

Mr. Stuart Cole  
Northwest Pipe Company  
Traffic Systems  
PO Box 2002  
Houston, TX 77252-2002

Dear Mr. Cole:

Thank you for your letters of December 27, 2002, January 15, 2003, and February 10, 2003, requesting Federal Highway Administration (FHWA) acceptance of variations to your company's breakaway support systems for use on the National Highway System (NHS). Accompanying your letters were: 1) a report from the Texas Transportation Institute (TTI) on the square slipbase system, and videos of the crash tests; 2) a 1996 TTI report on weak soil testing of the PozLoc system; and 3) drawings of the PozLoc Breakaway Mailbox Support. You requested that we find the following 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."

- 1) Northwest Pipe POZ LOC S-Q Post <sup>TM</sup> Sign Support System
- 2) PozLoc Sign Support System with extended anchor for use in weak soils.
- 3) PozLoc Breakaway Mailbox Support System for snow regions.

### **Introduction**

Testing of the Square Slipbase Sign Support System and prior testing of the PozLoc systems was in compliance with the guidelines contained in the NCHRP Report 350, Recommended Procedures for the Safety Performance Evaluation of Highway Features. Requirements for breakaway supports are those in the American Association of State Highway and Transportation Officials' (AASHTO) Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals.

**1) The Northwest Pipe POZ LOC S-Q Post <sup>TM</sup> Slipbase Sign Support System** consists of a 2.5 x 2.5 inch x 10 ga and 12 ga perforated square steel tube signpost mounted in a triangular slip base system. This system uses a 0.02 inch thick triangular keeper plate separated from the base plate by circular cardboard washers. A 3 ¾ inch long horizontal 0.5 inch diameter pin through the holes in the signpost prevent the end of the post from dropping below the slip joint.

In test NWP-P1, the lower portion of the slip base was rigidly anchored to the steel anchor plate in the pendulum facility. In test NWP-P2, the lower portion of the slip base was mounted in a standard TxDOT concrete footing placed in NCHRP Report 350 standard soil at the pendulum Facility. Details of the triangular slip base system are detailed in the diagrams that are enclosed

for reference. A 48 x 48 inch x 5/8-inch thick plywood sign panel was mounted at a height of 7 feet in test P1, and at a height of 7 feet, 2 inches in test P2. The slip base bolts were torqued to 40 foot-pounds in test P1 and to 60 foot-pounds in test P2

### Testing

Pendulum testing was conducted on the slip base system. The mass of the test bogie was 820 kg in all tests. The test bogie was equipped with a crushable honeycomb nose simulating the front end of a Volkswagen Rabbit. (Although no longer produced, this configuration is considered a “worst case” design.) The complete devices as tested are shown in the Enclosures.

Test Number	NWP-P1	NWP-P2
Foundation Type	Rigid test foundation	Concrete footer in Std soil
Pendulum Test Mass		
Slip Base Bolt Torque	40 foot pounds	60 foot pounds
Impact Angle	Zero degrees	Zero degrees
Test Impact Velocity	21.1 mph (34 kmh)	21.2 mph (34.2 kmh)
Occupant Impact Speed	None	None
Bogie Delta V	1.32 fps (0.43 m/s)	1.47 fps (0.47 m/s)
Extrapolated high speed Delta V	1.84 fps (0.56 m/s)	1.73 fps (0.53 m/s)
Stub Height	4 inches	3-1/2 inches

Occup. Speed: Occupant Impact Speed: Speed at which a theoretical front seat occupant will contact the windshield. Delta V: Speed change of the test vehicle / bogie.

### Findings

Velocity changes were all within acceptable limits. Because stub heights were at the 4-inch maximum we recommend that installation instructions stress the need to keep the height of the lower slip plate below the 4 inch maximum as required by the AASHTO Specification. The results of testing met the FHWA requirements and, therefore, the Northwest Pipe Square Slipbase Sign Support System described above and shown in the enclosed drawings for reference are acceptable for use as Test Level 3 devices on the NHS under the range of conditions tested, when proposed by a State.

**2) PozLoc Sign Support System with extended anchor for use in weak soils.** The PozLoc sign support system was crash tested in weak soils in February of 1997. In both the low and high speed tests the post pulled the socket / anchor out of the ground (in strong soil, the post pulls out of the socket.) FHWA Acceptance Letter SS-65A, dated 6-20-97, covered the PozLoc system in all soil types. The PozLoc anchor used in the testing was 33 inches (383 mm) long. Your current request is to find this system acceptable if anchors 48 inches (1220 mm) or 60 inches (1525 mm) long are used. Because of the increased embedment length it can be assumed that there will be greater resistance to pullout. After reviewing the prior crash testing we have concluded that the greater resistance will not be a disadvantage. If the anchor does not pull out then the system's

performance will be more like that seen in the strong soil testing. In those tests, the subject of FHWA Acceptance Letter SS-1 dated 5-13-86, the vehicle velocity changes were also below the “desirable” limits. Therefore, we concur that 48-inch and 60-inch long PozLoc anchors are acceptable for use.

**3) PozLoc Breakaway Mailbox Support System for snow regions.** The Northwest Pipe Co. 90 Degree Poz-Loc Socket Assembly for use with mailboxes is similar to the POZ-LOC Socket System with a minor difference. The single box cantilevered support system currently being used is 1-1/4 inch Schedule 40 pipe fabricated with pipe fittings (drawings enclosed for reference) in a concrete base. You proposed that the post be a 2-3/8 inch OD 14 ga pipe using a swaged elbow. The post is to be mounted in a POZ-LOC Socket and wedge mounted in concrete. You also requested a different single and double box support, which is a simple vertical 2-3/8 inch OD 14 ga pipe, mounted on a POZ-LOC post and socket. Because the Poz-Loc anchor performance has been found acceptable for sign supports, and the thin 14 gage steel is specified for the pipe supporting the mailbox, these systems can be expected to perform in an acceptable manner.

#### **Findings:**

In addition to the square slipbase system discussed as item 1) above, the Poz-Loc supports covered as items 2) and 3), as shown in the enclosed drawings for reference, are acceptable for use as Test Level 3 devices on the NHS under the range of conditions tested, or under the range that similar systems were tested, when proposed by a state.

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

- Our acceptance is limited to the crashworthiness characteristics of the devices and does not cover their structural features, or 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 FHWA and NCHRP Report 350.
- ! To prevent misunderstanding by others, this letter of acceptance, designated as number SS-117 shall not be reproduced except in full. As this letter and the supporting documentation that support it become public information, it will be available for inspection at our office by interested parties.
- Northwest Pipe Company’s Poz-Loc S-Q Post <sup>TM</sup> slipbase system is a patented product and is considered "proprietary." The use of proprietary devices specified on Federal-aid

projects, except exempt, non-NHS projects (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 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, a copy of which is enclosed.

Sincerely yours,

Michael S. Griffith  
Acting Director, Office of Safety Design  
Office of Safety

2 Enclosures

Sec. 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 distinctive 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.

ENCLOSURE 2