



U.S. Department
of Transportation

**Federal Highway
Administration**

DEC 4 1995

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

Refer to: HNG-14

Dr. Hayes E. Ross, Jr.
Research Engineer
The Texas A&M University System
Texas Transportation Institute
College Station, Texas 77843-3135

Dear Dr. Ross:

Your November 6 letter to Mr. William A. Weseman provided videotape and test reports indicating that the Slotted Rail Terminal (SRT) successfully met the National Cooperative Highway Research Program (NCHRP) Report 350 evaluation criteria as a test level 3 (TL-3) guardrail terminal. This letter also requested the Federal Highway Administration's (FHWA) concurrence in this determination.

In reviewing this material, we noted that the final NCHRP Report 350 terminal differed from the 230 tested design in the following ways:

1. The 305-mm long slots at post number 2 have been eliminated.
2. The w-beam rail element spanning posts 3 through 11 is a single section 76 20~~0~~ mm in length. The 230 design used two 38 10~~0~~-mm sections of w-beam in this area.
3. In lieu of a shelf angle to hold the rail in place, the 350 design uses standard 305-mm long w-beam backup plates at post 2 and at posts 4 through 10.
4. The 350 design uses a total of eight CRT posts (posts 3 through 10).

The final SRT design is shown in enclosure 1. Enclosure 2 summarizes the results of the full-scale tests that were conducted during the compliance testing for the SRT. We concur with the researchers' opinion that tests 3-30 and 3-34

need not be rerun on the modified design and that tests 3-32 and 3-33 may be waived for this terminal. In all tests the occupant impact velocities and subsequent ride down accelerations were below the maximum allowable values given in the NCHRP Report 350 evaluation criteria.

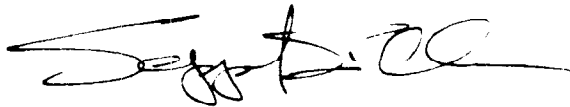
The FHWA concurs that the SRT is an acceptable TL-3 terminal for strong-post w-beam barrier and may be used on projects on the National Highway System when selected by a State highway agency.

Since the SRT is a proprietary design, its use on Federal-aid highway projects is subject to the conditions in Title 23, Code of Federal Regulations, Section 635.411, a copy of which is enclosed for your ready reference.

As with all gating terminals, the SRT must be installed on a relatively level site and have a reasonably clear and traversable area behind it for optimal performance in the field. We assume that, as with the BCT and the MELT terminals, the barrier length of need begins at post number 3 for the SRT.

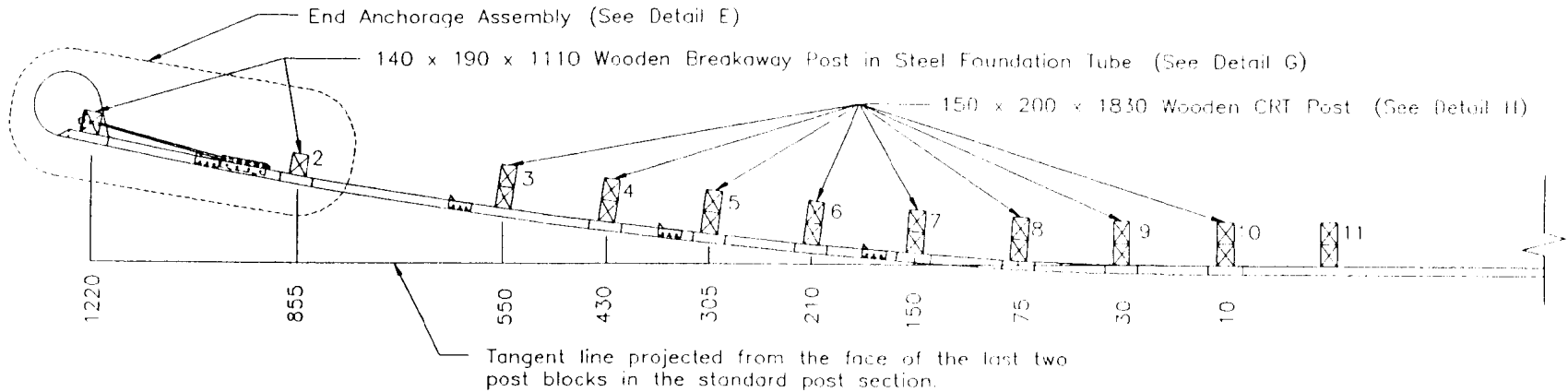
A copy of this letter with enclosures will be sent to all FHWA field offices for information. Questions concerning this terminal should be addressed to Mr. Richard Powers of my staff at (202) 366-1320.

Sincerely yours,

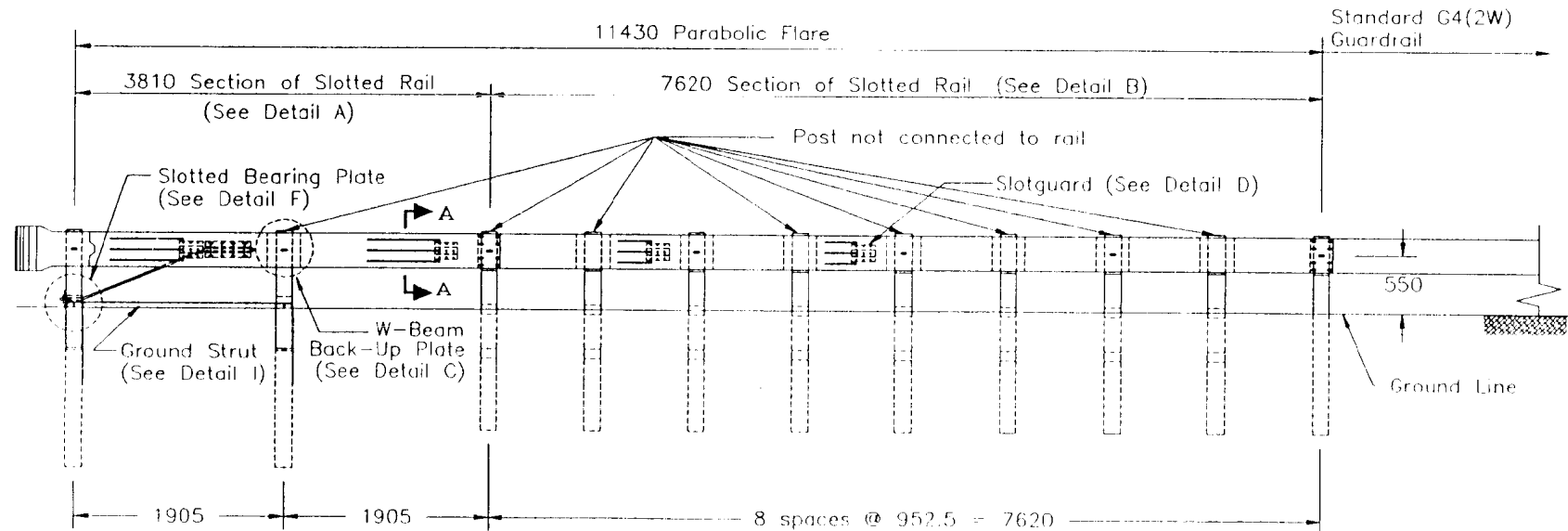


for Jerry L. Poston, Chief
Federal-Aid and Design Division

3 Enclosures



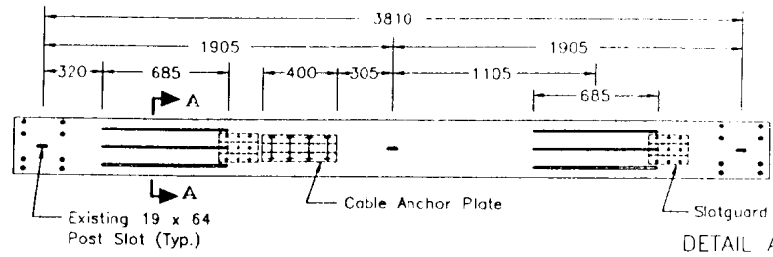
Plan



Elevation

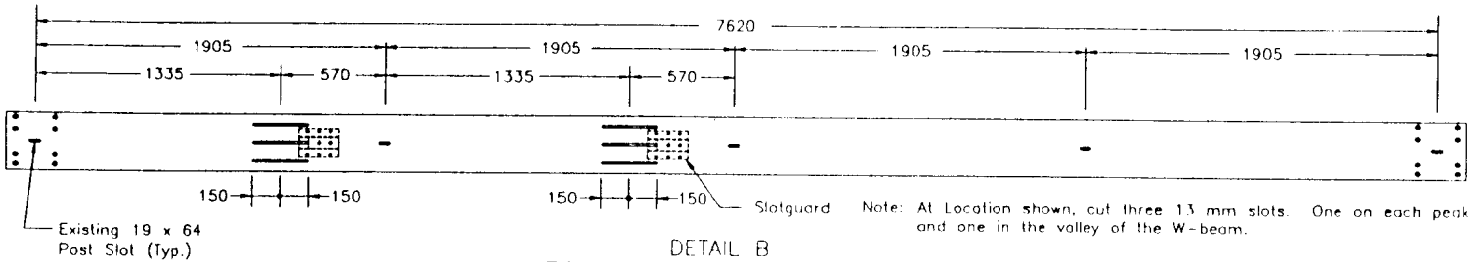
Notes: posts 3 through 10 are CRT posts
 posts 2, 3, 4, 6, 7, 8, 9, 10 not connected to rail
 backup plates at posts 2, 4, 5, 6, 7, 8, 9, 10

100 KM/H SLOTTED RAIL TERMINAL.



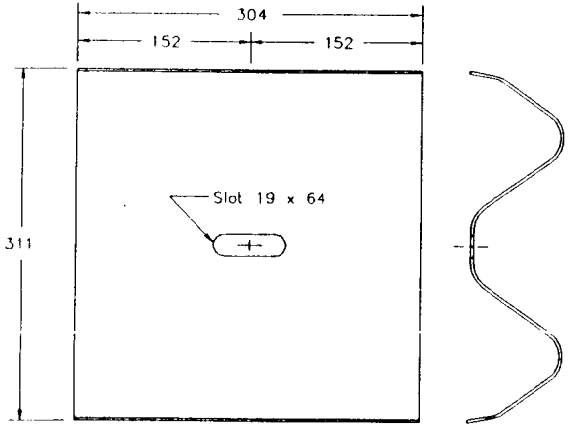
DETAIL A
3810 SLOTTED RAIL ELEMENT

Note: At Location shown, cut three 13 mm slots. One on each peak and one in the valley of the W-beam.

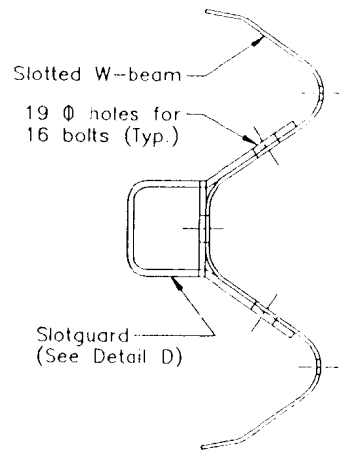


DETAIL B
7620 SLOTTED RAIL ELEMENT

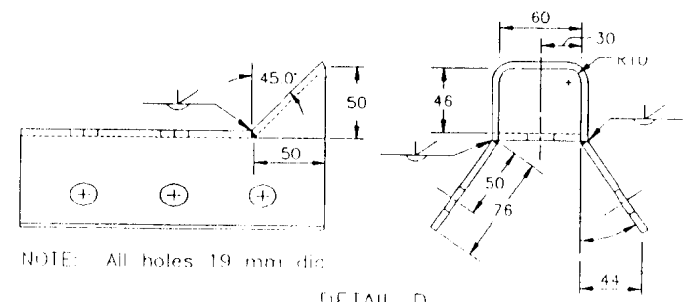
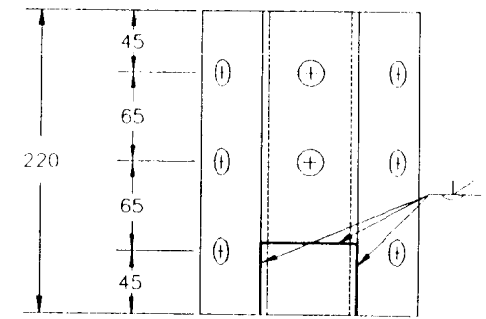
Note: At Location shown, cut three 13 mm slots. One on each peak and one in the valley of the W-beam.



DETAIL C
W-BEAM BACK-UP PLATE

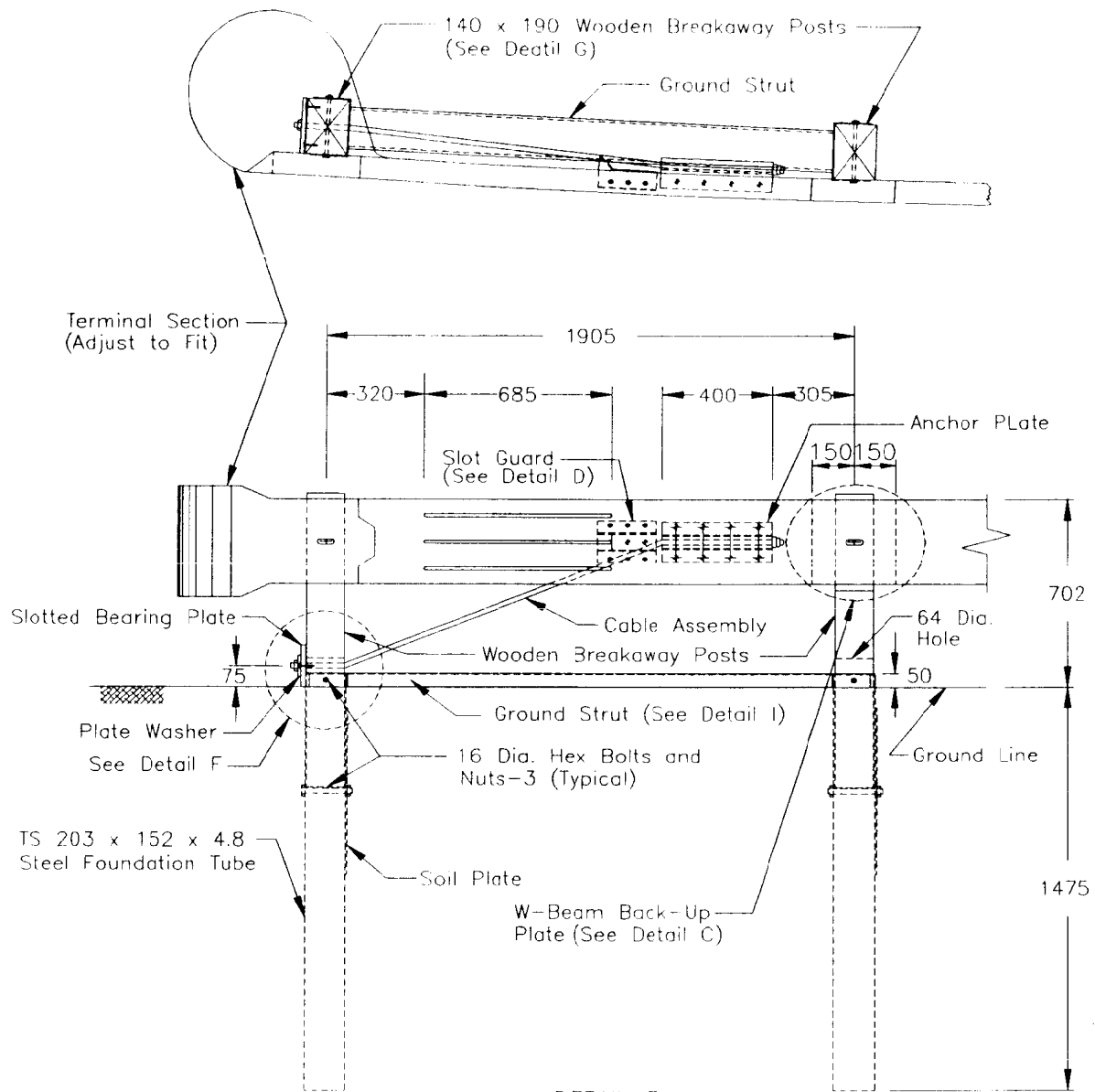


SECTION A-A

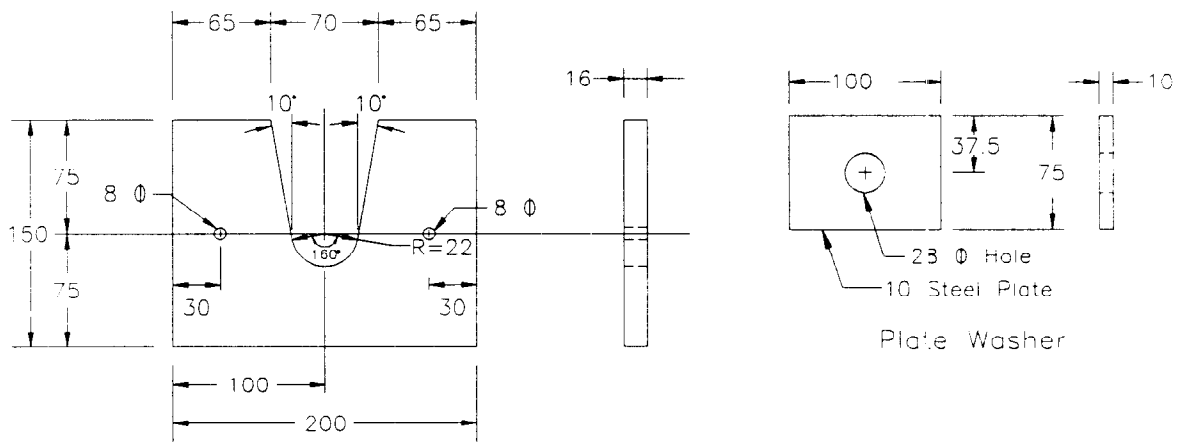
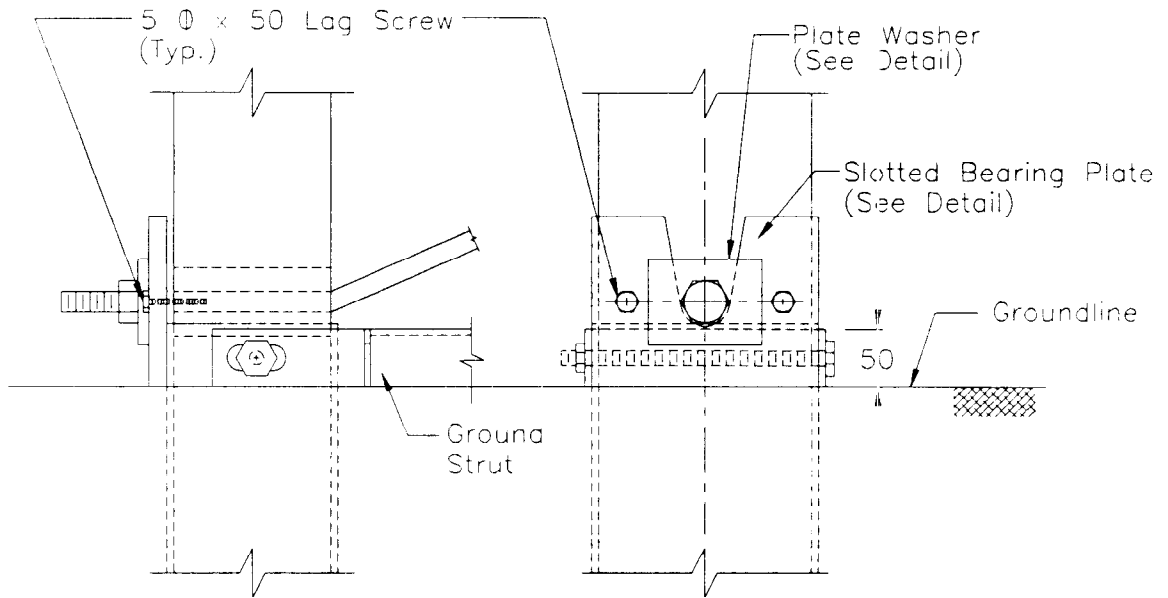


NOTE: All holes 19 mm dia

DETAIL D
SLOTGUARD

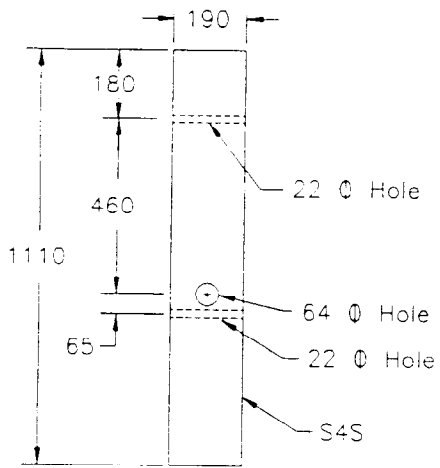


DETAIL E
END ANCHORAGE ASSEMBLY

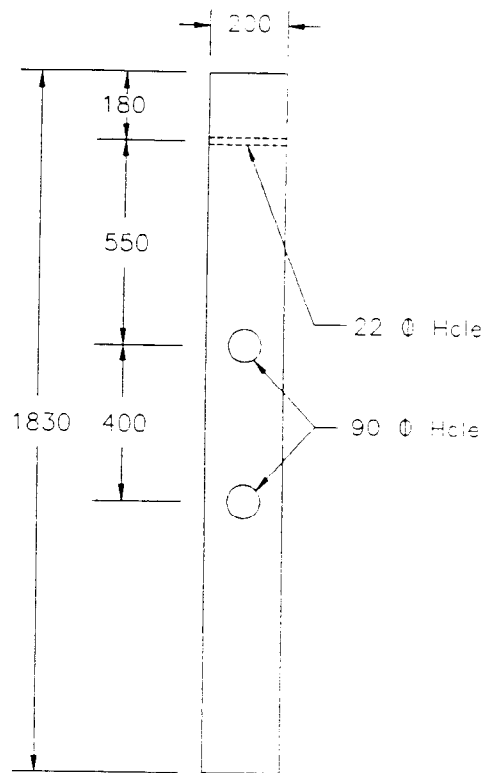


Slotted Bearing Plate

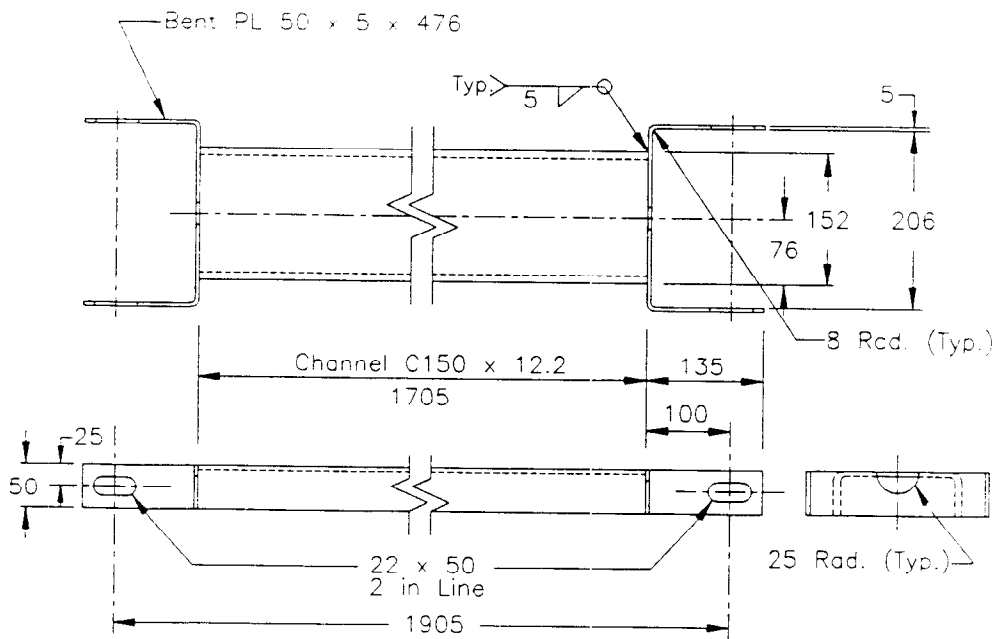
DETAIL F
SLOTTED BEARING PLATE



DETAIL G
SHORT BREAKAWAY WOODEN POST



DETAIL H
WOODEN CRT POST



DETAIL I
GROUND STRUT

Table 1. Summary of performance evaluation of compliance tests for 350 SRT terminal.

NCHRP 350 Test No.	Description	TTI Test No.	Impact Conditions		Occupant Impact Velocity		Ridedown Acceleration		Results Meet NCHRP 350 Requirements
			Speed	Angle	Long.	Lateral	Long.	Lateral	
3-30	Small Car Head-On	220530-5 ^(a)	99.4 km/h (61.8 mi/h)	0 deg.	8.4 m/s (26.7 ft/s)	2.6 m/s (8.6 ft/s)	-9.4 g	13.5 g	Yes
3-31	Pickup Truck Head-On	220530-10	101.4 km/h (63.0 mi/h)	0 deg.	5.4 m/s (17.8 ft/s)	3.2 m/s (10.5 ft/s)	-7.0 g	-8.2 g	Yes
3-34	Small Car Redirection	2404SR-5 ^(b)	101.8 km/h (63.3 mi/h)	15 deg.	5.9 m/s (19.2 ft/s)	7.2 m/s (23.7 ft/s)	-1.8 g	-13.8 g	Yes
3-35	Pickup Truck Redirection	220536-13	99.2 km/h (61.6 mi/h)	20.9 deg.	8.6 m/s (28.3 ft/s)	0.8 m/s (2.6 ft/s)	-6.5 g	10.5 g	Yes
3-39	Pickup Truck Reverse Direction	220536-14	100.9 km/h (62.7 mi/h)	21.0 deg.	3.9 m/s (12.8 ft/s)	1.6 m/s (5.4 ft/s)	-2.8 g	6.0 g	Yes

^(a) Reference 2. 230 SRT Terminal Compliance Test.

^(b) Reference 7. Split Rail End Terminal Compliance Test.

§ 635.411 Material or product selection.

(a) Federal funds shall not participate, directly or indirectly, in payment for any premium or royalty on any patented or proprietary material, specification, or process specifically set forth in the plans and specifications for a project, unless:

(1) Such patented or proprietary item is purchased or obtained through competitive bidding with equally suitable unpatented items; or

(2) The State highway agency certifies either that such patented or proprietary item is essential for synchronization with existing highway facilities, or that no equally suitable alternate exists; or

(3) Such patented or proprietary item is used for research or for a dis-

tinctive type of construction on relatively short sections of road for experimental purposes.

(b) When there is available for purchase more than one nonpatented, nonproprietary material, semifinished or finished article or product that will fulfill the requirements for an item of work of a project and these available materials or products are judged to be of satisfactory quality and equally acceptable on the basis of engineering analysis and the anticipated prices for the related item(s) of work are estimated to be approximately the same, the PS&E for the project shall either contain or include by reference the specifications for each such material or product that is considered acceptable for incorporation in the work. If the State highway agency wishes to substitute some other acceptable material or product for the material or product designated by the successful bidder or bid as the lowest alternate, and such substitution results in an increase in costs, there will not be Federal-aid participation in any increase in costs.

(c) A State highway agency may require a specific material or product when there are other acceptable materials and products, when such specific choice is approved by the Division Administrator as being in the public interest. When the Division Administrator's approval is not obtained, the item will be nonparticipating unless bidding procedures are used that establish the unit price of each acceptable alternative. In this case Federal-aid participation will be based on the lowest price so established.

(d) Appendix A sets forth the FHWA requirements regarding (1) the specification of alternative types of culvert pipes, and (2) the number and types of such alternatives which must be set forth in the specifications for various types of drainage installations.

(e) Reference in specifications and on plans to single trade name materials will not be approved on Federal-aid contracts.