Appendix C: Determining Sag-Tension on Single Span, No Original Design

Situation: A section of line is currently in place, with no recorded data as to the ruling span, design limits, or stringing sags. It is necessary to determine the ruling span and design limits, in order to modify the line (such as adding marker balls, changing the supporting structure, etc.).

For this example, the following assumptions were made:

- Conductor: 795.0 kcmil 26/7 ACSR "Drake"
- Calculated Ruling Span: 1000.00 ft
- Loading District: NESC 261.H.1.b *EXCEPTION 1* Heavy
- Measured Sag: 15.38 ft, 937.00 ft span, 60.0°F conductor temperature

Step #1
Calculate the ruling span using by inputting all the spans in the applicable tension section into the **Calculate Ruling Span** tool.

Step #2
Select the conductor in the **Conductor Selection** screen.

Step #3
The sag at a given conductor temperature must be determined for at least one span. This can be accomplished by measuring the sag with survey methods, or by throwing a ding line over the wire and using the stopwatch method (Use proper safety procedures if the line is hot).

Step #4
Choose the applicable load selection in the Load Selection panel on the **Main Menu**. In the Edit Loading Table screen, remove all limits except for the sag value obtained by survey, entered into the Limit column with the distance unit as the Type. Use the temperature at time of survey and Final in the Usage column if the line is assumed to be at final conditions.
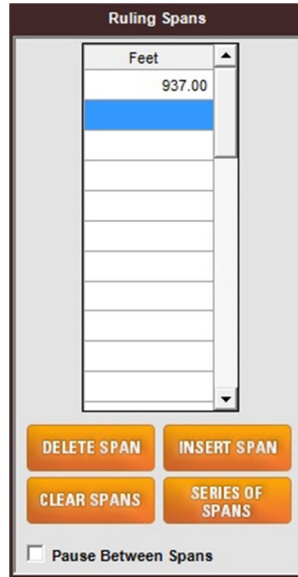
Loading Table

*	°F Cond. Temp	in Ice	lb/ft² Wind	Limit	Type	Usage
▶	0.0	0.50	4.00		▼	▼
	32.0	0.50			▼	▼
	-20.0				▼	▼
	0.0				▼	▼
	30.0				▼	▼
	60.0			15.38	ft ▼	Final ▼
	60.0				▼	Creep ▼
	90.0				▼	▼
	120.0				▼	▼
	167.0				▼	▼
	212.0				▼	▼
					▼	▼
					▼	▼
					▼	▼
					▼	▼

○ °C ◉ °F

* Right click on a row button to Insert or Delete a row

| OPEN | CLEAR | SAVE AS |

File [ ]

Step #5
Initially, the ruling span value used should match the single span for which the survey data was obtained.

Step #6
Click the **Calculate Sag & Tension** button. In the output, note the final tension at 60.0°F. This will be your final design limit at 60.0°F in the ruling span sag & tension calculations.

```
        Loading Limits
Cond.  Temp    Ice    Wind     K      Limit        Usage
 °F     °C      in    lb/ft²  lb/ft
60.0   15.6   0.00    0.00    0.00   15.38 ft*      Final
60.0   15.6   0.00    0.00    0.00                  Creep


        Design Points                              Final              Initial
Cond.  Temp    Ice    Wind     K     Weight    Sag      Tension    Sag      Tension
 °F     °C      in    lb/ft²  lb/ft  lb/ft     ft         lb       ft         lb
  0.0  -17.8   0.50G   4.00   0.30   2.508    18.58     14831     18.31     15052
 32.0    0.0   0.50G   0.00   0.00   2.093    18.59     12378     17.39     13227
-20.0  -28.9   0.00    0.00   0.00   1.093    10.69     11223      9.59     12519
  0.0  -17.8   0.00    0.00   0.00   1.093    11.75     10216     10.19     11781
 30.0   -1.1   0.00    0.00   0.00   1.093    13.49      8896     11.22     10696
 60.0   15.6   0.00    0.00   0.00   1.093    15.38*     7808     12.42      9663
 90.0   32.2   0.00    0.00   0.00   1.093    17.33      6929     13.78      8709
120.0   48.9   0.00    0.00   0.00   1.093    19.30      6227     15.29      7856
167.0   75.0   0.00    0.00   0.00   1.093    21.97      5471     17.83      6739
212.0  100.0   0.00    0.00   0.00   1.093     3.26      5171     20.35      5905
*  Design Condition

G  Glazed Ice Density of 57.0 lb/ft³
```

Step #7
Create a new project file using the calculated ruling span. The only design limit should be the tension obtained in Step #7. When sag & tension are calculated, review the output to be sure that design conditions have not been exceeded.

Loading Table

*	Cond. Temp (°F)	Ice (in)	Wind (lb/ft²)	Limit	Type	Usage
►	0.0	0.50	4.00		▼	▼
	32.0	0.50			▼	▼
	-20.0				▼	▼
	0.0				▼	▼
	30.0				▼	▼
	60.0			7808	lb ▼	Final ▼
	60.0				▼	Creep ▼
	90.0				▼	▼
	120.0				▼	▼
	167.0				▼	▼
	212.0				▼	▼
					▼	▼
					▼	▼
					▼	▼
					▼	▼

○ °C ● °F

* Right click on a row button to Insert or Delete a row

OPEN   **CLEAR**   **SAVE AS**

File [ ]

Ruling Spans

Feet
1000.00

DELETE SPAN   **INSERT SPAN**

CLEAR SPANS   **SERIES OF SPANS**

☐ Pause Between Spans