



## Strain Pole Foundation Design for Box Span Traffic Signals

**\*NOTE: If design parameters do not match the assumptions listed in this table and on page 2, a special foundation design may be necessary**

### STRAIN POLE FOUNDATION DEPTH AND SOIL TABLE

			FOUNDATION DIAMETER		
			42" DIA.	36" DIA.	
BOX SPAN LENGTH	SOIL CONDITIONS		FOUNDATION DEPTH (MIN)	FOUNDATION DEPTH (MIN)	CASING DEPTH
	COHESIVE SOIL Suc	NONCOHESIVE SOIL N			
<b>SPAN ≤ 120'</b>	Suc ≥ 500	N ≥ 4	12'	13.5'	AS SHOWN ON PLANS
<b>120' &lt; SPAN ≤ 144'</b>	Suc ≥ 500	N ≥ 4	13.5'	15'	

Suc = UNCONFINED COMPRESSIVE SHEARING RESISTANCE IN COHESIVE SOIL (PSF, USE FOR COHESIVE SOILS).

N = BLOWS/FOOT OF PENETRATION ACCORDING TO ASTM D1586 (USE FOR NON COHESIVE SOILS).

\* A SPECIAL DESIGN IS REQUIRED IF  $N < 4$  OR  $Suc < 500$  PSF.

\* SPAN LENGTHS > 144 FEET ALSO REQUIRE A SPECIAL DESIGN.

\* TABLE BASED ON DEFLECTION ≤ 1 INCH AT SERVICE LOAD AND A WATER TABLE ≥ 3' BELOW TOP OF SHAFT. DEFLECTION GREATER THEN 1 INCH IS POSSIBLE IF GROUNDWATER IS < 3' BELOW TOP OF SHAFT.

\* SEE PAGE 2 FOR ADDITIONAL FOUNDATION DESIGN ASSUMPTIONS AND BOX SPAN LOAD ANALYSIS ASSUMPTIONS



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### \*Foundation design assumptions:

Static loading (not cyclic)  
Allowable deflection of 1" at the top of the shaft, using the service load case.  
Maximum elevation of water table assumed to be 3' below top of shaft  
L-Pile 4.0 was used to calculate the shaft depth.  
For cased foundations, the casing is neglected in structural analysis

### \*Box span load analysis assumptions: **SPAN LENGTHS $\leq$ 120'**

#### **SPAN ATTACHMENT HEIGHTS $\leq$ 28'**

Span wire attached to pole at 28' above pole base  
Dead load + wind load at 45 degrees (120' span)  
Horizontal force = 4.44 k  
Vertical force = 1.53 k (includes 1 k pole weight)  
Moment = 114.22 k-ft

#### **Box span signal loading assumptions for 120' span:**

Box span signal structure with four 120' spans  
Two spans attached at each pole. No double hanging of spans  
Spans at 90 degrees  
Span dead loads remained the same as the 144' box span model  
Signals and case signs placed approximating an 83% scaled version  
of the M-43 at Drake location (see pg. 3)  
Camera and arm added 28' above pole base  
Span wire assumed 5% sag under dead load.

### \*Box span load analysis assumptions: **120' < SPAN LENGTHS $\leq$ 144'**

#### **SPAN ATTACHMENT HEIGHTS $\leq$ 35'**

Span wire attached to pole at 35' above pole base  
Dead load + wind load at 45 degrees (144' span)  
Horizontal force = 4.59 k  
Vertical force = 1.46 k (includes 1 k pole weight)  
Moment = 143.57 k-ft

#### **Box span signal loading assumptions for 144' span:**

Box span signal structure with four 144' spans  
Two spans attached at each pole. No double hanging of spans  
Spans at 90 degrees  
Signals and case signs placed approximating the M-43 at Drake location (pg. 3)  
Equipment not included in this analysis: Cameras, camera arms,  
luminaire, luminaire arms  
Span wire assumed 5% sag under dead load.

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