

# 1999

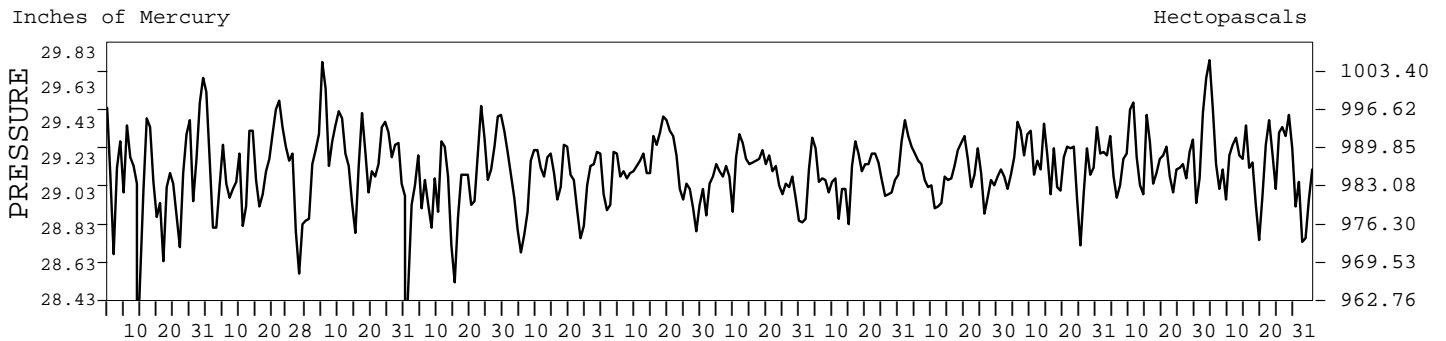
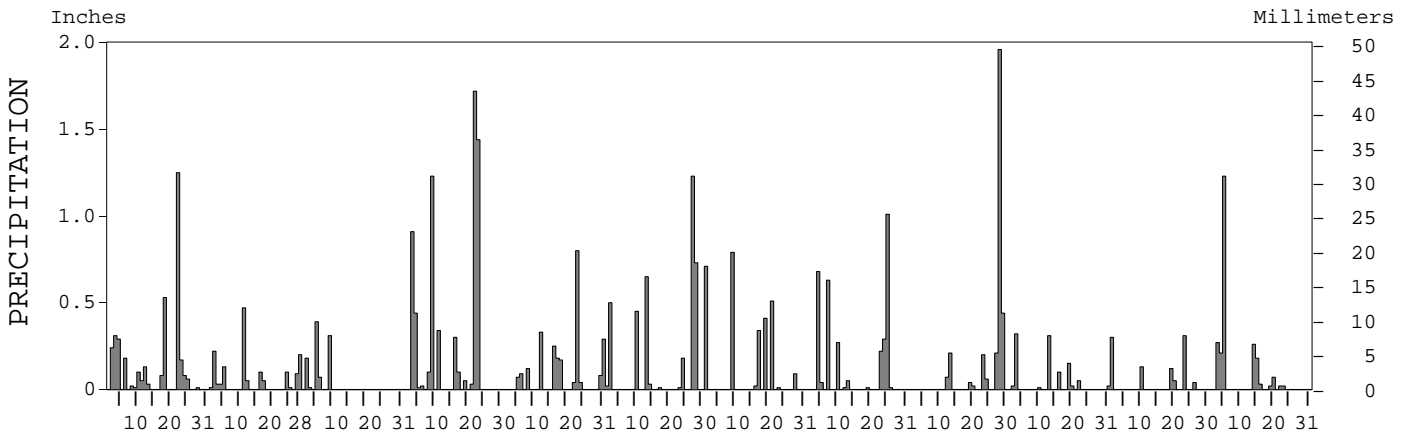
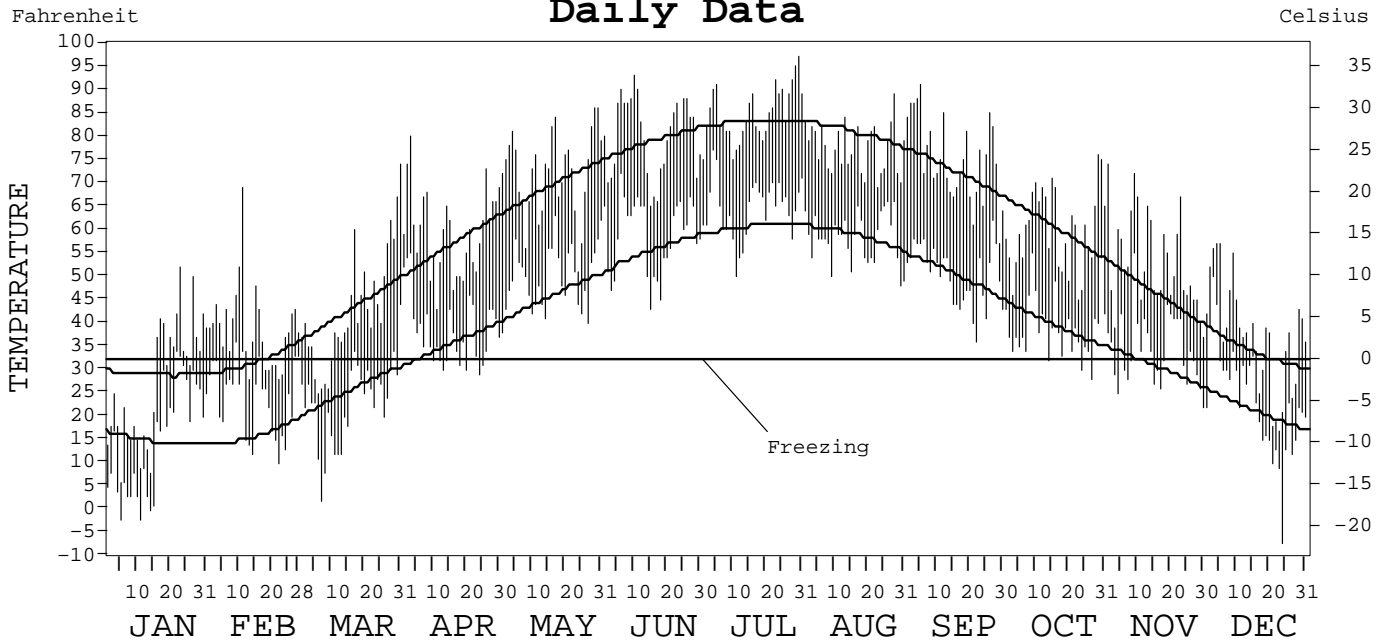
## LOCAL CLIMATOLOGICAL DATA ANNUAL SUMMARY WITH COMPARATIVE DATA



ISSN 0198-2575

### GRAND RAPIDS, MICHIGAN (GRR)

### Daily Data



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# METEOROLOGICAL DATA FOR 1999

## GRAND RAPIDS, MI (GRR)

LATITUDE: 42° 52' 56" N      LONGITUDE: 85° 31' 23" W      ELEVATION (FT): GRND: 786      BARO: 786      TIME ZONE: EASTERN (UTC + 5)      WBAN: 94860

	ELEMENT	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	
TEMPERATURE °F	MEAN DAILY MAXIMUM	27.4	38.8	42.7	59.4	72.2	80.0	84.9	77.5	75.0	60.0	53.0	37.4	59.0	
	HIGHEST DAILY MAXIMUM	52	69	74	80	86	93	97	89	91	76	74	57	97	
	DATE OF OCCURRENCE	23	11	31	03	30+	10	30	28	05	29	01	05+	JUL 30	
	MEAN DAILY MINIMUM	15.0	23.9	23.1	38.2	49.7	58.7	64.5	58.1	50.3	39.0	34.2	23.3	39.8	
	LOWEST DAILY MINIMUM	-2	10	2	29	38	43	50	48	36	28	22	-7	-7	
	DATE OF OCCURRENCE	11+	22	07	24	01	15	11	30	22	27	30	24	DEC 24	
	AVERAGE DRY BULB	21.2	31.4	32.9	48.8	61.0	69.4	74.7	67.8	62.7	49.5	43.6	30.4	49.5	
	MEAN WET BULB		28.8	28.8		53.8	63.2	69.3	62.7	56.2	45.4	39.8	28.5		
	MEAN DEW POINT		23.4	20.2		47.1	58.9	66.3	58.9	51.1	40.8	34.7	24.8		
	NUMBER OF DAYS WITH:														
	MAXIMUM ≥ 90°	0	0	0	0	0	3	7	0	1	0	0	0	0	11
MAXIMUM ≤ 32°	17	7	6	0	0	0	0	0	0	0	0	8	8	38	
MINIMUM ≤ 32°	29	23	28	8	0	0	0	0	0	3	15	26	26	132	
MINIMUM ≤ 0°	3	0	0	0	0	0	0	0	0	0	0	1	1	4	
H/C	HEATING DEGREE DAYS	1353	940	989	481	156	49	1	17	116	474	634	1066	6276	
	COOLING DEGREE DAYS	0	0	0	3	39	186	308	110	55	0	0	0	701	
RH	MEAN (PERCENT)	83	73	62	68	64	70	75	75	69	73	72	80	72	
	HOUR 01 LST	85	77	71	77	74	84	86	85	84	81	79	85	81	
	HOUR 07 LST	86	81	77	81	76	83	89	91	90	85	81	85	84	
	HOUR 13 LST	79	64	50	56	52	56	62	60	48	60	60	74	60	
	HOUR 19 LST	82	71	54	59	56	59	64	65	59	68	73	79	66	
S	PERCENT POSSIBLE SUNSHINE	37	36	59		58									
W/O	NUMBER OF DAYS WITH:														
	HEAVY FOG (VISBY ≤ 1/4 MI)	10	2	0	2	1	0	2	3	0	2	2	3	27	
	THUNDERSTORMS	1	1	0	5	5	6	7	3	1	1	2	0	32	
CLOUDINESS	SUNRISE-SUNSET: (OKTAS)														
	CEILOMETER (≤ 12,000 FT.)														
	SATELLITE (> 12,000 FT.)														
	MIDNIGHT-MIDNIGHT: (OKTAS)														
	CEILOMETER (≤ 12,000 FT.)														
	SATELLITE (> 12,000 FT.)														
	NUMBER OF DAYS WITH:														
	CLEAR														
	PARTLY CLOUDY														
	CLOUDY														
PR	MEAN STATION PRESS. (IN.)		29.14	29.25		29.11	29.17	29.13	29.16	29.14	29.22	29.25	29.18		
	MEAN SEA-LEVEL PRESS. (IN.)		30.03	30.14		29.96	30.02	29.97	30.01	29.99	30.09		30.05		
WINDS	RESULTANT SPEED (MPH)		3.0	2.7		1.5	1.6	2.1	1.5	3.1	3.7	4.7	3.7		
	RES. DIR. (TENS OF DEGS.)		22	31		20	21	28	33	25	24	24	23		
	MEAN SPEED (MPH)	12.3	10.7	11.0	11.0	10.5	7.5	8.9	7.5	8.3	9.5	10.0	9.7	9.7	
	PREVAIL. DIR. (TENS OF DEGS.)	07	18	31	06	07	13	25	01	23	21	20	20	25	
	MAXIMUM 2-MINUTE WIND:														
	SPEED (MPH)	40	55	43	52	41	30	51	24	30	35	37	36	55	
	DIR. (TENS OF DEGS.)	07	24	24	19	18	24	26	24	23	31	24	23	24	
	DATE OF OCCURRENCE	02	11	17	03	17	07	28	13+	30	22	24	29+	FEB 11	
	MAXIMUM 5-SECOND WIND:														
SPEED (MPH)	49	64	49	52	53	37	58	28	39	44	46	41	64		
DIR. (TENS OF DEGS.)	08	25	24	19	19	21	29	27	23	30	24	23	25		
DATE OF OCCURRENCE	02	11	17	03	17	10	28	17+	30	22	24	29+	FEB 11		
PRECIPITATION	WATER EQUIVALENT:														
	TOTAL (IN.)	3.54	1.49	0.96	6.69	2.46	3.81	2.88	3.22	3.21	1.00	0.95	2.31	32.52	
	GREATEST 24-HOUR (IN.)	1.25	0.49	0.39	2.66	0.82	1.23	0.79	1.08	2.11	0.32	0.31	1.44	2.66	
	DATE OF OCCURRENCE	22	11-12	05	22-23	23-24	27	09	24-25	27-28	03	23	04-05	APR 22-23	
	NUMBER OF DAYS WITH:														
PRECIPITATION ≥ 0.01	17	13	5	13	12	10	8	11	9	9	6	10	123		
PRECIPITATION ≥ 0.10	9	6	3	9	7	6	5	6	5	4	4	5	69		
PRECIPITATION ≥ 1.00	1	0	0	3	0	1	0	1	1	0	0	1	8		
SNOWFALL	SNOW, ICE PELLETS, HAIL:														
	TOTAL (IN.)	46.8	8.0	14.2	T	T	0.0	0.0	0.0	0.0	0.0	0.1	18.4	87.5	
	GREATEST 24-HOUR (IN.)	9.1	3.9	7.4	T	T	0.0	0.0	0.0	0.0	0.0	0.1	5.4	9.1	
	DATE OF OCCURRENCE	03	12	05	11	05						03	28+	JAN 03	
	MAXIMUM SNOW DEPTH (IN.)	20	3	6	0	0	0	0	0	0	0	T	7	20	
	DATE OF OCCURRENCE	08+	25	06								03	24	JAN 08+	
NUMBER OF DAYS WITH:															
SNOWFALL ≥ 1.0	11	2	3	0	0	0	0	0	0	0	0	6	22		

# NORMALS, MEANS, AND EXTREMES

## GRAND RAPIDS, MI (GRR)

LATITUDE: 42° 52' 56" N      LONGITUDE: 85° 31' 23" W      ELEVATION (FT): GRND: 786      BARO: 786      TIME ZONE: EASTERN (UTC + 5)      WBAN: 94860

ELEMENT		POR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
TEMPERATURE °F	NORMAL DAILY MAXIMUM	30	29.0	31.6	42.8	56.6	69.3	78.7	82.8	80.5	72.0	59.8	45.8	33.5	56.9
	MEAN DAILY MAXIMUM	52	29.7	32.4	42.1	56.7	69.3	78.7	82.6	80.4	72.6	60.8	46.0	34.2	57.1
	HIGHEST DAILY MAXIMUM	36	62	69	78	88	92	98	100	100	93	87	77	67	100
	YEAR OF OCCURRENCE		1967	1999	1986	1970	1978	1995	1988	1964	1973	1975	1975	1982	JUL 1988
	MEAN OF EXTREME MAXS.	52	47.6	49.6	67.0	78.4	85.5	91.4	92.6	89.7	87.5	78.8	66.5	53.2	74.0
	NORMAL DAILY MINIMUM	30	14.7	15.8	25.4	35.4	45.6	55.3	60.4	58.4	49.9	39.1	30.2	20.7	37.6
	MEAN DAILY MINIMUM	52	15.7	16.9	25.0	35.8	46.0	55.9	60.4	58.9	50.9	40.7	31.2	21.4	38.2
	LOWEST DAILY MINIMUM	36	-22	-19	-8	3	22	33	41	39	27	18	5	-18	-22
	YEAR OF OCCURRENCE		1994	1973	1978	1982	1966	1972	1983	1976	1991	1988	1977	1983	JAN 1994
	MEAN OF EXTREME MINS.	52	-6.2	-4.1	5.3	20.6	30.8	41.0	47.7	45.0	34.7	26.0	15.7	0.9	21.4
	NORMAL DRY BULB	30	21.8	23.7	34.1	46.0	57.5	67.0	71.6	69.5	61.0	49.5	38.0	27.1	47.2
	MEAN DRY BULB	52	22.7	24.7	33.5	46.2	57.7	67.2	71.5	69.7	61.8	50.7	38.6	27.8	47.7
	MEAN WET BULB	15	22.5	24.2	31.0	41.4	51.8	60.8	65.1	64.0	56.7	43.0	35.5	27.1	43.6
	MEAN DEW POINT	15	18.7	19.7	25.0	34.6	45.3	55.6	61.0	60.6	52.9	39.0	31.3	23.4	38.9
	NORMAL NO. DAYS WITH:														
MAXIMUM ≥ 90°	30	0.0	0.0	0.0	0.0	0.5	2.3	5.1	2.6	0.4	0.0	0.0	0.0	10.9	
MAXIMUM ≤ 32°	30	19.3	15.3	5.8	0.4	0.0	0.0	0.0	0.0	0.0	0.0	2.3	14.3	57.4	
MINIMUM ≤ 32°	30	29.4	26.1	23.9	11.9	2.2	0.0	0.0	0.0	0.3	6.1	17.3	27.9	145.1	
MINIMUM ≤ 0°	30	4.1	3.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	9.2	
H/C	NORMAL HEATING DEG. DAYS	30	1339	1156	958	570	273	50	0	18	139	485	810	1175	6973
	NORMAL COOLING DEG. DAYS	30	0	0	0	0	40	110	208	157	19	0	0	0	534
RH	NORMAL (PERCENT)	30	77	74	71	67	65	68	70	73	76	75	77	80	73
	HOUR 01 LST	30	80	78	76	74	76	80	82	86	86	82	81	82	80
	HOUR 07 LST	30	81	80	80	79	79	81	84	88	89	85	83	83	83
	HOUR 13 LST	30	72	67	63	56	53	55	56	58	61	62	69	75	62
	HOUR 19 LST	30	76	72	66	59	55	57	57	62	71	72	76	79	67
S	PERCENT POSSIBLE SUNSHINE	36	28	39	46	51	56	61	64	61	54	44	27	23	46
W/O	MEAN NO. DAYS WITH:														
	HEAVY FOG (VISBY ≤ 1/4 MI)	37	2.4	2.2	2.5	1.7	1.5	1.5	1.4	1.9	2.1	1.8	2.0	3.2	24.2
	THUNDERSTORMS	37	0.2	0.2	1.6	3.4	3.5	5.6	5.9	5.0	4.1	1.6	1.2	0.4	32.7
CLOUDINESS	MEAN:														
	SUNRISE-SUNSET (OKTAS)														
	MIDNIGHT-MIDNIGHT (OKTAS)														
	MEAN NO. DAYS WITH:														
CLEAR	1			1.0											
PARTLY CLOUDY	1			1.0		2.0									
CLOUDY	1	1.0		1.0											
PR	MEAN STATION PRESSURE (IN)	26	29.20	29.20	29.11	29.10	29.10	29.10	29.10	29.20	29.20	29.21	29.20	29.19	29.16
	MEAN SEA-LEVEL PRES. (IN)	14	30.06	30.06	30.05	29.95	29.97	30.01	29.98	30.03	30.04	30.06	30.04	30.06	30.03
WINDS	MEAN SPEED (MPH)	24	11.5	10.6	11.2	11.0	9.7	8.8	8.4	7.8	8.1	9.2	10.5	10.5	9.8
	PREVAIL. DIR (TENS OF DEGS)	25	25	24	24	25	25	24	24	24	18	18	24	20	24
	MAXIMUM 2-MINUTE:														
	SPEED (MPH)	4	45	55	43	52	47	33	51	31	39	47	49	36	55
	DIR. (TENS OF DEGS)		24	24	24	19	26	23	26	25	25	24	23	23	24
	YEAR OF OCCURRENCE		1996	1999	1999	1999	1998	1996	1999	1997	1997	1996	1998	1999	FEB 1999
	MAXIMUM 5-SECOND:														
	SPEED (MPH)	4	55	64	54	61	60	52	58	38	48	60	66	41	66
DIR. (TENS OF DEGS)		24	25	23	25	27	22	29	25	25	25	23	23	23	
YEAR OF OCCURRENCE		1996	1999	1996	1997	1998	1998	1999	1997	1997	1996	1998	1999	NOV 1998	
PRECIPITATION	NORMAL (IN)	30	1.83	1.42	2.63	3.37	3.13	3.68	3.19	3.57	4.24	2.81	3.32	2.85	36.04
	MAXIMUM MONTHLY (IN)	36	4.36	4.80	5.12	6.69	8.29	8.21	8.83	8.46	11.85	6.30	7.81	6.63	11.85
	YEAR OF OCCURRENCE		1975	1997	1974	1999	1981	1967	1992	1987	1986	1969	1966	1971	SEP 1986
	MINIMUM MONTHLY (IN)	36	0.47	0.33	0.96	1.70	0.94	0.25	0.81	0.14	T	0.60	0.95	T	T
	YEAR OF OCCURRENCE		1981	1969	1996	1997	1987	1988	1976	1969	1979	1964	1986	1952	SEP 1979
	MAXIMUM IN 24 HOURS (IN)	36	2.16	3.05	1.78	2.66	5.48	4.03	3.68	3.68	4.55	3.19	3.00	2.79	5.48
	YEAR OF OCCURRENCE		1993	1997	1985	1999	1981	1994	1994	1987	1986	1993	1990	1982	MAY 1981
	NORMAL NO. DAYS WITH:														
PRECIPITATION ≥ 0.01	30	16.2	11.9	12.8	13.0	10.4	10.0	9.2	9.4	10.2	11.1	13.1	16.5	143.8	
PRECIPITATION ≥ 1.00	30	0.1	0.1	0.3	0.6	0.8	0.9	0.8	0.9	1.1	0.4	0.6	0.6	7.2	
SNOWFALL	NORMAL (IN)	30	21.3	11.9	9.9	3.1	0.*	0.0	0.0	0.0	T	0.7	7.2	18.0	72.1
	MAXIMUM MONTHLY (IN)	36	46.8	29.6	36.0	12.4	0.2	0.0	T	T	T	8.4	25.3	34.8	46.8
	YEAR OF OCCURRENCE		1999	1994	1965	1982	1990		1990	1993	1967	1967	1991	1983	JAN 1999
	MAXIMUM IN 24 HOURS (IN)	36	16.1	9.1	13.2	9.8	0.2	0.0	T	T	T	8.4	10.4	15.1	16.1
	YEAR OF OCCURRENCE		1978	1985	1970	1975	1990		1990	1993	1967	1967	1991	1970	JAN 1978
	MAXIMUM SNOW DEPTH (IN)	51	27	21	15	10	0	0	0	0	0	5	11	22	27
	YEAR OF OCCURRENCE		1978	1985	1965	1975						1967	1951	1951	JAN 1978
	NORMAL NO. DAYS WITH:														
SNOWFALL ≥ 1.0	30	6.9	4.1	2.9	0.9	0.0	0.0	0.0	0.0	0.0	0.1	2.5	6.0	23.4	

PRECIPITATION (inches) 1999 GRAND RAPIDS, MI (GRR)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1970	1.18	0.51	2.43	3.27	4.24	6.53	6.32	2.89	7.18	3.65	3.42	1.89	43.51
1971	1.04	2.48	1.77	2.27	1.05	2.01	2.46	0.92	6.30	1.39	2.84	6.63	31.16
1972	1.26	0.90	2.11	3.85	1.99	4.64	3.72	5.01	3.96	2.92	2.06	4.96	37.38
1973	1.66	1.15	3.34	3.47	4.31	3.58	2.06	1.45	2.47	4.12	3.54	3.28	34.43
1974	3.23	2.09	5.12	2.93	4.01	4.43	0.97	4.61	2.05	2.44	3.11	1.83	36.82
1975	4.36	1.92	2.28	4.07	2.08	5.97	2.31	7.38	2.00	1.04	3.82	4.02	41.25
1976	1.67	2.13	4.99	4.75	6.63	2.79	0.81	1.03	1.21	2.00	1.51	1.05	30.57
1977	1.59	1.35	3.81	4.04	1.33	3.50	5.16	4.77	4.26	2.28	2.34	3.35	37.78
1978	2.22	0.54	2.01	2.55	2.91	4.65	2.83	5.00	5.62	3.05	1.83	3.32	36.53
1979	2.09	0.61	3.72	3.56	1.37	4.16	2.27	4.33	T	2.10	5.46	2.97	32.64
1980	1.76	1.76	1.74	3.64	3.19	4.00	5.90	3.18	4.57	1.99	1.57	3.60	36.90
1981	0.47	2.03	1.29	6.11	8.29	4.22	3.74	2.95	9.52	2.54	2.58	1.10	44.84
1982	2.98	0.36	3.36	2.11	3.63	2.45	3.81	3.07	1.92	1.42	5.36	6.49	36.96
1983	1.33	1.12	3.30	5.06	4.64	2.09	4.76	1.49	4.87	2.66	3.00	2.79	37.11
1984	0.94	1.15	2.77	2.10	4.77	0.62	2.12	1.49	2.16	3.34	2.85	4.37	28.68
1985	1.94	3.26	4.20	2.54	1.36	1.68	3.09	6.48	4.26	4.64	5.45	2.00	40.90
1986	1.07	3.34	2.35	2.58	3.88	7.14	5.27	5.30	11.85	2.76	0.95	1.04	47.53
1987	0.67	0.37	1.15	2.40	0.94	3.56	2.93	8.46	4.47	2.33	2.49	3.29	33.06
1988	2.39	1.14	2.12	3.11	1.07	0.25	3.69	3.04	7.49	5.37	4.82	1.88	36.37
1989	0.95	1.01	2.47	1.79	4.33	5.02	1.29	4.78	4.90	1.53	4.86	0.97	33.90
1990	2.39	2.08	1.96	2.23	4.39	3.00	3.73	3.40	4.22	5.05	7.14	2.97	42.56
1991	1.32	0.64	3.58	5.58	4.44	1.76	6.24	3.79	2.93	5.61	6.41	2.63	44.93
1992	1.52	1.06	3.51	3.98	1.45	1.61	8.83	3.55	5.60	2.34	5.64	3.27	42.36
1993	4.21	1.13	2.31	4.93	2.17	6.05	1.83	7.73	8.20	4.32	2.12	1.47	46.47
1994	2.68	1.70	1.46	3.25	2.64	7.17	8.07	7.39	2.38	3.29	5.44	1.11	46.58
1995	2.73	0.94	1.49	3.85	2.85	3.97	6.11	3.10	1.54	2.78	4.37	1.52	35.25
1996	1.18	0.90	0.96	2.41	4.83	6.33	1.28	0.33	2.72	2.76	1.40	2.45	27.55
1997	2.63	4.80	1.40	1.70	3.05	2.76	1.95	1.99	4.85	2.02	1.49	0.98	29.62
1998	4.09	1.50	4.93	2.75	1.86	2.11	2.49	1.70	2.49	2.98	2.27	1.20	30.37
1999	3.54	1.49	0.96	6.69	2.46	3.81	2.88	3.22	3.21	1.00	0.95	2.31	32.52
POR= 130 YRS	2.20	1.84	2.48	3.03	3.28	3.57	2.98	2.86	3.49	2.78	2.77	2.38	33.66

WBAN : 94860

AVERAGE TEMPERATURE (°F) 1999 GRAND RAPIDS, MI (GRR)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1970	17.0	22.4	28.8	46.8	59.4	66.8	72.1	70.1	61.7	52.2	38.3	25.7	46.8
1971	18.3	24.1	29.0	43.9	54.0	70.9	69.2	68.6	65.6	58.3	38.0	32.0	47.7
1972	20.8	21.9	29.7	42.3	59.3	63.5	70.3	68.7	62.0	46.1	35.9	26.6	45.6
1973	27.4	22.8	41.9	46.8	53.7	69.9	72.4	72.7	63.4	55.0	39.9	26.2	49.3
1974	25.7	21.1	33.6	47.2	53.2	63.0	71.1	67.3	56.4	46.9	37.6	28.4	46.0
1975	25.2	24.3	28.8	39.8	60.7	67.6	70.6	70.5	57.0	53.0	44.7	27.3	47.5
1976	18.9	31.0	37.9	48.2	53.9	69.5	72.5	68.9	60.2	45.7	31.5	19.1	46.4
1977	12.7	22.8	40.0	52.1	65.8	64.5	74.0	67.9	62.9	48.6	39.5	25.9	48.1
1978	19.3	14.4	27.9	45.3	59.9	66.8	70.4	68.1	63.7	47.2	37.6	26.6	45.6
1979	17.1	15.0	36.9	44.5	57.7	67.6	71.1	68.5	63.4	51.5	40.5	33.0	47.2
1980	25.1	22.7	32.5	47.0	59.9	64.4	72.7	72.6	62.7	45.8	37.5	25.1	47.3
1981	20.8	30.2	35.1	47.3	55.5	68.6	72.1	70.7	60.9	48.2	39.8	28.7	48.2
1982	17.2	22.1	32.5	41.8	65.0	62.8	73.1	68.6	61.9	53.6	40.8	36.2	48.0
1983	27.6	30.9	36.9	42.6	52.8	67.7	74.7	72.2	62.4	50.7	40.7	19.2	48.2
1984	17.1	34.0	28.9	47.3	53.5	70.1	70.1	73.0	60.5	54.2	40.3	32.2	48.4
1985	18.6	21.3	36.2	51.7	60.4	63.8	70.7	67.4	63.6	50.6	38.4	22.3	47.1
1986	22.7	22.5	36.7	49.7	58.8	64.4	72.5	66.0	62.8	50.2	35.0	29.8	47.6
1987	25.4	29.9	37.3	50.1	62.6	71.2	74.1	69.3	62.2	45.0	41.1	31.5	50.0
1988	20.8	20.7	34.1	47.1	60.9	68.5	74.7	73.4	61.3	44.2	40.7	27.3	47.8
1989	30.5	19.7	31.8	43.9	55.8	65.9	71.9	68.4	59.4	51.1	35.7	17.2	45.9
1990	32.1	28.1	37.1	47.7	55.0	67.1	70.3	69.0	62.8	49.9	43.3	30.0	49.4
1991	22.2	29.2	37.9	50.8	64.6	71.2	72.4	70.5	60.1	52.0	35.7	29.4	49.7
1992	27.5	30.3	33.7	44.0	57.4	64.3	67.2	65.0	59.7	48.2	38.2	30.5	47.2
1993	25.9	21.9	32.4	44.0	58.2	65.2	72.7	71.4	56.5	48.0	37.9	27.8	46.8
1994	14.5	19.2	34.1	47.9	56.1	68.6	71.1	66.6	63.8	51.7	42.3	33.2	47.4
1995	26.5	23.2	37.0	42.8	56.4	69.8	72.5	74.8	59.1	51.4	32.0	24.2	47.5
1996	21.7	24.4	28.4	43.0	55.6	67.7	68.2	72.2	62.3	50.2	33.2	28.7	46.3
1997	21.6	27.3	34.6	44.1	50.3	68.3	70.8	66.1	61.1	49.9	35.6	31.1	46.7
1998	29.6	34.1	36.1	48.6	64.3	67.4	72.2	72.2	66.0	52.7	42.1	33.3	51.6
1999	21.2	31.4	32.9	48.8	61.0	69.4	74.7	67.8	62.7	49.5	43.6	30.4	49.5
POR= 106 YRS	24.0	24.6	34.0	46.6	58.0	67.8	72.5	70.4	62.8	51.5	39.0	28.3	48.3

HEATING DEGREE DAYS (base 65°F) 1999 GRAND RAPIDS, MI (GRR)

YEAR	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
1970-71	13	17	150	397	798	1210	1441	1140	1110	626	342	35	7279
1971-72	15	11	107	233	800	1016	1365	1240	1089	675	204	102	6857
1972-73	28	41	126	577	867	1185	1162	1178	708	552	341	4	6769
1973-74	1	7	136	314	748	1196	1212	1225	967	532	364	113	6815
1974-75	5	22	275	555	816	1127	1227	1133	1113	750	191	61	7275
1975-76	16	5	242	382	602	1161	1420	980	835	526	342	18	6529
1976-77	0	32	185	591	999	1415	1616	1177	765	401	106	91	7378
1977-78	3	48	99	501	759	1204	1407	1413	1140	584	213	62	7433
1978-79	15	22	124	545	816	1182	1477	1393	863	607	264	42	7350
1979-80	7	31	109	431	731	984	1230	1221	1000	541	189	106	6580
1980-81	0	4	115	588	821	1227	1363	969	919	525	298	8	6837
1981-82	7	5	173	513	749	1116	1475	1196	998	689	91	98	7110
1982-83	6	34	140	361	717	884	1151	949	866	663	373	61	6205
1983-84	16	2	149	440	721	1413	1480	892	1107	532	353	13	7118
1984-85	16	4	189	333	735	1014	1431	1216	886	428	173	81	6506
1985-86	9	17	157	436	790	1316	1302	1186	871	466	214	75	6839
1986-87	11	56	118	452	894	1084	1220	978	849	440	178	20	6300
1987-88	18	36	118	610	712	1032	1364	1277	950	531	169	60	6877
1988-89	3	21	135	639	722	1162	1062	1263	1023	625	297	51	7003
1989-90	2	23	203	424	874	1477	1014	1026	865	549	306	45	6808
1990-91	11	15	139	475	645	1077	1323	997	830	430	157	18	6117
1991-92	5	4	211	404	871	1098	1155	1001	964	626	262	75	6676
1992-93	25	66	197	512	794	1060	1204	1203	1004	624	227	84	7000
1993-94	1	16	259	524	810	1150	1561	1274	950	520	297	42	7404
1994-95	0	46	94	405	675	980	1186	1165	860	659	265	28	6363
1995-96	14	0	212	417	982	1260	1337	1166	1130	653	320	29	7520
1996-97	10	2	147	451	944	1119	1338	1048	935	616	448	24	7082
1997-98	8	43	136	473	876	1046	1091	858	899	486	76	98	6090
1998-99	0	2	58	380	682	975	1353	940	989	481	156	49	6065
1999-	1	17	116	474	634	1066							

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COOLING DEGREE DAYS (base 65°F) 1999 GRAND RAPIDS, MI (GRR)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1970	0	0	0	19	49	122	242	180	55	6	0	0	673
1971	0	0	0	0	8	218	154	129	132	31	0	0	672
1972	0	0	0	0	37	61	200	163	42	0	0	0	503
1973	0	0	0	10	0	157	238	255	96	12	0	0	768
1974	0	0	0	4	6	60	201	103	23	3	0	0	400
1975	0	0	0	0	65	148	199	184	8	15	0	0	619
1976	0	0	0	27	4	158	239	161	49	0	0	0	638
1977	0	0	0	19	137	85	286	143	44	0	0	0	714
1978	0	0	0	0	62	123	188	125	90	0	0	0	588
1979	0	0	0	0	46	129	204	147	69	19	0	0	614
1980	0	0	0	6	34	96	247	245	53	0	0	0	681
1981	0	0	0	0	13	124	236	190	55	0	0	0	618
1982	0	0	0	0	99	40	263	153	55	12	0	0	622
1983	0	0	0	0	2	146	325	234	76	5	0	0	788
1984	0	0	0	7	5	174	179	259	60	6	0	0	690
1985	0	0	0	36	39	52	193	99	119	0	0	0	538
1986	0	0	0	14	26	64	252	94	61	0	0	0	511
1987	0	0	0	2	110	213	306	174	38	0	0	0	843
1988	0	0	0	0	50	170	310	289	29	2	0	0	850
1989	0	0	0	0	19	84	223	135	40	0	0	0	501
1990	0	0	6	37	6	115	185	144	83	13	0	0	589
1991	0	0	0	12	155	211	240	182	71	7	0	0	878
1992	0	0	0	2	36	60	99	74	44	1	0	0	316
1993	0	0	0	0	21	94	244	222	10	5	0	0	596
1994	0	0	0	13	29	159	196	102	65	1	0	0	565
1995	0	0	0	0	5	179	252	315	40	6	0	0	797
1996	0	0	0	0	33	118	116	230	74	0	0	0	571
1997	0	0	0	0	0	131	194	81	26	13	0	0	445
1998	0	0	9	0	62	177	230	233	95	4	0	0	810
1999	0	0	0	3	39	186	308	110	55	0	0	0	701

SNOWFALL (inches) 1999 GRAND RAPIDS, MI (GRR)

YEAR	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
1970-71	0.0	0.0	0.0	0.0	6.1	33.3	27.2	4.4	25.9	4.1	0.0	0.0	101.0
1971-72	0.0	0.0	0.0	0.0	14.9	3.7	22.6	16.9	14.2	7.5	0.0	0.0	79.8
1972-73	0.0	0.0	0.0	0.9	11.0	19.8	7.0	13.2	8.5	5.0	0.1	0.0	65.5
1973-74	0.0	0.0	0.0	0.0	0.4	20.0	13.3	18.4	11.3	1.0	T	0.0	64.4
1974-75	0.0	0.0	0.0	0.4	8.9	16.5	10.7	10.6	11.8	10.0	0.0	0.0	68.9
1975-76	0.0	0.0	0.0	0.0	6.6	23.3	25.0	6.5	3.5	4.2	0.1	0.0	69.2
1976-77	0.0	0.0	0.0	2.0	8.5	17.7	26.1	5.0	9.5	2.0	0.0	0.0	70.8
1977-78	0.0	0.0	0.0	0.0	10.6	23.2	35.8	8.8	6.2	T	0.0	0.0	84.6
1978-79	0.0	0.0	0.0	T	6.2	30.0	45.5	5.3	7.2	1.8	0.0	0.0	96.0
1979-80	0.0	0.0	0.0	T	9.4	2.6	13.3	12.6	6.6	4.0	T	0.0	48.5
1980-81	0.0	0.0	0.0	0.4	5.5	17.3	8.1	18.8	1.4	T	0.0	0.0	51.5
1981-82	0.0	0.0	0.0	T	4.4	8.9	30.3	6.7	11.8	12.4	0.0	0.0	74.5
1982-83	0.0	0.0	0.0	0.0	5.2	8.2	5.7	2.9	13.2	0.7	0.0	0.0	35.9
1983-84	0.0	0.0	0.0	T	4.7	34.8	19.6	1.6	10.6	0.1	T	0.0	71.4
1984-85	0.0	0.0	0.0	0.0	T	15.7	22.6	21.3	6.7	3.3	0.0	0.0	69.6
1985-86	0.0	0.0	0.0	0.0	3.5	30.7	18.4	20.2	6.1	0.2	0.0	0.0	79.1
1986-87	0.0	0.0	0.0	0.0	5.3	12.7	19.2	0.9	5.7	3.8	0.0	0.0	47.6
1987-88	0.0	0.0	0.0	1.6	0.7	18.2	21.9	18.1	3.4	0.3	0.0	0.0	64.2
1988-89	0.0	0.0	0.0	0.2	5.5	14.4	8.7	25.1	6.3	2.2	T	0.0	62.4
1989-90	0.0	0.0	0.0	5.8	19.4	25.2	10.6	23.8	2.7	2.1	0.2	0.0	89.8
1990-91	T	0.0	0.0	T	2.0	18.6	27.7	9.5	2.8	T	0.0	0.0	60.6
1991-92	0.0	0.0	0.0	0.3	25.3	27.9	13.4	3.5	15.1	2.3	0.0	0.0	87.8
1992-93	0.0	0.0	0.0	2.3	4.2	14.2	11.1	18.6	11.6	3.3	0.0	0.0	65.3
1993-94	0.0	T	0.0	T	1.9	17.7	25.3	29.6	1.9	T	0.1	0.0	76.5
1994-95	0.0	0.0	0.0	0.0	0.6	8.9	21.6	18.6	4.4	0.8	0.0	0.0	54.9
1995-96	0.0	0.0	0.0	T	20.8	17.4	13.5	6.9	19.3	1.8	0.0	0.0	79.7
1996-97	0.0	0.0	0.0	0.0	5.6	22.8	45.5	14.0	5.2	3.5	T	0.0	96.6
1997-98	0.0	0.0	0.0	2.4	10.1	11.5	20.3	0.5	13.8	0.0	0.0	0.0	58.6
1998-99	0.0	0.0	0.0	0.0	0.2	7.5	46.8	8.0	14.2	T	T	0.0	76.7
1999-	0.0	0.0	0.0	0.0	0.1	18.4							
POR= 35 YRS	T	T	T	0.8	7.6	17.3	21.2	11.8	9.7	2.5	0.2	0.0	71.1

WBAN : 94860

REFERENCE NOTES:

<p>PAGE 1: THE TEMPERATURE GRAPH SHOWS NORMAL MAXIMUM AND NORMAL MINIMUM DAILY TEMPERATURES (SOLID CURVES) AND THE ACTUAL DAILY HIGH AND LOW TEMPERATURES (VERTICAL BARS).</p> <p>PAGE 2 AND 3: H/C INDICATES HEATING AND COOLING DEGREE DAYS. RH INDICATES RELATIVE HUMIDITY W/O INDICATES WEATHER AND OBSTRUCTIONS S INDICATES SUNSHINE. PR INDICATES PRESSURE. CLOUDINESS ON PAGE 3 IS THE SUM OF THE CEILOMETER AND SATELLITE DATA NOT TO EXCEED EIGHT EIGHTHS(OKTAS).</p> <p>GENERAL: T INDICATES TRACE PRECIPITATION, AN AMOUNT GREATER THAN ZERO BUT LESS THAN THE LOWEST REPORTABLE VALUE. + INDICATES THE VALUE ALSO OCCURS ON EARLIER DATES. BLANK ENTRIES DENOTE MISSING OR UNREPORTED DATA. NORMALS ARE 30-YEAR AVERAGES (1961 - 1990). ASOS INDICATES AUTOMATED SURFACE OBSERVING SYSTEM. PM INDICATES THE LAST DAY OF THE PREVIOUS MONTH. POR (PERIOD OF RECORD) BEGINS WITH THE JANUARY DATA MONTH AND IS THE NUMBER OF YEARS USED TO COMPUTE THE MEAN. INDIVIDUAL MONTHS WITHIN THE POR MAY BE MISSING. WHEN THE POR FOR A NORMAL IS LESS THAN 30 YEARS, THE NORMAL IS PROVISIONAL AND IS BASED ON THE NUMBER OF YEARS INDICATED. 0.* OR * INDICATES THE VALUE OR MEAN-DAYS-WITH IS BETWEEN 0.00 AND 0.05. CLOUDINESS FOR ASOS STATIONS DIFFERS FROM THE NON-ASOS OBSERVATION TAKEN BY A HUMAN OBSERVER. ASOS STATION CLOUDINESS IS BASED ON TIME-AVERAGED CEILOMETER DATA FOR CLOUDS AT OR BELOW 12,000 FEET AND ON SATELLITE DATA FOR CLOUDS ABOVE 12,000 FEET. THE NUMBER OF DAYS WITH CLEAR, PARTLY CLOUDY, AND CLOUDY CONDITIONS FOR ASOS STATIONS IS THE SUM OF THE CEILOMETER AND SATELLITE DATA FOR THE SUNRISE TO SUNSET PERIOD.</p>	<p>GENERAL CONTINUED: CLEAR INDICATES 0 - 2 OKTAS, PARTLY CLOUDY INDICATES 3 - 6 OKTAS, AND CLOUDY INDICATES 7 OR 8 OKTAS. WHEN AT LEAST ONE OF THE ELEMENTS (CEILOMETER OR SATELLITE) IS MISSING, THE DAILY CLOUDINESS IS NOT COMPUTED. WIND DIRECTION IS RECORDED IN TENS OF DEGREES (2 DIGITS) CLOCKWISE FROM TRUE NORTH. "00" INDICATES CALM. "36" INDICATES TRUE NORTH. RESULTANT WIND IS THE VECTOR AVERAGE OF THE SPEED AND DIRECTION. AVERAGE TEMPERATURE IS THE SUM OF THE MEAN DAILY MAXIMUM AND MINIMUM TEMPERATURE DIVIDED BY 2. SNOWFALL DATA COMPRISE ALL FORMS OF FROZEN PRECIPITATION, INCLUDING HAIL. A HEATING (COOLING) DEGREE DAY IS THE DIFFERENCE BETWEEN THE AVERAGE DAILY TEMPERATURE AND 65° F. DRY BULB IS THE TEMPERATURE OF THE AMBIENT AIR. DEW POINT IS THE TEMPERATURE TO WHICH THE AIR MUST BE COOLED TO ACHIEVE 100 PERCENT RELATIVE HUMIDITY. WET BULB IS THE TEMPERATURE THE AIR WOULD HAVE IF THE MOISTURE CONTENT WAS INCREASED TO 100 PERCENT RELATIVE HUMIDITY.</p> <p>ON JULY 1, 1996, THE NATIONAL WEATHER SERVICE BEGAN USING THE "METAR" OBSERVATION CODE THAT WAS ALREADY EMPLOYED BY MOST OTHER NATIONS OF THE WORLD. THE MOST NOTICEABLE DIFFERENCE IN THIS ANNUAL PUBLICATION WILL BE THE CHANGE IN UNITS FROM TENTHS TO EIGHTHS(OKTAS) FOR REPORTING THE AMOUNT OF SKY COVER.</p>
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# 1999 GRAND RAPIDS, MICHIGAN (GRR)

Grand Rapids, Michigan, is located in the west-central part of Kent County, in the picturesque Grand River valley about 30 air miles east of Lake Michigan. The Grand River, the longest stream in Michigan, flows through the city and bisects it into east and west sections. High hills rise on either side of the valley. Elevations range from 602 feet on the valley floor to 1,020 feet in the extreme southern part of Kent County, southwest of the airport.

Grand Rapids is under the natural climatic influence of Lake Michigan. In spring the cooling effect of Lake Michigan helps retard the growth of vegetation until the danger of frost has passed. The warming effect in the fall retards frost until most of the crops have matured. Fall is a colorful time of year in western Michigan, compensating for the late spring. During the winter, excessive cloudiness and numerous snow flurries occur with strong westerly winds. The tempering effect of Lake Michigan on cold waves coming in from the west and northwest is quite evident.

The tempering effect of the lake promotes the growth of a great variety of fruit trees and berries, especially apples, peaches, cherries, and blueberries. The intense cold of winter is modified, thus reducing winter kill of fruit trees. Summer days are pleasantly warm and most summer nights are quite comfortable, although there are about three weeks of hot, humid weather during most summers. Prolonged severe cold waves with below-zero temperatures are infrequent. The temperature usually rises to above zero during the daytime hours regardless of early morning readings.

July is the sunniest month and December is the month with the least sunshine. November through January is usually a period of excessive cloudiness and minimal sunshine.

Precipitation is usually ample for the growth and development of all vegetation. About one-half of the annual precipitation falls during the growing season, May through September. Droughts occur occasionally, but are seldom of protracted length. The snowfall season extends from mid-November to mid-March. Some winters have had continuous snow cover throughout this period, although there is usually a mid-winter thaw. The Grand River flows through the city and reaches critical heights a couple of times each year, generally once in January-February and again in March-April. Overflow is generally limited to the lowlands of the flood plain.

November is one of the windiest months and although violent windstorms are infrequent, gusts have on occasion exceeded 65 mph. Summer thunderstorms occasionally produce gusty winds over 60 mph.

# STATION LOCATION

GRAND RAPIDS, MICHIGAN

LOCATION	OCCUPIED FROM	OCCUPIED TO	AIRLINE DISTANCES AND DIRECTIONS FROM PREVIOUS LOCATION	LATITUDE NORTH	LONGITUDE WEST	ELEVATION ABOVE											AUCI TOM P A T I O N C H I O N O R I E N T A L I N G *	* Type M = AMOS T = AUTOB S = ASOS W = AWOS	REMARKS
						SEA LEVEL	GROUND												
							WIND DIRECTION	WIND SPEED	WIND GUSTS	WIND SHEAR	WIND SHEAR SPEED	WIND SHEAR DIRECTION	WIND SHEAR DIRECTION SPEED	WIND SHEAR DIRECTION SPEED	WIND SHEAR DIRECTION SPEED	WIND SHEAR DIRECTION SPEED			
<u>COOPERATIVE</u> - - NOTE: For period May 1849 through December, 1859 refer to previous editions.																			
L. R. Strong	1854	1860	Unknown	42° 57'	85° 40'													Temperature.	
E. S. Holmes	1/1860 5/1866	4/1861 12/1880	Unknown															Smithsonian Collection, temperature, wind, clouds, and rain.	
F. M. Kendall Barclay & Lyon Streets	9/1882 2/1887	6/1884 2/1888	Unknown	42° 57'	85° 40'	760												Temperature, wind, and rain.	
F. W. Ball 414 East Fulton	3/1888	11/1891	Unknown			760												Temperature, wind, and rain.	
L. R. Strong	4/1891	6/1891	Unknown															Temperature, wind, and rain.	
Soldiers Home (North Park)	12/1891	4/1896	Unknown															Temperature, wind, and rain. D. F. Sweet 12/1891 - 3/1893; Theo. Ramsey to 7/1893; Talbert Gridley to 8/1895; John Kremer to 4/1896.	
Fire Department	12/1895	6/1905	Unknown	42° 57'	85° 40'	620												A. K. Lamb 12/1895-12/1896; M. G. Canfield to 5/1902; H. C. Bettinghouse to 6/1905.	
<u>CITY</u>																			
Michigan Trust Building Corner Ottawa & Pearl	7/1/03	12/31/10	NA				162 a 165	127	127		121		121					a - Effective 4/27/16.	
Post Office Building Lyon, Division, Ionia, and Pearl	1/1/11	1/26/56	475 ft. NE	42° 58'	85° 40'	638	87 b 244 c	70	70		71	73 c	70					b - Moved 925' SW to National Bank Building 3/29/30 c - Moved to Airport 8/3/50. cd - Not moved 11/21/39. e - Effective 3/26/48. f - Effective 7/25/47. g - Equipment from city office installed 8/3/50.	
<u>AIRPORT</u>																			
Kent County Airport 4 miles South of PO	9/1/34	11/21/39	NA	42° 54'	85° 40'	681	45	5	4	NA	NA	NA	4	NA	NA			h - Minor adjustment 11/30/63. i - Installed on roof 12/1/63. j - Minor adjustment 1/24/64. k - Moved to ground 4/11/67. m - Installed 9/1/72. n - Moved 510' SE 11/23/77. p - Type change 11/26/84. q - Moved 574' NW 6/1986.	
Kent County Airport	11/21/39	11/24/63	50 ft. S	42° 54'	85° 40'	681	d45 e48 f63 g64	6	5	NA	NA	NA g4	4	NA	NA				
Terminal Building Kent County Airport (formerly know as Cascade Airport)	11/24/63	08/01/95	6 mi. ESE	42° 53'	85° 31'	793	20 n20	NA	4 j4	NA i44	44 k3	4 h4	NA m3	5 p5 q5	NA				
Kent County Airport	08/01/95	Present	NA	42°53'	85°31'	786												S ASOS Commissioned 08/01/95	

SUBSCRIPTION: Price and ordering information available through: National Climatic Data Center, Federal Building, Asheville, North Carolina 28801.  
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