Justification for Changes to LRFD SLTS 10.4.2.1—Vertical Supports

The service dead plus wind deflection check for vertical poles uses the 10-year MRI wind speed map and maintains the deflection limit of 15% of the pole height. The LRFD SLTS as written reduces the deflection criterion compared to the LTS-6 provisions. This reduction was not the intent of the LRFD SLTS. Below illustrates the issue and the solution.

High Mast Pole Deflection Problem & Solution

Problem:
LTS-6 uses 90 mph wind speed for deflection calculation with a limit of 15%*Height

Pressure and Deflection proportional to $V_{so}^2$

LRFD SLTS uses Service $V_{so}$ wind speed which is $V_{so} = [0.36 + 0.10\ln(12*10)]V_{so} = 0.839V_{so}$

LRFD SLTS Deflection = $(0.839)^2 *$ LTS-6 Deflection = 0.70 * LTS-6 Deflection

Solution:
Deflection is a Service Limit State and $V_{so}$ should be used

To make LRFD SLTS Deflection criterion consistent with past LTS-6 practice, change the Deflection Limit to 10%*Height.

$\text{LTS-6 Deflection} = \Delta_{so} < 0.15H$

Same criterion for both LRFD and ASD

$\Delta_{10} = 0.70 \Delta_{so} < 0.10H$

and $0.10/0.70 = 0.15$

Change the deflection limit to 10% of pole height will enforce same deflection criterion as past LTS-6 practice.