Mr. Francisco D. Estrada, Supervisor  
Los Angeles County SAFE  
One Gateway Plaza  
Los Angeles, California  90012-2932

Dear Mr. Estrada:

Thank you for your February 25 letter to the Director, Office of Engineering, requesting acceptance of the Comarco Wireless Technologies’ TTY Call Box support system as a breakaway support for use on the National Highway System. Accompanying your letter was a report of crash testing done at E-Tech Testing Services dated December, 1998, and videos of the crash tests.


The test articles each consisted of a callbox, a 102-mm diameter by 4267-mm steel pole conforming to ASTM A 500, with an A.B.Chance auger foundation, a “Call Box” sign, a “TTY” sign, a unity gain antenna, and a 6.5 Watt solar panel. The poles were equipped with rectangular slip base mounting hardware consisting of (4) 5/8-11 UNC 3 1/4” long hot-dipped galvanized SAE J429 GD 2 hex bolts and J995 GD 2 nuts. SAE wide Type A plain washers were used against the faces of the nuts and bolts and between the slip base plates. All mating surfaces of the slip base plates, washer surfaces, and bolt threads were rubbed down with a layer of paraffin wax. The supports were augured 1664 mm (65.5 inches) into “weak” soil, and the slip base nuts were torqued to 54 N-m prior to testing. The hardware and torque specifications differ from those shown in the enclosed illustration of the tested support.

A summary of the crash tests is presented in the following table.
<table>
<thead>
<tr>
<th>Test #</th>
<th>11-4501-001</th>
<th>11-4501-002</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCHRP 350 Designation</td>
<td>3-60</td>
<td>3-61</td>
</tr>
<tr>
<td>Vehicle Mass</td>
<td>834.4 kg</td>
<td>809.4 kg</td>
</tr>
<tr>
<td>Vehicle Impact Speed</td>
<td>38.09 km/h</td>
<td>101.05 km/h</td>
</tr>
<tr>
<td>Soil Type</td>
<td>Weak (S-2)</td>
<td>Weak (S-2)</td>
</tr>
<tr>
<td>Impact Angle</td>
<td>20 degrees</td>
<td>20 degrees</td>
</tr>
<tr>
<td>Test Article Mass</td>
<td>103 kg</td>
<td>103 kg</td>
</tr>
<tr>
<td>Occupant Impact Speed</td>
<td>1.49 m/s</td>
<td>2.30 m/s</td>
</tr>
<tr>
<td>Vehicle Velocity Change</td>
<td>4.25 km/hr (1.18 m/s)</td>
<td>7.02 km/hr (1.95 m/s)</td>
</tr>
<tr>
<td>Windshield Damage</td>
<td>None, no contact</td>
<td>None, no contact</td>
</tr>
<tr>
<td>Vehicle Deformation</td>
<td>Major roof dents, 89 mm max</td>
<td>Major bumper, body dents</td>
</tr>
<tr>
<td>Stub Height</td>
<td>Approximately 75 mm</td>
<td>Approximately 75 mm</td>
</tr>
</tbody>
</table>

Notes:
1. The test article mass includes the pole, slip base assembly, and callbox, signs, and solar panel assemblies. That part of the test article which remains in the soil is included in this total even though it does not have to be put in motion by the test vehicle.
2. The 89 mm maximum deformation of the roof is within the 125-mm tolerance allowed by FHWA for roof deformation under impact by luminaire supports in a memorandum dated August 19, 1994.

The tested supports met the change in velocity and stub height requirements of the AASHTO Standard Specifications and NCHRP Report 350. There were no excessive deformations of the passenger compartment and no damage to the windshield. Therefore, the callbox supports are acceptable for use on the National Highway System (NHS) within the range of conditions tested, when requested by a State. The "weak" soil testing was the "worst-case scenario" for any slip-base design. Therefore the Comarco Wireless Technologies’ TTY Call Box support system will be acceptable when installed in strong soil as well. Should you wish to use the same slip base mechanism on a support embedded in concrete, that too will be acceptable if the foundation is adequate to support the typical structural loadings imposed by such an installation. To prevent misunderstanding by others, this letter of acceptance, numbered SS-84, shall not be reproduced except in full.

Our acceptance is limited to the breakaway characteristics of the supports and does not cover the structural features, compliance with the Americans with Disabilities Act, nor the devices’
conformity with the Manual on Uniform Traffic Control Devices. Presumably, users will be provided with sufficient information on structural design and installation requirements to ensure proper performance of the supports. Comarco Wireless Technologies should provide certification to other transportation agencies wishing to use this breakaway support system that the hardware furnished will have essentially the same chemistry, mechanical properties, and geometry as those used in the tests and that they will meet FHWA change in velocity requirements.

Sincerely yours,

Dwight A. Horne
Director, Office of Highway Safety Infrastructure
==NOTES==
1. FINISH: HOT DIP GALVANIZED
2. TORQUE BOLTS TO 60 FT-LBS 40 FT-LBS
3. TERMINATE INSTALLATION OF FOUNDATION WHEN BASEPLATE IS 3" ABOVE GRADE
3 - 1/2" DIAMETER FOUNDATION


CATALOG NUMBER


APPROVALS


Plate
HEX: ANSI A29.4-LATEST REVISION, HOT ROLLED STEEL


NOTE:
= =
DRAWING #3
INSTALLATION CONFIGURATION AND MOUNTING DETAILS