Dear Mr. Minor:

Thank you for your March 17 letter to Lawrence A. Staron requesting Federal Highway Administration's (FHWA) acceptance of your company's aluminum extrusion breakaway bases. Your letter was accompanied by the test report dated March 12, 1993, film and video documentation, and confidential information regarding material specifications and additional tests performed. Additional information and drawings were submitted with your letter of April 16. The pendulum testing was conducted to assess the breakaway performance of the base with various Hapco aluminum poles. The tests were witnessed by Mr. Nicholas Artimovich of this office. Requirements for breakaway supports are found in 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 FHWA.

The breakaway bases, which are shown in the enclosed drawings, are essentially slip bases. The bending capacity of the bases comes from the breakaway caps that hold the flanges on the ribs attached to the poles to the mating flanges on the base lugs. Breakaway comes from an impact force breaking the bolts that hold the breakaway caps in place. A friction-reducing tape on the clamp faces of the breakaway caps aids in activation of the breakaway mechanism.

<table>
<thead>
<tr>
<th>Test Number</th>
<th>3385</th>
<th>3386</th>
<th>3387</th>
</tr>
</thead>
<tbody>
<tr>
<td>Support Type</td>
<td>8&quot; Aluminum</td>
<td>10&quot; Aluminum</td>
<td>10&quot; Aluminum</td>
</tr>
<tr>
<td>Wall Thickness, mm (in)</td>
<td>4.78 (.188)</td>
<td>4.78 (.188)</td>
<td>6.35 (.250)</td>
</tr>
<tr>
<td>Base Designation</td>
<td>A73089</td>
<td>A73088</td>
<td>A73088</td>
</tr>
<tr>
<td>Bolt Circle Diam., mm (in)</td>
<td>280 (11)</td>
<td>380 (15)</td>
<td>380 (15)</td>
</tr>
<tr>
<td>Test Article Mass, kg (weight, lbs)</td>
<td>91 (200)</td>
<td>182 (400)</td>
<td>250 (550)</td>
</tr>
<tr>
<td>Mounting Height, m (ft)</td>
<td>9.15 (30)</td>
<td>11.8 (38.75)</td>
<td>16.8 (55)</td>
</tr>
<tr>
<td>Pendulum Mass, kg (wt, lbs)</td>
<td>818 (1800)</td>
<td>818 (1800)</td>
<td>818 (1800)</td>
</tr>
<tr>
<td>Impact Speed, km/hr (mph)</td>
<td>32.2 (20)</td>
<td>32.2 (20)</td>
<td>32.2 (20)</td>
</tr>
<tr>
<td>Velocity Change, m/s (fps)</td>
<td>2.5 (8.3)</td>
<td>2.3 (7.5)</td>
<td>3.3 (10.7)</td>
</tr>
<tr>
<td>Calculated 60-mph (97-km/h)</td>
<td>Velocity Change, m/s (fps)</td>
<td>1.8 (5.8)</td>
<td>2.3 (7.4)</td>
</tr>
<tr>
<td>Stub Height, mm (in)</td>
<td>75 (3)</td>
<td>75 (3)</td>
<td>75 (3)</td>
</tr>
</tbody>
</table>
The results of the tests summarized above meet the change in velocity and stub height requirements adopted by AASHTO and FHWA. Therefore, the tested extruded aluminum breakaway bases A73089 and A73088, described above, for 203-mm (8-inch) and 254-mm (10-inch) butt diameter aluminum luminaire supports, respectively, with wall thicknesses from 4.77 mm to 6.35 mm are acceptable for use on Federal-aid highway projects, within the range of conditions tested, if proposed by a State. This acceptance also applies to intermediate base sizes, provided appropriate stiffening is included at the base ends of the pole shafts.

Our acceptance is limited to the breakaway characteristics of the bases 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 plane surface for mounting these breakaway bases. Additionally, the material specifications for the bolts that hold the breakaway caps in place must ensure that the bolt strengths do not exceed that need for proper release. 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 that used in the tests and that it 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 for synchronization with existing highway facilities, or that no equally suitable alternative 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,

[Signature]

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

5 Enclosures
Figure (3)
Hapco Drawing No. B73071,
30' Lighting Pole

Pole Cap Alloy 43
With S.S. Screws

With 1" I.D.
Rubber Grommet

Extruded Pole Plate Alloy 6063-T6
With 1/2"-13NC Stainless Steel Hardware

Tapered Bracket .125" Wall Alloy 6063-T6

Wire Hole With 1" I.D.

Tapered Alum. Tube
.188" Wall Alloy 6063-T6
With Satin Ground Finish

BASE DETAIL

Breakaway Base (See Detail)

(4) 1"-BNC Hex Hd.
Stl. Bolts With Nuts,
Flatwashers, And Lockwashers

Ground Lug Opposite
Handhole Q

Reinforced Handhole (4"x6") With
Cover And Stainless Steel Hex
Head Screws

Breakaway Base Fabricated
From Aluminum Extrusions

14 1/2" 14 1/2"

11" Dia.
Bolt Circle

View A-A

WARNING: Do Not Install Lighting Poles without Luminaires
Figure (15)
Hapco Drawing No. B73075
38'-9" Lighting Pole

15'-0" Truss Arm (48489)

Orientation Of Base Flange, Handhole, Arm
And Impact Direction

Pole Cap Alloy 43
With S.S. Screws

38'-9" Lighting Pole

Topered Alum. Tube (4" O.D.)
.125" Wall Alloy 6063-T6
2" Sch. 40 Pipe Alloy 6063-T6

2 1/2" x 5 1/8" Section
Wire Hole With 1" I.D. With Rubber Grommet

Cast Alum Pole Bands With 1/2"-13NC
Stainless Steel Hardware

Aluminum Tube
.188" Wall Alloy 6063-T6
Satin Ground Finish

35'-11"

15" Dia.
Bolt Circle

View A-A

Breakaway Base Fabricated
From Alum. Extrusions

(4) 1"-BNC Hex Hd.
Stl. Bolts With Nuts,
Flatwashers And Lockwashers

Ground Lug
Opposite Handhole Q

Reinforced Handhole (4" x 6") With
Cover And Stainless Steel Hex. Hd.
Screws

Breakaway Base (See Detail)

Rigid Steel Test Frame

17 1/2"

17 1/2"

2 1/2"

10" O.D.

1'-6"

1'-9"

5"

10"
1/2" Plate Interior Reinforcing. (4) Pieces Located 1/2" From Tube Bottom And (4) Pieces Located 6" From Tube Bottom

10" O.D. Alum. Tubing

1 1/4" x 1 3/4" x 2 3/4"

Rib Spacer

Right Rib (See Detail)

Breakaway Cap (See Detail)

Bolt Cover Attachment Hole (Bolt Cover Not Shown—See Detail)

Cap Bolts (Break Upon Impact)

Base Ring

Base Lug (See Detail)

BOLT COVER