



**Project Number**  
BE717

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# Florida Department of Transportation Research

## Accelerated Weathering of Traffic Control Materials by Laboratory Testing

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### Current Situation

Signs are indispensable aids to driving, from maintaining lane position and efficient flow to wayfinding and hazard awareness. Signs in Florida are exposed to severe weathering conditions, including sunlight, wind, and rain, and evaluating their durability is key to ensure traffic safety. Durability is also crucial for structural steel coatings. The current approval process for the use of new materials depends on the ability to test the material's response to outdoor conditions. Current outdoor weathering test methods may take as much as 3 years for sign sheeting and 5 years for coatings. However, accelerated laboratory testing methods could be used to reduce testing time in a more controlled environment.

### Research Objectives

University of North Florida researchers evaluated literature on existing accelerated laboratory testing procedures for retroreflective sign sheeting materials and structural steel coatings. They used that data to calculate accelerating factors on weathering and reduce testing time.

### Project Activities

The researchers considered several weathering variables, including UV irradiance, temperature, moisture, concentration of chloride ions, and exposure duration. The researchers examined the literature related to the weathering behavior of coating and sheeting materials. Literature review included current standard accelerated test methods available from state and national transportation agencies and from manufacturers.

The correlation of various laboratory accelerated test methods with outdoor testing was evaluated and analyzed. The acceleration factors of different accelerated laboratory tests were calculated using the corresponding published test data. Test protocols for the coating materials and sign sheeting materials were recommended. For coating materials, the testing conditions of ASTM D5894, *Standard Practice for Cyclic Salt Fog/UV Exposure of Painted Metal*, were modified by increasing the UV irradiance, temperature, chloride ion, and humidity exposure. These changes could shorten the testing time to about 6 months, or 10% of the full-term outdoor testing exposure. For the sign sheeting materials, irradiance levels during xenon light-on periods of the test procedure according to ASTM D7869, *Standard Practice for Xenon Arc Exposure Test with Enhanced Light and Water Exposure for Transportation Coatings*, were increased, reducing the testing time to 16% of the outdoor testing duration, or about 6 months.

### Project Benefits

Accelerated laboratory testing methods will allow FDOT to approve materials in a shorter period. In addition, reduced testing time will be more cost effective.

*For more information, please see [www.fdot.gov/research/](http://www.fdot.gov/research/).*



*Road signs and structures in Florida must resist the effects of sun, salt, wind, and rain.*