

CROSS ARMS

04



CROSSARMS AND FITTINGS

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CROSSARM AND FITTINGS

Fiberglass Assembly Loading Criteria

04 00 01 01

1 of 1

Fiberglass Crossarm Loadings									
Description	DCS #	Crossarm STK #	Ultimate Transverse Load (lbs/wire)	No. Wire	Ultimate Longitudinal Load (lbs/wire)	No. Wire	Ultimate Vertical Load (lbs/wire)	No. Wire	Weight
8' Tangent Arm	04 00 41 14	41 01 286	1,750	4	1,375	4	1750	4	41
10' Tangent Arm	04 00 41 16	41 01 285	3,500	4	1,375	4	1750	4	48
12' Tangent Arm	04 00 41 20	41 01 309	4,375	6	2,250	2	3125	2	74
			-	-	1,125	6	1625	6	74
16' Tangent Arm	04 00 41 21	41 01 312	4,375	6	1,625	2	2500	2	91
			-	-	875	6	1625	6	91
6' Dead End Arm	04 00 42 01	41 01 291	4,625	2	6,000	2	-	-	47
8' Dead End Arm	04 00 42 02	41 01 189	4,625	2	5,250	2	-	-	54
10' Dead End Arm	04 00 42 03	41 01 295	3,375	4	4,000	4	1,313	4	69
12' Dead End Arm	04 00 42 04	41 01 307	6,375	3	7,500	3	-	-	107
9' Double Stack HD Dead End Arm	04 00 42 05	41 01 301	6,813	4	7,875	4	-	-	159
11' Double Stack HD Dead End Arm	04 00 42 06	41 01 302	6,813	4	8,000	4	-	-	142
12' Double Stack HD Dead End Arm	04 00 42 07	41 01 308	13,625	2	10,000	2	-	-	167
			6,813	4	7,375	4	-	-	167
8' Alley Arm	04 00 43 01	41 01 293	625	2	500	2	675	2	54
10' Alley Arm	04 00 43 02	41 01 294	312.5	4	275	4	375	4	63

REV	DATE	ENG	DESCRIPTION
2	01/01/21	KR	Converted to new format
1	04/11/11	MJ	



CROSSARMS AND FITTINGS

Wood Assembly Loading Criteria

04 00 01 02

1 of 2

This standard covers working clearances, electrical insulation levels, and Vertical (V), Horizontal (H), and Transverse (T) loads during "Continuous" and "Intermittent" conditions. These values are listed in DCS **04 00 20 ****, **04 00 24 ****, and **04 00 25 ****.

Vertical (V) Loadings

- "Continuous" loading, normally the 60°F loadings, are those applied day in and day out for years at a time. This compares to the "Intermittent" loadings or short term loadings as experienced during NESC Heavy Loading conditions due to ice, winds, plus at times, a lineman's weight on the extremity of the crossarm.
- Due to the inherent characteristics of wood, it behaves differently under the various types of loads. With a continuous load applied to the arm, deflection will occur and in time, a permanent set takes place. The degree of set is dependent upon the amount of applied load. It is from this condition, that as the intermittent loads are applied, further arm deflections or bending take place. However, as the intermittent loads reduce and return to the normal continuous loading the arm deflections also return to normal. Both of these conditions must be checked, and below Example illustrates the use of the table in this standard.

EXAMPLE:

Given a straight and level (4.16kV) line with 150ft spans and 3 x 556.5 kcmil bare AAC conductors carried on crossarms in the top pole gain. Neutral is attached on body of pole.

The bare weight of the conductor (without ice) is 0.5224 lbs/ft. The load on the pin is 78 lbs. Assume the conductors are placed on two end pins and a pin 29 inches in from one of the end pins. On an 8' arm, the Equivalent Continuous Vertical Load (VCont) located 4 inches in from the end of the arm is obtained by taking moments about the crossarm through bolt for the heavier loaded half of the crossarm.

$$\begin{aligned} V_{Cont} \times 44 \text{ inches} &= 78 \text{ lbs} \times 44 \text{ inches} + 78 \text{ lbs} \times 15 \text{ inches} \\ V_{Cont} &= 105 \text{ lbs} \end{aligned}$$

The portion of NESC "Heavy Loading" contributed by the conductor (with ice) is 1.366 lbs/ft or 205 lbs per pin. This gives a Partial Equivalent Intermittent Vertical Loading (VPint).

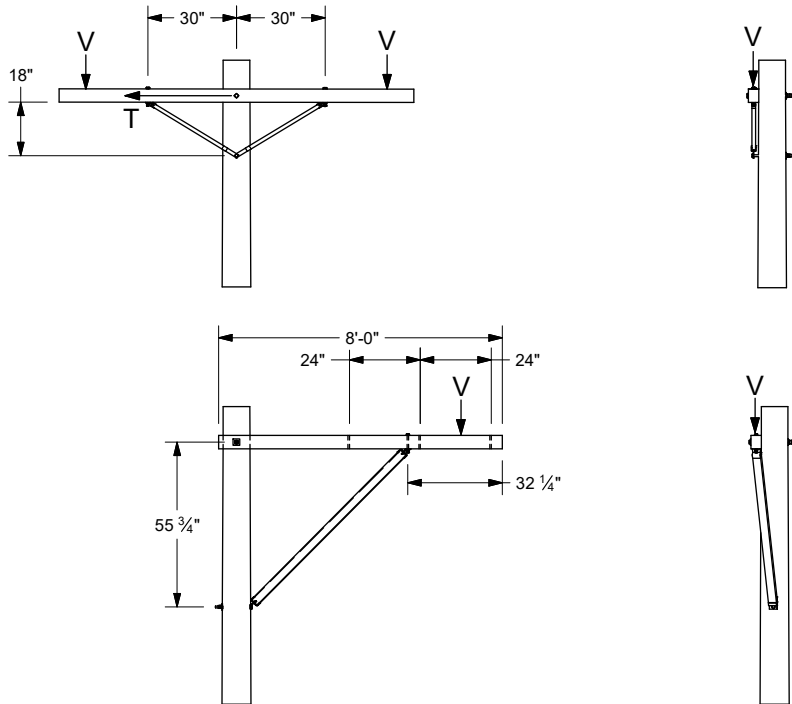
$$\begin{aligned} V_{Pint} \times 44 \text{ inches} &= 205 \text{ lbs} \times 44 \text{ inches} + 205 \text{ lbs} \times 15 \text{ inches} \\ V_{Pint} &= 275 \text{ lbs} \end{aligned}$$

All braced wood crossarms shall be capable of supporting a vertical load of 300 lbs (Lineman's weight, plus harness, tools, and equipment supported by the lineman) at either extremity in addition to the weight of the conductor. Thus, the total Equivalent Intermittent Vertical Load (VInt) is:

$$V_{Int} = 275 \text{ lbs} + 300 \text{ lbs} = 575 \text{ lbs}$$

In this construction standard, an 8' single wood arm, DCS **04 00 20 02**, is good for 300 lbs "Continuous Loading" and 900 lbs "Intermittent Loading" which is adequate for the calculated loads in both conditions. Overload capacity factors are built into the loading tables in this standard.

REV	DATE	ENG	DESCRIPTION
9	04/01/22	KR	Removed Problems 2 & 3; Revised Note 3; Updated Loading table
8	04/01/19	KR	



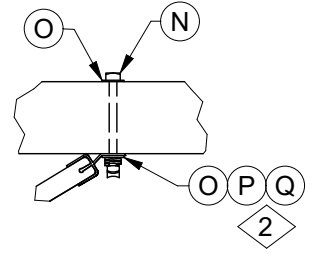
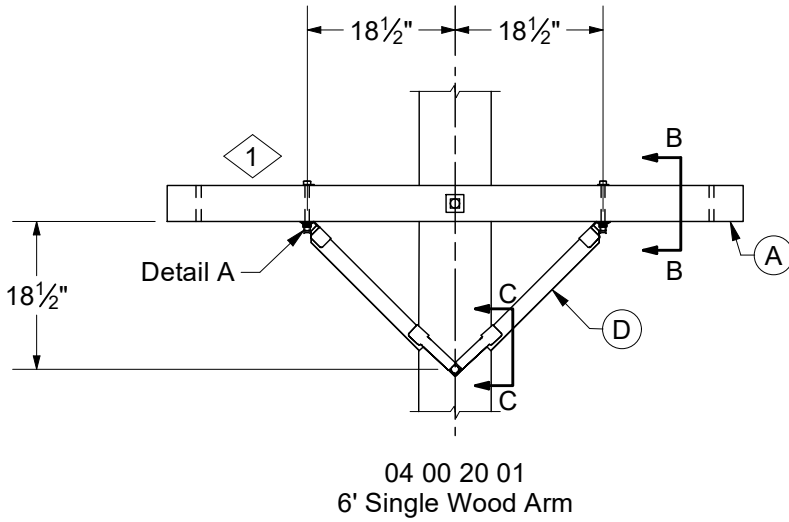
V = Equivalent Vertical Load on Crossarm 4" From End of Arm
T = Transverse Load on Crossarm Due to Line Angles or Wind Loads

Wood Crossarm Loadings											
DCS #	Crossarm Length (ft)	No. of Arms	Type Braces (Wood)	Allowable Continuous (60 F Initial) Loadings (lbs/wire)				Allowable Intermittent (NESC Heavy Final) Loadings (lbs/wire)			
				V	H 1	T 2	T 3	V	H 1	T 2	T 3
Crossarm Units											
04 00 20 01	6	Single	V	300	-	-	-	900	-	-	-
04 00 20 02	8	Single	V	300	-	-	-	900	-	-	-
04 00 20 03	10	Single	V	225	-	-	-	675	-	-	-
Side Arm Units											
04 00 24 01	6	Single	Heel	350	200	400	-	1050	400	1200	-
04 00 25 01	6	Double	Heel	350	400	800	1400	1050	800	2400	4000
04 00 24 02	8	Single	Heel	250	200	400	-	750	400	1200	-
04 00 25 02	8	Double	Heel	250	400	800	1400	750	800	2400	4000

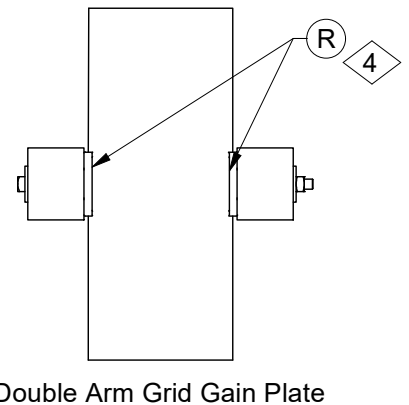
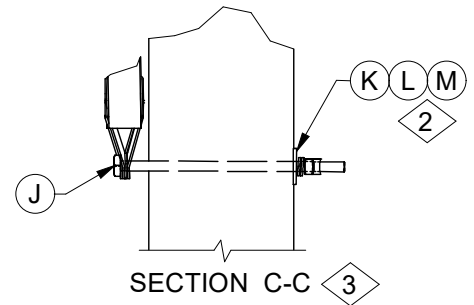
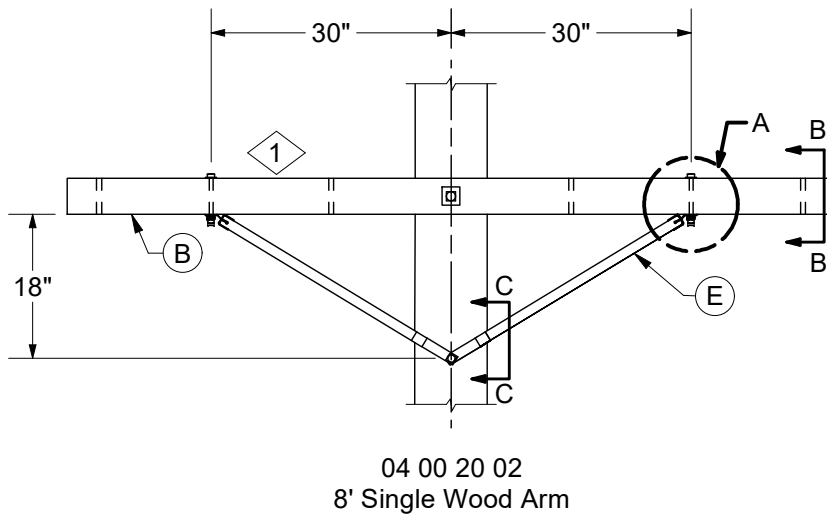
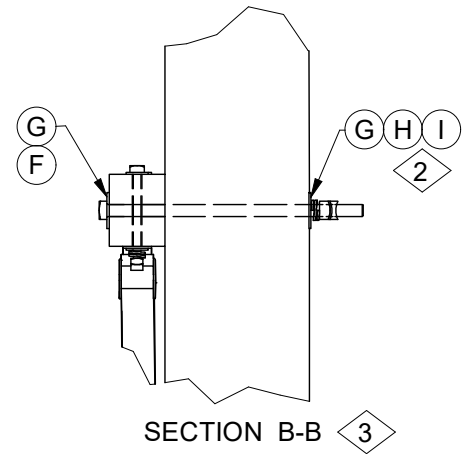
DESIGN NOTE(s):

1. The "Allowable Continuous Loading" for one insulator pin is 170 lbs, and the "Allowable Intermittent Loading" is 500 lbs.
2. The loadings shown are based on arm strength. Where more than two conductors are used per arm the total of pin loadings must not exceed the loadings given.
3. Double wood arm criteria is for existing conditions.

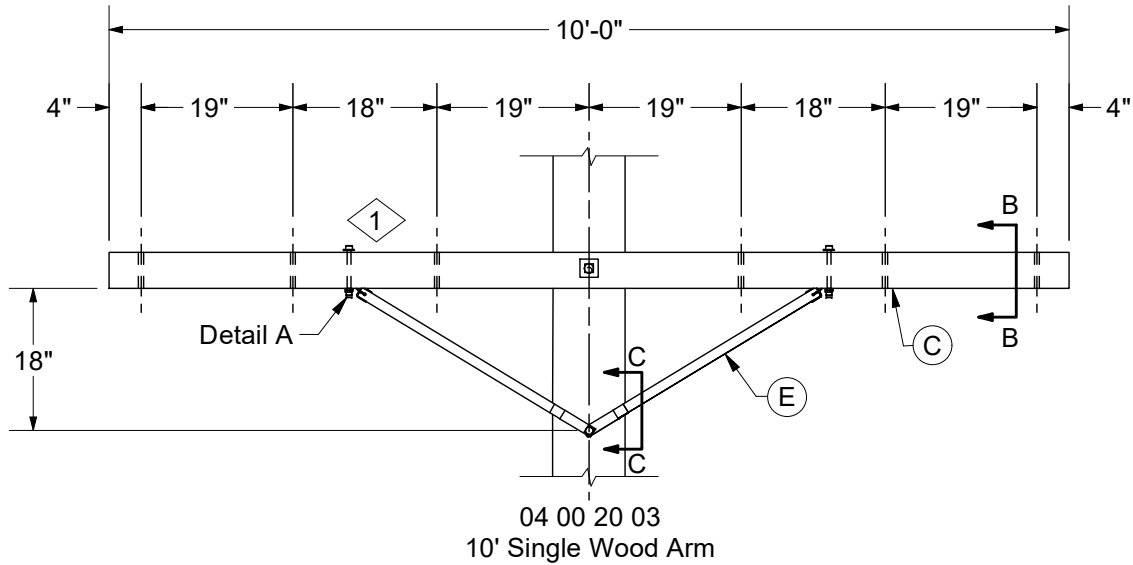
REV	DATE	ENG	DESCRIPTION
9	04/01/22	KR	Removed Problems 2 & 3; Revised Note 3; Updated Loading table
8	04/01/19	KR	



DETAIL A



REV	DATE	ENG	DESCRIPTION
016	01/01/21	KR	Removed double crossarm standards
015	03/11/16	WYW	

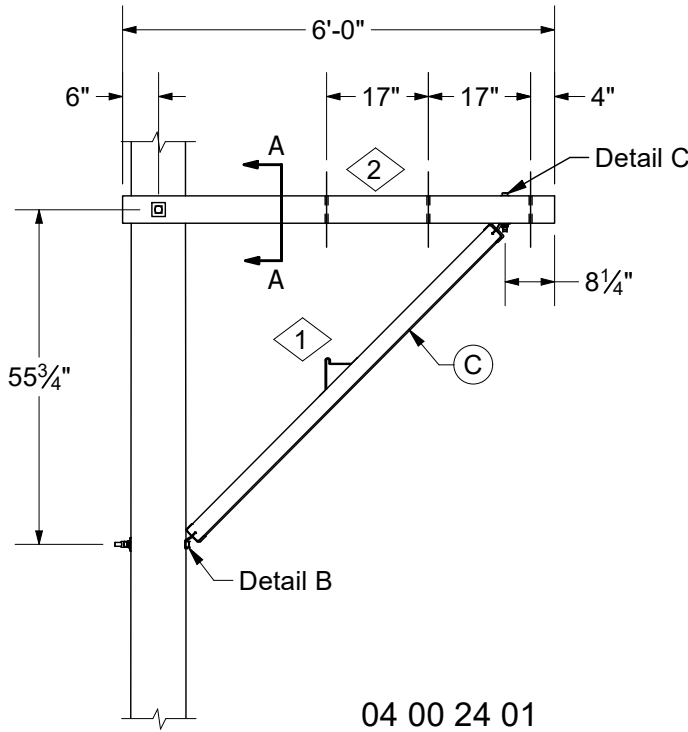


CONSTRUCTION NOTE(s):

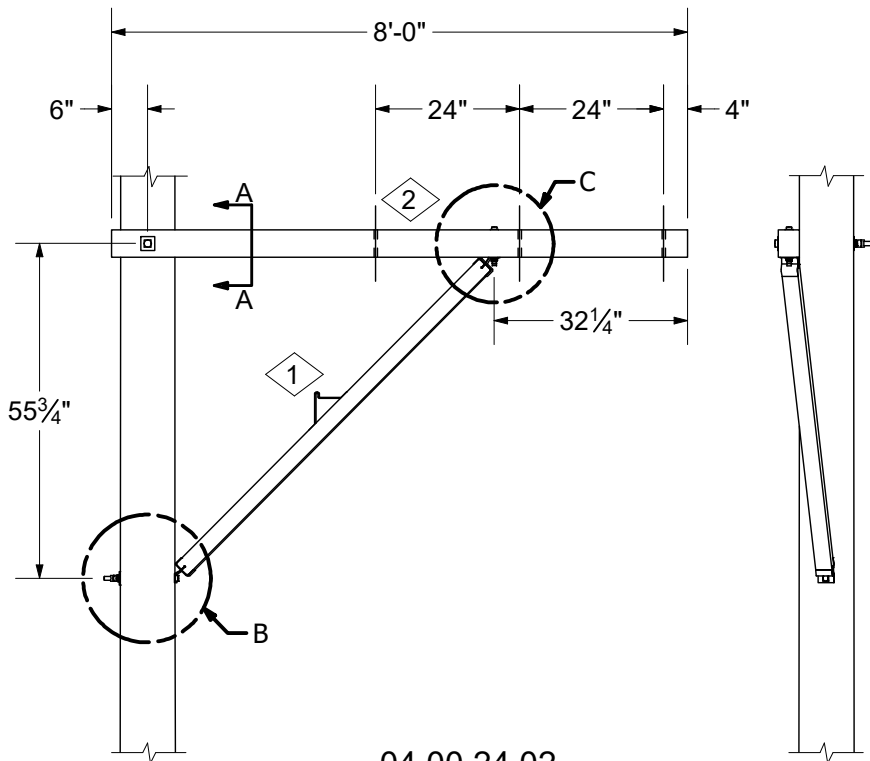
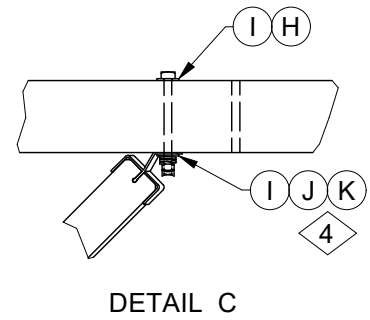
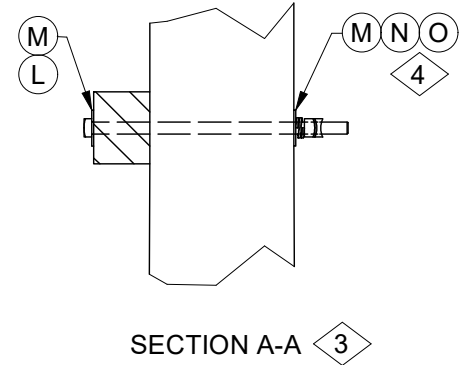
1. Field drill if required.
2. Assemble items in order listed. Square nut provided with bolt is used after double coil washer. Double coil washer not needed on composite poles. Lock nuts must be placed after nut included with bolt stock code number.
3. Always load the non-threaded portion of the bolt with arms and braces.
4. If back to back arms are needed, include item R. (Maintenance Only)
5. Use longer machine bolts for larger wood or composite poles if required.

ITEM	STK / DCS #	DESCRIPTION	04 00 20 **	01	02	03
A	41 01 006	6' Crossarm - 3-1/2" x 4-1/2"	1	-	-	
B	41 01 014	8' Crossarm - 3-1/2" x 4-1/2"	-	1	-	
C	41 01 008	10' Crossarm - 3-1/2" x 4-1/2"	-	-	1	
D	41 56 063	Brace - 37" V	1	-	-	
E	41 56 016	Brace - 60" V	-	1	1	
F	23 52 254	Bolt, Mach., 3/4" x 16" w/ square nut	1	1	1	
G	23 66 131	Washer, Square, 3/4"	2	2	2	
H	23 66 135	Lock Washer - 3/4" Double Coil	1	1	1	
I	23 65 042	Lock Nut - 3/4" Square	1	1	1	
J	23 52 066	Bolt, Mach., 5/8" x 14" w/ square nut	1	1	1	
K	23 66 027	Washer - Square 5/8"	1	1	1	
L	23 66 134	Lock Washer - 5/8" Double Coil	1	1	1	
M	23 65 043	Lock Nut - 5/8" Square	1	1	1	
N	23 52 038	Bolt, Mach., 1/2" x 6" w/ square nut	2	2	2	
O	23 66 017	Washer - Round 1/2"	4	4	4	
P	23 66 133	Lock Washer - Double Coil 1/2"	2	2	2	
Q	23 65 056	Lock Nut - 1/2" Square	2	2	2	
@4 R	23 77 218	Plate, Grain, Grid, Crossarm	2	2	2	

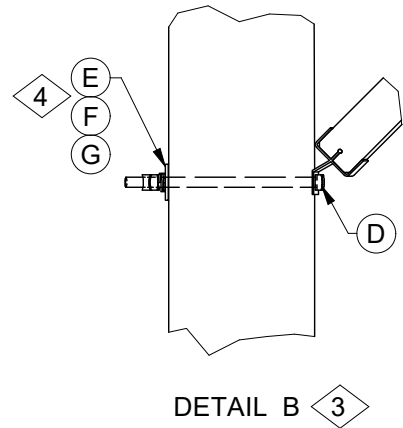
REV	DATE	ENG	DESCRIPTION
016	01/01/21	KR	Removed double crossarm standards
015	03/11/16	WYW	



04 00 24 01
6' Single Alley Arm



04 00 24 02
8' Single Alley Arm



REV	DATE	ENG	DESCRIPTION
5	01/01/21	KR	Modified Drawing, added note 3
4	04/12/11	MJ	



CROSSARMS AND FITTINGS

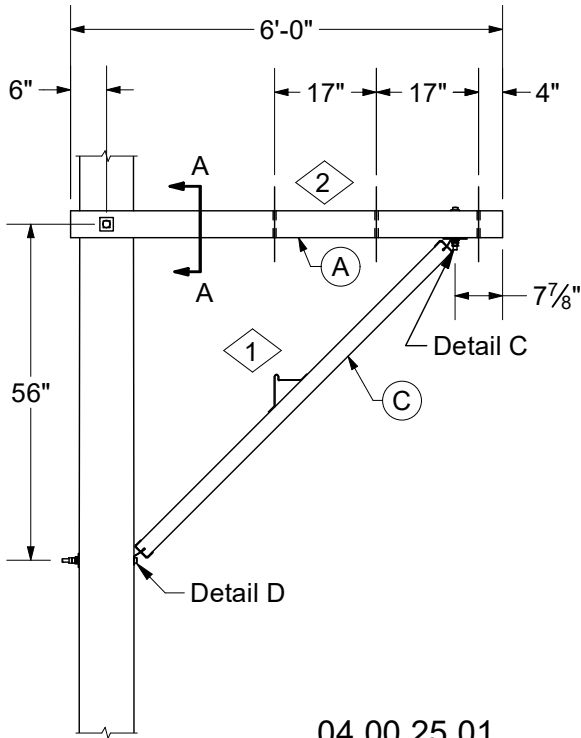
Wood Single Alley Arm Assembly

CONSTRUCTION NOTE(s):

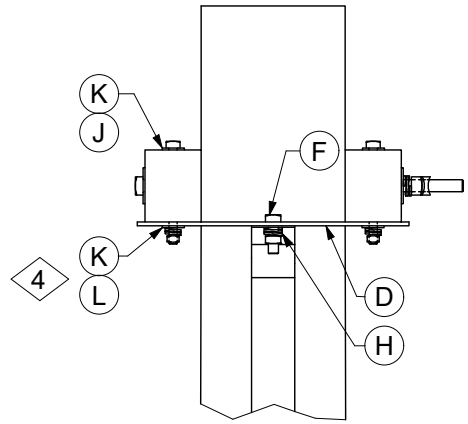
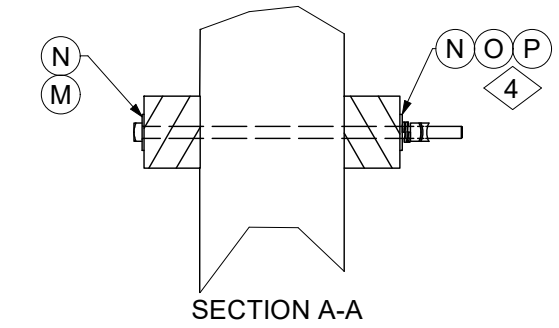
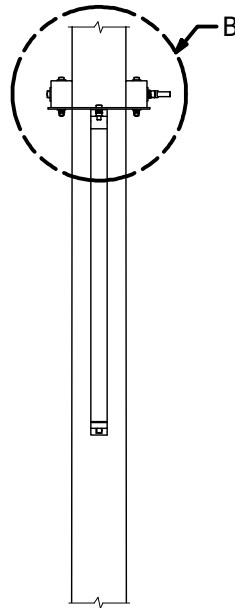
1. Heel brace step, Stock #23 67 064 is optional and is not shown in material list.
2. Field drill, if required.
3. Always load the non-threaded portion of the bolt with arms and braces.
4. Assemble items in order listed. Square nut provided with bolt is used after double coil washer. Double coil washer not needed on composite poles. Lock nuts must be placed after nut included with bolt stock code number.
5. Use longer machine bolts for larger wood or composite poles if required.

ITEM	STK / DCS #	DESCRIPTION	04 00 24 **	01	02
A	41 01 006	6' Crossarm - 3-1/2" x 4-1/2"		1	-
B	41 01 014	8' Crossarm - 3-1/2" x 4-1/2"		-	1
C	41 56 023	Heel Brace - 6'-0"		1	1
D	23 52 065	Bolt, Mach., 5/8" x 12" w/ square nut		1	1
E	23 66 027	Washer - Square 5/8"		1	1
F	23 66 134	Lock Washer - 5/8" Double Coil		1	1
G	23 65 043	Lock Nut - 5/8" Square		1	1
H	23 52 038	Bolt, Mach., 1/2" x 6" w/ square nut		1	1
I	23 66 017	Washer - Round 1/2"		2	2
J	23 66 133	Lock Washer - Double Coil 1/2"		1	1
K	23 65 056	Lock Nut - 1/2" Square		1	1
L	23 52 254	Bolt, Mach., 3/4" x 16" w/ square nut		1	1
M	23 66 131	Washer, Square, 3/4"		2	2
N	23 66 135	Lock Washer - 3/4" Double Coil		1	1
O	23 65 042	Lock Nut - 3/4" Square		1	1

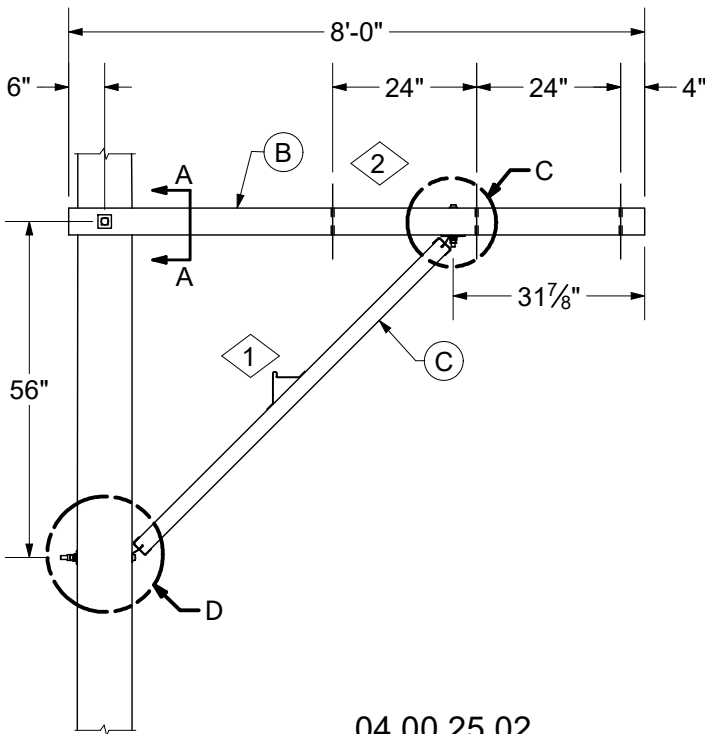
REV	DATE	ENG	DESCRIPTION
5	01/01/21	KR	Modified Drawing, added note 3
4	04/12/11	MJ	



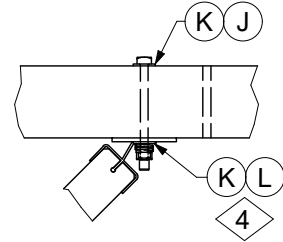
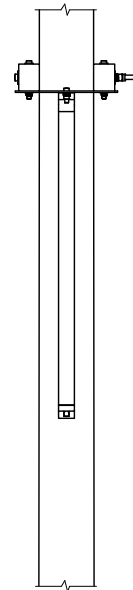
04 00 25 01
6' Double Alley Arm



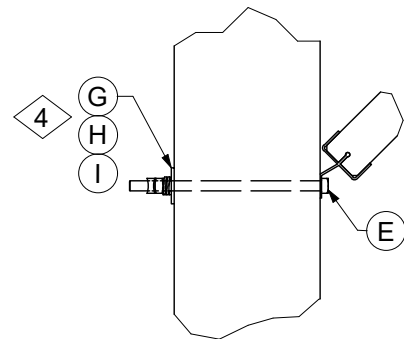
DETAIL B



04 00 25 02
8' Double Alley Arm



DETAIL C



DETAIL D 3

REV	DATE	ENG	DESCRIPTION
0	01/01/21	KR	New Issued Standard



CROSSARMS AND FITTINGS

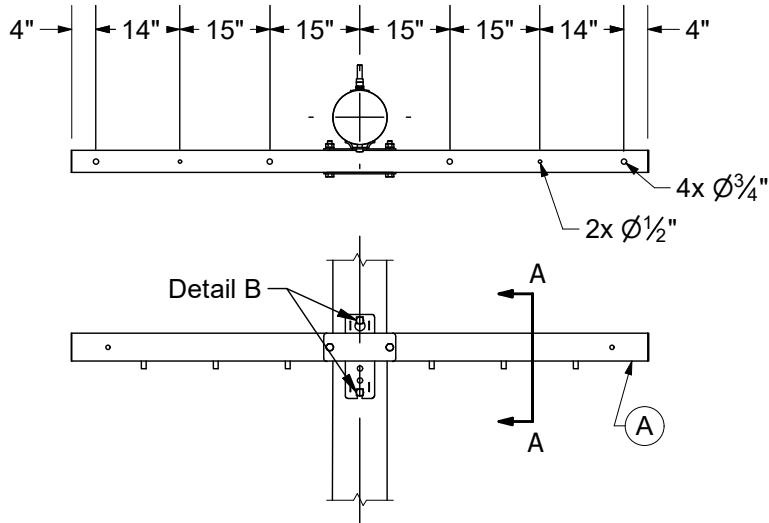
Wood Double Alley Arm Assembly

CONSTRUCTION NOTE(s):

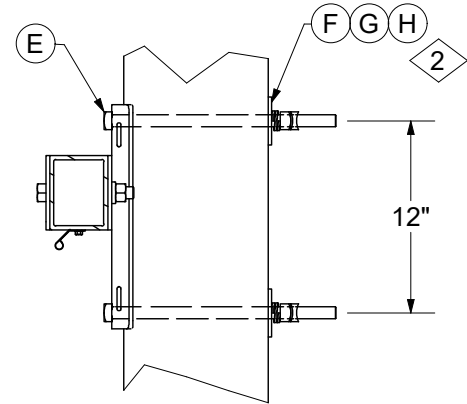
1. Heel brace step, Stk. # 23-67-064 is optional and is not shown in material list.
2. Field drill, if required.
3. Always load the non-threaded portion of the bolt with arms and braces.
4. Assemble items in order listed. Square nut provided with bolt is used after double coil washer. Double coil washer not needed on composite poles. Lock nuts must be placed after nut included with bolt stock number.
5. Use longer machine bolts for larger wood or composite poles if required.

ITEM	STK / DCS #	DESCRIPTION	04 00 25 **	01	02
A	41 01 006	6' Crossarm - 3-1/2" x 4-1/2"		2	-
B	41 01 014	8' Crossarm - 3-1/2" x 4-1/2"		-	2
C	41 56 023	Heel Brace - 6'-0"		1	1
D	23 77 212	Plate Heel Brace - 8-3/4" to 13-3/8"		1	1
E	23 52 065	Bolt, Mach., 5/8" x 12" w/ square nut		1	1
F	23 52 049	Bolt, Mach., 5/8" x 2" w/ square nut		1	1
G	23 66 027	Washer - Square 5/8"		1	1
H	23 66 134	Lock Washer - 5/8" Double Coil		2	2
I	23 65 043	Lock Nut - 5/8" Square		1	1
J	23 52 038	Bolt, Mach., 1/2" x 6" w/ square nut		2	2
K	23 66 017	Washer - Round 1/2"		4	4
L	23 66 133	Lock Washer - Double Coil 1/2"		2	2
M	23 52 118	Bolt, Mach., 3/4" x 20" w/ square nut		1	1
N	23 66 131	Washer, Square, 3/4"		2	2
O	23 66 135	Lock Washer - 3/4" Double Coil		1	1
P	23 65 042	Lock Nut - 3/4" Square		1	1

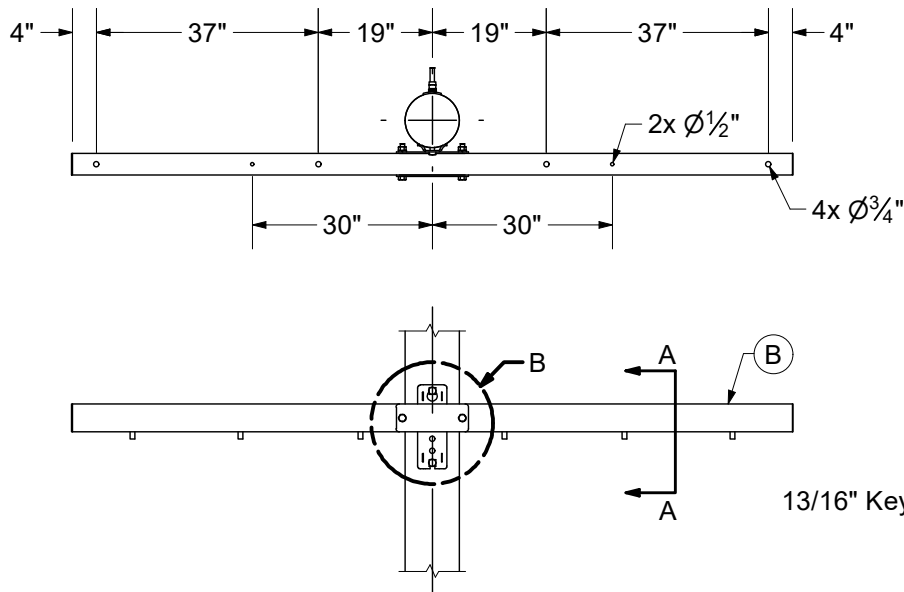
REV	DATE	ENG	DESCRIPTION
0	01/01/21	KR	New Issued Standard



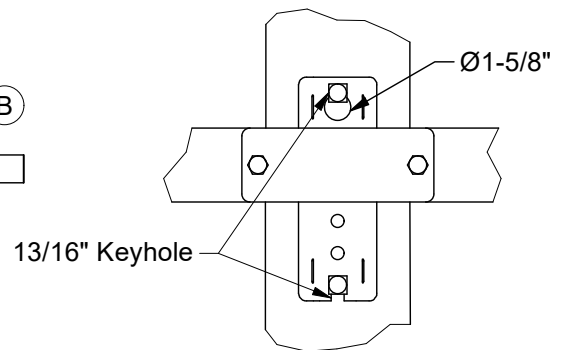
04 00 41 14
8' Tangent



SECTION A-A 5

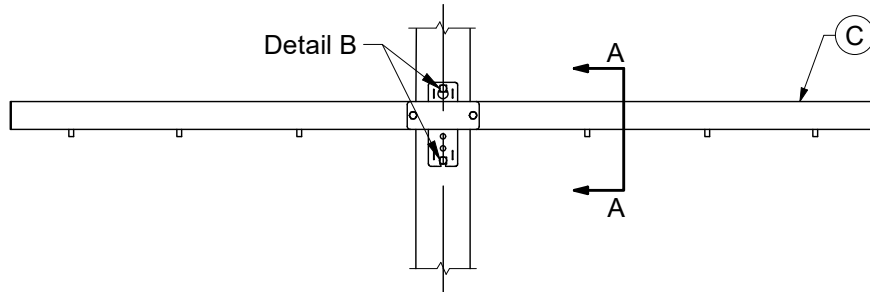
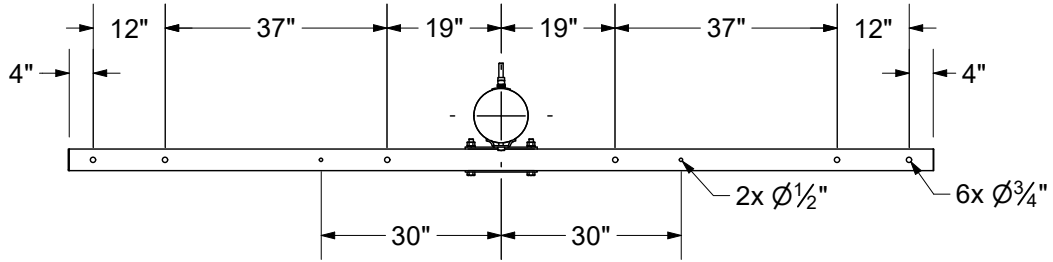


04 00 41 16
10' Tangent

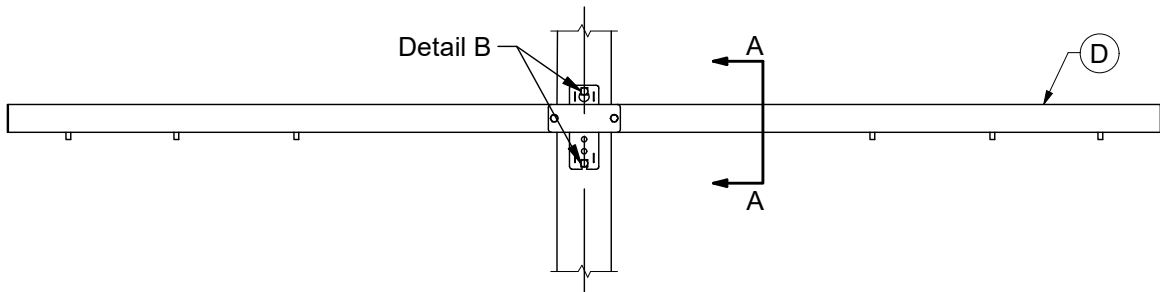
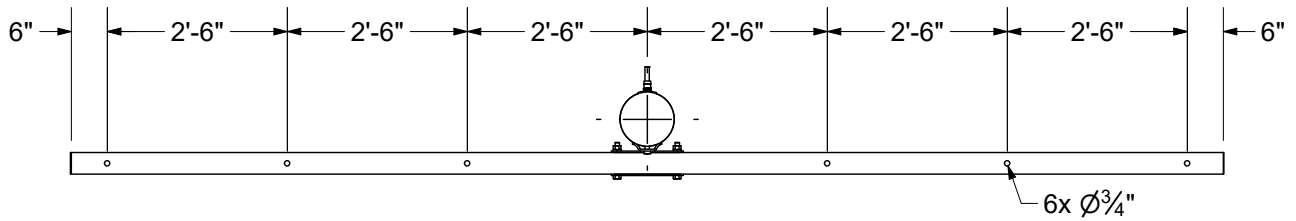


DETAIL B 5

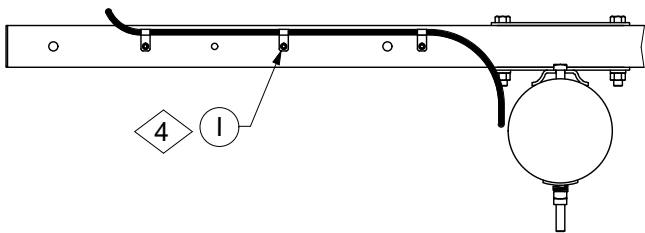
REV	DATE	ENG	DESCRIPTION
13	01/01/21	KR	Moved all fiberglass arms into new standards beside tangent arms.
12	03/10/16	WYW	



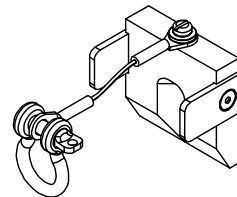
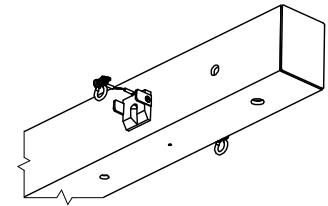
04 00 41 20
12' Tangent



04 00 41 21
16' Tangent



Bottom View



Hot Arm Block 3

REV	DATE	ENG	DESCRIPTION
13	01/01/21	KR	Moved all fiberglass arms into new standards beside tangent arms.
12	03/10/16	WYW	



CROSSARMS AND FITTINGS

Fiberglass Tangent Assembly

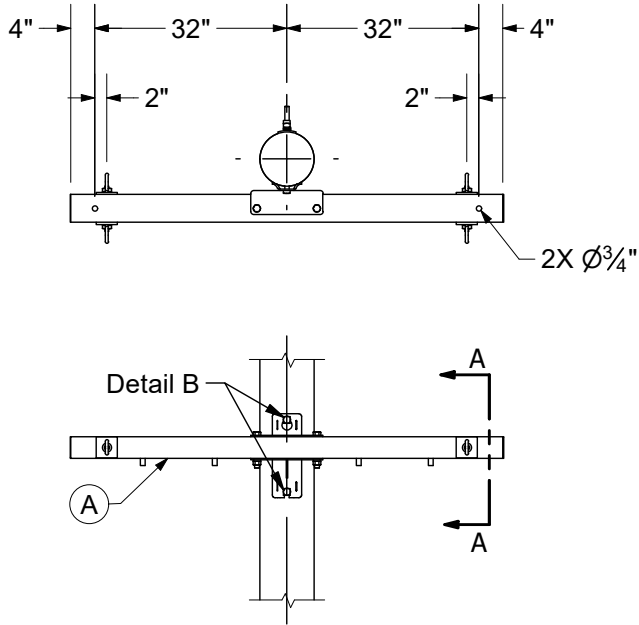
CONSTRUCTION NOTE(s):

1. Unbalanced loads require arm guys.
2. Assemble items in order listed. Square nut provided with bolt is used after double coil washer. Double coil washer not needed on composite poles. Lock nuts must be placed after nut included with bolt stock number.
3. When using fiberglass arms with hot arms a protective block to prevent the pin from fracturing the fiberglass arm is available (Stock #86 06 346).
4. When using a fiberglass arm with different devices a groundwire clip can be used below the arm to train the ground wire to the pole.
5. Always load the non-threaded portion of the bolt with arms and braces.
6. Use longer machine bolts for larger wood or composite poles if required.

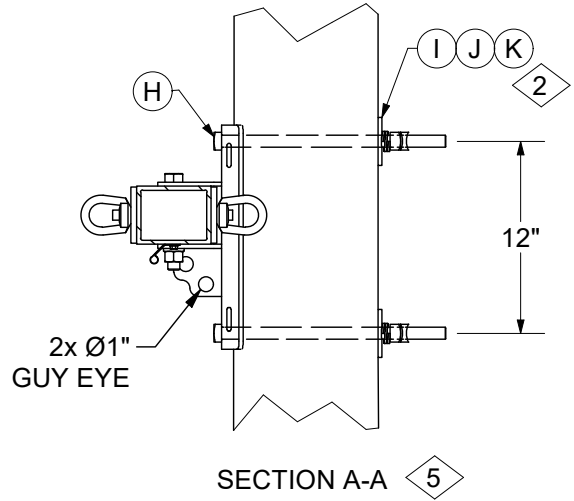
	ITEM	STK / DCS #	DESCRIPTION	04 00 41 **	14	16	20	21
	A	41 01 286	Crossarm - Tangent, F/G 8'		1	-	-	-
	B	41 01 285	Crossarm - Tangent, F/G 10'		-	1	-	-
	C	41 01 309	Crossarm - Tangent F/G 12'		-	-	1	-
	D	41 01 312	Crossarm - Tangent F/G 16'		-	-	-	1
	E	23 52 219	Bolt, Mach., 3/4" x 14" w/ square nut		2	2	2	2
	F	23 66 031	Washer, Curved, 3/4"		2	2	2	2
	G	23 66 135	Lock Washer - 3/4" Double Coil		2	2	2	2
	H	23 65 042	Lock Nut - 3/4" Square		2	2	2	2
@4	I	23 68 746	Grounding Clip Qty. 6		1	1	1	1

DISTRIBUTION CONSTRUCTION STANDARDS

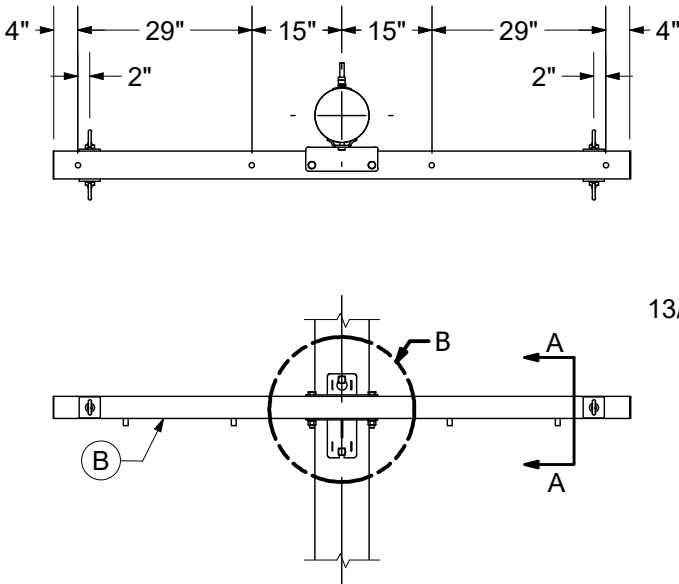
REV	DATE	ENG	DESCRIPTION
13	01/01/21	KR	Moved all fiberglass arms into new standards beside tangent arms.
12	03/10/16	WYW	



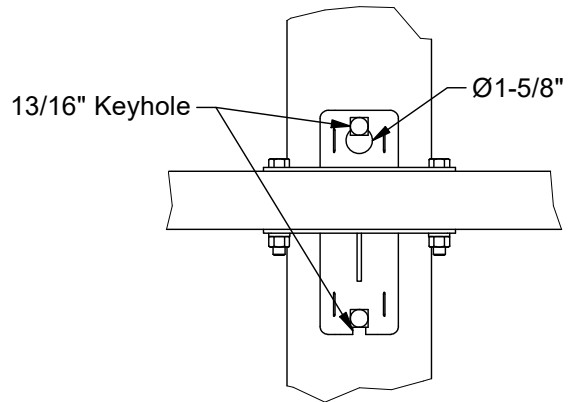
04 00 42 01
6' Deadend



SECTION A-A 5

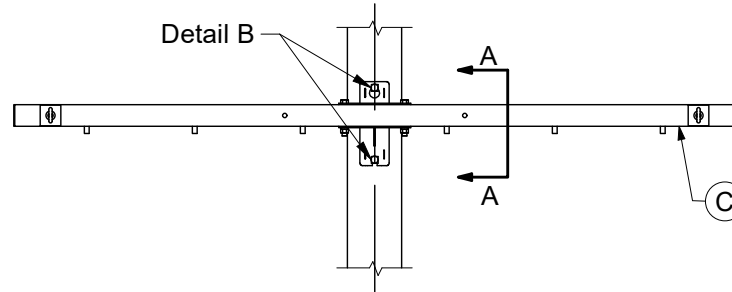
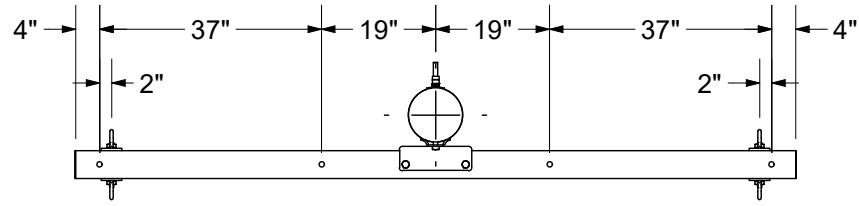


04 00 42 02
8' Deadend

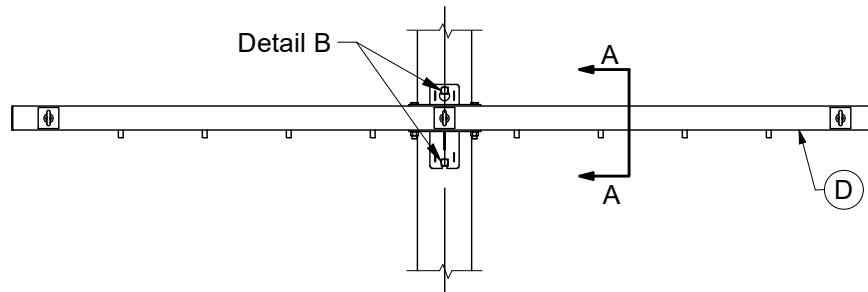
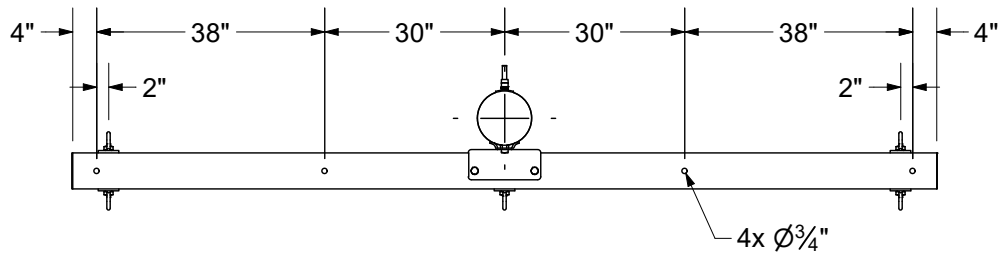


DETAIL B 5

REV	DATE	ENG	DESCRIPTION
0	01/01/21	KR	New Issued Standard

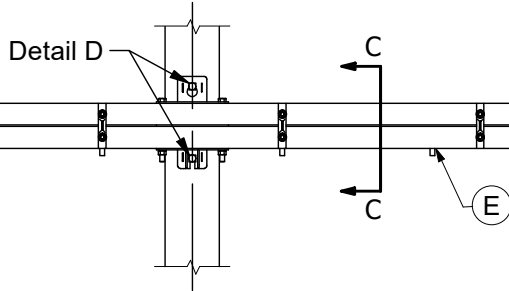
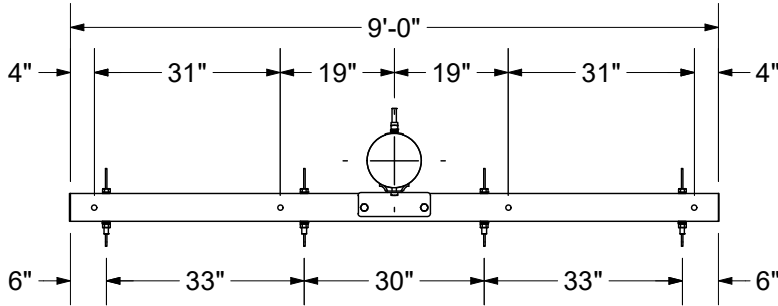


04 00 42 03
10' Deadend

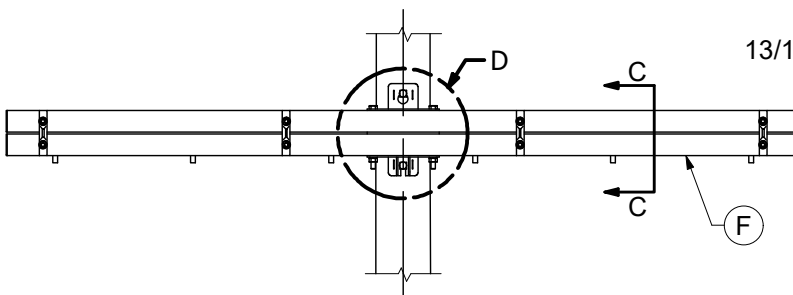
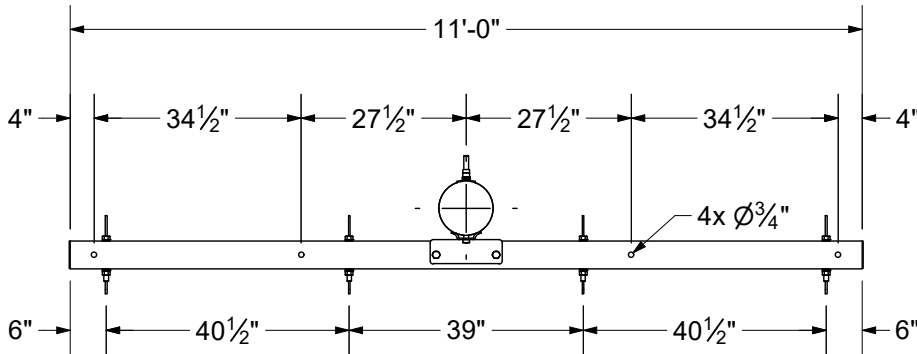
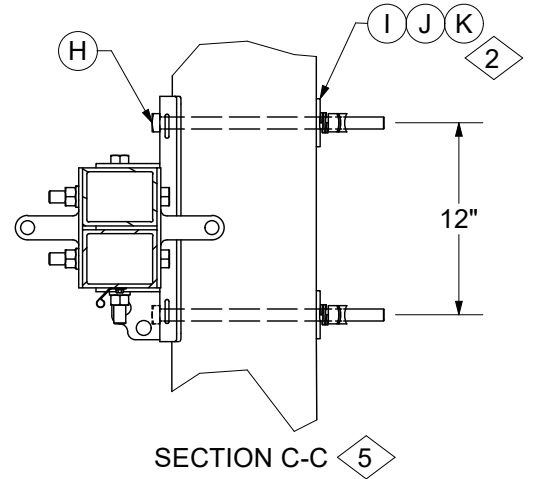


04 00 42 04
12' Deadend

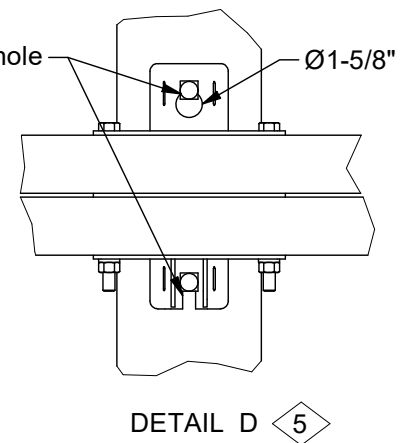
REV	DATE	ENG	DESCRIPTION
0	01/01/21	KR	New Issued Standard



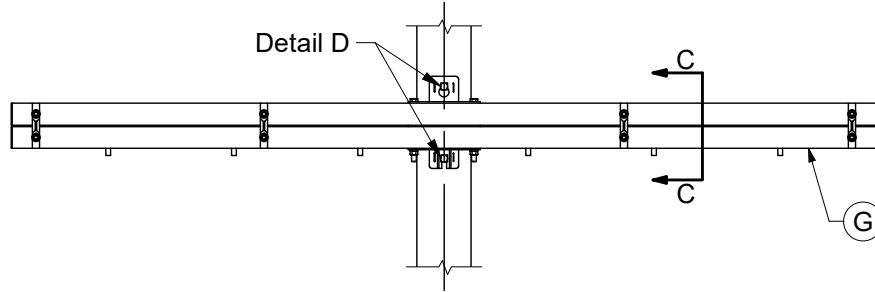
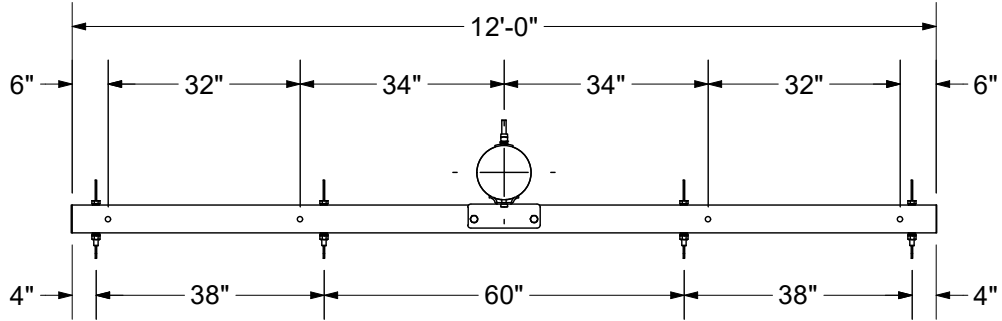
04 00 42 05
9' Double Stack HD Deadend



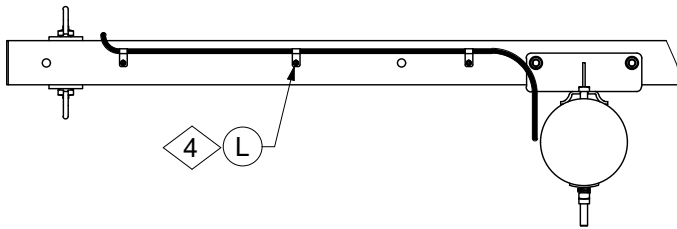
04 00 42 06
11' Double Stack HD Deadend



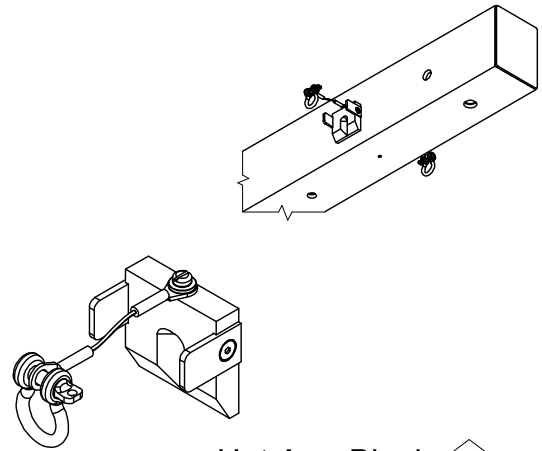
REV	DATE	ENG	DESCRIPTION
0	01/01/21	KR	New Issued Standard



04 00 42 07
12' Double Stack HD Deadend



Bottom View



Hot Arm Block 3

REV	DATE	ENG	DESCRIPTION
0	01/01/21	KR	New Issued Standard



CROSSARMS AND FITTINGS

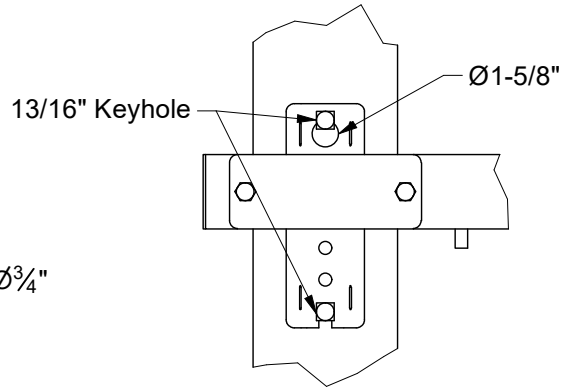
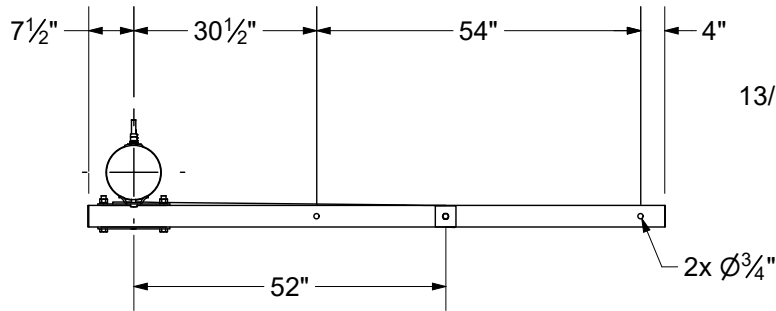
Fiberglass Deadend Assembly

CONSTRUCTION NOTE(s):

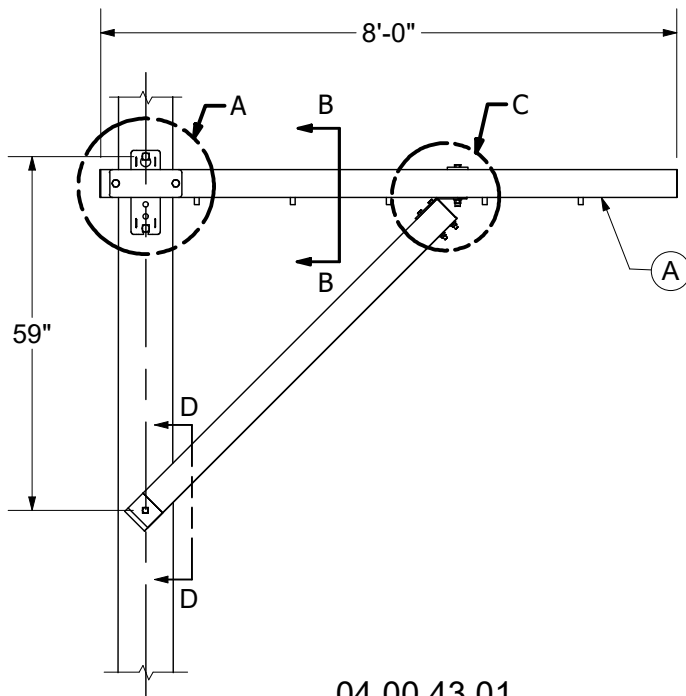
1. Unbalanced loads require arm guys.
2. Assemble items in order listed. Square nut provided with bolt is used after double coil washer. Double coil washer not needed on composite poles. Lock nuts must be placed after nut included with bolt stock number.
3. When using fiberglass arms with hot arms a protective block to prevent the pin from fracturing the fiberglass arm is available (Stock #86 06 346).
4. When using a fiberglass arm with different devices a groundwire clip can be used below the arm to train the ground wire to the pole.
5. Always load the non-threaded portion of the bolt with arms and braces.
6. Use longer machine bolts for larger wood or composite poles if required.

	ITEM	STK / DCS #	DESCRIPTION	04 00 42 **	01	02	03	04	05	06	07
	A	41 01 291	Crossarm - Deadend, F/G 6'		1	-	-	-	-	-	-
	B	41 01 189	Crossarm - Deadend, F/G 8'		-	1	-	-	-	-	-
	C	41 01 295	Crossarm - Deadend, F/G 10'		-	-	1	-	-	-	-
	D	41 01 307	Crossarm - Deadend, F/G 12'		-	-	-	1	-	-	-
	E	41 01 301	Crossarm - Double Stack HD Deadend 9'		-	-	-	-	1	-	-
	F	41 01 302	Crossarm - Double Stack HD Deadend 11'		-	-	-	-	-	1	-
	G	41 01 308	Crossarm - Double Stack HD Deadend 12'		-	-	-	-	-	-	1
	H	23 52 219	Bolt, Mach., 3/4" x 14" w/ square nut		2	2	2	2	2	2	2
	I	23 66 031	Washer, Curved, 3/4"		2	2	2	2	2	2	2
	J	23 66 135	Lock Washer - 3/4" Double Coil		2	2	2	2	2	2	2
	K	23 65 042	Lock Nut - 3/4" Square		2	2	2	2	2	2	2
@4	L	23 68 746	Grounding Clip Qty. 6		1	1	1	2	1	1	1

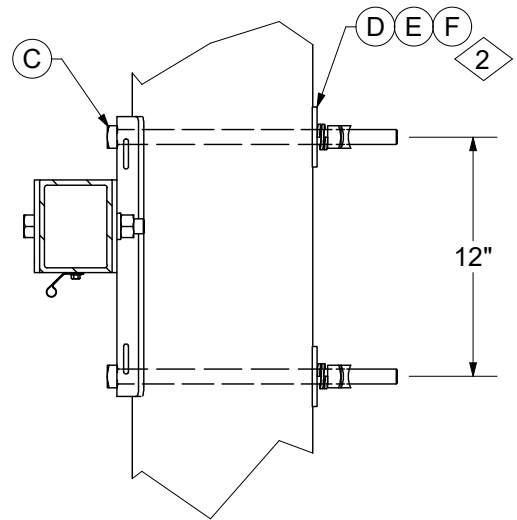
REV	DATE	ENG	DESCRIPTION
0	01/01/21	KR	New Issued Standard



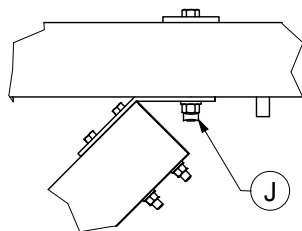
DETAIL A 5



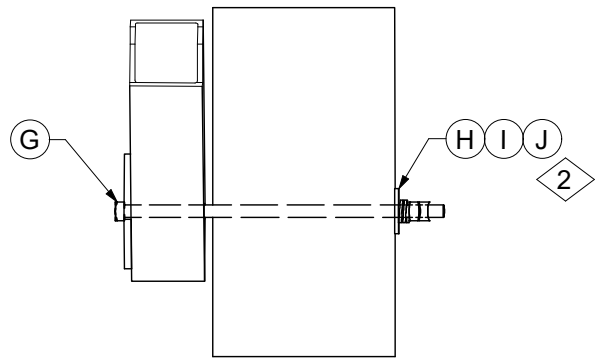
04 00 43 01
8' Alley Arm



SECTION B-B 5

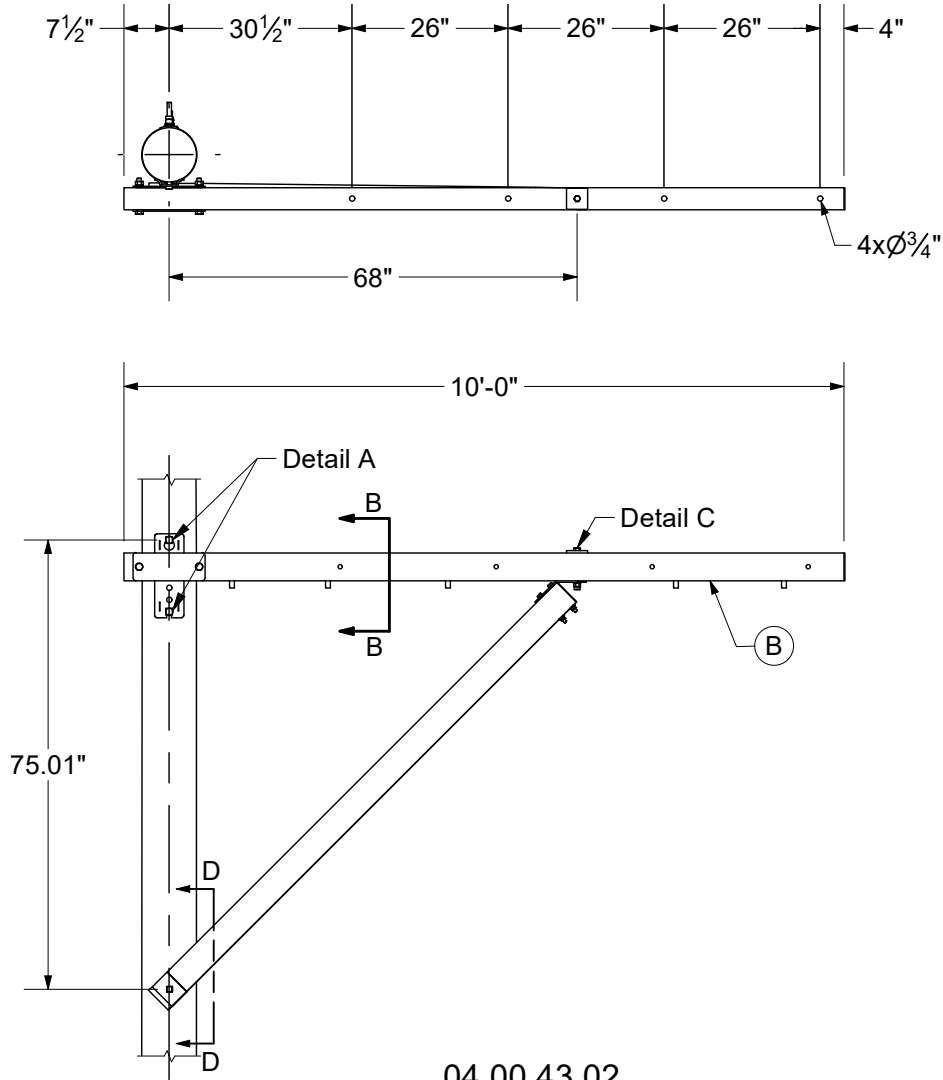


DETAIL C

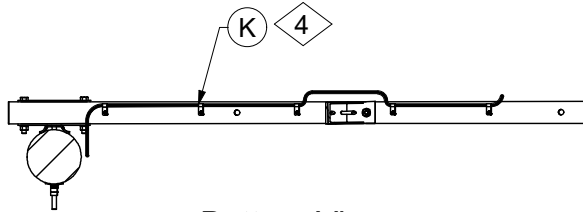


SECTION D-D 5

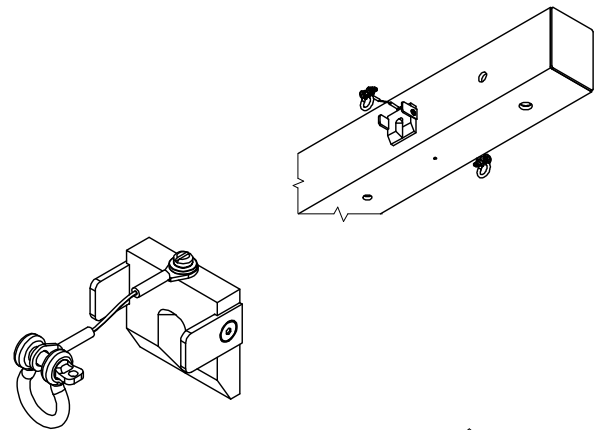
REV	DATE	ENG	DESCRIPTION
0	01/01/21	KR	New Issued Standard



04 00 43 02
10' Alley Arm



Bottom View



Hot Arm Block 3

REV	DATE	ENG	DESCRIPTION
0	01/01/21	KR	New Issued Standard



CROSSARMS AND FITTINGS

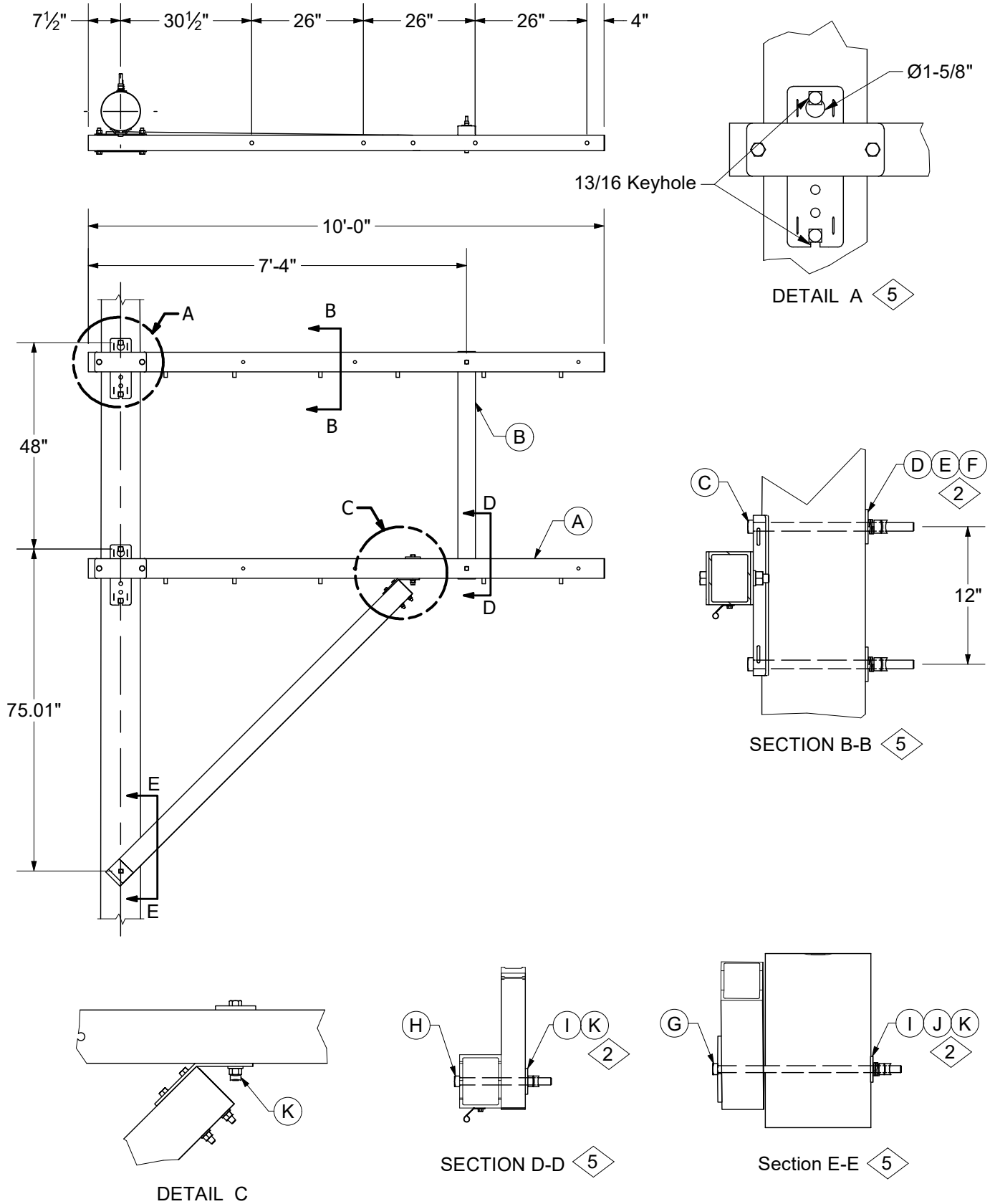
Fiberglass Alley Arm Assembly

CONSTRUCTION NOTE(s):

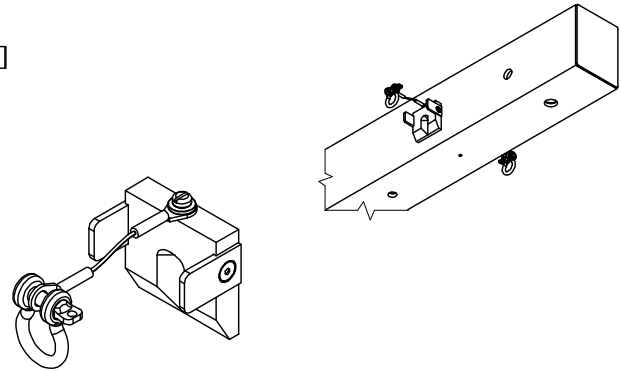
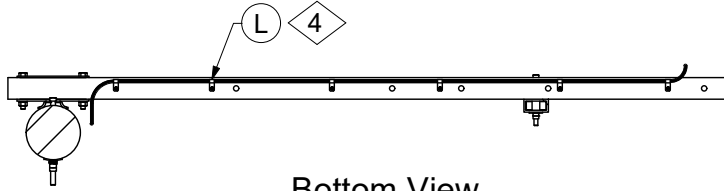
1. Unbalanced loads require arm guys.
2. Assemble items in order listed. Square nut provided with bolt is used after double coil washer. Double coil washer not needed on composite poles. Lock nuts must be placed after nut included with bolt stock number.
3. When using fiberglass arms with hot arms a protective block to prevent the pin from fracturing the fiberglass arm is available (Stock #86 06 346).
4. When using a fiberglass arm with different devices a groundwire clip can be used below the arm to train the ground wire to the pole.
5. Always load the non-threaded portion of the bolt with arms and braces.
6. Use longer machine bolts for larger wood or composite poles if required.

	ITEM	STK / DCS #	DESCRIPTION	04 00 43 **	01	02
	A	41 01 293	Crossarm - Alley, F/G 8'		1	-
	B	41 01 294	Crossarm - Alley, F/G 10'		-	1
	C	23 52 219	Bolt, Mach., 3/4" x 14" w/ square nut		2	2
	D	23 66 031	Washer, Curved, 3/4"		2	2
	E	23 66 135	Lock Washer - 3/4" Double Coil		2	2
	F	23 65 042	Lock Nut - 3/4" Square		2	2
	G	23 52 068	Bolt, Mach., 5/8" x 16" w/ square nut		1	1
	H	23 66 027	Washer - Square 5/8"		1	1
	I	23 66 134	Lock Washer - 5/8" Double Coil		1	1
	J	23 65 043	Lock Nut - 5/8" Square		2	2
@4	K	23 68 746	Grounding Clip Qty. 6		1	1

REV	DATE	ENG	DESCRIPTION
0	01/01/21	KR	New Issued Standard



REV	DATE	ENG	DESCRIPTION
0	01/01/21	KR	New Issued Standard



Hot Arm Block 3

CONSTRUCTION NOTE(s):

1. Unbalanced loads require arm guys.
2. Assemble items in order listed. Square nut provided with bolt is used after double coil washer. Double coil washer not needed on composite poles. Lock nuts must be placed after nut included with bolt stock number.
3. When using fiberglass arms with hot arms a protective block to prevent the pin from fracturing the fiberglass arm is available (Stock #86 06 346).
4. When using a fiberglass arm with different devices a groundwire clip can be used below the arm to train the ground wire to the pole.
5. Always load the non-threaded portion of the bolt with arms and braces.
6. Use longer machine bolts for larger wood or composite poles if required.

	ITEM	STK / DCS #	DESCRIPTION	04 00 44 **	01
	A	41 01 294	Crossarm - Alley, F/G 10'		2
	B	41 01 314	Crossarm - Alley Arm Brace F/G		1
	C	23 52 219	Bolt, Mach., 3/4" x 14" w/ square nut		4
	D	23 66 031	Washer, Curved, 3/4"		4
	E	23 66 135	Lock Washer - 3/4" Double Coil		4
	F	23 65 042	Lock Nut - 3/4" Square		4
	G	23 52 068	Bolt, Mach., 5/8" x 16" w/ square nut		1
	H	23 52 061	Bolt, Mach., 5/8" x 8" w/ square nut		2
	I	23 66 027	Washer - Square 5/8"		3
	J	23 66 134	Lock Washer - 5/8" Double Coil		1
	K	23 65 043	Lock Nut - 5/8" Square		4
@4	L	23 68 746	Grounding Clip Qty. 6		2