August 24, 2001

Refer to: HSA-10/CC46D

Mr. Kaddo Kothmann
President, Road Systems, Inc.
1507 E 4th St.
Big Spring, TX 79720

Dear Mr. Kothmann:

In your May 18 letter, you described a FLEAT guardrail terminal modified for use with a strong post, w-beam guardrail median barrier and provided preliminary summary information on the tests that were run at Southwest Research Institute to verify its compliance with current evaluation criteria. You also included a videotape of the tests that were conducted. Mr. Richard Powers of my staff received single copies of the final reports, entitled "FULL-SCALE CRASH EVALUATION of a FLEAT MEDIAN TERMINAL SYSTEM", TESTS FMT-1, FMT-2, and FMT-3M on August 22.

As seen in Enclosure 1, the FLEAT-MT is nearly identical to the previously accepted FLEAT roadside terminal. Since its intended use is to terminate a double-faced, strong post w-beam median barrier, two impact heads are required. One of these is at the fourth post in from the end of the barrier and fits over the backside w-beam rail element. The other impact head fits over the end of the traffic-side rail element 5717 mm ahead of the first and is offset 610 mm from the face of the median barrier proper in a straight flare. Minor modifications were made to the design to obtain satisfactory results in the reverse direction impact described below.

Based on the similarity of the FLEAT-MT to the roadside FLEAT design and layout, you reviewed the tests upon which acceptance of the FLEAT was based and concluded that only three additional tests would be required to certify the median terminal under NCHRP Report 350. My staff concurred with your analysis. The first test conducted was NCHRP Report 350 test 3-35, the 2000-kg pickup truck redirection test. The truck impacted the terminal at post 3, the beginning of the length of need, at 100.4 km/h and 20.8 degrees. Although all evaluation criteria were satisfied, the test vehicle snagged on post 7, which was a standard steel line post. This result was discussed with your consultant, Dr. Dean Sicking, and it was decided to make post 7 a breakaway design to improve test performance. This change is not reflected in the test reports, but is shown in Enclosure 1.

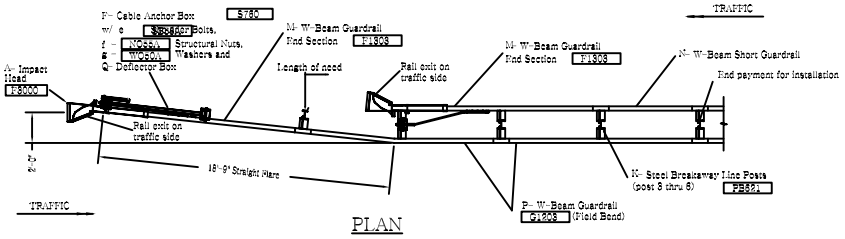
The second test was NCHRP Report 350 test 3-31 where the pickup truck impacted the FLEAT-MT head-on at 99.8 km/h. The truck was brought to a controlled stop in approximately 10 m, with 6.8 m of the front rail and 1.9 m of the back rail being extruded. Occupant impact velocity was 5.6 m/sec and the subsequent ridedown acceleration was 12.9 g's.

The final test was NCHRP Report 350 test 3-39, the reverse-direction impact that is required for devices such as median barrier terminals that are likely to be struck from either direction. When this test was first run, the pickup truck snagged on the downstream cable anchor and subsequently overturned. When a deflector bracket was added to the downstream end of the cable anchor, the vehicle was successfully redirected and all evaluation criteria were satisfied.

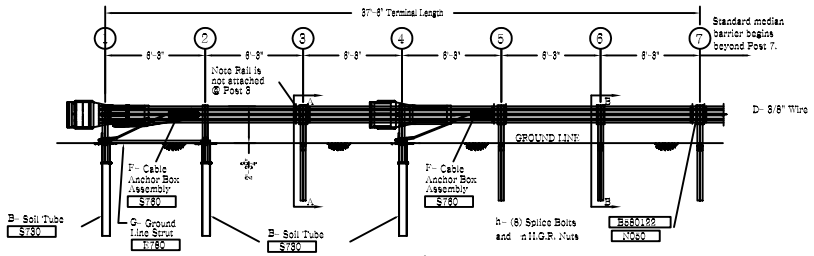
Based on the information you presented, I agree that the FLEAT-MT, as shown in Enclosure 1, meets the NCHRP Report 350 evaluation criteria for a test level 3 (TL-3) terminal and may be used on the National Highway System (NHS) to terminate a w-beam median barrier when such use is accepted or specified by the appropriate contracting agency. As a proprietary product, the conditions listed in Title 23, Code of Federal Regulations, Section 435.411 apply to its use on Federal-aid projects located on the NHS.

Sincerely yours,
(original signed by Rudolph M. Umbs)
Frederick G. Wright, Jr.
Program Manager, Safety

Enclosure



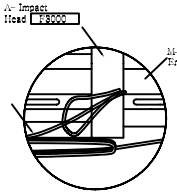
PLAN



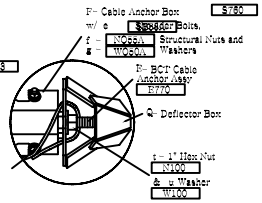
ELEVATION

GENERAL NOTES

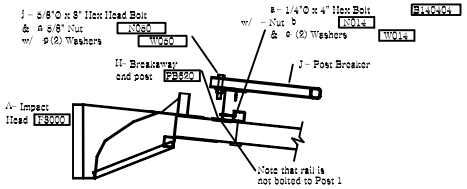
1. Breakaway posts are required with the FLEAT.
2. All bolts, nuts, cable assemblies, cable anchors and plates shall be galvanized.
3. The soil tubes shall not protrude more than 4" above ground (measured along a 5'–0" cord). Site grading may be necessary to meet this requirement.
4. The soil tubes may be driven with an approved driving head. Soil tubes should not be driven with the post in the tube. If the tubes are placed in drilled holes, the backfill material must be satisfactorily compacted to prevent settlement.
5. When rock is encountered during excavation, a 12" Dia. post hole, 20" deep may be used if approved by the engineer. Granular material will be placed in the bottom of the hole approx. 2 1/2" deep to provide drainage. The soil tubes will be field cut to length, placed in the hole and backfilled with adequately compacted material excavated from the hole.
6. The breakaway cable assembly must be taut. A locking device, (vice grips or channel lock pliers) should be used to prevent the cable from twisting, when tightening nuts.



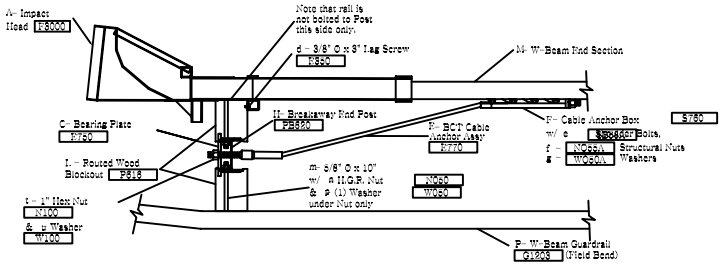
5/8" WIRE CONNECTION DETAIL



DEFLECTOR BOX & 5/8" WIRE CONNECTION DETAIL



IMPACT HEAD CONNECTING DETAIL (Post 1)

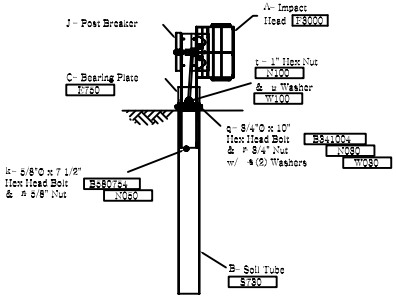


SECOND IMPACT HEAD CONNECTING DETAIL (Post 4)

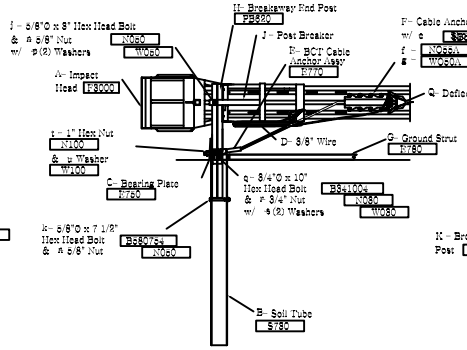
ITEM	QTY	DESCRIPTION
A	2	FLEAT IMPACT HEAD (F3000)
B	8	*FOUNDATION SOIL TUBE, 6" x 8" (S780)
C	2	BRARING PLATE (E750)
D	1	3/8" WIRE 20'–0"
E	2	BCT CABLE ANCHOR ASSEMBLY (E770)
F	2	CABLE ANCHOR BOX (S760)
G	1	GROUND STRUT (E780)
H	8	BREAKAWAY END POSTS 1, 2, & 4 (PB620)
J	1	POST BREAKER
K	4	BREAKAWAY LINE POSTS 3, 5, 6 & 7 (PB621)
L	7	ROUTED TIMBER BLOCKOUT OR RECYCLED EQUIV. (P616)
M	2	W–BEAM GUARDRAIL END SECTION, 12 GA. (F1303)
N	1	W–BEAM GUARDRAIL SHORT SECTION, 12 GA. 6'–3" LG.
P	2	W–BEAM GUARDRAIL, 12 GA. (G1203)
Q	1	DEFLECTOR BOX
		HARDWARE
a	2	1/4" DIA. x 4" HEX BOLT (B140404) (POST 1)
b	2	1/4" HEX NUT (N014) (POST 1)
c	4	1/4" WASHER (W014) (POST 1)
d	2	5/8" DIA. x 8" LAG SCREW (E852) (POST 4)
e	16	1/2" DIA. CABLE ANCHOR BOX SHOULDER BOLT (SB58A)
f	16	1/2" A325 STRUCTURAL NUT (N055A)
g	32	1/2" WASHER (W050A)
h	41	5/8" DIA. X 1 1/4" SPLICE BOLT (B580122) (5 SPLICE/POST 2)
j	1	5/8" DIA. x 8" HEX BOLT (POST BREAKER)
k	8	5/8" DIA. x 7 1/2" HEX BOLT (B580754) (FOUNDATION TUBES)
m	8	5/8" DIA. x 10" H.G.R. BOLT (B581002) (POSTS 3–7)
n	53	5/8" H.G.R. NUT (N050)
p	11	5/8" H.G.R. WASHER (W050) (POST BREAKER, POSTS 2–7)
q	8	3/4" DIA. x 10" HEX BOLT (B841004) (FOUNDATION TUBES)
r	8	3/4" HEX NUT (N080) (FOUNDATION TUBES)
s	6	3/4" WASHER (W080) (FOUNDATION TUBES)
t	4	1" ANCHOR CABLE HEX NUT (N100)
u	4	1" ANCHOR CABLE WASHER (W100)

Foundation Tube Options For Posts 1 & 2 & 4

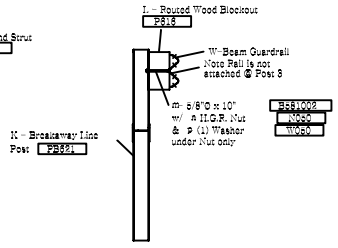
*6'–0" Split Foundation Tubes S780
*6'–0" Solid Foundation Tubes E781
*5'–0" Foundation Tubes S735 W/Soil Plates SP600
*4'–6" Foundation Tubes E735 W/Soil Plates SP600



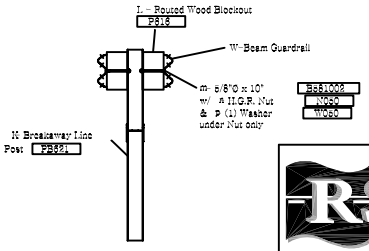
END VIEW OF POST 1



BACK VIEW OF POST 1



SECTION A–A (Post 8)



SECTION B–B (Typical @ Post 5 & 6)

Road Systems, Inc.
8616 Old Howard County Airport
Big Spring, TX 79720
Phone: 915–263–8435

FLared Energy Absorbing Terminal
FLEAT Median Assembly For
Steel Breakaway Post System

Scale:	Date:	Sheet:
NONE	07–06–01	A1
Drawn by: SML	Drawing Name: MEDFLT–S–US	