



2017 Meteorology Summary

New Jersey Department of Environmental Protection

AIR POLLUTION AND METEOROLOGY

Meteorology plays an important role in the distribution of pollution throughout the troposphere, the layer of the atmosphere closest to the earth's surface. Atmospheric processes such as wind speed and wind direction affect the transport and dispersion of air pollution. Precipitation, solar radiation, and other weather phenomena influence chemical reactions and atmospheric transformations. By studying meteorological and air pollution data together, scientists and mathematicians have developed reasonably accurate models for predicting the fate of pollutants as they go through the stages of transport, dispersion, transformation, and removal. Air pollution models can assist in comparing predicted pollutant concentrations to National Ambient Air Quality Standards (NAAQS), in determining the impacts of new and existing air pollution sources, and in designing ambient air monitoring networks.

The New Jersey Department of Environmental Protection (NJDEP) Bureau of Air Monitoring collects meteorological data at a number of its air monitoring stations. This data can be used by planners in preparing State Implementation Plans (SIPs) to reduce pollutant emissions; by engineers to design or evaluate air pollution permit applications; and by scientists to site air monitoring stations.

CLIMATOLOGY IN NEW JERSEY

New Jersey is located about halfway between the Equator and the North Pole, on the eastern coast of the United States. Its geographic location results in the state being influenced by different air streams at different times (wet, dry, hot, cold), making for daily weather that is highly variable.

Although New Jersey is one of the smallest states in the Union, with a land area of 7,836 square miles, it has five distinct climate zones, which are classified as the Northern, Central, Pine Barrens, Southwest, and Coastal Zones. The topography of the different zones, their distance from the Atlantic Ocean, and the prevailing atmospheric flow patterns affecting them produce distinct variations in the daily weather. These climate zones are shown in Figure 9-1.

Figure 9-1
New Jersey Climate Zones



Source: Office of the New Jersey State Climatologist

MONITORING LOCATIONS

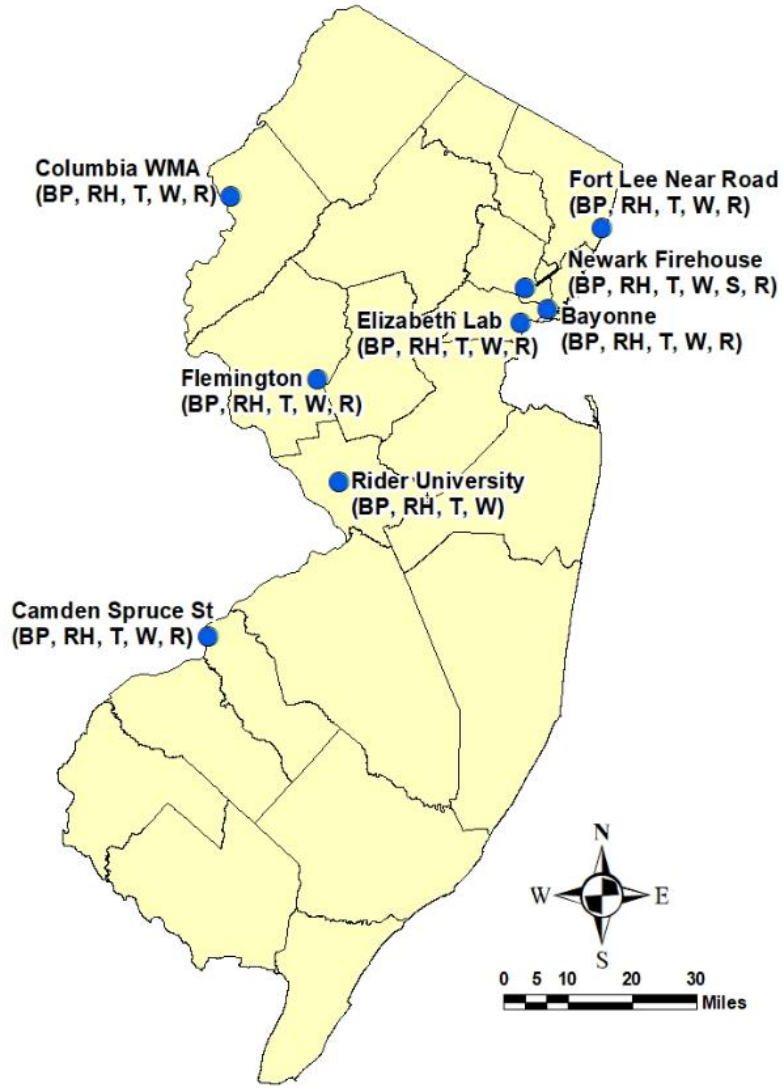
NJDEP collected meteorological data at eight stations in its monitoring network in 2017. Not all meteorological parameters were measured at each site. Table 9-1 lists the parameters monitored at each station, and Figure 9-2 is a map of the 2017 meteorological monitoring network. In Tables 9-2 through 9-6, the 2017 meteorological data is summarized for temperature, rain, relative humidity, solar radiation, and barometric pressure. Figure 9-3 presents the average temperature for each monitoring site compared with the statewide 30-year average. Figure 9-4 shows the monthly precipitation at each site, as well as the statewide 30-year average.

Figures 9-5 through 9-13 show annual wind roses for Bayonne, Camden Spruce Street, Columbia, Elizabeth Lab, Flemington, Fort Lee Near Road, Newark Firehouse, and Rider University, respectively. Presented in a circular format, a wind rose shows the frequency of winds blowing *from* a specific direction for a specified period. The length of each "spoke" around the circle is related to the frequency that the wind blows from a particular direction per unit time. Each concentric circle represents a different frequency, starting with zero at the center and increasing frequencies at the outer circles. Each spoke is broken down into color-coded bands that show wind speed ranges.

Table 9-1
2017 New Jersey Meteorological Monitoring Network
Parameter Summary

	Site Name	Temperature	Relative Humidity	Wind Speed	Wind Direction	Barometric Pressure	Solar Radiation	Rain
1	Bayonne	X	X	X	X	X		X
2	Camden Spruce Street	X	X	X	X	X		X
3	Columbia	X	X	X	X	X		X
4	Elizabeth Lab	X	X	X	X	X		X
5	Flemington	X	X	X	X	X		X
6	Fort Lee Near Road	X	X	X	X	X		X
7	Newark Firehouse	X	X	X	X	X	X	X
8	Rider University	X	X	X	X	X		

**Figure 9-2
2017 Meteorological Monitoring Network**



Legend

●	Meteorological Site
BP	Barometric Pressure
RH	Relative Humidity
S	Solar Radiation
T	Temperature
W	Wind Speed & Direction
R	Rain

Table 9-2
2017 Temperature Data (in Degrees Fahrenheit)
from NJ's Air Monitoring Sites

SITE		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
Bayonne	Mean	37	39	38	54	60	71	75	73	69	62	46	34	55
	Minimum	16	20	14	37	45	52	61	61	54	43	25	10	10
	Maximum	62	70	69	80	89	91	92	90	89	81	73	60	92
Camden Spruce St	Mean	37	43	41	59	62	74	78	74	70	63	47	35	57
	Minimum	16	23	16	39	44	53	64	61	54	43	24	11	11
	Maximum	65	73	73	86	92	96	95	91	91	82	74	62	96
Columbia	Mean	32	36	35	54	57	67	71	67	63	56	40	29	51
	Minimum	7	17	10	30	36	44	52	48	42	34	18	5	5
	Maximum	54	72	63	83	90	92	89	87	89	80	72	54	92
Elizabeth Lab	Mean	36	40	38	56	60	72	76	73	69	62	46	34	55
	Minimum	12	18	13	37	43	52	62	60	53	40	23	8	8
	Maximum	66	73	72	86	93	95	94	91	89	83	73	63	95
Flemington	Mean	34	38	36	54	58	69	73	69	65	58	41	31	52
	Minimum	4	17	13	29	34	44	53	50	43	32	20	7	4
	Maximum	63	72	70	83	91	94	92	89	90	82	73	61	94
Fort Lee Near Road	Mean	35	38	36	52	62	71	75	72	68	62	44	32	54
	Minimum	12	17	12	35	43	50	59	59	52	40	22	7	7
	Maximum	63	66	68	84	92	95	93	89	87	80	72	58	95
Newark Firehouse	Mean	36	39	37	55	60	71	75	72	68	61	45	33	54
	Minimum	13	18	13	36	43	51	60	60	52	41	23	9	9
	Maximum	65	70	70	83	92	93	92	89	90	82	73	61	93
Rider University	Mean	35	39	38	55	59	69	74	70	66	58	44	32	53
	Minimum	3	17	12	30	37	46	55	52	44	35	21	6	3
	Maximum	64	72	72	84	90	93	92	89	89	82	74	63	93

Figure 9-3
2017 Average Temperatures at NJDEP Air Monitoring Sites
Compared to the Statewide 30-Year Average

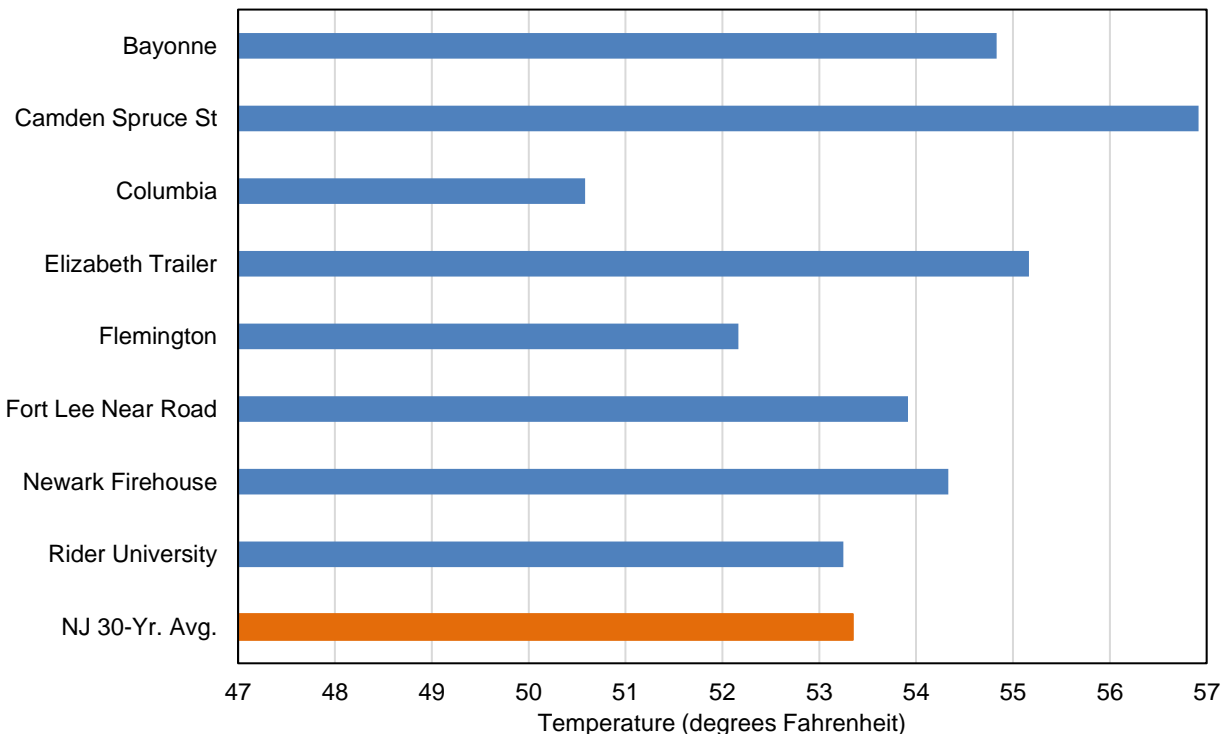


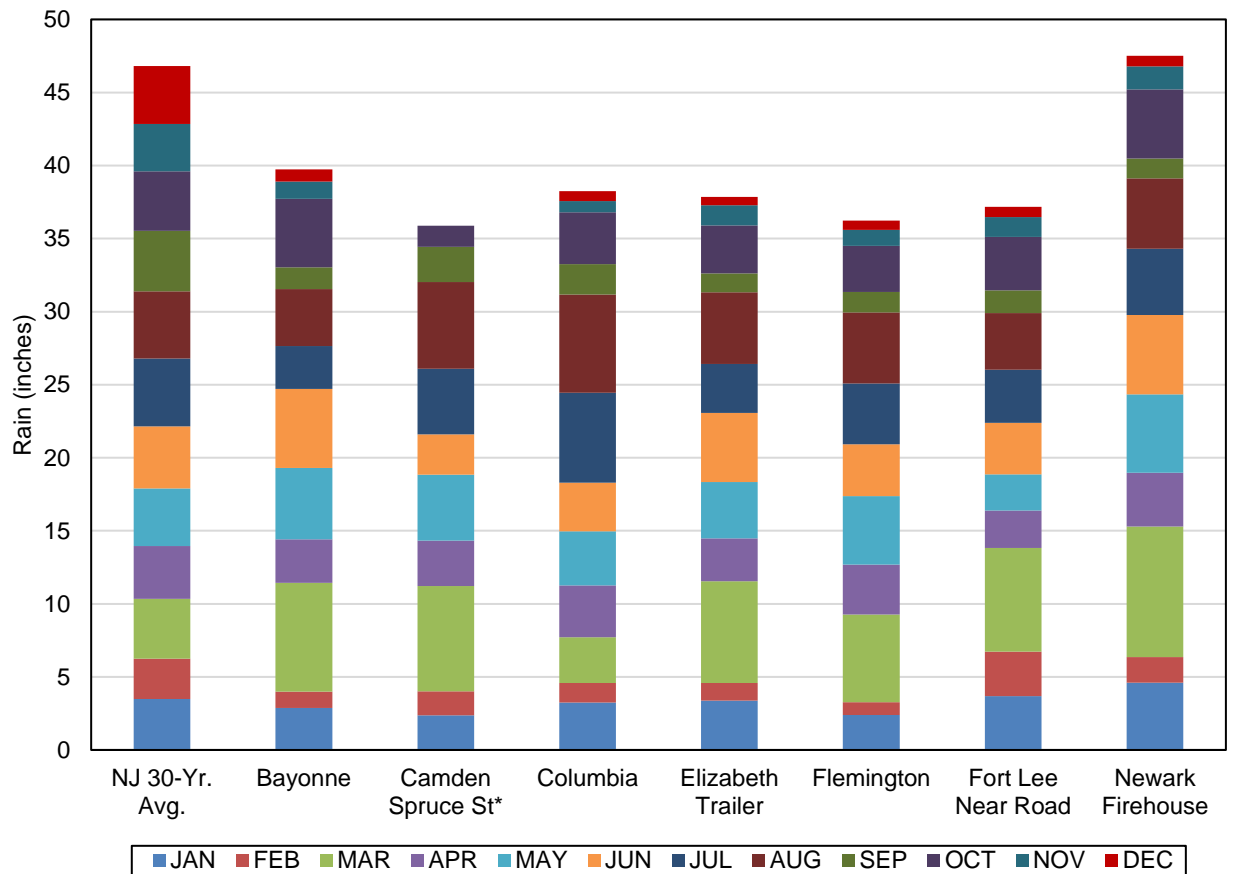
Table 9-3
2017 Rain Data (Inches) from NJ's Air Monitoring Sites

SITE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL TOTAL
Bayonne	2.88	1.10	7.45	2.98	4.88	5.43	2.93	3.89	1.49	4.69	1.18	0.84	39.74
Camden Spruce St.	2.37	1.64	7.21	3.11	4.52	2.76	4.48	5.94	2.40	1.46	ND	ND	*
Columbia	3.25	1.33	3.12	3.55	3.70	3.35	6.15	6.73	2.09	3.53	0.77	0.68	38.24
Elizabeth Lab	3.38	1.21	6.96	2.93	3.85	4.73	3.35	4.92	1.29	3.29	1.38	0.56	37.84
Flemington	2.39	0.88	5.99	3.43	4.69	3.53	4.18	4.86	1.40	3.15	1.09	0.64	36.23
Fort Lee Near Road	3.69	3.03	7.09	2.57	2.47	3.54	3.63	3.88	1.56	3.67	1.34	0.70	37.17
Newark Firehouse	4.61	1.74	8.95	3.68	5.36	5.44	4.53	4.82	1.36	4.72	1.59	0.71	47.51

ND = no data

*Not able to determine an annual statistic because of missing data.

Figure 9-4
2017 Total Rainfall at NJDEP Air Monitoring Sites
Compared to the Statewide 30-Year Average



*Camden Spruce Street has no rain data for November and December.

**Table 9-4
2017 Relative Humidity Data (%) from NJ's Air Monitoring Sites**

SITE		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
Bayonne	Mean	65	57	52	60	61	58	61	61	63	63	59	58	60
	Minimum	33	25	17	23	24	25	29	26	28	21	25	35	17
	Maximum	89	89	89	90	89	90	89	88	88	88	88	88	90
Camden Spruce St	Mean	59	50	49	54	58	54	61	59	60	62	56	53	56
	Minimum	26	22	15	16	20	22	27	27	24	23	21	24	15
	Maximum	89	90	89	89	90	88	90	90	90	90	90	88	90
Columbia	Mean	68	59	55	61	67	69	75	77	76	73	66	62	67
	Minimum	30	17	13	19	24	24	33	37	28	23	21	32	13
	Maximum	91	90	91	91	91	91	92	92	92	93	91	91	93
Elizabeth Lab	Mean	63	55	49	58	61	56	61	62	62	63	57	55	59
	Minimum	26	17	13	16	23	20	27	26	22	18	20	27	13
	Maximum	91	91	91	91	91	92	91	91	90	91	89	89	92
Flemington	Mean	68	59	54	61	67	65	71	73	73	71	66	62	66
	Minimum	30	19	13	17	26	23	30	35	30	19	24	29	13
	Maximum	91	92	91	92	92	93	93	93	93	92	92	92	93
Fort Lee Near Road	Mean	63	55	50	56	62	55	60	60	62	62	57	57	58
	Minimum	28	17	13	19	23	21	29	30	22	20	22	30	13
	Maximum	91	91	91	91	92	92	91	90	91	91	91	90	92
Newark Firehouse	Mean	63	54	49	58	61	57	61	61	62	61	57	54	58
	Minimum	28	17	13	16	25	21	28	28	22	18	21	27	13
	Maximum	91	91	91	91	92	92	91	91	89	91	89	88	92
Rider University	Mean	70	59	57	65	70	68	74	74	74	75	67	62	68
	Minimum	33	20	15	18	29	26	36	34	34	21	25	28	15
	Maximum	96	96	95	95	95	96	95	95	95	95	94	94	96

**Table 9-5
2017 Solar Radiation Data (in Langleys) from NJ's Air Monitoring Sites**

SITE		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
Newark Firehouse	Mean	0.08	0.15	0.21	0.25	0.29	0.36	0.34	0.31	0.25	0.17	0.12	0.08	0.22
	Maximum	0.74	0.97	1.19	1.29	1.37	1.43	1.43	1.39	1.28	1.05	0.76	0.64	1.43

**Table 9-6
2017 Average Barometric Pressure Data (in inches of Hg)
from NJ's Air Monitoring Sites**

SITE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
Bayonne	29.94	29.91	30.09	29.99	29.87	29.9	29.93	30	29.99	30.07	30.09	30.04	29.99
Camden Spruce St	30.02	29.93	30.11	29.98	29.87	29.91	29.93	30	29.99	30.07	30.1	30.06	30.00
Columbia	29.46	29.4	29.57	29.48	29.37	29.41	29.45	29.52	29.51	29.57	29.57	29.52	29.49
Elizabeth Lab	29.97	29.91	30.08	29.97	29.86	29.89	29.92	29.99	29.98	30.06	30.07	30.03	29.98
Flemington	29.83	29.77	29.96	29.84	29.72	29.75	29.79	29.85	29.85	29.92	29.94	29.9	29.84
Fort Lee Near Road	29.65	29.59	29.76	29.68	29.58	29.59	29.63	29.69	29.68	29.75	29.76	29.71	29.67
Newark Firehouse	29.87	29.8	29.98	29.88	29.76	29.79	29.83	29.89	29.88	29.97	29.98	29.93	29.88
Rider University	29.88	29.82	29.97	29.88	29.76	29.8	29.83	29.9	29.89	29.97	30.01	29.95	29.89

Wind Roses - Distribution of Wind Speed & Wind Direction

Figure 9-5. 2017 Wind Rose for Bayonne

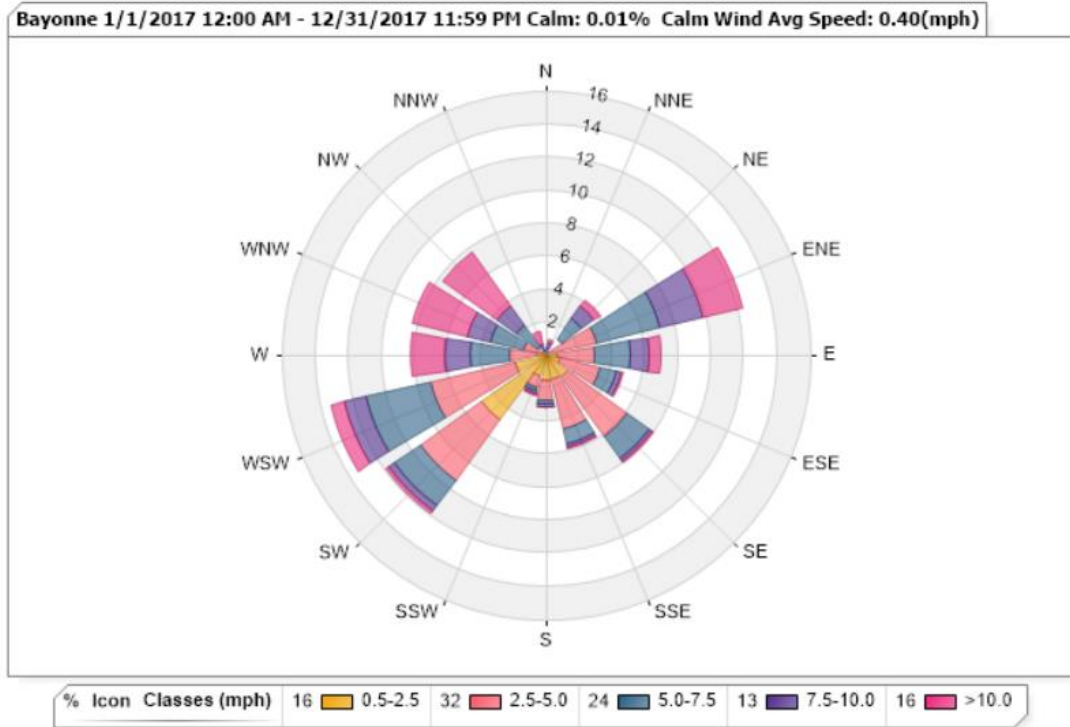


Figure 9-6. 2017 Wind Rose for Camden Spruce Street

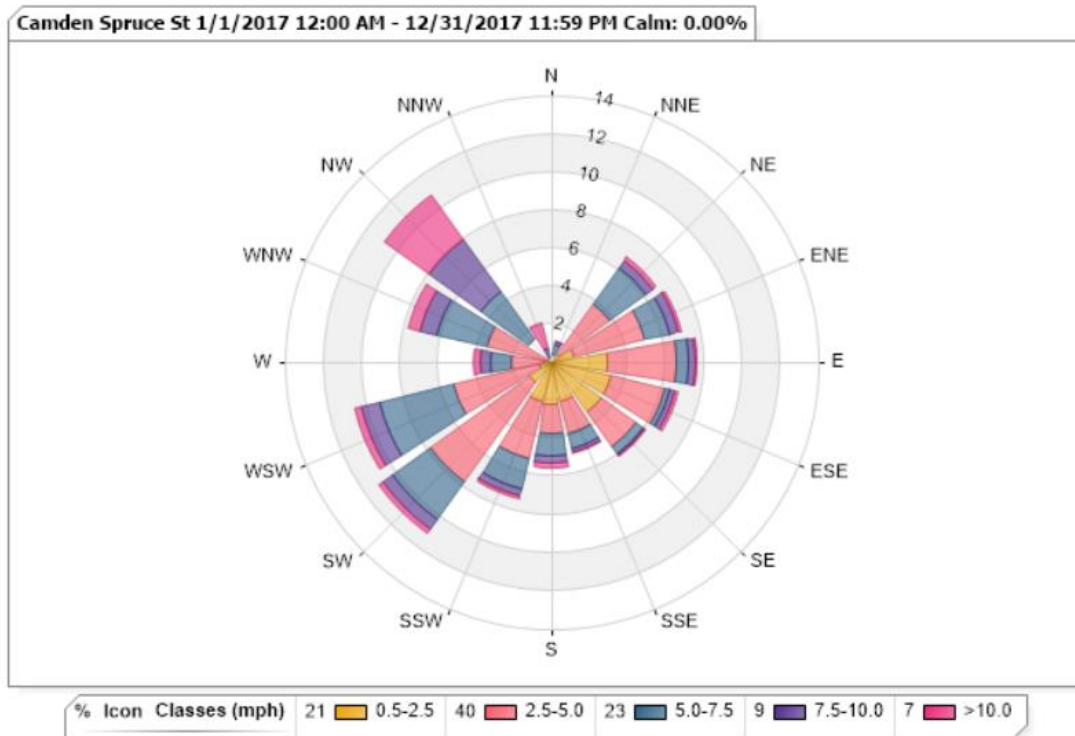


Figure 9-7. 2017 Wind Rose for Columbia

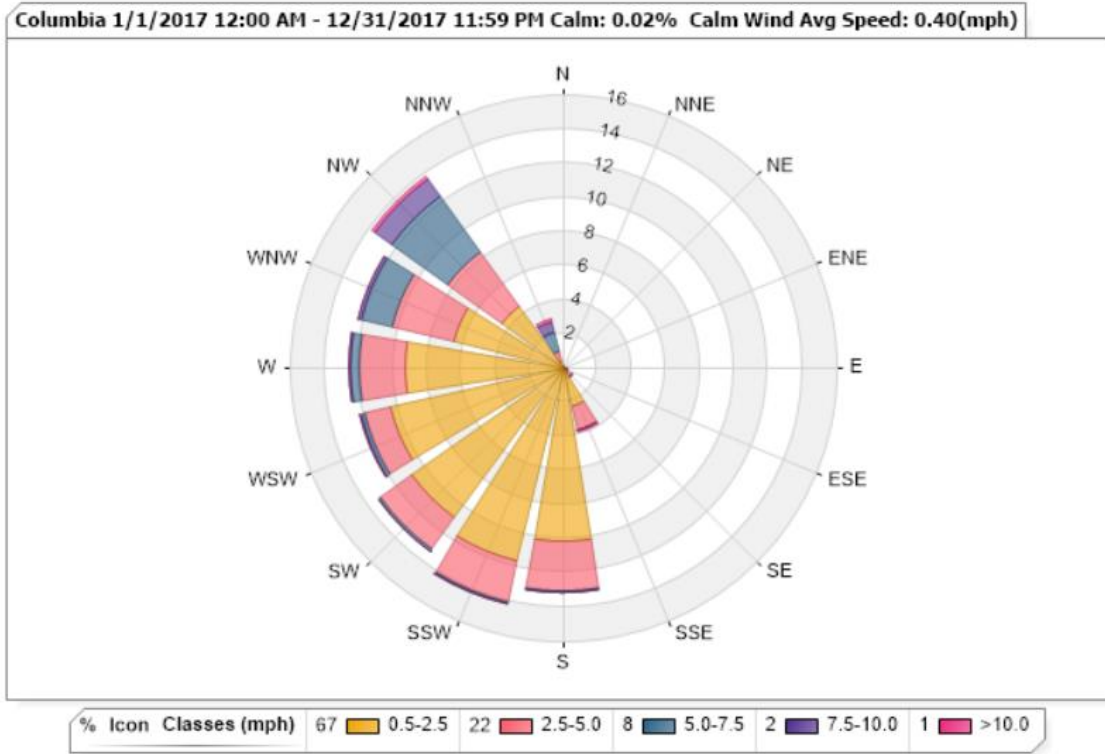


Figure 9-8. 2017 Wind Rose for Elizabeth Lab

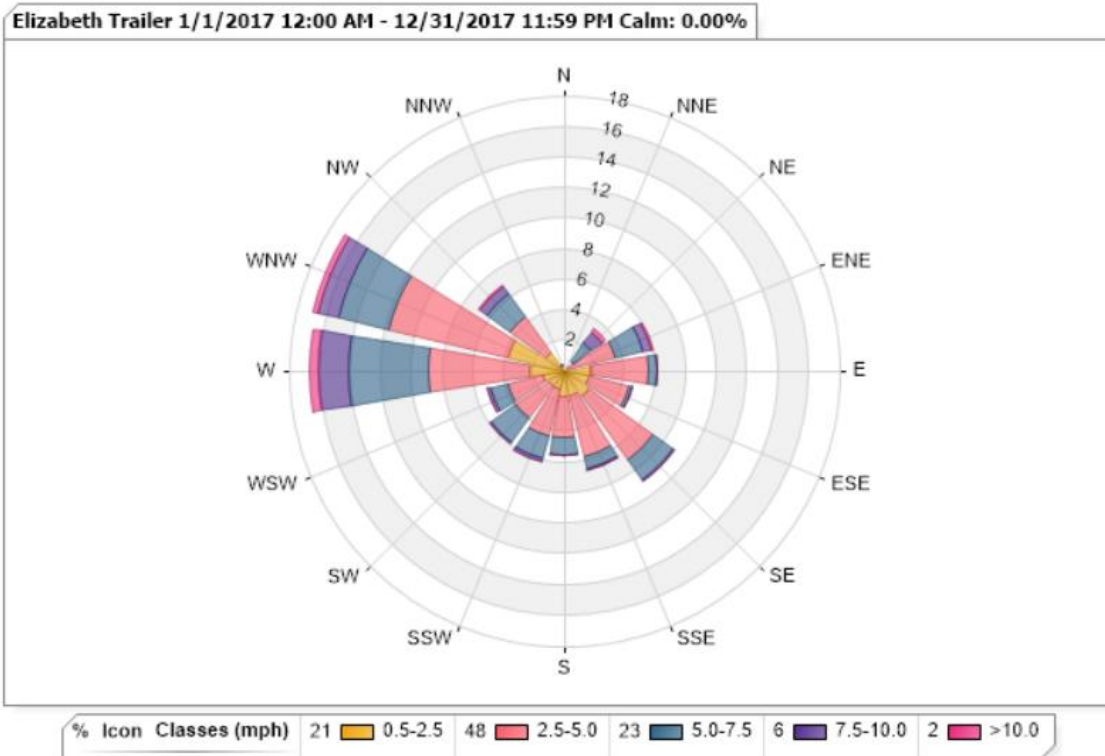


Figure 9-9. 2017 Wind Rose for Flemington

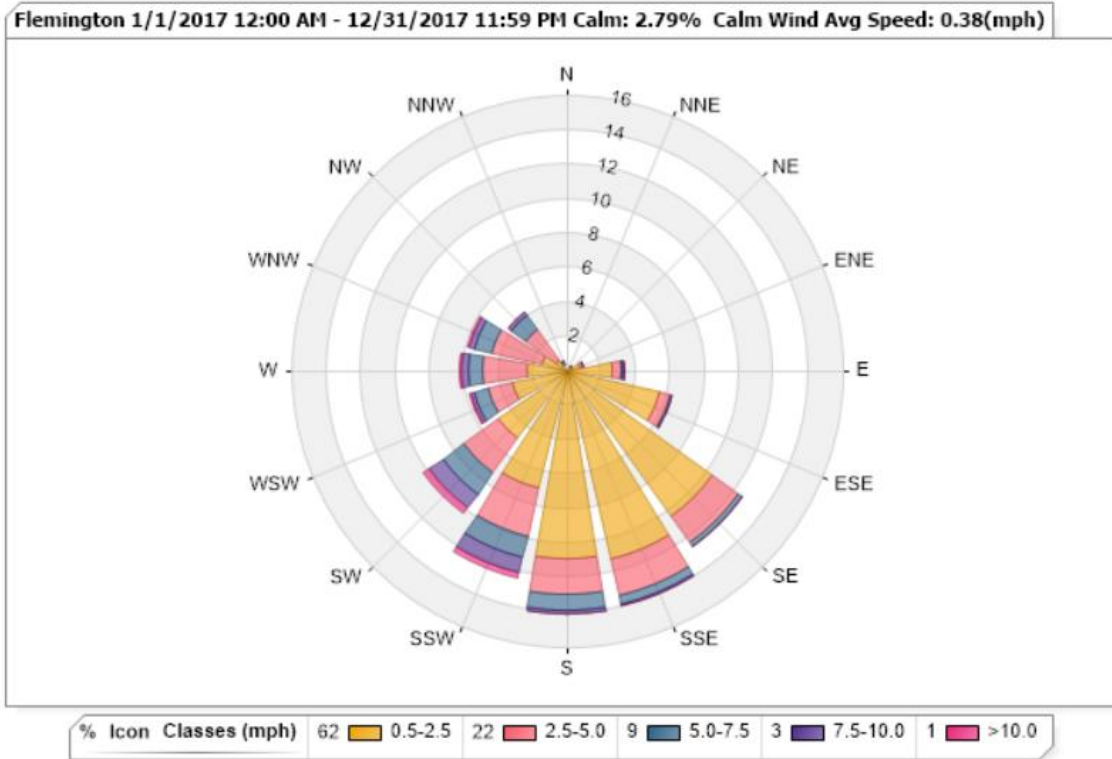


Figure 9-10. 2017 Wind Rose for Fort Lee Near Road

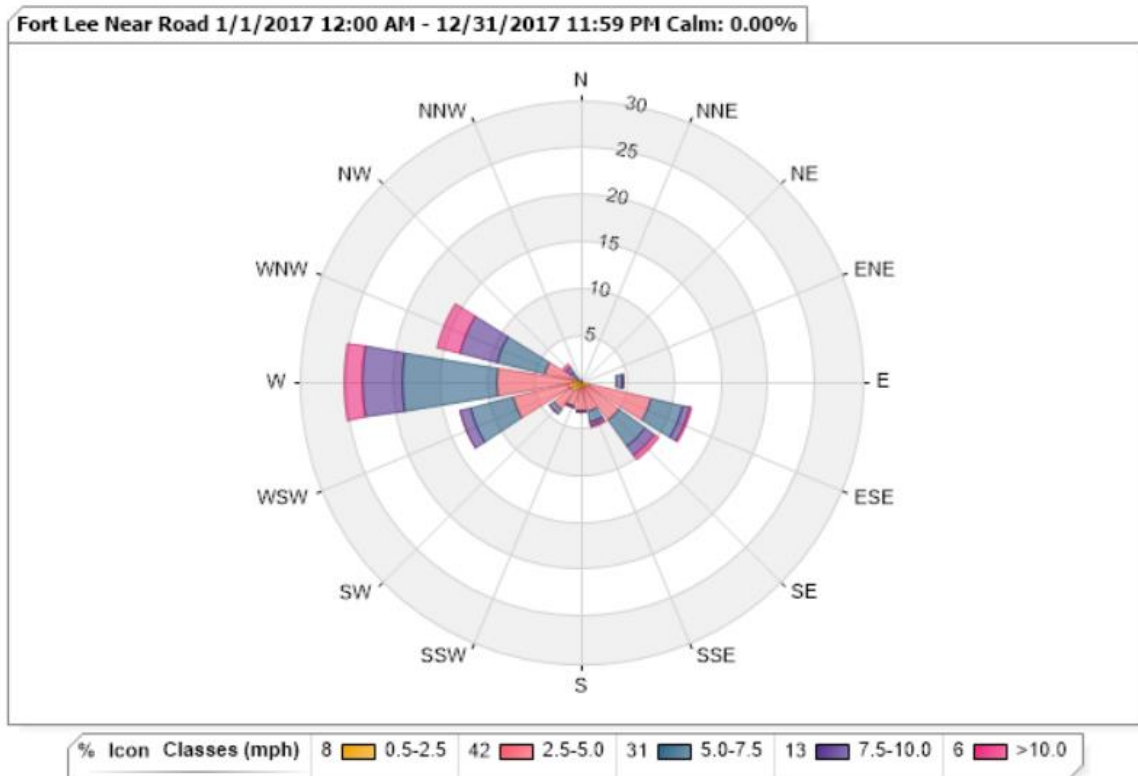


Figure 9-11. 2017 Wind Rose for Newark Firehouse

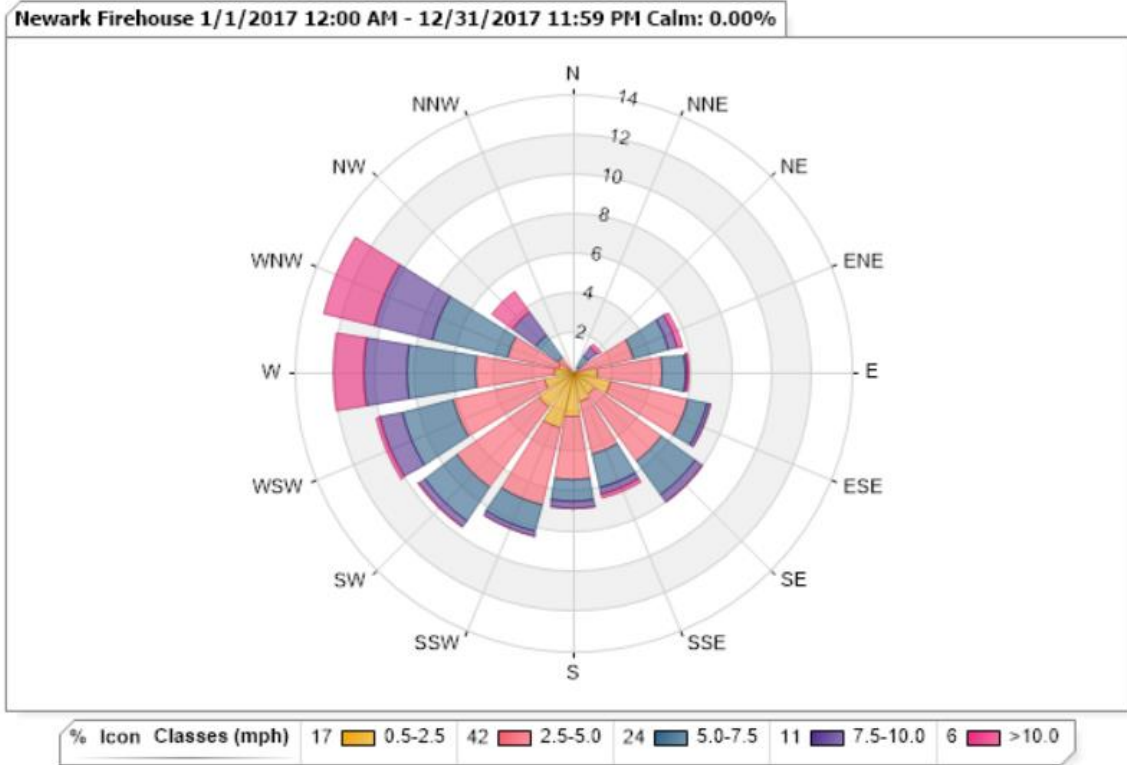
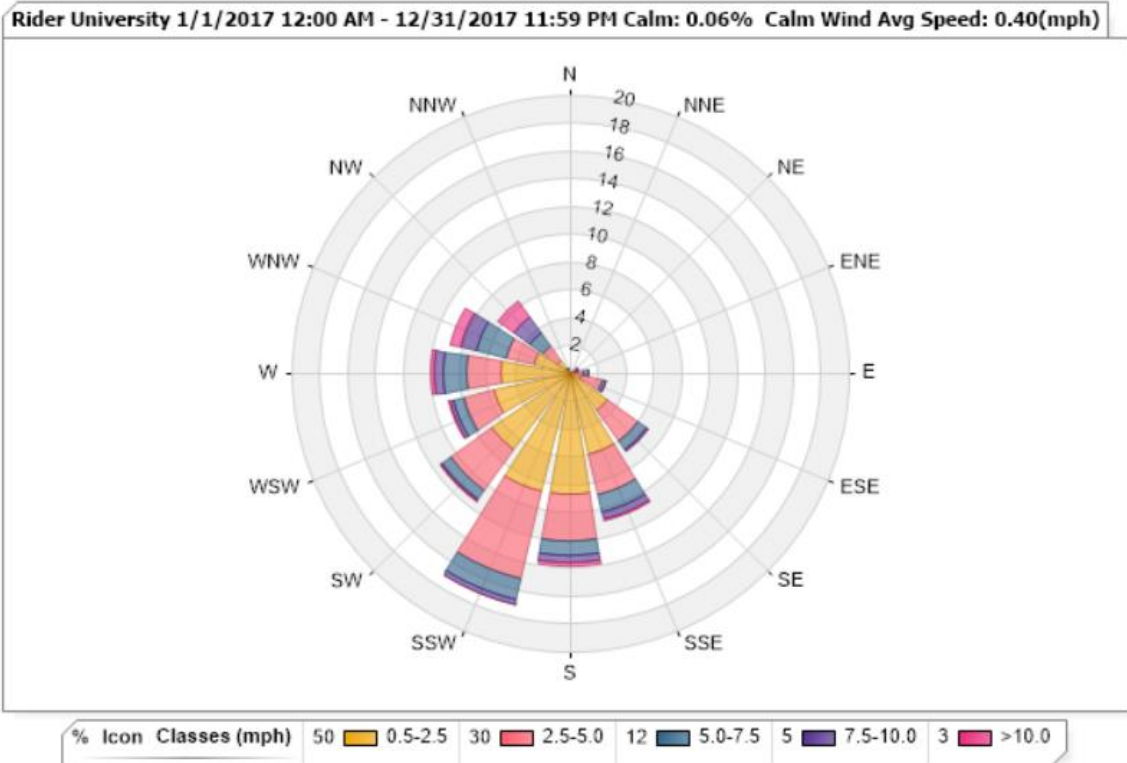


Figure 9-12. 2017 Wind Rose for Rider University



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