

Industry Development: Weather Consulting and Risk Transfer Products

3Q 2017

Table of Contents

Quantifying Weather Risk.....2

Transferring Weather Risk.....4

Weather Risk Transfer Example5

Contacts6

The Weather Risk Management Association conference in 2016 estimated that 88% of all business is affected by weather. Coupled with an increase in volatile weather globally, this risk has heightened exposure across all industries. The construction industry is particularly exposed to adverse weather through schedule delays, abatement costs, and in some cases, penalties and liquidated damages.

However, new ways to view historical weather patterns and interest from third parties willing to assume these risks are changing the way the industry approaches weather exposure and contingencies.

Weather risk is often related to traditional catastrophe perils that can cause significant physical damage to a project and cause schedule delays. The focus of weather risk in this article is on the more day-to-day weather conditions such as precipitation, temperature (high or low), excessive wind speed, or ocean wave height. These weather conditions are low severity and high frequency as compared to traditional catastrophe perils. While these types of events often do not correspond to direct damages or physical losses on a project, they are particularly damaging to a project due to the delays they can cause. In addition, an underestimation of weather days can lead to expediting costs or liquidated damages from an insufficient weather contingency.

Ultimately, weather risk is not a foreign topic for contractors, as nearly all construction projects are subject to some component of weather

risk. However, changing weather patterns have heightened the need for contractors and owners to be more conscious of their weather contingencies. As neither the owner nor the contractor is better positioned to manage weather risk, this can be a difficult risk to assign and negotiate. As a result, the industry is inconsistent in assigning this risk responsibility on projects and we see various contractual arrangements between owner and contractors where weather risk is the responsibility of the contractor, the owner, or shared.

The consequences of assuming and underestimating this risk are often evident to contractors who lose scheduling time or incur abatement costs. The consequences to the owner can be more difficult to identify, but they still exist. A recent example of this is highlighted by the record setting rain in LA which has delayed the Chargers and Rams' new stadium. NFL executives reported to ESPN that the one year delay will result in an estimated \$80 million of lost revenue¹.

Regardless of which party takes the responsibility for weather related risk, the potential for loss exists. Without accurate means of estimating and budgeting for weather related events on project sites, contractors and owners can be exposed to the damaging effects that weather delays can have on a project's schedule, and ultimately their balance sheets. To help alleviate these issues, Aon is working with insurance markets to help give contractors and owners an ability to quantify weather related risks and, when necessary, transfer these risks to third parties.

¹ ESPN, "Record-Setting Rain in Los Angeles Delays Completion of Chargers and Rams' Stadium".

Quantifying Weather Risk

The revived discussion of weather risk is partially driven by the industry's ability to analyze large datasets of historical weather conditions. The construction industry has traditionally relied on past experience in the location or even "gut" intuition for weather risk quantification. Without an adequate quantification, risk mitigation efforts can lead to an inefficient allocation of weather risk between the contracting parties.

Increased reporting by weather stations throughout North America offers contractors new ways to understand the weather exposure on a job site, but this comes at the cost of having to analyze years' worth of daily or hourly recorded weather data.

Fortunately, there are several quantitative tools available that allow users to more easily sort through historical weather data and set parameters specific to the project site and construction activity that is exposed. Aon utilizes its Data and Analytics team to provide clients an innovative way to analyze and quantify weather at specific locations. Using a

combination of government meteorological station data in addition to more granular gridded data from private satellite data sources, Aon clients can analyze a project or portfolio's weather exposure by looking at 10-50 years' worth of historic occurrences. This provides contractors and owners a systematic approach to quantifying the risk of a particular weather peril and assists in negotiating contractual risk transfer. These tools also allow clients to overlay historical weather on to the project's schedule to identify potential impacts from adverse weather.

As an example, Aon teams worked with clients in the Detroit, MI area to help quantify the exposure from seasonal rainfall during a project. Outlined below are the available data sources around precipitation, both weather station and gridded data. Figure 1 highlights the nearest weather station to downtown Detroit.

Figure 2 shows the satellite gridded data capabilities of pulling 5km by 5km weather data over the downtown area.

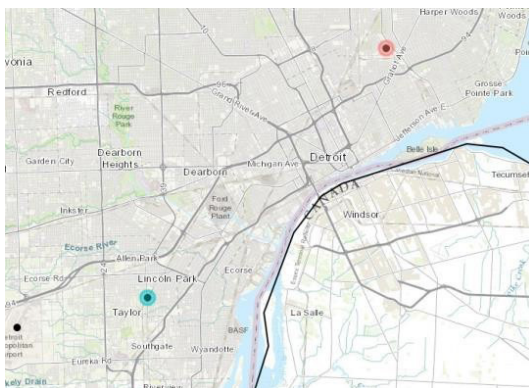


Figure 1 – Weather Station

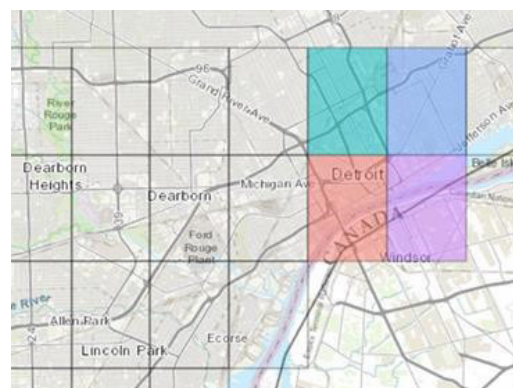


Figure 2 – Satellite Gridded Data

Utilizing these data sources, clients can view historical weather events on a monthly basis with

historical volatility (Figure 3) or on a daily basis for a specific time period (Figure 4).

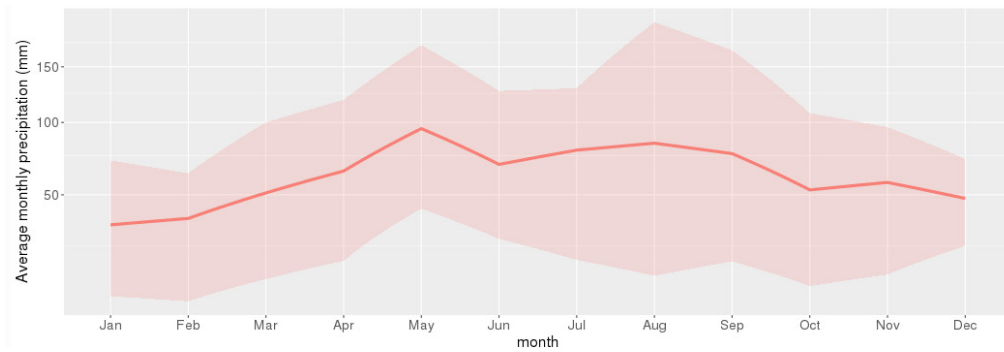


Figure 3 – Monthly Average Precipitation and Volatility

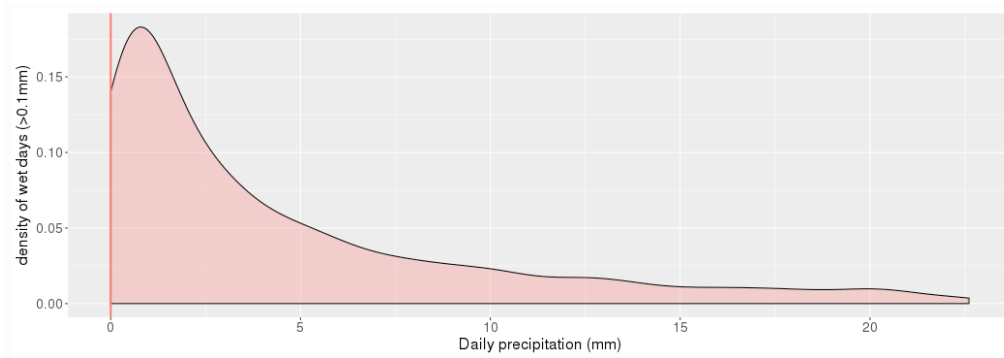


Figure 4 – Daily Precipitation over a Fixed Period

Data capabilities also allow users to view historical abnormalities to the average and identify years in

which annual precipitation was outside a specific confidence level or were significantly rainy (figure 5).

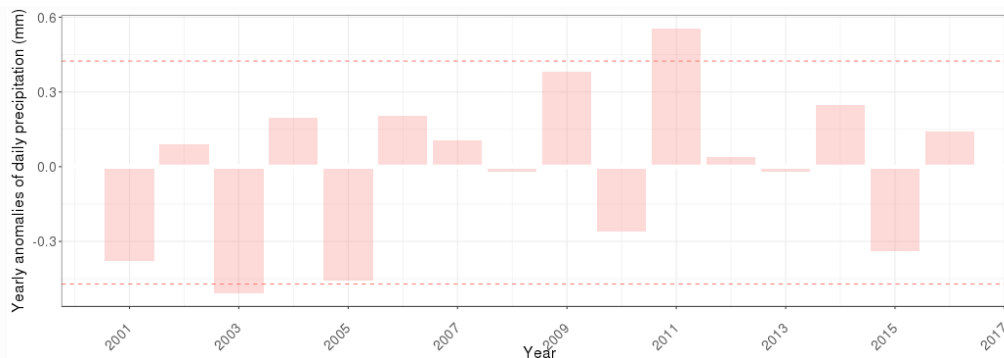


Figure 5 – Historical Annual Precipitation Abnormalities

Using this information, clients are able to overlay historical weather patterns on a project's schedule. Aon then works with clients to identify trades that are more or less susceptible to weather events, and identify the event level that is associated with delays

and additional costs (e.g. whether ¼, ½, or 1in of precipitation results in a delay or additional costs). This is used to identify expected weather delays and build contingencies into the entire project up to a level that clients are most comfortable with.

Transferring Weather Risk

In addition to new quantitative capabilities, there is also increased interest from third parties willing to accept weather exposure. From an investment perspective these risks are unique and independent from traditional capital markets, providing new ways to diversify investment portfolios. To contractors and owners this interest offers a risk transfer market to help provide financial stability to projects where they are unable to avoid the more volatile weather environments.

Coupled with the data analysis abilities, Aon is working with various insurance carriers to offer

clients a tailorable, index-triggered weather solution that helps contractors and owners mitigate the impact of specific weather peril(s), such as precipitation, temperature, and wind. Aon then works with all parties to validate available weather data and to help evaluate the level of weather risk to be transferred. This risk can then be packaged into an index-triggered solution, which is akin to a parametric insurance product or agreed upon value policy. The solution helps insureds manage weather volatility on more risky projects to protect the contractor or owner's balance sheet.

Weather Risk Transfer Example

Aon worked with clients to help identify the policy's parameters below:

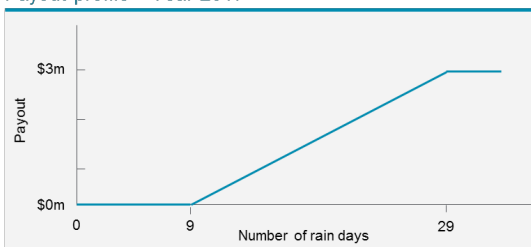
Weather Source:	The source of the data that will be utilized for the underwriting process as well as determination of loss settlements. It is essential that this is established upfront and is provided by a mutually agreed upon third party as to avoid any basis risk or moral hazard.
Risk Period:	The term of the insurance coverage. Some clients elect to insure the term of the project while others look to insure particular spans of time.
Index:	The measure of an adverse weather event. These are typically structured as a number of days over the risk period or an accumulation of an adverse weather event over a Risk Period.
Critical Day:	The determination of what will constitute an adverse weather day.
Deductible:	The amount of the adverse weather days that the insured will retain.
Payout:	The amount that the carrier will pay per critical day over the deductible.
Policy Limit:	The carriers' limit of payment.

For the purpose of this article, the hypothetical policy structure was proposed below:

Structural Proposal – Year 2017

- Station: ABC Airport
- Risk Period: 1-Jun-2017 – 1-Dec-2017, Index: Sum of Critical Days
- Critical Day: If daily rainfall > 0.08 inch, then 1 otherwise 0
- Deductible: 9 Critical Days
- Payout: USD 150,000 per Critical Day
- Policy Limit USD 3,000,000

Payout profile – Year 2017



A policy for the proposed structure is designed to stretch from June of 2017 until December of 2017. The client in this example has agreed that ABC Airport weather station is the data source that will be used to measure when there is a daily rainfall event greater than .08 inches. In the event there is rain over .08 inches, that day will constitute a critical day. The client would retain the risk for the first nine days during the risk period that there is over .08 inches of rain. On the tenth day that there is over .08 inches of rain, as observed at ABC Airport, the event would qualify as a payout day. This would continue on until the limit of liability is exhausted by the insurance company (i.e. on the 29th day that rain is greater than .08 inches).

While this scenario is an oversimplified example of solutions around weather, Aon can work with clients to understand what adverse weather conditions could affect a jobs critical path and design a program for the specific project's risk. Ultimately, the coverage increases firms' confidence around tendering for weather- inclusive construction contracts and enables contractors to be more competitive by both reducing contingency funds, enabling them to maintain realistic pricing, and providing funds to maintain a project's schedule.

Contacts

**If you have questions about Weather insurance,
please contact:**

Michael DeLio

Associate

Aon Infrastructure Solutions

+1 (312) 381-3249

michael.delio@aon.com

**If you have questions about your coverage or are interested
in coverage, please contact your Aon broker**

About Aon

Aon plc (NYSE:AON) is a leading global professional services firm providing a broad range of risk, retirement and health solutions. Our 50,000 colleagues in 120 countries empower results for clients by using proprietary data and analytics to deliver insights that reduce volatility and improve performance.

© Aon plc 2017. All rights reserved.

The information contained herein and the statements expressed are of a general nature and are not intended to address the circumstances of any particular individual or entity. Although we endeavor to provide accurate and timely information and use sources we consider reliable, there can be no guarantee that such information is accurate as of the date it is received or that it will continue to be accurate in the future. No one should act on such information without appropriate professional advice after a thorough examination of the particular situation.

www.aon.com

GDM000000