

Three-Phase Angle Pole Top Assemblies

1. Scope

This standard covers the information necessary to construct the pole top assemblies for two- and three-phase angle poles supporting #4 AWG copper, 397.5 kcmil ACSR, and 954 kcmil ACSR primary conductors on the 26 kV primary distribution system.

Requirements for vertical spacing and hardware, and installation instructions to connect the primary conductor to the pole are included.

Criteria for pole top assemblies covered under this standard include the following:

Grade of construction	B or C
Pole class	1 or stronger
Pole length	50 ft
Soil condition	Average
Allowable line angle	1°–30°

For line angles less than the allowable line angle described above, refer to SCL 0123.01.

For line angles greater than the allowable line angle described above, refer to SCL 0123.05.

Composite, steel, laminated, and other non-wood poles are outside the scope of this standard.

2. Application

This standard provides direction to Seattle City Light (SCL) engineers, crews, and contractors for the installation of three-phase angle pole top assemblies on 26 kV distribution poles with #4 AWG copper, 397.5 kcmil ACSR, and 954 kcmil ACSR primary conductors.

3. General Requirements

Two-phase angle poles shall be constructed as three-phase angle poles without the center phase.

Three-phase angle poles shall be constructed as shown in Table 3. All spans greater than 200 ft shall be designed by the engineer.





Table 3. Three-Phase Angle Pole Top Assemblies

Conductor Size	Grade of Construction	Pole Class	Allowable Line Angle	Figures
#4 AWG	C	1	7°–30°	3a, 3c
#4 AWG	B	1	1°–30°	3b, 3c
397.5 kcmil	C	1	4°–18°	3d, 3j
397.5 kcmil	B	1	1°–14°	3e, 3j
397.5 kcmil	C	1	18°–30°	3f, 3j
397.5 kcmil	B	1	14°–28°	3g, 3j
954 kcmil	C	1	3°–9°	3h, 3j
954 kcmil	B	1	1°–7°	3i, 3j
954 kcmil	C	1	9°–15°	3k, 3m
954 kcmil	B	H1	7°–14°	3l, 3m

A side tie shall be used for an angle pole and be installed on the side of the insulator away from the pole.

The headpin on an angle pole (if required) shall be installed on the side of the pole where the conductor angles into the pole.

Angle poles shall be guyed according to the requirements in SCL 0199.01.

Figure 3a. Allowable Line Angle Range for Grade C #4 AWG Copper Single Arm Angle Pole

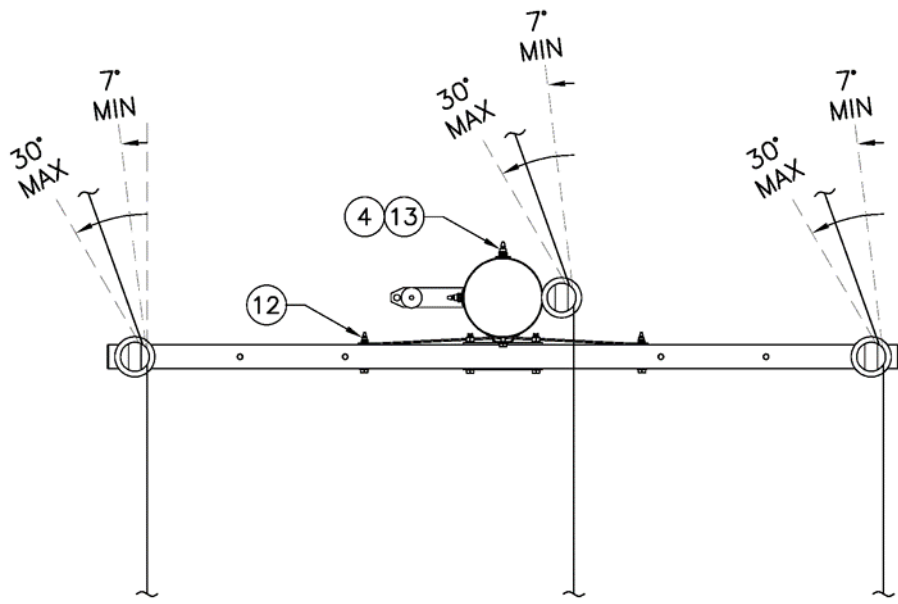


Figure 3b. Allowable Line Angle Range for Grade B #4 AWG Copper Single Arm Angle Pole

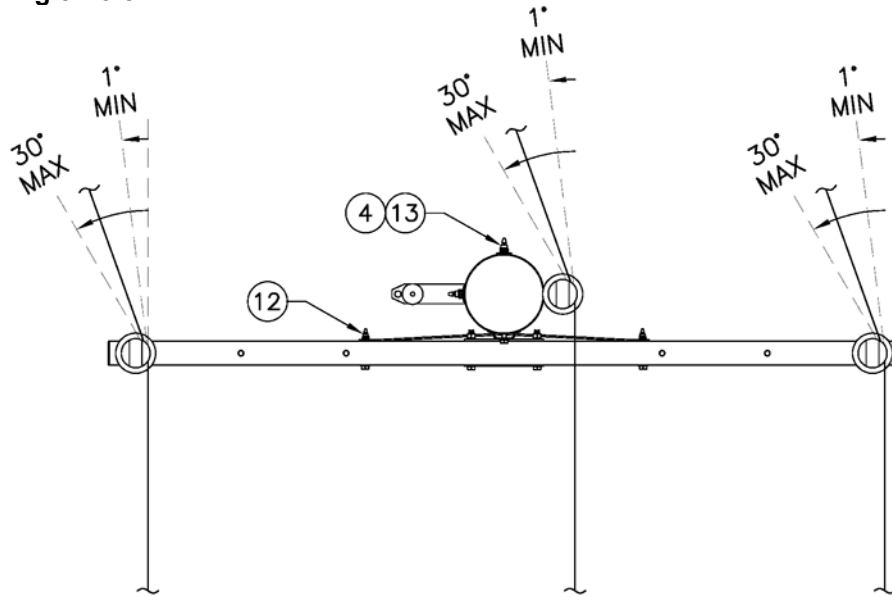


Figure 3c. Three-Phase #4 AWG Copper Single Arm Angle Pole Top Assembly

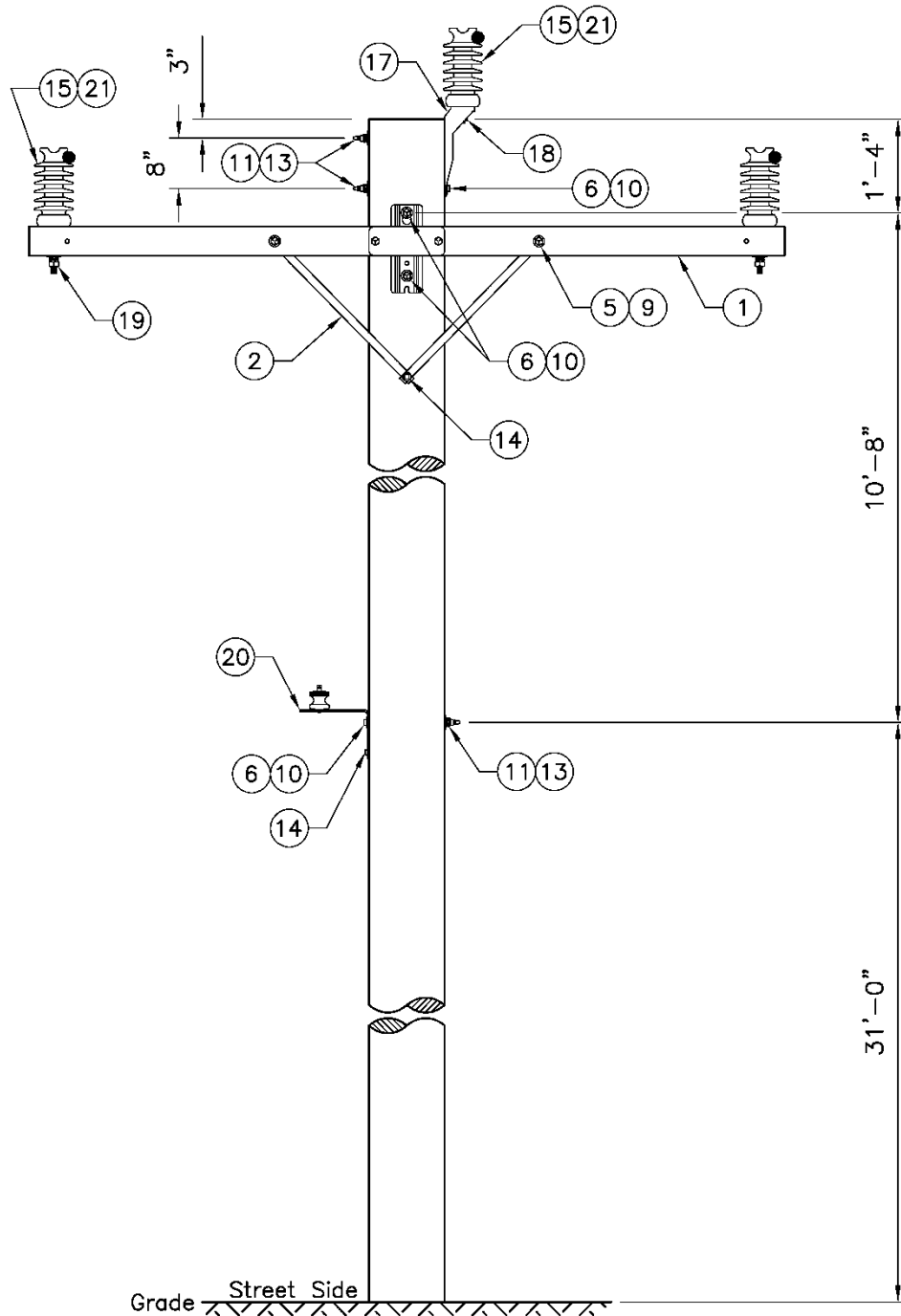


Figure 3d. Allowable Line Angle Range for Grade C 397.5 kcmil ACSR Single Arm Angle Pole

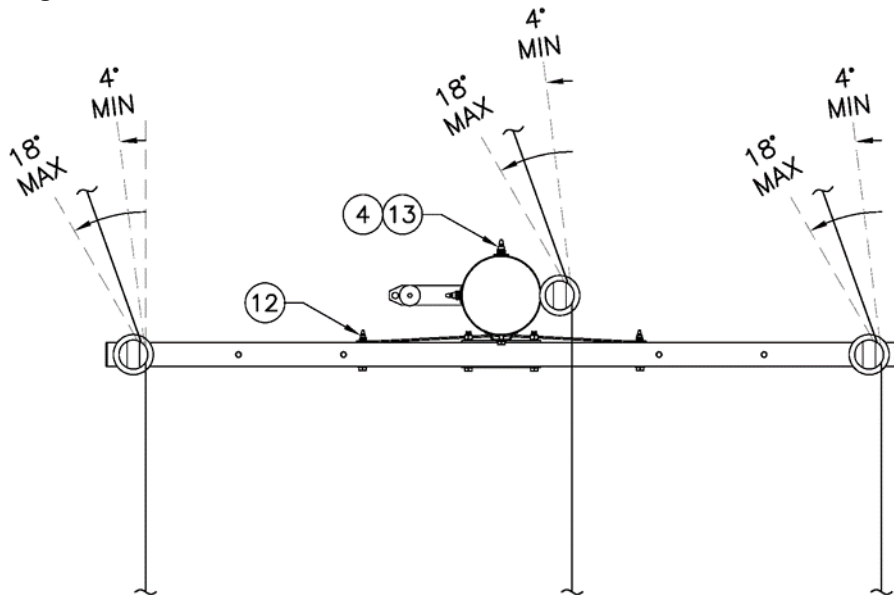


Figure 3e. Allowable Line Angle Range for Grade B 397.5 kcmil ACSR Single Arm Angle Pole

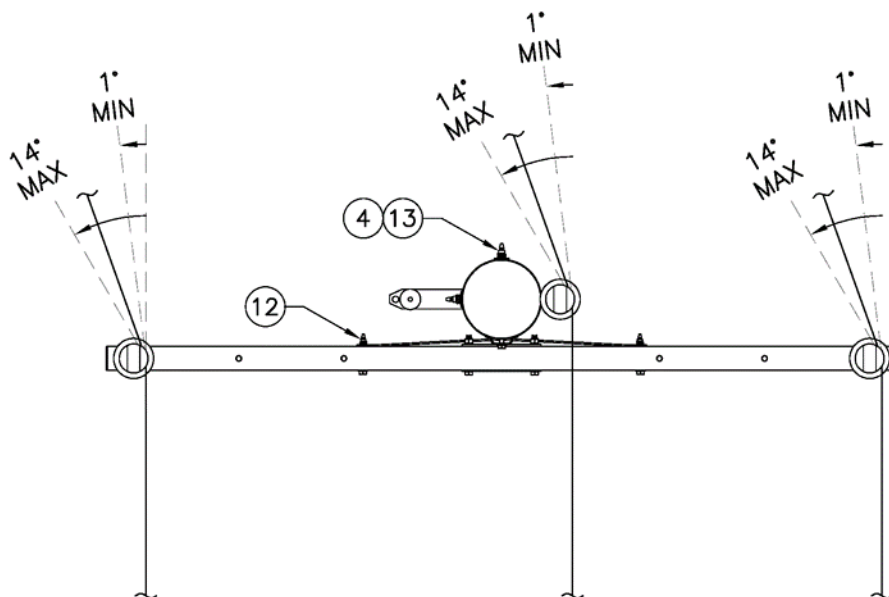


Figure 3f. Allowable Line Angle Range for Grade C 397.5 kcmil ACSR Double Arm Angle Pole

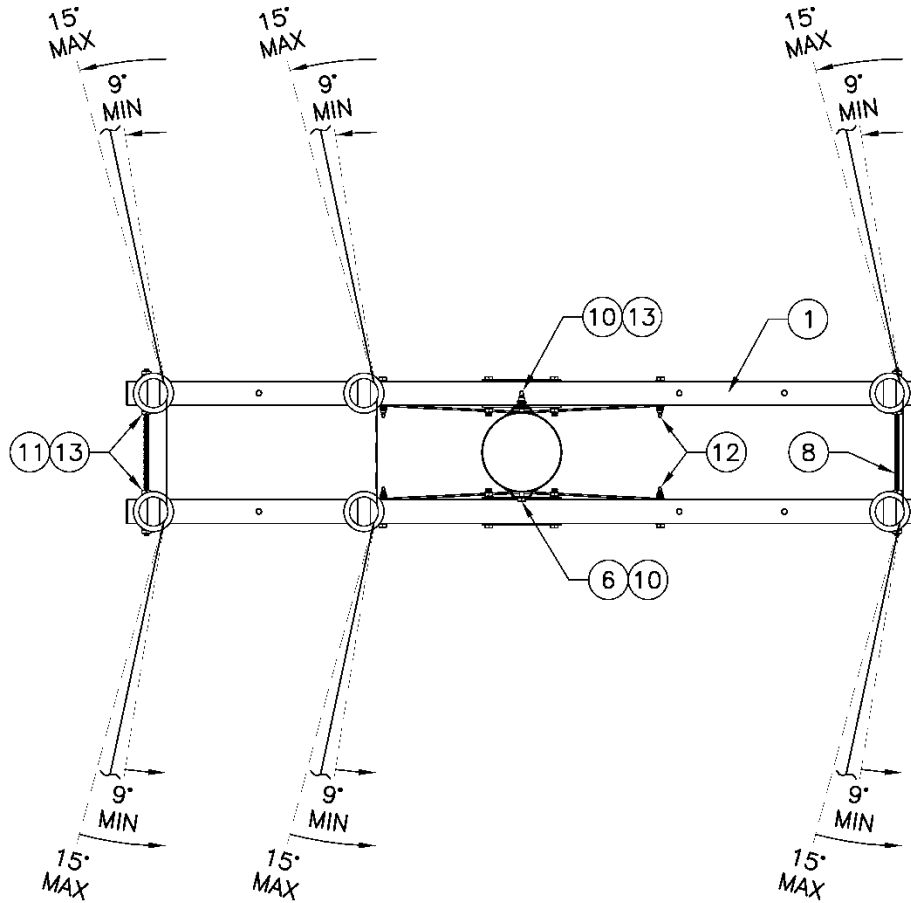


Figure 3g. Allowable Line Angle Range for Grade B 397.5 kcmil ACSR Double Arm Angle Pole

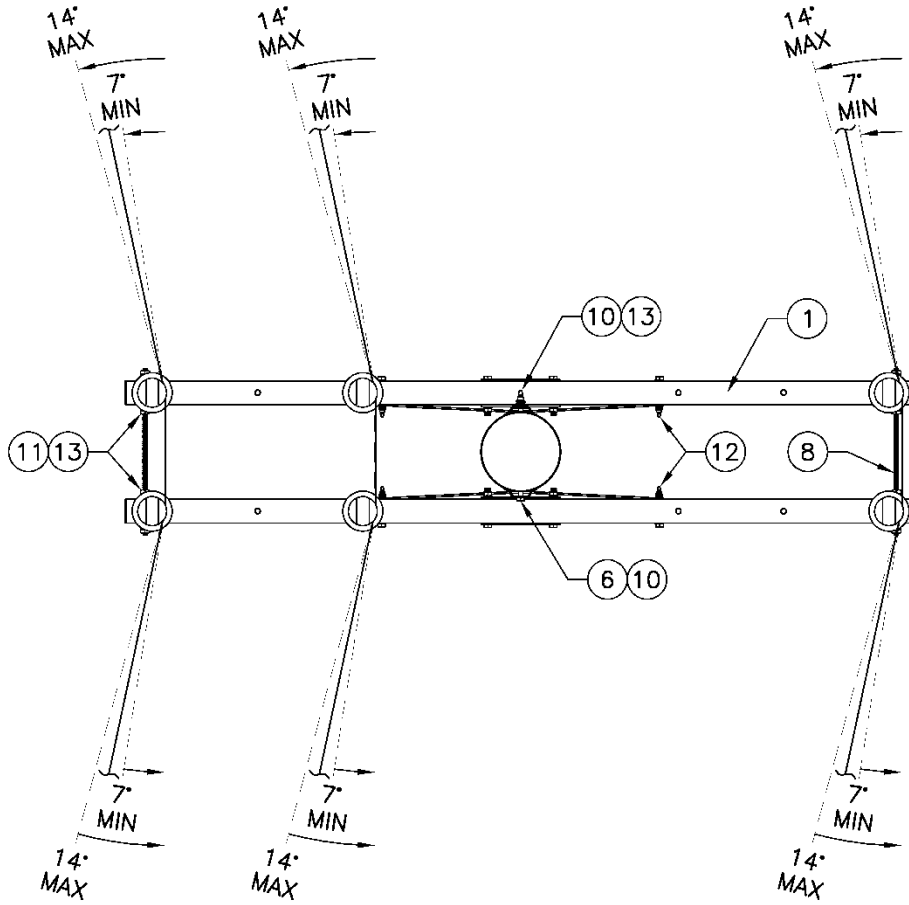


Figure 3h. Allowable Line Angle Range for Grade C 954 kcmil ACSR Single Arm Angle Pole

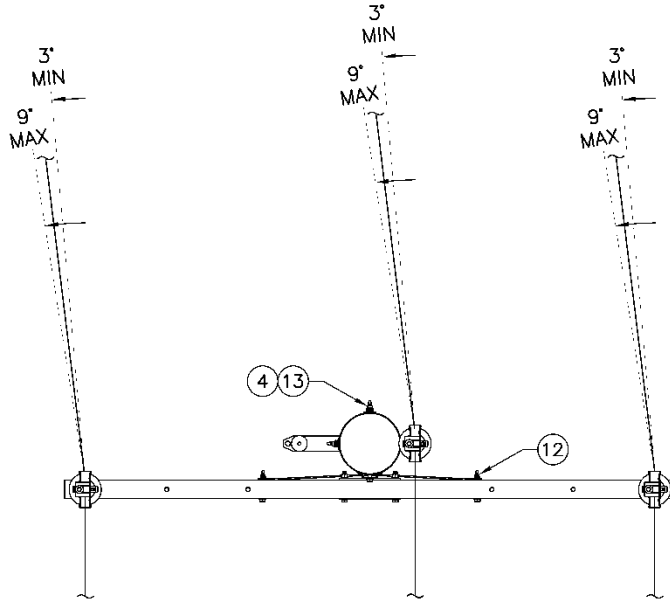


Figure 3i. Allowable Line Angle Range for Grade B 954 kcmil ACSR Single Arm Angle Pole

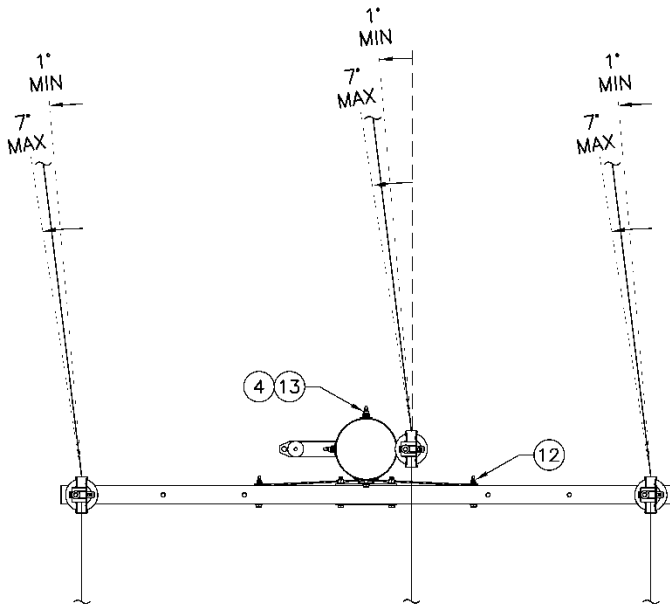


Figure 3j. Three-Phase 397.5 and 954 kcmil ACSR Single Arm Angle Pole Top Assembly

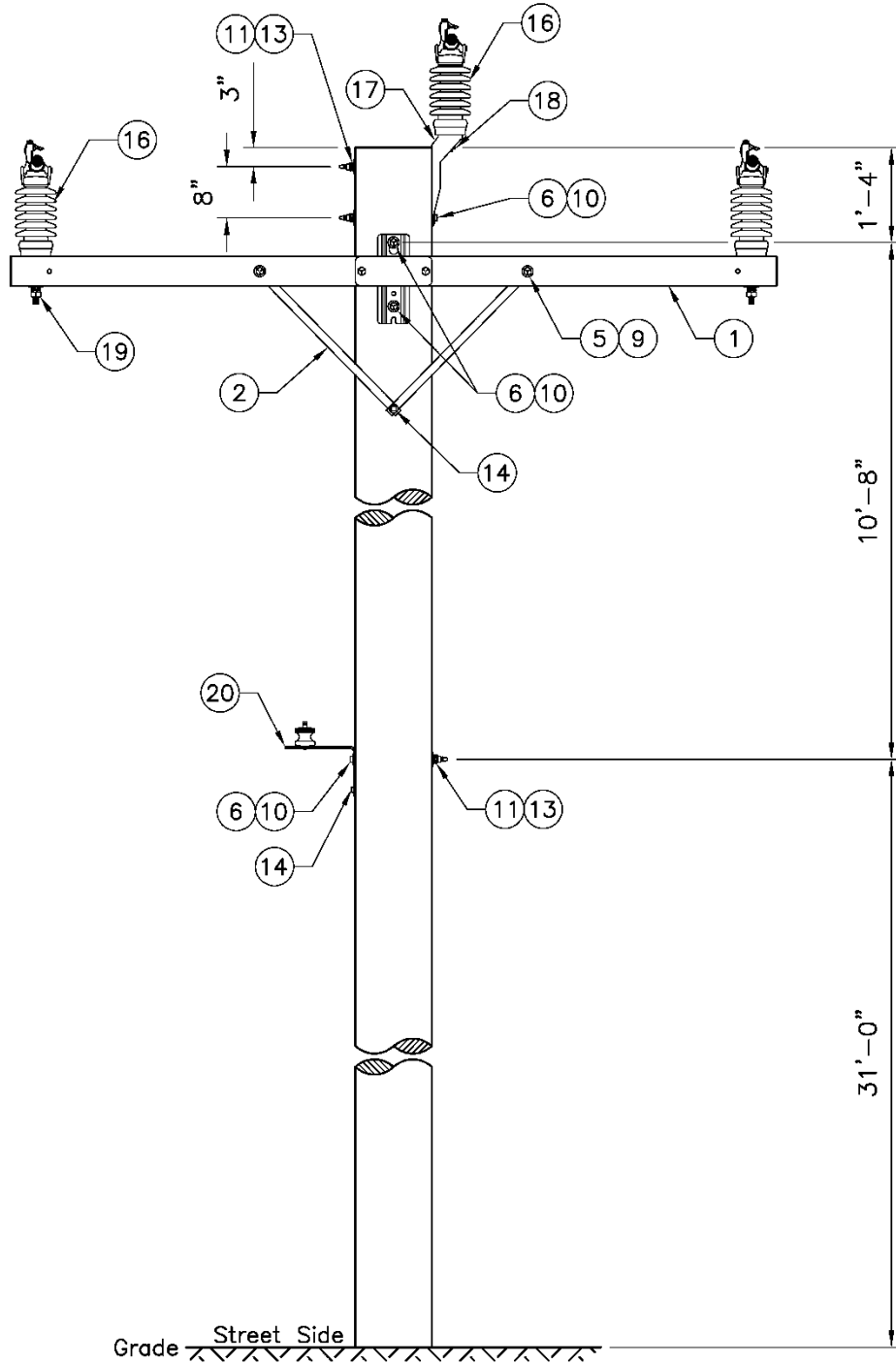


Figure 3k. Allowable Line Angle Range for Grade C 954 kcmil ACSR Double Arm Angle Pole

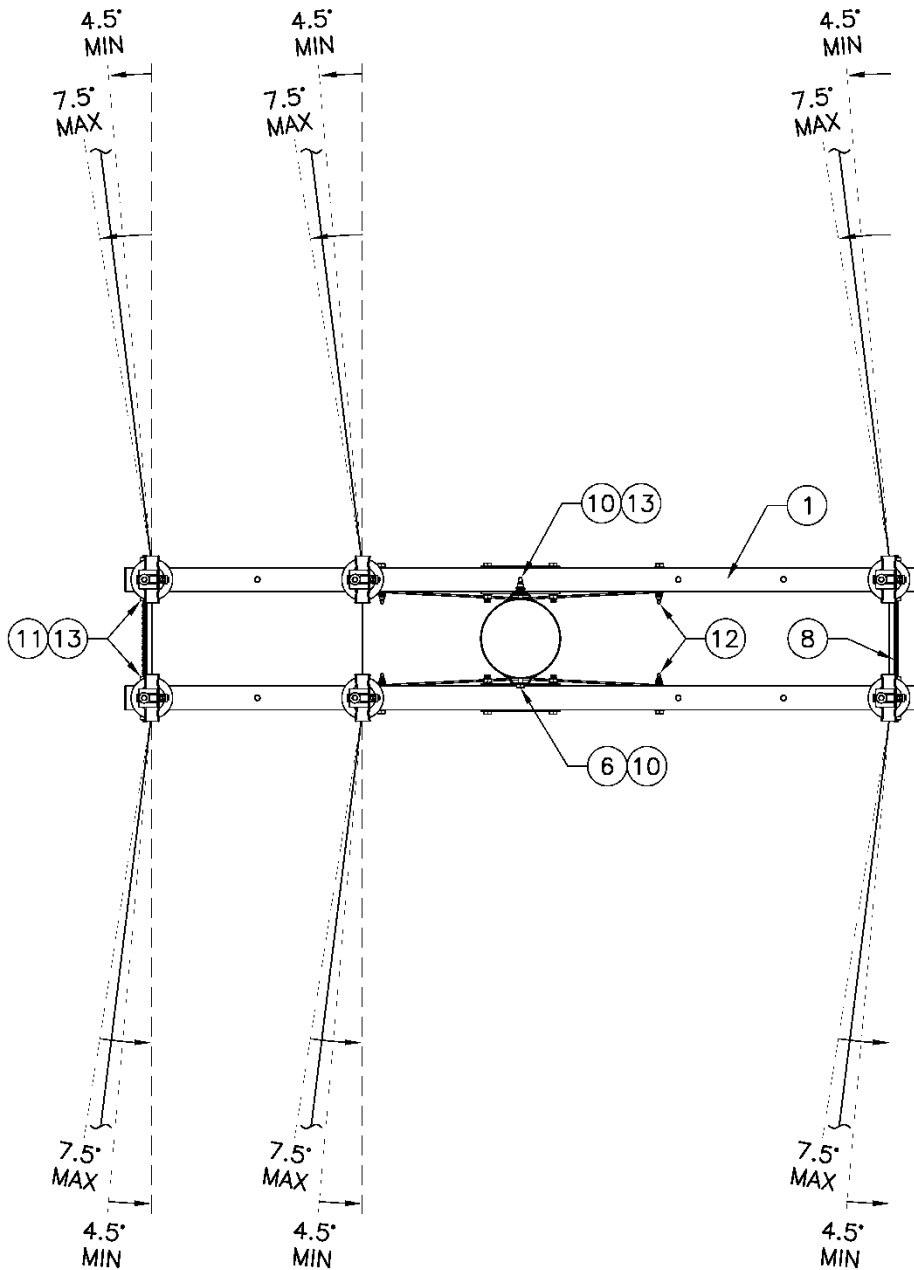


Figure 3I. Allowable Line Angle Range for Grade B 954 kcmil ACSR Double Arm Angle Pole

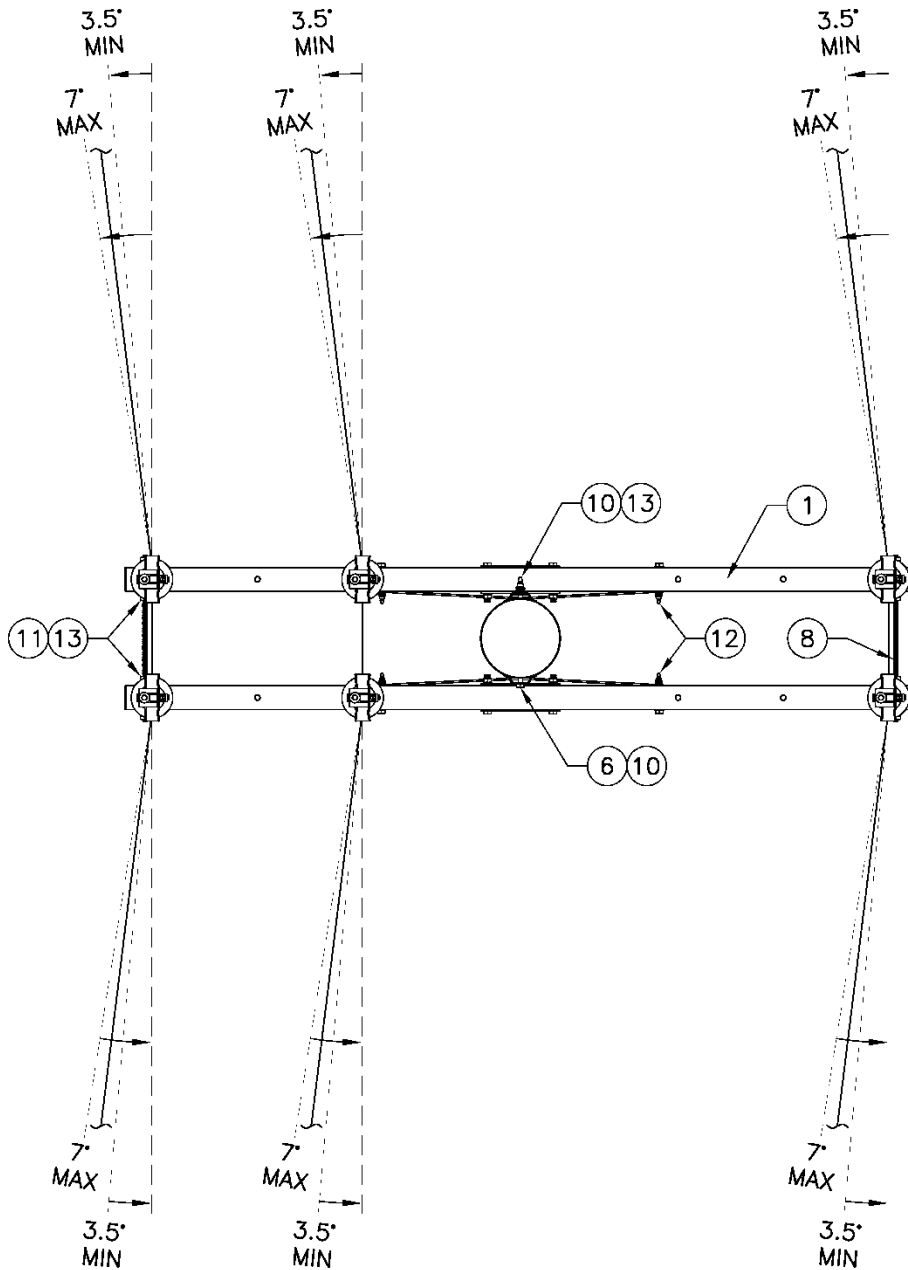
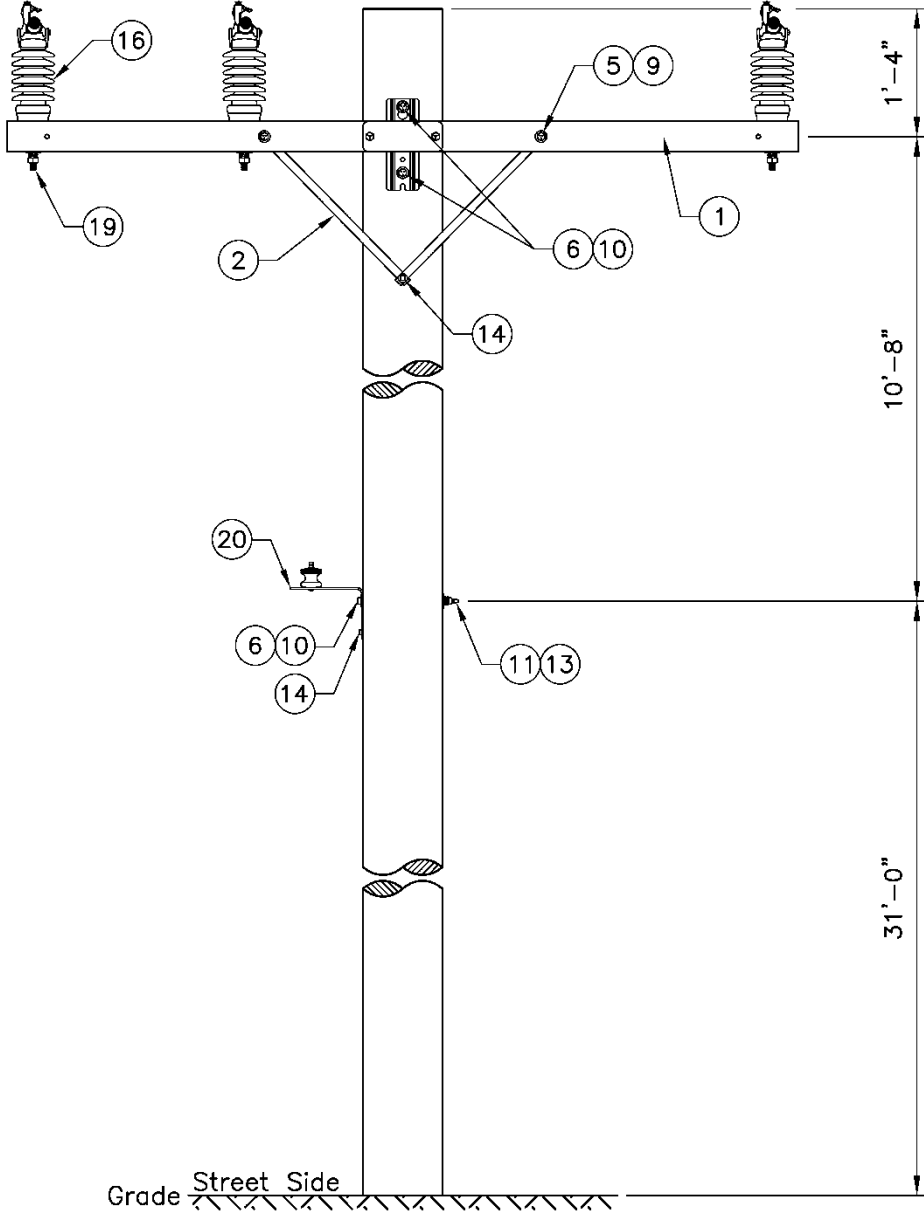


Figure 3m. Three-Phase 397.5 and 954 kcmil ACSR Double Arm Angle Pole Top Assembly



4. Construction Notes

- The LR bracket shall be installed on the street side of the pole.
- If two neutrals are required, mount the second neutral on the street side 1 ft below the top bolt hole of the original neutral.
- If poor soil is found in the field, contact the SCL Design Engineer.
- If there are avian and wildlife concerns, contact the SCL Design Engineer.
- If there are salt spray concerns, contact the SCL Design Engineer.

5. Material List

Table 5. Materials for Three-Phase Angle Pole Top Assemblies

Fig	Compatible Unit	ID	Quantity					
3c	Three-phase #4 AWG Cu angle pole top assembly	PLT#4-3ANGHP						
3c	Two-phase #4 AWG Cu angle pole top assembly	PLT#4-2ANG						
3j	Three-phase 397.5 kcmil ACSR single arm angle pole top assembly	PLT397-ANGHP						
3m	Three-phase 397.5 kcmil ACSR double arm angle pole top assembly	PLT397-ANG2						
3j	Three-phase 954 kcmil ACSR single arm angle pole top assembly	PLT954-ANGHP						
3m	Three-phase 954 kcmil ACSR double arm angle pole top assembly	PLT954-ANG2						
#	Material Description	ID	2	1	2	1	1	1
1	Crossarm, tangent, fiberglass	014643	2	1	2	1	1	1
2	Crossarm, brace, flat - 32"	563005	4	2	4	2	2	2
4	Washer, square, curved, 4" x 4"	584775	2	2	2	2	2	2
5	Bolt, machine, galvanized - 1/2" x 5"	780804	4	2	4	2	2	2
6	Bolt, machine, galvanized - 5/8" x 14"	780846	3	5	3	5	3	5
8	Bolt, double arming, galvanized - 5/8" x 22"	560522	2	-	2	-	-	-
9	Washer, round, flat - 1/2"	585025	4	2	4	2	2	2
10	Washer, round, flat - 5/8"	585030	3	5	3	5	3	5
11	Washer, square, flat - 2-1/4" x 2-1/4"	585135	10	3	10	3	1	3
12	Washer, coil spring lock - 1/2"	584257	4	2	4	2	2	2
13	Washer, coil spring lock - 5/8"	584261	13	5	13	5	3	5
14	Screw, lag - 1/2" x 4"	785261	3	2	3	2	2	2
15	Insulator, post top, 34.5 kV (tie-top)	014304	-	-	-	-	2	3
16	Insulator, post top, 34.5 kV (clamp-top)	014517	3	3	6	3	-	-
17	Bracket, pole top	563253	-	1	-	1	-	1
18	Stud, short - 3/4" x 1-3/4"	696826	-	1	-	1	-	1
19	Stud, long - 3/4" x 7-1/2"	696828	6	2	6	2	2	2
20	Bracket, LR	690404	1	1	1	1	1	1
21	Wire, ties, insulator, #6 Cu solid, bare, SD, ft	610210	-	-	-	-	6	9

6. References

SCL Construction Standard 0199.01; “Requirements for Guying and Anchoring”

SCL Construction Standards 0123.01; “Three-Phase Tangent Pole Top Assemblies”

SCL Construction Standards 0123.05; “Three-Phase Dead End Pole Top Assemblies”

7. Sources

National Electrical Safety Code (NESC) C2-2012 Edition; Institute of Electrical and Electronics Engineers (IEEE) Inc., New York, NY, 2011

Hall, Alan; SCL Senior Electrical Engineer and subject matter expert for 0123.03

Lu, Curtis; SCL Standards Engineer and originator of 0123.03