Dear Mr. Sik:

This is in response to your July 13 letter to Mr. Artimovich requesting acceptance by the Federal Highway Administration (FHWA) of your company's cast aluminum transformer bases for use on Federal-aid highway projects. Tests were conducted to assess compliance of the bases with FHWA breakaway requirements, which cite Section 7 of the 1985 American Association of State Highway and Transportation Officials' (AASHTO) Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals. The Southwest Research Institute forwarded copies of the five crash test reports (Project No. 06-3116-516), dated June 1990, containing results of the pendulum tests on various aluminum and steel poles with these bases. Fully dimensioned drawings and material test reports on the aluminum castings had been received from you on May 31.

The tests used an instrumented 1,800-pound pendulum fitted with a 10 stage crushable nose which simulates the left quarter point of a 1979 Volkswagen Rabbit. Impact speed was 20 mph. A summary of the tested hardware is presented below:

<table>
<thead>
<tr>
<th>Test Number</th>
<th>Akron Foundry Number</th>
<th>Height of Base</th>
<th>Pole Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test-1</td>
<td>TB-AF-6-9</td>
<td>9 inches</td>
<td>Aluminum</td>
</tr>
<tr>
<td>Test-10</td>
<td>TB-AF-6-9</td>
<td>9 inches</td>
<td>Steel</td>
</tr>
<tr>
<td>Test-11</td>
<td>TB-AF-6-9</td>
<td>9 inches</td>
<td>Steel</td>
</tr>
<tr>
<td>Test-12</td>
<td>TB3-AF-1517-17 I.W.</td>
<td>17 inches</td>
<td>Steel</td>
</tr>
<tr>
<td>Test-14</td>
<td>TB-AF-5-9</td>
<td>9 inches</td>
<td>Steel</td>
</tr>
<tr>
<td>Test-16</td>
<td>TB-AF-5-9</td>
<td>9 inches</td>
<td>Steel</td>
</tr>
</tbody>
</table>

Details of the tested hardware are shown in Enclosure I. Test parameters and measured and extrapolated test results and are shown on Enclosure II as part of Test Series IV. This information shows that the tested pole-base combinations will meet the change in velocity and stub-height requirements adopted by the FHWA.

The 17.1 fps and 16.8 fps calculated changes in velocity of Tests 12 and 14, respectively, exceed FHWA requirements. However, as the calculated changes in velocities nearly always over estimate the 60-mph results, we will consider...
the Test 14 results as meeting the new FHWA requirements. However, in the absence of other test evidence, we believe the calculated 60-mph change in velocity for Test 12 is beyond the limit we should accept without qualification.

Thus, the transformer bases manufactured by your company and distributed under the product numbers shown above, as shown on the enclosed drawings, are acceptable for use on Federal-aid highway projects within the range of conditions tested, if proposed by a State, except that for base TB3-AF-1517-17 I.W. for which our acceptance is limited to use were the combined supported weight of the pole, mast arm, and luminaire does not exceed 900 pounds. This acceptance is limited to breakaway characteristics of the bases and does not cover their structural features. Presumably, you will supply potential users with sufficient information on structural design limitations and on installation requirements to ensure proper performance. We anticipate that States will require certification from Akron Foundry that bases furnished have essentially the same chemistry, mechanical properties, and geometry as those used in the tests, and that supports with those bases will meet the FHWA breakaway requirements.

Since your company's breakaway support designs 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 was provided with prior correspondence.

Your letter also requested acceptance for TB-1 and TB-2 bases tested with heavier pole hardware. Enclosure III is a copy of our letter of acceptance dated May 30, 1990, sent in response to an earlier request.

Sincerely yours,

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

Enclosures
Endorsement to FHWA field offices: All of the transformer bases covered by this letter and Geometric and Roadside Design Acceptance Letters LS-17 and LS-18 were manufactured by Akron Foundry Company. For marketing purposes Akron Foundry has requested these three acceptance letters to cover what is essentially two 9-inch high transformer base models that will be manufactured by Akron Foundry and sold by three firms: Feralux, Pole Lite, and Akron Foundry. One model has top and bottom bolt circle ranges of 11.5 inches to 12.5 inches. It will carry a marking of CS-300 for Feralux, F-1300 for Pole Lite, and TB-AF6-9" for Akron. The other has top and bottom bolt circle ranges of 14.5 inches to 15.25 inches. It will carry a marking of CS-370 for Feralux, F-1302 for Pole Lite, and TB-AF5-9" for Akron. A separate series of tests was run to cover the Feralux model designations, while another series was run to cover the combined Pole Lite and Akron designations. It is our understanding that in production the Feralux bases will only be marked with Feralux's base numbers. On the other hand, bases to be marketed by either Pole Lite or Akron will be manufactured showing both suppliers' model numbers and before being shipped, one model number will be removed so that only the nominal supplier's model number will remain.
1.76R

1/2 -13 TAP THRU FOR GROUND SCREW

1/4 - 20 TAP THRU FOR GROUND SCREW

17.44 SQ.

15.09 SQ.

9.75 x 11.75 DOOR

14.25 CUT-OFF

17.00

.15 NOMINAL

MIG 4043 WIRE 5/16

WITH APPROX. 5" OF WELD ON EACH OF THE (4) INTERNAL CORNERS

2 3/4 DIA. x 1 5/16 x 1/2 TK. STEEL WASHERS FOR 1 1/4 DIA. ANCHORAGE

4 PLS, EQ, SPACED ON 15.00 DIA. THRU 17.25 DIA. BOTTOM GROUND B.C.

WHEN ADDITIONAL STATIC LOADING IS REQUIRED ON 15.00 DIA. B.C. APPLICATIONS USE 5/8 x 2 3/4 x 4 1/4

RECTANGULAR STEEL WASHER UNDER 2 3/4 x 1 1/16 I.D. x 1/2 TK. WASHERS FOR 1" DIA. GROUND MOUNTING B.C.

2 3/4 DIA. x 1 5/16 I.D. x 1/2 TK. STEEL WASHERS 4 PLS. EQ. SPACED ON 13.00 DIA. THRU 15.12 DIA. B.C.

DOOR SUPPLIED/BLANK OR LOGO IN ALUMINUM OR PLASTIC WITH OR WITHOUT HINGE

STD 1/4 -20 B.S.HEX. SCREW OR VANDAL SCREW TO FIT YOUR SPECIFICATIONS

ALL WASHERS TO BE ZINC MECHANICAL COATED PER ASTM B 695 - 85 CLASS 50

356 T-6 ALUMINUM ALLOY / B.S. WHEELABRATED FINISH CHEMICAL AND PHY. CERTS TO BE SUPPLIED WITH EACH SHIPMENT

ADHESIVE BREAKAWAY AND CAUTION LABELS TO APPEAR ON INSIDE WALL OPPOSITE DOOR OPENING

AKRON FOUNDRY CO.
1985 AASHTO T-BASE

1-25-88
TB3 - AF 1517 - 17 I.W.

MATERIAL MELTED AND MANUFACTURED IN THE USA. CASTINGS PRODUCED IN THE USA.

SPECIAL CUT-OFF 17.25 DIA. GROUND MOUNT ONLY
USE 2 3/4 DIA. x 1 1/16 I.D. x 1/2 TK. WASHERS FOR 1" ANCHORAGE TOP & BOTTOM B.C.

11.50/12.50 DIA. B.C.

4.75 CUT-OFF
9.50 OVERALL

DANGER
HIGH VOLTAGE DO NOT TAMPER

5.5 x 9.25 DOOR OPENING

12.72 SQ.

MIG 4043

1/4

2.00

7.00

9.00

9.75 DIA.

12.25 SQ.

.62

WITH INTERNAL CORNER WELDS

356 T6 ALUMINUM ALLOY PER ASTM B108

AKRON FOUNDRY CO.
9" HIGH T-BASE
5-1-90 TB-AF6-9"

1985 AASHTO REQUIREMENTS / 1800 LB PENDULUM TEST
Figure 3. Assembly Drawing, Akron Foundry Test 1
POLE WGT. 403 LBS.
ARM WGT. 137 LBS.
ARM WGT. 137 LBS.
50 LB. LUMINAIRE (2) 100 LBS.
777 LBS. GROSS

9.00 DIA. STEEL POLE / 11 GAUGE (.1196 WALL)
MOUNT POLE TO BASE / 1" BOLTS ON 12.00 DIA. B.C.

AKRON FOUNDRY TB-AF6-9 T-BASE (REF. TB-2 BOTTOM)
MOUNT BASE ON GROUND B.C. / 12.00 DIA. USING 1" BOLTS ON 12.00 DIA. B.C.

OR
POLE-LITE F-1300 T-BASE (REF. TB-2 BOTTOM)
MOUNT BASE ON GROUND B.C. / 12.00 DIA. USING 1" BOLTS ON 12.00 DIA. B.C.

1985 AASHTO REQUIREMENTS / 1800 LB. PENDULUM TEST

AKRON FOUNDRY TEST 10 ON POLE-LITE F-1300 T-BASE
PROJECT 68-3116-516

Figure 3. Assembly Drawing, Akron Foundry Test 10
**Figure 3. Assembly Drawing, Akron Foundry Test 11**

- **1085 AASHTO REQUIREMENTS / 1800 LB. PENDULUM TEST**

- **AKRON FOUNDRY TEST 11 ON AKRON FOUNDRY TB-AF6-9 T-BASE**
  
  **PROJECT 06-8116-516**

- **KRON FOUNDRY TEST 11**

  **ALUMINUM POLE .25 WALL / TWIN ARMS**

  **POLE WGT. 256 LBS.**
  **ARM WGT. 43 LBS.**
  **ARM WGT. 43 LBS.**
  **50 LB. LUMINAIRE (2) 100 LBS.**
  **442 LBS. GROSS**

- **8.00 DIA. ALUMINUM POLE / .25 WALL**
  **MOUNTED ON 356 T6 CAST ALUMINUM ANCHOR BASE**
  **1" BOLTS ON 12.00 DIA. B.C.**

- **AKRON FOUNDRY TB-AF6-9 T-BASE (REF.TB-2 BOTTOM)**
  **MOUNT ON GROUND B.C. / 12.00 DIA. USING 1" ANCHORAGE**

  **OR**

- **POLE-LITE F-1300 T-BASE (REF.TB-2 BOTTOM)**
  **MOUNT ON GROUND B.C. / 12.00 DIA. USING 1" ANCHORAGE**

- **37'-1"**

- **13'-8" TWIN ARMS**

- **41'-0" MOUNTING HEIGHT**
Figure 3. Assembly Drawing, Akron Foundry Test 12
Figure 3. Assembly Drawing, Akron Foundry Test 14
POLE WGT. 405 LBS.
ARM WGT. 43 LBS.
ARM WGT. 43 LBS.
50 LB. LUMINAIRE (2) 100 LBS.
591 LBS. GROSS

10.00 DIA. ALUMINUM POLE / .25 WALL
MOUNTED ON 350 TO CAST ALUMINUM ANCHOR BASE # AF-1315-10-2
1 1/4 BOLTS ON 15.00 DIA. B.C.

AKRON FOUNDRY TB-AF5-9 T-BASE (REF.TB-1 BOTTOM)
MOUNT BASE ON 16.00 DIA. B.C. USING 1 1/4 ANCHORAGE
OR
POLE - LITE F-1302 T-BASE (REF.TB-1 BOTTOM)
MOUNT BASE ON 15.00 DIA. B.C. USING 1 1/4 ANCHORAGE

1986 AASHTO REQUIREMENTS / 1900 LB. PENDULUM TEST
AKRON FOUNDRY TEST 16 ON TB-AF5-9 T-BASE
PROJECT 06-3116-316

Figure 3. Assembly Drawing, Akron Foundry Test 16
<table>
<thead>
<tr>
<th>Test Series</th>
<th>Test Number</th>
<th>Base Test</th>
<th>Test</th>
<th>Delta V</th>
<th>Delta V</th>
<th>Stub Pole</th>
<th>Pole Type</th>
<th>Nominal Luminaire Mounting Length (feet)</th>
<th>Mast Arm ID Diameter (In.)</th>
<th>Bottom Bolt Diameter (In.)</th>
<th>Bottom Washer Diameter (In.)</th>
<th>Bottom Washer</th>
<th>Top Bolt Diameter (In.)</th>
<th>Top Washer Diameter (In.)</th>
<th>Top Washer Thickness (In.)</th>
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<tbody>
<tr>
<td>IV</td>
<td>AF-1</td>
<td>FERALUX CS-300</td>
<td>3.4</td>
<td>6.4</td>
<td>2.0</td>
<td>413</td>
<td>ALUMINUM</td>
<td>36.83</td>
<td>15.65</td>
<td>12</td>
<td>2 3/4</td>
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<td>TB-AF-6-9 POLE LITE F-1300</td>
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<td>IV</td>
<td>TEST-2</td>
<td>FERALUX-CS-300</td>
<td>5.3</td>
<td>11.1</td>
<td>2.0</td>
<td>777</td>
<td>STEEL</td>
<td>49.50</td>
<td>14.50</td>
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<td>2 3/4</td>
<td>1/2</td>
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<tr>
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<td>TEST-10</td>
<td>TB-AF-6-9 POLE LITE F-1300</td>
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<td>STEEL</td>
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<td>12</td>
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<td>1/2</td>
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<td>ALUMINUM</td>
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<td>12</td>
<td>2 3/4</td>
<td>1/2</td>
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<td>TEST-12</td>
<td>TB-AF-5-9 POLE LITE F-1302</td>
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<td>17.1</td>
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<td>55.42</td>
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<td>1/2</td>
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<td>IV</td>
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<td>ALUMINUM</td>
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<td>15</td>
<td>2 3/4</td>
<td>1/2</td>
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<tr>
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<td>TEST-17</td>
<td>FERALUX CS-300</td>
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<td>2.0**</td>
<td>442</td>
<td>ALUMINUM</td>
<td>41.08</td>
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<td>12</td>
<td>2 3/4</td>
<td>1/2</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

+ I.W. signifies Internal Weld.
** All tests run with twin mast arms.

* Anchor bolt nuts should not be torqued over 150 foot-pounds.
** A small shard of aluminum remained between 2 and 3 inches above the base plate.