



U.S. Department
of Transportation
**Federal Highway
Administration**

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

March 27, 2005

In Reply Refer To: HSA-10/B-82B

Mr. Derek W. Muir
Group Managing Director
Hill & Smith Ltd.
Springvale Business and Industrial Park
Bilston, Wolverhampton, West Midlands, WV14 0QL

Dear Mr. Muir:

In your March 7 letter, you requested formal Federal Highway Administration's acceptance of your Brifen Wire Rope Safety Fence (WRSF) as an National Cooperative Highway Research Program (NCHRP) Report 350 test level 4 (TL-4) traffic barrier. To support this request, you also submitted reports detailing two tests conducted by MIRA test laboratory, entitled "Vehicle Impact into the Standard Length of a Brifen Safety Fence to the NCHRP Report 350 Test 4-10" and "Vehicle Impact into the Standard Length of a Brifen Safety Fence to the NCHRP Report 350 Level 4-12," and digital videos of the tests themselves.

The TL-4 Brifen design consists of four separate cables, the bottom three of which are interwoven between posts with the top cable set in a 101-mm deep x 22-mm wide slot cut into the top of each post. Cable heights measured from ground level are 480 mm, 630 mm, 780 mm, and 930 mm, respectively. The posts, shown in enclosure 1a, are S-shape posts, 100-mm x 55-mm x 4.55-mm thick, manufactured from ASTM A-36 steel that is galvanized after fabrication. Post spacing is 3.2-m. For the tests, 1420-mm long posts were set approximately 400 mm into tubular steel sockets contained in cylindrical concrete footings. Your recommended transition design from the TL-3 system (or from the cable Brifen anchor) to the TL-4 design is shown in enclosure 1b, and consists of transition posts "A" and "B" at which points the two bottom cables are gradually lowered and the two top cables are raised over a 6.4-m distance to match the tested TL-4 cable heights. Since no test was conducted at this location with the single-unit truck, the transition itself can be considered only a TL-3 design.

Test summary sheets for the two tests you conducted are shown in enclosure 2. In the small car test, although successful, several of the concrete footings pulled out of the ground, negating the supposed maintenance benefit of using socketed posts. To reduce the likelihood of this occurrence, you recommended increasing the footing size from its tested 250-mm diameter to a 300-mm diameter, with its depth remaining at 750 mm. Deeper footings can be used in soft or saturated soils to improve system maintainability, the use of which would not need any



additional approval action. If you use driven posts with soil plates with the TL-4 design, these posts must have the same cross-section noted above for the TL-4 system and have the same below-ground geometry as is now specified for the TL-3 barrier, shown for convenience as enclosure 3. If you wish also to utilize steel sockets driven directly into the ground, you will first need to specify the size and depth you recommend, and provide an analysis showing equivalency with the approved designs. Design deflection with the small car was 1.35 m. With the single unit truck, it was reported to be 2.21 m. Presumably, deflection with the pickup truck would be similar to that noted in your earlier TL-3 test and thus may be assumed to be approximately 2.4 m.

In summary, your Brifen WRSF, as described above, is acceptable as a TL-4 traffic barrier and may be used on the National Highway System when such use is specified by the contracting agency. I understand that all steel components of the TL-4 design, as with the TL-3 WRSF, are manufactured in the United States (U.S.) with U.S. steel and are not subject the Buy America provisions of Title 23, U.S. Code (USC), Section 635.410. However, both designs are proprietary and, as such, their use on Federally-funded projects remains subject to the conditions listed in Title 23 USC, Section 635.411.

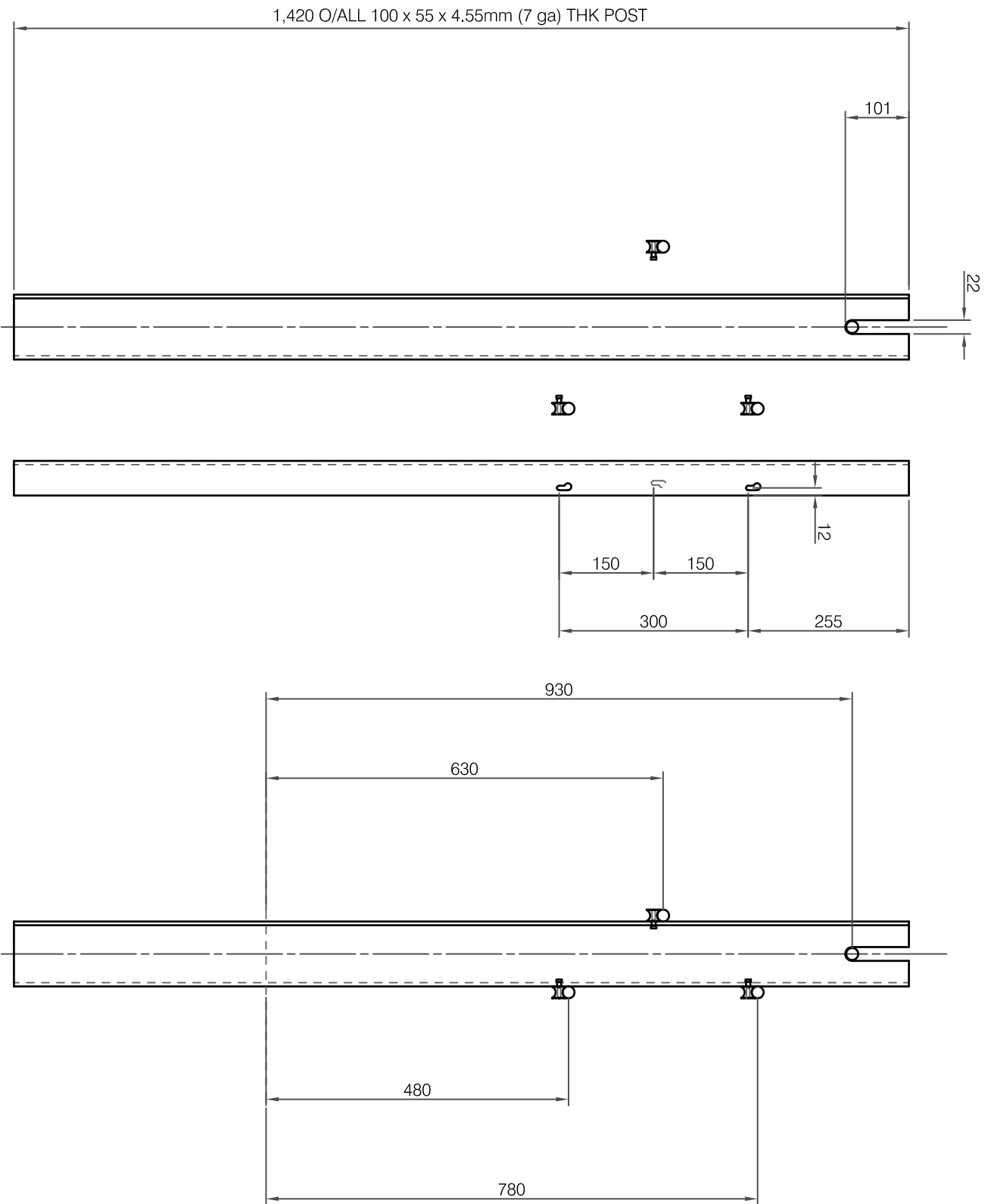
Sincerely yours,

/original signed by/

John R. Baxter, P.E.
Director, Office of Safety Design
Office of Safety

3 Enclosures

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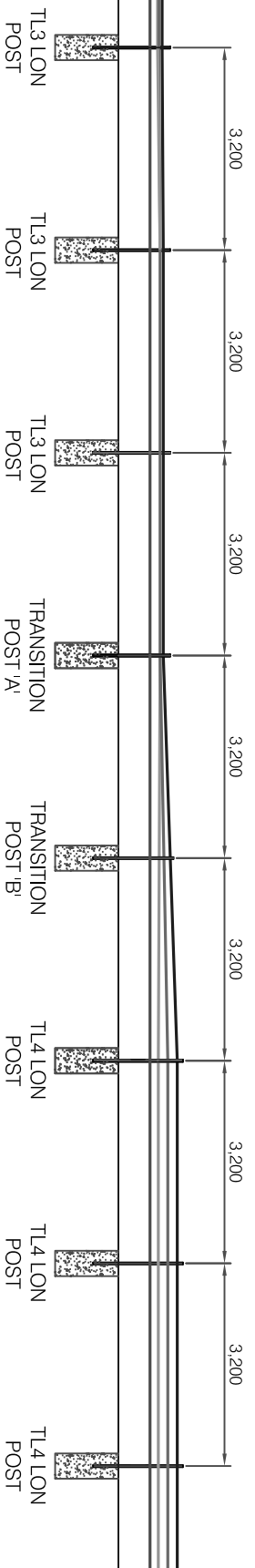
ROPE HEIGHTS DETAIL

a	Post Thickness Amended			3/05
a	Redrawn			7/04
Rev	Remarks	E.C.O.	Date	
Drawn By	Date	Material		
<i>AS Wright</i>	July 2004			
Scale	Finish	Weight		
Description				
100 x 55 x 4.55 (7ga) Wire Rope Post Detail				

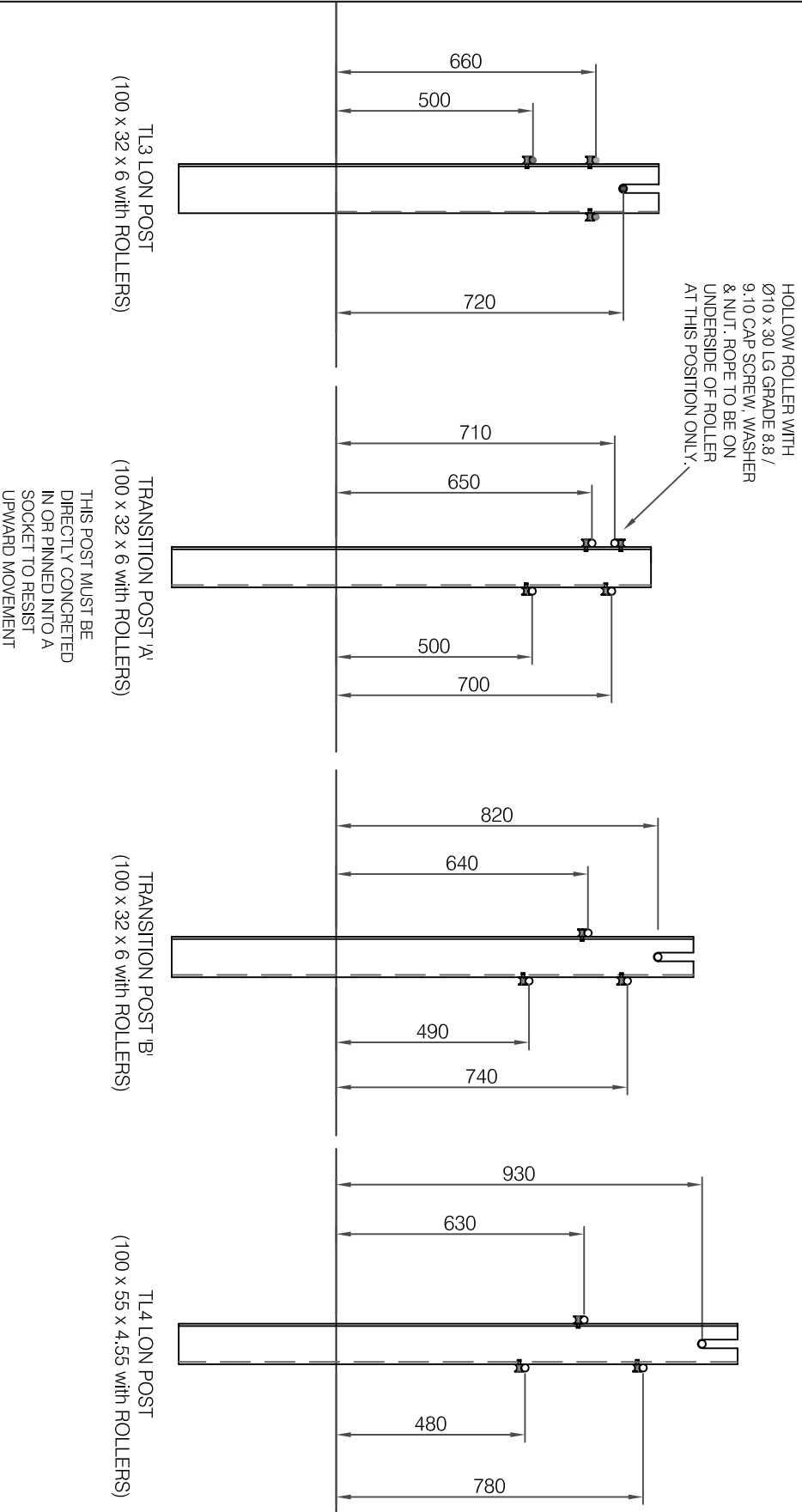
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Drawing No. **WR 1044b**

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TYPICAL ELEVATION ON TRANSITION FROM TL3 - TL4 POSTS



Rev#	Remarks	E.C.O.	Date
Drawn By <i>ASW/sght</i>	Date March 2005	Material	
Scale	Finish	Weight	

Description
 Transition from Brien NCHRP350
 TL3 - TL4 Cable Guard Rail

BRIFFEN USA INC.
 Drawing No. WRSF-05-002

3 Assessment and Conclusions

3.1 Summary of Test Results



General Information		Impact Conditions		Test Article Deflections (Deflection of Traffic face)	
Test Agency	MIRA Ltd	Speed (km/h)	100.8 km/h	Dynamic (m)	1.35m
Test No	D0002	Angle (deg)	21.3deg	Permanent (m)	0m
Date	10 January 2005	Exit Conditions		Vehicle Penetration (m)	1.35m
Test Article		Speed (km/h)	Not measured	Vehicle Damage – Exterior	
Type	Brifen Safety Fence	Angle (deg)	Not measured	VDS	N/a
Installation Length (m)	275m Total 157m Full height	Occupant Risk Values		CDC	N/a
Size and/or dimension and material of key elements	Post Spacing 3.2m	THIV (km/h)	19.94 km/h*	Vehicle Damage – Interior	
Soil Type and Condition		PHD (g)	5.07g*	OCDI	AS0000000
Concrete post foundations 250mm diameter x 750mm deep in compacted AASHTO M147-65 standard soil.		ASI	0.55	Post Impact Vehicular Behaviour	
Test Vehicle		x direction	3.73m/s	Max Roll Angle (deg)	0.0* (CFC60 filter)
Type	3 Door Hatchback	y direction	-4.09 m/s	Max Pitch Angle (deg)	0.0* (CFC60 filter)
Designation	Ford	ORA		Max Yaw Angle (deg)	0.0* (CFC60 filter)
Model	Fiesta	x direction	3.53g		
Mass	Kerb (kg)	y direction	0.91g		
	Test Inertial (kg)				
	Total Ballast (kg)				
	Gross Static (kg)				

* - Due to an intermittent power problem within the rate gyros we deem these values suspect

Figure 8: Summary of Results for Test MIRA-05-1008159 (D0002).

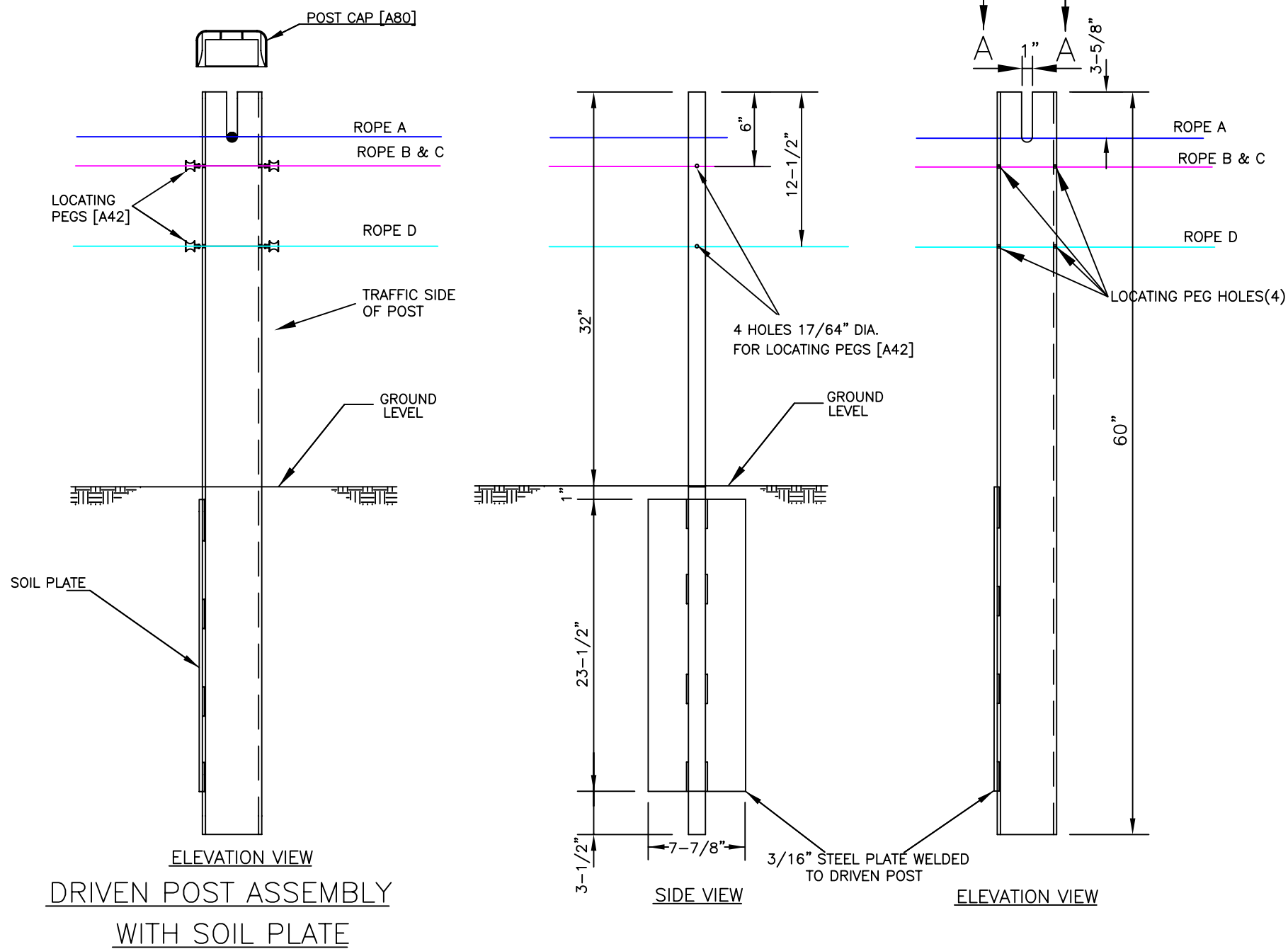
3 Assessment and Conclusions

3.1 Summary of Test Results



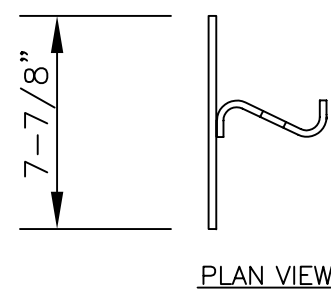
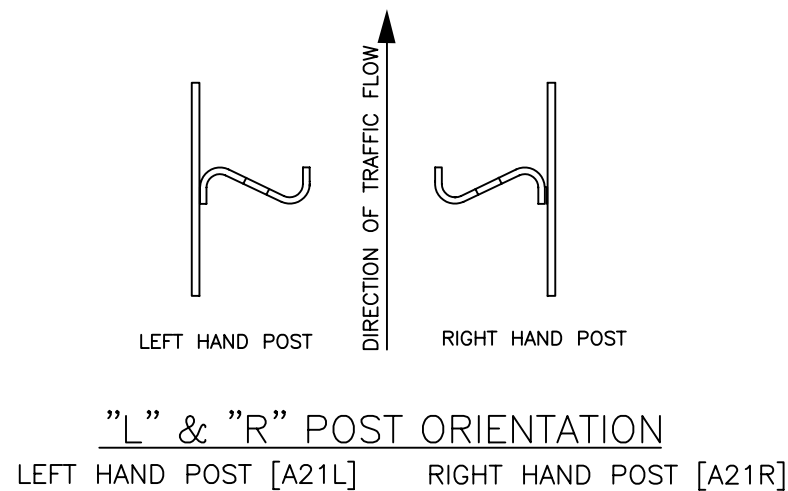
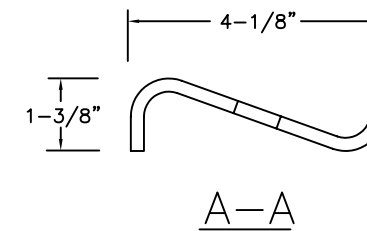
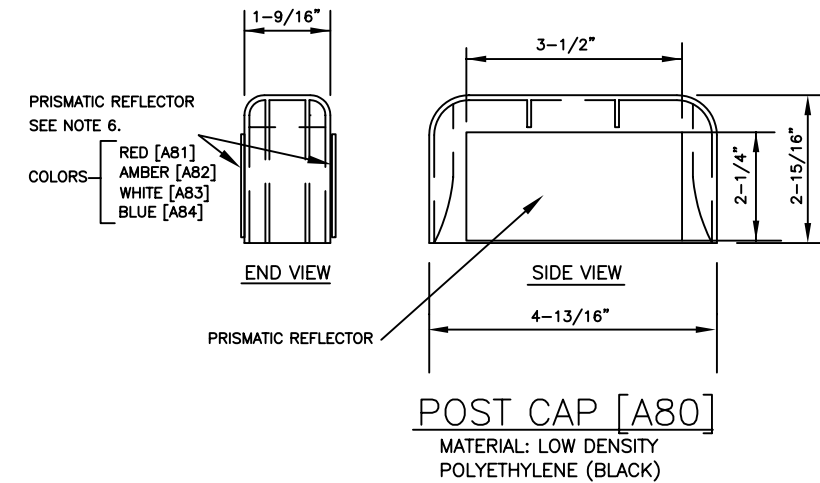
General Information		Impact Conditions		Vehicle Damage – Exterior	
Test Agency	MIRA Ltd	Speed (km/h)	79.7 km/h	VDS	N/a
Test No	C0050	Angle (deg)	15.8deg	CDC	N/a
Date	29 November 2004	Exit Conditions		Vehicle Damage – Interior	
Test Article		Speed (km/h)	Not measured		
Type	Brifen Safety Fence	Angle (deg)	Not measured		
Installation Length (m)	275 (Nom)	Occupant Risk Values		Post Impact Vehicular Behaviour	
Size and/or dimension and material of key elements	Post Spacing 3.2m	THIV (km/h)	7.09 km/h	Max Roll Angle (deg)	5.0 (CFC60 filter)
Soil Type and Condition		PHD (g)	5.09g	Max Pitch Angle (deg)	6.0 (CFC60 filter)
Concrete post foundations 250mm diameter x 750mm deep in compacted AASHTO M147-65 standard soil.		ASI	0.18	Max Yaw Angle (deg)	20 (CFC60 filter)
Test Vehicle		OIV		Test Article Deflection	
Type	8T rigid truck	x direction	0.77m/s	Dynamic	2.21m
Designation	International	y direction	1.85 m/s	Permanent	0.00m
Model	Harvester	x direction	0.49g		
Mass	Kerb (kg)	y direction	1.44g		
	Test Inertial (kg)				
	Total Ballast (kg)				
	Gross Static (kg)				

Figure 8: Summary of Results for Test MIRA-04-1007578 (C0050).

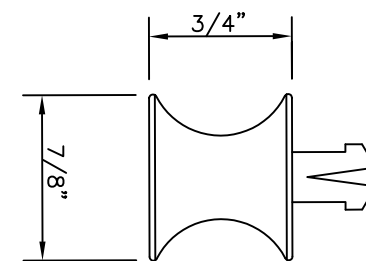


NOTES:

1. Post and soil plate shall be ASTM A-36 material Galvanized to ASTM A-123, after fabrication.
2. Holes for locating pegs shall be cleaned after Galvanizing to accept locating peg item [A42].
3. All welding per AWS D1.1.
4. Radiused edge of posts shall be on the approach side of traffic.
5. Three locating pegs per post are required.
6. Prismatic reflector (adhesive back) shall be field applied to cap when specified. Specify color, post interval and single or double sided.
7. Ropes B, C, and D interweave between posts.



DRIVEN LINE POST [A21L]
("L" POST SHOWN)



LOCATING PEG [A42]

The information herein is proprietary to BRIFEN USA, and shall not be disclosed, duplicated or used otherwise without the express written consent of BRIFEN USA, Inc.

Revisions			Customer:		
1.			Date	Drawn By	Scale
2.			4.19.04	Aaron Wells	None
3.			Driven Line Post Detail		Sheet No.
4.					
5.			Dwg. No.	WRSF-04-004a	4 of 5