

February 27, 2009

1200 New Jersey Ave., S.E.
Washington, DC 20590

In Reply Refer To: HSSD/LS-68

Mr. John F. Boozer III, P.E.
Engineering Manager
Shakespeare Composite Structures
19845 US Highway 76
Newberry, SC 29108

Dear Mr. Boozer:

This letter is in response to your request for the Federal Highway Administration (FHWA) acceptance of roadside safety devices for use on the National Highway System (NHS).

Name of devices: Shakespeare decorative poles (14)
Type of device: Luminaire Support
Test Level: Test Level 3
Testing conducted by: Texas Transportation Institute
Date of request: January 20, 2009
Date of follow-up: January 27, 2009

The 14 devices submitted with your request include:

Series: Name, Base Diameter (inches)	Series, Name, Base Diameter (inches)
AA15: Adams, 15	AM20: Madison, 20
AAN19: Anaheim, 19	AMB18: Monterey, 18
ABO19: Boise, 19	ASB10: Steamboat, 10
ACH9: Charleston, 9	AP13: Washington, 13
APB17: Pittsburg, 17	AP17: Washington, 17
AJ20: Jefferson, 20	AP20: Washington, 20
AM17: Madison, 17	AP24: Washington, 24

You requested that we find these 14 devices acceptable for use on the NHS under the provisions of the National Cooperative Highway Research Program (NCHRP) Report 350 "Recommended Procedures for the Safety Performance Evaluation of Highway Features."

Requirements

Roadside safety devices should meet the guidelines contained in the NCHRP Report 350, "Recommended Procedures for the Safety Performance Evaluation of Highway Features". The FHWA memorandum "ACTION: Identifying Acceptable Highway Safety Features" of July 25, 1997, provides further guidance on crash testing requirements of luminaire supports.

Description

From the 14 devices listed above to be considered for acceptance, the Shakespeare AP20 luminaire support was determined to be reasonably representative of this product series. This product series of decorative luminaire supports conforms to the general construction details enclosed as a reference. Two AP20 decorative luminaire supports were tested and evaluated for crashworthy performance at the Texas Transportation Institute (TTI) outdoor pendulum testing facility. The weight of the pole base was 111 pounds and the round light fixture was 22 pounds, totaling a weight of 133 pounds. The pole base is a 20-inch diameter fiberglass reinforced composite with a 7-inch diameter hole at the center to accommodate wiring. For the first test, the base was attached to a rigid mounting plate with 3/4-inch bolts and standard 3/4-inch round washers. For the second test, the base was attached with 3/4-inch bolts and standard 3/4-inch round washers and shop made 1/8-inch by 2-inch by 2-inch washers. In the first test, the hand hole was placed to the opposite side of impact and for the second test it was placed on the impact side. Drawings of the AP20 support are enclosed.

Crash Testing

Your company's decorative lighting pole was tested at TTI's outdoor pendulum testing facility, as a surrogate for full-scale crash testing. The pendulum bogie was built according the specifications of the Federal Outdoor Impact Laboratory's pendulum, and the frontal crush of the aluminum honeycomb nose of the bogie simulated the crush of an actual vehicle. Tests with pendulums are acceptable for most breakaway supports, exceptions being base bending or yielding supports.

Two low speed pendulum tests were conducted on Shakespeare's AP20 decorative luminaire support. Summaries of the two test results are enclosed. The tested AP20 decorative luminaire support met the NCHRP Report 350 occupant risk criteria. In addition, TTI extrapolated the high-speed performance of the AP20 luminaire support from the low speed pendulum tests. The test articles appear to perform appropriately to make such high-speed extrapolations. The high-speed extrapolations yield lower change in velocity values than the paired low speed pendulum test.

In the two tests with the AP20 decorative luminaire supports, the base separated from the ground and the lighting pole separated from the decorative base section. The base fractured at ground line and this performance satisfies the FHWA limit of maximum 3.9 inch stub height remaining after a support breaks away.

Findings

In summary, the Shakespeare series of decorative luminaire supports listed above, including the AP20 support, meet the appropriate evaluation criteria for NCHRP 350 Test Level 3. Installations should include breakaway wiring connections that will not interfere with the crashworthy performance of these devices. These devices may be used at all appropriate locations on the NHS when selected by the contracting authority, subject to the provisions of Title 23, Code of Federal Regulations, Section 635.411 as they pertain to proprietary products.

Standard provisions

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

- This acceptance is limited to the crashworthiness characteristics of the device 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, we reserve the right to modify or revoke our 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 it will meet the crashworthiness requirements of the FHWA and the NCHRP Report 350.
- To prevent misunderstanding by others, this letter of acceptance is designated as number LS-68 and shall not be reproduced except in full. This letter and the test documentation upon which it is based are public information. All such letters and documentation may be reviewed at our office upon request.
- The Shakespeare decorative luminaire supports are patented products and considered proprietary. If proprietary devices are specified by a highway agency for use on Federal-aid projects, except exempt, non-NHS projects, they: (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 the 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.
- This acceptance letter shall not be construed as authorization or consent by the FHWA to use, manufacture, or sell any patented device for which the applicant is not the patent holder. The acceptance letter is limited to the crashworthiness characteristics of the candidate device, and the FHWA is neither prepared nor required to become involved in issues concerning patent law. Patent issues, if any, are to be resolved by the applicant.

Sincerely yours,



David A. Nicol
Director, Office of Safety Design
Office of Safety

Enclosures



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General construction details for Shakespeare anchor base decorative light poles

Shaft: 7 inch OD at bottom end, made from two layers of 34 oz per square yard stitched fiberglass fabric and thermoset polyester resin.

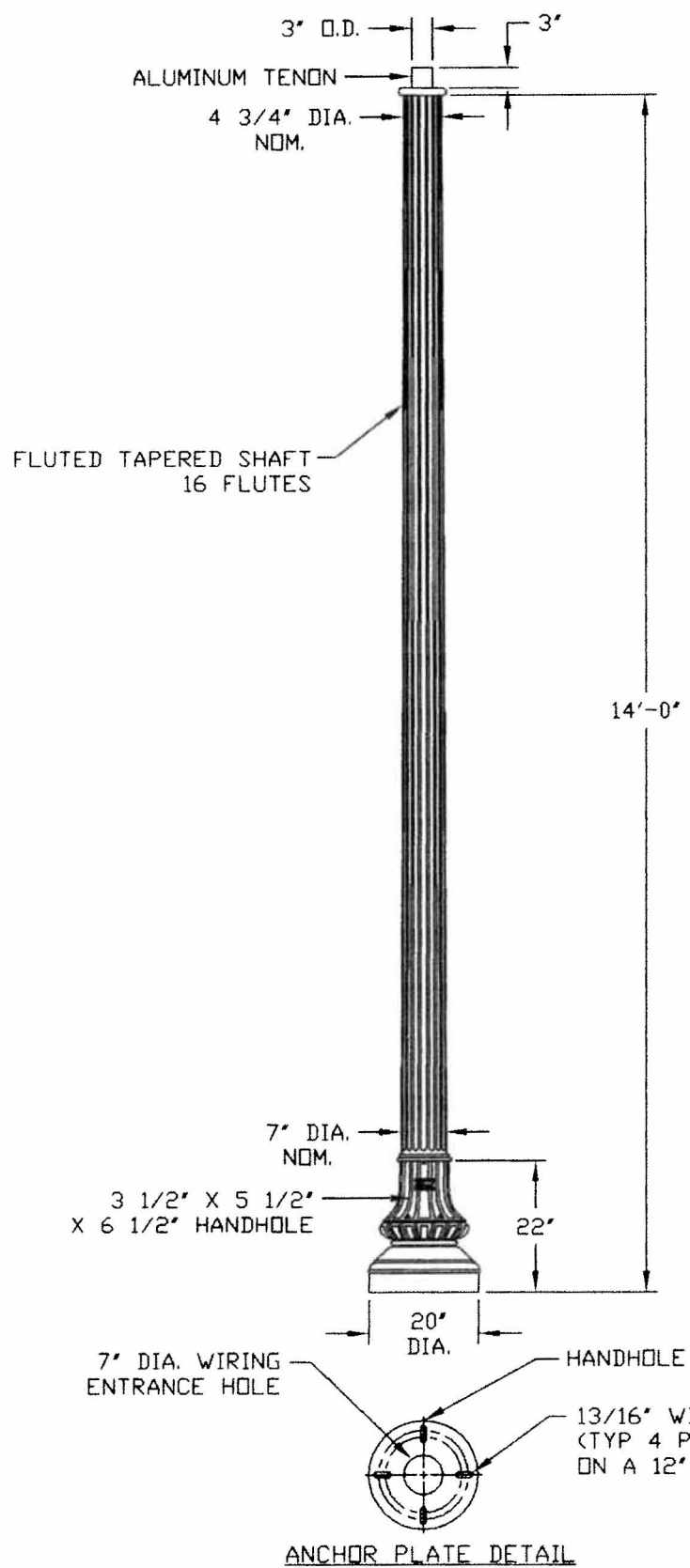
Base: Outside dimensions as shown in catalog data, made from two layers of 24 oz per square yard woven fiberglass roving and polyester resin

Anchor plate: Fits inside the bottom of the base, made from two layers of the 34 oz. per sq. yard fabric and polyester resin.

The shaft attaches to the base via a telescopic joint that is bonded with polyester adhesive.

The anchor plate is bonded into the bottom of the base with polyester adhesive.

NOTES:
 1-COLOR - BLACK
 2-FINISH - SEMI-GLOSS
 3-MATERIAL - FIBERGLASS REINFORCED
 COMPOSITE EXCEPT AS NOTED



				DESCRIPTION:											
				14'-0" SEMI-GLOSS BLACK ORN LIGHT POLE WITH 20" WASHINGTON BASE				DRAWN: DBD		CHK'D: JJB JJ		SCALE: NONE		DATE: 01/21/05	
								SAVED AS: I:\AP20-14FS11							
								PC. NO.							
								AP20-14FS11							
LET	WAS	BY	DATE												

Table D1. Summary of results for pendulum test 400001-SCS P1.

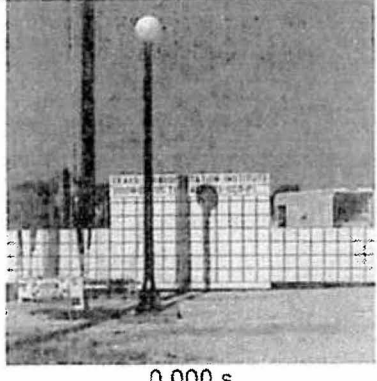
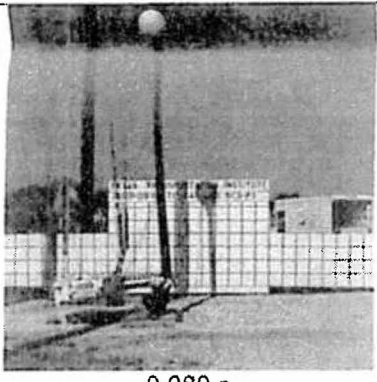
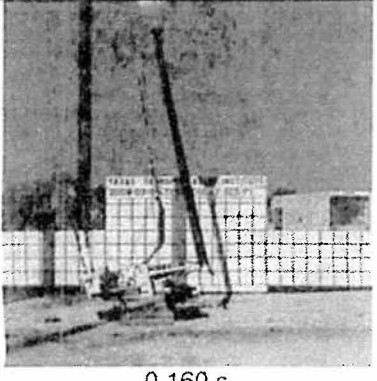
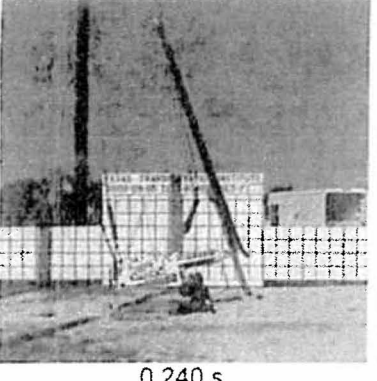
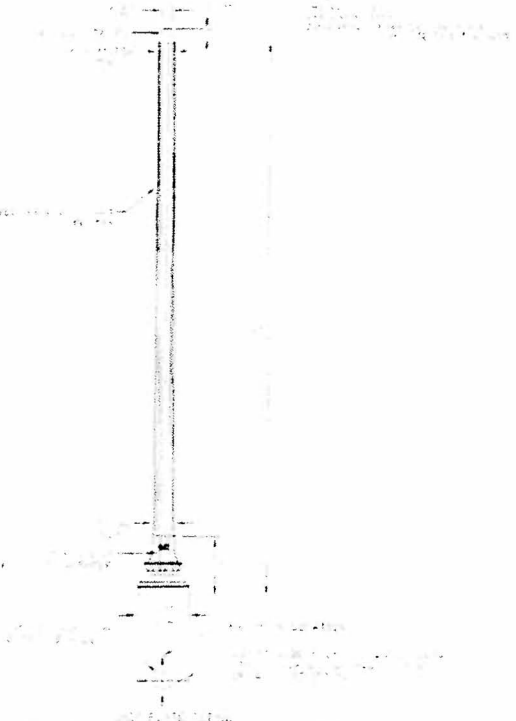
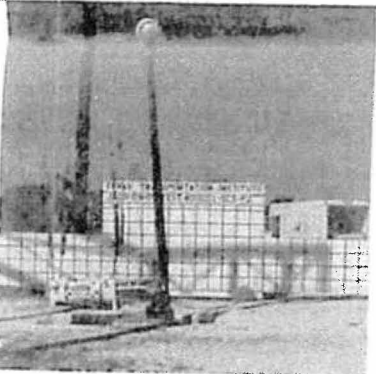
 <p>0.000 s</p>	<p>General Information Test Agency..... Texas Transportation Institute Test No..... 400001-SCS P1 Date..... 2008-09-05</p>
 <p>0.080 s</p>	<p>Test Article Type..... Light Support Name..... Shakespeare 14.5 ft AP20-14FS11 Light Support Installation Height..... 14.5 ft Material of Key Element..... Fiberglass Reinforced Composite</p>
 <p>0.160 s</p>	<p>Soil Type..... Rigid Mounting Plate</p> <p>Test Vehicle Type..... Bogie Designation..... Pendulum Test Inertia Mass..... 839 kg</p>
 <p>0.240 s</p>	<p>Impact Conditions Speed..... 21.4 mi/h Angle..... 90 deg</p> <p>Occupant Risk Values Impact Velocity Longitudinal direction..... 8.9 ft/s Ridedown Accelerations Longitudinal direction..... -1.4 g's</p> <p>Maximum Change in Velocity..... 8.9 ft/s Predicted High-Speed Change in Velocity..... 5.3 ft/s</p>
	

Table D2. Summary of results for pendulum test 400001-SCS P2.



0.000 s



0.084 s



0.168 s



0.252 s

General Information

Test Agency..... Texas Transportation Institute
 Test No..... 400001-SCS P2
 Date..... 2008-09-05

Test Article

Type..... Light Support
 Name..... Shakespeare 14.5 ft AP20-14FS11 Light Support
 Installation Height..... 14.5 ft
 Material of Key Element..... Fiberglass Reinforced Composite

Soil Type..... Rigid Mounting Plate

Test Vehicle

Type..... Bogie
 Designation..... Pendulum
 Test Inertia Mass..... 839 kg

Impact Conditions

Speed..... 21.4 mi/h
 Angle..... 90 deg

Occupant Risk Values

Impact Velocity
 Longitudinal direction..... 9.8 ft/s
 Ridedown Accelerations
 Longitudinal direction..... -1.2 g's

Maximum Change in Velocity..... 7.9 ft/s

Predicted High-Speed Change in Velocity..... 4.96 ft/s

