

## **DEADLY HIGHWAY SIGNS ON THE PENNSYLVANIA TURNPIKE**

Emily Morris was looking forward to joining her parents, Drs. Wilson S. and Leona Ewing Morris, on a trip to California. It was a medical conference for Emily's parents, and a vacation for Emily. But mostly, it was an opportunity for the family to be together. Dr. Wilson Morris was a critical care physician, and his wife, Dr. Leona Morris, was a pediatrician. They shared the same medical office in Lebanon, Pennsylvania.

Emily lived in Norristown, Pennsylvania, where she was the Web Editor at Montgomery Media and managing editor for Souderton Independent and Perkasie News Herald. She was also an adjunct professor of English at Northampton Community College.

Emily was born on February 2, 1981, and grew up in Lebanon, Pennsylvania, with her parents and an older brother, Andrew. She graduated from Lebanon High School in 1999, and from Dickinson College in 2003. She earned a Masters of Art Degree (magna cum laude) in Journalism at Northeastern University. Emily was a gregarious and outgoing person who was much loved by her family, friends, and co-workers. One of Emily's friends commented that while most people have one best friend, Emily was a best friend to everyone.

It was noon on Saturday, April 14, 2012. The weather was clear and sunny. Emily was alone, driving her 2012 Volkswagen Passat. She was traveling westbound on the Pennsylvania Turnpike from her home in Norristown to her parents' home in Lebanon. Emily's father had spoken with Emily just before she left her home, and was expecting her arrival. They planned to fly out of Harrisburg International Airport together the next day. They were excited to spend time together on a family trip.

At the same time, a white commercial box truck was heading eastbound in the passing lane on the Pennsylvania Turnpike. It was driven by a deliveryman who had started work early that morning and was returning to his company's warehouse in Montgomery County

after a long trip. While we may never know why, the truck started to wander from the center line to the travel edge of the roadway.

PennDOT had started work on a bridge that passed over the Pennsylvania Turnpike near the Reading Exit, and the project required the protection of traffic traveling on the Pennsylvania Turnpike. The traffic control plan for the project called for the erection of temporary construction signs straddling the concrete median barriers ("Jersey Barriers") on the Turnpike, to the east and west of the bridge, warning motorists of construction ahead. The temporary construction signs that were used are called Type III barricades. They consist of 2 vertical steel posts, about 7' high, one erected on either side of the Jersey barrier, and connected above the Jersey Barrier by a wooden sign placard. The bottoms of the vertical steel posts are welded to horizontal steel post bases. A Pennsylvania Turnpike Standard Drawing of the sign and photograph of one of the signs erected in connection with the project are attached hereto as Exhibits "A" and "B." The vertical steel posts of the Type III barricade involved in this accident were only 3' from travel edge of the passing lanes in both lanes of travel.

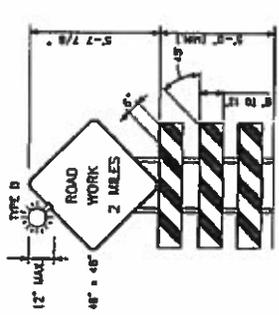
As Emily Morris's Volkswagen Passat and the commercial box truck approached each other from opposite directions on the Pennsylvania Turnpike, the box truck crossed over the travel edge of the highway, and its mirror struck the vertical post of the Type III barricade, sending the barricade hurtling up into the air and into Emily Morris's lane of travel. The posts and sign came slamming down onto the windshield of Emily's car, penetrating it and striking Emily in the face, head and upper body, and shearing off part of her skull.

The next call that Emily Morris's father received was that his daughter had been critically injured in an accident while driving home on the Pennsylvania Turnpike. Wilson and Leona Morris rushed to their daughter's side at Reading Hospital and stayed with her until she died on April 16, 2012.

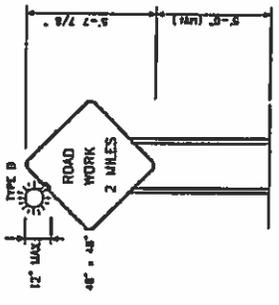
This accident was caused by the dangerous and improper standards created by the Pennsylvania Turnpike for the Type III barricades used in medians straddling Jersey Barriers. All temporary construction signs are required to be approved by the Federal Highway Administration as “crashworthy” based on crash tests. The letter from the Federal Highway Administration approving the Type III barricade used in this construction project was dated July 25, 2000, and was based on a crash test in which the barricade was set out in the open and a vehicle ran into both legs of the barricade head-on and at a 90 degree angle. The letter approving the sign stated that, “any changes that may adversely influence the crashworthiness of the device will require a new acceptance letter.” A copy of the FHA’s letter dated July 25, 2000, is attached hereto as Exhibit “C.”

This incident might easily be dismissed as a “freak” occurrence, but one must remember that the purpose of the Jersey Barrier is to prevent errant vehicles from crossing over from their lanes into the opposite lane of travel. The Jersey Barrier is like the back stop behind home plate on a baseball field. Only, it is there to stop cars, not baseballs. Thus, in order for it serve its purpose, it is foreseeable that the Jersey Barrier will be struck by motor vehicles. This writer has been contacted in other cases involving serious injuries caused by metal posts and debris from Type III Barricades laying on the roadway after being struck by vehicles.

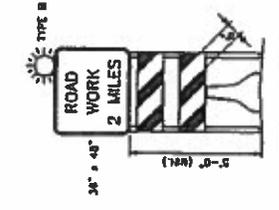
Other states use different, safer designs for temporary construction signs. This writer has brought this issue to the attention of the Turnpike Commission, to no avail. Moreover, the Pennsylvania Turnpike Commission claims immunity from lawsuits. Thus, the only protection that the public may have from these dangerous signs may be from the Pennsylvania Legislature.



TYPICAL PAVED SHOULDER ROADWAY  
TYPE III BARRICADE



TYPICAL SHOULDER POST MOUNTED

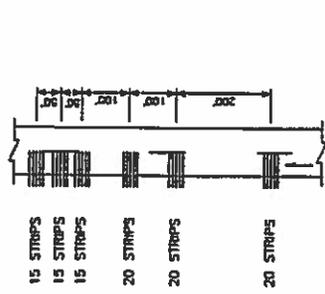


TYPICAL MEDIAN  
TYPE III BARRICADE

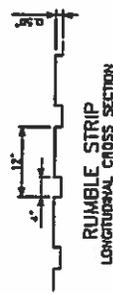
NOTES:

1. DISTANCE BETWEEN THE SIGN AND BARRICADE, SEE PLAN.
2. DO NOT USE METAL OR WOOD SIGNS IN MEDIAN.
3. THE SIGN SHALL BE PLACED AS REQUIRED BY THE STATE SHALL AS TO POSITION TO BE USED UNLESS CONDITIONS WARRANT OTHERWISE.
4. THE LENGTH OF BARRICADE MAY NOT EXCEED OR EXCEED BY MORE THAN 10% THE WIDTH OF THE WORKS SIGN OR ATTACHED TO MESSAGE ABOVE THE CROWD CREDITY.
5. BARRICADE SHALL BE PLACED ON SIDE AS INDICATED OR BARICED TO ROAD SHOULDER DUE TO WIND.

TYPICAL SIGN INSTALLATION

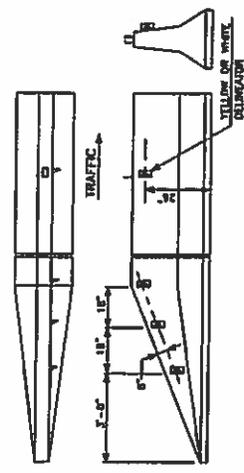


RUMBLE STRIP PATTERN



RUMBLE STRIP  
LONGITUDINAL CROSS SECTION

RUMBLE STRIP DETAIL



NOTES:

1. PLACE ONE (1) YELLOW CONE OF WHITE DELINEATOR ON THE SIGN AT THE POINT OF VIEW OF EACH APPROACH TO THE SIGN. YELLOW CONE OF WHITE DELINEATOR SHALL BE USED IN CONSTRUCTION DELINEATORS AT PAUL SHAWNEE. YELLOW CONE OF WHITE DELINEATOR SHALL BE USED IN CONSTRUCTION DELINEATORS AT PAUL SHAWNEE.
2. FOR SINGLE FACE CONCRETE BARRIERS, METAL DELINEATORS AS DESCRIBED BY 11 ABOVE.

PLACING OF DELINEATORS  
ON TEMPORARY CONCRETE BARRIER

RECEIVED UNDER OCTOBER 13 2012  
 APPROVED BY: [Signature]  
 APPROVED BY: [Signature]  
 APPROVED BY: [Signature]  
 APPROVED BY: [Signature]

PENNSYLVANIA TURNPIKE COMMISSION  
 STANDARD DRAWING

FILE NAME: PTS-980-13.dwg  
 DRAWING TYPE: SA

SHEET: 13 OF 13  
 DATE: OCTOBER 2012  
 PTS-980

CONSTRUCTION AND MAINTENANCE  
 MISCELLANEOUS DETAILS



SPEED  
LIMIT  
55



U.S. Department  
of Transportation  
Federal Highway  
Administration

July 25, 2000

400 Seventh St., SW.  
Washington, D.C. 20590

Refer to: HSA-I

Richard J. Sesny, P.E.  
Manager, Regulations and Control Section  
Bureau of Highway Safety and Traffic Engineering  
Pennsylvania Department of Transportation  
P. O. Box 2047  
Harrisburg, PA 17105-2047

Dear Mr. Sesny:

Thank you for your March 28 letter requesting the Federal Highway Administration (FHWA) acceptance of the Pennsylvania Type III Barricade/Sign Stand as a crashworthy traffic control device for use in work zones on the National Highway System (NHS). Accompanying your letter was a report from the Pennsylvania Transportation Institute (PTI), photographs, and videos of the crash tests. You requested that we find the barricade acceptable for use on the NHS under the provisions of National Cooperative Highway Research Program (NCHRP) Report 350 "Recommended Procedures for the Safety Performance Evaluation of Highway Features."

The FHWA guidance on crash testing of work zone traffic control devices is contained in two memoranda. The first, dated July 25, 1997, titled "Information: Identifying Acceptable Highway Safety Features," established four categories of work zone devices: Category I devices were those lightweight devices which could be self-certified by the vendor, Category II devices were other lightweight devices which needed individual crash testing, Category III devices were barriers and other fixed or massive devices also needing crash testing, and Category IV devices were trailer-mounted lighted signs, arrow panels, etc. The second guidance memorandum was issued on August 28, 1998, and is titled "INFORMATION: Crash Tested Work Zone Traffic Control Devices." This later memorandum lists devices that are acceptable under Categories I, II, and III.

The tested Type III barricades each consisted of a large sign, a small sign, three plastic rails, and a warning light. The battery pack for the light is placed on the ground and secured to the barricade's vertical post. The height to the bottom of the large sign is 1.5 m (5 feet). It is of A-C plywood; 13 mm thick (1/2 inch) and is supported on two vertical posts made of 3 8.1 mm (1 1/4 inch) square perforated steel tubing spaced 760 mm (30 inches) on center. Three 6 mm thick (1/4 inch) plastic rails are also supported on the vertical posts. The smaller plywood sign is bolted to two of the three plastic horizontal rails. The base consists of two 1.8 m (6-foot) long pieces of steel tubing supporting the vertical posts. In the head-on test, two bags of ball bearing shot, each bag being 22.7 kg (50 lbs.), were placed on each of the forward legs of the barricade to prevent it from blowing over. In the edge-impact test, two bags of shot were placed one each of the legs, one on the front and one to the rear. Detailed drawings of the test article are enclosed.

Full-scale automobile testing was conducted on these barricades. Two stand-alone examples of the device were tested in separate impacts. One was struck head-on and the next was hit at an angle 90 degrees relative to the first. Because Type III barricade-mounted signs are rarely, if ever, used in close sequence, we consider this an acceptable variation to the procedures in our guidance memoranda which call for both devices to be struck in the same test.

The crash test is summarized in the table below:

Test Number	#1	#2
Test Article Orientation	Head-On	90-Degrees
Height to Top of Rails	1.5 meters	
Height to Top of Sign	3251 mm	
Width of Barrier unit	1.8 meters	
Flags or lights	Yes, one warning light affixed to the large sign	
Test Article Mass (each)	59 kg	
Mass of light	0.5 kg	
Mass of battery pack	4.5 kg	
Mass of large sign	11.3 kg	
Mass of Ballast	45.4 kg	90.8 kg
Vehicle Inertial Mass	815 kg	845 kg
Impact Speed	102.5 km/h	103.4 km/h
Velocity Change	1.17 m/s	3.39 m/s
Vehicle crush	Crushing of grille and hood. Minor dent to roof	Crushing of grille and hood. Dents to hood and roof
Occupant Compartment Intrusion	None	50 mm deformation of roof
Windshield Damage	None	Significant localized cracking near the roof line

Damage to the vehicle was limited to the denting of the grille, hood, and roof. The only impact of concern was the edge of the sign panel impacting the roof. This left a dent but did not tear the metal. This impact also shattered the windshield to the extent that glass particles ended up in the passenger compartment, but there was no penetration of the windshield, nor did it make a hole through the glass. In general, the test articles did not show potential for penetrating the

occupant compartment. The results of this testing met the FHWA requirements and, therefore, the subject barricades are acceptable for use as Test Level 3 devices on the NHS under the range of conditions tested, when proposed by a State.

You also asked that this barricade be acceptable if a) smaller signs were used, or b) if the large sign was mounted at 2.1 meters, or c) if aluminum sign blanks were acceptable. We concur in these requests as noted:

- A) The smaller size sign (900 x 900 mm, 36 x 36-inches) would be acceptable-height to the top remained the same as the signs used in the crash tests. This would require mounting the smaller sign approximately 450 mm above the top rail of the barricade.
- B) At a mounting height of 2.1 meters, the increased height of the 1200 x 1200 mm sign would improve the crash performance because it would be further removed from the windshield. The slight increases in mass of the barricade necessary to mount the sign higher would not significantly affect the occupant impact speed. Therefore, the 2.1 meter sign height is also acceptable.
- C) Aluminum signs have a mass of 8.4 kg as compared to the tested plywood signs which are 11.3 kg. We believe the performance would be acceptable because the aluminum blanks would impact the vehicle with less force (due to less inertia) and would have more of a tendency to bend under dynamic loads than plywood blanks would.

Please note the following standard provisions which apply to FHWA letters of acceptance:

- Our acceptance is limited to the crashworthiness characteristics of the devices and does not cover their structural features, nor conformity with the Manual on Uniform Traffic Control Devices.
- Any changes that may adversely influence the crashworthiness of the device will require a new acceptance letter.
- Should the FHWA discover that the qualification testing was flawed, that in-service performance reveals unacceptable safety problems, or that the device being marketed is significantly different from the version that was crash tested, it reserves the right to modify or revoke its acceptance.
- You will be expected to supply potential users with sufficient information on design and installation requirements to ensure proper performance.

- To prevent misunderstanding by others, this letter of acceptance , designated as number WZ-44, will not be reproduced except in full.

Sincerely yours,



Frederick G. Wright, Jr.  
Program Manager, Safety

Enclosure