

Programa PREPARE

Pasto, Colombia

(Preparing Rescue and Emergency Personnel to Ameliorate
the Response to Earthquakes)



USAID
DEL PUEBLO DE LOS ESTADOS
UNIDOS DE AMÉRICA

miyamoto. EARTHQUAKE +
STRUCTURAL
ENGINEERS

Field Survey Exposure Model.



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ENGINEERS

EXPOSICIÓN



EXPOSICIÓN

Tipo 0

Tipo

Adobe, Tapia, No ingenieriles.

No. pisos.

1 - 4

Código Construcción

< 1984; < 1998

Ocupación

Residencial, Comercio

Parte Histórica, colonial, balcones típicos.



EXPOSICIÓN

Tipo 1

Tipo

URM. Mampostería sin refuerzo. Muros de carga

No. pisos.

1 - 4

Código Construcción

< 1984; < 1998

Ocupación

Residencial (sencilla), Comercio (pequeño),
Industria (pequeño)



EXPOSICIÓN

Tipo 2

Tipo

URM w RC bond. Mampostería Confinada

No. pisos.

1 - 4

Código Construcción

< 1984; < 1998

Ocupación

Residencial (sencilla), Comercio (pequeño)



EXPOSICIÓN

Tipo 3 - 4

Tipo

RC moment Frame. Pórticos concreto reforzado.
+ URM infill Mampostería reforzada.

No. pisos.

1 – 3; 4 – 7

Código Construcción

< 1984; < 1998; < 2010

Ocupación

Residencial (Multi), Comercio (Centros
Comerciales, oficinas)



EXPOSICIÓN

Tipo 5 - 6

Tipo

RC moment Frame. Pórticos concreto reforzado.
o RC shear wall Muros cortante concreto (PE).

No. pisos.

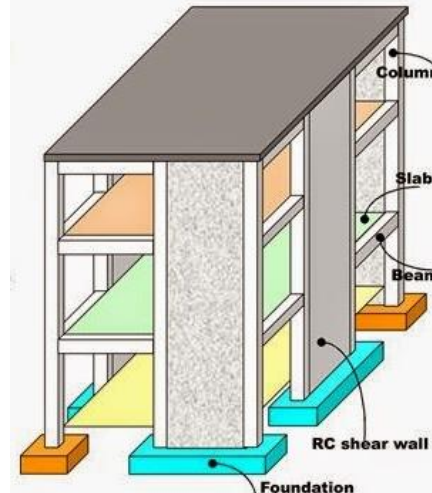
4 – 7; 8+

Código Construcción

< 2010; > 2010

Ocupación

Hospitales, Oficinas (4-7),
Apartamentos (4-7; 8+)



EXPOSICIÓN

Tipo 7

Tipo

Light gage Steel. Acero ligero (cerchas)

No. pisos.

1

Código Construcción

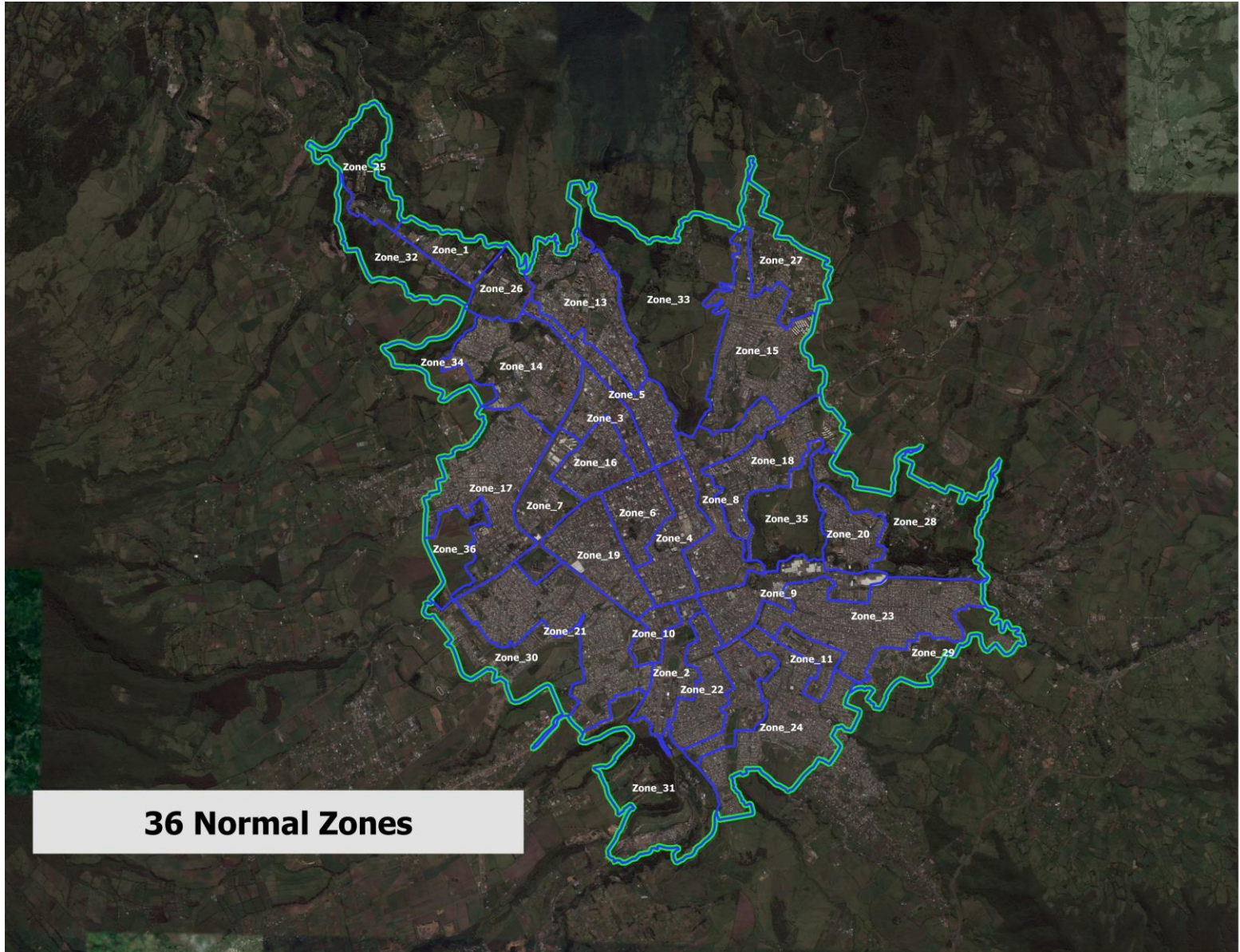
< 1984; < 1998; < 2010

Ocupación

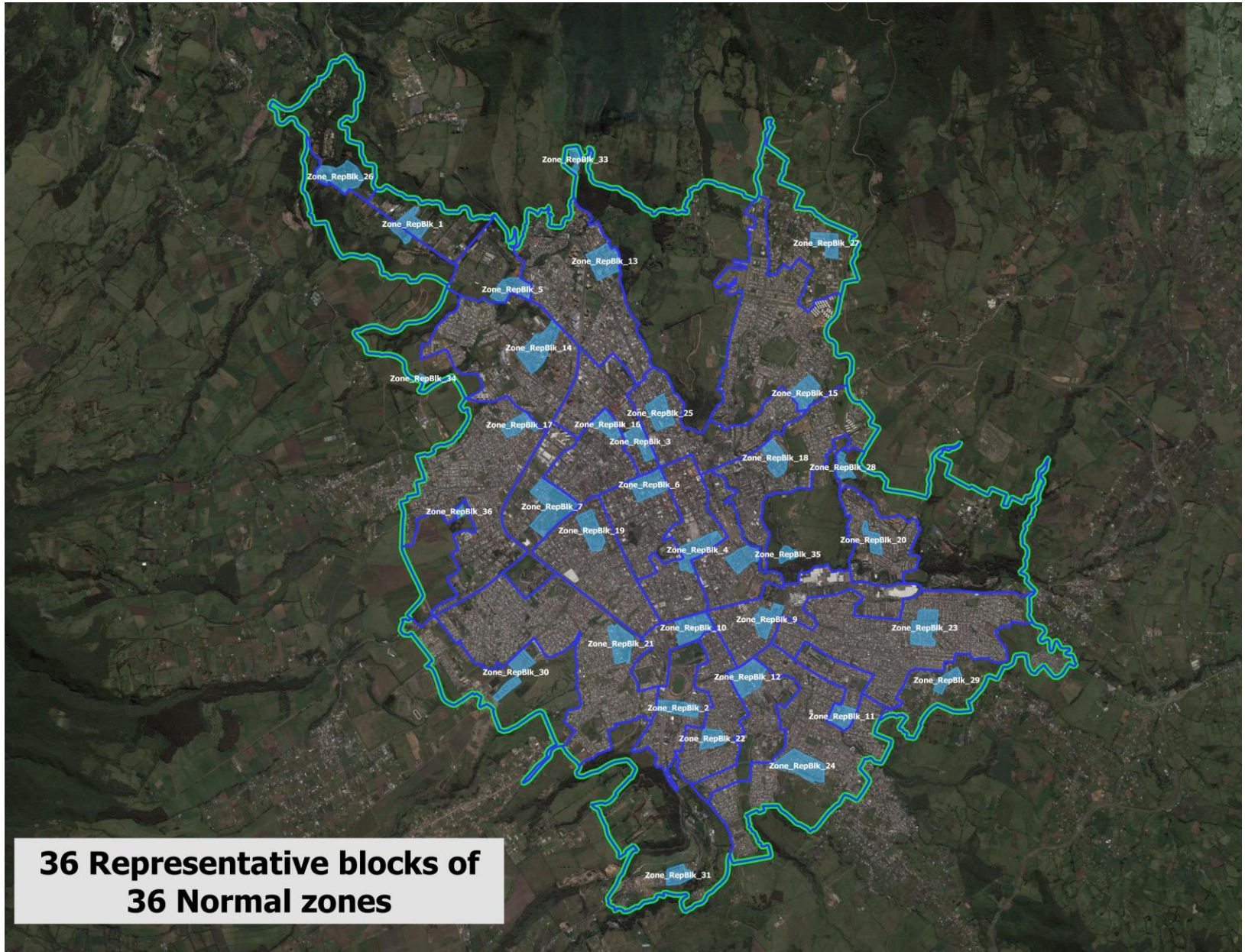
Comercial (centros comerciales),
Fábricas, talleres.



EXPOSICIÓN



36 Normal Zones



**36 Representative blocks of
36 Normal zones**

City of San Juan de Pasto: Building information (based on City data and Sattelite image) & Survey building number

Zone No.	Building footprint area and number in Pasto (total)										
	Land use category	Land use category No.	Zone area (m2) (no overlapped)	Building footprint area (m2) (no overlapped)				Building number (no overlapped)			
				1-3F	4-7F	8F+	Total	1-3F	4-7F	8F+	Total
1	Industrial	1	334,922	35,704	191	0	35,895	290	8	0	298
2	Industrial	1	392,038	84,878	1,026	56	85,960	1,451	25	1	1,477
3	Urban	2	369,481	105,491	19,917	115	125,523	1,362	191	1	1,554
4	Urban	2	532,805	215,585	27,539	0	243,124	2,499	203	0	2,702
5	Commercial	3	348,009	44,928	3,721	0	48,648	269	5	0	274
6	Commercial	3	434,187	195,989	18,920	2,002	216,911	2,130	194	8	2,332
7	Commercial	3	486,759	91,186	5,225	571	96,982	1,048	65	2	1,115
8	Commercial	3	440,827	165,846	7,744	0	173,590	2,250	112	0	2,362
9	Commercial	3	476,231	151,835	3,642	1,079	156,556	2,501	50	3	2,554
10	Commercial	3	231,563	66,633	1,072	0	67,705	821	14	0	835
11	Commercial	3	202,908	66,413	1,106	0	67,519	1,318	31	0	1,349
12	Commercial	3	444,579	120,415	1,979	0	122,395	1,552	36	0	1,588
13	Residence	4	962,914	252,330	29,276	4,198	285,803	3,697	249	29	3,975
14	Residence	4	948,566	211,573	13,529	1,48					
15	Residence	4	1,226,953	295,102	443						
16	Residence	4	370,228	143,062	21,639	9					
17	Residence	4	1,164,147	336,561	9,447	1,77					
18	Residence	4	728,577	161,185	3,421						
19	Residence	4	621,373	247,140	9,760						
20	Residence	4	371,491	102,043	2,894	53					
21	Residence	4	1,423,683	467,758	9,991	1					
22	Residence	4	466,860	209,274	2,254						
23	Residence	4	1,266,658	549,826	8,246						
24	Residence	4	1,284,494	360,981	4,182						
25	Residence	4	606,587	225,607	20,894	1,25					
26	Sparse_Residence	5	535,569	13,428	22						
27	Sparse_Residence	5	622,288	68,568	0						
28	Sparse_Residence	5	1,201,190	33,884	11						
29	Sparse_Residence	5	554,115	57,409	634						

36 Normal zones

* 95% Confidence level

* 95% Confidence level

Survey building number							
Survey building number (each height)			Survey building number (each zone)		Survey building number (each land use)		
1-3F	4-7F	8F+	Survey Bldg. (rate)	Margin of error*	Total	Survey Bldg. (rate)	Margin of error*
10	2	0	12 (4.03%)	27.76%	1,775	53 (2.99%)	13.26%
35	5	1	41 (2.78%)	15.10%			
25	15	1	41 (2.64%)	15.11%	4,256	101 (2.37%)	9.64%
40	20	0	60 (2.22%)	12.51%			
10	2	0	12 (4.38%)	27.71%	73,680	1,367 (1.86%)	2.63%
35	20	2	57 (2.44%)	12.82%			
20	5	1	26 (2.33%)	19.00%			
40	10	0	50 (2.12%)	13.71%			
45	5	2	52 (2.04%)	13.45%			
20	3	0	23 (2.75%)	20.16%			
25	3	0	28 (2.08%)	18.33%			
30	5	0	35 (2.20%)	16.39%			
55	20	3	78 (1.96%)	10.99%			
65	15	2	82 (1.98%)	10.72%			
105	5	0	110 (1.67%)	9.27%			
30	15	1	46 (2.11%)	14.30%			
110	15	2	127 (1.69%)	8.62%			
55	10	0	65 (1.83%)	12.05%			
65	15	0	80 (1.95%)	10.85%			
40	5	1	46 (1.89%)	14.31%			
165	20	1	186 (1.85%)	7.12%			
70	10	0	80 (1.92%)	10.85%			
220	25	0	245 (1.86%)	6.20%			
145	10	0	155 (1.82%)	7.80%			
50	15	2	67 (2.01%)	11.85%			
5	1	0	6 (4.11%)	39.31%			
30	0	0	30 (2.20%)	17.70%			
15	1	0	16 (2.99%)	24.15%			
25	1	0	26 (2.46%)	18.99%			



49 Special mini zones

EXPOSICIÓN

City of San Juan de Pasto

	Zone area (m2)	Building footprint (m2)				Building number				Survey building number			
		1-3F	4-7F	8F+	Total	1-3F	4-7F	8F+	Total	1-3F	4-7F	8F+	Total
36 Normal zones	24,977,476	5,164,155	237,856	13,183	5,415,193	93,762	2,828	63	96,653	1,637	293	19	1,949
49 Special mini zone	612,500	158,976	9,426	48,400	216,803	357	30	196	583	70	9	43	122
Total	25,589,976	5,323,131	247,282	61,583	5,631,996	94,119	2,858	259	97,236	1,707	302	62	2,071

* Zone area, Building footprint and Building number are NOT overlapped.

* Building number is NOT overlapped.

EXPOSICIÓN

City of San Juan de Pasto

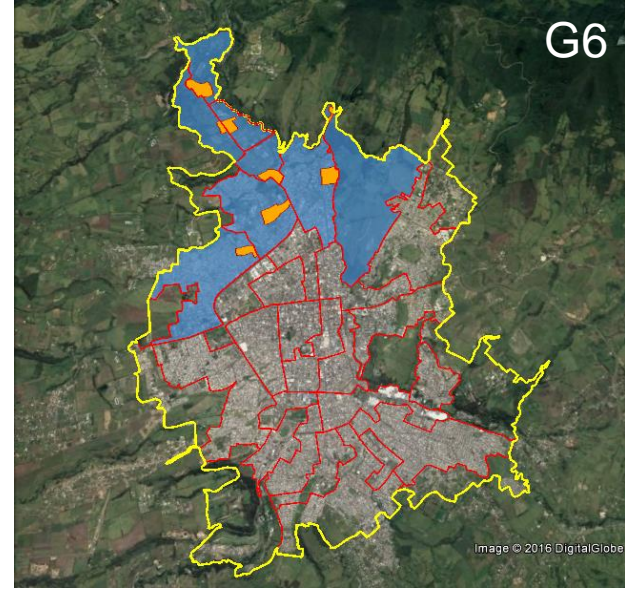
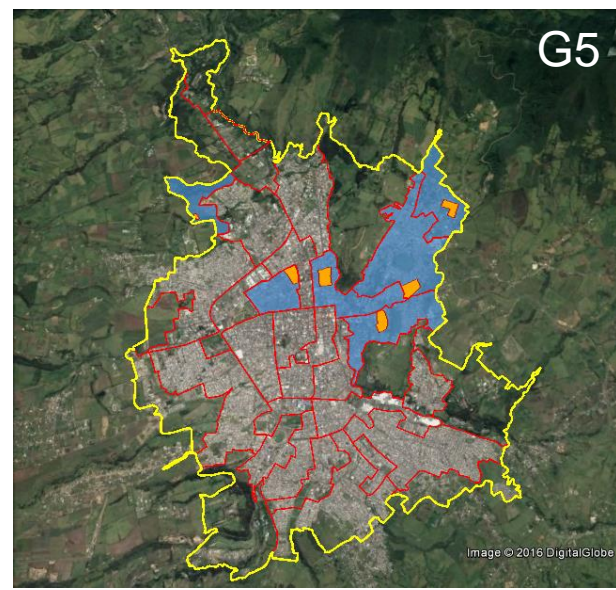
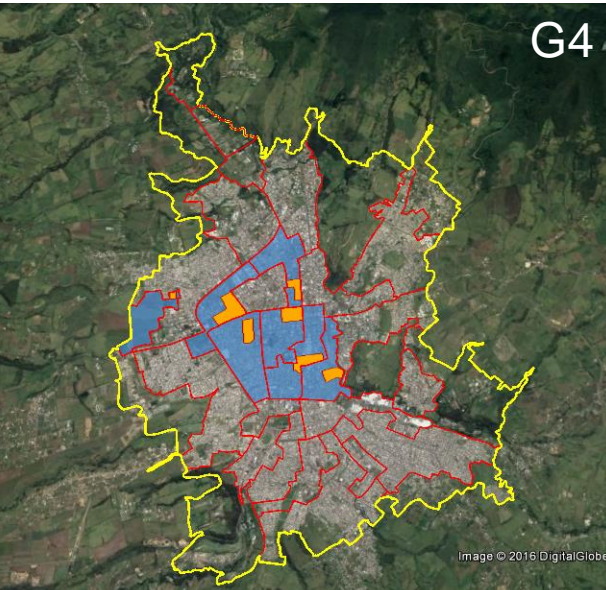
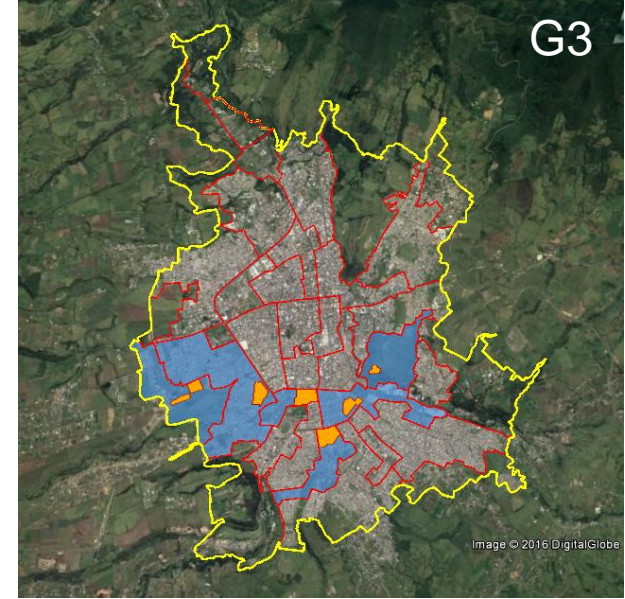
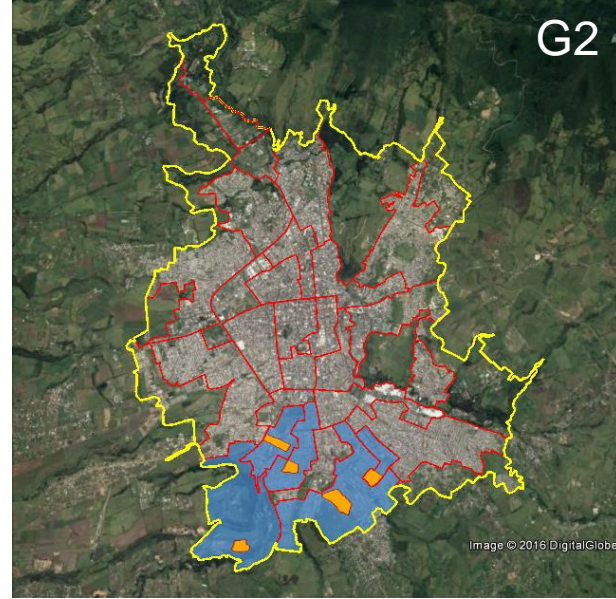
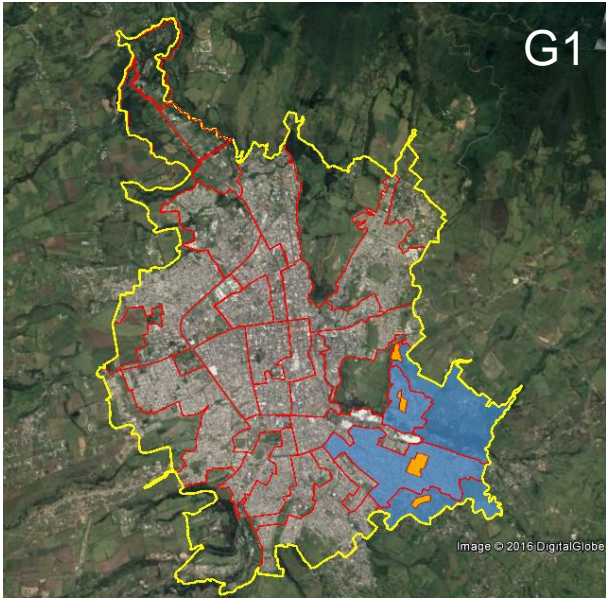
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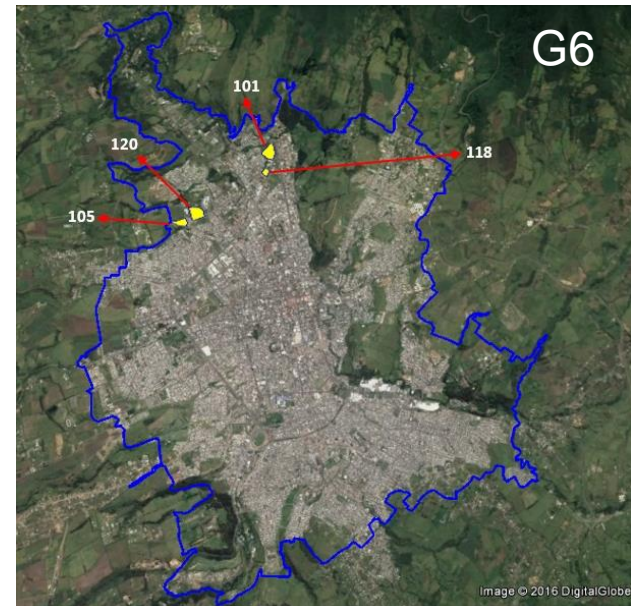
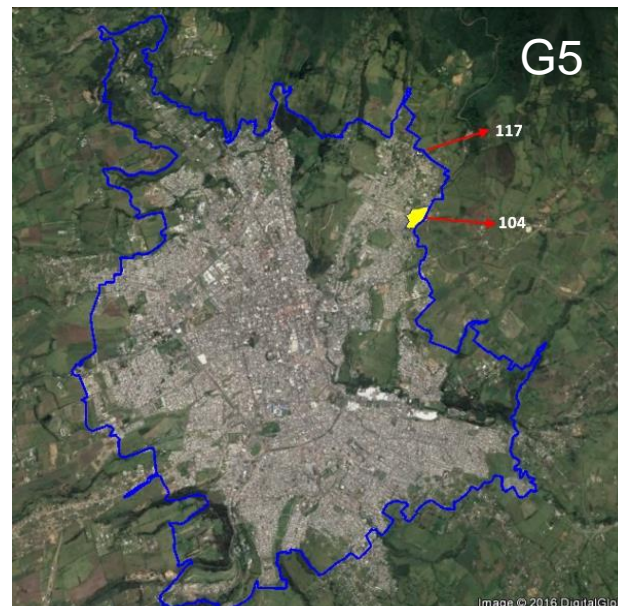
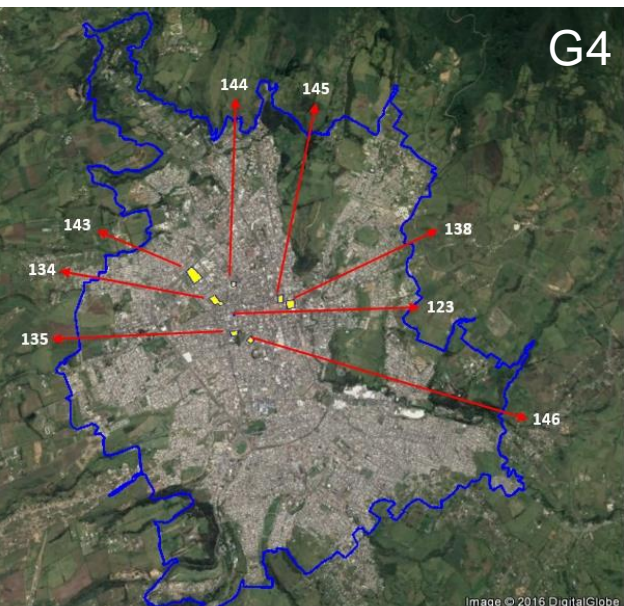
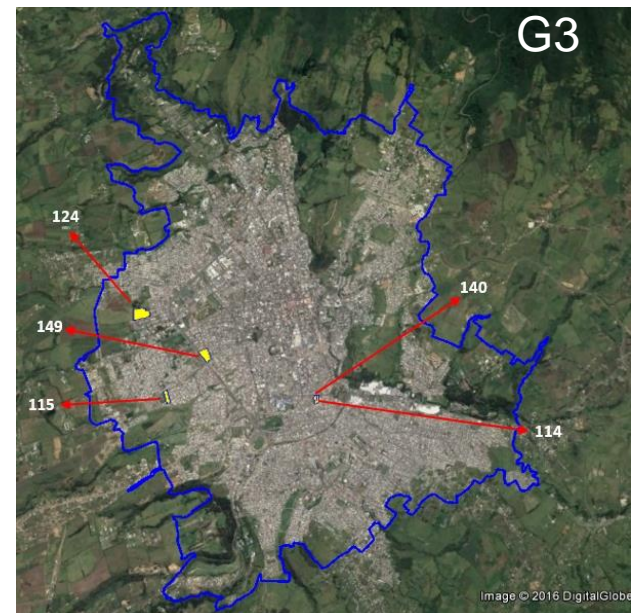
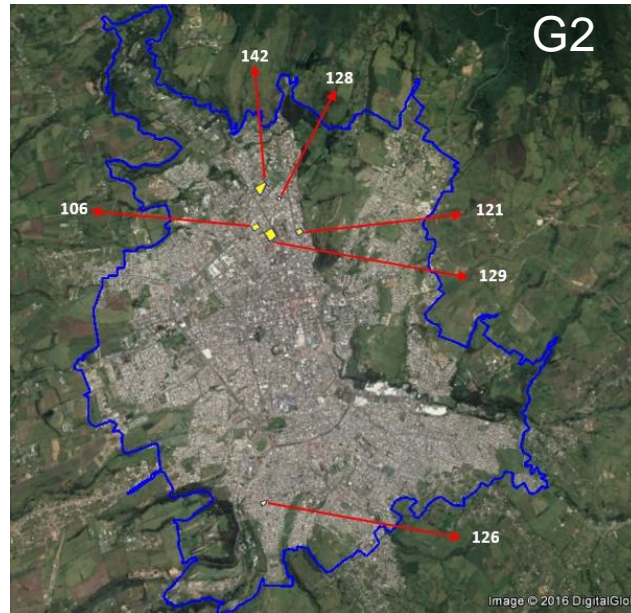
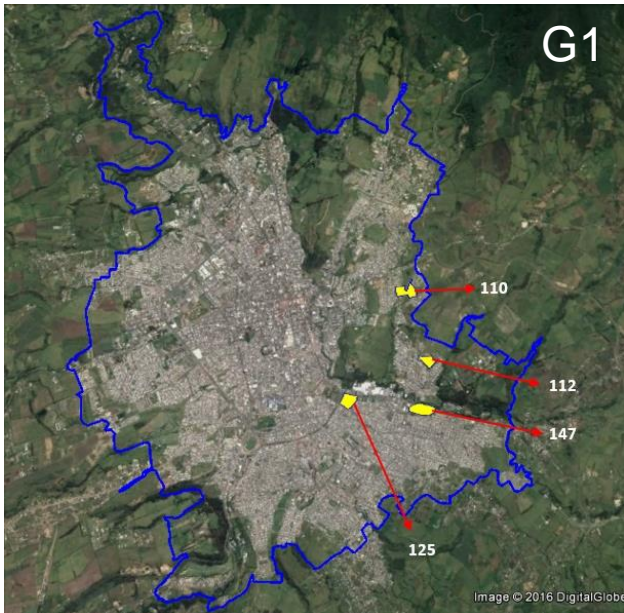
* Building number is NOT overlapped.

	Total	Normal	Special
Número Equipos	6	6	6
Número de Edificios	2,071	1,949	122
Edificios por Equipo	345	325	20
Número de días	10	10	10
No. Edificios por Día	35	32	2
No. Edificios por Hora	5	5	0

EXPOSICIÓN



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