LS-35

U.S. Department
of Transportation
Federal Highway
Administration

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

February 16, 1995

Refer to: HNG-14

Ray C. Minor, P.E.
Manager of Engineering
Hapco Division
P.O. Box 547
Abingdon, Virginia 24210

Dear Mr. Minor:

Your September 15, 1994, letter to Mr. Nicholas Artimovich transmitted test reports by the Texas Transportation Institute, dated May 1994, and video documentation of full-scale crash testing conducted to assess the breakaway performance of your company's aluminum extrusion breakaway bases supporting Hapco aluminum poles. This material had been sent for our information. By a January 12 telephone call to Mr. Artimovich you requested Federal Highway Administration (FHWA) acceptance of the bases covered in these reports. Requirements for breakaway supports are found in, the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic S'analp These specifications have been adopted by'the FHWA. The testing was done in conformance with the guidelines 'in the National Cooperative Highway Research Program Report Number 350 Recommended Procedures for the Safety Performance Evaluation of Hiahway Features.

The breakaway bases are similar to the pendulum tested four-bolt base that we indicated acceptable in our letter to you dated April 26, 1993. The present submission is for acceptance of a four-bolt base and a three-bolt base., The bases consist of an external sleeve welded on the end of a light pole. Three or four pairs of ribs with flanged ends are welded to the sleeves. They mate to u-shaped yokes that are secured by the foundation anchor bolts. The yokes and ribs are held together by u-shaped caps that fit over the flanges on the ends of the ribs and the legs of the yokes. These caps are held in place by two screws in each, some of which break under impact to allow the portion of the base welded to the pole to separate from the anchoring yokes. In addition, friction-reducing tape is used on the "caps" to enhance breakaway performance and a 457-mm long sleeve centered at bumper height is inserted in the pole to minimize energy loss that might occur from collapse of the pole under a concentrated bumper load. The test installations and breakaway base details are shown in the enclosed drawings.

The test results are summarized here::

Test Number	405121-1	405121-2	405121-3	405121-4
Support Type Pole Wall Thickness, mm (in)	73141-005 4.78 (0.188)	73141-005 4.78 (0.188)	73140-004 4.78 (0.188)	73140-004 4.78 (0.188)
Pole Butt Diam. and Base Designation HAPCO Drawing No.	9" 3-bolt Y base B73825	9" 3-bolt Y base B73825	8" 4-bolt X base B73486	8" 4-bolt X base B73486
Bolt Circle Diameter, mm (in) Test Article Mass, kg (wt, lbs)	381 (15) 168 (371)	381 (15) 168 (371)	279 (11) 159 (351)	279 (11) 159 (351)
Mounting Height, m (ft) Vehicle Mass, kg (weight, lbs)	12.04 (39.5) 820 (1808)	12.04 (39.5) 820 (1808)	10.36 (34.0) 820 (1808)	10.36 (34.0) 820 (1808)
Test Speed, km/h (mph) Occup. Imp. Speed m/s (fps)	34.0 (21.1) 1.38 (4.52)	97.6 (60.6) 1.70 (5.57)	34.4 (21.4) 2.16 (6.96)	98.1 (61.0) 1.66 (5.44)
Stub Height, mm (in)	76 (3.0)	76 (3.0)	76 (3.0)	76 (3.0)

The results of these tests meet the change in velocity and stub height requirements adopted by AASHTO and the FHWA. Therefore, the tested aluminum breakaway bases shown on drawings numbered 873825 (3-bolt Y base) and 873486 (4-bolt X base) for 203-mm to 229-mm (B-inch to g-inch) aluminum luminaire supports with 4.77~mm wall thickness described above are acceptable for use on the National Highway System, within the range of conditions tested, if proposed by a State.

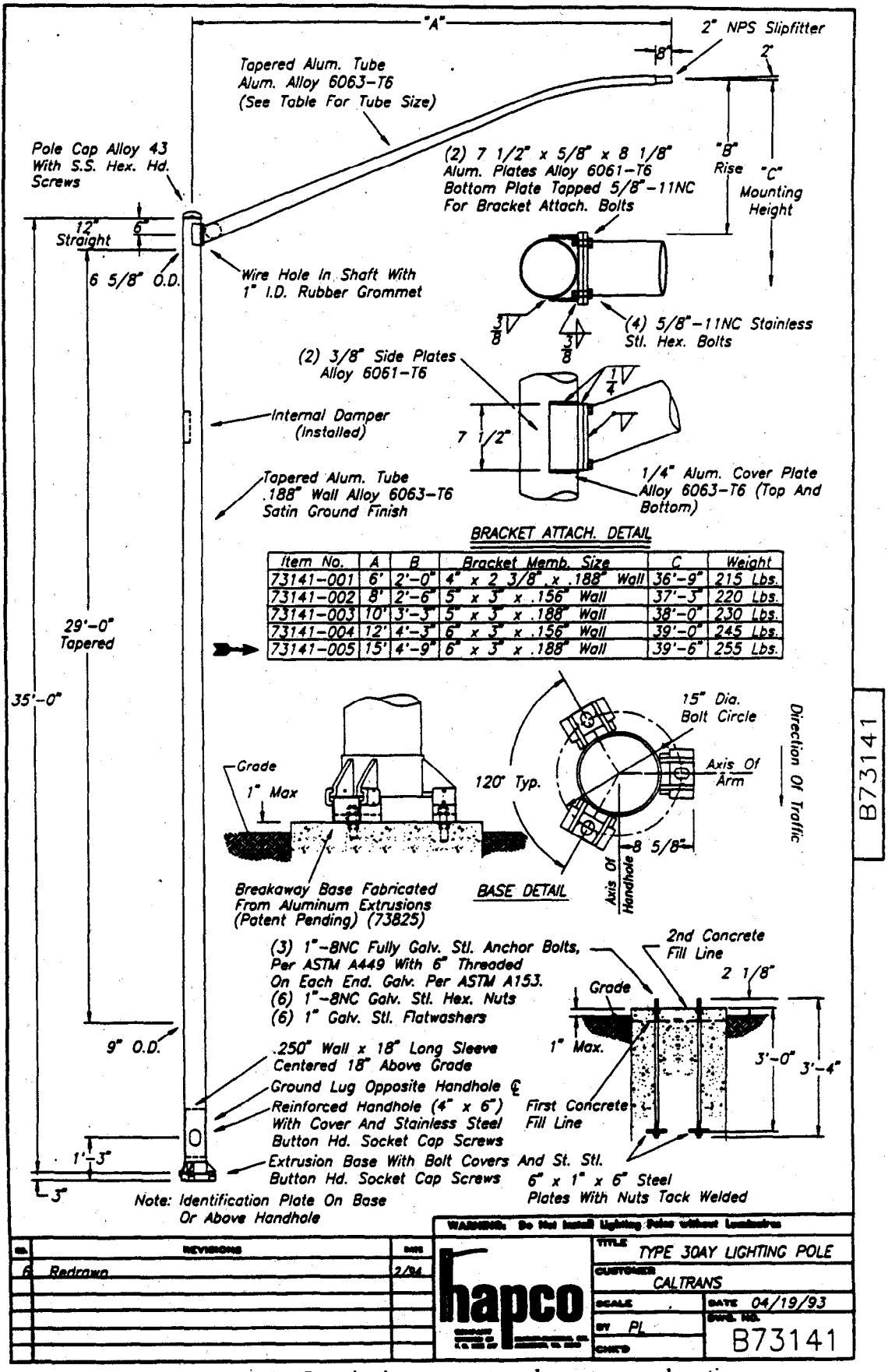
Our acceptance is limited to the breakaway characteristics of the systems and does not cover their structural features. Presumably, you will supply potential users with sufficient information on structural design and installation requirements to ensure.proper performance. We recommend that installation instructions stress the need for a level base for mounting these breakaway systems. We anticipate that the States will require certification from Hapco Division 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 change in velocity requirements.

Because the Hapco breakaway extruded aluminum bases are proprietary, to be used in Federal-aid highway projects: (a) they must be supplied through competitive bidding with equally suitable unpatented items; (b) the highway agency must certify that they are essential forsynchronization 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,

Jerry L. Poston, Chief
Federal-Aid and Design Division

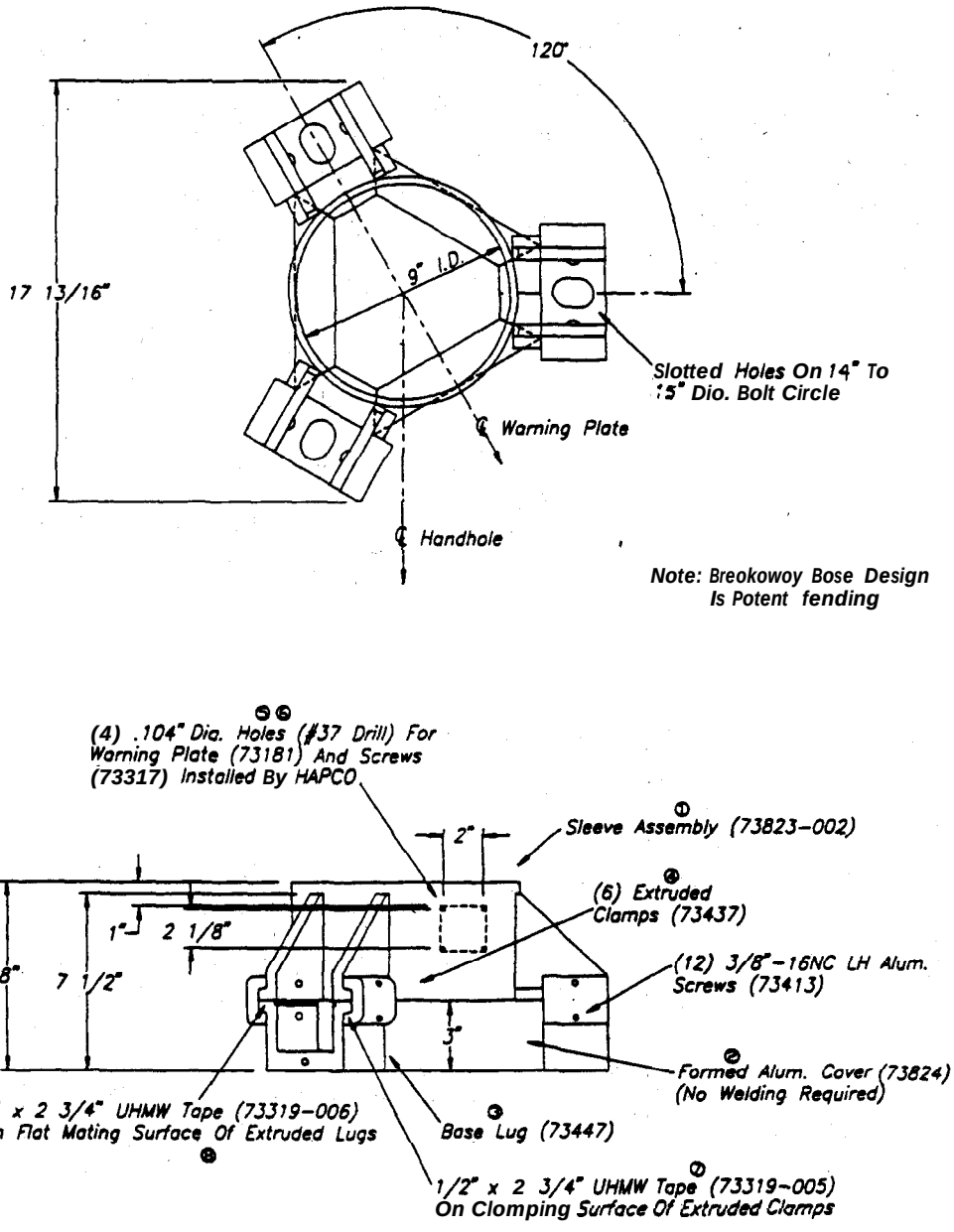
6 Enclosures



Item No.	A	B	Bracket Memb. Size	C	Weight
73141-001	6'	2'-0"	4" x 2 3/8" x .188" Wall	36'-9"	215 Lbs.
73141-002	8'	2'-6"	5" x 3" x .156" Wall	37'-3"	220 Lbs.
73141-003	10'	3'-3"	5" x 3" x .188" Wall	38'-0"	230 Lbs.
73141-004	12'	4'-3"	6" x 3" x .156" Wall	39'-0"	245 Lbs.
73141-005	15'	4'-9"	6" x 3" x .188" Wall	39'-6"	255 Lbs.

BRACKET ATTACH. DETAIL

Figure 1. Luminaire support and mast arm elevation.



B73825

NO.	REVISIONS	DATE

WARNING: Do Not Install Lighting Poles without Luminaires

hapco

TITLE: 9" BREAKAWAY Y-BASE

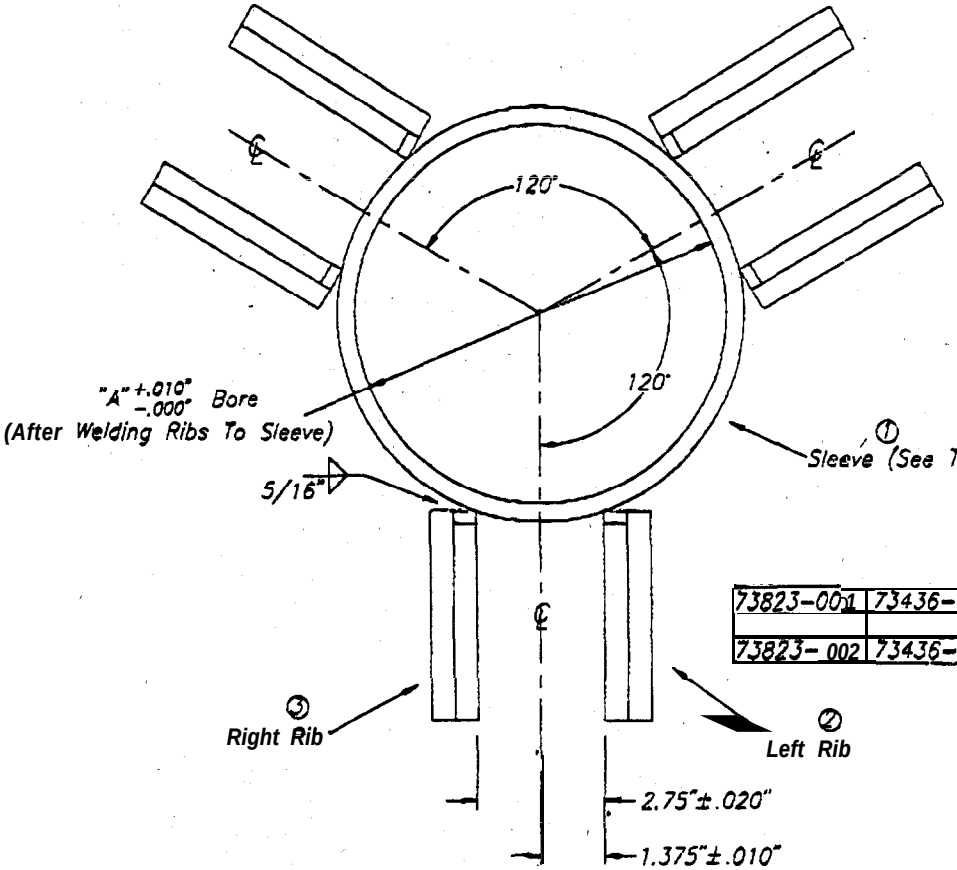
CUSTOMER:

SCALE: | DATE: 01/13/94

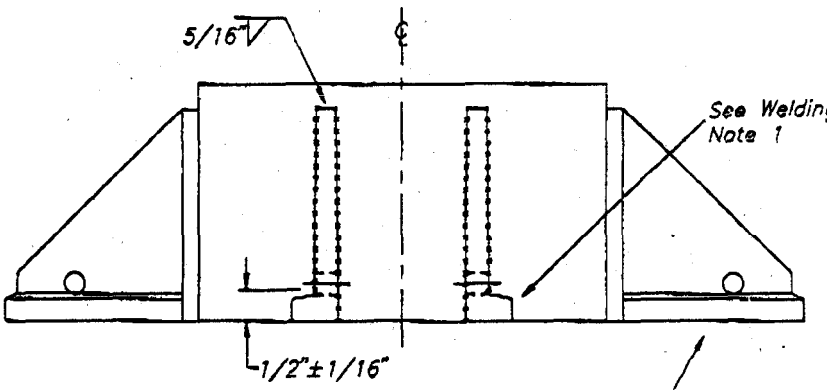
BY: LW | DWG. NO.: B73825

CHK'D: PL

Figure 2. Plan and elevation view of break-away base.



73823-001	73436-004	8.040"
73823-002	73436-005	9.040"



All Portions Of The Bearing Surface Must Lie In The Some Plane And Be Perpendicular To The Axis Of The Sleeve

Note:
. Indicates Location Of Fillet Weld

Weld Quality Requirements

1.) Weld Spotter Shall Be Remaved. Flange And BearingSurfaces Shall Be Smooth
2.) All Welds Shll Be Wire Brushed Thoroughly
3.) he Toe Of All Fillet Welds Shall Be Blended Into The Parent Metal
4.) No Craters, Cracks, Lack Of Fusion. Under-Cut, Or Overlap Are Not Permitted

NO.	REVISIONS	DATE

WARNING: Do Not Install Lighting Poles without Luminaires

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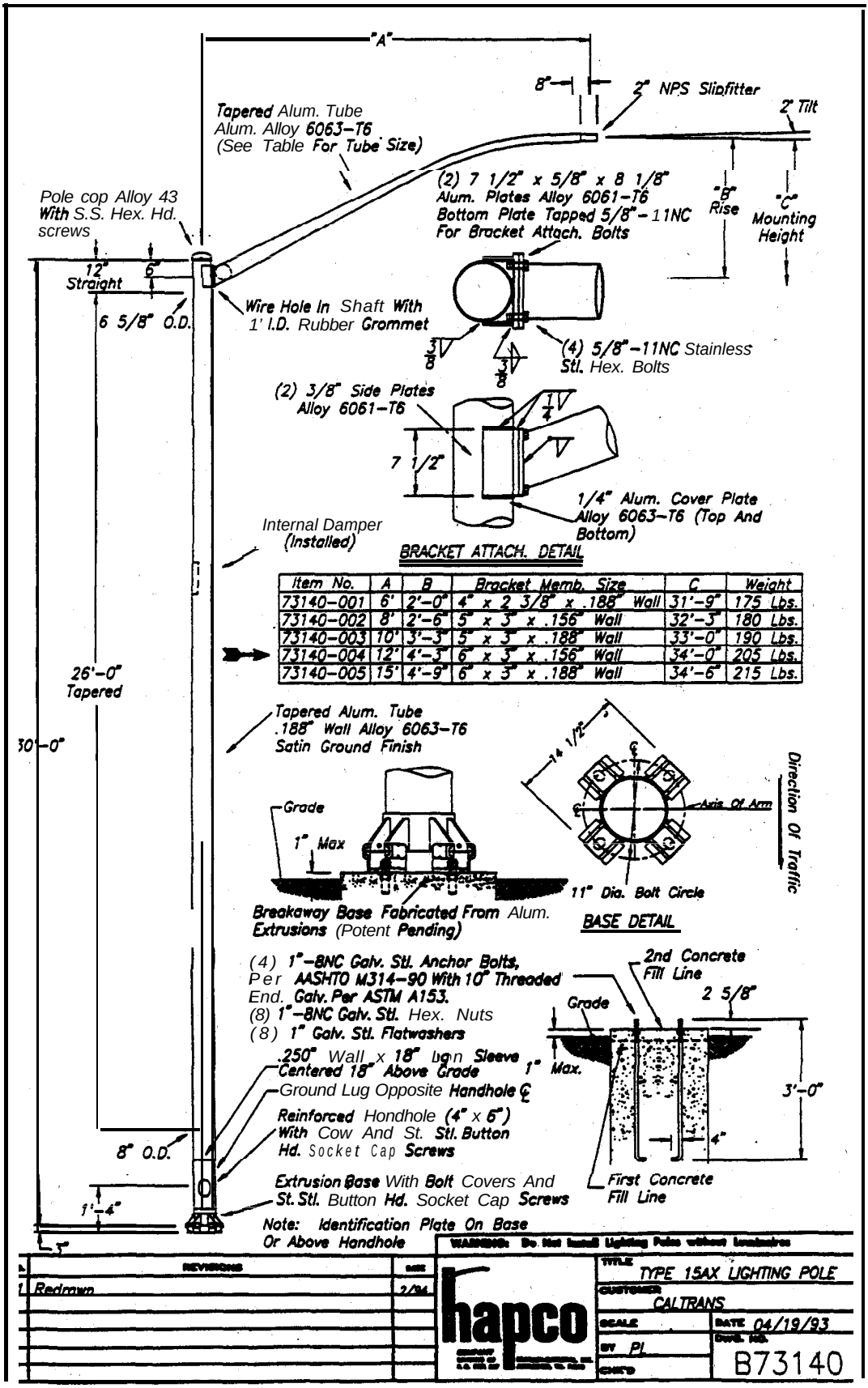
TITLE	SLEEVE ASSEMBLY
CUSTOMER	
SCALE 2.66	DATE 01/13/94
BY LW	DWG. NO. B73823
CHK'D PL	

B73823



Item No.	A	B	Bracket Memb. Size	C	Weight
73140-001	6'	2'-0"	4" x 2 3/8" x .188" Wall	31'-9"	175 Lbs.
73140-002	8'	2'-6"	5" x 3" x .156" Wall	32'-3"	180 Lbs.
73140-003	10'	3'-3"	5" x 3" x .188" Wall	33'-0"	190 Lbs.
73140-004	12'	4'-3"	6" x 3" x .156" Wall	34'-0"	205 Lbs.
73140-005	15'	4'-9"	6" x 3" x .188" Wall	34'-6"	215 Lbs.

Figure 1. Luminaire support and mast arm elevation.

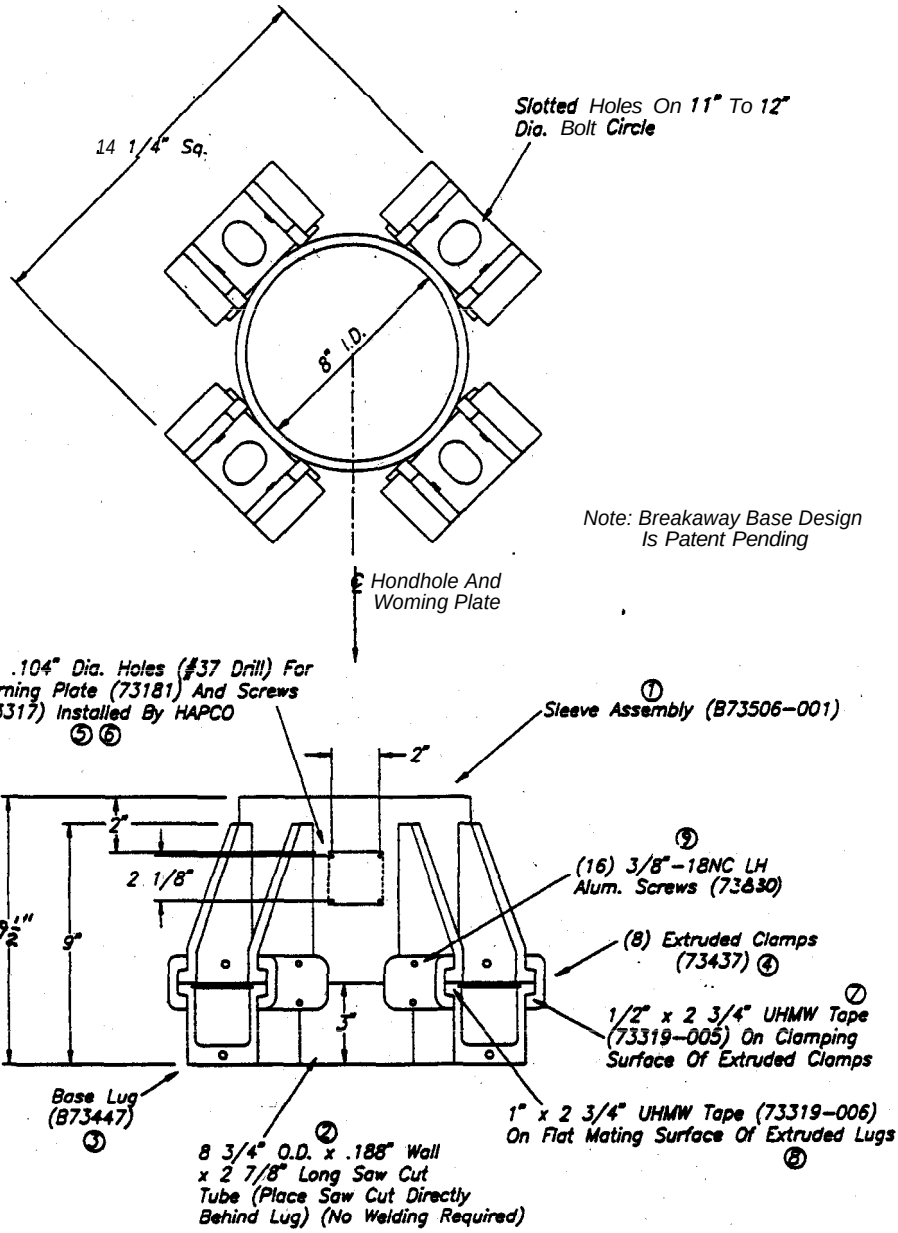
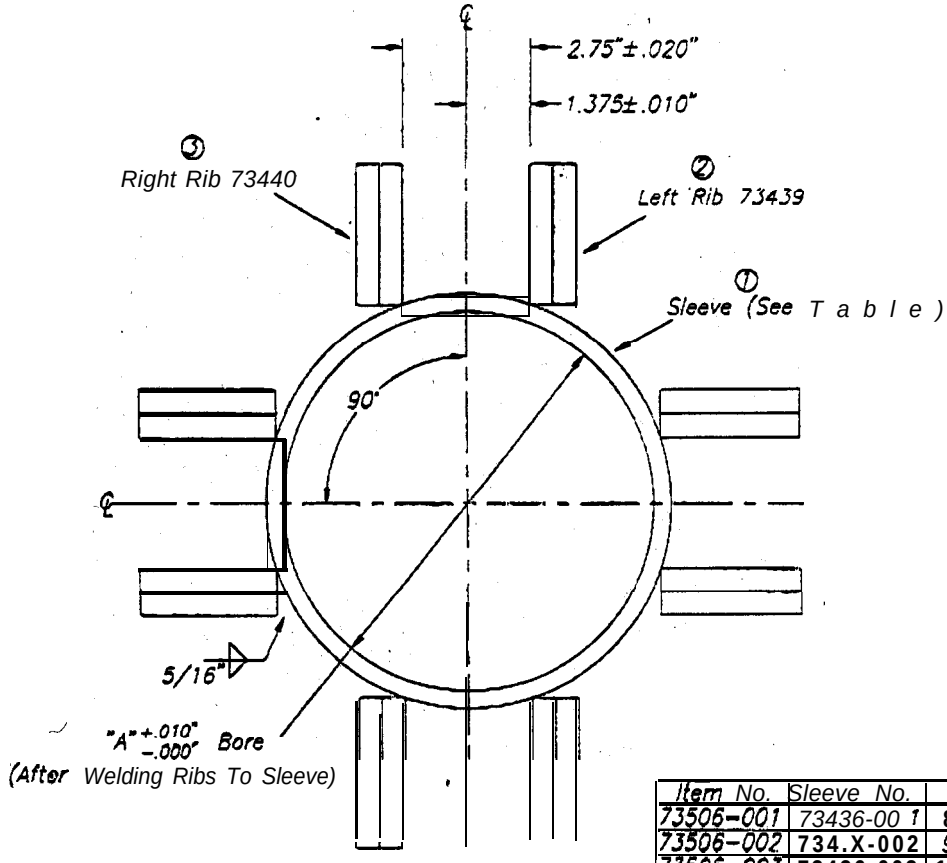
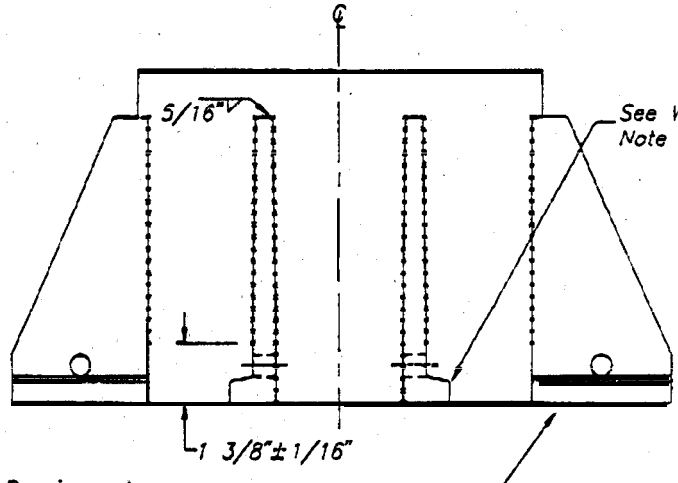


Figure 2. Plan and elevation view of break-away base.



Item No.	Sleeve No.	A
73506-001	73436-001	8.048"
73506-002	734.X-002	9.040
73506-003	73436-003	10.044



Weld Quality Requirements

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2.) All Welds Shall Be Wire Brushed Thoroughly
3.) The foe Of All filet Welds Shall Be Blended Into The Parent Metal
4.) No Craters, Cracks, lock Of Fusion, Under-Cut, Or Overlap Are Not Permitted

All Portions Of The Bearig Surface Must Lie In The Some Plane And Be Perpendicular To The Axis Of The Sleeve

Note:
1 Indicates Location Of Filet Weld

NO.	REVISIONS	DATE
1	ADDED TABLE	9/16/93

WARNING: Do Not Install Lighting Poles without Luminaire

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TITLE: SLEEVE ASSEMBLY
CUSTOMER:
SCALE:
DATE: 08/25/93
BY: PI
CHK'D:
DWG. NO. B73506