LS-31

U.S. Department
of Transportation
Federal Highway
Administration

JUN 17 1993

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

Refer to: HNG-14

Mr. David R. Lewis
Vice President, Marketing
Syro Steel Company
1170 N. State Street
Girard, Ohio 44420

Dear Mr. Lewis:

Thank you for your May 18 letter requesting acceptance of the AD-IV breakaway timber utility pole, which was delivered May 19 when you and Mr. Don Ivey met with my staff. Your letter was accompanied by attachments which reported on pendulum and full-scale crash testing done by the Texas Transportation Institute (TTI). You also supplied a video tape documenting those tests. The testing was done to assess the compliance of the AD-IV breakaway system with the recommendations of National Cooperative Highway Research Program (NCHRP) Report 230, Recommended Procedures for the Safety Performance Evaluation of Highway Appurtenances.

The AD-IV breakaway system is similar to the Federal Highway Administration's Breakaway Timber Utility Pole (FHWA-BTUP), classified as operational on January 27, 1993, in that they are both slip base designs, with upper hinge mechanisms installed to limit damage to conductors in the event of a crash. The AD-IV system uses a four-bolt slip base design, compared to the FHWA-BTUP six-bolt design. The AD-IV system also modifies the upper hinge to make it easier to realign the top of the pole after deflection caused by strong wind loads. The drawings of the AD-IV system are enclosed.

TTI submitted information on two non-standard pendulum tests of the AD-IV system in 1991 and requested FHWA acceptance. The pendulum mass was 2,250 pounds and was fixed with a hard rubber nose. TTI contended that the AD-IV design compared favorably to the FHWA-BTUP and that standard crash test results would be lower for the AD-IV than for the FHWA-BTUP. Via a letter dated June 28, 1991, to Mr. Don Ivey, we denied TTI's request and recommended that full-scale 20-mph and 60-mph tests be conducted using 1800-pound cars. A pendulum test could be used as a substitute for the low speed car test.

Two tests were conducted in 1992 and 1993 on the AD-IV system, and they are summarized here:

Test Number	6018A-P1	6018A-1
Test Device, Mass, kg (lbs)	Pendulum, 1099 (2415)	Automobile, 816 (1800)
Impact Angle (degrees)	0	15
Impact Speed, kmh (mph)	32.2 (20.1)	95.9 (59.6)
Velocity Change, m/s (fps)	2.1 (7.0)*	6.0 (19.7)
Stub Height, mm (in)	100 (4)	100 (4)

*The low speed test used the TTI crushable nose pendulum which has significantly greater mass than the preferred 1,800 pounds. The result, therefore, cannot directly be used as a measure of crashworthiness. However, it may be compared against the results of three tests on the FHWA-BTUP using the same pendulum but different bolt torques. The TTI analysis shows that the AD-IV system test had a lower peak force when torqued to 271 N·m (200 foot·pounds) than did the FHWA-BTUP.

The result of the high-speed test (#6018A-1) meets the change in velocity requirement of the NCHRP Report 230, which is a maximum velocity change of 9.1 m/s (30 feet-per-second) for timber utility poles. The result of the low-speed test (non-standard pendulum) shows that the AD-IV is comparable to the FHWA-BTUP. In addition, the stub height requirements of FHWA are also met. Therefore, the AD-IV breakaway timber utility pole described above and illustrated in the enclosed drawings (3 sheets) is acceptable for use on National Highway System (NHS) projects, within the range of conditions tested, if proposed by a State.

Our acceptance is limited to breakaway characteristics of the system 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 or utility companies will require certification from Syro Steel or TTI that the timber utility poles modified with the AD-IV system will meet the FHWA change in velocity requirements and that hardware furnished for the modification has essentially the same composition, mechanical properties, and geometry as that used in the acceptance testing.

The AD-IV breakaway timber utility pole is proprietary. Thus, to be used in a Federal-aid highway project on the NHS: (a) they 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 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

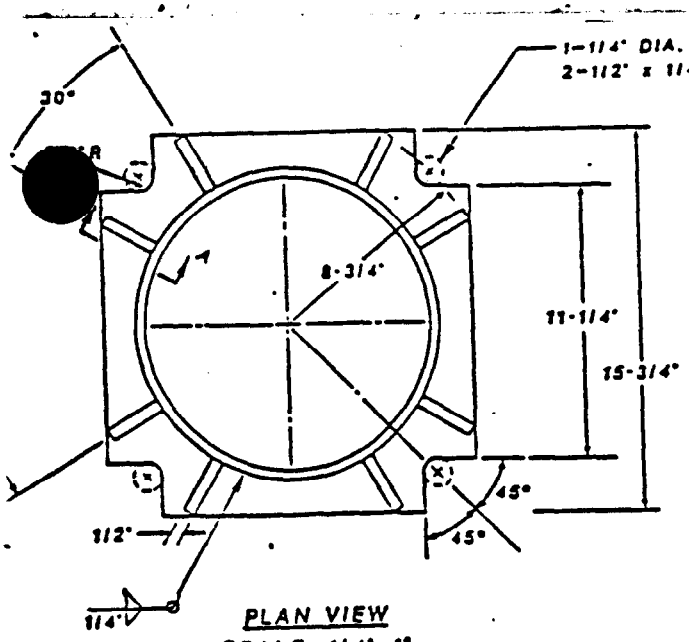
regulations concerning proprietary products are contained in Title 23, Code of Federal Regulations, Section 635.411, a copy of which is enclosed.

Please be advised that the FHWA is in the process of adopting NCHRP Report 350, Recommended Procedures for the Safety Performance Evaluation of Highway Features, as the FHWA's guide for crash testing. When that occurs, the FHWA will no longer review tests which use pendulum masses above the 820-kg (1,800-pound) range.

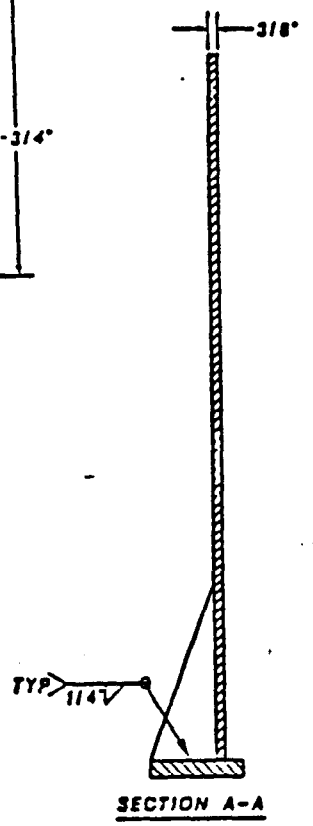
Sincerely yours,

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

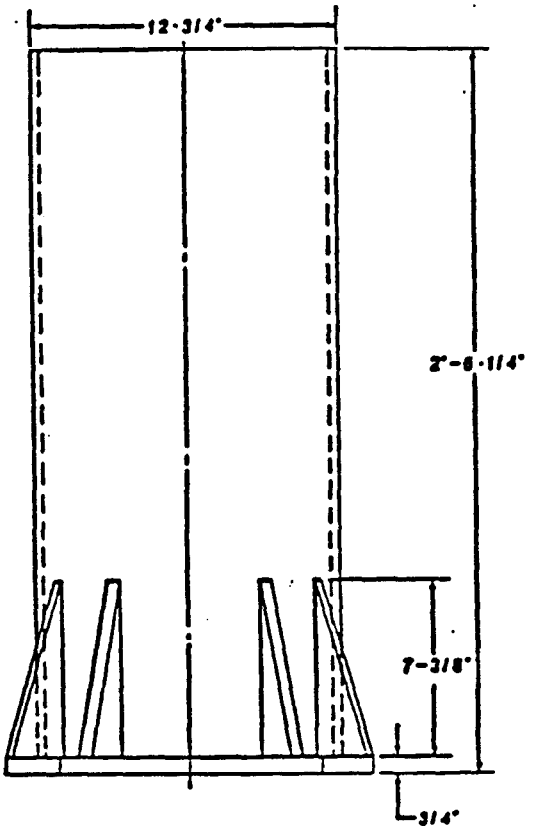
2 Enclosures



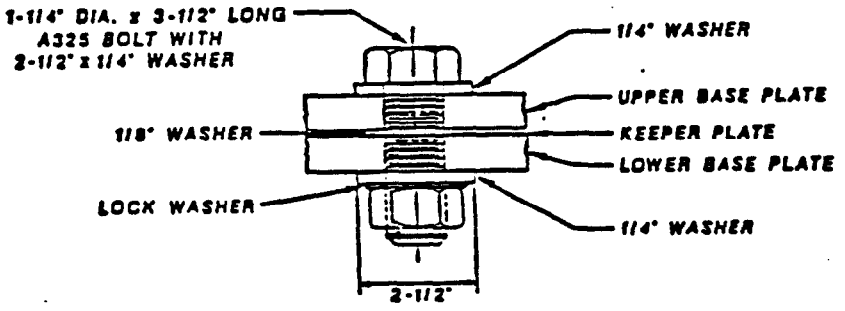
PLAN VIEW
SCALE: 1/4"=1"



SECTION A-A



TUBE AND SHEAR BASE
ELEVATION
SCALE: 1/4"=1"



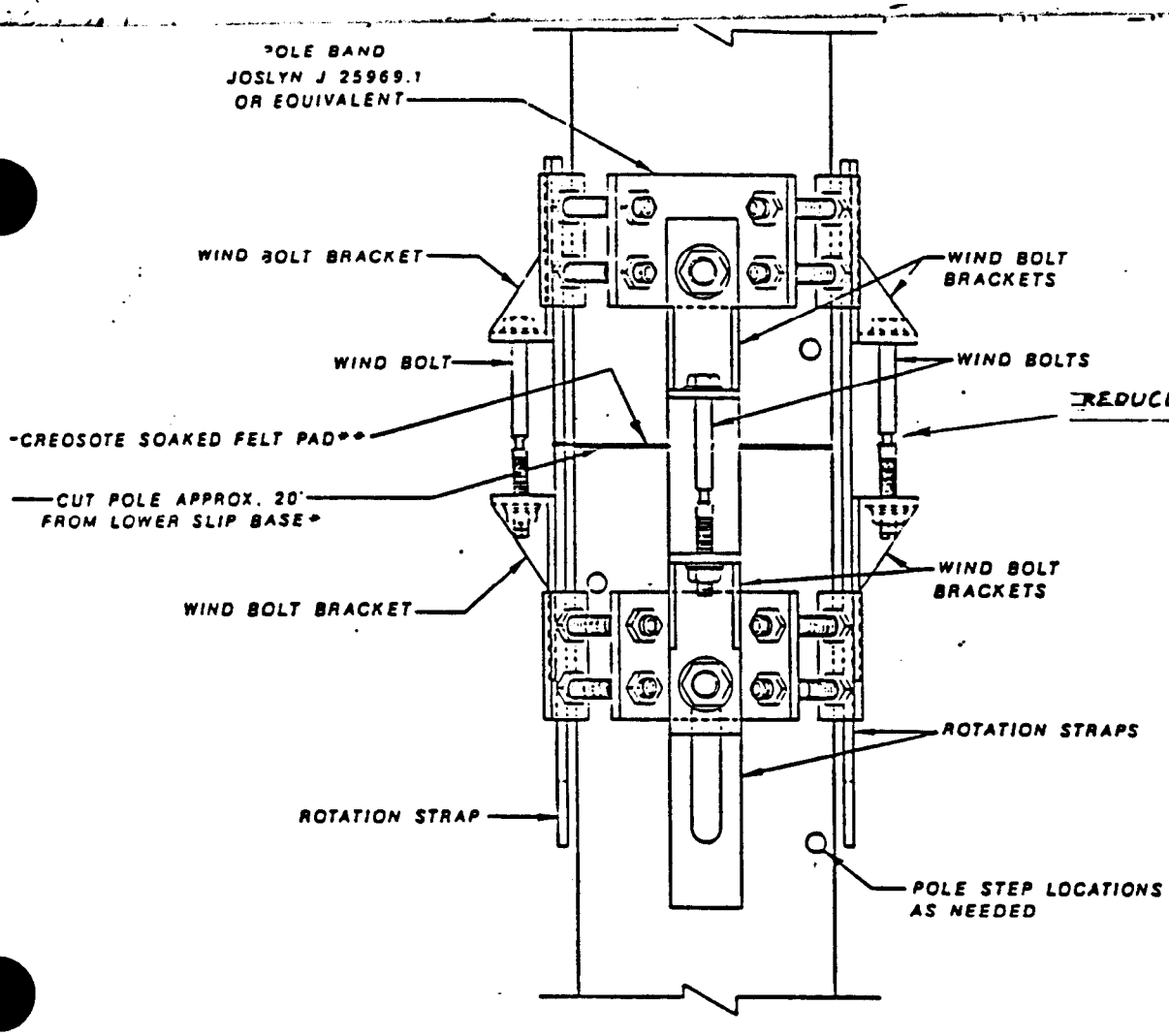
BOLT CONNECTION DETAIL
SCALE: 1/2"=1"

Figure 8. AD-IV Slip Base (Lower Connection)

U.S. Patent Pending

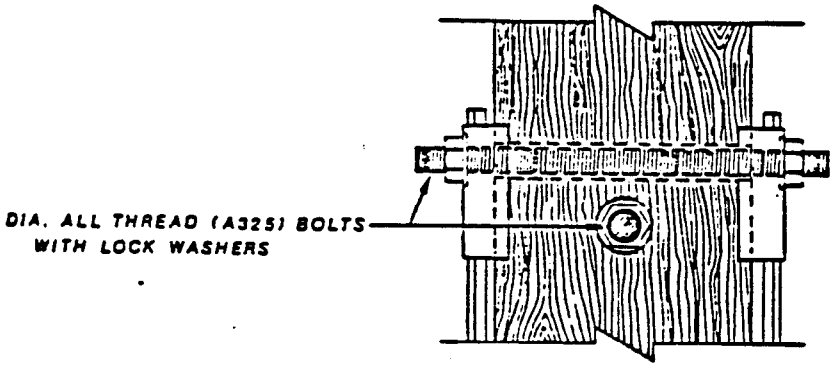
The Texas A&M University System

Revisions			TEXAS TRANSPORTATION INSTITUTE COLLEGE STATION, TEXAS 77843			
No.	Date	By	Design	Date	Drawn By	Scale
			D.L. Ivey	4-18-87	J. Hobbs	As Noted
			Title			Sheet No.
			AD-IV SAFETY MODIFICATION FOR TIMBER UTILITY POLES			2 of 3



WIND BOLT & BRACKET OPTION

SCALE: 1/4"=1'



SECTION A-A

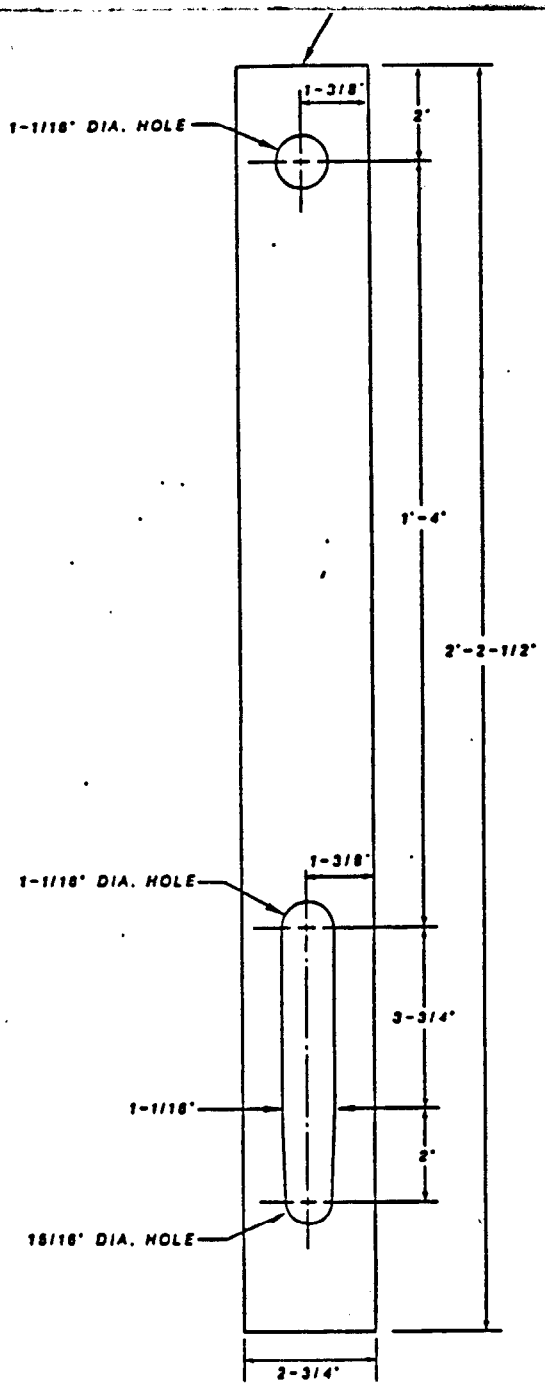
SCALE: 1/4"=1'

Figure 9. AD-IV Hinge (Upper Connection)

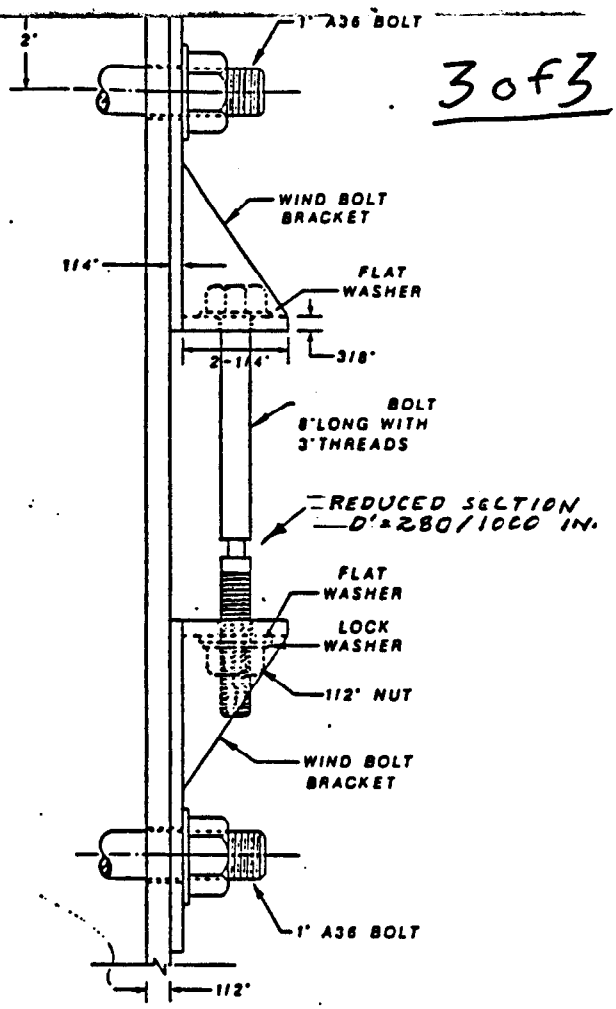
U.S. Patent Pending

The Texas A&M University System

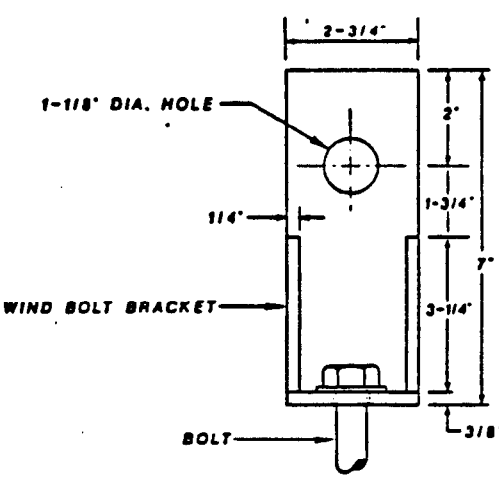
Revisions			TEXAS TRANSPORTATION INSTITUTE COLLEGE STATION, TEXAS 77843			
No.	Date	By	Design	Date	Drawn By	Scale
			D.L. Ivey	4-18-87	J. Hobbs	As Noted
			Title: AD-IV SAFETY MODIFICATION FOR TIMBER UTILITY POLES			Sheet No. 3 of 3



ROTATION STRAP DETAIL
SCALE: 1/2"=1"



WIND BOLT & BRACKET DETAIL
SIDE VIEW
SCALE: 1/2"=1"



WIND BOLT & BRACKET DETAIL
FRONT VIEW
SCALE: 1/2"=1"

Figure 10. Detail of Rotation Strap, Wind Bolt and Bracket

U.S. Patent Pending

The Texas A&M University System					
Revisions			TEXAS TRANSPORTATION INSTITUTE COLLEGE STATION, TEXAS 77843		
No.	Date	By			
			Design: D.L. Ivey	Date: 4-18-87	Drawn By: J. Hobbs	Scale: As Noted
			Title: AD-IX SAFETY MODIFICATION FOR TIMBER UTILITY POLES			Sheet No.: 3 of 3