U.S. Department
Of Transportation
Federal Highway
Administration

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

July 15, 1992

Refer to: HNG-14/SS-29

Mr. William G. Edwards
A.B Chance Company
210 North Allen Street
Centralia, Missouri 65240-1395

Dear Mr. Edwards:

This is in response to your request for the Federal highway Administration's (FHWA) acceptance of your company's helical screw foundations (HSFs) as foundations for slip-base supports for motorist aid call boxes. Your initial letter of November 26, 1991, included the reports of crash tests Chance 1 and Chance 2 conducted by Southwest Research Institute (SWRI) along with documentation describing the foundations. You provided additional information and video of the callbox support crash testing with your March 10 letter responding to our request of January 2. Subsequent to our meeting on May 27 you submitted a copy of a crash test conducted in "weak" soil by Mobility Systems and Equipment Company (MSE) and followed that up with final details in your facsimile message of July 6.

The tests were conducted to assess the breakaway performance of steel-post motorist-aid call boxes mounted on HSFs. Requirements for breakaway supports are found in the 1985 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals. These specifications have been adopted, with minor modifications, by the FHWA. The test articles are described in the enclosed drawings.

The test results are summarized here:

Test Number	SWRI Chance-1	SWRI Chance-2	MSE Test-1
Support Type	Sch. 40 Steel	Sch. 40 Steel	Steel .266 wall
Test Article Mass, kg (lbs.) (including 23.6 kg callbox)	95 (208)	95 (208)	100 (218)
Bolt Torque, N-m (ft-lbs)	40.7 (30)	40.7 (30)	67.9 (50)
Vehicle Mass, kg (lbs)	898 (1975)	890 (1957)	825 (1815)
Soil Type (per NCHRP 230)	S-1	S-1	S-1

Impact Speed, km/hr (mph)	30.9 (19.2)	95.1 (59.1)	31.5 (19.6)
Velocity Change, m/s (fps)	0.37 (1.2)	1.28 (4.2)	1.28 (4.2)
Stub Height, mm (in)	75 (3)	75 (3)	100 (4)

All supports were steel poles, 100 mm (4 inches) in diameter with a height of 4300 mm (14 feet) to the top of the pole (base of antenna). The HSF was embedded 1500 mm (5 feet) into the soil. We believe that the low speed test in weak soil is a "worst case" scenario and that a high speed test is not warranted.

The films of the crash tests that you supplied show that the only significant damage to the test vehicles occurred when the top of the support rotated after impact and struck the rear hatch windows. We do not consider this to be significant passenger compartment intrusion. The comparison test video that you provided showed that a wooden callbox support, when tested, broke at the groundline, at bumper height, and below the call box. This left the callbox suspended in space, with the result that it severely damaged the windshield of the test vehicle and entered the passenger compartment. It is apparent that a different type support, such as a steel pipe, is required to assure that the callbox does not become a greater hazard than the support in the event of a crash.

The results of the three slip-base tests outline above meet the change in velocity and stub height requirements adopted by AASHTO and the FHWA. Therefore, your company's helical screw foundation described above is acceptable for use on Federal-aid highway projects to support slip-base callbox supports, 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 will require certification from A.B. Chance Company and/or the callbox supplier that the hardware furnished has essentially the same chemistry, mechanical properties, and geometry as that used in the tests, and that it will meet the FHWA change in velocity requirements.

Sincerely yours,

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

Enclosures

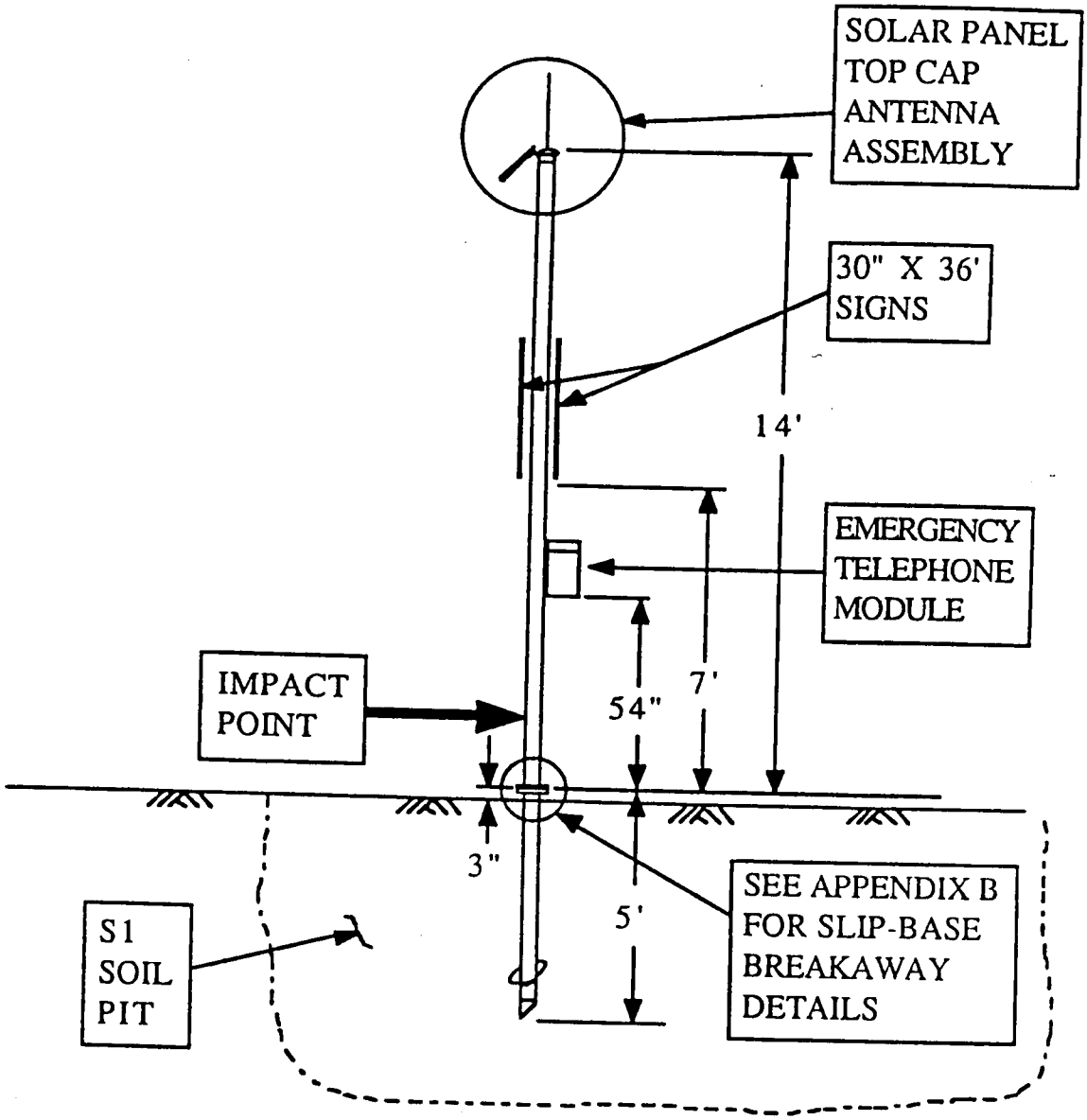
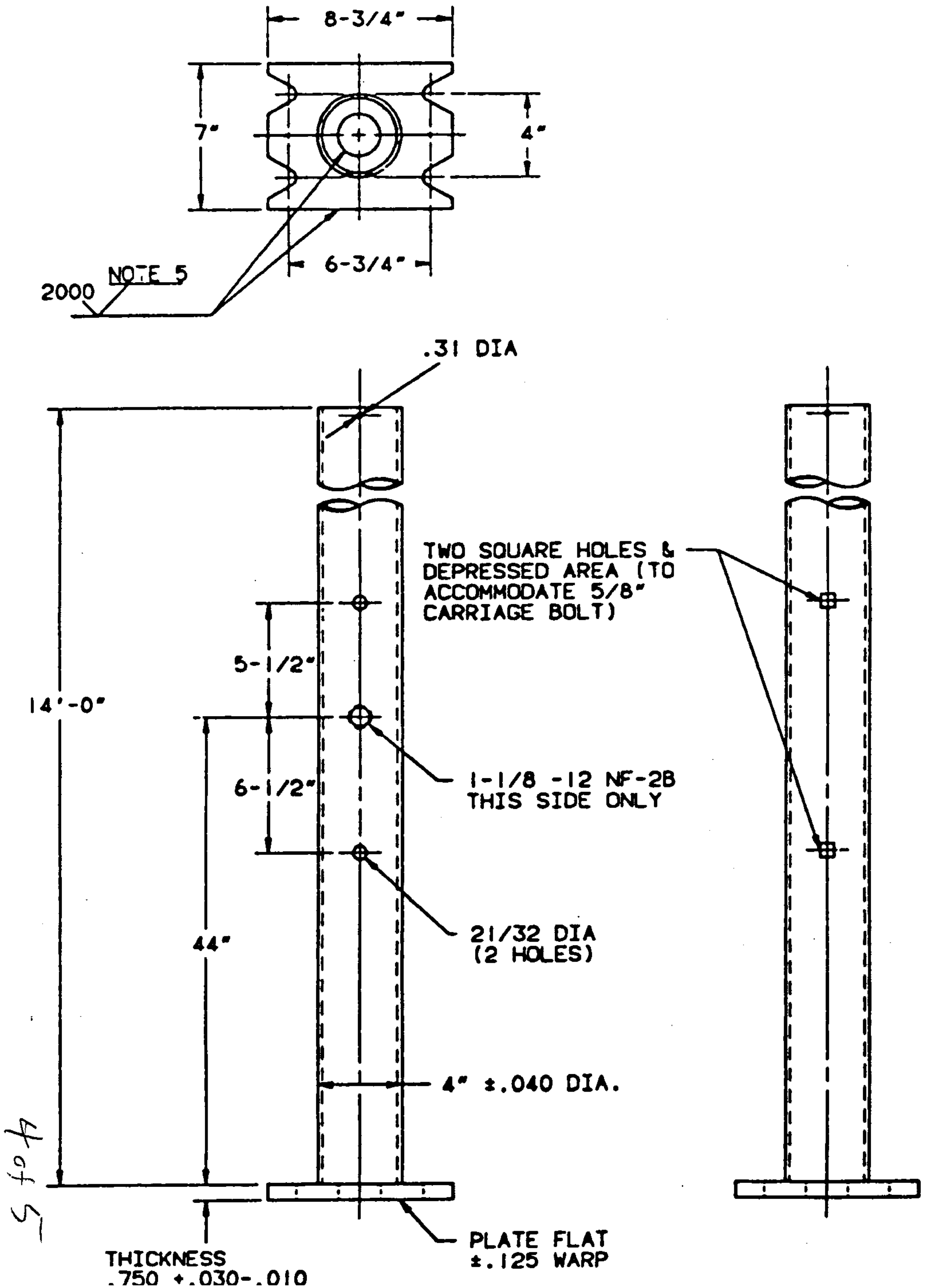


Figure 1. Test Article Description, Test Chance 1 and Chance 3



==NOTES==

1. FINISH: HOT DIP GALVANIZE PER ASTM-153 (LATEST REVISION).
2. BASEPLATE TO BE PERPENDICULAR TO SHAFT AXIS (±1°) AND HOLE TO BE CONCENTRIC (±.125 I.D.) TO SHAFT AXIS.
3. STENCIL MIN. 1/2 IN. LETTERS MANUFACTURER'S NUMBER AFTER GALVANIZING.
4. TUMBLAST, HAND GRIND OR PICKLE & PREHEAT BASEPLATE AND SHAFT BEFORE WELDING.
5. FLAMECUT IRREGULARITIES PERMISSIBLE: (1) VALLEYS NOT TO EXCEED 3/32 IN. BELOW NOMINAL SURFACE LEVEL. (2) PEAKS OR POSITIVE IRREGULARITIES NOT TO EXCEED 1/32 IN. ABOVE NOMINAL SURFACE LEVEL OR INTERSECTIONS OF NOMINAL SURFACES.
6. MANUFACTURER TO HAVE IN EFFECT INDUSTRY RECOGNIZED WRITTEN QUALITY CONTROL FOR ALL MATERIALS AND MANUFACTURING PROCESSES.
7. ALL MATERIAL IS TO BE NEW, UNUSED AND MILL TRACEABLE MEETING THE FOLLOWING SPECIFICATIONS:

   BASEPLATE: ASTM A36-(LATEST REVISION) HOT ROLLED STEEL PLATE. TO CONFORM TO CALTRAN SLIP PLATE DESIGN.

   MAST: ASTM 500, GRADE B (LATEST REVISION), STRUCTURAL TUBING.

8. FASTENERS: (ORDER SEPARATELY)
   MOUNTING HARDWARE: T112-0314
   - 4 - 5/8-11 X 3" LG. HEX. HEAD MACH. BOLT PER SAE J429, GRADE 2, ZINC PLATED STEEL
   - 4 - 5/8-11 HEX. NUTS, ZINC PLATED STEEL
   - 12 - 5/8" TYPE A WIDE FLAT WASHERS, ZINC PLATED STEEL

   CALL BOX HARDWARE: T112-0315
   - 2 - 5/8-11 X 5-1/2" LG. ROUND HEAD REG. SQ. NECK CARR. BOLT PER SAE J429, GR. 2.
   - 2 - 5/8-11 HEX. NUT
   - 2 - 5/8" TYPE A NARROW FLAT WASHERS
9. LUBRICATE SLIP BASE AND WASHERS WITH PARAFFIN. TORQUE MOUNTING BOLTS TO 30 FT.-LBS.
10. POLE ONLY TO BE USED ON MATING 4 POINT SLIP BASE.

APPROVALS

DATE	*ORGANIZATION*	*SIGNATURE*

4" DIAMETER MAST

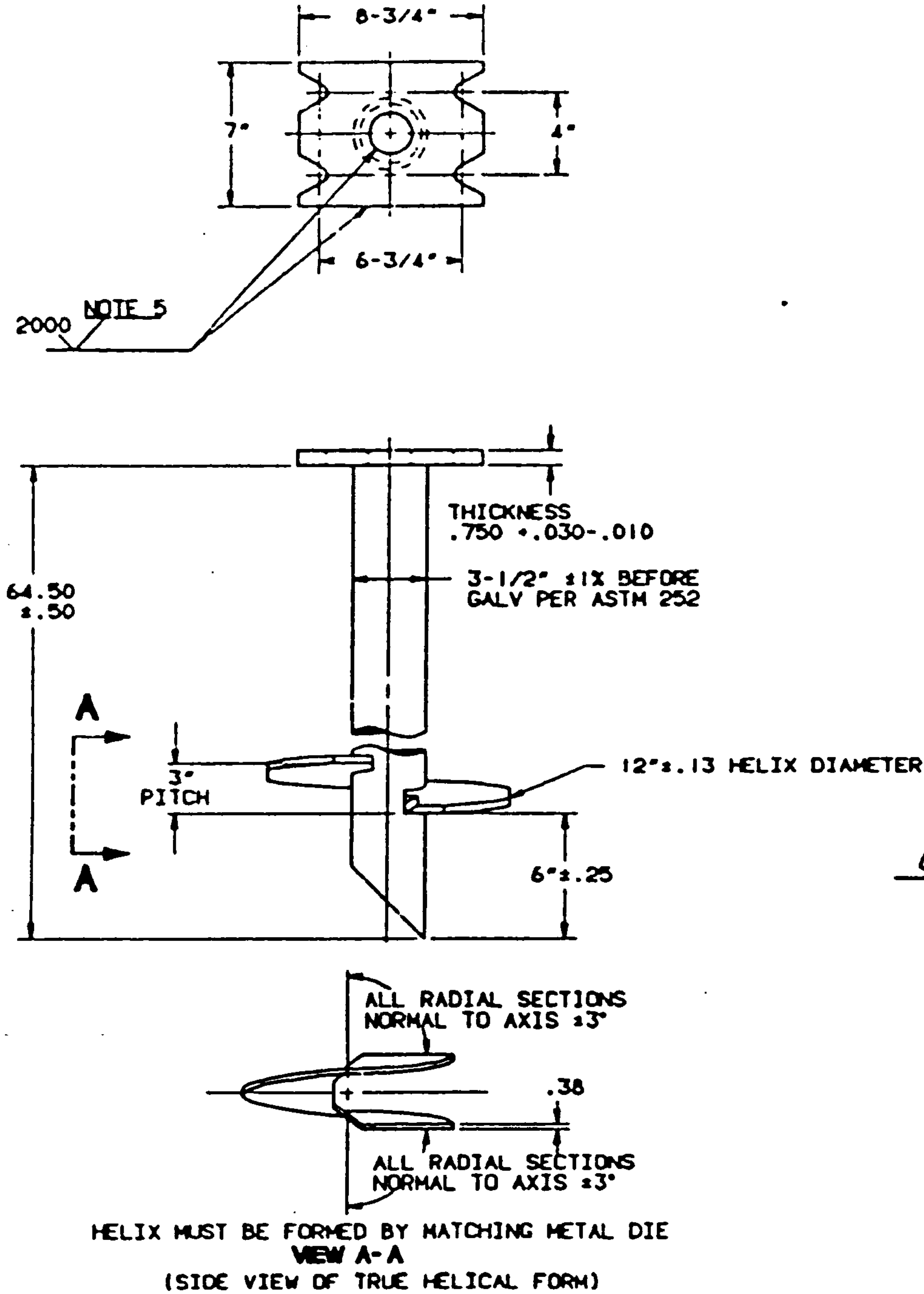
CATALOG NUMBER

T112-0350

LESS HARDWARE - SEE NOTE #8

ISO DUAL DIMENSIONS (IF ANY) IN = INCH, MM = MILLIMETER	THIRD ANGLE PROJECTION	REV.	DATE	BY	APPD

	INIT.	DATE	EMERGENCY CALL BOX POLE (TESTED PER AASHTO & FED 230)	C
DRN.	SC	10-01-90		
CHK.	DRB	12-21 93		



==NOTES==

1. FINISH: HOT DIP GALVANIZE PER ASTM-153 (LATEST REVISION).
2. BASEPLATE TO BE PERPENDICULAR TO SHAFT AXIS (±1°) AND HOLE TO BE CONCENTRIC (±.125 I.D.) TO SHAFT AXIS.
3. STENCIL MIN. 1/2 IN. LETTERS MANUFACTURER'S NUMBER AFTER GALVANIZING.
4. TUMBLAST, HAND GRIND OR PICKLE & PREHEAT BASEPLATE, HELIX AND SHAFT BEFORE WELDING.
5. FLAMECUT IRREGULARITIES PERMISSIBLE: (1) VALLEYS NOT TO EXCEED 3/32 IN. BELOW NOMINAL SURFACE LEVEL. (2) PEAKS OR POSITIVE IRREGULARITIES NOT TO EXCEED 1/32 IN. ABOVE NOMINAL SURFACE LEVEL OR INTERSECTIONS OF NOMINAL SURFACES.
6. MANUFACTURER TO HAVE IN EFFECT INDUSTRY RECOGNIZED WRITTEN QUALITY CONTROL FOR ALL MATERIALS AND MANUFACTURING PROCESSES.
7. MAXIMUM TORQUE RATING IS 10,000 LBS. FT.
8. ALL MATERIAL IS TO BE NEW, UNUSED AND MILL TRACEABLE MEETING THE FOLLOWING SPECIFICATIONS:

BASEPLATE: ASTM A36-(LATEST REVISION) HOT ROLLED STEEL PLATE, TO CONFORM TO CALTRAN SLIP PLATE DESIGN.

SHAFT: STEEL PIPE PILES, SEAMLESS OR STRAIGHT WELDED, GRADE 2 PER ASTM A252.
ALT. MATERIAL: STEEL PIPE, TYPE E OR S, GRADE B PER ASTM A53.

HELIX: ASTM A29-(LATEST REVISION) HOT ROLLED STEEL PLATE

APPROVALS

DATE	ORGANIZATION	SIGNATURE

CATALOG NUMBER

T112-0300

3-1/2" DIAMETER FOUNDATION

LATEST EC NO.	REV.	DATE	CHANGED BY	REQ DESIGNER
90101905	E	10-24-90	JONES	SEIDER

THIRD ANGLE PROJECTION
ISO DUAL DIMENSIONS [IN-INCH, MM-MILLIMETER]

DRN BY: JONES | DATE | TITLE: 4 POINT SLIP BASE FOUNDATION | SIZE C

CHANCE — A.B. CHANCE CO. CENTRALIA, MO. USA | DWG NO. SA112-0300