



**TESIS: ÍNDICE PÉRDIDA-POSESIÓN PARA GENERACIÓN DE MAPAS DE
RIESGO ANTE INUNDACIONES EN ZONAS URBANAS**

ANEXOS



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TORMENTA DE DISEÑO



TESIS: ÍNDICE PÉRDIDA-POSESIÓN PARA GENERACIÓN DE MAPAS DE RIESGO ANTE INUNDACIONES EN ZONAS URBANAS

1.1 Prueba de estadística de Helmert

Estación Observatorio				
Año	Precipitación diaria máxima anual (mm)	Diferencia Respecto a promedio	Cambio	Serie
2016	56.40	10.20	-	-
2015	35.00	-11.20	1	0
2014	50.50	4.30	1	0
2013	92.00	45.80	0	1
2012	64.70	18.50	0	1
2011	38.80	-7.40	1	0
2010	60.00	13.80	1	0
2009	26.70	-19.50	1	0
2008	47.50	1.30	1	0
2007	28.20	-18.00	1	0
2006	27.00	-19.20	0	1
2005	62.10	15.90	1	0
2004	91.40	45.20	0	1
2003	45.00	-1.20	1	0
2002	33.00	-13.20	0	1
2001	61.00	14.80	1	0
2000	60.00	13.80	0	1
1999	71.30	25.10	0	1
1998	30.40	-15.80	1	0
1997	32.60	-13.60	0	1
1996	85.30	39.10	1	0
1995	112.90	66.70	0	1
1994	32.20	-14.00	1	0
1993	28.20	-18.00	0	1
1992	44.30	-1.90	0	1
1991	37.80	-8.40	0	1
1990	80.00	33.80	1	0
1989	65.90	19.70	0	1
1988	35.00	-11.20	1	0
1987	51.80	5.60	1	0
1986	54.40	8.20	0	1
1985	40.40	-5.80	1	0



TESIS: ÍNDICE PÉRDIDA-POSESIÓN PARA GENERACIÓN DE MAPAS DE RIESGO ANTE INUNDACIONES EN ZONAS URBANAS

1984	22.20	-24.00	0	1
1983	30.40	-15.80	0	1
1982	13.20	-33.00	0	1
1981	35.00	-11.20	0	1
1980	64.00	17.80	1	0
1979	71.50	25.30	0	1
1978	67.20	21.00	0	1
1977	31.80	-14.40	1	0
1976	80.60	34.40	1	0
1975	38.00	-8.20	1	0
1974	51.00	4.80	1	0
1973	64.50	18.30	0	1
1972	34.90	-11.30	1	0
1971	26.20	-20.00	0	1
1970	30.50	-15.70	0	1
1969	49.00	2.80	1	0
1968	60.30	14.10	0	1
1967	43.00	-3.20	1	0
1966	70.00	23.80	1	0
1965	42.50	-3.70	1	0
1964	19.00	-27.20	0	1
1963	62.00	15.80	1	0
1962	23.00	-23.20	1	0
1961	20.00	-26.20	0	1
1960	25.60	-20.60	0	1
1959	24.60	-21.60	0	1
1958	31.50	-14.70	0	1
1957	23.60	-22.60	0	1
1956	30.60	-15.60	0	1
1955	48.00	1.80	1	0
1954	70.00	23.80	0	1
1953	11.00	-35.20	1	0
1952	34.70	-11.50	0	1
1951	18.00	-28.20	0	1
Promedio:	46.20	Total:	31	34



1.2 Prueba estadística de las secuencias

Estación Observatorio			
Año	Precipitación diaria máxima anual (mm)	Comparación A o B	Secuencia
2016	56.40	B	-
2015	35.00	A	0
2014	50.50	B	0
2013	92.00	B	1
2012	64.70	B	1
2011	38.80	A	0
2010	60.00	B	0
2009	26.70	A	0
2008	47.50	B	0
2007	28.20	A	0
2006	27.00	A	1
2005	62.10	B	0
2004	91.40	B	1
2003	45.00	B	1
2002	33.00	A	0
2001	61.00	B	0
2000	60.00	B	1
1999	71.30	B	1
1998	30.40	A	0
1997	32.60	A	1
1996	85.30	B	0
1995	112.90	B	1
1994	32.20	A	0
1993	28.20	A	1
1992	44.30	B	0
1991	37.80	A	0
1990	80.00	B	0
1989	65.90	B	1
1988	35.00	A	0
1987	51.80	B	0
1986	54.40	B	1
1985	40.40	A	0
1984	22.20	A	1



TESIS: ÍNDICE PÉRDIDA-POSESIÓN PARA GENERACIÓN DE MAPAS DE RIESGO ANTE INUNDACIONES EN ZONAS URBANAS

1983	30.40	A	1
1982	13.20	A	1
1981	35.00	A	1
1980	64.00	B	0
1979	71.50	B	1
1978	67.20	B	1
1977	31.80	A	0
1976	80.60	B	0
1975	38.00	A	0
1974	51.00	B	0
1973	64.50	B	1
1972	34.90	A	0
1971	26.20	A	1
1970	30.50	A	1
1969	49.00	B	0
1968	60.30	B	1
1967	43.00	B	1
1966	70.00	B	1
1965	42.50	B	1
1964	19.00	A	0
1963	62.00	B	0
1962	23.00	A	0
1961	20.00	A	1
1960	25.60	A	1
1959	24.60	A	1
1958	31.50	A	1
1957	23.60	A	1
1956	30.60	A	1
1955	48.00	B	0
1954	70.00	B	1
1953	11.00	A	0
1952	34.70	A	1
1951	18.00	A	1
Promedio:	46.20	Número de secuencias U=	34



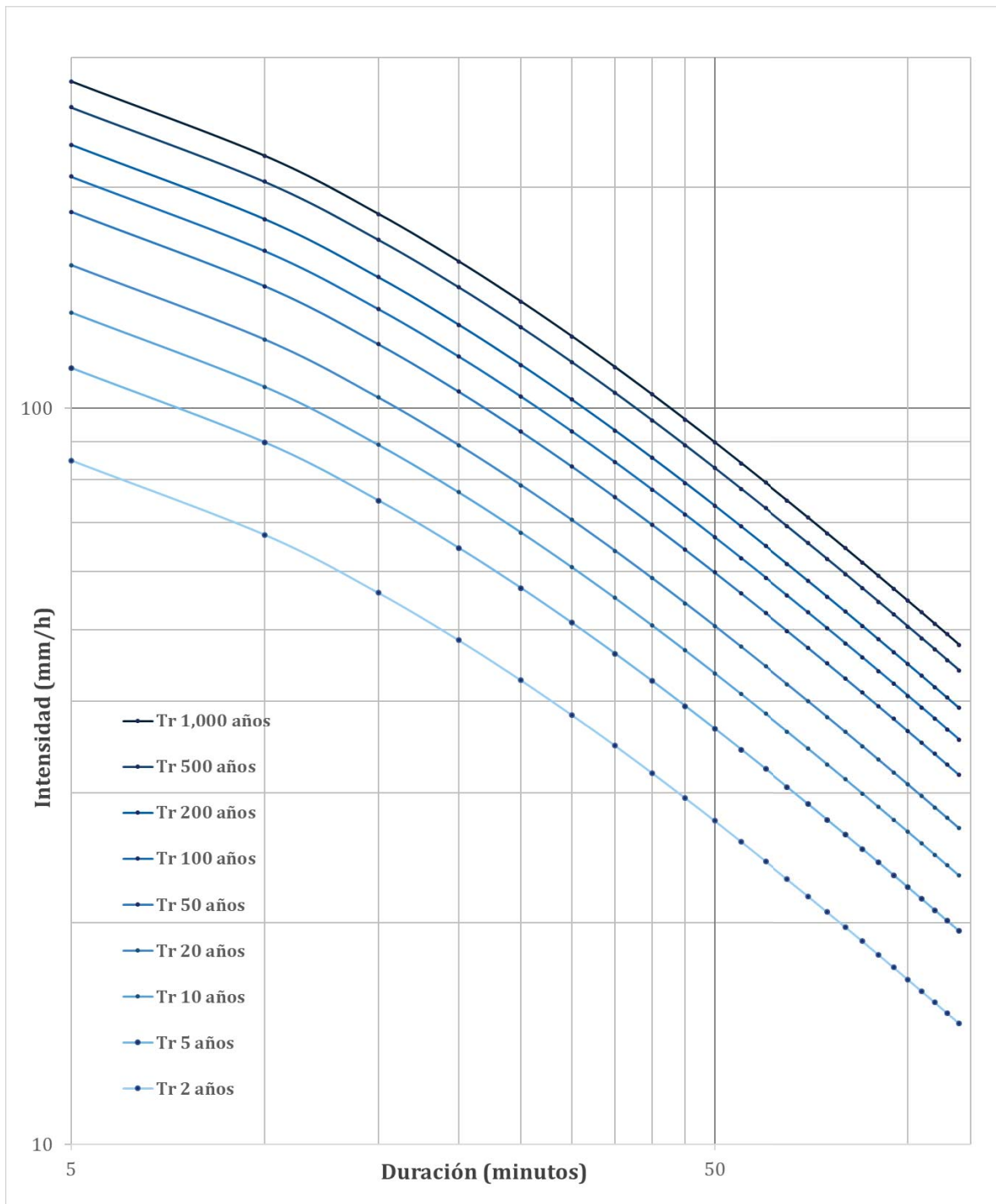
1.3 Curvas I-D-Tr de Chen Cheng-Lung

Estación Observatorio

Duración (minutos)	Tr (años)								
	2	5	10	20	50	100	200	500	1000
5	85.00	113.48	135.02	156.57	185.04	206.59	228.13	256.60	278.15
10	67.33	89.89	106.95	124.01	146.57	163.63	180.70	203.25	220.32
15	56.16	74.98	89.21	103.44	122.26	136.49	150.72	169.54	183.77
20	48.41	64.63	76.90	89.17	105.39	117.66	129.93	146.14	158.41
25	42.69	57.00	67.82	78.64	92.94	103.76	114.58	128.88	139.70
30	38.28	51.11	60.81	70.51	83.34	93.04	102.74	115.57	125.27
35	34.77	46.42	55.23	64.05	75.69	84.51	93.32	104.97	113.78
40	31.90	42.59	50.67	58.76	69.45	77.53	85.62	96.30	104.39
45	29.51	39.40	46.87	54.35	64.24	71.72	79.20	89.08	96.56
50	27.48	36.69	43.65	50.62	59.82	66.79	73.75	82.96	89.93
55	25.74	34.36	40.89	47.41	56.03	62.55	69.08	77.70	84.22
60	24.22	32.34	38.48	44.62	52.73	58.87	65.01	73.13	79.27
65	22.89	30.56	36.36	42.17	49.84	55.64	61.44	69.11	74.91
70	21.71	28.99	34.49	40.00	47.27	52.77	58.28	65.55	71.05
75	20.66	27.58	32.82	38.06	44.98	50.22	55.45	62.37	67.61
80	19.72	26.32	31.32	36.32	42.92	47.92	52.91	59.52	64.52
85	18.86	25.18	29.96	34.74	41.06	45.84	50.62	56.94	61.72
90	18.09	24.14	28.73	33.31	39.37	43.95	48.54	54.60	59.18
95	17.38	23.20	27.60	32.01	37.83	42.23	46.63	52.46	56.86
100	16.73	22.33	26.57	30.81	36.41	40.65	44.89	50.49	54.73
105	16.13	21.53	25.62	29.71	35.11	39.20	43.28	48.69	52.77
110	15.57	20.79	24.74	28.69	33.90	37.85	41.80	47.02	50.96
115	15.06	20.11	23.92	27.74	32.79	36.61	40.42	45.47	49.29
120	14.59	19.47	23.17	26.86	31.75	35.45	39.14	44.03	47.73
Suma	728.90	973.09	1157.82	1342.54	1586.73	1771.46	1956.18	2200.37	2385.10



TESIS: ÍNDICE PÉRDIDA-POSESIÓN PARA GENERACIÓN DE MAPAS DE RIESGO ANTE INUNDACIONES EN ZONAS URBANAS





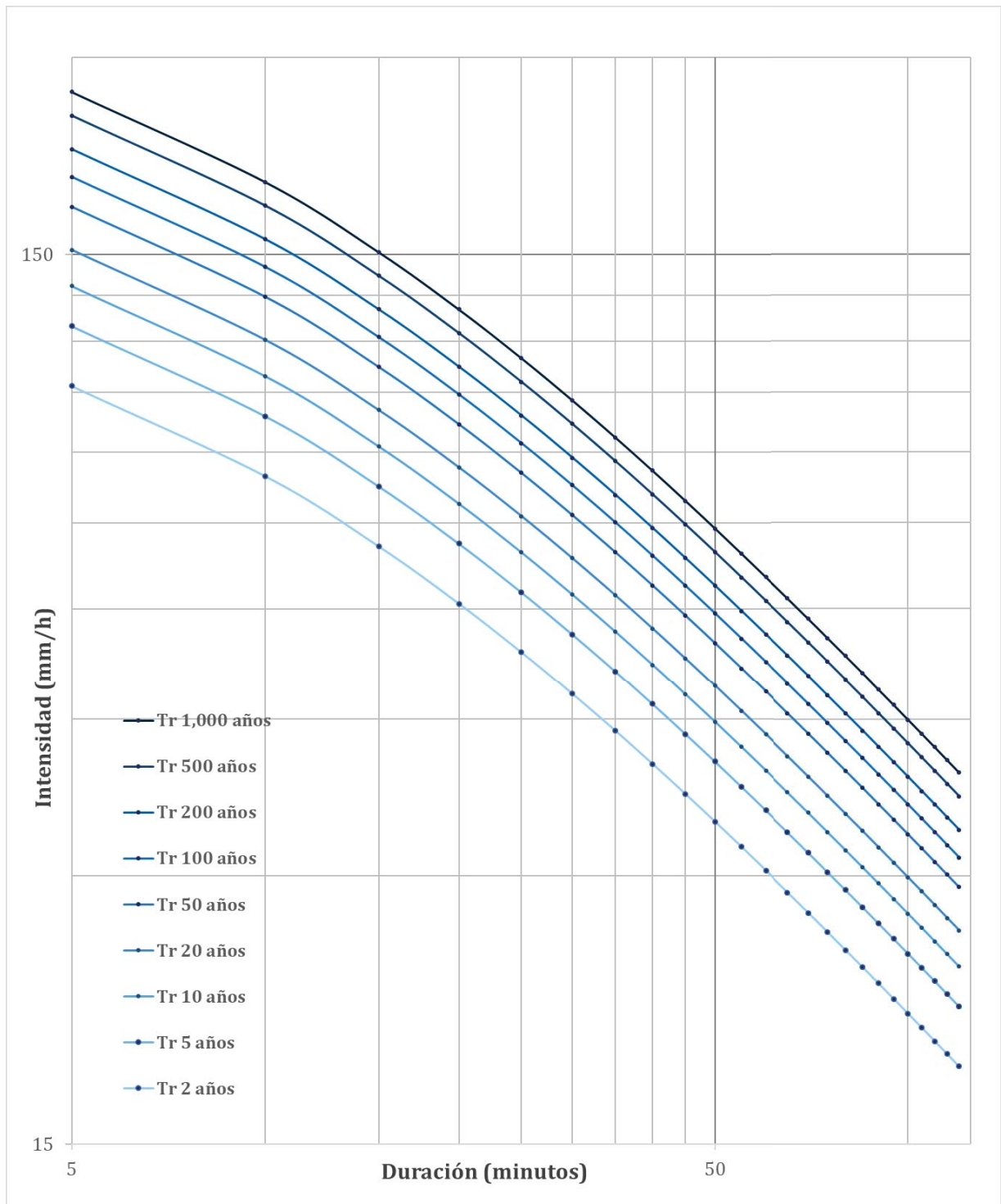
TESIS: ÍNDICE PÉRDIDA-POSESIÓN PARA GENERACIÓN DE MAPAS DE RIESGO ANTE INUNDACIONES EN ZONAS URBANAS

Estación El Rejón

Duración (minutos)	Tr (años)								
	2	5	10	20	50	100	200	500	1000
5	106.79	124.75	138.34	151.92	169.88	183.47	197.05	215.01	228.60
10	84.59	98.81	109.58	120.34	134.56	145.32	156.08	170.31	181.07
15	70.56	82.42	91.40	100.38	112.24	121.22	130.19	142.06	151.04
20	60.82	71.05	78.79	86.53	96.75	104.49	112.23	122.46	130.20
25	53.64	62.66	69.48	76.30	85.32	92.15	98.97	107.99	114.81
30	48.10	56.19	62.30	68.42	76.51	82.63	88.75	96.84	102.96
35	43.69	51.03	56.59	62.15	69.49	75.05	80.61	87.95	93.51
40	40.08	46.82	51.92	57.02	63.76	68.86	73.96	80.70	85.79
45	37.07	43.31	48.03	52.74	58.98	63.69	68.41	74.64	79.36
50	34.53	40.33	44.73	49.12	54.92	59.32	63.71	69.51	73.91
55	32.34	37.78	41.89	46.00	51.44	55.55	59.67	65.11	69.22
60	30.43	35.55	39.42	43.29	48.41	52.28	56.16	61.27	65.15
65	28.76	33.60	37.26	40.92	45.75	49.41	53.07	57.91	61.57
70	27.28	31.87	35.34	38.81	43.40	46.87	50.34	54.93	58.40
75	25.96	30.32	33.63	36.93	41.29	44.60	47.90	52.26	55.57
80	24.77	28.94	32.09	35.24	39.40	42.56	45.71	49.87	53.02
85	23.70	27.68	30.70	33.71	37.70	40.71	43.73	47.71	50.73
90	22.72	26.54	29.43	32.32	36.15	39.04	41.93	45.75	48.64
95	21.83	25.50	28.28	31.06	34.73	37.51	40.28	43.95	46.73
100	21.01	24.55	27.22	29.89	33.43	36.10	38.78	42.31	44.98
105	20.26	23.67	26.25	28.82	32.23	34.81	37.39	40.79	43.37
110	19.57	22.86	25.35	27.84	31.13	33.62	36.11	39.40	41.88
115	18.92	22.11	24.51	26.92	30.10	32.51	34.92	38.10	40.51
120	18.32	21.41	23.74	26.07	29.15	31.48	33.81	36.89	39.22
Suma	915.75	1069.75	1186.24	1302.74	1456.74	1573.24	1689.73	1843.73	1960.23



TESIS: ÍNDICE PÉRDIDA-POSESIÓN PARA GENERACIÓN DE MAPAS DE RIESGO ANTE INUNDACIONES EN ZONAS URBANAS

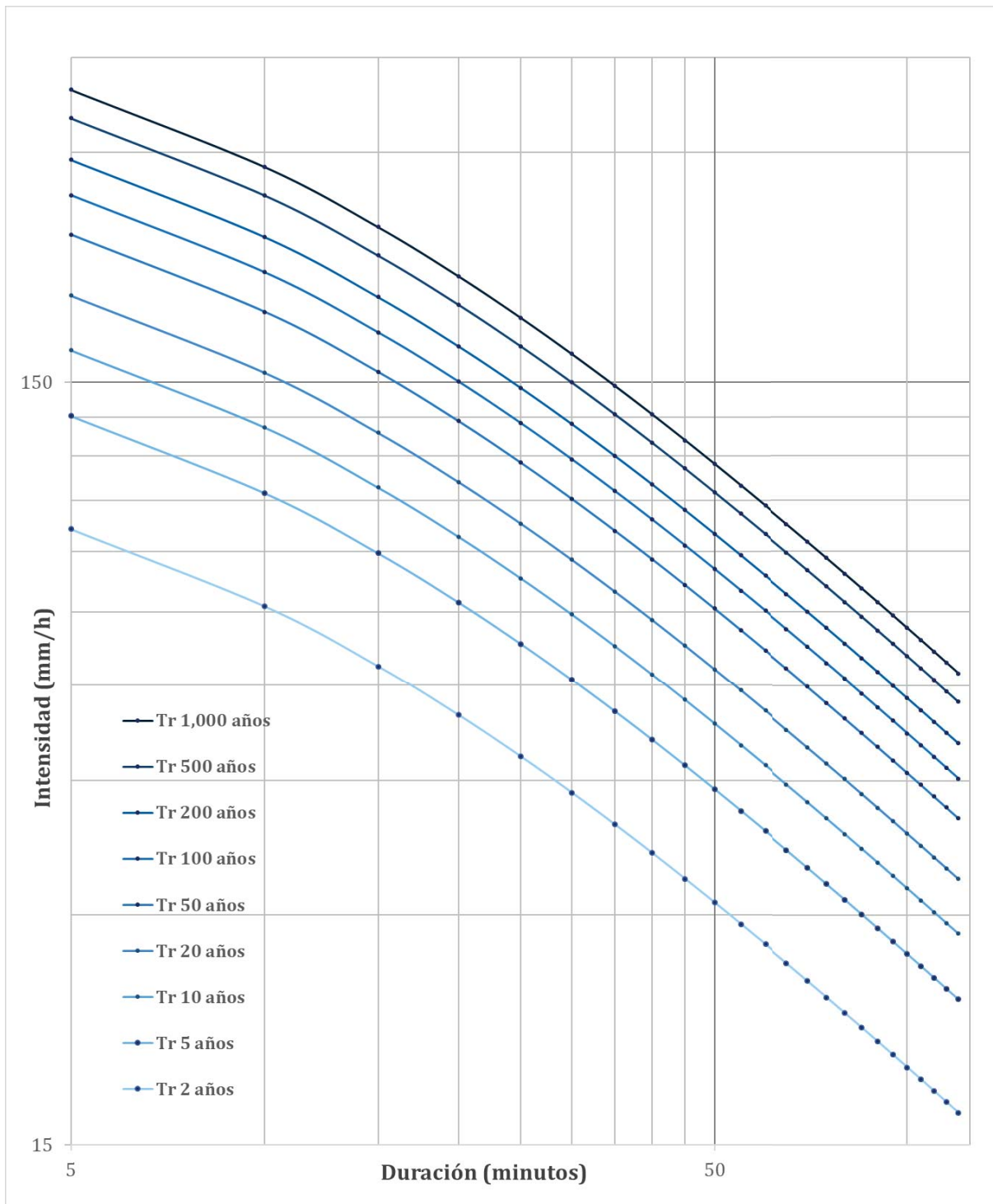




TESIS: ÍNDICE PÉRDIDA-POSESIÓN PARA GENERACIÓN DE MAPAS DE RIESGO ANTE INUNDACIONES EN ZONAS URBANAS

Estación Majálca

Duración (minutos)	Tr (años)								
	2	5	10	20	50	100	200	500	1000
5	96.26	135.54	165.25	194.97	234.25	263.96	293.67	332.95	362.67
10	76.25	107.36	130.90	154.43	185.54	209.08	232.62	263.73	287.26
15	63.60	89.55	109.18	128.82	154.77	174.40	194.03	219.98	239.61
20	54.82	77.19	94.12	111.04	133.41	150.33	167.26	189.63	206.55
25	48.35	68.08	83.00	97.92	117.65	132.57	147.50	167.23	182.15
30	43.35	61.04	74.43	87.81	105.50	118.88	132.27	149.96	163.34
35	39.38	55.44	67.60	79.75	95.82	107.98	120.13	136.20	148.35
40	36.13	50.87	62.02	73.17	87.91	99.07	110.22	124.96	136.11
45	33.42	47.05	57.37	67.68	81.32	91.64	101.95	115.59	125.90
50	31.12	43.82	53.43	63.03	75.73	85.34	94.95	107.64	117.25
55	29.15	41.04	50.04	59.04	70.93	79.93	88.92	100.82	109.82
60	27.43	38.63	47.09	55.56	66.75	75.22	83.69	94.88	103.35
65	25.92	36.50	44.51	52.51	63.09	71.09	79.09	89.67	97.67
70	24.59	34.62	42.21	49.80	59.84	67.43	75.02	85.05	92.64
75	23.40	32.95	40.17	47.39	56.94	64.16	71.38	80.93	88.16
80	22.33	31.44	38.33	45.22	54.33	61.23	68.12	77.23	84.12
85	21.36	30.08	36.67	43.26	51.98	58.57	65.17	73.88	80.48
90	20.48	28.84	35.16	41.48	49.84	56.16	62.48	70.84	77.16
95	19.68	27.71	33.78	39.86	47.89	53.96	60.03	68.06	74.14
100	18.94	26.67	32.52	38.36	46.09	51.94	57.79	65.52	71.36
105	18.26	25.72	31.35	36.99	44.44	50.08	55.72	63.17	68.81
110	17.64	24.83	30.28	35.72	42.92	48.36	53.81	61.00	66.45
115	17.06	24.02	29.28	34.55	41.51	46.77	52.04	59.00	64.26
120	16.52	23.26	28.35	33.45	40.19	45.29	50.39	57.13	62.23
Suma	825.43	1162.25	1417.04	1671.83	2008.65	2263.45	2518.24	2855.06	3109.85





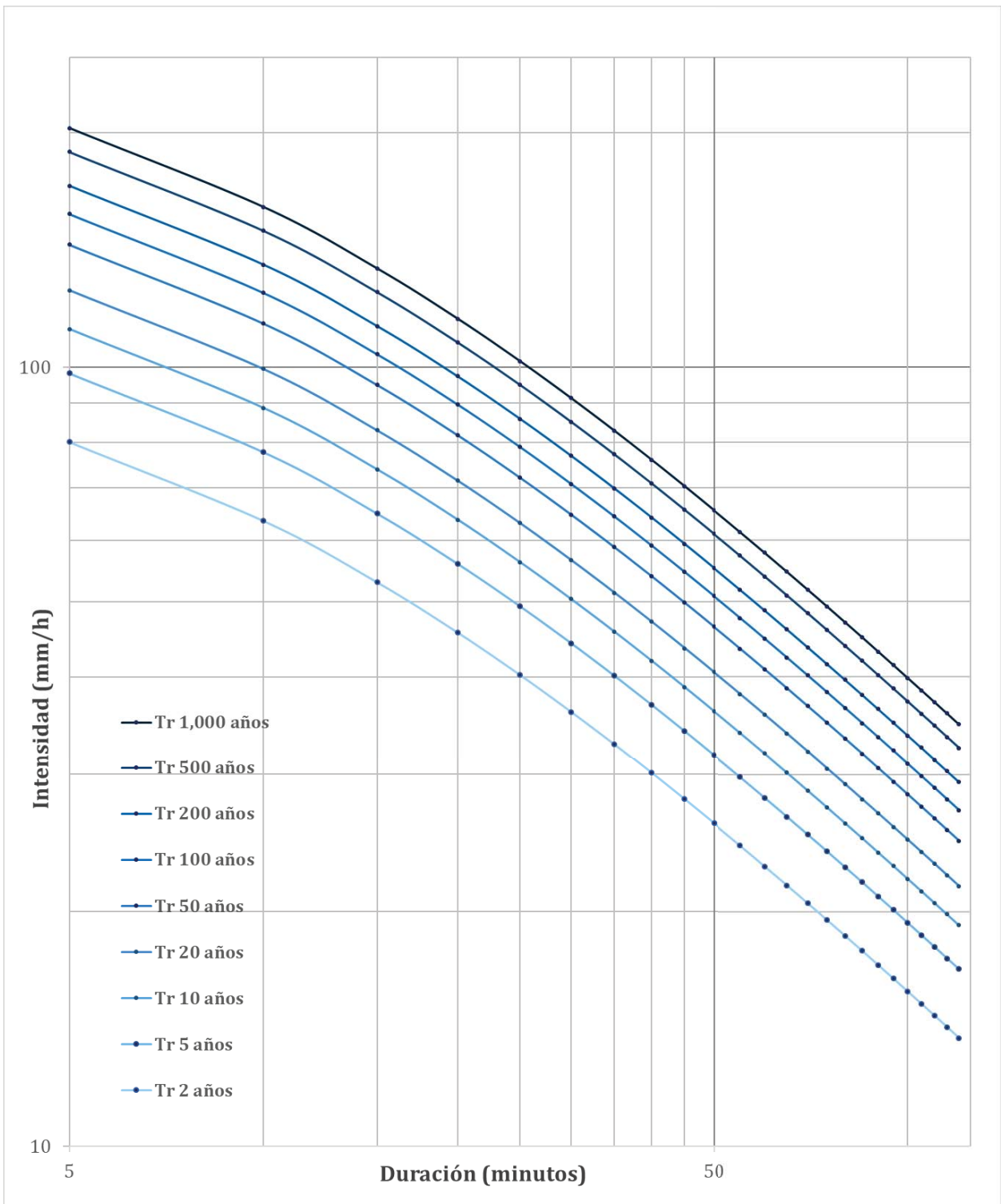
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Estación La Mesa

Duración (minutos)	Tr (años)								
	2	5	10	20	50	100	200	500	1000
5	80.23	98.29	111.95	125.61	143.67	157.33	171.00	189.06	202.72
10	63.55	77.85	88.67	99.49	113.80	124.62	135.44	149.75	160.57
15	53.00	64.94	73.96	82.99	94.92	103.95	112.98	124.91	133.94
20	45.69	55.98	63.76	71.54	81.83	89.61	97.39	107.67	115.46
25	40.29	49.36	56.23	63.09	72.16	79.02	85.88	94.95	101.82
30	36.13	44.27	50.42	56.57	64.71	70.86	77.01	85.15	91.30
35	32.82	40.20	45.79	51.38	58.77	64.36	69.95	77.34	82.92
40	30.11	36.89	42.01	47.14	53.92	59.05	64.18	70.95	76.08
45	27.85	34.12	38.86	43.61	49.88	54.62	59.36	65.63	70.38
50	25.94	31.78	36.19	40.61	46.45	50.87	55.28	61.12	65.54
55	24.29	29.76	33.90	38.04	43.50	47.64	51.78	57.25	61.38
60	22.86	28.01	31.90	35.80	40.94	44.84	48.73	53.88	57.77
65	21.61	26.47	30.15	33.83	38.69	42.37	46.05	50.92	54.60
70	20.49	25.11	28.60	32.09	36.70	40.19	43.68	48.30	51.79
75	19.50	23.89	27.21	30.53	34.92	38.24	41.56	45.95	49.28
80	18.61	22.80	25.97	29.14	33.32	36.49	39.66	43.85	47.02
85	17.80	21.81	24.84	27.87	31.88	34.91	37.94	41.95	44.98
90	17.07	20.91	23.82	26.73	30.57	33.47	36.38	40.22	43.13
95	16.40	20.09	22.88	25.68	29.37	32.16	34.96	38.65	41.44
100	15.79	19.34	22.03	24.72	28.27	30.96	33.65	37.20	39.89
105	15.22	18.65	21.24	23.83	27.26	29.85	32.44	35.87	38.46
110	14.70	18.01	20.51	23.01	26.32	28.83	31.33	34.64	37.14
115	14.22	17.42	19.84	22.26	25.46	27.88	30.30	33.50	35.92
120	13.77	16.86	19.21	21.55	24.65	27.00	29.34	32.44	34.78
Suma	687.93	842.80	959.95	1077.10	1231.97	1349.13	1466.28	1621.15	1738.31



TESIS: ÍNDICE PÉRDIDA-POSESIÓN PARA GENERACIÓN DE MAPAS DE RIESGO ANTE INUNDACIONES EN ZONAS URBANAS

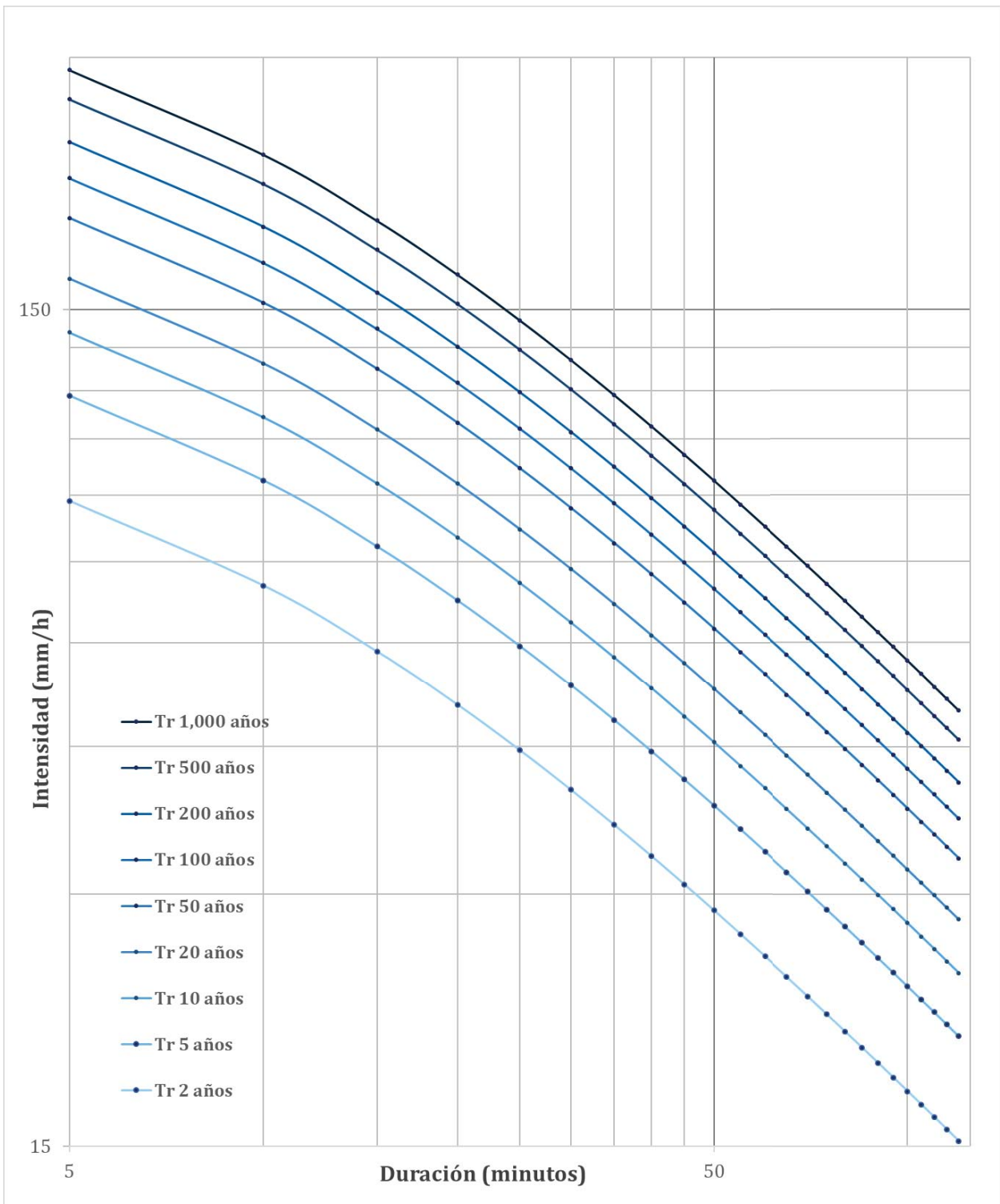




TESIS: ÍNDICE PÉRDIDA-POSESIÓN PARA GENERACIÓN DE MAPAS DE RIESGO ANTE INUNDACIONES EN ZONAS URBANAS

Estación Presa Chihuahua

Duración (minutos)	Tr (años)								
	2	5	10	20	50	100	200	500	1000
5	88.63	118.29	140.72	163.15	192.81	215.24	237.68	267.33	289.77
10	70.20	93.69	111.46	129.23	152.72	170.49	188.26	211.75	229.52
15	58.56	78.15	92.97	107.80	127.39	142.21	157.03	176.63	191.45
20	50.48	67.37	80.14	92.92	109.81	122.59	135.37	152.26	165.03
25	44.51	59.41	70.68	81.94	96.84	108.11	119.37	134.27	145.54
30	39.92	53.27	63.38	73.48	86.84	96.94	107.05	120.40	130.51
35	36.26	48.39	57.56	66.74	78.87	88.05	97.23	109.36	118.53
40	33.26	44.39	52.81	61.23	72.36	80.78	89.20	100.33	108.75
45	30.77	41.06	48.85	56.64	66.94	74.72	82.51	92.81	100.60
50	28.65	38.24	45.50	52.75	62.34	69.59	76.84	86.43	93.68
55	26.84	35.82	42.61	49.40	58.38	65.18	71.97	80.95	87.74
60	25.26	33.71	40.10	46.49	54.95	61.34	67.73	76.18	82.58
65	23.87	31.86	37.90	43.94	51.93	57.97	64.01	72.00	78.04
70	22.64	30.22	35.95	41.68	49.25	54.98	60.72	68.29	74.02
75	21.54	28.75	34.21	39.66	46.87	52.32	57.77	64.98	70.44
80	20.56	27.44	32.64	37.84	44.72	49.93	55.13	62.01	67.21
85	19.67	26.25	31.23	36.20	42.78	47.76	52.74	59.32	64.30
90	18.86	25.17	29.94	34.71	41.02	45.80	50.57	56.88	61.65
95	18.12	24.18	28.77	33.35	39.41	44.00	48.59	54.65	59.24
100	17.44	23.28	27.69	32.10	37.94	42.35	46.77	52.60	57.02
105	16.82	22.44	26.70	30.96	36.58	40.84	45.09	50.72	54.98
110	16.24	21.67	25.78	29.89	35.33	39.44	43.55	48.98	53.09
115	15.70	20.96	24.93	28.91	34.16	38.14	42.11	47.37	51.34
120	15.21	20.30	24.15	27.99	33.08	36.93	40.78	45.87	49.72
Suma	760.00	1014.30	1206.67	1399.04	1653.34	1845.71	2038.08	2292.38	2484.75





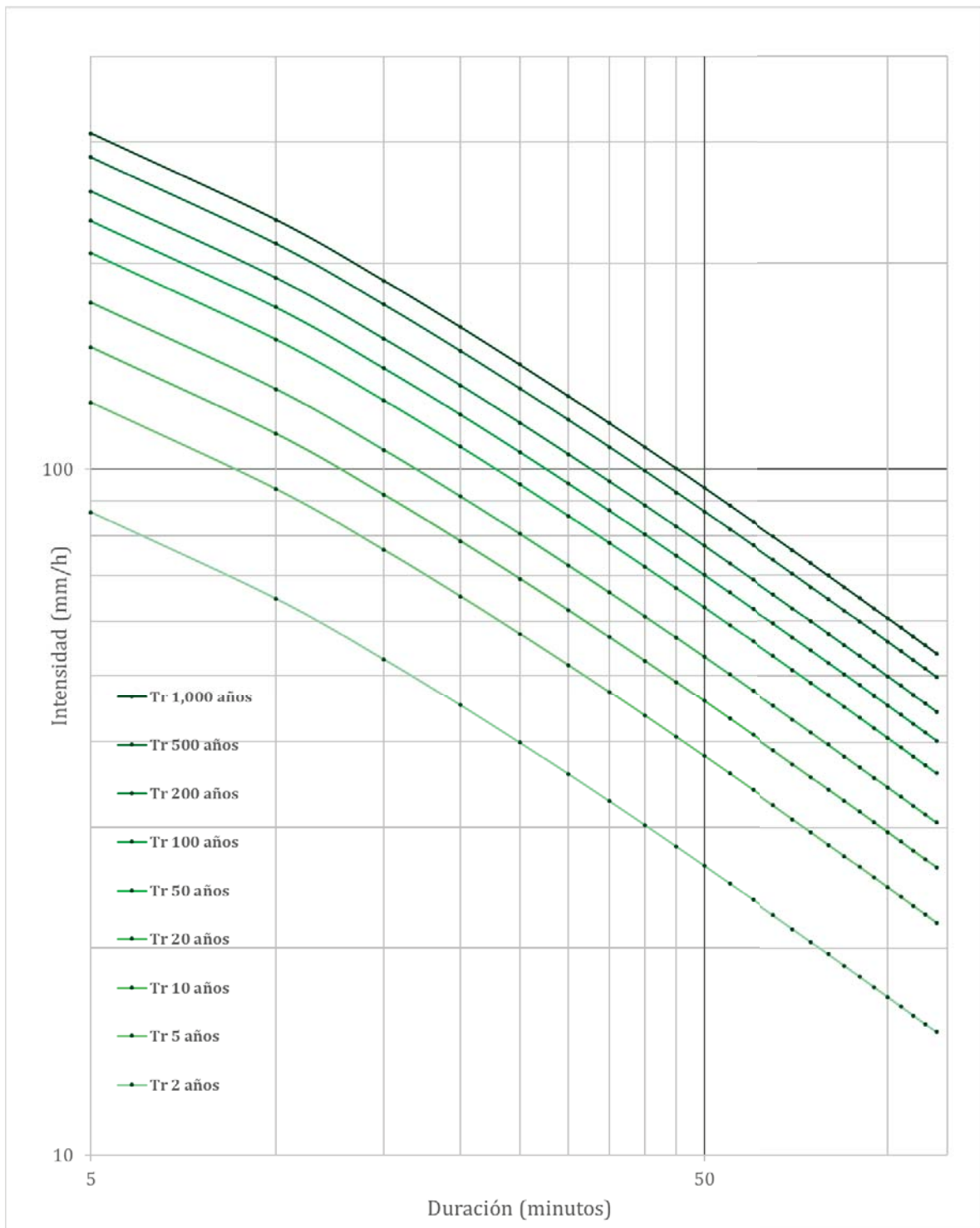
1.4 Curvas I-D-Tr de Bell Modificado

Estación Observatorio

Duración (minutos)	Tr (años)								
	2	5	10	20	50	100	200	500	1000
5	86.60	125.10	150.59	175.04	206.69	230.40	254.03	285.20	308.76
10	64.82	93.63	112.71	131.01	154.69	172.44	190.13	213.46	231.09
15	52.83	76.31	91.86	106.78	126.08	140.55	154.96	173.98	188.35
20	45.20	65.30	78.60	91.36	107.88	120.26	132.59	148.86	161.16
25	39.85	57.57	69.30	80.55	95.11	106.02	116.90	131.24	142.08
30	35.85	51.79	62.34	72.46	85.57	95.38	105.17	118.07	127.83
35	32.73	47.28	56.91	66.15	78.11	87.07	96.00	107.78	116.69
40	30.21	43.64	52.53	61.05	72.09	80.37	88.61	99.48	107.70
45	28.12	40.62	48.90	56.84	67.11	74.81	82.49	92.61	100.26
50	26.36	38.08	45.84	53.28	62.91	70.13	77.32	86.81	93.98
55	24.85	35.90	43.21	50.23	59.31	66.11	72.89	81.84	88.60
60	23.54	34.00	40.93	47.58	56.18	62.62	69.05	77.52	83.92
65	22.39	32.34	38.93	45.25	53.43	59.56	65.66	73.72	79.81
70	21.36	30.86	37.15	43.18	50.99	56.84	62.67	70.36	76.17
75	20.45	29.54	35.56	41.33	48.81	54.41	59.99	67.35	72.91
80	19.63	28.35	34.13	39.67	46.84	52.22	57.57	64.64	69.98
85	18.88	27.27	32.83	38.16	45.06	50.23	55.38	62.18	67.32
90	18.20	26.29	31.65	36.79	43.44	48.42	53.39	59.94	64.89
95	17.58	25.39	30.57	35.53	41.95	46.77	51.56	57.89	62.67
100	17.01	24.57	29.57	34.37	40.59	45.24	49.88	56.01	60.63
105	16.48	23.80	28.65	33.30	39.33	43.84	48.33	54.26	58.75
110	15.99	23.09	27.80	32.31	38.16	42.53	46.90	52.65	57.00
115	15.53	22.44	27.01	31.39	37.07	41.32	45.56	51.15	55.37
120	15.11	21.82	26.27	30.53	36.05	40.19	44.31	49.75	53.86
Suma	709.56	1024.98	1233.82	1434.14	1693.43	1887.73	2081.33	2336.74	2529.78



TESIS: ÍNDICE PÉRDIDA-POSESIÓN PARA GENERACIÓN DE MAPAS DE RIESGO ANTE INUNDACIONES EN ZONAS URBANAS





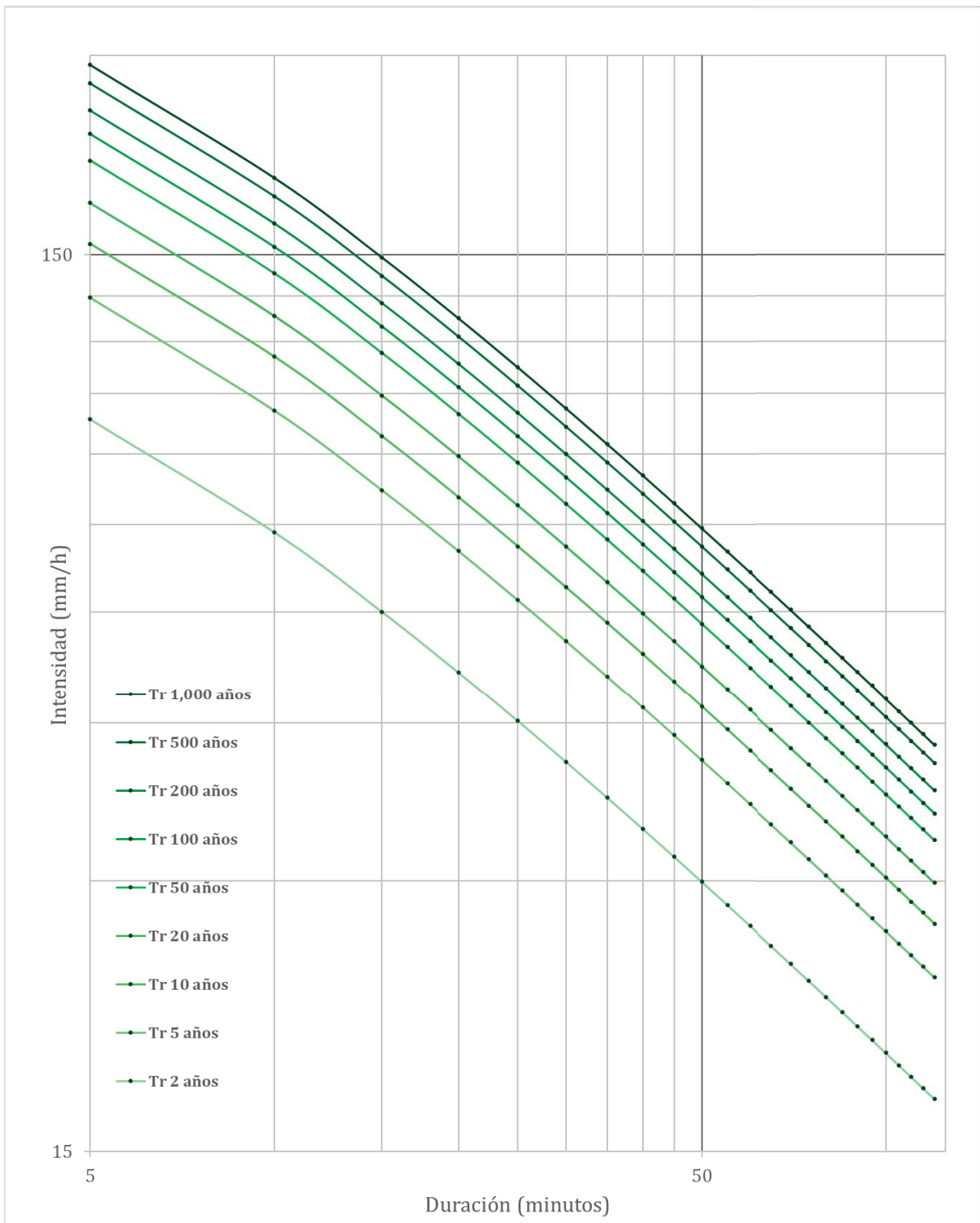
TESIS: ÍNDICE PÉRDIDA-POSESIÓN PARA GENERACIÓN DE MAPAS DE RIESGO ANTE INUNDACIONES EN ZONAS URBANAS

Estación El Rejón

Duración (minutos)	Tr (años)								
	2	5	10	20	50	100	200	500	1000
5	98.33	134.37	154.29	171.30	191.07	204.62	217.28	232.96	244.18
10	73.59	100.57	115.47	128.21	143.00	153.15	162.62	174.36	182.75
15	59.98	81.97	94.12	104.50	116.56	124.82	132.54	142.11	148.95
20	51.32	70.13	80.53	89.41	99.73	106.80	113.41	121.59	127.45
25	45.25	61.83	71.00	78.83	87.92	94.16	99.99	107.20	112.36
30	40.71	55.63	63.87	70.92	79.10	84.71	89.95	96.44	101.09
35	37.16	50.78	58.31	64.74	72.21	77.33	82.11	88.04	92.28
40	34.30	46.87	53.82	59.75	66.65	71.37	75.79	81.26	85.17
45	31.93	43.63	50.10	55.62	62.04	66.44	70.55	75.65	79.29
50	29.93	40.90	46.96	52.14	58.16	62.28	66.14	70.91	74.32
55	28.22	38.56	44.27	49.15	54.83	58.72	62.35	66.85	70.07
60	26.73	36.52	41.94	46.56	51.93	55.62	59.06	63.32	66.37
65	25.42	34.73	39.88	44.28	49.39	52.89	56.17	60.22	63.12
70	24.26	33.15	38.06	42.26	47.14	50.48	53.60	57.47	60.24
75	23.22	31.73	36.43	40.45	45.12	48.32	51.31	55.01	57.66
80	22.28	30.45	34.97	38.82	43.30	46.37	49.24	52.80	55.34
85	21.44	29.30	33.64	37.35	41.66	44.61	47.37	50.79	53.24
90	20.67	28.24	32.43	36.00	40.16	43.00	45.67	48.96	51.32
95	19.96	27.27	31.32	34.77	38.78	41.53	44.10	47.29	49.56
100	19.31	26.39	30.30	33.64	37.52	40.18	42.67	45.75	47.95
105	18.71	25.57	29.36	32.59	36.35	38.93	41.34	44.32	46.46
110	18.15	24.81	28.48	31.62	35.27	37.77	40.11	43.01	45.08
115	17.63	24.10	27.67	30.72	34.27	36.70	38.97	41.78	43.79
120	17.15	23.44	26.91	29.88	33.33	35.69	37.90	40.64	42.59
Suma	805.64	1100.93	1264.11	1403.51	1565.49	1676.50	1780.24	1908.70	2000.63



TESIS: ÍNDICE PÉRDIDA-POSESIÓN PARA GENERACIÓN DE MAPAS DE RIESGO ANTE INUNDACIONES EN ZONAS URBANAS





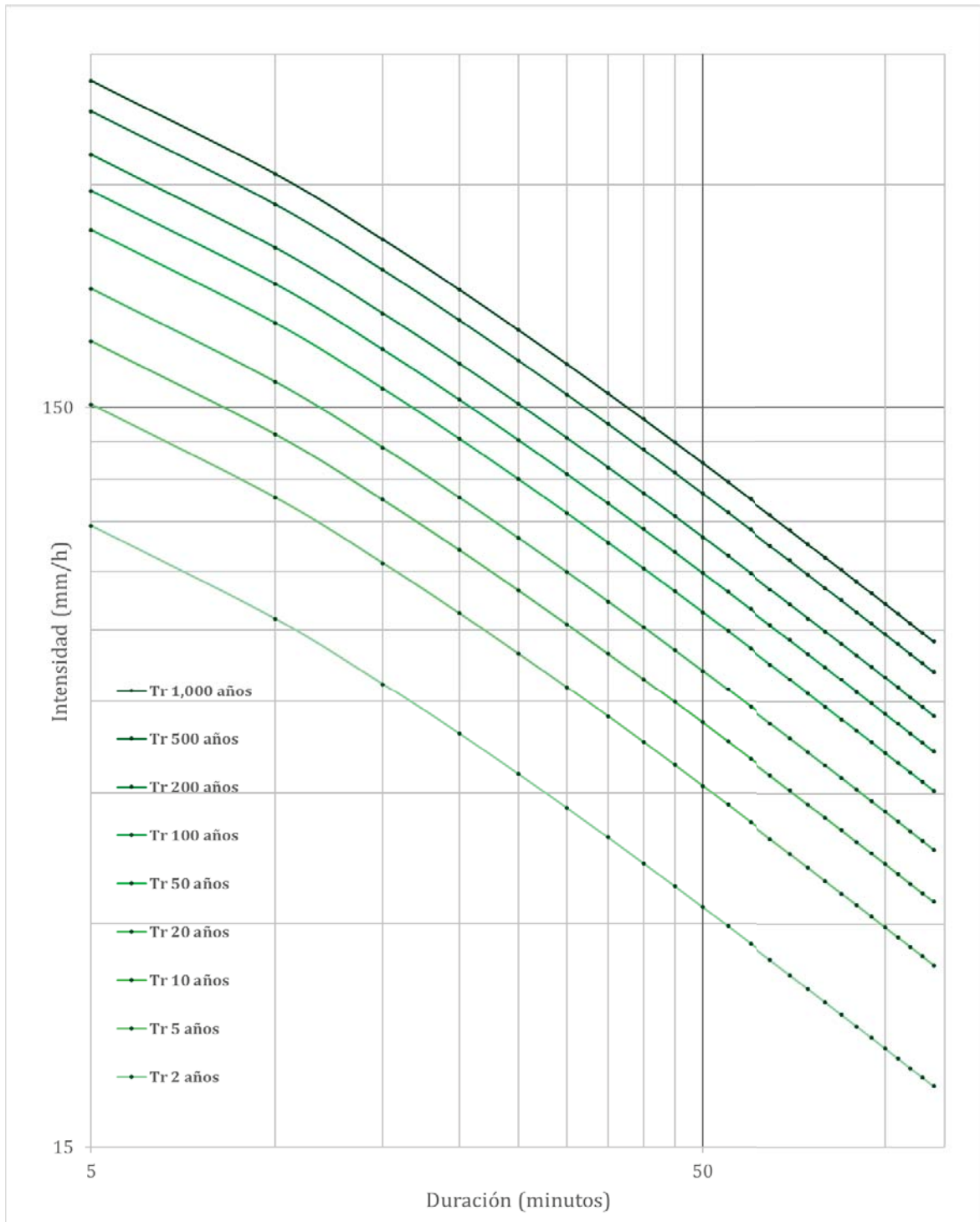
TESIS: ÍNDICE PÉRDIDA-POSESIÓN PARA GENERACIÓN DE MAPAS DE RIESGO ANTE INUNDACIONES EN ZONAS URBANAS

Estación Majálca

Duración (minutos)	Tr (años)								
	2	5	10	20	50	100	200	500	1000
5	103.77	151.32	184.30	216.90	260.53	294.39	329.22	377.00	414.60
10	77.66	113.25	137.94	162.34	194.99	220.33	246.40	282.16	310.30
15	63.30	92.31	112.43	132.31	158.93	179.58	200.83	229.98	252.91
20	54.16	78.98	96.20	113.21	135.98	153.65	171.83	196.77	216.40
25	47.75	69.63	84.81	99.81	119.89	135.47	151.50	173.48	190.78
30	42.96	62.65	76.30	89.80	107.86	121.88	136.30	156.08	171.64
35	39.22	57.19	69.65	81.97	98.46	111.26	124.42	142.48	156.69
40	36.19	52.78	64.29	75.66	90.87	102.69	114.83	131.50	144.61
45	33.69	49.14	59.85	70.43	84.60	95.59	106.90	122.42	134.63
50	31.58	46.06	56.10	66.02	79.30	89.61	100.21	114.75	126.20
55	29.78	43.42	52.89	62.24	74.76	84.48	94.47	108.18	118.97
60	28.20	41.13	50.09	58.95	70.81	80.02	89.48	102.47	112.69
65	26.82	39.12	47.64	56.07	67.35	76.10	85.10	97.45	107.17
70	25.60	37.33	45.47	53.51	64.27	72.62	81.22	93.00	102.28
75	24.50	35.73	43.52	51.22	61.52	69.52	77.74	89.02	97.90
80	23.52	34.29	41.77	49.16	59.04	66.72	74.61	85.44	93.96
85	22.62	32.99	40.18	47.29	56.80	64.18	71.78	82.19	90.39
90	21.81	31.80	38.74	45.59	54.76	61.87	69.19	79.23	87.14
95	21.06	30.72	37.41	44.03	52.88	59.76	66.83	76.52	84.16
100	20.38	29.71	36.19	42.59	51.16	57.81	64.65	74.03	81.41
105	19.74	28.79	35.07	41.27	49.57	56.01	62.64	71.73	78.88
110	19.16	27.93	34.02	40.04	48.10	54.35	60.78	69.60	76.54
115	18.61	27.14	33.05	38.90	46.72	52.80	59.04	67.61	74.36
120	18.10	26.40	32.15	37.83	45.45	51.35	57.43	65.76	72.32
Suma	850.19	1239.80	1510.05	1777.12	2134.59	2412.02	2697.41	3088.88	3396.91



TESIS: ÍNDICE PÉRDIDA-POSESIÓN PARA GENERACIÓN DE MAPAS DE RIESGO ANTE INUNDACIONES EN ZONAS URBANAS





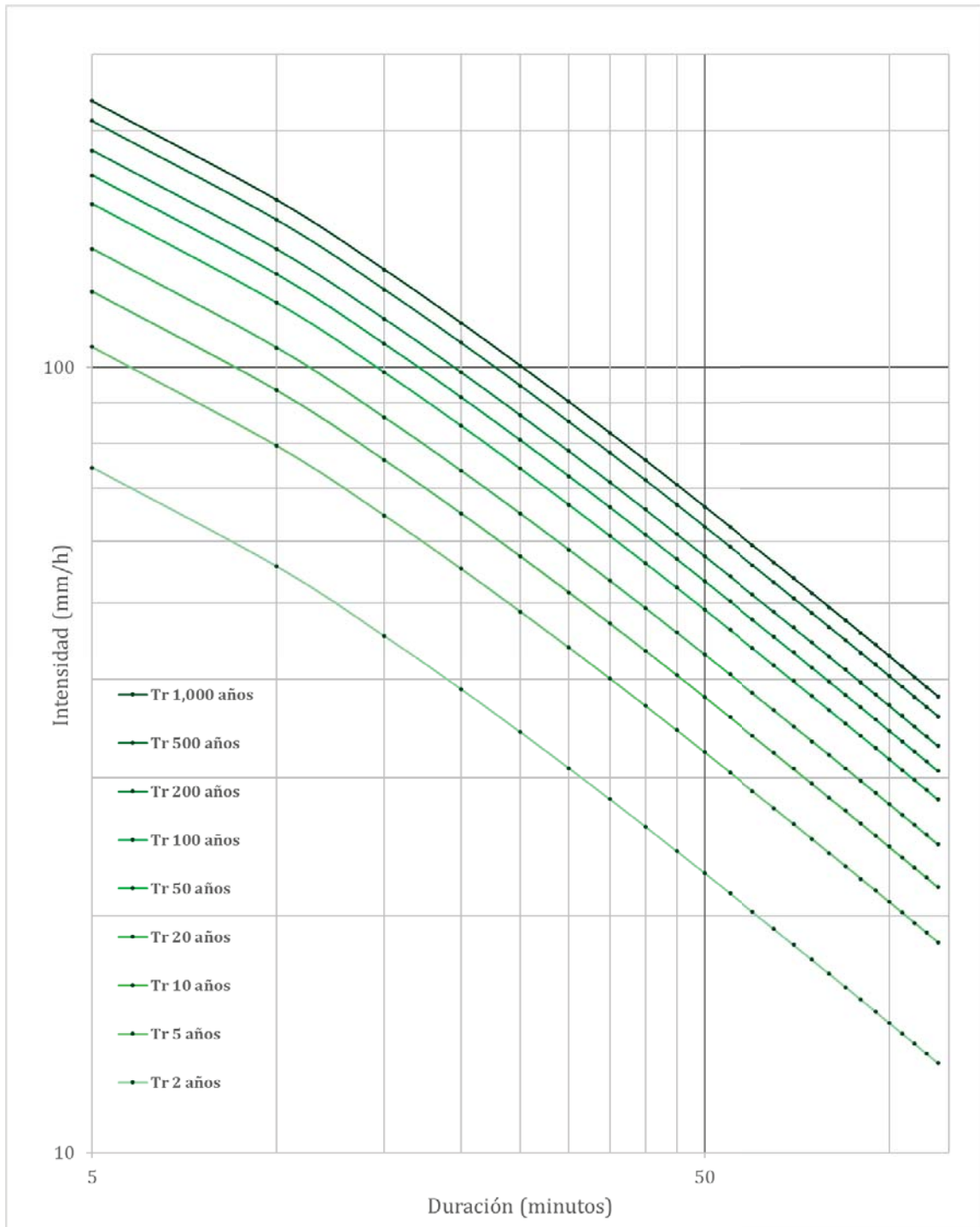
TESIS: ÍNDICE PÉRDIDA-POSESIÓN PARA GENERACIÓN DE MAPAS DE RIESGO ANTE INUNDACIONES EN ZONAS URBANAS

Estación La Mesa

Duración (minutos)	Tr (años)								
	2	5	10	20	50	100	200	500	1000
5	74.49	106.15	124.85	141.45	161.40	175.47	188.89	205.85	218.22
10	55.75	79.45	93.45	105.87	120.80	131.33	141.37	154.07	163.32
15	45.44	64.75	76.16	86.29	98.46	107.04	115.22	125.57	133.12
20	38.88	55.41	65.17	73.83	84.24	91.59	98.59	107.44	113.90
25	34.28	48.85	57.45	65.09	74.27	80.75	86.92	94.73	100.42
30	30.84	43.95	51.69	58.56	66.82	72.64	78.20	85.22	90.34
35	28.15	40.12	47.18	53.46	61.00	66.31	71.39	77.80	82.47
40	25.98	37.03	43.55	49.34	56.30	61.21	65.89	71.80	76.12
45	24.19	34.47	40.54	45.93	52.41	56.98	61.33	66.84	70.86
50	22.67	32.31	38.00	43.06	49.13	53.41	57.49	62.66	66.42
55	21.37	30.46	35.83	40.59	46.31	50.35	54.20	59.07	62.62
60	20.25	28.85	33.94	38.45	43.87	47.69	51.34	55.95	59.31
65	19.25	27.44	32.27	36.56	41.72	45.36	48.83	53.21	56.41
70	18.38	26.19	30.80	34.89	39.82	43.29	46.60	50.78	53.83
75	17.59	25.07	29.48	33.40	38.11	41.43	44.60	48.61	51.53
80	16.88	24.06	28.30	32.06	36.58	39.77	42.81	46.65	49.46
85	16.24	23.14	27.22	30.84	35.19	38.26	41.18	44.88	47.58
90	15.66	22.31	26.24	29.73	33.92	36.88	39.70	43.26	45.86
95	15.12	21.55	25.34	28.71	32.76	35.62	38.34	41.78	44.29
100	14.63	20.85	24.52	27.78	31.70	34.46	37.09	40.42	42.85
105	14.17	20.20	23.76	26.91	30.71	33.39	35.94	39.17	41.52
110	13.75	19.60	23.05	26.11	29.80	32.39	34.87	38.00	40.28
115	13.36	19.04	22.39	25.37	28.95	31.47	33.88	36.92	39.14
120	12.99	18.52	21.78	24.67	28.15	30.61	32.95	35.91	38.06
Suma	610.31	869.73	1022.96	1158.94	1322.43	1437.68	1547.62	1686.61	1787.93



TESIS: ÍNDICE PÉRDIDA-POSESIÓN PARA GENERACIÓN DE MAPAS DE RIESGO ANTE INUNDACIONES EN ZONAS URBANAS





TESIS: ÍNDICE PÉRDIDA-POSESIÓN PARA GENERACIÓN DE MAPAS DE RIESGO ANTE INUNDACIONES EN ZONAS URBANAS

Estación Presa Chihuahua

Duración (minutos)	Tr (años)								
	2	5	10	20	50	100	200	500	1000
5	90.31	130.40	156.94	182.40	215.36	240.06	264.67	297.13	321.67
10	67.59	97.60	117.46	136.52	161.18	179.67	198.09	222.38	240.75
15	55.09	79.55	95.74	111.27	131.37	146.44	161.45	181.25	196.22
20	47.14	68.06	81.91	95.20	112.41	125.30	138.14	155.08	167.89
25	41.56	60.01	72.22	83.94	99.10	110.47	121.79	136.73	148.02
30	37.39	53.98	64.97	75.51	89.16	99.38	109.57	123.01	133.17
35	34.13	49.28	59.31	68.93	81.39	90.72	100.02	112.29	121.56
40	31.50	45.48	54.74	63.62	75.12	83.73	92.32	103.64	112.20
45	29.32	42.34	50.96	59.23	69.93	77.95	85.94	96.48	104.45
50	27.49	39.69	47.77	55.52	65.55	73.07	80.56	90.44	97.91
55	25.91	37.42	45.03	52.34	61.80	68.88	75.95	85.26	92.30
60	24.55	35.44	42.66	49.58	58.54	65.25	71.94	80.76	87.43
65	23.34	33.71	40.57	47.15	55.67	62.05	68.41	76.81	83.15
70	22.28	32.17	38.72	45.00	53.13	59.22	65.29	73.30	79.35
75	21.32	30.79	37.06	43.07	50.85	56.69	62.50	70.16	75.96
80	20.47	29.55	35.57	41.34	48.81	54.40	59.98	67.34	72.90
85	19.69	28.43	34.22	39.77	46.95	52.34	57.70	64.78	70.13
90	18.98	27.41	32.98	38.34	45.26	50.45	55.62	62.45	67.60
95	18.33	26.47	31.86	37.02	43.71	48.73	53.72	60.31	65.29
100	17.73	25.61	30.82	35.82	42.29	47.14	51.97	58.35	63.17
105	17.18	24.81	29.86	34.71	40.98	45.67	50.36	56.53	61.20
110	16.67	24.07	28.97	33.67	39.76	44.32	48.86	54.85	59.38
115	16.20	23.39	28.15	32.71	38.62	43.05	47.47	53.29	57.69
120	15.75	22.75	27.38	31.82	37.57	41.87	46.17	51.83	56.11
Suma	739.92	1068.39	1285.87	1494.49	1764.51	1966.86	2168.47	2434.45	2635.48



TESIS: ÍNDICE PÉRDIDA-POSESIÓN PARA GENERACIÓN DE MAPAS DE RIESGO ANTE INUNDACIONES EN ZONAS URBANAS

