U.S. Department
Of Transportation
Federal Highway
Administration

400 Seventh St., S.W.
Washington, D.C. 20590

January 8, 1990

Refer to: HNG-14/SS-17

Mr. Arthur M. Dinitz
President
Transpo Industries, Inc.
20 Jones Street
New Rochelle, New York 10801-6024

Dear Mr. Dinitz:

This is in response to your October 13 letter to Mr. Thomas O. Willett requesting acceptance of your company's Break-Safe breakaway sign support system for use on Federal-aid highway projects. Transmitted with your letter was the Southwest Research Institute report (dated September 1989) of the pendulum tests you had performed, and drawings of the Type A and Type B systems. Additional information including drawings, were submitted with your December 13, 1989, letter.

The tests were conducted to assess the compliance of the Break-Safe frangible couplings with the breakaway requirements of the 1985 American Association of State Highway and Transportation Officials (AASHTO) Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals. These specifications have been adopted, with minor modifications by the Federal Highway Administration (FHWA). Testing was conducted using a 1,800 pound instrumented pendulum with a 10 stage crushable nose. The speed of the pendulum at impact was 20 m.p.h. (29.3 fps) in each case. The tests and their results are summarized below. Al impacts are head on except as noted for test TP-7.

Test No.	Test Article Description	Total Weight (lbs)	20 mph Test Velocity Change (fps)	60 mph Calc Velocity Change (fps)	Stub Height (in)
TP-4	B-525 Coupling, W8x18 Post	297	4.1	4.9	0.3
TP-5	B-650 Coupling, W12x35 Post	595	5.7	10.7	0.3
TP-6	AI6 Coupling, W6x9 Post	98	1.6	4.1	0.3
TP-7	B-525 Coupling, W8x18 Post (45 degree hit)	297	2.8	4.4	0.3

TP-8	AUX8 Coupling, Back to Back Franklin Steel, 4 pounds per foot U-post in "strong" soil	110	2.3	2.4	4.0

These results meet the change in velocity and stub height requirements adopted by the AASHTO and the FHWA. Therefore, except as limited below, your company's Break-Safe Type A and Type B couplings are acceptable for use on Federal-aid highway projects, if proposed by a State. We note the AUX system using back to back U-posts was only tested in the strong (National Cooperative Highway Research Program (NCHRP) designation S-1) soil described in the NCHRP Report 230. Embedding the stub in "weak" (S-2) soil may allow the post and stub to rotate under impact, loading the couplings in a way that they do not readily fracture. Therefore, testing in "weak" soil is recommended to fully qualify the AUX Brake-Safe systems. Until the direct burial Type AUX systems are qualified in the S-2 soil, our acceptance is only extended for their use in "strong" soils.

Additionally, we note that all the tests were run on single support installations with ballast attached to the upper portion of the support, but with no sign blank or upper hinge present. This is an unconventional and questionable test procedure. If the occupant risk test results were not so low we would request that tests be run on multiple support installations before accepting the use of the subject couplings in such installations. Your request that acceptance be granted for "any size or weight per foot provided the mass of the post under hinge mechanism is 600 pounds or less." Since upper hinge/slip plate mechanisms were not involved in your tests, we are unable to confirm that such a mass would yield acceptable results. However, we believe that for installations where supports are further than 7 feet apart, posts up to 45 pounds per foot will perform satisfactorily (we have applied the same size limitation to slip-base sign supports). For dual support installations (where both the posts lie within a 7-foot path), we limit our acceptance to situations where the total weight of both posts below the hinges ifs 45 pounds per foot. The couplings should not be used in sign structures with three supports or more if posts are closer than 7 feet apart without further testing.

Our acceptance is limited to he breakaway characteristics of the systems and does not cover their structural features. Presumably, you will supply potential users with sufficient information on structural design and installation requirements to ensure proper performance. We anticipate that the States will require certification from Transpo Industries that the hardware furnished has essentially the same chemistry, mechanical properties, and geometry as those used in the tests, and that they will meet the FHWA breakaway requirements.

Since the Break-Safe couplings are proprietary items, to be used in a Federal-aid highway project they: (a) must be supplied through competitive bidding with equally suitable unpatented items; (b) the State highway agency must certify that they are essential for synchronization with existing highway facilities or that no equally suitable alternate exists; or (c) they must be used for research or for a distinctive type of construction on

relatively short sections of road for experimental purposes. Our regulations concerning proprietary products are contained in Title 23, Code of Federal Regulations, Section 635.411, a copy of which is enclosed.

Sincerely yours,

L. A. Staron, Chief
Federal-Aid and Design Division

Enclosures

25-17

GENERAL NOTES

Meets all AASHTO "Standard specifications for structural supports for highway signs, luminaires and traffic signals."

All ASTM A325 bolts must be within a hardness range of Rockwell C23 to C31 prior to hot dip galvanizing per ASTM A153 or mechanically galvanized per ASTM B-454-76.

Fasteners, except for special bolt and coupling, are installed with lockwashers or locknuts and do not have specific torque requirements. Fasteners should be made as tight as possible with conventional wrenches.

Square and level individual components to minimize need for shimming.

No more than two shims underneath any one coupling and no more than three shims underneath any two couplings.

Structual steel to be hot dip galvanized per ASTM A123 after fabrication.

All brackets to be permanently labled with the appropriate bracket type and bracket selection number.

Select correct bracket number by locating the intersection of sign height and post length in the bracket selection matrix. The intersection will be either Zone 1, 2 or 3 which corresponds to bracket numbers 1, 2 or 3.

6" POST

POST LENGTH

SIGN HEIGHT	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
9																
8																
7																
6																
5																
4																
3																
2																
1																

8" POST

POST LENGTH

SIGN HEIGHT	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
9																
8																
7																
6																
5																
4																
3																
2																
1																

BRACKET TABLES

INSTALLATION NOTES

Wrench sizes required: 9/16", 7/8", 1-1/16", 1-1/4", 1-7/16", 1-5/8"

ANCHOR ASSEMBLY

Check hole alignment of retrofit plate and slipbase. (Item 12)

The retrofit plate may be leveled by introducing shims between the retrofit plate and the slipbase. (Items 10 and 11)

Install bolts, washers and nuts as tight as possible to permanently clamp retrofit plate to slipbase stub. (Items 10 11 12 13 14 and 15)

BRACKET & HINGE ASSEMBLY

Attach brackets to post using bolts and cap screws provided. Square and tighten. (Items 1 2 3 4 5 6 and 7)

Attach hinge plates to post using bolts provided. Square and tighten. (Items 16 17 and 18)

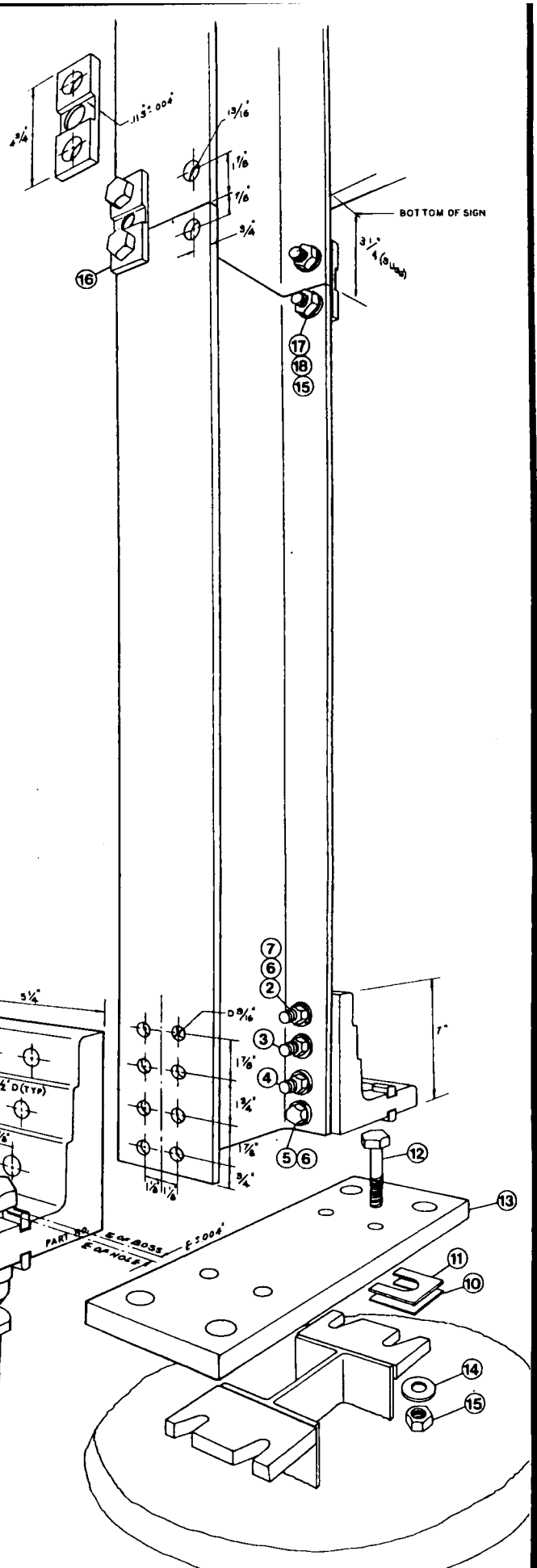
COUPLING ASSEMBLY

Suspend post over anchor section. Insert special bolt through bracket and into coupling. Hand tighten. (Items 8 and 9) Lower post with couplings onto anchor section — guiding lower portion of couplings through holes provided. (Items 8 and 10) Install locknut onto threaded portion of coupling protruding through anchor section. Hand tighten. (Items 9 and 19) If post is not plumb insert shims between anchor section and coupling flange. Tighten locknut — then tighten special bolt. (Items 8 9 10 11 and 19)

NOTE: Do not place torque across necked down portion of coupling. Wrench flats are provided on either side for proper tightening.

BILL OF MATERIALS

ITEM	DESCRIPTION	QTY POST	PART NO.
1	Bracket	2	SBBK529-1A, 2A, 3A
2	Bolt	4	S3256G3250
3	Bolt	4	S3256G3775
4	Bolt	4	S3256G4500
5	Cap Screw	4	S3075G1125
6	Lockwasher	16	S109WGBL50
7	Nut	12	S194NGHH50
8	Special Bolt	4	SBCSBB
9	Coupling	4	SBCB2B
10	Shim	4	S109WGBH16
11	Shim	4	S109WGBH14
12	Bolt	4	S3256G7375
13	Retrofit Plate 1-1/2" thick 8061 T6 Alum or A441 steel	1	BY OTHERS
14	Flat Washer 3/4" galvanized	4	S109WGFL75
15	Nut	12	S194NGHH75
16	Hinge Plate	4	SBHB1B
17	Bolt	8	S3256G7325
18	Lockwasher 3/4" Galvanized	8	S109WGBL75
19	Locknut	4	S194NGA10B



"break-away" TRANSPO

BREAKAWAY SYSTEM FOR GROUND MOUNTED SIGN SUPPORTS

base and hinge assembly

type B-525 (S/B)

for 6" & 8" WF Sign Posts

ASSEMBLY NO. SBM525-4,-5,-6 DATE 6-24-87

SS-17

GENERAL NOTES

Meets all AASHTO "Standard specifications for structural supports for highway signs, luminaires and traffic signals."

All ASTM A325 bolts must be within a hardness range of Rockwell C23 to C31 prior to hot dip galvanizing per ASTM A153 or mechanically galvanized per ASTM B-695-76.

Bolts, except for special bolt and coupling, are installed with lockwashers or self-locking nuts and do not have specific torque requirements. Fasteners should be made as tight as possible with conventional wrenches.

Square and level individual components to minimize need for shimming.

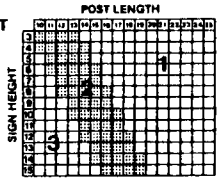
Use no more than two shims underneath any one coupling and no more than three shims underneath any two couplings.

Structural steel to be hot dip galvanized per ASTM A123 after fabrication.

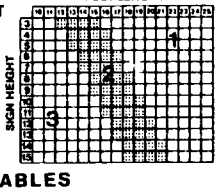
All brackets to be permanently labled with the appropriate bracket type and bracket selection number.

Select correct bracket number by locating the intersection of sign height and post length in the bracket selection matrix. The intersection will be either Zone 1, 2 or 3 which corresponds to bracket numbers 1, 2 or 3.

6" POST



8" POST



BRACKET TABLES

INSTALLATION NOTES

Wrench sizes required: 9/16", 7/8", 1-1/16", 1-1/4", 1-7/16", 1-5/8"

BRACKET ASSEMBLY
Assemble brackets to post with bolts provided. Square and tighten. (Items ① ② ③ ④ ⑤ ⑥ and ⑦)

ANCHOR ASSEMBLY
Assemble coupling anchors ⑫ to installation template (not shown).

Lower entire anchor assembly into fresh concrete and vibrate into position so that the tops of the individual anchors ⑫ are flush with the finished top surface of the footings.

COUPLING ASSEMBLY
Suspend post over footing and insert special bolts ⑥ through brackets ①.

Below bracket, thread couplings ⑨ into anchors ⑫ but leave loose.

Lower post with special bolts ⑧ onto loose couplings ⑨ and thread special bolts into couplings. Thread couplings all the way into anchors ⑫.

Tighten special bolts ⑧ with 1-5/8" wrench. NOTE! Do not place torque across necked down portion of coupling — wrench flats are provided on either side for proper tightening.

If post is not plumb, insert shims ⑯ and ⑰ between couplings ⑨ and anchors ⑫.

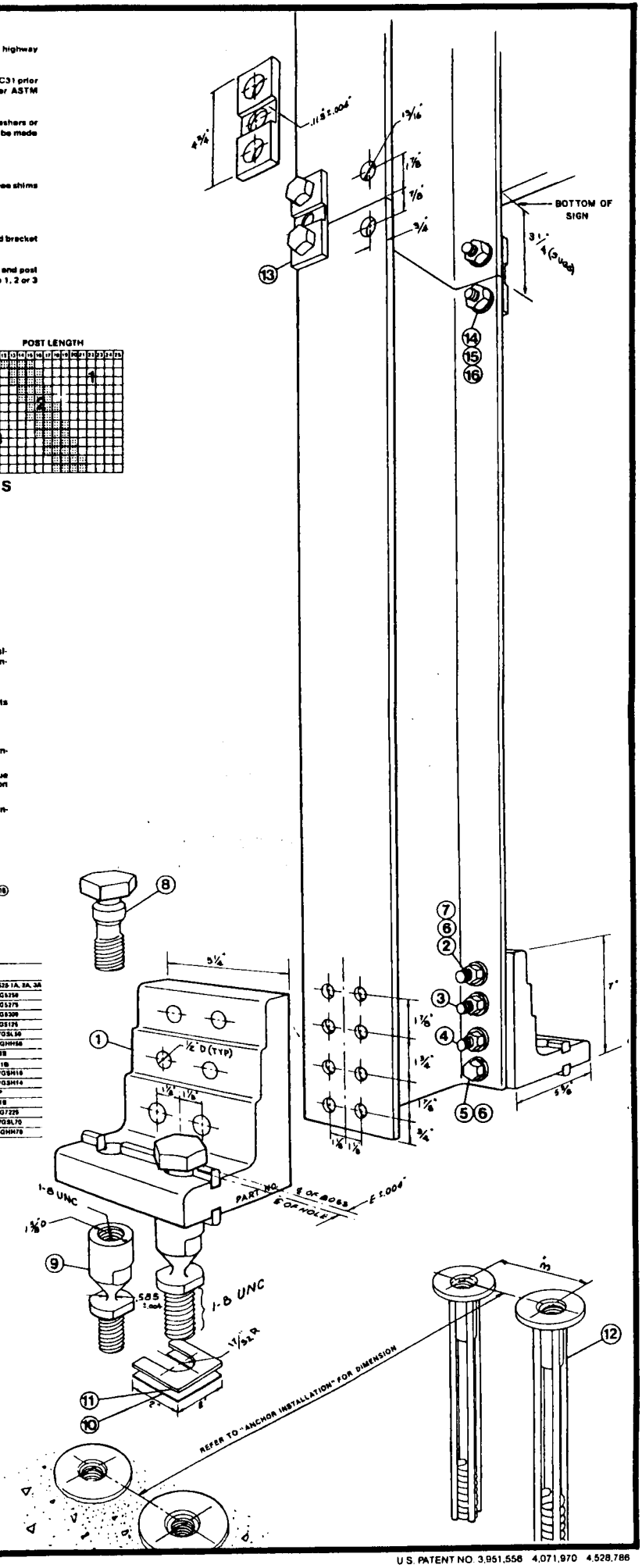
HINGE ASSEMBLY
Butt upper and lower posts together on flat surface.

Place hinge plates ⑬ on outer flanges and secure with 3/4-UNC bolts ⑭ ⑮ and ⑯ — snug but do not tighten.

Make sure upper and lower posts are in alignment; then tighten all nuts ⑯ to proof load — 1/2 of a turn beyond snug.

BILL OF MATERIALS

ITEM	DESCRIPTION	QTY POST	PART NO.
① Bracket	0061 T6 Alum. (See Bracket Selection Table)	2	S98K525-1A, 2A, 3A
② Bolt	Top, 1/2"-13 UNC x 2-1/2" Hex. Hd., ASTM A325, Galv. ASTM A153	4	S325BG5250
③ Bolt	Middle, 1/2-13 UNC x 3-3/4", Hex. Hd., ASTM A325, Galv. ASTM A153	4	S325BG5375
④ Bolt	Bottom, 1/2"-13 UNC x 8", Hex. Hd., ASTM A325 Galv. A153	4	S325BG8000
⑤ Cap Screw	Bracket, 1/2"-13 UNC x 1-1/4", Hex. Hd., ASTM A307, Galv. ASTM A153	6	S307GS125
⑥ Lockwasher	1/2" Galvanized	10	S100WGSL50
⑦ Nut	Hex. 1/2"-13 UNC, ASTM A194 GR.2-2H, Galv. ASTM A153	12	S194NGHH50
⑧ Special Bolt	1-8 UNC, ASTM A325, Galv. ASTM B-454-76	4	SBC5BB
⑨ Coupling	Large, 1-8 UNC, SA 2 2B, Galv. ASTM B-454-76	4	SBCB1B
⑩ Shim	Horseshoe, 10 Gauge, Galv. Steel Sheet	2	S10GWGSH10
⑪ Shim	Horseshoe, 14 Gauge, Galv. Steel Sheet	2	S10GWGSH14
⑫ Anchor	1-8 UNC, 304 Stainless Steel Ferrule-1035 Steel Rod & Coil	4	SBABP
⑬ Hinge Plate	Large, .113" Section, Galv. ASTM A153	4	SBHB1B
⑭ Bolt	Hinge, 3/4-10 UNC x 2-1/2", Hex. Hd., ASTM A325, Galv ASTM A153	8	S325BG7225
⑮ Lockwasher	3/4" Galvanized	8	S100WGSL70
⑯ Nut	Hex., 3/4-10 UNC, ASTM A325, Galv. ASTM A153	8	S194NGHH70



"breakaway" TRANSPO

BREAKAWAY SYSTEM FOR GROUND MOUNTED SIGN SUPPORTS

base and hinge assembly

type B-525-1P

for 6" and 8" WF Sig

ASSEMBLY NO. SBM525-1, -2, -3 DATE 14-87

U.S. PATENT NO. 3,951,558 4,071,970 4,528,786

SS-17

GENERAL NOTES

Meets all AASHTO "Standard specifications for structural supports for highway signs, luminaires and traffic signals."

All ASTM A325 bolts must be within a hardness range of Rockwell C23 to C31 prior to hot dip galvanizing per ASTM A153 or mechanically galvanized per ASTM B-454-76.

Fasteners, except for special bolt and coupling, are installed with lockwashers or locknuts and do not have specific torque requirements. Fasteners should be made as tight as possible with conventional wrenches.

Square and level individual components to minimize need for shimming.

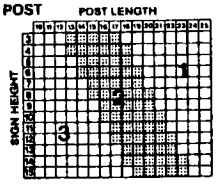
No more than two shims underneath any one coupling and no more than three shims underneath any two couplings

Structual steel to be hot dip galvanized per ASTM A123 after fabrication

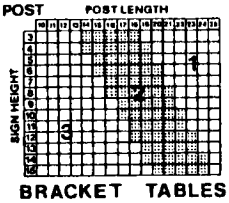
All brackets to be permanently labled with the appropriate bracket type and bracket selection number.

Select correct bracket number by locating the intersection of sign height and post length in the bracket selection matrix. The intersection will be either Zone 1, 2 or 3 which corresponds to bracket numbers 1, 2 or 3.

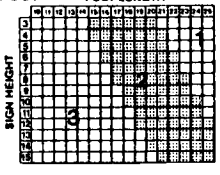
10" POST



12" POST



14" POST



BRACKET TABLES

INSTALLATION NOTES

Wrench sizes required: 9/16", 7/8", 1-1/16", 1-1/4", 1-7/16", 1-5/8"

ANCHOR ASSEMBLY

Check hole alignment of retrofit plate and slipbase.
(Item 13)

The retrofit plate may be leveled by introducing shims between the retrofit plate and the slipbase.
(Items 10 and 11)

Install bolts, washers and nuts as tight as possible to permanently clamp retrofit plate to slipbase stub.
(Items 10 11 12 13 14 and 15)

BRACKET & HINGE ASSEMBLY

Attach brackets to post using bolts and cap screws provided. Square and tighten.
(Items 1 2 3 4 5 6 and 7)

Attach hinge plates to post using bolts provided. Square and tighten.
(Items 16 18 17 and 18)

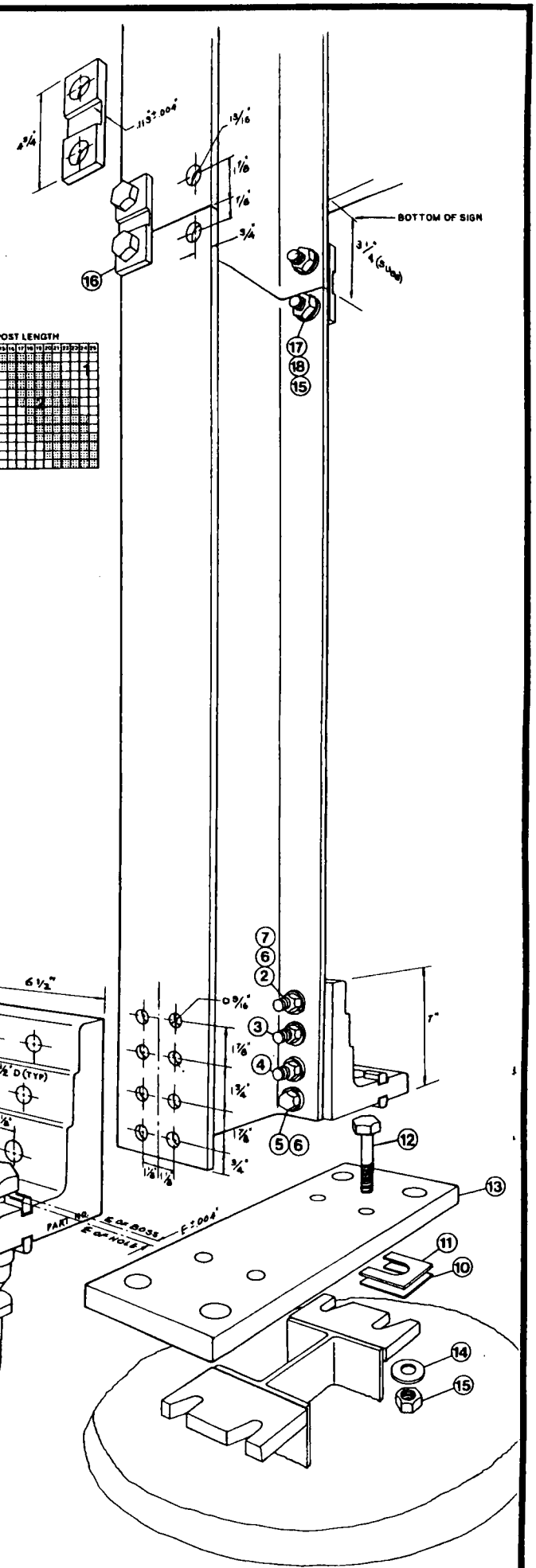
COUPLING ASSEMBLY

Suspend post over anchor section. Insert special bolt through bracket and into coupling. Hand tighten. (Items 8 and 9) Lower post with couplings onto anchor section — guiding lower portion of couplings through holes provided. (Items 8 and 12) Install locknut onto threaded portion of coupling protruding through anchor section. Hand tighten. (Items 8 and 19) If post is not plumb insert shims between anchor section and coupling flange. Tighten locknut — then tighten special bolt.
(Items 8 9 10 11 and 20)

NOTE: Do not place torque across necked down portion of coupling. Wrench flats are provided on either side for proper tightening.

BILL OF MATERIALS

ITEM	DESCRIPTION	QTY PO ST	PART NO.
1	Bracket	6061 T6 Alum. (See Bracket Selection Table)	2	SBBK650-1A, 2A, 3A
2	Bolt	Top, 5/8-11 UNC x 2.3/4" Hex. Hd., ASTM A325, Galv. ASTM A153	4	S325BG4275
3	Bolt	Middle, 5/8-11 UNC x3", Hex. Hd., ASTM A325, Galv. ASTM A153	4	S325BG4300
4	Bolt	Bottom, 5/8-11 UNC x3-1/4", Hex. Hd., ASTM A325 Galv. A153	4	S325BG4325
5	Cap Screw	Bracket, 5/8-11 UNC x3-1/4", Hex. Hd. ASTM A307, Galv.ASTM A153	4	S307BG4125
6	Lockwasher	5/8" Galvanized	10	S108WGSL58
7	Nut	Hex. 5/8-11 UNC, ASTM A194 GR 2-2H, Galv. ASTM A153	12	S104NGHH58
8	Special Bolt	1-8 UNC, ASTM A325, Galv. ASTM B-454-76	4	S8CSBB
9	Coupling	Large, 1-8 UNC, 3A & 2B, Galv. ASTM B-454-76	4	S8CS2B
10	Shim	Horseshoe, 16 Gauge, Galv. Steel Sheet	4	S108WGSH16
11	Shim	Horseshoe, 14 Gauge, Galv. Steel Sheet	4	S108WGSH14
12	Bolt	Plate 3/4-10UNC x 3-3/4", Hex. Hd., ASTM A325, Galv.ASTM A153	4	S325BG7375
13	Retrofit Plate	1.125" thick 6061 T6 Alum or A441 steel	1	BY OTHERS
14	Flat Washer	3/4" galvanized	4	S108WGFL75
15	Nut	Hex., 3/4-10 UNC, ASTM A325, Galv. ASTM A153	12	S104NGHH75
16	Hinge Plate	Large, .113" Section, Galv. ASTM A153	4	S8HP2B
17	Bolt	Hinge, 3/8-16 UNC x3 1/4", Hex. Hd., ASTM A325, Galv.ASTM A153	8	S325BG7225
18	Lockwasher	3/4" Galvanized	8	S108WGSL75
19	Locknut	ANCO, 1"-8 UNC, ASTM A325, Galv. ASTM A153	4	S104NGA100



"break-safe"™

BREAKAWAY SYSTEM FOR GROUND MOUNTED SIGN SUPPORTS

base and hinge assembly

type B-650 (S/B)

for 10", 12" & 14" WF Sign Posts

ASSEMBLY NO. SBM650-4, -5, -6 DATE 6-12-87

TRANSPO

U.S. PATENT NO. 3,951,556 4,071,970 4,528,786

SS-17

GENERAL NOTES

Meets all AASHTO Standard specifications for structural supports for highway signs, luminaires and traffic signals.

All ASTM A325 bolts must be within a hardness range of Rockwell C23 to C31 prior to hot dip galvanizing per ASTM A153 or mechanically galvanized per ASTM B-454-76.

Fasteners, except for special bolt and coupling, are installed with lockwashers or locknuts and do not have specific torque requirements. Fasteners should be made as tight as possible with conventional wrenches.

Square and level individual components to minimize need for shimming.

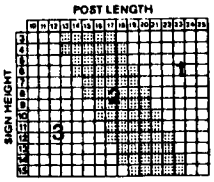
No more than two shims underneath any one coupling and no more than three shims underneath any two couplings.

Structual steel to be hot dip galvanized per ASTM A123 after fabrication.

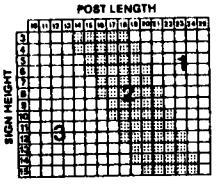
All brackets to be permanently labled with the appropriate bracket type and bracket selection number.

Select correct bracket number by locating the intersection of sign height and post length in the bracket selection matrix. The intersection will be either Zone 1, 2 or 3 which corresponds to bracket numbers 1, 2 or 3.

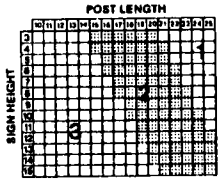
10" POST



12" POST



14" POST



BRACKET TABLES

INSTALLATION NOTES

Wrench sizes required: 9/16", 7/8", 1-1/16", 1-1/4", 1-7/16", 1-5/8"

BRACKET ASSEMBLY

Assemble brackets to post with bolts provided. Square and tighten. (Items ① ② ③ ④ ⑤ ⑥ and ⑦)

ANCHOR ASSEMBLY

Assemble coupling anchors ⑫ to installation template (not shown).

Lower entire anchor assembly into fresh concrete and vibrate into position so that the tops of the individual anchors ⑫ are flush with the finished top surface of the footings.

COUPLING ASSEMBLY

Suspend post over footing and insert special bolts ⑧ through brackets ①.

Below bracket, thread couplings ⑨ into anchors ⑫ but leave loose.

Lower post with special bolts ⑧ onto loose couplings ⑨ and thread special bolts into couplings. Thread couplings all the way into anchors ⑫.

Tighten special bolts ⑧ with 1-5/8" wrench. NOTE! Do not place torque across necked down portion of coupling — wrench flats are provided on either side for proper tightening.

If post is not plumb, insert shims ⑩ and ⑪ between couplings ⑨ and anchors ⑫.

HINGE ASSEMBLY

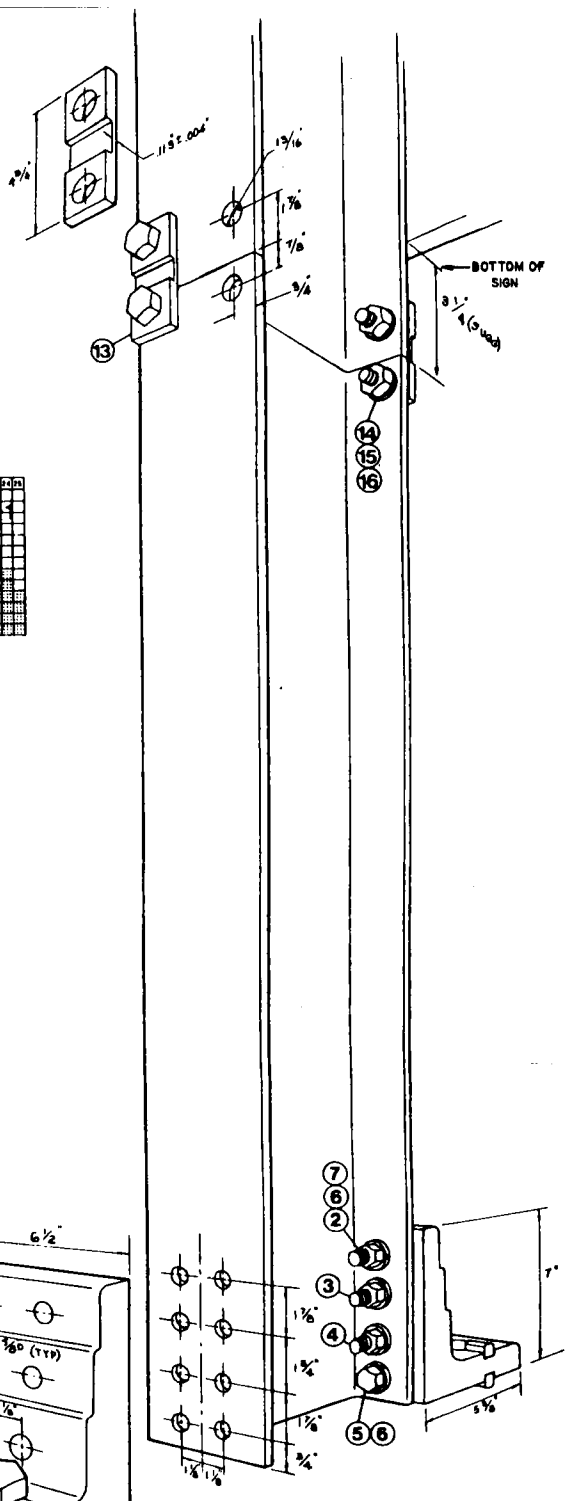
Butt upper and lower posts together on flat surface.

Place hinge plates ⑬ on outer flanges and secure with 3/4-UNC bolts ⑭ ⑮ and ⑯—snug but do not tighten.

Make sure upper and lower posts are in alignment; then tighten all nuts ⑯ to proof load—1/2 of a turn beyond snug.

BILL OF MATERIALS

ITEM	DESCRIPTION	QTY POST	PART NO
① Bracket	6061 T6 Alum. (See Bracket Selection Table)	2	SBGK650-1A, 2A, 3A
② Bolt	Top, 5/8-11 UNC x 2 3/4" Hex. Hd., ASTM A325, Galv. ASTM A153	4	S3258G6275
③ Bolt	Middle, 5/8-11 UNC x 2", Hex. Hd., ASTM A325, Galv. ASTM A153	4	S2258G6200
④ Bolt	Bottom, 5/8-11 UNC x 2-1/4", Hex. Hd., ASTM A325 Galv. A153	4	S2258G6225
⑤ Cap Screw	Bracket, 5/8-11 UNC x 1-1/4", Hex. Hd. ASTM A307 Galv. ASTM A153	4	S5075G6125
⑥ Lockwasher	5/8" Galvanized	16	S100WGSL62
⑦ Nut	Hex. 5/8-11 UNC, ASTM A194 GR.2 2H, Galv. ASTM A153	12	S194NGMH62
⑧ Special Bolt	1-8 UNC, ASTM A325, Galv. ASTM B-454-76	4	SBC2GB
⑨ Coupling	Large, 1-8 UNC, 2A & 2B, Galv. ASTM B-454-76	4	SBCB1G
⑩ Shim	Horseshoe, 10 Gauge, Galv. Steel Sheet	2	S100WGSH10
⑪ Shim	Horseshoe, 14 Gauge, Galv. Steel Sheet	2	S100WGSH14
⑫ Anchor	1-8 UNC, 304 Stainless Steel Formlok 1035 Steel Rod & Coil	4	SBAB7
⑬ Hinge Plate	Large, .113" Section, Galv. ASTM A153	4	SBHB2G
⑭ Bolt	Hinge, 3/4-10 UNC x 3-1/4", Hex. Hd., ASTM A325, Galv. ASTM A153	8	S3258G7225
⑮ Lockwasher	3/4" Galvanized	8	S100WGSL75
⑯ Nut	Hex., 3/4-10 UNC, ASTM A325, Galv. ASTM A153	8	S194NGMH75



"break-safe"™

BREAKAWAY SYSTEM FOR GROUND MOUNTED SIGN SUPPORTS

base and hinge assembly

type B-650-LP

for 10", 12" and 14" WF Sign Posts

TRANSTAR

ASSEMBLY NO. SBM650-1,-2,-3 DATE 5-4-87

U.S. PATENT NO. 3,951,556 4,071,970 4,528,786

GENERAL NOTES

Meets a l l AASHTO "Standard specifications for structural supports for highway signs, luminaires and traffic signals."

Fasteners are installed with lockwashers or locknuts and do not have specific torque requirements. Fasteners should be made as tight as possible with conventional wrenches.

Square and level individual components to minimize need for shimming.

Structural steel to be hot dip galvanized per ASTM A123 after fabrication.

INSTALLATION NOTES

Wrench sizes required: 7/8", 1", 1-1/16"

BRACKET ASSEMBLY

Assemble brackets to post with bolts provided. Square and tighten. (Items ① ② ③ and ④)

ANCHOR ASSEMBLY

Assemble coupling anchors ⑨ to installation template (not shown).

Lower entire anchor assembly into fresh concrete and vibrate into position so that the tops of the individual anchors ⑨ are flush with the finished top surface of the footings.

COUPLING ASSEMBLY

Suspend post over footing and insert special bolts ⑤ through brackets ①.

Below bracket, thread couplings ⑥ into anchors ⑨ but leave loose.

Lower post with special bolts ⑤ onto loose couplings ⑥ and thread special bolts into couplings. Thread couplings all the way into anchors ⑨.

Tighten special bolts ⑤ with 1-5/8" wrench. NOTE! Do not place torque across necked down portion of coupling — wrench flats are provided on either side for proper tightening.

If post is not plumb, insert shims ⑦ and ⑧ between couplings ⑥ and anchors ⑨.

HINGE ASSEMBLY

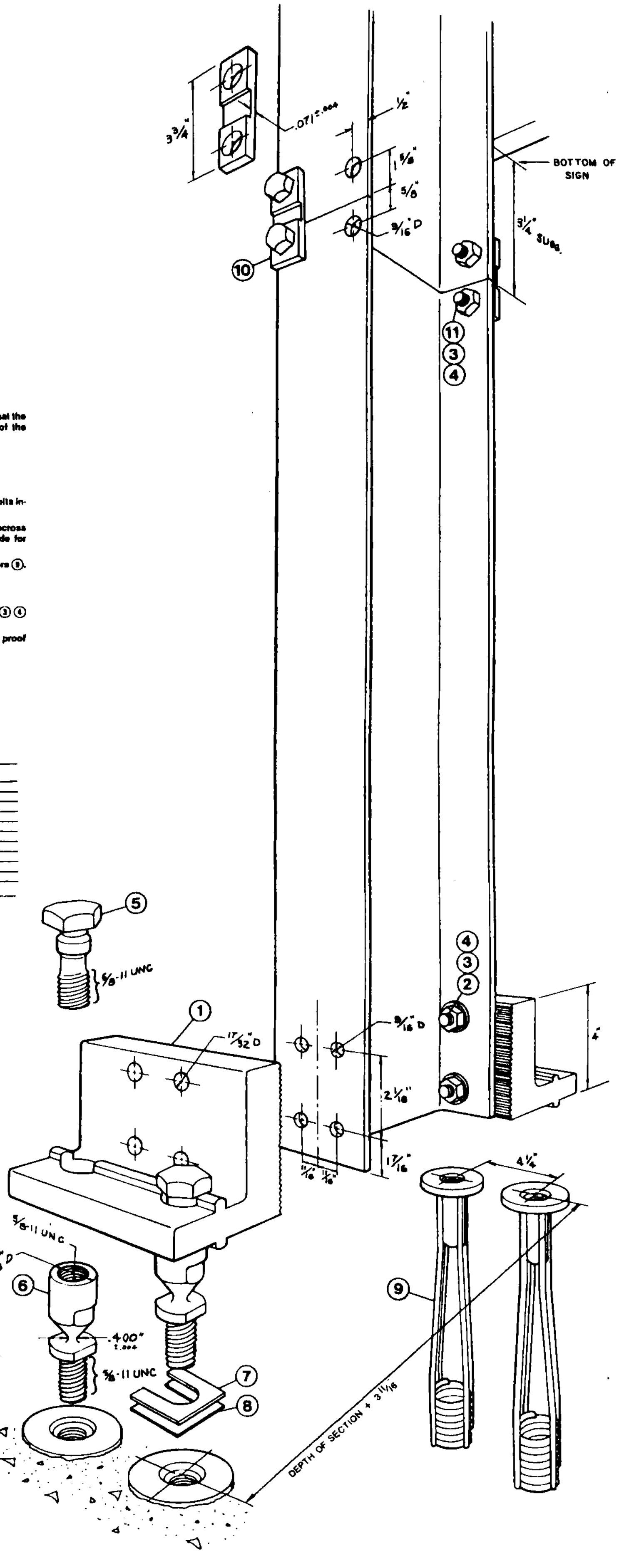
Butt upper and lower posts together on flat surface.

Place hinge plates ⑩ on outer flanges and secure with 1/2-UNC x 1-1/2" bolts ③ ④ and ⑪—snug but do not tighten.

Make sure upper and lower posts are in alignment; then tighten all nuts ④ to proof load—1/2 of a turn beyond snug.

BILL OF MATERIALS

ITEM	DESCRIPTION	QTY POST	PART NO.
① Bracket	6061 T6 Alum.	2	SBAK6117
② Bolt	1/2"-13 UNCx2-1/4", Hex.Hd. ASTM A325, Galv. ASTM A153	8	[illegible]
③ Lockwasher	1/2" Galvanized	16	S100WGSL50
④ Nut	Hex. 1/2"-13 UNC ASTM A194 Gr 2H, Galv. ASTM A153	16	S104NGHH50
⑤ Special Bolt	5/8"-11 UNC ASTM A325, Galv. ASTM B-454-76	4	SBCS5A
⑥ Coupling	Small 5/8-11 UNC 2A & 2B, Galv. ASTM B-454-76	4	SBCA1A
⑦ Shim	Horseshoe, 16 Gauge Galv. Steel Sheet	2	S100WGSH16
⑧ Shim	Horseshoe, 14 Gauge Galv. Steel Sheet	2	S100WGSH14
⑨ Anchor	304 Stainless Steel Ferrule/C-1050 Steel Rod & Coil	4	SBAAP
⑩ Hinge Plate	Small .071" Section, Galv. ASTM A153	4	SBHA1B
⑪ Bolt	1/2"-13 UNCx1-1/2", Hex.Hd. ASTM A325, Galv. ASTM A153	8	[illegible]



"break-safe"®

TRANSPO

BREAKAWAY SYSTEM FOR GROUND MOUNTED SIGN SUPPORTS

base and hinge assembly

type AI6-LP

for 6WF 9 section (max.)

ASSEMBLY NO. SBMAI6

DATE 4-2-87

U.S. PATENT NO. 3,951,556 4,071,970 4,528,786

SS-17

GENERAL NOTES

Meets all AASHTO "Standard specifications for structural supports for highway signs, luminaires and traffic signals."

All ASTM A325 bolts must be within a hardness range of Rockwell C23 to C31 prior to hot dip galvanizing per ASTM A153 or mechanically galvanized per ASTM B-454-76.

Fasteners, except for special bolt and coupling, are installed with lockwashers or locknuts and do not have specific torque requirements. Fasteners should be made as tight as possible with conventional wrenches.

Square and level individual components to minimize need for shimming.

No more than two shims underneath any one coupling and no more than three shims underneath any two couplings.

Structual steel to be hot dip galvanized per ASTM A123 after fabrication

INSTALLATION NOTES

Wrench sizes required: 7/8", 1", 1-1/16"

ANCHOR BRACKET ASSEMBLY

Attach adapters ⑩ and ⑨ to post, tighten bolts ⑪, ⑫ and ⑬ to proof load (1/2 turn beyond snug).

Mount anchor brackets ⑯ onto adapters ⑩ and ⑨. Tighten bolts ②, ③ and ④ to proof load.

EARTH EMBEDMENT OF ANCHOR SECTION

Drive the anchor assembly into the ground with a special drive cap, and a hydraulic, pneumatic or gasoline engine powered driver. The anchor assembly may also be placed in an augured hole with either concrete, or with a stone and grout mix.

UPPER BRACKET ASSEMBLY

Attach adapters ⑨ to post, tighten bolts ⑪, ⑫ and ⑬ to proof load. Mount upper brackets ① onto adapters ⑨. Tighten bolts ②, ③ and ④ to proof load.

COUPLING ASSEMBLY

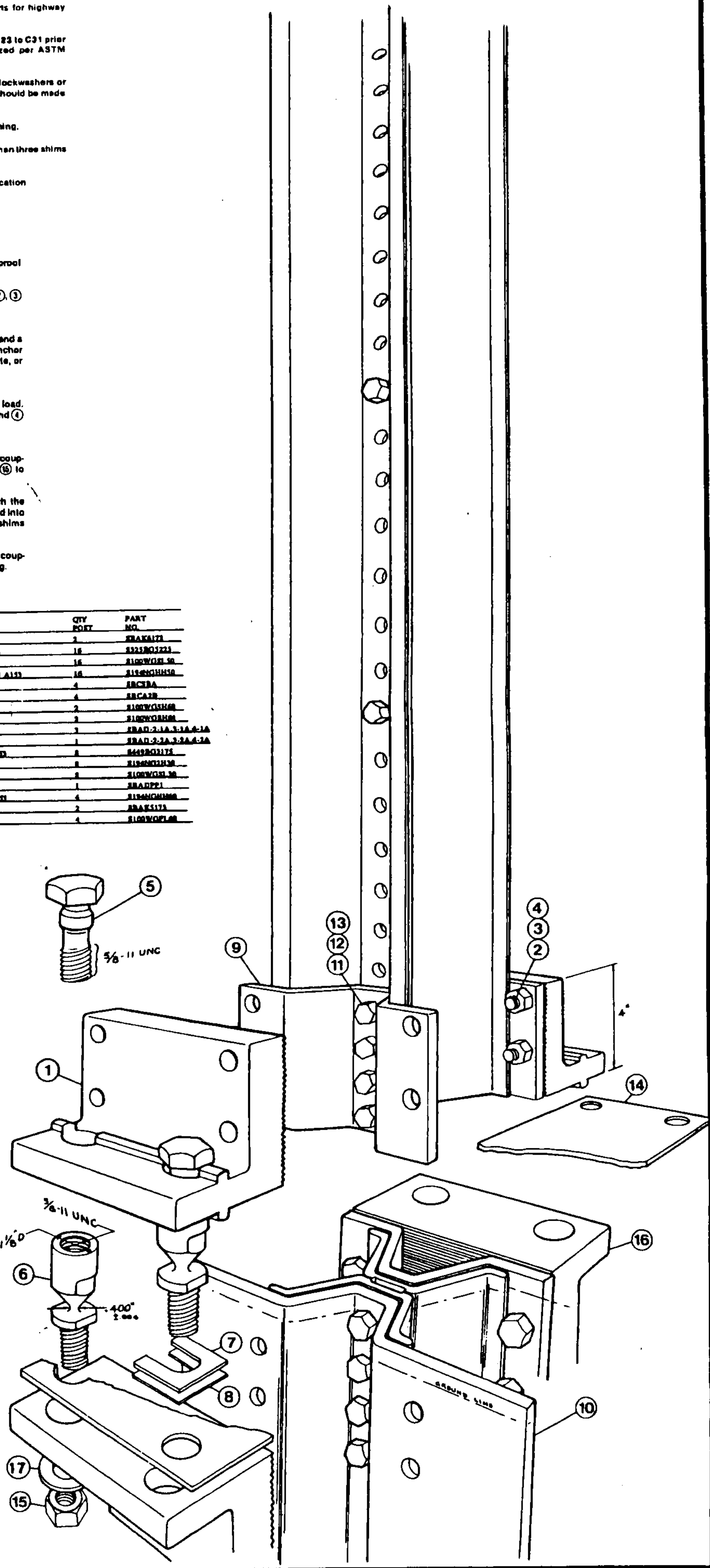
Place pop-plate ⑭ onto imbedded anchor section. Insert frangible couplings ⑥ through pop-plate and anchor brackets. Tighten hex nut ⑮ to proof load.

Suspend post over anchor section, lining up the brackets ① with the frangible couplings. Insert special bolts ⑤ through the brackets and into the frangible couplings. Tighten couplings and special bolts. Insert shims ⑦ and ⑧ between couplings and pop-plate if necessary.

Note: Do not place torque across necked down section of frangible couplings. Wrench flats are provided on either side for proper tightening.

BILL OF MATERIALS

ITEM	DESCRIPTION	QTY POST	PART NO.
1 Upper Bracket	6061 T6 Alum.	2	SBAKA173
2 Bolt	1/2"-13UNC x 2-1/4" ASTM A325 galv. ASTM A153	16	S325BO5225
3 Lockwasher	1/2" Galvanized	16	S100WOSL50
4 Nut	Hex 1/2"-13 UNC ASTM A194 Gr 2-2H, Galv. ASTM A153	16	S194NOHH50
5 Special Bolt	5/8"-11 UNC ASTM A325, Galv. ASTM B-454-76	4	SBCSBA
6 Coupling	Small 5/8-11 UNC 2A & 2B, Galv. ASTM B454-76	4	SBCA2B
7 Shim	Horseshoe, 16 Gauge Galv. Steel Sheet	2	S100WOSH60
8 Shim	Horseshoe, 14 Gauge Galv. Steel Sheet	2	S100WOSH80
9 Adapter	1/4" C.R. Steel, Galv. ASTM A123 - Small	3	SBAD-2-1A,3-1A,4-1A
10 Adapter	1/4" C.R. Steel, Galv. ASTM A123 - Large	1	SBAD-2-2A,3-2A,4-2A
11 Bolt	5/16"-18 UNCX 1-3/4" ASTM A449 Galv. ASTM A153	8	S449BO3175
12 Nut	5/16"-18 UNC ASTM A194 Gr2, Galv. ASTM A153	8	S194NO2H30
13 Lockwasher	5/16" Galvanized	8	S100WOSL30
14 Pop Plate	1/8" Galv. Steel Sheet	1	SBADPP1
15 Nut	Hex Nut 5/8"-11 UNC ASTM A325 Galv. ASTM A153	4	S194NOHH60
16 Anchor Bracket	6061 T6 Aluminum	2	SBAKS173
17 Flat Washer	5/8" Galvanized	4	S100WOFL60



TRANSPO

"break-safe"

BREAKAWAY SYSTEM FOR GROUND MOUNTED SIGN SUPPORTS

Earth Embedded

type AUX4, AUX6, AUX8

for 4#, 6# and 8# back to back U channel post

ASSEMBLY NO. SBMAUX4, 6, 8

DATE 3-13-87

U.S. PATENT NO. 3,951,556 4,071,970 4,528,788