
10'	15	16	17	18	19	1X	1Y	10	11	12	13	₹	15	16	17	
10	26	26	27	28	29	2X	2Y	20	21	22	23	24	25	26	27	
15'	35	36	37	38	39	ЗX	3Y	30	31	32	33	34	35	36	y	
20'	45	46	47	48 1824	49	4X	4Y	40	41	42	43	44 1825	45	46	47	
25	55	56	57	58	59	-5X	5Y	50	51	52	53	54	55	56	57	
30'	65	66	67	68	69	6X	6Y	60	61	62	63	64	65	86	67	
35'	75	76	77	78	79	7X	7Y	70	71	72	73	74	75	76	77	
40'-	85	86	87	88	89	8X	8Y	80	81	82	83	84	-	86	87	
45'	95	96	97	98	99	9X	9Y	90	91	hgz (	93	94	95	26	97	-
50'	X5	X6	¥7	X8	χq	YY	XY	XO	< YI	X2	¥3	¥4	¥5	X6	¥7	-

Fig 4. Example of New Coding System of Grid Squares in Bali (1825-73)



Fig 5. Example of New Coding System of Grid Squares in Bali (1825-73-64)

			0°5'					0° 10'
			А	В	С	D	Е	
		1°0'						
			0 1	2 3	4 5	6 7	89	
10001	A	0 1	AA	AB	AC	AD	AE	
	В	2 3	BA	BB	BC	BD	BE	
	С	4 5	CA	СВ	СС	CD	CE	
	D	6 7		DB	DC	DD	DE	
	E	8 9	EA	EB	EC	ED	EE	

## Fig 6. Example of the Coding of the 1' X 1' Grid Square Divisions

In the case of the "1'X1' Grid Square, the Grid Square is coded in 8 digit as 10001BC in the Fig.6.