APPENDIX G

IDF Curves and MTO Report Table

The following tables and figures are taken from the 2008 Final MTO Report entitled "*Identification of the Effect of Climate Change on Future Design Standards of Drainage Infrastructure in Ontario*"

Table A1 – Observed Precipitation (1961-1980): Precipitation Intensity for Different Return Periods at Station G6140954

	T=2 years	T=5 years	T=10 years	T=20 years	T=50 years	T=100 years
T_d (hr)						
	(mm/hr)	(mm/hr)	(mm/hr)	(mm/hr)	(mm/hr)	(mm/hr)
24	2.1	2.6	2.9	3.2	3.6	3.9
18	2.6	3.1	3.5	3.9	4.4	4.7
12	3.5	4.2	4.8	5.3	5.9	6.4
6	6.2	7.6	8.5	9.4	10.5	11.4
3	10.8	13.3	14.9	16.4	18.4	19.9
2	14.2	17.4	19.5	21.6	24.2	26.2
1	22.8	28.0	31.4	34.7	38.9	42.1
0.5	38.5	47.2	53.0	58.5	65.7	71.1
0.25	58.8	72.1	80.9	89.3	100.3	108.4
0.17	65.6	80.4	90.2	99.7	111.8	121.0
0.08	76.0	93.2	104.6	115.5	129.6	140.2

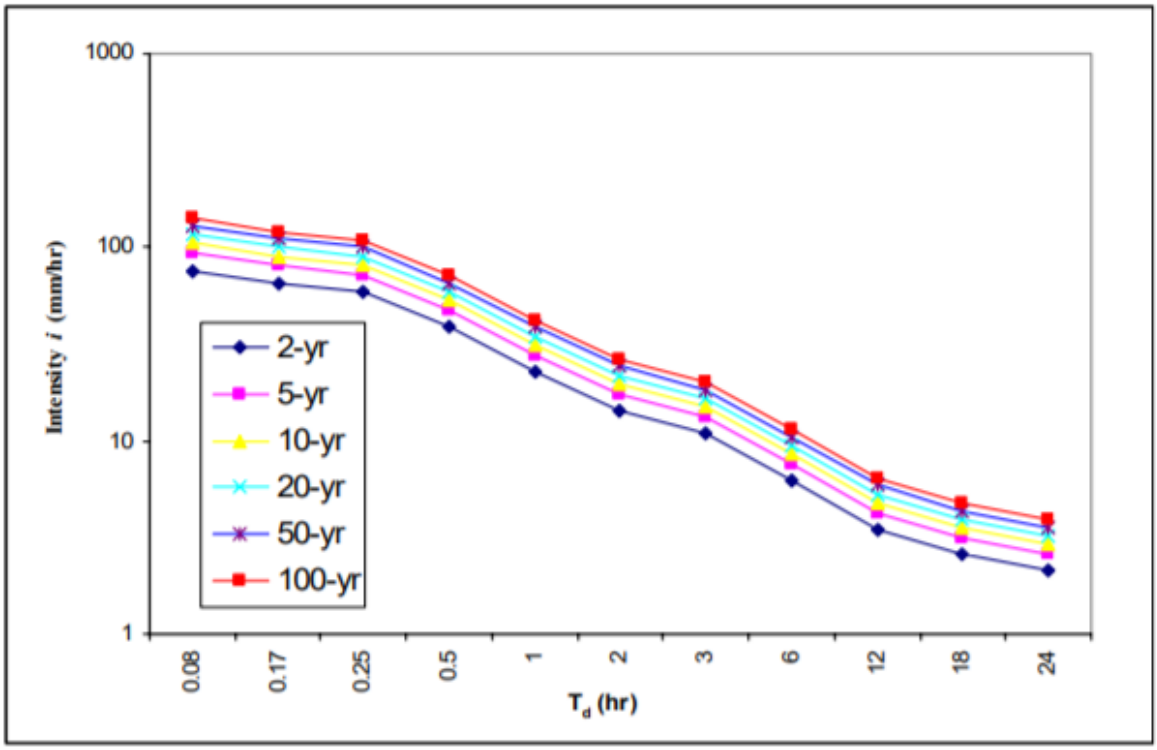


Figure A9 – IDF Curves for Observed Precipitation (1961-1980) at Station G6140954

Table A2 – Observed Precipitation (1981-2000): Precipitation Intensity for Different Return Periods at Station G6140954

T_d (hr)	T=2 years (mm/hr)	T=5 years (mm/hr)	T=10 years (mm/hr)	T=20 years (mm/hr)	T=50 years (mm/hr)	T=100 years (mm/hr)
24	2.2	2.9	3.3	3.7	4.3	4.7
18	2.7	3.5	4.0	4.5	5.2	5.7
12	3.6	4.7	5.4	6.1	7.0	7.7
6	6.5	8.4	9.7	10.9	12.5	13.7
3	11.3	14.7	16.9	19.1	21.9	23.9
2	14.8	19.3	22.2	25.0	28.7	31.4
1	23.9	31.0	35.7	40.3	46.1	50.5
0.5	40.3	52.4	60.3	68.0	77.9	85.3
0.25	61.5	79.9	92.1	103.8	118.9	130.2
0.17	68.6	89.2	102.7	115.8	132.6	145.3
0.08	79.6	103.3	119.1	134.2	153.7	168.4

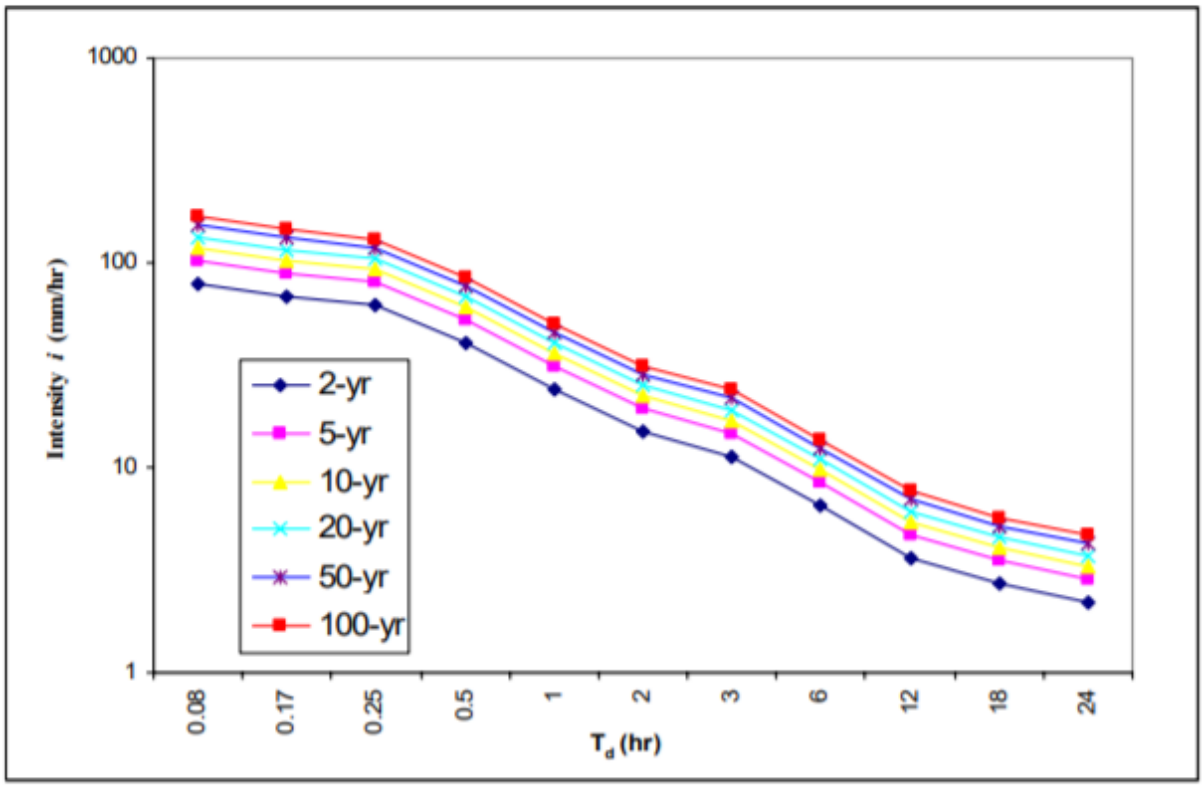


Figure A10 – IDF Curves for Observed Precipitation (1981-2000) at Station G6140954

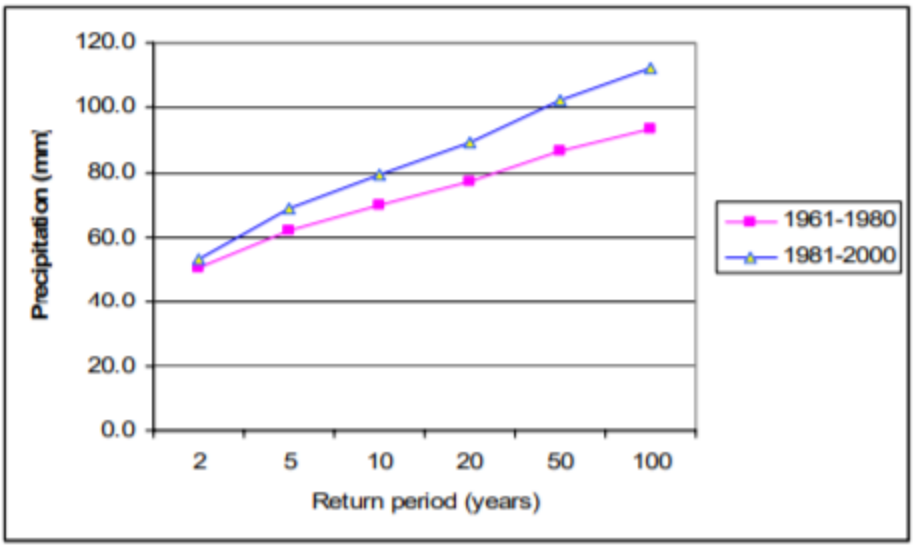


Figure 5 - Comparison of 24-Hour Precipitation Between 1961-1980 and 1981-2000 at Station G6140954

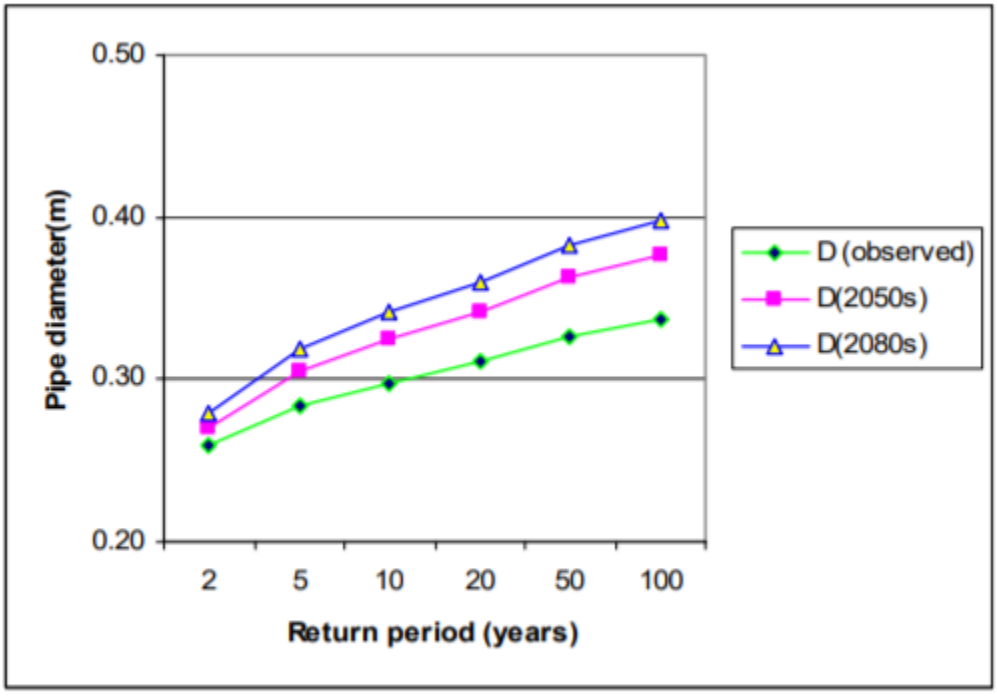
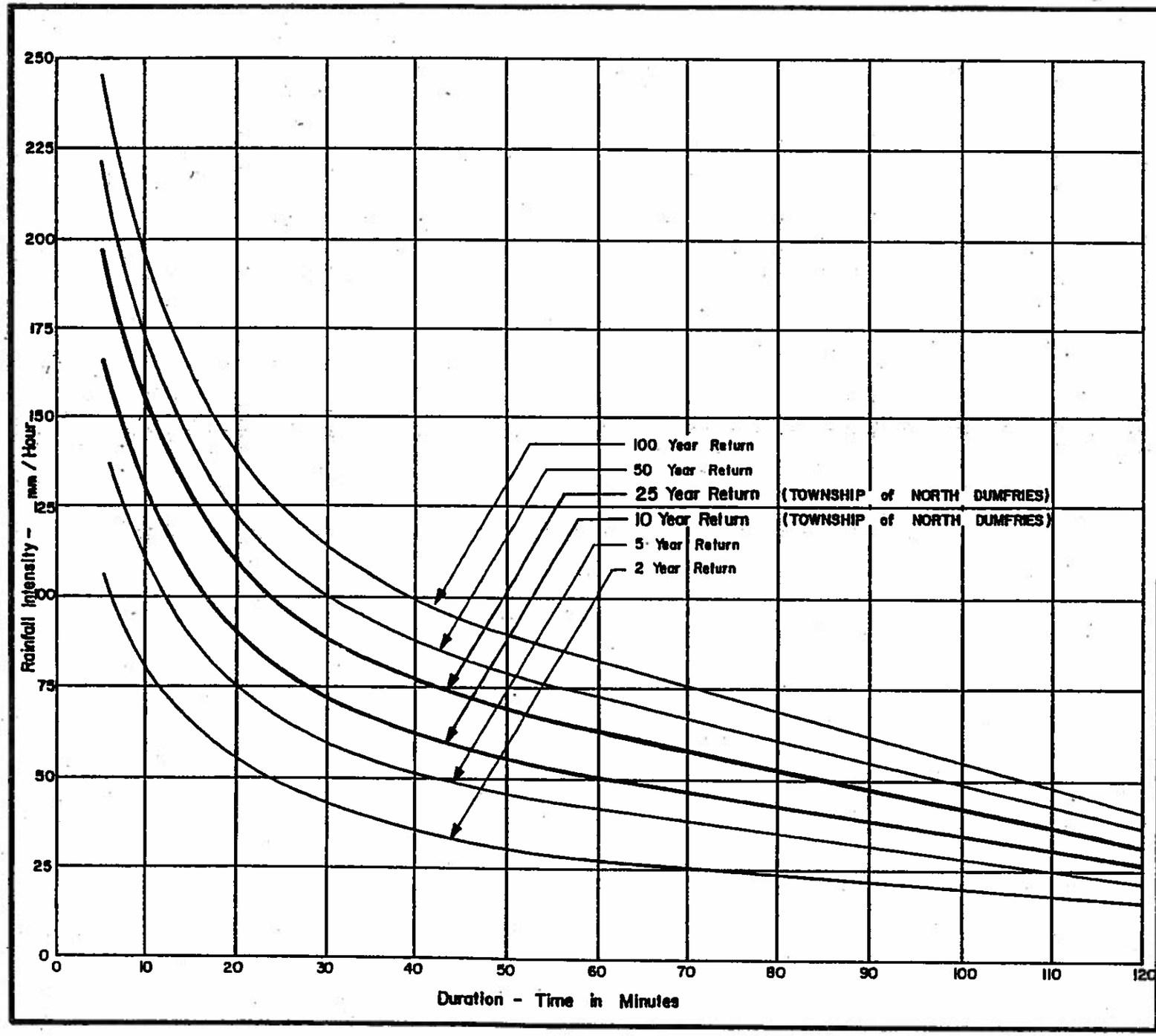


Figure 23 – Estimated Pipe Diameter for 2050s and 2080s Compared with the Current Period in the Grand River Region

Table 16 - Change in Pipe Diameter for 2050s and 2080s Compared with the Current Period in Ontario

Return period (yr)			2	5	10	20	50	100
Change in pipe diameter (%)	Grand River Region	2050s	3.6	7.3	8.9	10.1	11.4	12.1
		2080s	7.5	12.3	14.4	15.9	17.5	18.4
	Kenora and Rainy River Region	2050s	3.6	6.1	7.0	7.5	8.1	8.4
		2080s	9.4	11.7	12.5	13.0	13.5	13.8



INLET TIMES:

ESTATE RESIDENTIAL ——— 15 min.

SUBURBAN RESIDENTIAL ——— 10 min.

SUBURBAN INDUSTRIAL
COMMERCIAL ——— 10 min.

URBAN COMMERCIAL
MULTIPLE & HIGH DENSITY — 5 min.

NO.	REVISION	BY	CHKD	DATE
2	REVIEWED	F.P.S.	G.R.S.	4/18/02
1	REVIEWED	F.P.S.	G.R.S.	2/11/90

TOWNSHIP OF
NORTH DUMFRIES

RAINFALL INTENSITY CURVES

SCALE:

DATE: JANUARY 1979

STD. S-1

Franklin A. Lisle
MAYOR

The following storm run-off coefficients 'C' are to be used for storm water design:

LAND USE		RUN-OFF COEFFICIENTS 'C'
Commercial	- Downtown Areas	0.90
	- Suburban, General	0.75
Industrial	- Heavy	0.75
	- Light and General	0.70
Residential	- Apartments and Multi-units	0.60
	- Mixed Residential	0.45
	- Single Family	0.30
	- Estate Residential	0.25
Schools, Churches, Institutions		0.65
Parkland, Cemeteries		
	- Over 5 Hectares	0.15
	- Under 5 Hectares	0.20
Rural Lands	- Woodland (rolling)	0.15 - 0.20
	- Pasture (flat)	0.10 - 0.20
	- Pasture (rolling)	0.15 - 0.35
	- Cultivated (flat)	0.30 - 0.40
	- Cultivated (rolling)	0.35 - 0.50

Watershed run-off 'C' to be a weighted average for area consisting of several distinct zones.

NOTES:

1. Pipe velocity ranges:
   0.75 m/sec. minimum [2.5 ft/sec.] 4.5 m/sec. maximum [15 ft/sec.]
2. Minimum storm pipe 300 mm [12"] diameter.
3. Minimum pipe culvert 375 mm [15"] diameter at private driveways.
4. Minor systems (pipes, conduits) to be designed for 10-year rainfall intensity. Major systems (open channel, creeks, etc.) designed to 25-year rainfall intensity except as otherwise directed.

NO.	REVISION	BY	CHKD	DATE
2	REVIEWED	F. P. S.	G. R. S.	4/18/02
1	REVIEWED	F. P. S.	G. R. S.	2/1/90

TOWNSHIP OF
NORTH DUMFRIES

STORM WATER RUN-OFF DESIGN CRITERIA

SCALE:

DATE: JANUARY 1979

STD. S-2

Frank R. Lisa
MAYOR