2.3 Hurricanes

Grenada lies in the North Atlantic Ocean, one of the six main tropical areas of the Earth where hurricanes may develop every year. Within the 100 years between 1886 and 1986, 66 tropical storms passed within 150 miles of Grenada. Of these, 16 passed within 30 miles. Of the 16 which passed within 30 miles, 13 attained hurricane strength.

Tables 1 through 5 give the list of 66 tropical cyclones which passed within 250 kilometers (155 miles) of Grenada. Figure 9 shows the frequency of occurrence of tropical cyclones in Grenada between 1886 and 1986, while figure 10 plots the tracks of the 16 cyclones which passed within 50km (31 miles) of Grenada.

The destructive potential of a hurricane is significant due to high wind speeds and torrential rains that produce flooding and occasional storm surges with heights of several feet above normal sea level. Because of the elevation of the hospital site above sea level, storm surge is not expected to be an issue at the hospital.

Five categories of hurricanes are defined based on their potential for damage as follows:

Category	**Wind Speed in miles per hour (fastest mile)**	**Potential Damage**
HC1	74 to 95	Minimal
HC2	96 to 110	Moderate
HC3	111 to 130	Extensive
HC4	131 to 155	Extreme
HC5	>155	Catastrophic

The normal criterion for the design of buildings to resist hurricane force winds is the 1-in-50-year wind, i.e. a wind which on average is not expected to be exceeded more that once in 50 years. For Grenada, this produces a basic 3-second gust wind speed of about 112 mph. This represents a category 2 hurricane (HC2). (A 3-second wind speed of 112 mph is equivalent to a fastest-mile wind speed of about 100 mph.)

For buildings of a critical nature, such as a hospital, it is common practice in hurricane-resistant design to cater for a wind speed with a statistical return period of more than 50 years. Depending on the circumstances, a 1-in-100-year hurricane (HC3 for Grenada) or a 1-in-200-year hurricane (HC4 for Grenada) would be appropriate. This has the same effect as increasing the "safety factor" or the design wind speed.

The pages following this section contain the following tables and figures:

****	Notation Used in Tables 1 to 5
Tab 1	16 Tropical Cyclones passing within 50 km of Grenada
Tab 2	12 Tropical Cyclones passing within 50-100 km of Grenada
Tab 3	9 Tropical Cyclones passing within 100-150 km of Grenada
Tab 4	14 Tropical Cyclones passing within 150-200 km of Grenada
Tab 5	15 Tropical Cyclones passing within 200-250 km of Grenada
Tab 6	Hurricanes affecting Grenada from 1750-1980
Fig 9	Grenada Tropical Cyclone Occurrences for the Period 1886-1985
Fig 10	16 Tropical Cyclones passing within 50 km of Grenada
Fig 11	Isolines Depicting Geographical Distribution of Tropical Storms and Hurricanes during the Period 1886-1992

NOTATION USED TABLES 1 - 5

GRENADA

Latitude 12.12 N
Longitude 61.70 W

66 TROPICAL CYCLONES PASSING WITHIN 250 km
OF GRENADA IN THE PERIOD 1886 - 1985

N1 = Sequence number in table

N2 = Sequence number of storm in HURDAT tape
(tape containing all known historical tropical cyclones
for the North Atlantic, in the period 1886-1985)

Y-M-D = Year-Month-Day at time of closest approach

S1 = Status of the storm at its maximum intensity
S2 = Status of the storm at its maximum intensity and
within the distance specified for each table

HR = Hurricane
TS = Tropical Storm

Dmin = Distance from Grenada at time of closest approach
(+/-ve Dmin means that Grenada was to the right/left
of the storm track at the time of closest approach)

Theta = Direction of motion at time of closest approach
(θ=360 degrees is True North, 270 degrees is due West)

TABLE 1

16 TROPICAL CYCLONES PASSING WITHIN 50 KM OF GRENADA

N1	N2	Y-M-D	Name	S1	S2	Dmin (km)	Theta (deg)
1	5	1886 8 13	NOT NAMED	HR	1	-1.9	292.4
2	6	1886 8 16	NOT NAMED	HR	1	8.9	275.0
3	12	1887 7 20	NOT NAMED	HR	1	-35.0	278.9
4	100	1897 10 9	NOT NAMED	TS	2	-31.1	276.6
5	183	1909 7 13	NOT NAMED	HR	2	-19.9	270.2
6	233	1918 8 23	NOT NAMED	HR	1	-39.8	279.8
7	289	1928 8 3	NOT NAMED	HR	2	9.6	306.3
8	326	1933 8 17	NOT NAMED	TS	2	4.9	284.5
9	334	1933 9 17	NOT NAMED	HR	2	-46.1	285.7
10	384	1938 8 10	NOT NAMED	HR	2	22.9	285.2
11	431	1944 7 24	NOT NAMED	TS	2	-43.4	290.0
12	553	1955 9 23	JANET	HR	1	-25.3	280.7
13	600	1961 7 20	ANNA	HR	1	50.2	276.7
14	703	1971 9 6	EDITH	HR	2	28.1	277.0
15	707	1971 9 14	IRENE	HR	2	18.0	261.8
16	765	1978 8 11	CORA	HR	2	14.0	270.2

TABLE 2

12 TROPICAL CYCLONES PASSING BETWEEN 50 - 100 KM OF GRENADA

N1	N2	Y	M	D	Name	S1	S2	Dmin (km)	Theta (deg)
1	56	1891	10	12	NOT NAMED	HR	2	-60.6	328.3
2	89	1895	10	15	NOT NAMED	HR	1	-96.4	278.5
3	125	1901	7	3	NOT NAMED	TS	2	-97.5	270.2
4	184	1909	7	30	NOT NAMED	TS	2	-85.5	289.0
5	191	1910	8	20	NOT NAMED	TS	2	-65.4	283.5
6	232	1918	8	1	NOT NAMED	HR	2	-61.9	276.0
7	304	1931	9	6	NOT NAMED	HR	2	-68.0	273.5
8	325	1933	8	12	NOT NAMED	TS	2	-74.9	289.0
9	541	1954	10	6	HAZEL	HR	1	-81.7	276.0
10	622	1963	10	1	FLORA	HR	1	65.0	287.6
11	675	1969	8	29	FRANCELIA	HR	2	76.3	281.7
12	735	1974	10	2	GERTRUDE	HR	2	-55.2	276.6

TABLE 3

9 TROPICAL CYCLONES PASSING BETWEEN 100 - 150 KM OF GRENADA

N1	N2	Y	M	D	Name	S1	S2	Dmin (km)	Theta (deg)
1	13	1887	8	2	NOT NAMED	TS	2	-128.3	294.6
2	27	1887	12	8	NOT NAMED	TS	2	-108.9	281.7
3	35	1888	11	1	NOT NAMED	TS	2	-147.7	313.1
4	64	1892	10	7	NOT NAMED	HR	1	113.5	270.1
5	109	1898	10	3	NOT NAMED	TS	2	-108.5	285.8
6	226	1916	10	7	NOT NAMED	HR	2	-122.6	300.5
7	246	1921	9	9	NOT NAMED	HR	1	-126.5	305.5
8	290	1928	8	7	NOT NAMED	HR	2	-116.2	302.8
9	433	1944	8	17	NOT NAMED	HR	2	-105.3	282.6

TABLE 4

14 TROPICAL CYCLONES PASSING BETWEEN 150 - 200 KM OF GRENADA

N1	N2	Y	M	D	Name	S1	S2	Dmin (km)	Theta (deg)
1	17	1887	9	12	NOT NAMED	HR	1	-166.9	276.6
2	53	1891	10	2	NOT NAMED	TS	2	-166.8	183.6
3	83	1894	10	12	NOT NAMED	HR	2	-192.4	315.9
4	104	1898	9	11	NOT NAMED	HR	1	-186.0	310.3
5	123	1900	10	23	NOT NAMED	TS	2	-190.8	297.3
6	187	1909	9	11	NOT NAMED	HR	2	-190.6	274.4
7	197	1911	9	4	NOT NAMED	HR	2	-198.2	274.4
8	411	1942	8	21	NOT NAMED	HR	2	-197.9	275.5
9	428	1943	10	11	NOT NAMED	HR	2	-186.6	270.1
10	478	1949	9	1	NOT NAMED	TS	2	-185.9	297.3
11	543	1954	1	6	ALICE	HR	2	-160.1	180.0
12	652	1966	9	30	JUDITH	TS	2	-186.5	270.1
13	769	1978	9	13	GRETA	HR	2	152.0	284.5
14	783	1980	8	4	ALLEN	HR	1	-175.1	281.9

TABLE 5

15 TROPICAL CYCLONES PASSING BETWEEN 200 - 250 KM OF GRENADA

N1	N2	Y	M	D	Name	S1	S2	Dmin (km)	Theta (deg)
1	86	1895	8	22	NOT NAMED	HR	2	-229.1	284.6
2	126	1901	7	5	NOT NAMED	HR	2	-237.8	302.9
3	153	1905	9	7	NOT NAMED	TS	2	-220.1	270.1
4	218	1916	8	13	NOT NAMED	HR	1	-235.4	274.1
5	302	1931	8	10	NOT NAMED	TS	2	-241.6	270.2
6	321	1933	6	28	NOT NAMED	HR	1	227.8	287.5
7	407	1941	9	24	NOT NAMED	HR	2	-208.0	270.2
8	470	1948	9	1	NOT NAMED	TS	2	-221.8	273.5
9	505	1951	9	2	DOG	HR	1	-221.8	274.1
10	594	1960	7	10	ABBY	HR	1	-200.3	287.8
11	621	1963	9	25	EDITH	HR	1	-230.2	297.4
12	655	1967	9	7	BEULAH	HR	2	-215.9	315.6
13	701	1971	8	19	CHLOE	TS	2	-223.1	279.2
14	729	1974	8	14	ALMA	TS	2	208.7	272.5
15	774	1979	6	23	ANA	TS	2	-208.4	270.2

Table 6

Hurricanes affecting Grenada from 1750 to 1980

1750 - 1800

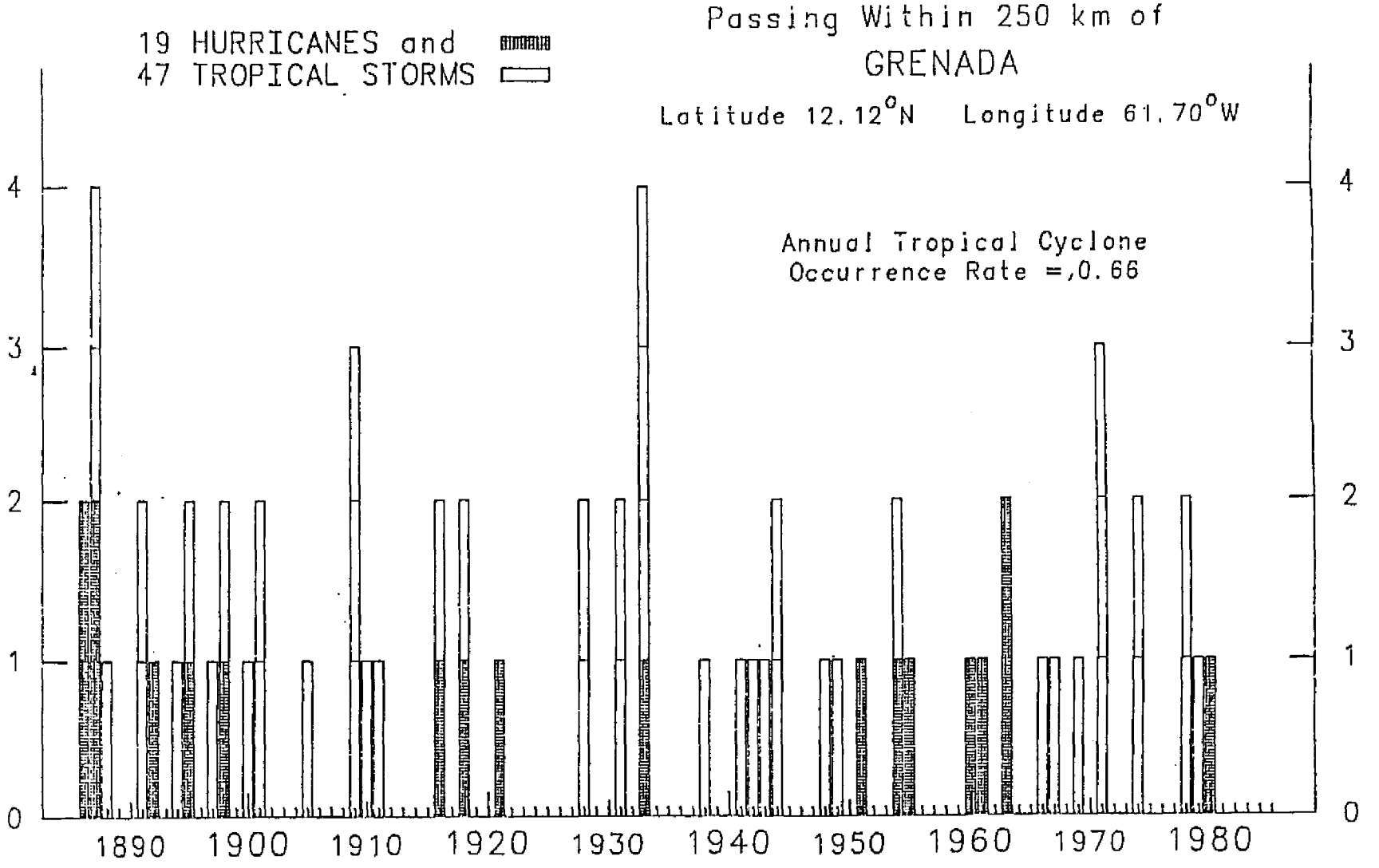
August 12, 1768
October 10 - 18, 1780 - "Great Hurricane"
October 5, 1786
July 6, 1787
October 12, 1788

1800 - 1900

June 23 - 27, 1831
August 16 - 28, 1886

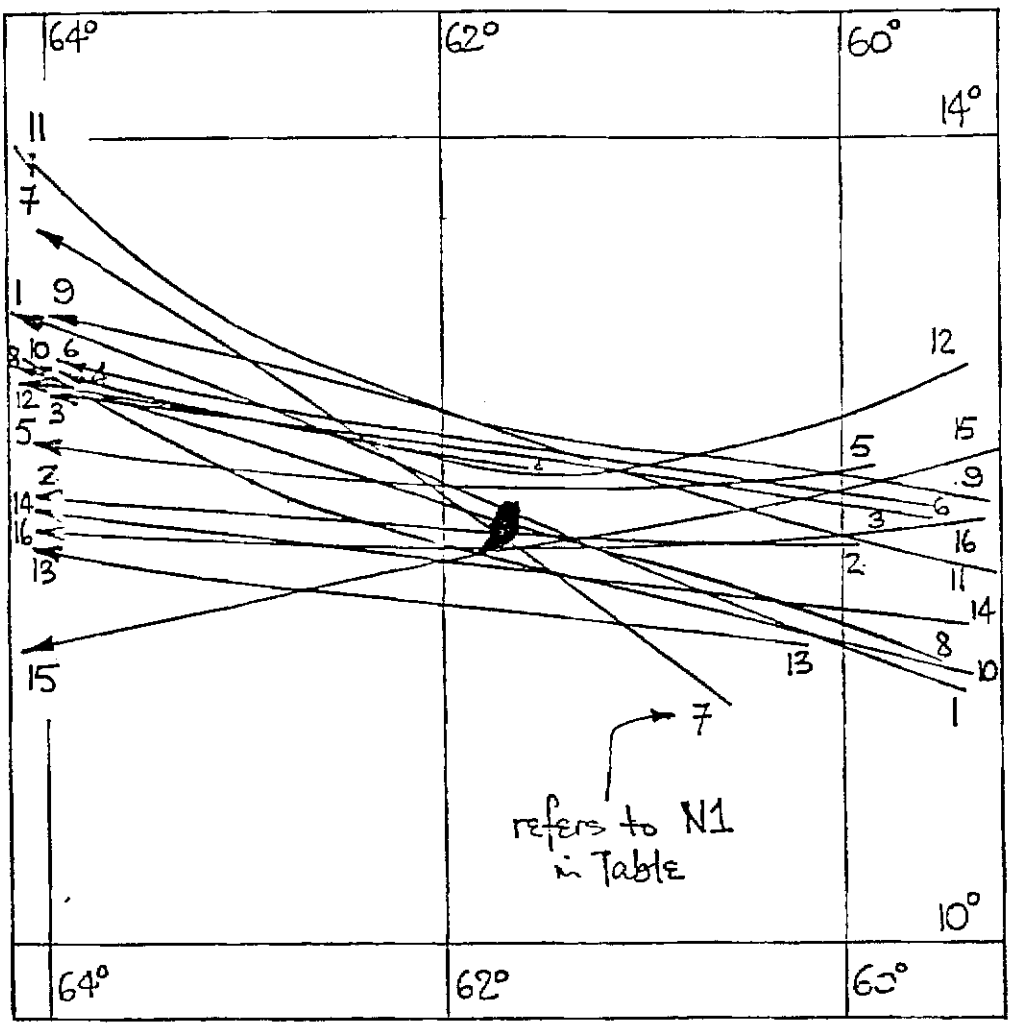
1900 - 1980

October 5 - 16, 1954 - "Hazel" - minor damage Grenadines
September 21 - 29, 1955 - "Janet" - 122 fatalities in Grenadines
September 26 - October 13, 1963 - "Flora" - 6 deaths in Grenada



Grenada Tropical Cyclone Occurrences
for the Period 1886 - 1985

Figure 9



16 Tropical Cyclones passing within 50km of Grenada

Figure 10