U.S. Department of Transportation
Federal Highway Administration

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

May 5, 2008

In Reply Refer To: HSSD/LS-66

Mr. Greg Mercier
Director of Design Engineering
Hapco
26252 Hillman Highway
Abingdon, VA 24210

Dear Mr. Mercier:

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

Name of device: Hapco decorative pole, breakaway B13163 and 13164
Type of device: Luminaire Support
Test Level: Test Level 3 (TL-3)
Testing conducted by: Texas Transportation Institute (TTI)
Date of request: March 23, 2008
Date of follow-up: April 8, 2008

You requested that we find this device 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."

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

Description
The following two 20 ft (6.1 m) HAPCO decorative luminaire supports were tested at the TTI outdoor pendulum testing facility:

1) *HAPCO* Georgetown (B13163) with cast base assembly 72133. The base of the lighting pole was cast aluminum (alloy 356-T6) with a 10-1/8 inch (257.18 mm) round base tapering to a fluted shape for a base height of 42-5/8 inches (1082.68 mm). A 6 inch (152.4 mm) outside

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diameter tapering to a 3 inch (76.2 mm) outside diameter aluminum tube (alloy 6063-T6) with 1/4 inch (6.35 mm) wall thickness and 16 foot 7 inch (5.05 m) long was welded to the base, giving a total height of 20 feet (6.1 m). A cast aluminum adapter ring was placed on top of the pole to accommodate the round light. The weight of the pole with base was 134 pounds and the round light was 17 pounds, totaling a weight of 151 pounds. The 1/2 inch (12.7 mm) base plate was bolted to a steel reaction plate using 3/4 inch (19.05 mm) anchor bolts on a 7 inch (177.8 mm) diameter bolt circle. Drawings of the HAPCO Georgetown (B13163) decorative luminaire support with cast base assembly 72531 are enclosed.

2) *HAPCO* Embedded Pedestal (B13164). The base of the lighting pole was cast aluminum (alloy 356-T6) with a 10-1/8 inch (257.18 mm) round base (72133) tapering to a fluted shape for base height of 42-5/8 inches (1082.68 mm). A 6 inch (152.4 mm) outside diameter tapering to a 3 inch (76.2 mm) outside diameter aluminum tube (alloy 6063-T6) with 1/4 inch (6.35 mm) wall thickness and 16 foot 7 inch (5.05 m) long was welded to the base, giving a total height 20 feet (6.1 m). A cast aluminum adapter ring was placed on top the pole to accommodate the round light. Weight of the pole with base was 156 pounds and the round light was 14.6 pounds, totaling a weight 170.6 pounds. The base was welded to a 6 inch (152.4 mm) diameter aluminum tube (12315) with 1/4 inch (6.35 mm) wall thickness, 4 feet (1.22 m) long and flattened the lower 1 foot (0.305 m) to close the opening at the bottom to 2 1/2 inches (63.5 mm), and embedded in NCHRP Report 350 standard soil. Two slotted holes were positioned at 180 degrees to each other in the aluminum ground tube with centerline at 2 feet (0.61 m) below the base. Drawings of the HAPCO Embedded Pedestal (B13164) decorative luminaire support are enclosed.

Crash Testing

Your company's decorative lighting poles were 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 (FOIL) 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 your company's decorative lighting supports, one test on each of the poles. Summaries of test results are enclosed. All Decorative Lighting Poles met the NCHRP Report 350 occupant risk criteria. In addition, TTI extrapolated the high-speed performance of these four lighting poles installation from the low speed pendulum tests. I agree that the test articles appear to perform appropriately to make such high-speed extrapolations. All high speed extrapolations yield lower change in velocity values than the paired low speed pendulum test.

In tests with HAPCO B13163 and HAPCO B13164 decorative lighting poles 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 (100 mm) stub height remaining after a support breaks away.

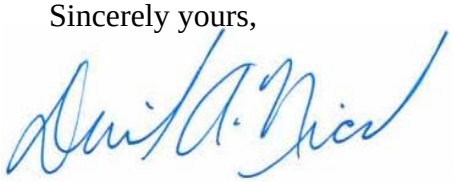
Findings
In summary, the HAPCO Georgetown (B13163) and HAPCO Embedded Pedestal (B13164) 20 ft (6.1 m) decorative lighting poles as described above, meet the appropriate evaluation criteria for a NCHRP 350 TL-3 device and may be used at all appropriate locations on the NHS when selected by the contracting authority, subject to the provisions of Title 23, Code of Federal Regulations, Section 635.411 as they pertain to proprietary products. The HAPCO Georgetown (B13163) is accepted with luminaire mounting heights up to 20 feet (6.1 m) with shafts up to 1/4 inch (6.35 mm) wall thickness with diameters up to 6 inches (152.4 mm). The HAPCO Embedded Pedestal (B13164) is accepted with luminaire heights up to 20 feet (6.1 m), shafts up to 1/4 inch (6.35 mm) wall thickness with diameters up to 6 inches (152.4 mm), and embedment lengths not less than 4 feet (1.22 m). Furthermore, the embedment tube wall thickness must be equal to the shaft wall thickness.

Standard provisions
Please note the following standard provisions that apply to 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-66 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 HAPCO 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.

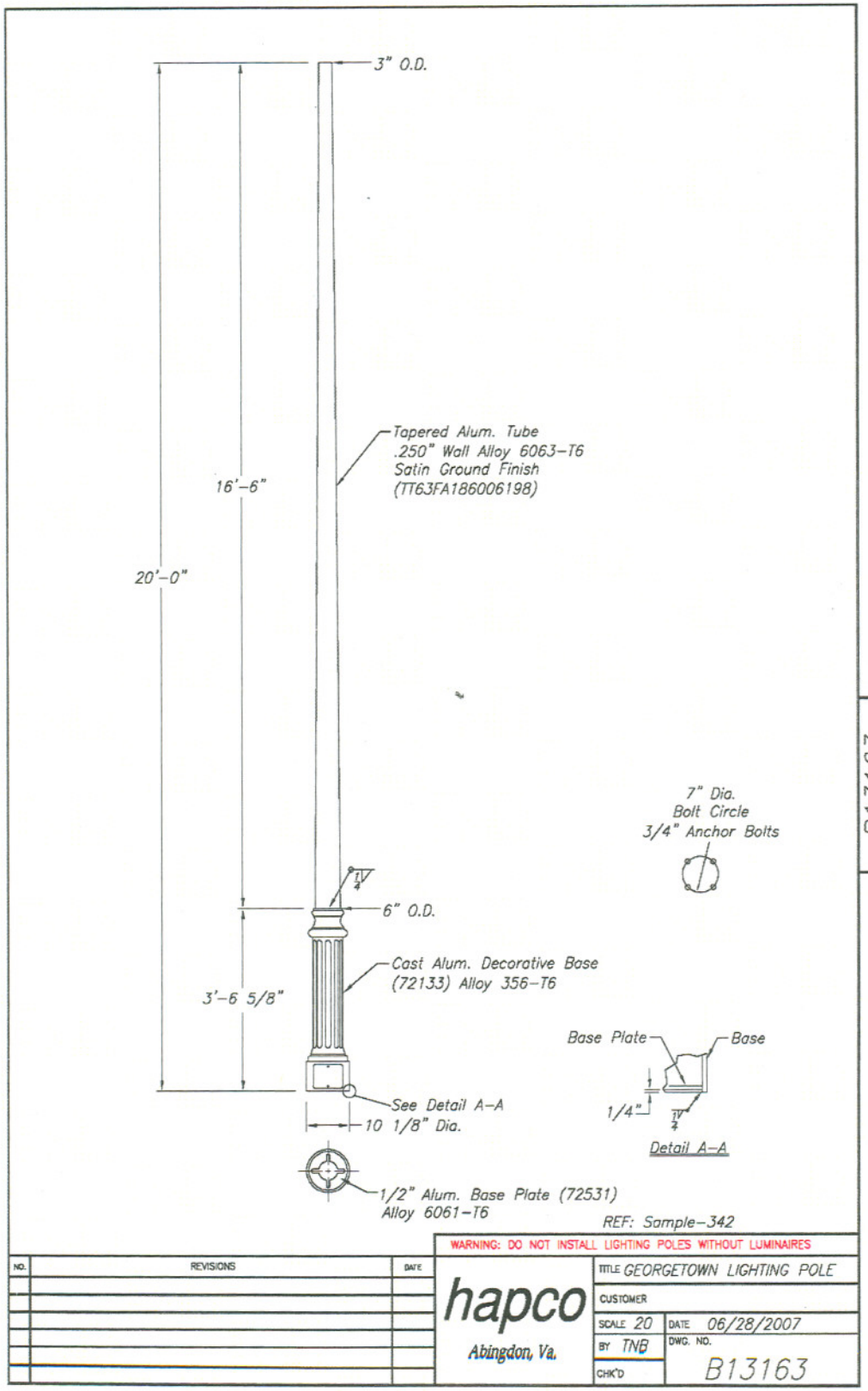
Sincerely yours,



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

Enclosures

APPENDIX C. DETAILS OF TEST ARTICLES



Texas Transportation Institute

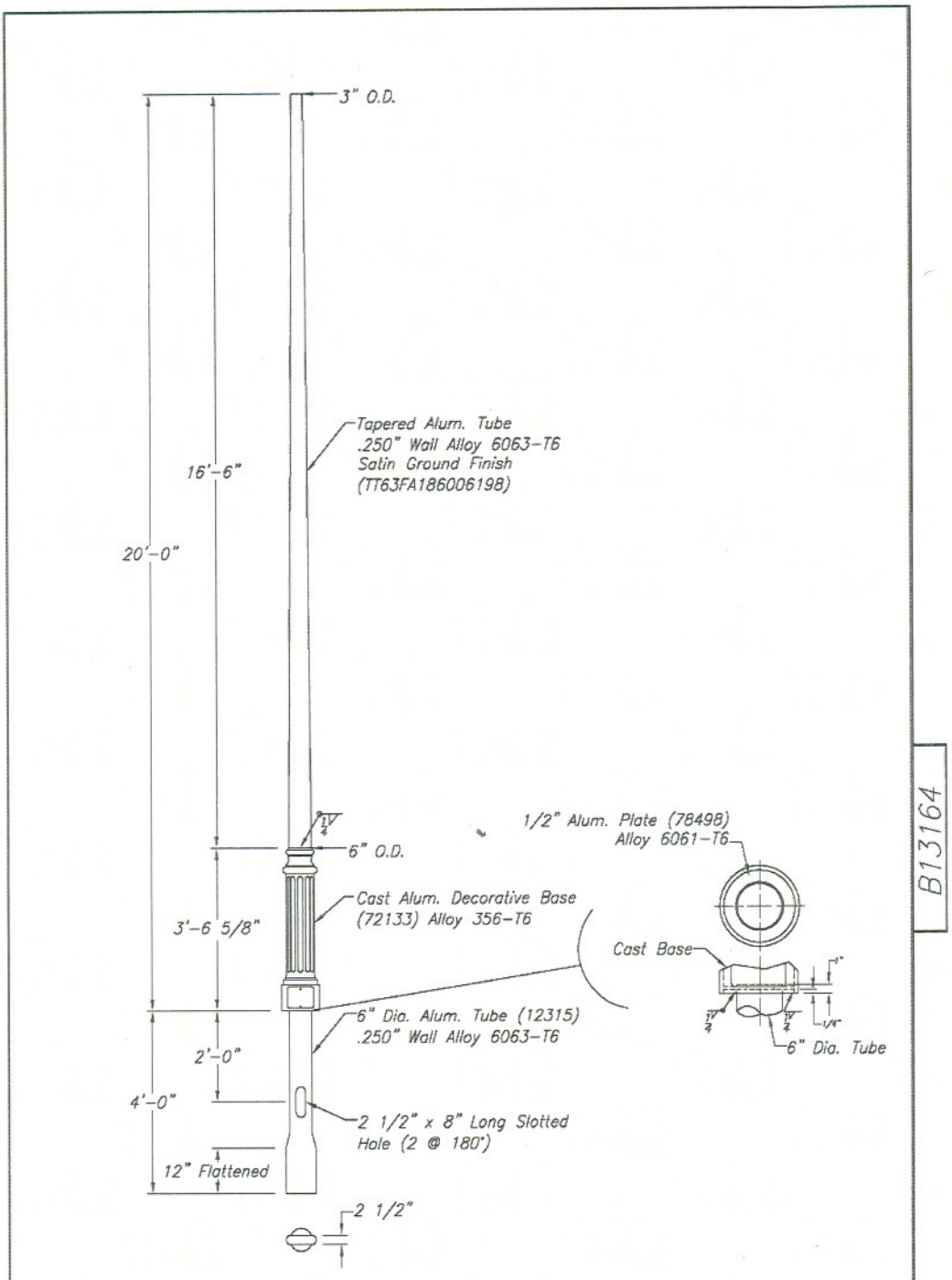
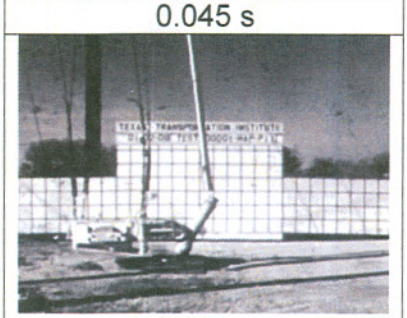

3" O.D.
Tapered Alum. Tube
.250" Wall Alloy 6063-T6
Satin Ground Finish
(TT63FA186006198)
16'-6"
20'-0"
1/2" Alum. Plate (78498)
Alloy 6061-T6
6" O.D.
Cast Alum. Decorative Base
(72133) Alloy 356-T6
3'-6 5/8"
Cast Base
6" Dia. Alum. Tube (12315)
.250" Wall Alloy 6063-T6
2'-0"
4'-0"
2 1/2" x 8" Long Slotted
Hole (2 @ 180°)
12" Flattened
2 1/2"
6" Dia. Tube
REF: Sample-343
B13164
WARNING: DO NOT INSTALL LIGHTING POLES WITHOUT LUMINAIRES
NO.
REVISIONS
DATE
hapco
Abingdon, Va.
TITLE EMBEDDED PEDESTAL
CUSTOMER
SCALE 24
DATE 06/28/2007
BY TNB
DWG. NO.
CHK'D
B13164

Table D1. Summary of results for pendulum test 400001-HAP P11.

0.000 s

0.045 s



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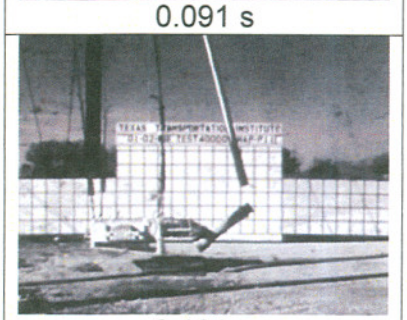


0.136 s

General Information

Test Agency ..... Texas Transportation Institute
Test No. 400001-HAP P11
Date 01-02-2008

Test Article

Type ..... Boltdown Lighting Pole
Name ..... HAPCO Georgetown (B13163)
Installation Height (m) ..... 6.1 m (20 ft)
Material or Key Element ..... Aluminum

Soil Type ..... Reaction Plate

Test Vehicle

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

Impact Conditions

Speed ..... 34.7 km/h
Angle ..... 90 deg

Occupant Risk Values

Impact Velocity
Longitudinal direction ..... 3.5 m/s
Ridedown Accelerations
Longitudinal direction ..... -0.8 g's

Maximum Change in Velocity ..... 3.1 m/s

Predicted High-Speed Change in Velocity ..... 2.1 m/s

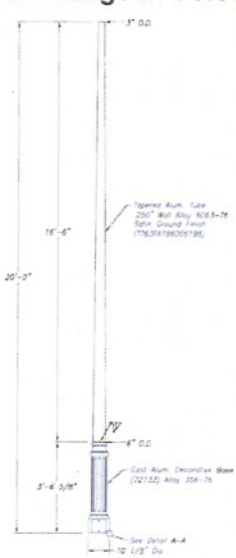
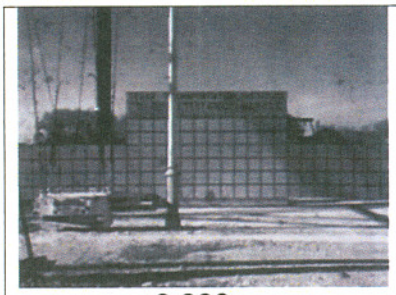


Table D2. Summary of results for pendulum test 400001-HAP P12.



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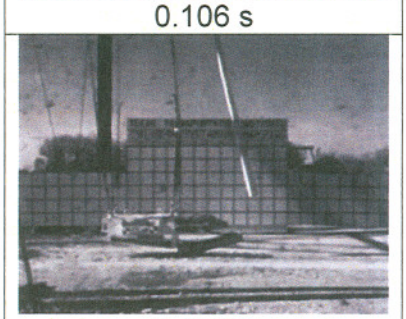
0.053 s

0.106 s



0.158 s

General Information

Test Agency ..... Texas Transportation Institute
Test No. 400001-HAP P12
Date 01-02-2008

Test Article

Type ..... Lighting Pole
Name ..... HAPCO Embedded Pedestal (B13164)
Installation Height (m) ..... 6.1 m (20 ft)
Material or Key Element ..... Aluminum

Soil Type ..... Standard Soil

Test Vehicle

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

Impact Conditions

Speed ..... 34.9 km/h
Angle ..... 90 deg

Occupant Risk Values

Impact Velocity
Longitudinal direction ..... 4.5 m/s
Ridedown Accelerations
Longitudinal direction ..... -1.2 g's

Maximum Change in Velocity ..... 3.5 m/s

Predicted High-Speed Change in Velocity ..... 2.4 m/s