

AASHTO 2015 EXTREME WEATHER SESSIONS

AASHTO'S SUBCOMMITTEE ON MATERIALS, ANNUAL MEETING

EXTREME WEATHER EVENTS: TRENDS AND IMPLICATIONS FOR MATERIALS

AUGUST 4, 2015
8:00-8:30 AM
PITTSBURGH, PENNSYLVANIA

PRESENTATION SUMMARY

Mike Savonis of ICF International presented to the AASHTO Subcommittee on Materials on trends in extreme weather events and implications for materials. Attendance at the session included representatives from state departments of transportation (DOTs), along with individuals from the Federal Highway Administration (FHWA) and the materials industry.

Extreme weather events are occurring across the country and are happening more frequently. In recent years, states have been experiencing severe transportation impacts from events such as flooding, high temperatures, snowstorms, landslides, drought, wildfires, and permafrost thaw. Extreme weather is also getting costlier. There is an upward trend in the costs over time from extreme events and in part due to increasing development in riskier areas.

The United States has been observing changes in extreme weather in the recent past. Average temperatures from 1991-2012 have increased by 1.5°F and higher in the United States compared to the 1901-1960 average. The length of the frost-free season has been increasing nationally since the 1980s, with the largest increases occurring in the western United States. Observed precipitation change varies by region; in general, dry areas are getting drier and wet areas are getting wetter. More precipitation is coming down in extreme events, particularly in the Northeast. For example, several states have experienced heavy snow events in the recent past although the length of the frost-free season has been decreasing.

These trends in extreme events are projected to continue and accelerate. The United States is projected to experience an increase in average and extreme temperatures, heat wave intensity, number of frost-free days, precipitation variability, drought intensity in the Southwest, and hurricane intensity and rainfall.

Extreme weather impacts transportation and materials. For example, extreme heat can lead to asphalt softening and rutting, cracking, and pavement blow-ups. Increased freeze thaw conditions, permafrost thaw, heavy or extended precipitation events, droughts, and sea level rise and storm surge can also damage transportation materials. The way we plan for materials depends on our assumptions about weather and climate, such as asphalt grading, soil saturation, soil stability, and time-dependent properties. With changing extreme weather conditions, some assumptions may not hold true in the future. For example, ICF International worked with Parsons Brinckerhoff and the U.S. Department of

Transportation (DOT) to develop a case study on how changes in extreme temperatures might affect pavement design decisions in Mobile, Alabama. Based on historical temperature extremes, the Alabama DOT recommends use of either PG 67-22 or PG 76-22 in the Mobile region, depending on expected traffic loads. Available data suggests 7-day maximum pavement temperature could increase from about 133°F to up to 152.3°F, which stays within the range of the current pavement binder. Although the recommendation would still hold under changing extreme temperature conditions, the DOT would lose the safety margin that was historically built in.

The materials community can prepare for extreme weather trends. The right materials and/or installation techniques (such as erosion-resistant aggregate blends, erodible fills near high value structures, novel anti-icing strategies, “smart” pavements, and sustainable materials and technologies) can help prevent or reduce weather impacts. The materials community can also continue to understand the problem by improving monitoring and tracking of weather events and their effects on materials, reviewing climate and weather-related assumptions, and increasing coordination between maintenance and engineers (maintenance crews have experience responding to extreme weather, although there is often no institutional record of it). Learning from peer states that normally experience the extreme weather conditions your state is projected to face in the future can provide helpful insight into best practices for managing the impacts. Additionally, materials can be changed where appropriate in order to increase resilience. The goal is to reduce, not eliminate, vulnerability to extreme weather events.

The presenter did not receive any questions.