



U.S. Department
of Transportation
**Federal Highway
Administration**

August 29, 2001

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

Refer to: HSA-10/LS-50

Mr. Richard Foedinger
Project Manager
DE Technologies, Inc.
3620 Horizon Drive
King of Prussia, PA 19406-2647

Dear Mr. Foedinger:

Thank you for your letter of May 23 requesting Federal Highway Administration (FHWA) acceptance of your company's Energy Absorbing Utility Pole as a crashworthy device for use on the National Highway System (NHS). Accompanying your letter was a summary report from Southwest Research Institute and videos of the crash tests. You requested that we find the Energy Absorbing Utility Pole acceptable for use on the NHS under the provisions of National Cooperative Highway Research Program (NCHRP) Report 350 "Recommended Procedures for the Safety Performance Evaluation of Highway Features."

Introduction

Testing of the supports was in compliance with the Test Level 2 (TL-2) guidelines contained in the NCHRP Report 350. Requirements for crashworthy utility poles are quite different from those which apply to breakaway sign and luminaire supports. Conventional breakaway supports are covered in the American Association of State Highway and Transportation Officials' (AASHTO) Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals and call for a maximum occupant impact speed of 5 m/s in a test vehicle impacting at 35 kmh and 70 kmh. The criteria for utility poles are those found in Section 3.2.3 of Report 350 and allow up to a 12 m/s occupant impact speed in 820C test vehicles impacting at 50 kmh and 70 kmh.

Testing

Full-scale automobile testing was conducted on your company's devices. The test articles were filament wound fiberglass reinforced polyester composite utility poles fabricated by Shakespeare Composites and Electronics Division. The overall length of the test poles was 13.7 meters (45 feet), with an octagonal cross-section at the lower section of the pole that transitions to a circular cross-section at the upper section of the poles. Fiberglass composite cross-arms, also provided by Shakespeare, were mounted near the top of the poles using Shakespeare-provided mounting brackets and bolts. Pre-drilled holes were provided in the poles for cross-arm attachments.

The test articles were installed in drilled holes and backfilled with NCHRP Report 350 Standard (strong) Soil at a burial depth of 1.83 m (6 feet.) The poles were installed such that the cross arms were perpendicular to the normal direction of traffic. A 12.2 m (40 ft) long wooden utility pole was installed

at a nominal distance of 140 feet on both sides of the composite poles. The wooden poles were guyed in the standard manner. Standard wires were attached to the cross-arms and tensioned between the three poles.

The mass of the test vehicles was 820 kg, and they impacted the poles on the centerline of the vehicle in all tests. The complete devices as tested are shown in the Enclosure 1. The tests are summarized in the table below:

Test #	NCHRP 350 Designation	Test Impact Speed	Occupant Impact Speed		Longitudinal Ridedown
			X-dir	Y-dir	
1	2-80	50.0 km/hr	10.6 m/s	1.0 m/s	13.3 gs's
2	2-81	70.0 km/hr	10.8 m/s	1.1 m/s	5.6 g's

Occupant Impact Speed: Speed at which a theoretical front seat occupant will contact the windshield.

Longitudinal Ridedown: The maximum g force that the theoretical occupant will experience once contact has been made with the vehicle interior.

Findings

These composite energy absorbing utility poles were not designed to break away. These poles were designed to capture the vehicle and stop it gently enough that the velocity change and deceleration requirements were met.

There was major damage to the front ends of the test vehicles in both impacts. The poles and the vehicles remained upright, and there was no occupant compartment deformation. Velocity changes and other occupant risk measures were all within acceptable limits for utility pole tests. The results of the tests met the FHWA requirements and, therefore, the devices described above and shown in the enclosed drawings for reference are acceptable for use as TL-2 devices on the NHS under the range of conditions tested, when proposed by a State.

Please note the following standard provisions which apply to FHWA letters of acceptance:

- ! Our acceptance is limited to the crashworthiness characteristics of the devices and does not cover their structural features, nor conformity with the Manual on Uniform Traffic Control Devices.
- ! Any changes that may adversely influence the crashworthiness of the device will require a new acceptance letter.
- ! Should the FHWA discover that the qualification testing was flawed, that in-service performance reveals unacceptable safety problems, or that the device being marketed is significantly different from the version that was crash tested, it reserves the right to modify or revoke its acceptance.
- ! You will be expected to supply potential users with sufficient information on design and installation requirements to ensure proper performance.
- ! You will be expected to certify to potential users that the hardware furnished has essentially the same chemistry, mechanical properties, and geometry as that submitted for acceptance, and that they will meet the crashworthiness requirements of FHWA and NCHRP Report 350.
- ! To prevent misunderstanding by others, this letter of acceptance, designated as number LS-50 shall not be reproduced except in full. As this letter and the supporting documentation which

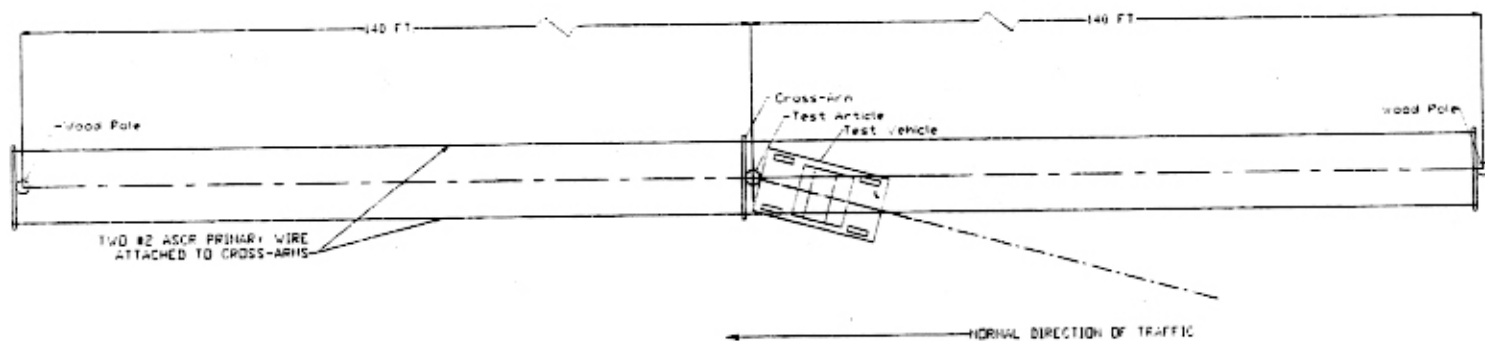
you supplied become public information, it will be available for inspection at our office by interested parties.

- ! The DE Technologies energy absorbing composite utility pole is or will be a patented product and is considered "proprietary." The use of proprietary devices specified on Federal-aid projects, except exempt, non-NHS projects: (a) 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,

Frederick G. Wright, Jr.
Program Manager, Safety

Enclosure



Test Article Location and Impact Orientation for Full Scale Crash Tests of Energy Absorbing Composite Utility Pole.

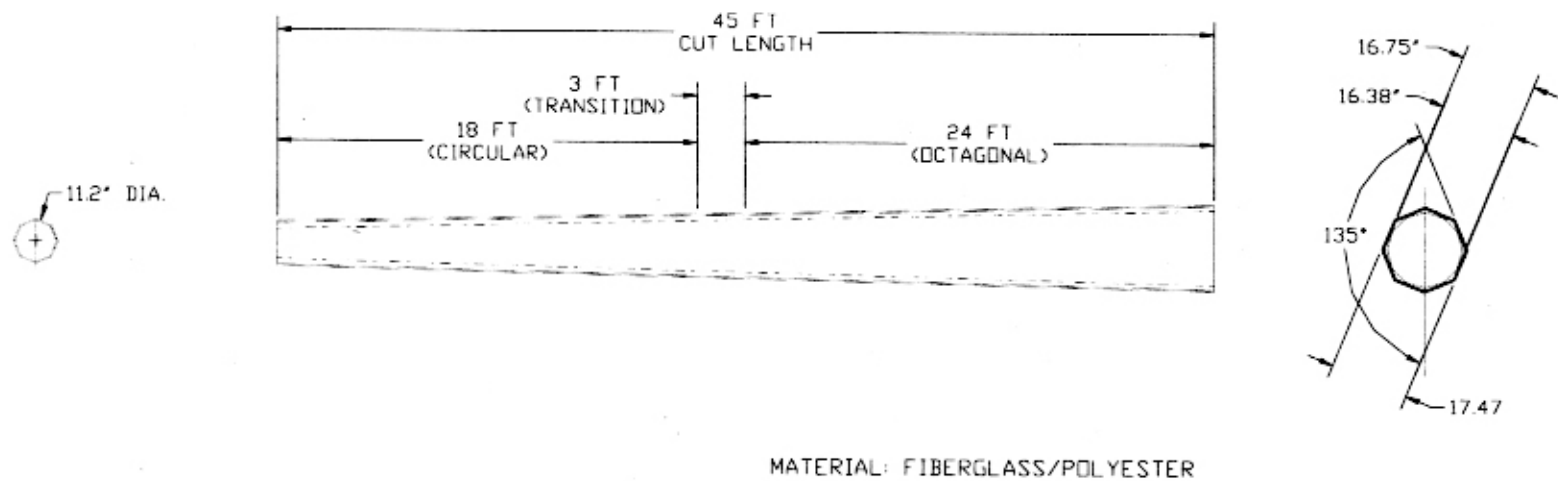


Figure 1 – Test Specimen Details, Test DET-CP-2