U.S. Department
of Transportation
Federal Highway Administration

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

MAY 30 1990

Refer to: HNG-14

Dennis H. O'Brien, P.E.
Manager, Product Planning
Industrial & Construction Products Division
Valmont Industries, Inc.
Valley, Nebraska 68064

Dear Mr. O'Brien:

Thank you for your April 4 letter to Mr. Thomas O. Willett requesting Federal Highway Administration's (FHWA) acceptance of your company's breakaway luminaire support. With your letter, you enclosed a Southwest Research Institute (SwRI) report (Project No. 06-3116-516) dated March 1990, containing results of pendulum tests on the Valmont Industries Model DS60-T00E486-15D, pole mounted on a cast aluminum transformer base, Valmont Part Number 0283093, manufactured by Akron Foundry Company. The test was conducted to assess the compliance of this hardware 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 test used an instrumented 1,800-pound pendulum fitted with a 10 stage crushable nose, which simulates a 1979 Volkswagen Rabbit. Details of the tested hardware are shown on enclosure 1. The measured and extrapolated test results are summarized below:

Base tested	Valmont No. 0283093 356-T6 Aluminum Alloy. 15-inch bolt circle. 1-inch diameter bolts. Nuts torqued to approximately 200 foot-pounds.
Pole used	DS60-T00E486-15D, steel
Mast arm lengths	15.0 feet (two mounted perpendicular to the direction of impact)
Luminaire mounting height	55 feet
Test article weight	950 pounds (excluding base weight)
Test speed	20 mph
Velocity change	9.5 fps
Stub height (actual)*	6.7 inches
Calculated velocity change	16.7 fps at 60 mph

*The reported stub height was 3.3 inches which is the measurement to the top of the anchor bolt. A shard of aluminum from the transformer base remained in place to a height of 6.7 inches. We concur with the SwRI conclusion that the protrusion above the 4-inch maximum does not constitute "substantial remains" as referred to in Section 7 of the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals.

The above information shows that the test results of the subject pole-base combination meet the change in velocity and stub-height requirements adopted by the FHWA. The 16.7 fps calculated change in velocity exceeds FHWA requirements by 0.7 fps. However, as the evidence you presented in your submission indicated, calculated changes in velocities nearly always over estimate the 60 mph results. Therefore, we will consider the results as meeting the new FHWA requirements.

Your letter requested that our acceptance be granted with several hardware parameters specified that do not conform with the tested hardware, such as the bolt diameter, weight of pole with mast arm and luminaire, mounting height, and pole wall thickness. The evidence presented suggests the hardware, as tested, is marginally acceptable. Therefore, without further crash testing, we cannot accept the hardware changes you propose because we believe they have the potential for reducing the breakaway performance of the pole-base combination. Specifically, our acceptance is limited to the use of 1-inch diameter anchor bolts, a maximum anchor bolt nut tightening torque of 200 foot/pounds, and a maximum weight of pole and appurtenances of 950 pounds, and a maximum luminaire mounting height of approximately 55 feet.

In the test, machined washers were used on the bolts attaching the bottom of the base to the test pad. As these smoother surfaced washers probably created less friction than typical galvanized cut washers would have, the breakaway performance may have been enhanced. Thus, our acceptance is also limited to the use of similarly machined washers for the use with the anchor bolts.

In summary, the transformer base you have designated Valmont Part Number 0283093, as shown on the enclosed drawings and subject to the limitations described above, is acceptable for use on Federal-aid highway projects if proposed by a State. This acceptance is limited to breakaway characteristics of the base and does not cover its 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 Valmont Industries that the castings furnished have essentially the same chemistry, mechanical properties, and geometry as the casting used in the test, and that the castings will meet the FHWA change in velocity requirements.

Since your company's breakaway support design is a proprietary item, to be used in a Federal-aid highway project it; (a) must be supplied through competitive bidding with equally suitable unpatented items; (b) the State highway agency must certify that it is essential for synchronization with existing highway facilities, or that no equally suitable alternate exists; or (c) it 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 for your information.

Sincerely yours,

L. A. Staron

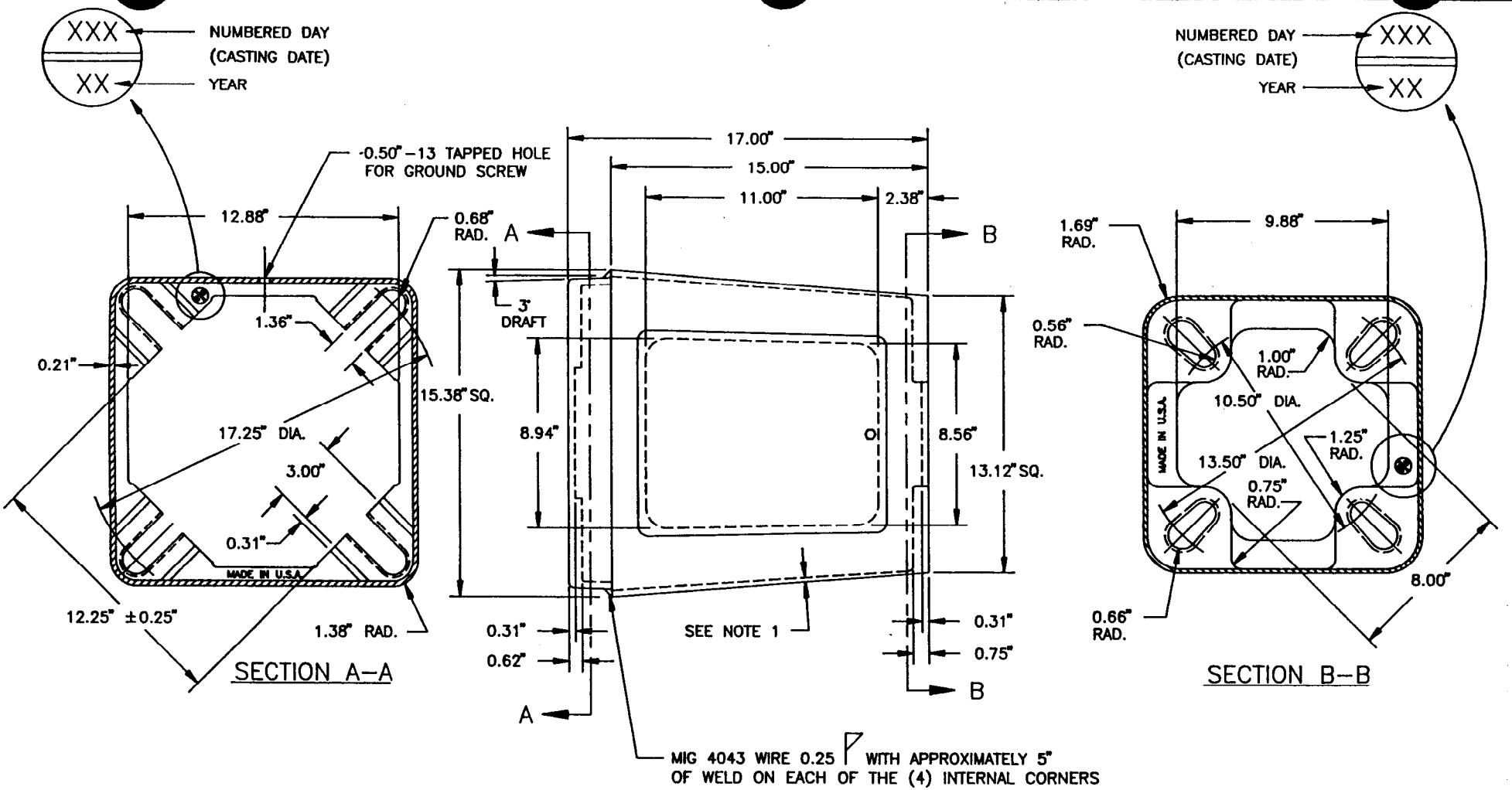
L. A. Staron
Chief, Federal-Aid and Design Division

Enclosures

Endorsement to FHWA Field Offices:

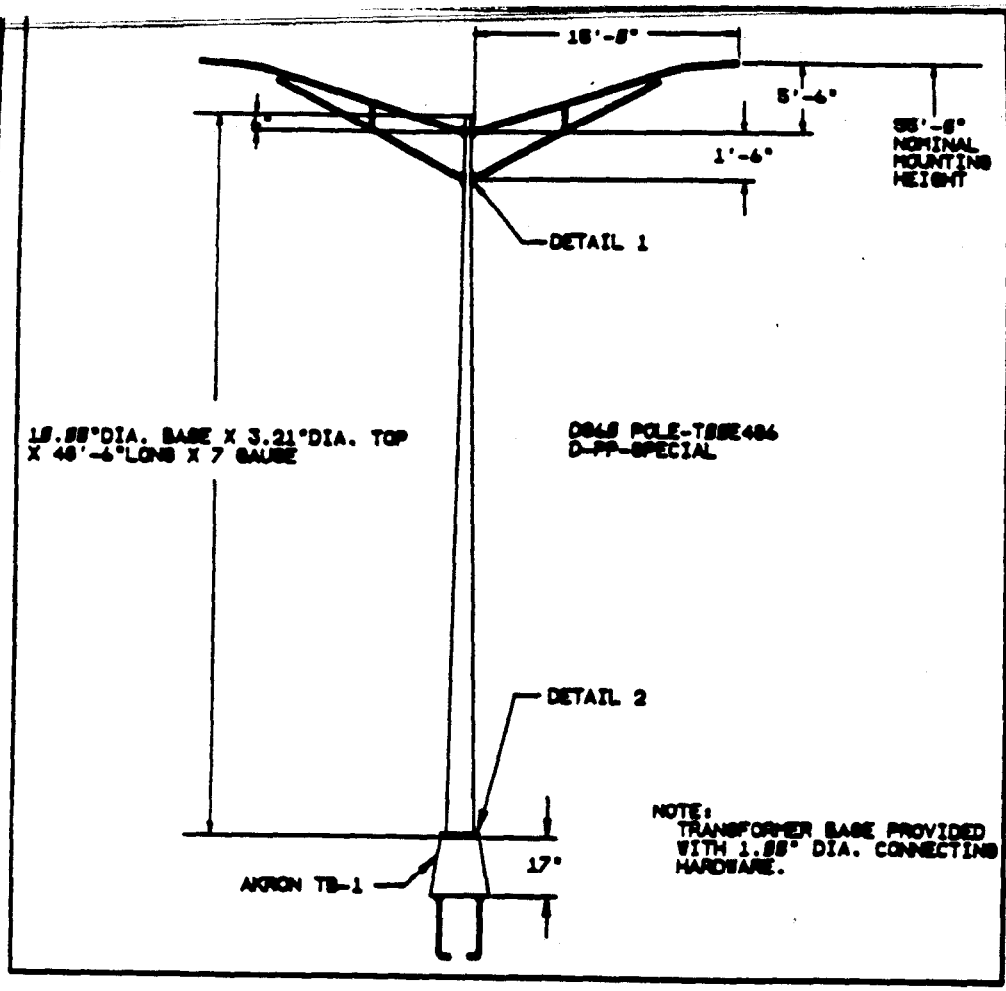
Geometric and Roadside Design acceptance letter number LS-14

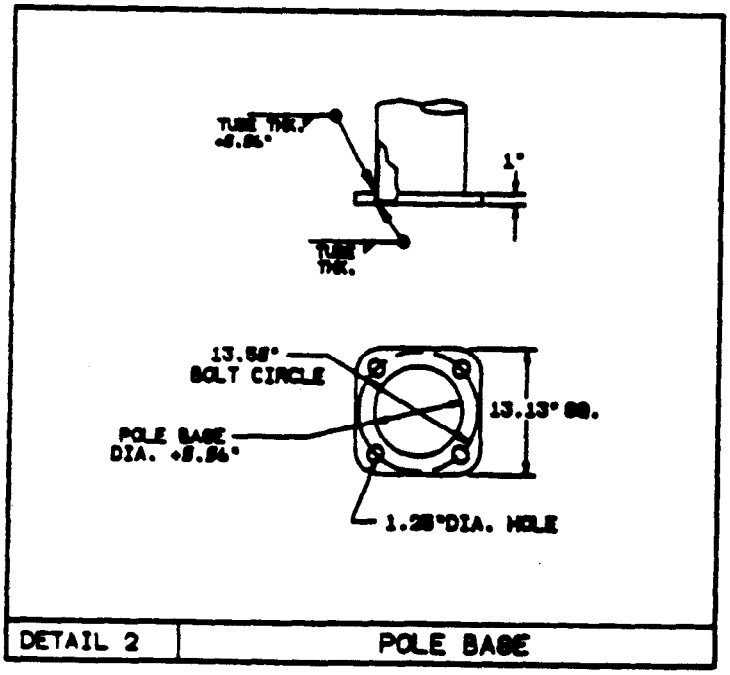
The cast aluminum transformer base Valmont part number 0283093 is nominally the same as the Akron Foundry TB-1 base which is the subject of a same-dated letter to Robert Sik of Akron Foundry (Geometric and Roadside Design Acceptance letter LS-15). The TB-1 base was also the subject of letters to Akron Foundry dated 6/29/88 (LS-2) and 1/12/89 (LS-4).



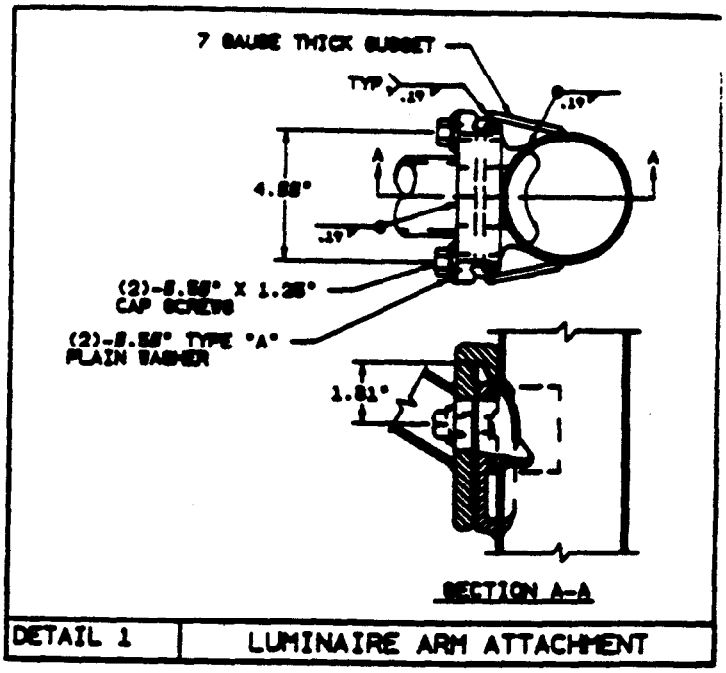
NOTES:
1. WALL THICKNESS VARIES-MINIMUM 0.15" IN MIDDLE TO A MAXIMUM 0.31" AT WELDED END.
2. BOLT SLOT DRAFT ANGLE IS 10°.

MATERIAL: ASTM B108 ALLOY 356.0 T6	VALMONT.
WEIGHT: 25#	
DATE: 5-10-90	
BREAKAWAY BASE IDENTIFICATION DRAWING	PART NO. 283093





DETAIL 2 | POLE BASE



DETAIL 1 | LUMINAIRE ARM ATTACHMENT

MATERIAL DATA

COMPONENT	ASTM DESIGNATION	MIN. YIELD (KSI)	COMPONENT	ASTM DESIGNATION	MIN. YIELD (KSI)
POLE SHAFT	A595 GR A	55	PRIME PAINT-OUTSIDE SURFACES ONLY PER VALMONT SPEC. NO. F73	NA	NA
ARM SHAFT-2.38"O.D.X .154"WALL		36			
ARM STRUTS					
ARM SIMPLEX ATTACHMENTS	A27 GR65-35				
SIMPLEX PLATE GUSSETS					
BASE PLATE	A36	36			