October 30, 2002

HSA-10/CC-61A

Dean L. Sicking, PhD., P.E.
Director, Midwest Roadside safety Facility
W. 328.1 Nebraska Hall
P.O. Box 880529
Lincoln, NE 68588-0529

Dear Dr. Sicking:

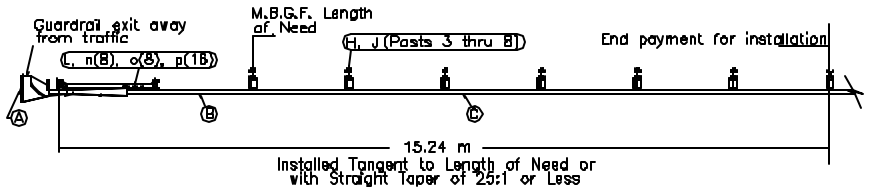
In your July 24 letter to Mr. Richard Powers of my staff, you requested formal acceptance of a two-piece bolted breakaway post for use with the SKT and FLEAT w-beam guardrail terminals. The breakaway posts originally tested and accepted for use with these terminals used a one-piece post with a plug welded breakaway design. You presented both static analyses of the bolted design vs. the original plug welded design as well as the results of low-speed bogie tests on individual posts. The layout of the SKT terminal using the modified posts is shown on Enclosure 1. Details for posts 1 and 2 and for the line posts (posts 3-8) are shown on Enclosure 2.

Although your analyses and component testing showed comparable strong- and weak-axis performance of individual posts, I remain concerned about the posts' equivalency in a redirective impact into the side of the system where the posts are not hit at right angles to either axis and the bolts may not be loaded equally or uniformly. Consequently, I will allow *conditional* use of the bolted post design with the SKT terminal, but will withhold acceptance of its use with the FLEAT (with its greater flare angle) until successful completion of NCHRP Report 350 test 3-35 on a FLEAT with its full 4-foot offset. I understand you plan to conduct this test in early 2003. In the interim, the field performance of any SKT terminals using the bolted post design should be monitored to verify acceptable crash performance.

Sincerely yours,

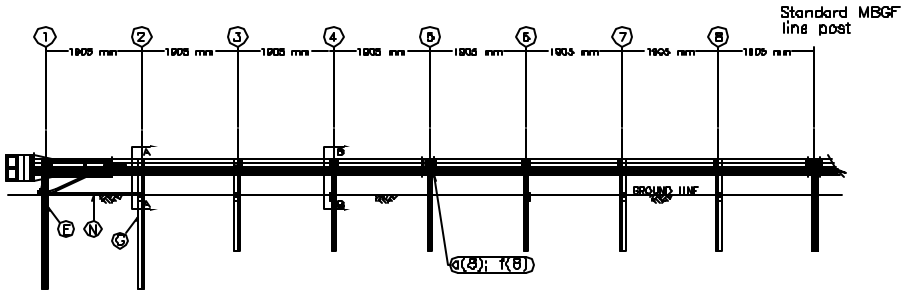
(original signed by Harry W. Taylor)
for:
Carol H. Jacoby, P.E.
Director, Office of Safety Design

2 Enclosures



TRAFFIC

PLAN

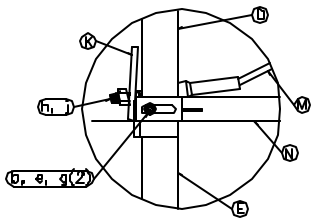


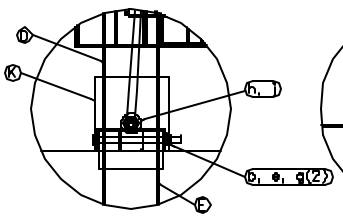
ELEVATION

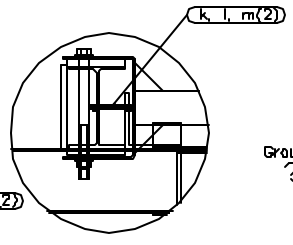
GENERAL NOTES:

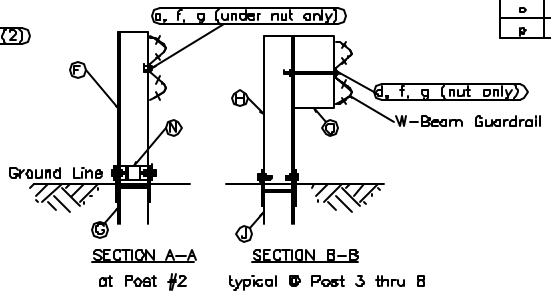
1. Breakaway posts are required with the Sequential Kinking Terminal.
2. All bolts, nuts, cable assemblies, cable anchors and bearing plates shall be galvanized.
3. When the Sequential Kinking Terminal is selected as the end treatment for MBGF installation, the SKT can be flared at a rate of 25:1 to prevent the impact head from encroaching on the shoulder. The flare is not required and may be decreased or eliminated for specific installations.
4. The lower sections of the posts shall not protrude more than 100 mm above the ground (measured along a 1,500 mm cord). Site grading may be necessary to meet this requirement.
5. The lower section of Post #1 should not be driven with the upper post attached. If the post is placed in a drilled hole, the backfill material must be satisfactorily compacted to prevent settlement.
6. When rock is encountered, a 200 mm Ø post hole, 500 mm into the rock surface may be used if approved by the engineer. Granular material will be placed in the bottom of the hole, approximately 65 mm deep to provide drainage. The first two posts can be field cut to length, placed in the hole and backfilled with adequately compacted material excavated from the hole.
7. The breakaway cable assembly must be taut. A locking device (vice grips or channel lock pliers) should be used to prevent the cable from twisting when tightening nuts.
8. A special site evaluation should be considered prior to using the SKT where there is less than 7.6 m between the outlet side of the terminal and any adjacent driving lane.

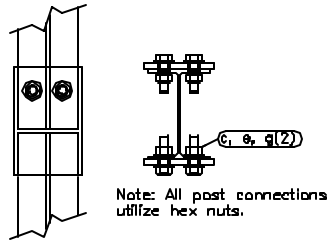
ITEM	QTY	BILL OF MATERIALS	ITEM NO.
A	1	IMPACT HEAD	S3000
B	1	W-BEAM GUARDRAIL END SECTION (12'-6" or 7,620 mm)	S1303/ S1305
C	3/1	W-BEAM GUARDRAIL, 12 GA, 3,810 or 7,620 mm	S1202/ S1204
D	1	FIRST POST ASSEMBLY TOP	HP1A
E	1	FIRST POST ASSEMBLY BOTTOM	HP1B
F	1	SECOND POST ASSEMBLY TOP	HP2A
G	1	SECOND POST ASSEMBLY BOTTOM	HP2B
H	8	BREAKAWAY LINE POST TOP	HP8A
J	5	BREAKAWAY LINE POST BOTTOM	HP8B
K	1	BEARING PLATE	E750
L	1	CABLE ANCHOR BOX	S780
M	1	BCT CABLE ANCHOR ASSEMBLY	E770
N	1	GROUND STRUT	S785
O	5	ROUTED TIMBER BLOCKOUT OR RECYCLED EQUIV.	PB18
		HARDWARE (ALL DIMENSIONS IN MM)	
a	17/33	18 Dia. x 32 SPLICE BOLT, POST #2	B580122
b	1	16 Dia. x 229 HEX BOLT GRD 5	B580904A
c	28	18 Dia. x 51 HEX BOLT GRD 5	B580204A
d	5	18 Dia. x 254 H.G.R. BOLT (POSTS 3 THRU 8)	B581002
e	29	16 Dia. HEX NUT (FIRST POST 1, POSTS 2 THRU 8, 28)	N050
f	23/39	16 Dia. H.G.R. NUT (SPLICE 16/33, POSTS 2 THRU 8, 7)	N050
g	85	H.G.R. WASHER (FIRST POST 2, POST BOLTS 7, POST BASE 36)	W050
h	2	25 ANCHOR CABLE HEX NUT	N100
j	2	25 ANCHOR CABLE WASHER	W100
k	2	8 x 102 HEX BOLT	B140404
l	2	8 HEX NUT	N014
m	4	8 WASHER	W014
n	8	CABLE ANCHOR BOX SHOULDER BOLT	B858A
o	8	13 A325 STRUCTURAL NUT	N055A
p	16	27 OD X 14 ID A325 STR. WASHER	W060A

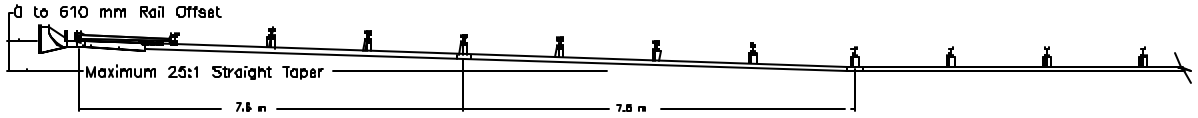












DETAIL A
optional flared installation, 25:1 maximum flare rate

R-SI

Sequential Kinking Terminal (SKT-350) Assembly for Hinged Steel Breakaway Post System

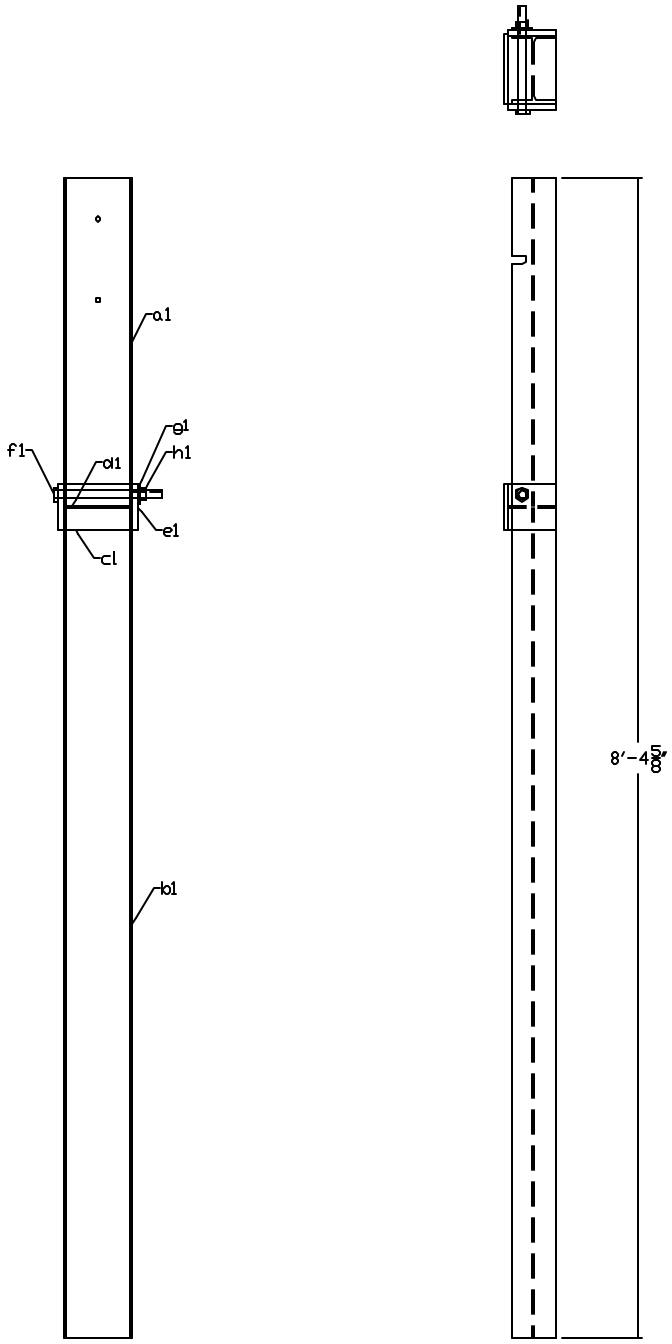
A1

6/20/02

SKT-HS-M.DWG

NONE

JRR



ITEM	QTY	DESCRIPTION	MATERIAL
a1	1	Post Top #HP1A	W6X9
b1	1	Post Bottom #HP1B	W6X9
c1	1	Front Plate	1/2" A36
d1	1	Post Cap Plate	1/4" A36
e1	2	Side Plate	1/2" A36
f1	1	Hex Bolt #B580904A	5/8 x 9" Grade 5
g1	1	Washer #W050	5/8" Washer
h1	1	Hex Nut #N055	5/8" Hex Nut

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Phone: 915-263-2435
or Phone: 330-346-0721

Hinged Breakaway First Post

Assembly Drawing

Sheet: 101

Date: 06\11\02

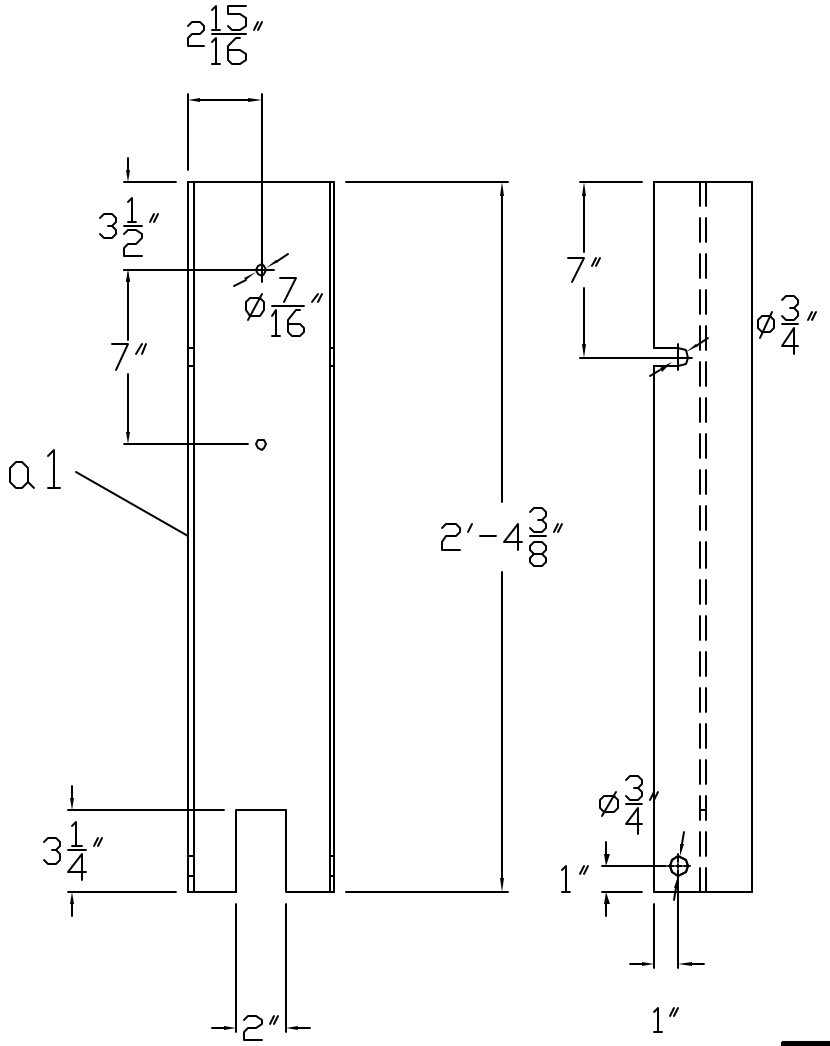
Drawing Name: HP1 ASSEMBLY.DWG

Scale: NONE

By: JRR

Rev: 0

ITEM	QTY	DESCRIPTION	MATERIAL
a1	1	Top Post	W6X9



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Hinged Breakaway End Post

Post Top
Part #HP1A

Sheet: 101

Date: 06\11\02

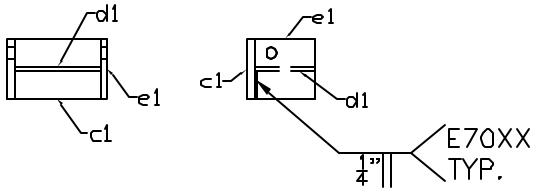
Drawing Name: HP1A R0.DWG

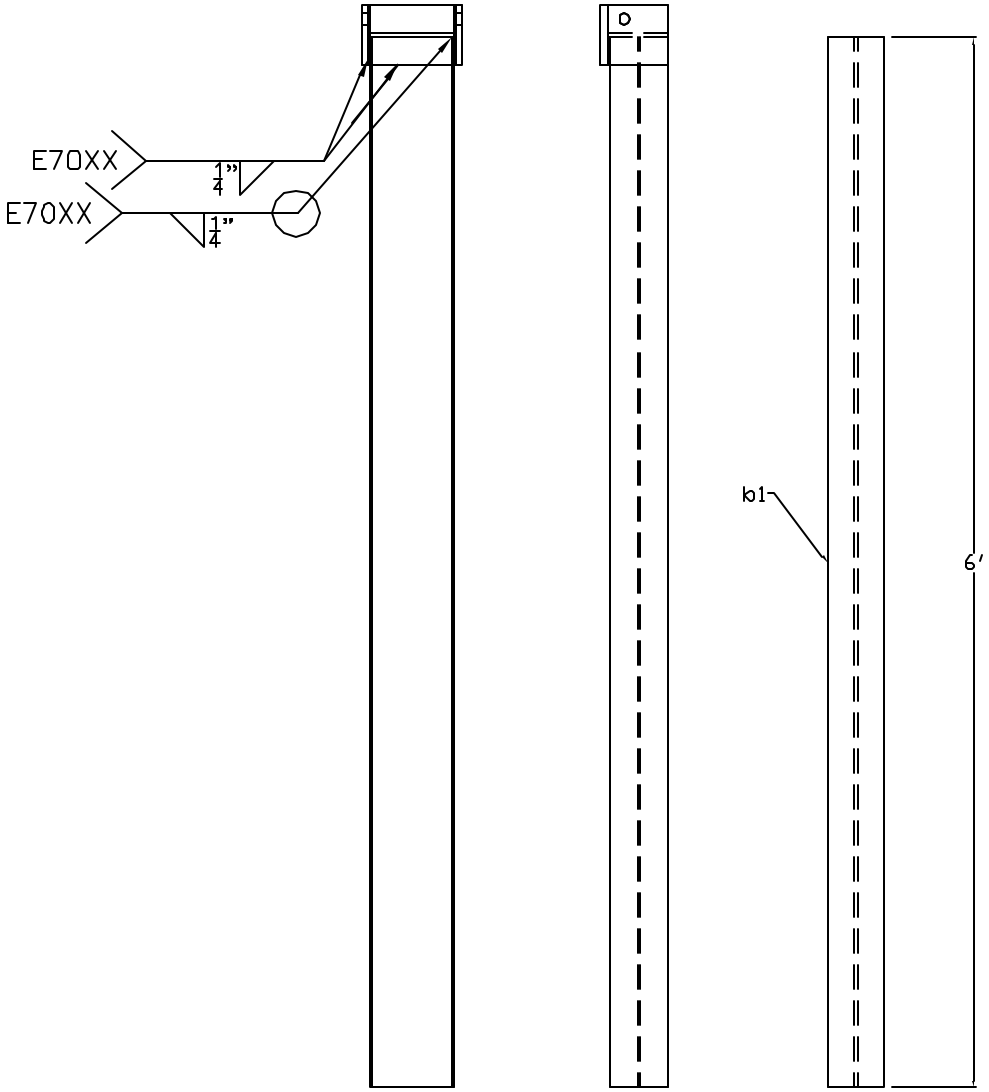
Scale: NONE

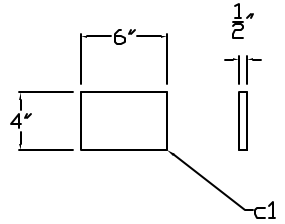
By: JRR

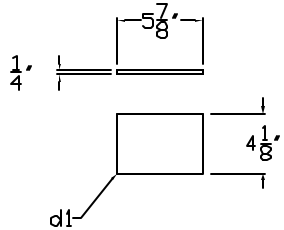
Rev: 0

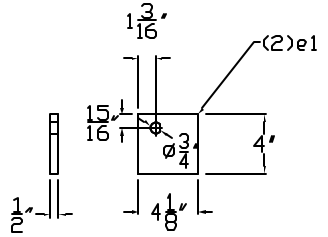
ITEM	QTY	DESCRIPTION	MATERIAL
b1	1	Post Bottom	W6X9
c1	1	Front Plate	1/2" A36
d1	1	Post Cap Plate	1/4" A36
e1	2	Side Plate	1/2" A36











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Hinged Breakaway End Post

Post Bottom
Part #HP1B

Sheet: 101

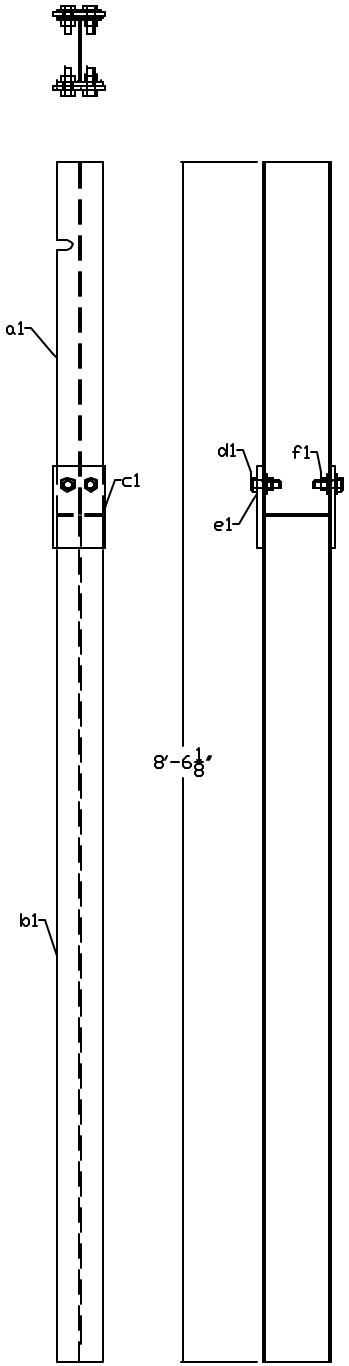
Date: 06\11\02

Drawing Name: HP1B R0.DWG

Scale: NONE

By: JRR

Rev: 0



ITEM	QTY	DESCRIPTION	MATERIAL
a1	1	Post Top #HP2A	W6X9
a1	1	Post Bottom #HP2B	W6X9
c1	2	Side Plates	3/8" A36
d1	4	Hex Bolt #B580204A	5/8 x 2" Grade 5
e1	8	Washer #W050	5/8" Washer
f1	4	Hex Nut #N055	5/8" Hex Nut

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Hinged Breakaway Second Post

Assembly Drawing

Sheet: 101

Date: 06\11\02

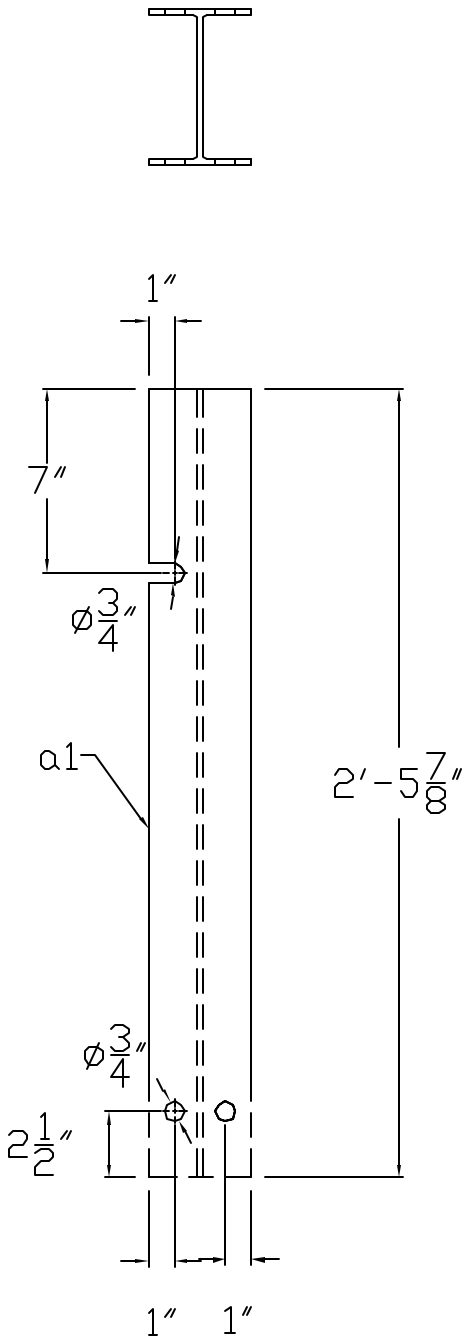
Drawing Name: HP2 ASSEMBLY.DWG

Scale: NONE

By: JRR

Rev: 0

ITEM	QTY	DESCRIPTION	MATERIAL
a1	1	Post Top	W6X9



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Hinged Breakaway
Second Post

Post Top
Part #HP2A

Sheet: 101

Date: 06\11\02

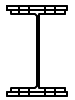
Drawing Name: HP2A RO.DWG

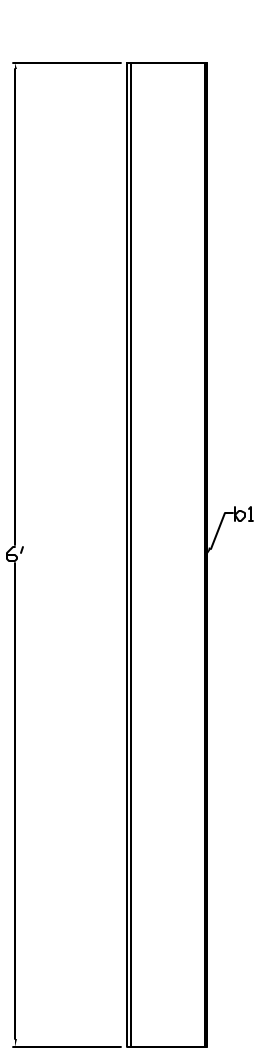
Scale: NONE

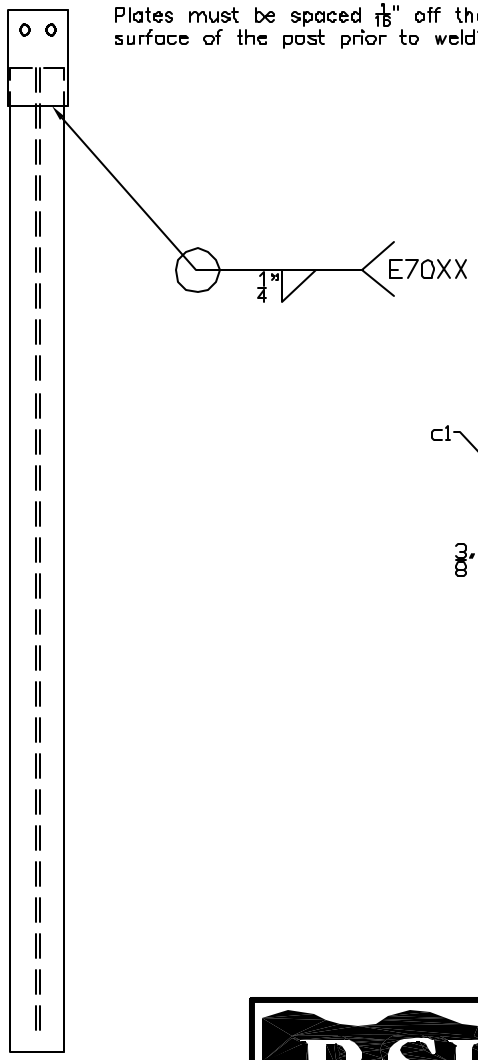
By: JRR

Rev: 0

ITEM	QTY	DESCRIPTION	MATERIAL
b1	1	Bottom Post	W6X9
c1	2	Side Plates	3/8" A36

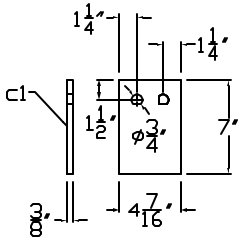






Note:

Plates must be spaced $\frac{1}{16}$" off the surface of the post prior to welding.



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Hinged Breakaway Second Post

Post Bottom Part #HP2B

Sheet: 101

Date: 06\11\02

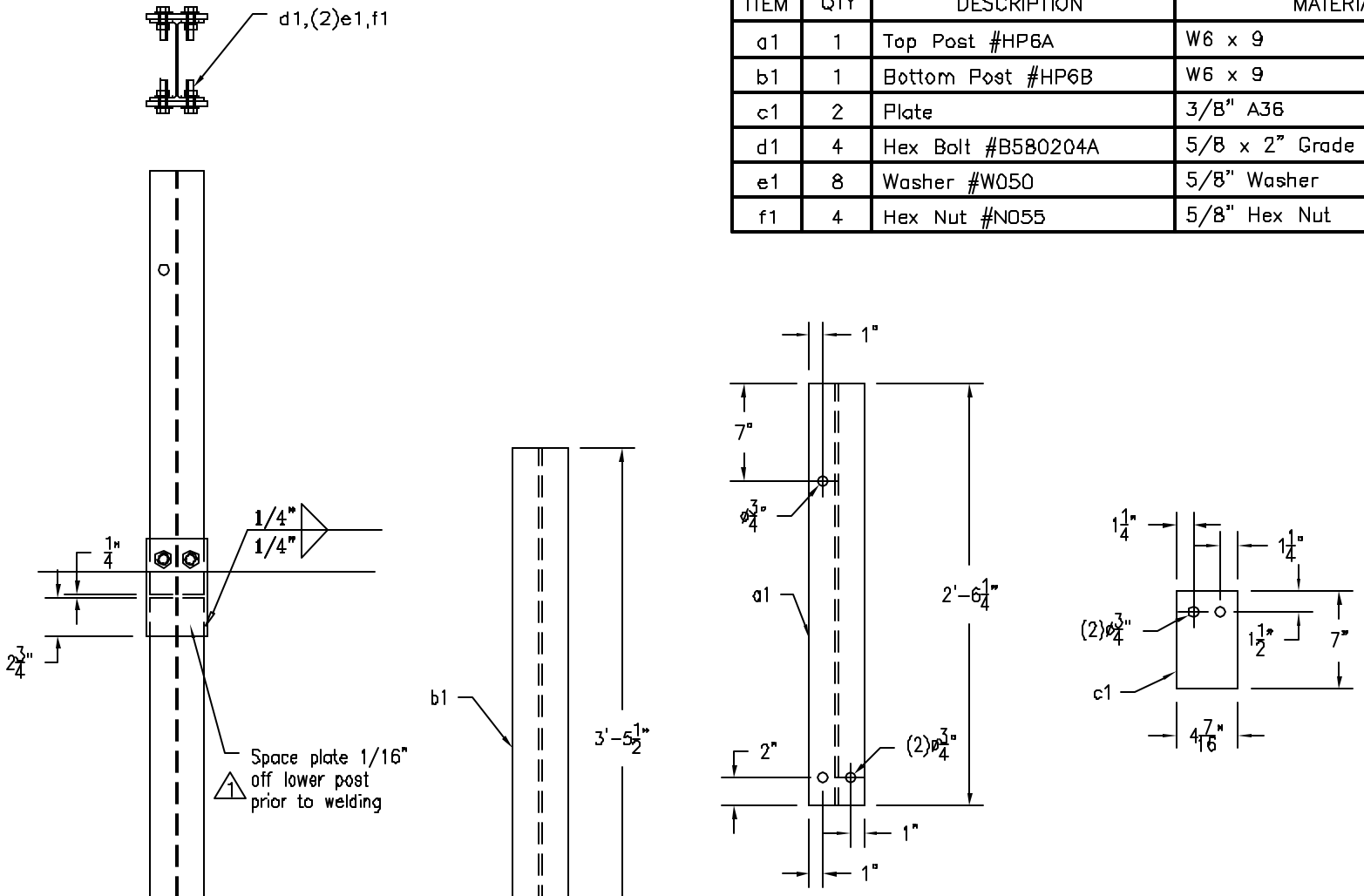
Drawing Name: HP2B R0.DWG

Scale: NONE

By: JRR

Rev: 0

ITEM	QTY	DESCRIPTION	MATERIAL
a1	1	Top Post #HP6A	W6 x 9
b1	1	Bottom Post #HP6B	W6 x 9
c1	2	Plate	3/8" A36
d1	4	Hex Bolt #B580204A	5/8 x 2" Grade 5
e1	8	Washer #W050	5/8" Washer
f1	4	Hex Nut #N055	5/8" Hex Nut



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Hinged Breakaway Line Post

Assembly Drawing

Sheet: 101

Date: 06\11\02

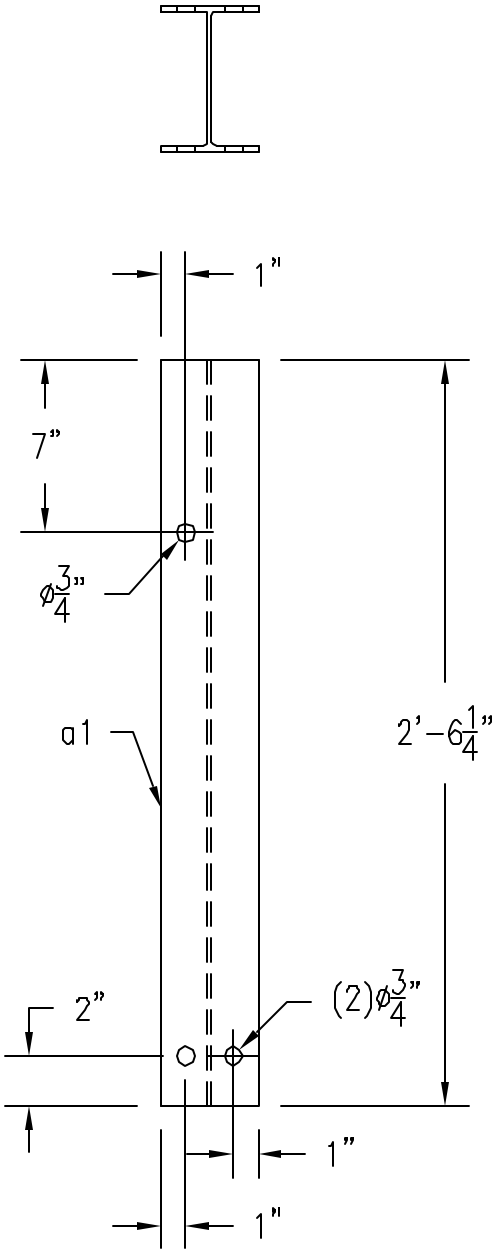
Drawing Name: HP6 ASSEMBLY R0.DWG

Scale: NONE

By: JRR

Rev: 1

ITEM	QTY	DESCRIPTION	MATERIAL
a1	1	Top Post	W6 x 9



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Hinged Breakaway Line Post

Post Top
Part #HP6A

Sheet: 101

Date: 06\11\02

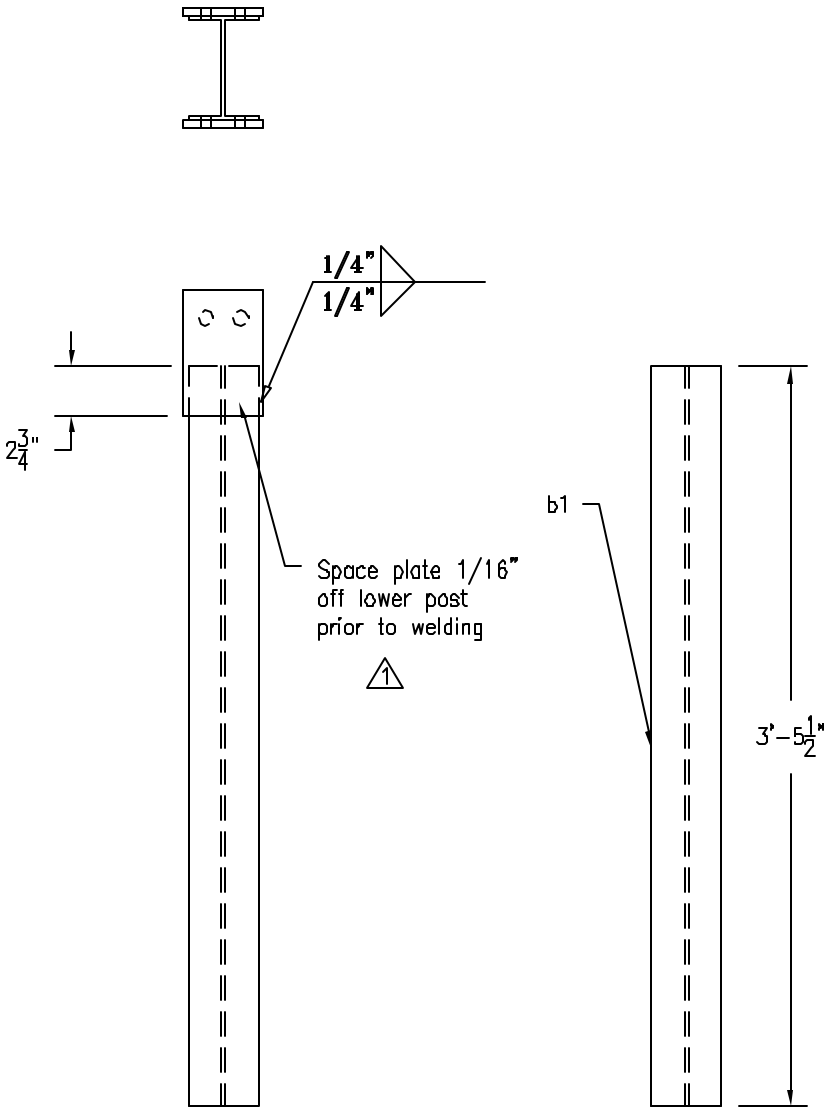
Drawing Name: HP6A R0.DWG

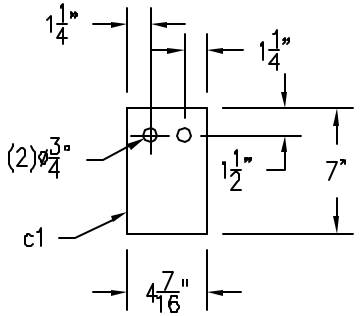
Scale: NONE

By: JRR

Rev: 0

ITEM	QTY	DESCRIPTION	MATERIAL
b1	1	Bottom Post	W6 x 9
c1	2	Plate	3/8" A36





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Hinged Breakaway Line Post

Post Bottom
Part #HP6B

Sheet: 101

Date: 06\11\02

Drawing Name: HP6B R0.DWG

Scale: NONE

By: JRR

Rev: 1