

 **CERTIFIED**
Past Weather Reports

COMPREHENSIVE REPORT

Prepared By:

Thomas M. Else
Certified Consulting Meteorologist
WeatherWorks, LLC

Prepared For:

John Doe
John Doe Law Offices

Reference:

Moe v Larry
Sampletown, NJ | February 21, 2019

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INTRODUCTION

The following report was requested by John Doe from the John Doe Law office. At the request of Mr. Doe I have examined the weather conditions for 99999 Green Street in Samletown, NJ for February 19 - 21, 2019.

In order to determine the weather conditions for 99999 Green Street in Samletown, NJ (elevation approximately 590 feet) within a reasonable degree of meteorological and scientific certainty, I utilized data from the following systems and networks: Automated Surface Observing System (ASOS), Automated Weather Observing System (AWOS), Meteorological Assimilation Data Ingest System (MADIS), Cooperative Observer Network (COOP), Community Collaborative Rain, Hail And Snow Network (CoCoRaHS), NOHRSC Interactive Snow Information, Doppler Radar Images, Geostationary Satellites (GOES), and Complete Sun and Moon Data.

Supplemental products reviewed include: National Weather Service daily zone forecasts, watches, warnings, advisories, Special Weather Statements, and Public Information Statements.

Weather data was accessed from the following sources and official webpages: NOAA's National Centers for Environmental Information (NCEI), The Office of The New Jersey State Climatologist, University of Utah – MesoWest, Community Collaborative Rain, Hail And Snow Network (CoCoRaHS), NOAA's National Operational Hydrologic Remote Sensing Center (NOHRSC), UCAR/NCAR Image Archive, and the US Naval Observatory - Astronomical Applications Department. Descriptions of these systems, networks, products, and access pages can be found in the Data Sources and Other References section near the end of my report. Lastly, I examined a color photo of the incident scene provided by Plaintiff's counsel.

My report of the actual weather conditions as well as expert opinions and appropriate conclusions within a reasonable degree of Meteorological and scientific certainty follows. They are based on the aforementioned weather data, materials provided by the Attorney's office, and 22 years of professional experience in forecasting and preparing weather reconstruction reports for law firms and the insurance industry.

It is my understanding that on February 21, 2019 at approximately 9 AM, Plaintiff Moe, slipped and fell on ice on a sidewalk outside of the subject property.

REVIEW OF PROVIDED WRITTEN DOCUMENTS

SUMMARY OF THE DEPOSITION OF PLAINTIFF

Plaintiff testified that back in December 10, 2014, she arrived at the subject property.

SUMMARY OF THE DEPOSITION OF DEFENDANT

Defendant testified that back on December 10, 2014, he heard about the slip-and-fall incident from an associate.

TABULAR WEATHER OVERVIEW

WEATHER TABLES

Table 1 below contains the daily weather conditions for 99999 Green Street in Samletown, NJ from February 8 - 14, 2019. **Temperatures** are in degrees Fahrenheit. **Weather** is a general description of the predominant weather conditions during the day. **Precipitation (Precip)** is the amount of rain, melted snow, and/or ice that occurred during the day and is reported in inches. A trace of precipitation is an amount less than 0.01 inches. **Snow/Sleet** is the 24-hour snow/sleet accumulation reported in inches. A trace of snow/sleet is less than 0.1 inches. **Ground Conditions** refer to the average amount of snow and/or ice cover, in inches, on exposed, undisturbed, and untreated ground surfaces. The measurement is normally taken at 7 AM, and any amount less than 0.5 inches is considered a Trace. **Please note: man-made snow piles from the post clean-up of winter storms are not accounted for in the daily measurements.**

Table 1. Daily Weather Table – February 8 – 14, 2019

Day	Temperature High	Low	Weather	Precip	Snow Sleet	Ground Conditions
2/8	28–29	14–15	Late day snow	0.40–0.50	4.0–5.0	0.0
2/9	16–17	-2 to -1	Pre-dawn light snow, then mostly sunny	0.15–0.25	2.0–2.5	6.5–7.5
2/10	24–25	-4 to -3	Mostly sunny	0.00	0.0	6.0–7.0
2/11	28–29	14–15	Late day snow	0.40–0.50	4.0–5.0	0.0
2/12	16–17	-2 to -1	Pre-dawn light snow, then mostly sunny	0.15–0.25	2.0–2.5	6.5–7.5
2/13	24–25	-4 to -3	Mostly sunny	0.00	0.0	6.0–7.0
2/14	28–29	14–15	Late day snow	0.40–0.50	4.0–5.0	0.0

DETAILED WEATHER ANALYSIS

WEATHER SUMMARY

February 12, 2014 was mostly cloudy with late day snow. During the pre-dawn hours, the sky became cloudy and the temperature fell from an early high of 28–29 degrees into the mid-20s by sunrise, 7:26 AM. Exposed, undisturbed and untreated ground surfaces were clear of any naturally precipitated snow and/or ice accumulation from all prior storms. During the daylight hours, the weather was cloudy. Snow overspread Greentown, NJ between 4 and 5 PM. Snow continued for the rest of the calendar day as the temperature reached an evening low of 14–15 degrees. The 24-hour snowfall accumulation was approximately 4.0–5.0 inches.

The National Weather Service in Mount Holly, NJ had a Winter Storm Warning in effect from 1 PM through Midnight.

February 13, 2014 featured pre-dawn light snow, then became mostly sunny. Light snow from the previous day tapered off between 6:30 and 7:30 AM with a temperature that fell from an early pre-dawn high of 16–17 degrees into the low-teens. Since 12 AM, an additional 2.0–2.5 inches of snow had fallen, and this brought the two-day snowfall total to about 6.0–7.5 inches. The ongoing Winter Storm Warning was cancelled at 12:26 PM. For the rest of the daylight hours, the weather became mostly sunny. At night, the weather remained mainly clear as the temperature fell to a low of -2 to -1 degrees toward Midnight.

February 14, 2019 (Day of Incident) was mostly sunny. Under a mainly clear pre-dawn sky, the temperature fell to a low of -4 to -3 degrees. At 7 AM, exposed, undisturbed and untreated ground surfaces were covered with approximately 6.0–7.0 inches of naturally precipitated snow and ice from the February 2–3 storm. During the daylight hours, the weather remained mostly sunny as the temperature rose to an afternoon high of 24–25 degrees. After sunset, 4:46 PM, the sky was overall mainly clear as the temperature fell into the mid-to-upper single digits toward Midnight.

Table 2 below provides an estimate of the hourly weather conditions for 99999 Sampletown, NJ on February 21, 2019. **Temperatures (Temp)** are in degrees Fahrenheit. **Weather** is the present weather observed at the time shown, unless otherwise indicated. **Hourly Precip** is the amount of precipitation (rain, melted snow and/or ice), in inches, that fell during the previous hour. **Hourly Snow** is the amount of snow, in inches, that fell during the previous hour. A trace of snow is less than 0.1 inches. **Ground Conditions** refer to the average amount of snow and/or ice cover, in inches, on exposed, undisturbed, and untreated ground surfaces at the time shown. **Please note: man-made snow piles from the post clean-up of winter storms are not accounted for in the hourly measurements.**

*****Ice Accretion** is the amount of freezing rain accumulation, in inches, on exposed, undisturbed and untreated ground surfaces during the prior hour. A trace of freezing rain is less than 0.10 inches.

*****Sustained Wind** represents the highest sustained wind speed during the prior hour with accompanying direction from which the wind was coming. Sustained wind is defined as wind speed averaged over a 2-minute period measured at 33 feet above ground level.

*****Peak Wind Gust** is the highest wind gust with accompanying direction from which the wind was coming during the prior hour. Peak Wind Gust is defined as wind speed averaged over a 3-to-5 second period measured at 33 feet above ground level.

*****Visibility** is the greatest distance that can be seen and identify with the unaided eye, measured in miles, at the time shown. Unrestricted visibility is 10.00 miles.

Table 2. Hourly Weather Table – February 21, 2019

Time	Temp	Weather	Hourly Precip	Hourly Snow	Ground Conditions
3 PM	24–25	Mostly sunny	0.00	0.0	0.0
4 PM	24–25	Mostly sunny			
5 PM	22–23	Mainly clear			
6 PM	19–20	Partly cloudy			
7 PM	15–16	Partly cloudy			
8 PM	12–13	Mainly clear			
9 PM	11–12	Mainly clear			
10 PM	10–11	Mainly clear			
11 PM	8–9	Clear			

REVIEW OF NATIONAL WEATHER SERVICE PRODUCTS

The National Weather Service in Mount Holly, NJ is responsible for issuing zone forecasts, watches, warnings and/or advisories for the Samletown, NJ area. Zone Forecasts provide the general public with a statement of the expected weather conditions within a given county or set of counties. The forecast will include information; such as, sky condition, temperature, type of precipitation and its probability, wind direction and speed, etc. Watches, Warnings and/or Advisories are issued for hazardous weather conditions or events that may cause significant inconvenience or pose a threat to life and/or property. Below are the actual zone forecasts, watches, warnings and/or advisories issued from February 19 - 21, 2019.

Table 3. National Weather Service Product Table

National Weather Service Products
PAZ057-221430- DAUPHIN- INCLUDING THE CITIES OF...HARRISBURG...HERSHEY 925 PM EST SUN DEC 21 2014 .OVERNIGHT...MOSTLY CLEAR. PATCHY FOG. LOWS IN THE LOWER 20S. NORTHEAST WINDS AROUND 5 MPH LATE THIS EVENING...BECOMING LIGHT AND VARIABLE.
Forecast 2

Table 3 cont. National Weather Service Product Table

National Weather Service Products
PAZ057-221430- DAUPHIN- INCLUDING THE CITIES OF...HARRISBURG...HERSHEY 925 PM EST SUN DEC 21 2014 .OVERNIGHT...MOSTLY CLEAR. PATCHY FOG. LOWS IN THE LOWER 20S. NORTHEAST WINDS AROUND 5 MPH LATE THIS EVENING...BECOMING LIGHT AND VARIABLE.
Forecast 2

REVIEW OF PHOTOGRAPHS

Insert appropriate image below



Figure 1. A general description

REVIEW OF EXPERT REPORT

This is optional.

REVIEW OF DEICERS - ABRASIVES

OVERVIEW

The main goal of any snow and ice contractor, property manager and/or owner is bare-pavement. A plow, shovel, snow blower, etc., cannot always clean a surface (parking lot, roadway, sidewalk, walkway, etc.) down to the pavement. In order to achieve bare-pavement, deicers (chemicals) are applied to break the snow/ice bond from the surface. Or, an abrasive, such as, sand is put down to provide traction. Deicers can be applied prior to the onset of a storm (anti-icing/pre-treating), during a storm and afterwards. Please see below for a description on the most commonly used deicers and abrasives.

A REVIEW OF THE MOST COMMON DEICERS / ABRASIVES

Salt (NaCl - Sodium Chloride) – is by far the least expensive and most commonly utilized deicer. The product is delivered as rock salt, but can be made into a brine solution as well. Salt is very effective in melting ice in temperatures down to 20 degrees above zero, but quickly loses its capability below 20 degrees and becomes useless as the temperature approaches minus 6 degrees Fahrenheit. The lowest practical melting temperature in the real world is 15 degrees Fahrenheit. Salt can melt five times more ice at 30 degrees than it can at 20 degrees.

Calcium Chloride (CaCl₂) – is probably the second most utilized ice melting agent. The product is delivered as flakes, pellets and or a liquid. Calcium Chloride has a much lower effective ice melting capability than salt, and it can effectively melt ice down to about 20 degrees below zero. As the temperature drops below minus 20 degrees, Calcium Chloride begins to lose its effectiveness, and the product becomes useless at minus 60 degrees Fahrenheit. Calcium Chloride is more-costly than salt, but is the preferred chemical during colder weather due to its ability to melt ice faster and at a much lower temperature than salt.

Magnesium Chloride (MgCl₂) – is delivered as flakes, pellets or liquid. Often used to wet sodium chloride crystals to increase adherence to road and reduce melting points. Magnesium Chloride is expensive and corrosive. The lowest practical melting temperature in the real world is minus 10 degrees Fahrenheit.

Abrasives – consist of materials, such as sand, crushed aggregate and cinders. Abrasives are primarily used to improve traction on snow-and-ice covered surfaces like pavements and sidewalks. The advantages of abrasives are: low cost, they work immediately upon application, not dependent on the temperature and are visible to the pedestrian or driver. However, the biggest disadvantage of using abrasives is they do not melt ice and or snow (SIMA 2018; Craw 2016; Allin 2015; Balgowan 2014; James 2013; Jordan 2009).

SUMMARY AND CONCLUSION

I have prepared the following summary including important conclusions and opinions. These conclusions and opinions are provided with a reasonable degree of meteorological and scientific certainty, are supported by the data and documents examined, and are appropriate for 99999 Green Street in Samletown, NJ from February 19 - 21, 2019.

1. National Weather Service zone forecasts issued for Any County, NJ on December 5 and 6, 2014 did not mention the threat of freezing rain and/or ice accumulation for the calendar day of Friday, December 4, 2014.
- 2. Based on the weather data examined and documents reviewed, it is my Meteorological expert opinion that the ice on the stairs Plaintiff slipped and fell on, if any, was from the freezing rain. However, the National Weather Service did not give any advanced notice and/or warning of the freezing rain event. The first time freezing rain was mentioned in the forecast was on the day of the incident, and they only gave a slight chance of freezing rain. Also, the first Freezing Rain Advisory was not issued until 8:22 AM on December 10. The freezing rain began in Greentown, NJ between 8:45 and 9 AM, which only gave the Defendant less than an hour's worth of notice.**

DATA SOURCES AND OTHER REFERENCES

The following descriptions provide a review of each source and reference utilized in this report. Please refer to Figure 1 at the end of the section for a map of weather stations.

AUTOMATED SURFACE OBSERVING SYSTEM (ASOS)

The ASOS program serves as the nation's primary surface weather observing network, and is a joint effort of the National Weather Service (NWS), the Federal Aviation Administration (FAA) and the Department of Defense (DOD). Weather observations from ASOS include: air temperature, dew point, relative humidity, precipitation type and amounts, cloud coverage, wind speed and direction, visibility, air pressure, etc. In general, these stations report once per hour; however, special and more frequent observations are reported in the event of rapidly changing conditions which meet specific thresholds. NOAA's National Centers for Environmental Information (NCEI) provides access to the data online in the form of Local Climatological Observations (LCD).

AUTOMATED WEATHER OBSERVING SYSTEM (AWOS)

AWOS stations are similar to ASOS stations; however, they are operated and controlled by the Federal Aviation Administration (FAA). Unlike ASOS, AWOS systems generally report in 20-minute increments and do not report observations for rapidly changing weather conditions. These systems are among the longest running automated weather stations and predate the ASOS. NOAA's National Centers for Environmental Information (NCEI) provides access to the data online in the form of Local Climatological Observations (LCD).

METEOROLOGICAL ASSIMILATION DATA INGEST SYSTEM (MADIS)

Meteorological Assimilation Data Ingest System (MADIS) incorporates data from NOAA data sources and non-NOAA providers. Quality control checks are conducted. Some of the common data sets are: Citizens Weather Observer Program (CWOP), Hydrometeorological Automated Data System (HADS), Integrated Mesonet, private firms, state DOT'S and Federal Agencies. These observations are utilized as a supplement to the more reliable and comprehensive ASOS and AWOS data to aid in meteorological analysis.

COOPERATIVE OBSERVER NETWORK (COOP)

Through the National Weather Service (NWS) Cooperative Observer Program (COOP), more than 10,000 volunteers take daily weather observations in varying geographic regions of the country. Daily observations include some or all of the following information: 24-hour maximum and minimum temperature, temperature at observation time, 24-hour precipitation amounts (rain and snow), and the snow/ice depth on the ground. NOAA's National Centers for Environmental Information (NCEI) provides access to the NWS COOP data sheets online.

COMMUNITY COLLABORATIVE RAIN, HAIL AND SNOW NETWORK

The Community Collaborative Rain, Hail, and Snow Network (CoCoRaHS) is a community-based network of volunteers who measure precipitation (rain, sleet, hail, and snow). Standard daily observations include some or all of the following information: rainfall, snowfall, snow/ice depth, and water content of the snow. The National Oceanic and Atmospheric Administration (NOAA) and the National Science Foundation (NSF) are major sponsors of CoCoRaHS. The data from CoCoRaHS is available through their online web page and the National Centers for Environmental Information's GHCN-Daily database.

NOHRSC INTERACTIVE SNOW INFORMATION

NOAA's National Operational Hydrologic Remote Sensing Center (NOHRSC) Interactive Snow Information website ingests daily ground-based, airborne and satellite snow observations into their snow model to estimate snow depth and snow water equivalency amounts for the coterminous US. The resolution of the maps is 1 km by 1 km and the data is available hourly.

DOPPLER RADAR IMAGES

Doppler RADAR is used to detect where precipitation is falling in the atmosphere. There are 160 operational high-resolution Doppler weather RADAR sites across the United States. Radar images were accessed from the National Centers for Environmental Information's NEXRAD Data Archive. The RADAR site used in this report was KLOT, which is located in Joliet, IL. Radar images were accessed from the NOAA National Centers for Environmental Information (NCEI). Short Range Base Reflectivity images depict the intensity and location of precipitation from approximately 143 miles outward from the Radar site. The resolution of Short Range Base Reflectivity images is approximately 0.62 miles by 1.0 azimuth degree (Level III) or 0.16 miles by 0.5 azimuth degree (Level II). Depending on the mode of operation used, images are typically available every 4 to 10 minutes.

GEOSTATIONARY SATELLITES (GOES)

Geostationary Operational Environmental Satellite (GOES-16) satellite data is accessible on NOAA's National Center for Environmental Information web-site. One of the main uses of a satellite is to see where and what type of clouds are present over an area. The two main channels referenced are the visible channel and long-wave infrared. Visible images have the finest spatial resolution at 0.5 kilometers (0.3 miles) per pixel; however, they are only available during the daylight hours. Meanwhile, long-wave infrared images have a spatial resolution of 2 kilometers (1.2 miles) per pixel, but are available during the day and at night.

NATIONAL WEATHER SERVICE (NWS) PRODUCTS

The National Weather Service Forecast Office is responsible for issuing daily zone forecasts, most watches, warnings, advisories, and special weather statements. Daily zone forecasts are issued several times a day, sometimes more if updates are needed. These forecasts are immediately made available to the public on the internet, local radio, and/or television stations. The watches, warnings, advisories, and special weather statements are issued when impending weather meets certain criteria set by the National Weather Service. Products are available through the NCEI Service Records Retention System (SRRS).

NWS PUBLIC INFORMATION STATEMENTS

The National Weather Service Forecast Office may issue Public Information Statements during and after a weather event that has been affecting their region. Public information statements come from highway departments, hourly weather observation stations, cooperative observers, law enforcement officials, the general public, skywarn spotters, and the media. Some types of weather phenomenon reported are: snow and ice accumulations, peak wind speeds and rainfall amounts. In addition, each individual forecast office may use Public Information Statements for storm damage surveys, climate records, or other miscellaneous weather information. Statements are available through the NCEI Service Records Retention System (SRRS).

COMPLETE SUN AND MOON DATA

The US Naval Observatory Astronomical Applications Department provides sunrise, sunset, civil twilight, moonrise, moonset, phases of the moon, and the percentage of the moon's visible disk for any day of the year. In addition to the above, the altitude and azimuth angles of the sun and moon are available to plot where the sun and moon are in the sky at any time of the day. Most US cities are available; however, for site specific areas, longitude and latitude coordinates can be entered.

HOURLY & SUB-HOURLY OBSERVATIONS

- **KBLM: Belmar Allaire Airport, NJ (AWOS)**
Elevation 274 feet – located 12.7 miles West-Northwest
- **KEWR: Newark Liberty International Airport (ASOS)**
Elevation 7 feet – located 18.7 miles Northeast
- **Upper Freehold Twp., NJ (NJ Weather and Climate Network, NJDOT)**
Elevation 190 feet – located 25.9 miles Southwest
- **E1682: Ew1682 Howell, NJ (MADIS; APRSWXNET/CWOP)**
Elevation 85 feet – located 4.7 miles southwest

DAILY OBSERVATIONS

- **Freehold-Marlboro, NJ (COOP)**
Elevation 30 feet – located 6.8 miles west West-Northwest
- **Toms River, NJ (COOP)**
Elevation 90 feet – located 5.4 miles Northeast
- **OC-02: South Toms Rivers 4.6 NNW, NJ (CoCoRaHS)**
Elevation 105 feet – located 4.2 miles South-Southwest
- **BT-10: Pemberton Twp 3.0 SSE, NJ (CoCoRaHS)**
Elevation 98 feet – located 8.2 miles South-Southwest

STATION MAP

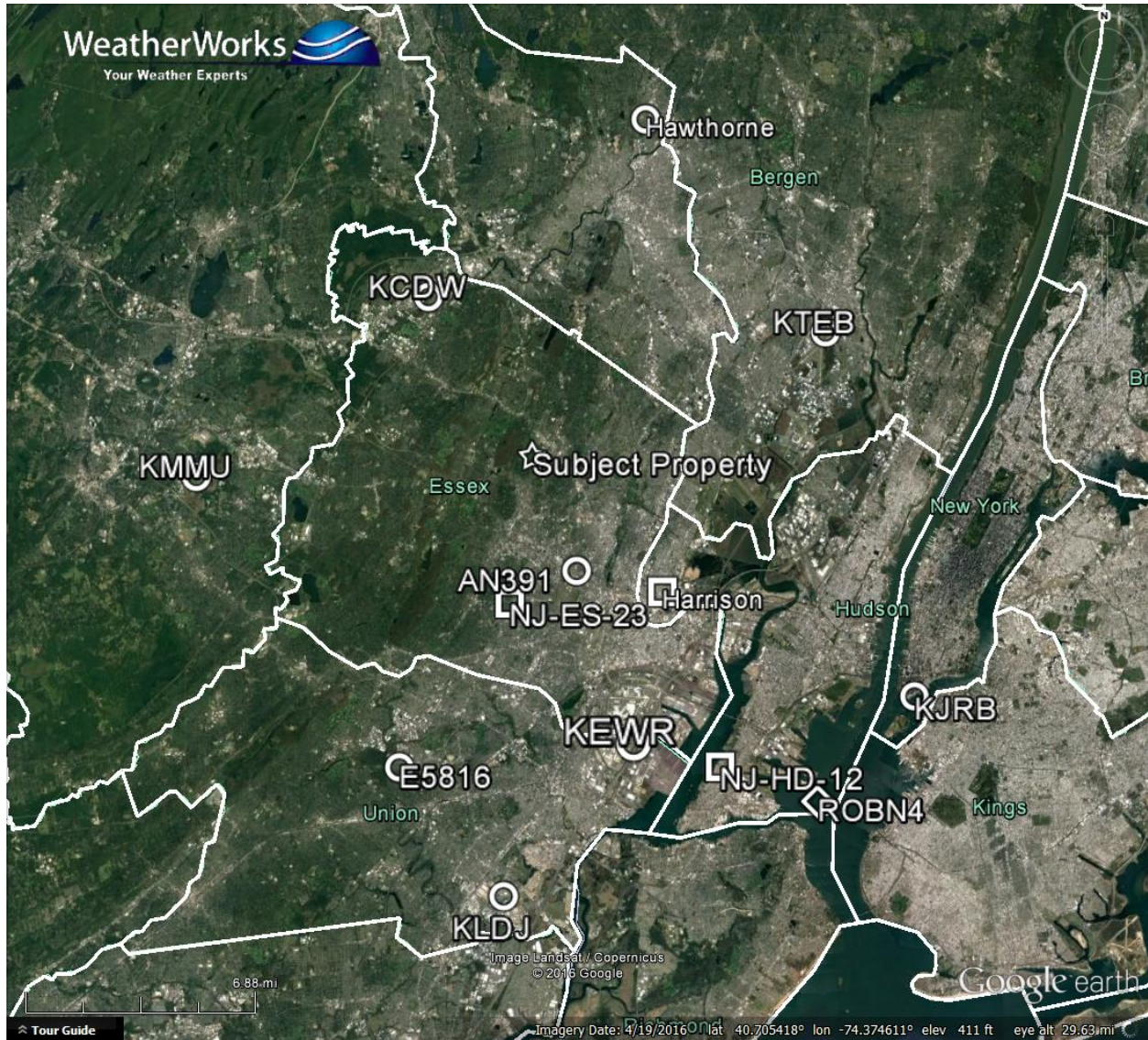
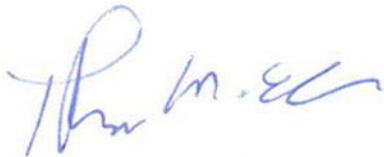


Figure 1 - A general map of the accident location and the weather observation stations used to reconstruct the weather for 99999 Green Street in Samletown, NJ (elevation approximately 590 feet) from February 19 - 21, 2019 (Source: Google Earth).

CERTIFICATION

I certify that the information in this report is true and accurate, and that any estimations, interpolations, or assumptions that have been made were done so by a professional meteorologist with expert accuracy within a reasonable degree of meteorological and scientific certainty. Any conclusions are based on the interpretation of the best available information at the time of the issuance of my report as well as my education, training, and experience. I certify that the analysis provided within this report represents my unbiased opinion as to the weather conditions at the subject property during the stated timeframe. I reserve the right to amend the conclusions made herein upon further discovery of additional meteorological data or other relevant materials. Use of any information within this report is intended for the referenced matter only and should not be utilized for any other purpose.



Thomas M. Else
Weather Works, LLC
Senior Forensic Meteorologist
AMS Certified Consulting Meteorologist #675
SIMA Advanced Snow Manager



ABOUT WEATHERWORKS

Since 1986, WeatherWorks has provided dependable meteorological services to thousands of clients in the private and public sectors by understanding the core principles and complexities of meteorology in addition to utilizing technological advances. For over 30 years, WeatherWorks has prepared detailed, site specific, and easy to understand past weather reports for all types of cases and claims. The professional meteorologists at WeatherWorks have performed site specific analysis on over 3500 plaintiff and defense cases across the United States. Our sound meteorological advice and customized services relating to past, present, and future weather conditions remain vital in each of our client's decision making process, and provide our staff with the continued knowledge of the weather's impact on the spectrum of weather related cases and incidents.