L5-25

U.S. Department
of Transportation
Federal Highway Administration

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

Refer to: HNG-14

OCT 10 1991

David L. Christensen, P.E.
Chief Structural Engineer
Utah Department of Transportation
4501 South 2700 West
Salt Lake City, Utah 84119-5998

Dear Mr. Christensen:

Thank you for your September 12 letter to Mr. Thomas O. Willett in which you requested Federal Highway Administration (FHWA) acceptance for the four bolt slip-base used for luminaire support poles. These bases are currently in use in Utah, Montana, Idaho, Wyoming, and Nevada. In support of this request, you submitted reports dated August 1991 of tests conducted at the Midwest Roadside Safety Facility at the University of Nebraska at Lincoln. The tests were conducted to determine if the bases and poles met the FHWA breakaway requirements which reference the American Association of State Highway and Transportation Official's (AASHTO) Standard Specifications for Structural Supports for Signs, Luminaires and Traffic Signals - 1985.

Details of the tested hardware are shown in the enclosed drawing of the slip-base. Test results and significant design details are summarized below:

Test Number	USBLM-1	USBLM-2
Impact Speed	24.15 km/h (15.0 mph)	92.60 km/h (57.5 mph)
Vehicle Velocity Change	1.86 m/s (6.1 fps)	4.11 m/s (13.5 fps)
Occupant Velocity Change	2.32 m/s (7.6 fps)	4.33 m/s (14.2 fps)

Data Common to Both Tests

Vehicle Mass (Weight) 795 kg (1,750 pounds)

Test Article Configuration Dual Mast Arm
(Single or dual mast arm configuration will be acceptable.)

Stub Height 100mm (4.0 inches)

Weight of Test Article 410 kg (902 pounds)
(Pole mast arm and luminaire weights of up to 450 kg (1,000 pounds) each will be acceptable.)

Luminaire Mounting Height 15.85m (52.0 feet)
(Up to 17.25 m (56.5 feet) will be acceptable.)

Bolt Circle Diameter 330mm (13 inches)
(This is the minimum acceptable bolt circle.)

Clamping Bolt Force	four 1-inch bolts @ 19,126 N (4,300 pounds) each.

(The four slip-bolts were torqued to 108 Newton-meters (80 foot-pounds) each, and then released and retorqued to 95 Newton-meters (70 foot-pounds.))

Pole Wall Thickness	11 gage

(Minimum wall thickness for a 250mm (10-inch) diameter pole to be considered breakaway is 11 gage. This is consistent with FHWA guidelines for 3-bolt slip-bases.)

Keeper Plate Thickness	28 gage steel

(This is the maximum acceptable thickness.)

The above information shows that the tested pole-base combination meets the change in velocity and stub-height requirements adopted by the FHWA. Therefore, the subject four-bolt slip-base for luminaire supports, as shown in the enclosed drawing, is acceptable for use on Federal-aid projects when requested by a State. Our acceptance is limited to bases where the corrosion protection of the fastener hardware is the same as the tested hardware. It is our understanding that all hardware was hot-dip galvanized except for the clamping bolts and their nuts which were cadmium plated. Galvanized clamping bolts will be acceptable if procedures are followed during their installation to assure that the same clamping force is developed in the bolts. Care must be taken during installation of the anchor bolts that the tops of the bolts do not extend above the slip-plane. The slip-base itself may not extend more than 100mm (4 inches) above a 60-inch chord, as specified by AASHTO.

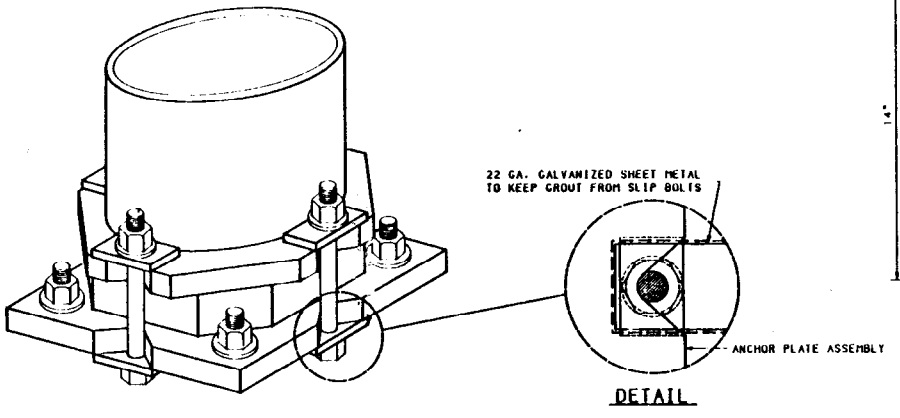
This acceptance is limited to breakaway characteristics of the bases and does not cover the structural features of the bases nor the poles. Presumably, you will supply potential users with sufficient information on structural design and installation requirements to ensure proper performance. You should request certification from the manufacturer that the poles and slip-bases furnished have 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.

Sincerely yours,

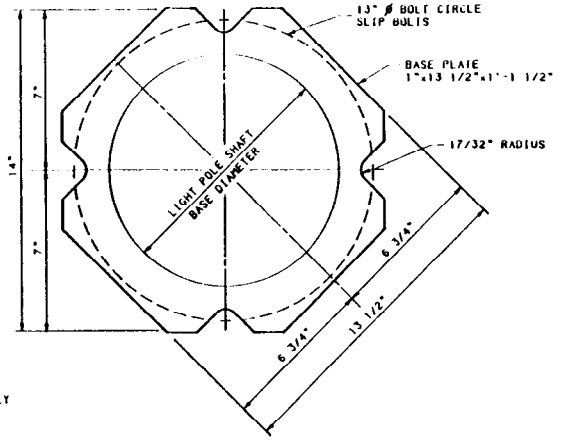
L. A. Staron

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

Enclosure



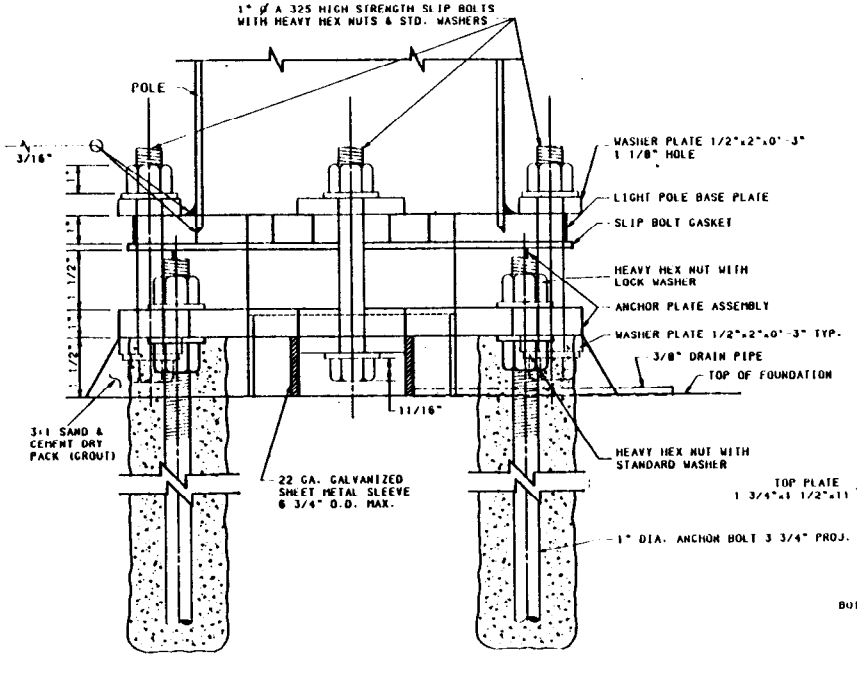
DETAIL



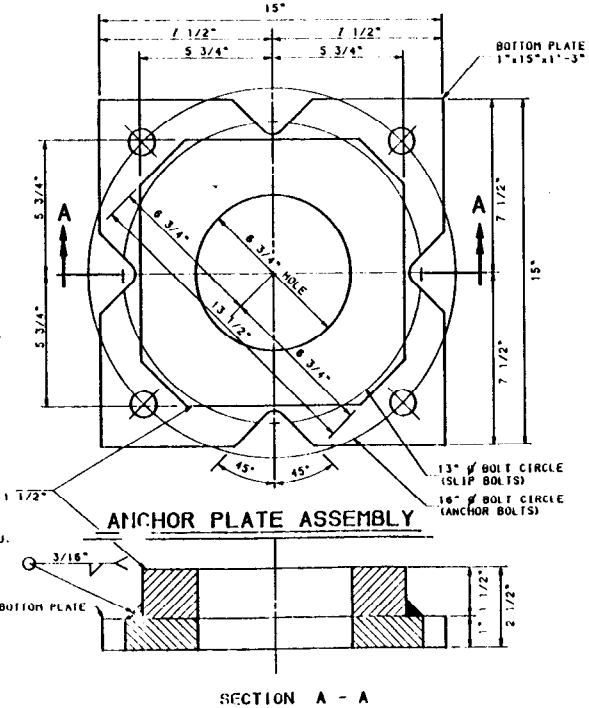
LIGHT POLE BASE PLATE

NOTES:

1. PLACE ANCHOR PLATE ASSEMBLY ON LEVELING NUTS ON ANCHOR BOLTS AND SECURE IN PLACE.
2. ERECT LIGHT POLE AND SECURE WITH 1" ø HIGH STRENGTH BOLTS. BOLTS SHALL BE INSTALLED IN THE SLOTS SO THE BOLT SHANKS ARE IN CONTACT WITH THE PLATES.
3. ALL STRUCTURAL STEEL FOR PLATES SHALL CONFORM TO A.S.T.M. A36, EXCEPT THE ANCHOR PLATE ASSEMBLY WHICH MAY BE FURNISHED CAST IN COMPLIANCE WITH A.S.T.M. A27, GRADE 70 - 40.
4. ALL STEEL PLATE ASSEMBLIES SHALL BE HOT DIPPED GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH A.S.T.M. A123.
5. ALL SLIP BOLTS, NUTS AND WASHERS SHALL BE ELECTRO PLATED CADMIUM IN ACCORDANCE WITH A.S.T.M. A-165 TYPE NS.
6. ALL CONTACT AREAS OF PLATES SHALL BE FREE OF GALVANIZING BEADS OR RUNS.
7. ALL SLIP BOLTS SHALL BE TORQUED TO 80 FOOT POUNDS (960 INCH POUNDS), RELEASED AND RETORQUED TO 70 FOOT-POUNDS (840 INCH-POUNDS).
8. GROUTING SHALL BE DONE AFTER LIGHT POLE HAS BEEN LOCATED IN FINAL POSITION.
9. OTHER MATERIAL MAY BE ACCEPTABLE SUBJECT TO APPROVAL OF THE ASSISTANT DIRECTOR.

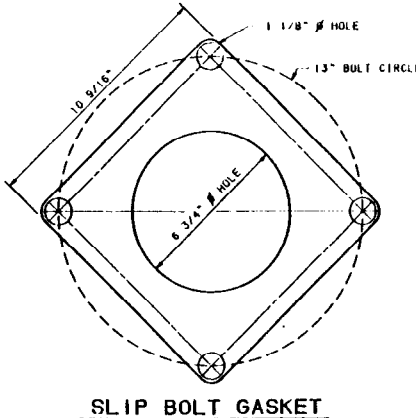


LIGHT POLE BASE



ANCHOR PLATE ASSEMBLY

SECTION A - A



SLIP BOLT GASKET

(28 GA. GALVANIZED SHEET METAL)

UTAH DEPARTMENT OF TRANSPORTATION

SUPERCEDES

REVISIONS

Date	Appr

LUMINAIRE BREAKAWAY BASE DETAIL

RECOMMENDED FOR APPROVAL

DIRECTOR STANDARDS COMMITTEE APPROVED

STD. DWG. NO. 755 2