September 6, 2001

Mr. David R. Lewis **HSA-10/B80A**
President
HALCO, LLC
263 Bradford Drive
Canfield, Ohio 44406

Dear Mr. Lewis:

In your August 23 letter to Mr. Richard Powers of my staff, you requested acceptance of a fabricated tubular steel post similar in design to your previously accepted X-48 post, but lighter in weight. Both posts are intended as alternatives to the standard W150 x 13.5 wide flange posts currently used with the G4(1S) guardrail system or to the 150 mm x 200 mm posts used with the G4(2W) system. Included with your letter was a copy of an August 2001 report from E-TECH Testing Services, Inc. entitled "NCHRP Report 350 Crash Test Results for the HALCO X-40 Post," and a copy of the crash test video tape.

The tested posts, designated as the HALCO X-40 Posts, were fabricated from 12-gauge steel plate into a rectangular cross-section with a back flange 152-mm wide, a traffic face 80-mm wide and a depth of 127 mm. The posts were comprised of several pieces of 12-gauge AASHTO M180 steel plate fastened together using a "partial punch" technology and galvanized after fabrication. Each post was 1600-mm long, spaced on 1.9-m centers, and embedded approximately 922.5 mm below grade in an NCHRP Report 350 standard soil. The 12-gauge w-beam rail was offset from the posts with 155 mm x 200 mm x 360 mm Central Fabricator's recycled plastic blocks. These blocks were installed to extend approximately 50 mm above the top of each X-40 post, thus centering the w-beam rail 550 mm above the ground. Post and offset block dimensions are shown in Enclosure 1.

A 53.3 m w-beam guardrail installation with X-40 posts was tested with a 2000-kg pickup truck impacting at 100 km/h and an impact angle of 25 degrees and with a 820-kg passenger car at 100 km/h and 20 degrees. As noted in the test summary sheets (Enclosures 2 and 3), the test vehicles were both contained and smoothly redirected upright with little roll or pitch and no significant vehicular snagging on the posts. Occupant risk values were below the Report 350 preferred limits and well below the maximums allowable. The dynamic deflection of the barrier system was 0.5 m with the small car and 1.3 m with the pickup truck.

Based on the information you provided, I agree that the HALCO X-40 guardrail post with the Central Fabricators' recycled plastic offset block (or any approved wood or plastic block with similar geometry) may be considered acceptable for use on the National Highway System as a substitute for the steel post and routed wood or plastic offset blocks currently used in the G4(1S) barrier system when such use is requested by the contracting highway agency. As with the heavier X-48 post, this

acceptance is only for the use of these posts in the barrier proper. They cannot be used in guardrail terminals unless specifically tested for that application. Since the X-40 post is a proprietary design, the provisions of Section 635.411 (Material or Product Selection) of Title 23, Code of Federal Regulations apply. A copy of this regulation has been provided with our previous acceptance of the X-48 post.

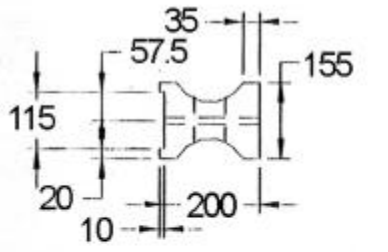
Please do not hesitate to call Mr. Powers at (202) 366-1320 if you have any questions regarding this acceptance of your product.

Sincerely yours,

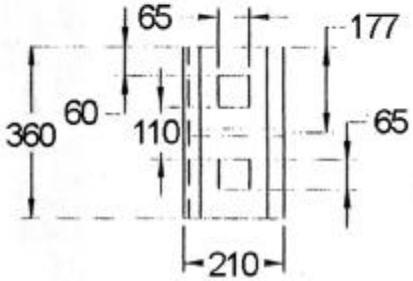
(original signed by Frederick G. Wright, Jr.)

Frederick G. Wright, Jr.
Program Manager, Safety

3 Enclosures

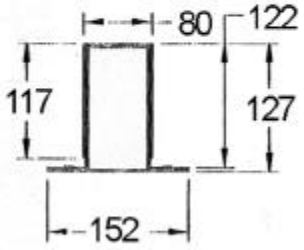


PLAN

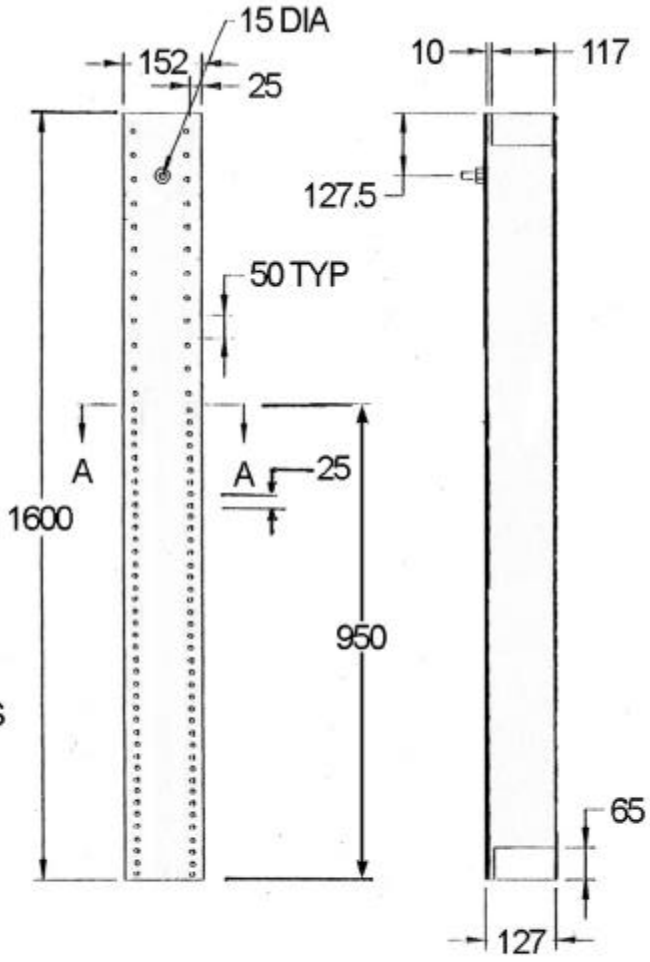


ELEVATION

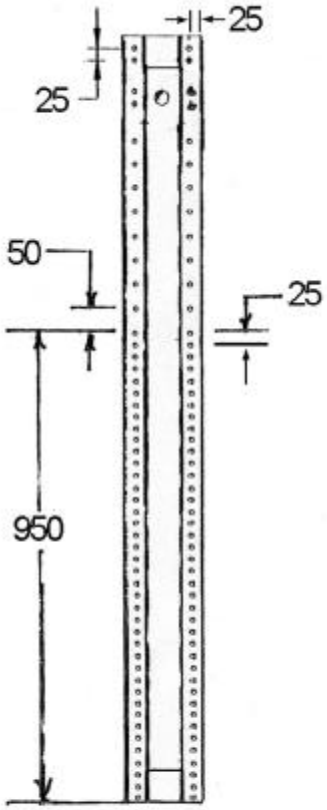
DETAIL 1 – RECYCLED PLASTIC BLOCKOUT DETAILS



SECTION A-A



DETAIL 2 X-40 POST



Revisions			
No	Date	By	
1	1/8/01	RS	
2			
3			
4			
5			

Project No. | Date | Drawn By | Scale

Title: X-40 POST AND RECYCLED BLOCKOUT

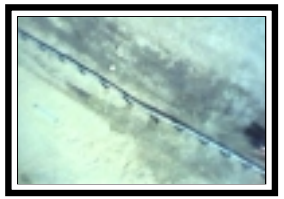
Sheet No. 1 of 2


t = 0.000 sec


t = 0.144 sec


t = 0.288 sec


t = 0.432 sec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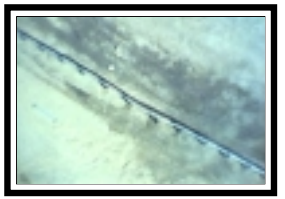
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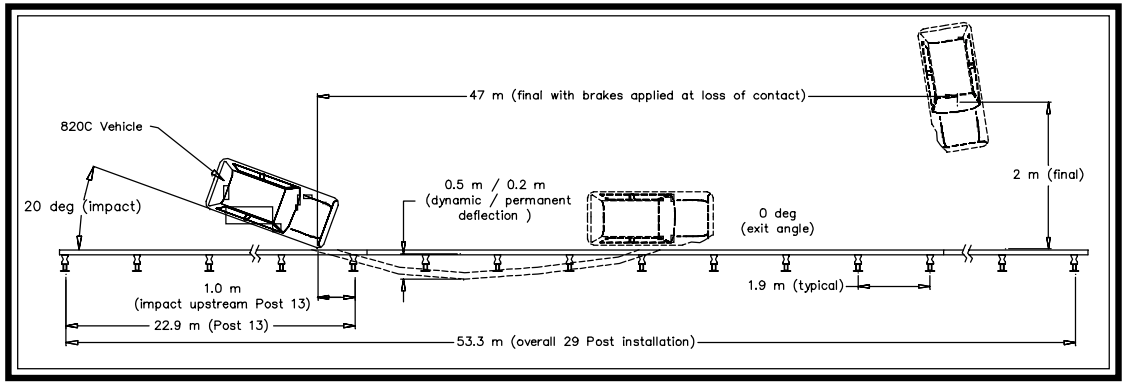
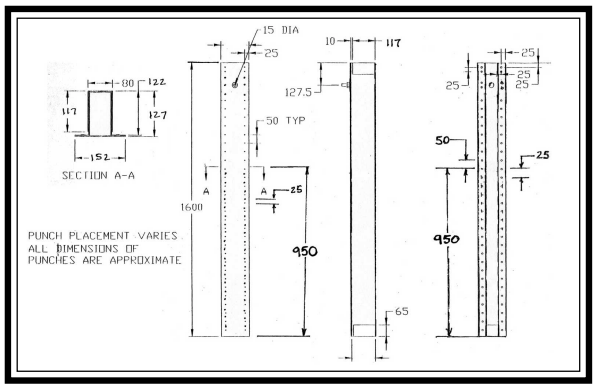




General Information

Test Agency	E-TECH Testing Services, Inc.
Test Designation	NCHRP 350 Test 3-10
Test No.	41-1655-002
Date	7/17/01

Test Article

Type	HALCO X-40 Post and Re-Block Recycled Plastic Guardrail Blockout in W-Beam Guardrail
Installation Length	53.3 m Guardrail (overall)
Material and key elements	AASHTO SGR04a Guardrail with SEW02a End Terminal equipped with X-40 posts of AASHTO M180 steel and Re-Block blockouts of 50% HDPE / 50% PP recycled plastic
Foundation Type and Condition	NCHRP 350 Strong Soil, dry

Test Vehicle

Type	Production Model
Designation	820C
Model	1988 Ford Festiva
Mass (kg)	
Curb	807
Test inertial	816
Dummy	75
Gross	891

Impact Conditions

Speed (km/h)	101.8
Angle (deg)	20
Impact Severity (kJ)	38.2

Exit conditions

Speed (km/h)	76
Angle (deg - veh. c.g.)	0

Occupant Risk Values

Impact Velocity (m/s)	
x-direction	3.7
y-direction	-6.3
Ridedown Acceleration (g's)	
x-direction	-10.2
y-direction	-13.7

European Committee for Normalization (CEN) Values

THIV (km/h)	26.1
PHD (g's)	16.3
ASI	1.1

Test Article Deflections (m)

Dynamic	0.5
Permanent	0.2

Vehicle Damage

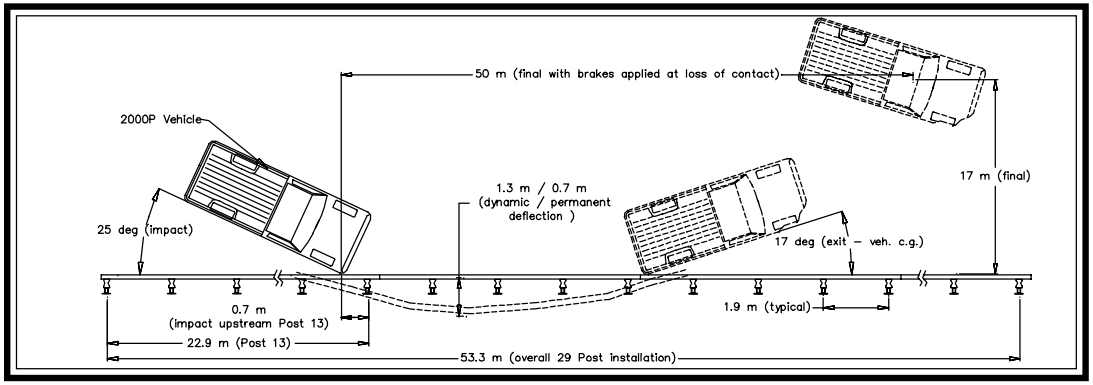
Exterior	
VDS	RFQ-3
CDC	01RFYW3
Interior	
OCDI	AS0000000

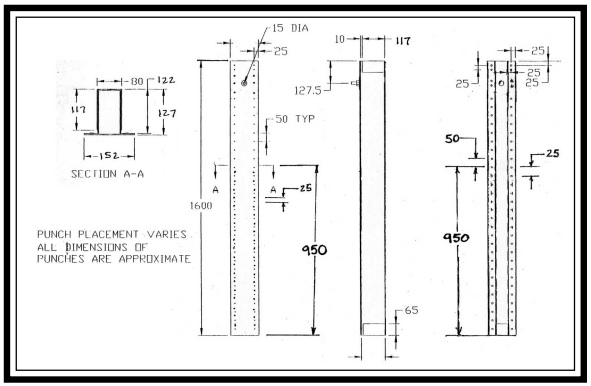
Post-Impact Vehicular Behavior (deg - rate gyro)

Maximum Roll Angle	-7.4
Maximum Pitch Angle	-2.2
Maximum Yaw Angle	58.8

Figure 1. Summary of Results - HALCO X-40 Post Test 41-1655-002

t = 0.000 sec | t = 0.144 sec | t = 0.288 sec | t = 0.432 sec | t = 0.576 sec | t = final





General Information

Test Agency	E-TECH Testing Services, Inc.
Test Designation	NCHRP 350 Test 3-11
Test No.	41-1655-001
Date	6/27/01

Test Article

Type	HALCO X-40 Post and Re-Block Recycled Plastic Guardrail Blockout in W-Beam Guardrail
Installation Length	53.3 m Guardrail (overall)
Material and key elements	AASHTO SGR04a Guardrail with SEW02a End Terminal equipped with X-40 posts of AASHTO M180 steel and Re-Block blockouts of 50% HDPE / 50% PP recycled plastic
Foundation Type and Condition	NCHRP 350 Strong Soil, dry

Test Vehicle

Type	Production Model
Designation	2000P
Model	1994 GMC 3/4 Ton Pickup
Mass (kg)	
Curb	1873
Test inertial	1992
Dummy	N/A
Gross	1992

Impact Conditions

Speed (km/h)	100.4
Angle (deg)	25
Impact Severity (kJ)	138.2

Exit conditions

Speed (km/h)	66
Angle (deg - veh. c.g.)	17

Occupant Risk Values

Impact Velocity (m/s)	
x-direction	4.3
y-direction	-4.6
Ridedown Acceleration (g's)	
x-direction	-8.0
y-direction	-10.5

European Committee for Normalization (CEN) Values

THIV (km/h)	21.1
PHD (g's)	12.3
ASI	0.9

Test Article Deflections (m)

Dynamic	1.3
Permanent	0.7

Vehicle Damage

Exterior	
VDS	RFQ-3
CDC	01RFYW2
Interior	
OCDI	AS0000000

Post-Impact Vehicular Behavior (deg - rate gyro)

Maximum Roll Angle	10.4
Maximum Pitch Angle	-10.9
Maximum Yaw Angle	-52.3

Figure 6. Summary of Results - HALCO X-40 Post Test 41-1655-001