



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

400 Seventh St., S.W.
Washington, DC 20590

May 8, 2007

In Reply Refer To:
HSSD/SS-148

Mr. Michael Elle
Minnesota Department of Transportation
Transportation Building
395 John Ireland Boulevard
Saint Paul, MN 55155-1899

Dear Mr. Elle:

Thank you for your mail correspondence of December 11, 2006, requesting the Federal Highway Administration (FHWA) acceptance of the Modified Minnesota Swing-Away Mailbox Support (2006 version) for use on the National Highway System (NHS) as a test level 3 (TL-3) device under the provisions of the National Cooperative Highway Research Program (NCHRP) Report 350 "Recommended Procedures for the Safety Performance Evaluation of Highway Features." Accompanying your letter was a report on testing of this roadside hardware conducted by the Texas Transportation Institute (TTI) and test videos. You also included a report on crash testing of the previous design of Minnesota Swing-Away Mailbox Support conducted by the TTI in 1993.

Requirements

Mailbox supports should meet the guidelines contained in the NCHRP Report 350, "Recommended Procedures for the Safety Performance Evaluation of Highway Features." FHWA Memorandum "Action: Identifying Acceptable Highway Safety Features" of July 25, 1997 provides further guidance on crash testing of breakaway supports.

Product description

The Minnesota Swing-Away Mailbox Support was originally designed and tested in 1993 for use in locations where snow and ice removal during the winter presents a problem. The original design utilized a cantilevered arm that permits snowplow operation beyond the shoulder or curb, thereby reducing both snow drifting on the roadway and the potential for damage to the mailbox support.

The Modified Minnesota Swing-Away Mailbox Support (2006 version) is based on the original design and includes several modifications which include, but are not limited to the following:

- Reducing the length of the mailbox cantilever from 1346 mm (53 in) to 914 mm (36 in);

- Revising the angled member to transition from vertical to horizontal using bends of 30 and 60 degrees rather than two 45-degree angles;
- Skewing the ends of the pipe in the angled member at 45 degrees to help the horizontal member to return to its original position after being displaced;
- Adding a 279 mm (11 inch) length of security chain between the horizontal and vertical mailbox support members to discourage vandalism and theft.

A schematic diagram of the Modified Minnesota Swing-Away Mailbox Support (2006 version) in a test installation is enclosed.

Testing

The NCHRP Report 350 requires that in order for mailbox supports to meet TL-3 criteria they must successfully pass tests 3-60 and 3-61. These tests involve a 820 kg passenger car impacting the support head-on at the critical impact angle at a speed of 35 km/h (test 3-60) and 100 km/h (test 3-61). While not specifically required by the NCHRP Report 350, the testing of the cantilevered design also included a modified test 3-61 allowing the mailbox assembly impacting the windshield of the vehicle without the front of the vehicle impacting the support.

Previous testing conducted in 1993 on the original Minnesota Swing-Away Mailbox Support demonstrated that the low-speed test (test designation 3-60) posed no problems or concerns as the mailbox system readily released from its base and was propelled forward with only minor damage to the vehicle front end and without windshield contact. In the modified test 3-61 the performance of a single mailbox support was found to be marginally acceptable. Although the windshield of the impacting vehicle was shattered and separated from the vehicle shortly after impact, high-speed film indicated that the mailbox assembly did not intrude or penetrate into the occupant compartment.

A repeat of the 3-60 test on the modified design was not necessary. It is also agreed that two high-speed tests (one being standard 3-61 test and the other being modified 3-61 test) conducted on your device will be adequate to determine if it complies with recommended criteria for breakaway supports contained in NCHRP Report 350.

In the standard 3-61 test the right front quarter point of the 820 kg passenger car was aligned with the centerline of the vertical part of the support structure at 0 degrees so that the shortened cantilever arm with the mailbox assembly could strike the windshield rather than the left A-pillar, thus increasing the potential for intrusion in the occupant compartment. In the modified 3-61 test, the centerline of the cantilevered mailbox was aligned with the right front quarter point of the vehicle so that it could impact the windshield directly, without the front bumper of the vehicle first impacting the support structure.

During the standard 3-61 test of the Modified Minnesota Swing-Away Mailbox Support (2006 version) the swing-away mailbox support yielded to the vehicle, pulled off the vertical support, and traveled along with the vehicle. Although contact with the mailbox caused a tear in the windshield measuring 400 mm x 300 mm (15.7 in x 11.8 in), no pieces or components of the mailbox system penetrated, nor showed potential for penetrating the occupant compartment. During the modified 3-61 test, the swing-away mailbox support yielded to the vehicle, the newspaper holder separated from the mailbox, however, it did not penetrate or show potential for

penetrating the occupant compartment, nor did it present a hazard to others in the area. The windshield was shattered over an area measuring 620 mm x 450 mm (24.4 in x 17.7 in), with a cut measuring 140 mm x 15 mm (5.5 in x 0.6 in) near the right A-pillar. The windshield was pushed inward 60 mm (2.4 in), and the right side A-pillar was deformed. No other occupant compartment deformation occurred. All NCHRP Report 350 evaluation criteria were met in both tests. A summary of test results is enclosed.

Since the NCHRP Report 350 does not provide precise quantitative criteria for assessing windshield damage and there is no other windshield damage criteria for mailboxes, the results of the crash tests on the Modified Minnesota Swing-Away Mailbox Support (2006 version) will be considered acceptable if the windshield damage and potential for occupant compartment intrusion is no worse than that caused by the original Minnesota design. Comparison of the test results shows that:

- In the standard 3-61 test the Modified Minnesota Swing-Away Mailbox Support caused greater, however acceptable damage to the windshield than in the standard 3-61 test conducted on the original design in 1993. It should be noted that in the 3-61 test conducted in 2006 the mailbox assembly struck the windshield rather than the left A-pillar, while in the standard 3-61 test on the original design the mailbox assembly struck the left A-pillar.
- In the modified 3-61 test conducted on the original design in 1993 the windshield was shattered, cracked and separated from the vehicle shortly after impact while in the same test conducted on the Modified Minnesota Swing-Away Mailbox Support the windshield remained in place and sustained less damage.

Based on the comparison of test results, it is agreed that the windshield damage and potential for occupant compartment intrusion caused by the Modified Minnesota Swing-Away Mailbox Support was not worse than that caused by the original accepted Minnesota design. Therefore, the Modified Minnesota Swing-Away Mailbox Support (2006 version), as described above, meets the appropriate evaluation criteria for NCHRP 350 TL-3 for mailbox supports and may be used at all appropriate locations on the NHS when selected by the contracting authority. It is recommended that the device be installed at locations as safe as is practicable.

This acceptance is based on the reported crash performance of the Modified Minnesota Swing-Away Mailbox Support (2006 version) and is not intended to address the long-term durability of the unit. Production models should be identical to the prototype test units and the mailboxes used with the device will be comparable in type and not exceed the weight of the mailbox used in the test installation.

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

- This 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.

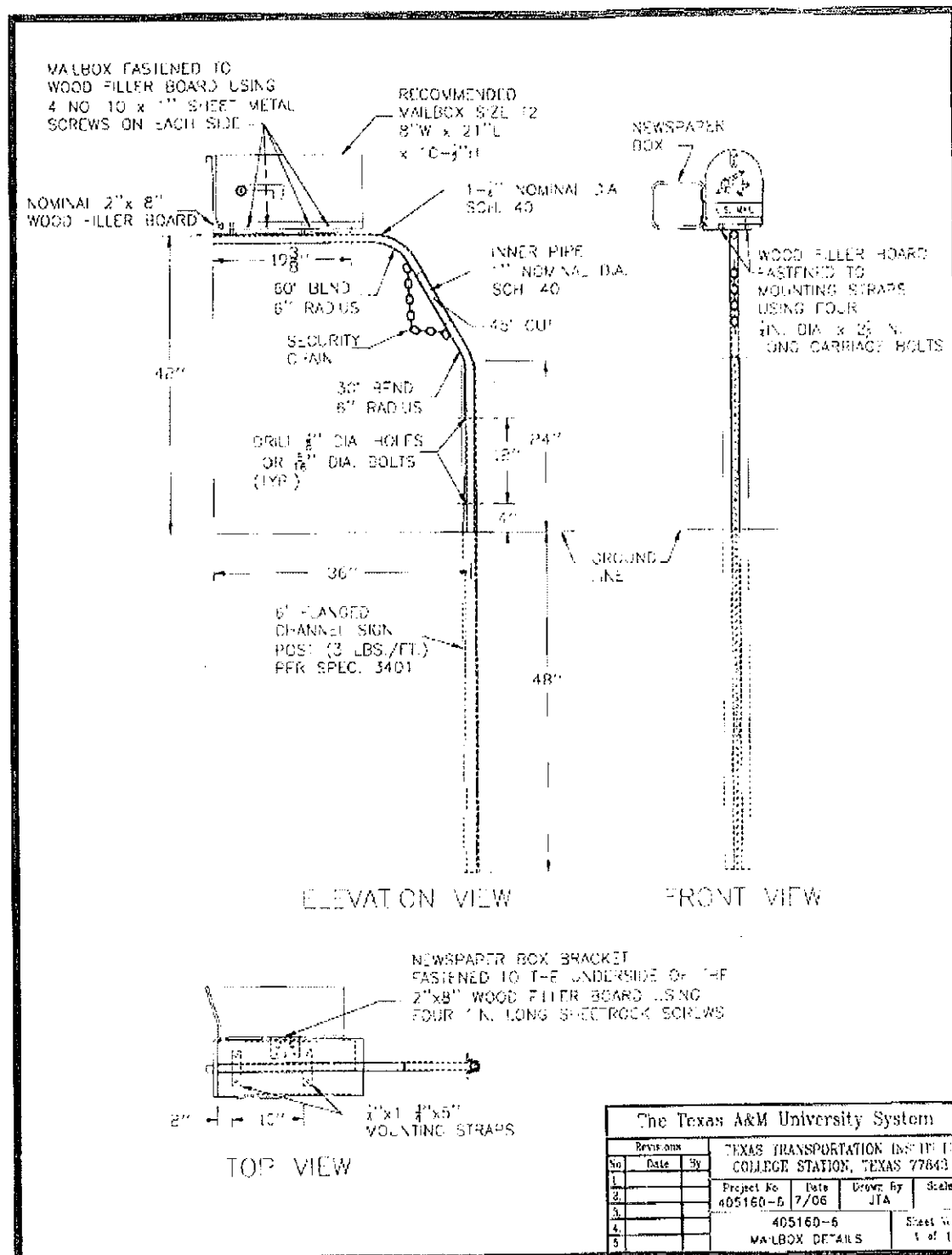
- Should the FHWA discover that the qualification testing was flawed, that in-service performance reveals unacceptable safety problems, or that the device being marketed is significantly different from the version that was crash tested, it reserves the right to modify or revoke its acceptance.
- You will be expected to supply potential users with sufficient information on design and installation requirements to ensure proper performance.
- You will be expected to certify to potential users that the hardware furnished has essentially the same chemistry, mechanical properties, and geometry as that submitted for acceptance, and that they will meet the crashworthiness requirements of the FHWA and the NCHRP Report 350.
- To prevent misunderstanding by others, this letter of acceptance, designated as number SS-148, shall not be reproduced except in full. This letter, and the test documentation upon which this letter is based, is public information. All such letters and documentation may be reviewed at our office upon request.
- The Modified Minnesota Swing-Away mailbox support is a generic product. However, if proprietary devices are specified by a highway agency for use on Federal-aid projects, except exempt, non-NHS projects, they: (a) must be supplied through competitive bidding with equally suitable unpatented items; (b) the highway agency must certify that they are essential for synchronization with the existing highway facilities or that no equally suitable alternative exists; or (c) they must be used for research or for a distinctive type of construction on relatively short sections of road for experimental purposes. Our regulations concerning proprietary products are contained in Title 23, Code of Federal Regulations, Section 635.411.
- This acceptance letter shall not be construed as authorization or consent by the FHWA to use, manufacture, or sell any patented device for which the applicant is not the patent holder. The acceptance letter is limited to the crashworthiness characteristics of the candidate device, and the FHWA is neither prepared nor required to become involved in issues concerning patent law. Patent issues, if any, are to be resolved by the applicant.

Sincerely yours,

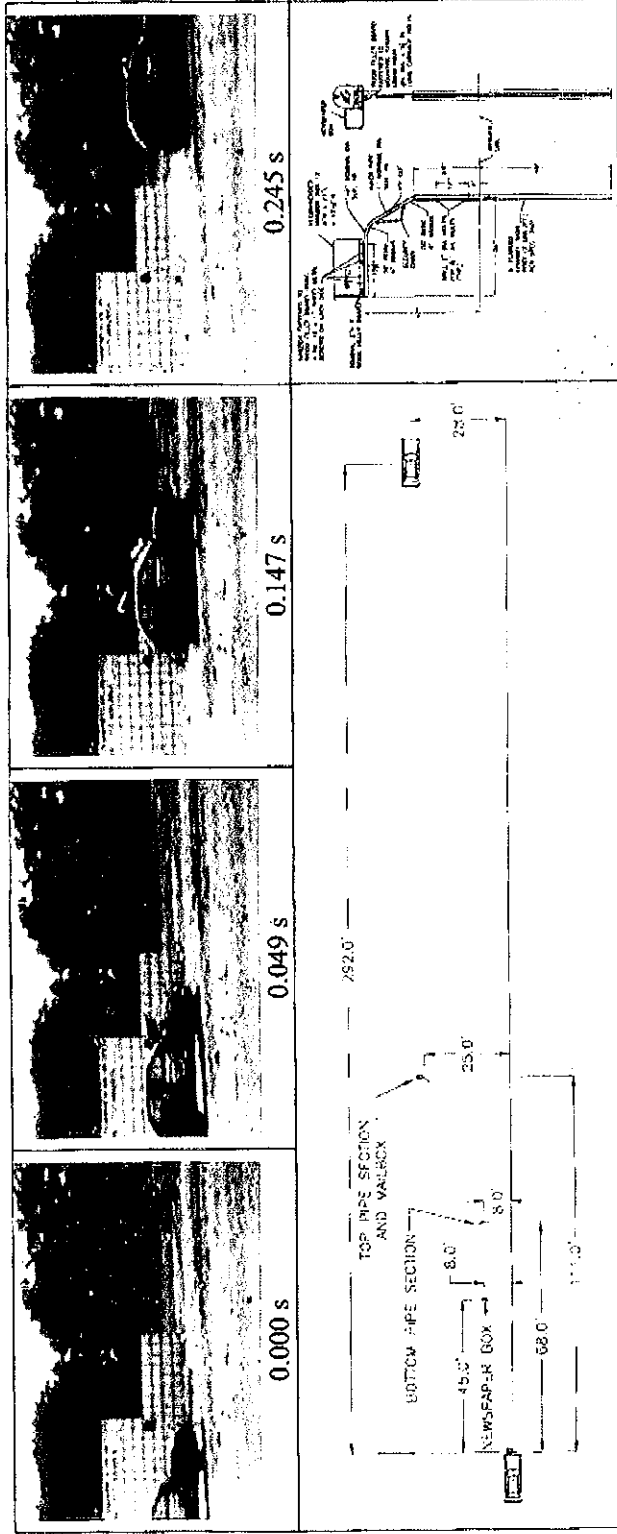
A handwritten signature in blue ink, reading "George E. Rice, Jr." with a stylized flourish at the end.

George E. Rice, Jr.
Acting Director, Office of Safety Design
Office of Safety

Enclosures



The Texas A&M University System				
Revisions				
No.	Date	By	TEXAS TRANSPORTATION INSTITUTE	
1			COLLEGE STATION, TEXAS 77843	
2			Project No.	Date
3			405160-5	7/06
4			Drawn by	Scale
5			JTA	
405160-5				Sheet No.
MAILBOX DETAILS				1 of 1



General Information		Impact Conditions		Test Article Debris Scatter (m)	
Test Agency	Texas Transportation Institute	Speed (km/h)	98.3	Longitudinal	33.8
Test No.	405180-6-1	Angle (deg)	0	Lateral	7.6
Date	07-24-2006	Exit Conditions		Vehicle Damage	
Test Article	Type	Speed (km/h)	96.3	Exterior	
	Name	Angle (deg)	0	VDS	12RF3
Material or Key Elements	Installation Height (m)	Occupant Risk Values		CDC	12FREN3
		Impact Velocity (m/s)	1.9	Max. Exterior	
Soil Type and Condition		Longitudinal	0.2	Vehicle Crush (mm)	255
		Lateral	7.0	Interior	
Test Vehicle		THIV (km/h)		OCD	FS0000000
		Ridedown Accelerations (g/s)		Max. Occupant Compartment	
Type	Production	Longitudinal	-0.5	Deformation (mm)	0
Designation	820C	Lateral	0.4	Post-Impact Behavior	
Model	1996 Chevrolet Metro	PHD (g/s)	0.6	(during 1.0 sec after impact)	
Mass (kg)		ASI	0.24	Max. Yaw Angle (deg)	2
Curb	772	Max. 0.050-s Average (g/s)		Max. Pitch Angle (deg)	2
Test Inertial	820	Longitudinal	-2.3	Max. Roll Angle (deg)	3
Dummy	77	Lateral	-0.6		
Gross Static	897	Vertical	-2.0		

Summary of results for NCIIIRP Report 350 test 3-61 on the MinnDOT swing-away mailbox support vertical support.