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# AASHTO-AGC-ARTBA Joint Committee

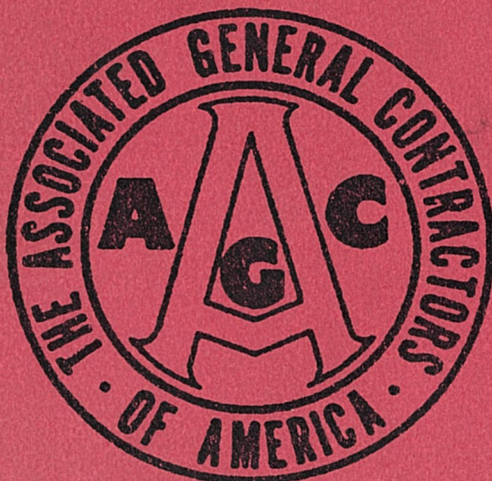
## Subcommittee on New Highway Materials

### Task Force 13 Report

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#### A Guide to Small Sign Support Hardware

June 1998

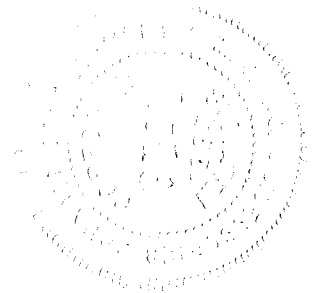


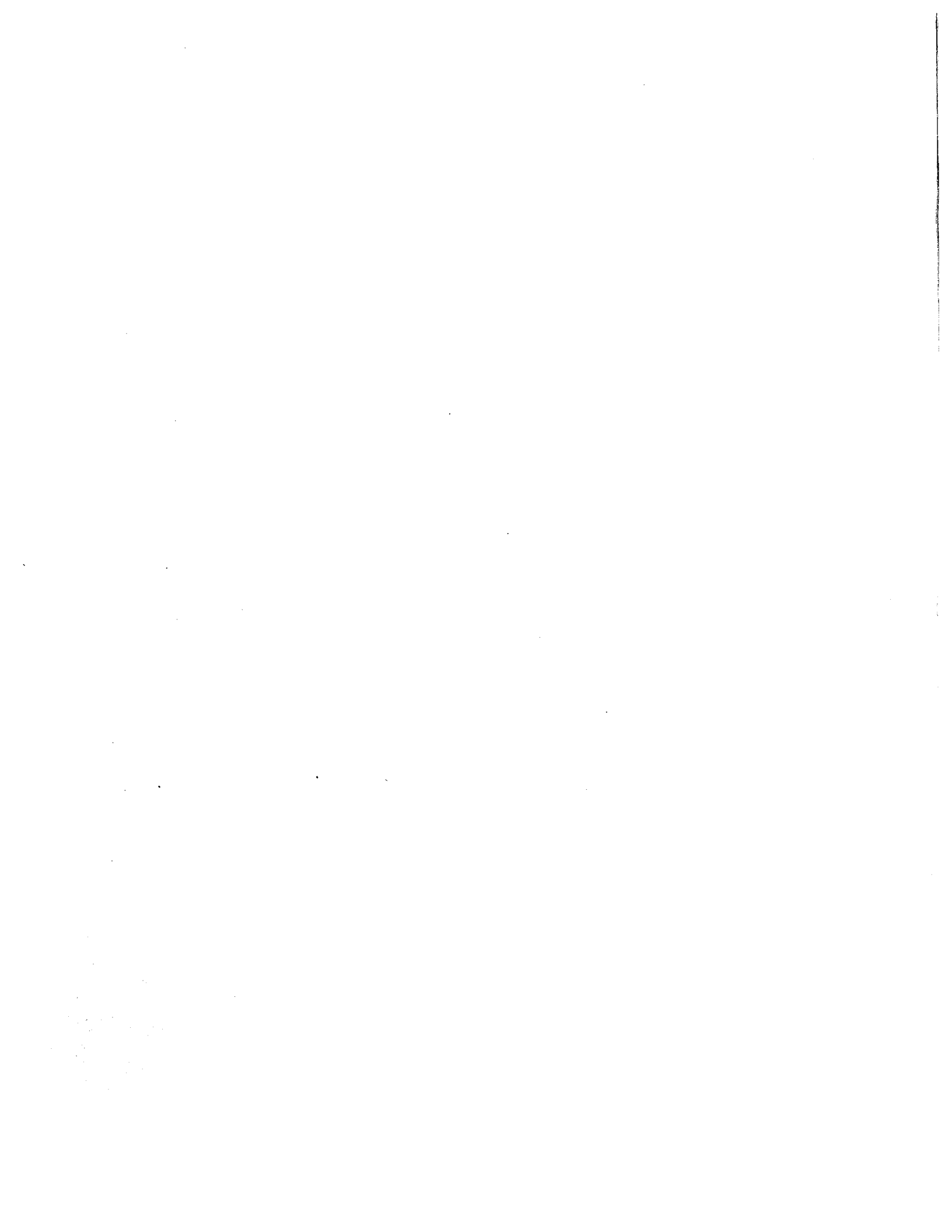
**AASHTO-AGC-ARTBA  
Joint Committee**

**Task Force No. 13**

**A Guide to Small Sign Support Hardware**

**June 1998**





## **Preface**

This document is disseminated upon the sponsorship of the Joint Committee of the American Association of State Highway and Transportation Officials, the Associated General Contractors of America and the American Road and Transportation Builders Association (the Joint AASHTO-AGC-ARTBA Committee) in the interest of information exchange, based on the combined technical expertise of the authors. As such, the opinions and conclusions implied or expressed herein do not necessarily reflect the official views or policies of the Joint Committee or its member organizations.

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## Acknowledgements

The Task Force expresses its thanks to the following people who have provided source materials, reviewed draft drawings and specifications, and provided comments on the materials.

|  |   |  |
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These materials were developed by Dr. Malcolm H. Ray of Momentum Engineering as a part of National Cooperative Highway Research Program (NCHRP) Project 22-10. The NCHRP project panel provided considerable guidance, review, and direction during the project. The panel members included:

|                        |                      |                     |
|------------------------|----------------------|---------------------|
| John Panak (Chair)     | John Durkos          | James Siebels       |
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## Introduction

### Background

Most small highway signs are supported by rolled steel shapes, extruded aluminum shapes, woodposts, steel flange-channel shapes, round tubes, pipes, square steel tubes or fiber reinforced plastic shapes. These may be used in a variety of ways to meet the dual requirements of (1) providing support for signs under a broad range of environmental conditions and (2) releasing when struck by a vehicle to minimize the chance of injury to vehicle occupants.

This guide is a compilation of proprietary and non-proprietary small sign support hardware. Details have been provided and reviewed by members of the American Association of State Highway and Transportation Officials (AASHTO), the Associated General Contractors of America (AGC), and American Road and Transportation Builders' Association (ARTBA), Joint Cooperative Committee Task Force 13. Proprietary sign support hardware materials were provided by the manufacturers and non-proprietary sign support materials were developed by Momentum Engineering, Inc. as a part of National Cooperative Highway Research Program Project 22-10.

The Task Force believes that it would provide a valuable service to the highway community by publishing a comprehensive document containing the information detailed herein for widely used small sign support systems. This document presents a “state of the art” perspective that should be of benefit to engineers, designers, maintenance personnel, contractors, and administrators. This document only addresses the crashworthiness features of sign supports. Issues like typical design wind loadings, the sign to post attachment details and the maximum size sign permitted for each type of support, though important, are not discussed in this document.

To be acceptable for use on Federal Aid roadways all sign supports must be tested and evaluated as described in AASHTO's 1994 *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*. (1) The results of this testing must be submitted to the Federal Highway Administration (FHWA) whereupon FHWA will issue a letter indicating the acceptable uses of the sign support system.

While every effort has been made to make this document as complete as possible, some designs may have been omitted inadvertently. New systems and improvements to existing systems will also continue to be developed in the coming years. The information in this document, therefore, must be continually updated to remain of value to practicing engineers. This guide has been organized with special consideration to facilitating more frequent revisions. Task Force 13 will periodically update this document so that it will become an effective and timely means of transmitting sign support hardware information throughout the roadside safety community and hardware manufacturing industry. Information on any new small sign support designs should be forwarded to the AASHTO-AGC-ARTBA Joint Committee's Task Force 13, through AASHTO, AGC, or ARTBA, for evaluation and possible inclusion in future versions of this publication.

Many of the tested sign support systems in this document are representative of the largest crashworthy design. For example, a single 4.5 kg/m u-channel post driven directly into a strong soil is acceptable. By extension, single posts of lesser masses (kg/m) are also acceptable. Slip

bases and breakaway couplings theoretically will work over a wide range of post sizes. The upper limit is dependent upon the mass of the post that the impacting vehicle must accelerate (maximum 270 kg) and the lower limit is dependent upon the rigidity of the post to ensure that it does not bend.

### **Submitting New Small Sign Hardware Drawings**

Anyone interested in having new systems or components included in future revisions of *A Guide to Small Sign Support Hardware* should send the following materials to the secretary of AASHTO-ARTBA-AGC Task Force 13:

1. An FHWA letter of approval that indicates the submitted small sign system has been successfully crash-tested according to the latest AASHTO Specifications.
2. A drawing (on a reproducible 216 x 280 mm sheet) along with design and material specifications conforming exactly to the standards and style used on the drawings currently in the guide.

The above materials should be forwarded to:

Secretary, AASHTO-ARTBA-AGC Task Force 13  
Federal Highway Administration/HNG-14  
400 Seventh Street, S.W.  
Washington, D.C. 20590

Submissions that do not meet the above criteria will not be considered for inclusion in any revisions to this guide.

The drawings for the non-proprietary drawings in this guide were produced using INTERGRAPH MICROSTATION. The text specifications were produced using WordPerfect 5.1. Both the text and drawing files are available and may be obtained from several sources including:

PCTRANS  
Transportation Center  
University of Kansas  
2011 Learned Hall  
Lawrence, Kansas 66045  
Phone (913) 864-5655  
Fax (800) 245-8760

MACTRANS  
University of Florida  
Center for Microcomputers in Transportation  
512 Weill Hall  
P.O. Box 116585  
Gainesville, Florida 32611-6585  
Phone (800) 226-1013  
Fax (904) 392-3224

Suggestions about revising drawings or specifications currently in the Guide should be forwarded to the appropriate manufacturer in the case of proprietary systems or to the Task Force secretary in the case of non-proprietary systems. Proposed revisions will be periodically evaluated by the Task Force.

## **Safety Performance**

The 1994 AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals* relate specifically to the safety performance evaluation for small sign support systems.(1) The AASHTO specification requires testing with an 816.5-kg (1800-lb) vehicle at impact velocities of 32 km/h and 97 km/h. To be acceptable the change in velocity while the vehicle is in contact with the sign must be 4.87 m/s (16 ft/sec) or less.

NCHRP Report 350 was published in 1993 and calls for tests with small signs using an 820-kg vehicle striking the device at 35 km/h and 100 km/h for Test Level 3.(2) To be acceptable the change in velocity while the vehicle is in contact with the sign must be 5 m/s or less. Report 350 Test Level 3 conditions are slightly less demanding than the 1985 AASHTO specifications. The low velocity test uses a slightly higher velocity providing a little more energy to make the device activate and the acceptance criteria are slightly higher. The differences arise due to the change from U.S. Customary Units to SI Units in testing so the differences are relatively minor. The FHWA will accept NCHRP Report 350 Test Level 3 results as evidence of the sign support crashworthiness acceptability.

NCHRP Report 230 test and evaluation criteria were closer to the 1985 AASHTO specifications.(3)(1) Anything tested and accepted using Report 230 or the 1985 AASHTO specifications had to pass slightly more demanding tests than those in Report 350.(4) All small sign supports found acceptable using Report 230 and the 1985 AASHTO specifications are therefore still acceptable using Report 350 and the 1994 AASHTO specifications.

All of the sign support systems included in this guide have been crash tested and evaluated in terms of the above specifications. Only those sign support systems judged by the FHWA to have met the safety performance requirements of the specifications are included.

This document only addresses crashworthiness aspects of small sign support designs. Other design considerations affecting the structural adequacy such as abnormal live loads, wind loads, fatigue, and corrosion are also important although they are not addressed in this document.

The user is responsible for verifying the accuracy of any system or component in a specific application.

It is important to note that crash tests are conducted on support systems as opposed to individual components. For this reason, small sign support acceptance letters are generally only referenced on drawings of the whole sign support system. There are a few exceptions to this rule where an acceptance letter was issued regarding specific components such as, for example, the equivalence between some wood species. Seemingly small variations in system details such as embedment method, embedment depth, sign panel size, sign panel mounting height, and mounting hardware may have significant effects on impact behavior.

## **Organization**

This guide is organized into four sections. The first section, including this subsection, contains the introductory materials, table of contents, and general information. The next sections contain drawings and specifications of fastener and post components. The fourth section contains

drawings of small sign support systems. The small sign support system drawings and specifications show how the components shown in the fastener and post sections of the guide can be assembled to produce a variety of small sign support systems.

Fasteners include bolts, nuts, and washers. Post components are those parts that serve to support the sign and also the components of the breakaway, yielding or foundation mechanism. Each component has been assigned a unique designator that identifies the component and also serves as a page number with components being arranged alphabetically by designator. The designator used in this small sign support hardware guide are consistent with those found in *A Guide to Standardized Highway Barrier Hardware*.(5) Many of the fastener components used in this Guide also appear, with the same designator, in the Hardware Guide.

**Units**

This guide has been produced completely in the International System (SI) of units. All length dimensions in this guide are in millimeters (mm), the units of stress are Mega-Pascals (MPa), the units of force are kilo-Newtons (kN), the units of torque are Newton-meters (N-m) and the units of mass

are kilograms (kg). Units of length are not shown on the drawings since all dimensions are in millimeters. U.S. customary weights of lbs have been converted to the SI mass unit of kilograms (kg). All the components and systems shown in this guide were originally developed in the foot-pound-second system and have been converted into their present form. Dimensions were converted and rounded as suggested in R 1-91 I (ASTM E 380-89a).

**Table 1. Guide Units**

|        |   |     |
|--------|---|-----|
| Length | millimeters                                 | mm  |
| Mass   | kilograms                                   | kg  |
| Force  | Newtons                                     | N   |
| Stress | 10 <sup>6</sup> Pascals (N/m <sup>2</sup> ) | MPa |
| Torque | Newton-meters                               | N-m |

Several references were used to guide the metrication process. The National Institute of Building Sciences' *Metric Guide for Federal Construction* is a good general purpose guide to metrication.(6) Basic SI definitions and guidelines for metrication can be found in AASHTO R 1 (ASTM 380), "Standard Practice for Use of the International System of Units (SI)." Inertial and cross-sectional properties of structural steel shapes were taken from the AISC "Metric Properties of Structural Shapes."(7) For more specific metrication issues, the following guidelines and specifications are cited throughout the guide:

- Metrication definitions AASHTO R 1
- Tolerances ANSI B4.3
- Fasteners ANSI B18
  - Hex bolts ANSI B18.2.3.5M
  - Heavy hex bolts ANSI B18.2.3.6M
  - Heavy hex structural bolts ANSI B18.2.3.7M
  - Metric hex nuts, style 1 ANSI B18.2.4.1M
  - Metric hex nuts, style 2 ANSI B18.2.4.2M
  - Metric plain washers ANSI B18.22M
  - M Profile threads ANSI B1.13M
- Structural Shapes AASHTO M 160M
- Plate AASHTO M 183M

**Abbreviations**

The following list contains abbreviations used throughout the guide for various standards-making organizations.

|        |  |
|--------|--|
| AASHTO | American Association of State Highway and Transportation Officials |
| AISC   | American Institute of Steel Construction                           |
| AGC    | Associated General Contractors                                     |
| ANSI   | American National Standards Institute                              |
| ARTBA  | American Road and Transportation Builders Association              |
| ASTM   | American Society for Testing and Materials                         |
| AWS    | American Welding Society   |
| FHWA   | Federal Highway Administration                                     |
| IFI    | Industrial Fasteners Institute                                     |
| SAE    | Society of Automotive Engineers                                    |

There is a great deal of intentional duplication between the AASHTO and ASTM material specifications. Generally, the AASHTO version of a specification is considered the primary reference and the ASTM reference is included in parentheses for convenience. Table 2 shows abbreviations used in drawings throughout this guide.

**Table 2. Abbreviations**

---

|                      |                 |               |
|----------------------|-----------------|---------------|
| CLR = Clear distance | D = Diameter    | EA = Each     |
| OC = On center       | MAX = Maximum   | MIN = Minimum |
| LNG = Long           | TOL = Tolerance | TYP = Typical |
| R = Radius           |                 |               |

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**Component Nomenclature**

Nomenclature for the components is presented on the following pages. Component designators begin with either an **F** or a **P** denoting a fastener or post component, respectively.

The remaining columns of the designator are defined below. A valid designator has three upper case letters, followed by two digits, followed by an optional lower case letter. In the tables on the following pages, valid options for the next column can be found between the two horizontal lines. Thus FPA01 is a valid designator and FPX01 is not.

## COMPONENTS

|                 | <b>Function</b>   | <b>Type</b>   | <b>Sequence Number</b> | <b>Option</b> |
|-----------------|-------------------|---|------------------------|---------------|
| <b>Fastener</b> | <b>Bolt/Screw</b> | <b>Button Head Bolt</b>   | 01-99                  | a-b           |
|                 |                   | <b>Carriage Bolt</b>  |                        |               |
|                 |                   | <b>Hook Bolt</b>  |                        |               |
|                 |                   | <b>Lag Screw</b>  |                        |               |
|                 |                   | <b>Cap Screw</b>  |                        |               |
|                 |                   | <b>Toggle Bolt</b>  |                        |               |
|                 |                   | <b>HeX Head Bolt</b>  |                        |               |
|                 | <b>Nut</b>        | <b>Square Nut</b><br><b>HeX Nut</b>   | 01-99                  | a-b           |
|                 | <b>Plate</b>      | <b>Anchor Plate</b><br><b>Bearing Plate</b><br><b>Slipbase Plate</b><br><b>Post Fitting</b> | 01-99                  | a-b           |
|                 | <b>Washer</b>     | <b>Circular</b><br><b>Rectangular</b>   | 01-99                  | a-b           |

The designator identifies a general functional group of components (fastener or post) followed by a more specific categorization of the component function. Thus, in a component designated as FWC20, the letter **F** indicates it is a fastener, and the letter **W** denotes it is a washer. The **C** designator further indicates this is a circular washer and is the twentieth in the series of circular washers. Post components are organized in a similar manner.

## COMPONENTS

|             | <b>Function</b>       | <b>Type</b>       | <b>Sequence Number</b> | <b>Option</b> |
|-------------|-----------------------|-------------------|------------------------|---------------|
| <b>Post</b> | <b>Aluminum tube</b>  | <b>Sign Post</b>  | 01-99                  | a-b           |
|             | <b>C-section</b>      | <b>Foundation</b> |                        |               |
|             | <b>Wood</b>           |                   |                        |               |
|             | <b>Flange Channel</b> | <b>Soil Plate</b> |                        |               |
|             | <b>PLate</b>          |                   |                        |               |
|             | <b>COncrete</b>       |                   |                        |               |
|             | <b>Plastic tube</b>   |                   |                        |               |
|             | <b>S-section</b>      |                   |                        |               |
|             | <b>Steel Tube</b>     |                   |                        |               |
|             | <b>W-section</b>      |                   |                        |               |

### System Nomenclature

The second type of designator describes the small sign support system where a system is an assembly of components. All system designators in both *A Guide to Standardized Highway Barrier Hardware* and *A Guide to Small Sign Support Hardware* begin with the letter **S** to indicate that the drawing is of a system rather than a fastener or post component. The second column identifies the type of system, **S** for all the sign support hardware in this document. The third column identifies a family of similar small sign supports. For example all slipbase sign supports are designated with an **S** so the user will immediately recognize an SSS01 to be the first variation of a slipbase small sign support system.

### SYSTEMS

|        | Function | Type   | Sequence Number | Option |
|--------|----------|--|-----------------|--------|
| System | Sign     | Coupling<br>Fracture<br>Slip base<br>SPliced | 01-99           | a-c    |

The last character in the designator indicates the number of posts that can be used within a 2100-mm wide distance. A vehicle could come in contact with all the posts that are located within the width of the vehicle so the FHWA approval letters indicate the number and type of posts that are acceptable for each system within a 2100-mm span (e.g., the assumed typical vehicle width). One-post systems are designated with the letter **a**. When two posts are acceptable within a 2100-mm span the system is designated with a **b**. When three posts are acceptable within a 2100-mm span the system is designated with a **c**.

### Federal Highway Administration Approval Letters

In order for a small sign support system to be acceptable for use on a Federal Aid roadway, the system must have been approved by the FHWA. The FHWA routinely issues small sign support acceptance letters that indicate if a particular device is acceptable, the maximum number and size of posts acceptable in a 2100-mm span, and the type of soil support that is required. These letters are the definitive statement about what is acceptable practice for small sign supports. As of the end of 1996, some 70 letters have been issued by the FHWA's Office of Engineering. These letters are summarized in Tables 3 and 4. Table 3 is a list of all the FHWA approval letters issued to date (September 1996) along with the date of issue, the recipient of the approval, and a brief description of the contents of the letter. Table 4 is a synthesis of the letters listed by the systems that are included in the Guide. The table lists the system name and designator, manufacturer, the number and size of posts acceptable within a 2100-mm span, the acceptable soil support conditions, and the number of the FHWA approval letter.



**Table 3. Summary of Federal Highway Administration Small Sign Support Acceptance Letters<sup>†</sup>**

| <b>No.</b> | <b>Date</b> | <b>Addressee</b>         | <b>Description</b>   |
|------------|-------------|--------------------------|--|
| 1          | 5/13/86     | Southwestern Pipe, Inc.  | POZ-LOC anchor system with 60-mm diameter post with maximum 2.41-mm wall thickness. <sup>‡</sup>   |
| 2          | 8/19/86     | Truss Joist MacMillan    | MICRO-LAM 378-mm by 200-mm plywood box section post tested in S-2 soil.  |
| 3          | 10/3/86     | Allied Tube & Conduit    | QUIK-PUNCH tube system with maximum size 57-mm square 2.67 mm post set in reinforced sleeve base.  |
| 4          | 1/29/87     | Minute Man Anchors, Inc. | Breakaway coupling for use with a 4.46 kg/m steel flanged channel post (superseded by new hardware in SS-6).   |
| 5          | 6/15/87     | Memorandum to Regions    | a. Perforated 51-mm square 2.67-mm thick steel tube (maximum size). <sup>‡</sup><br>b. Single 4.46 kg/m steel flanged channel post. <sup>‡</sup><br>c. Dual 4.46 kg/m steel flanged channel post. <sup>‡</sup><br>d. Arizona dual leg slipbase with S200x11.5 post.<br>e. Texas dual leg slipbase with W310x67 post. |
| 6          | 3/10/88     | Minute Man Anchors, Inc. | Breakaway Coupling for use with steel flanged channel supports. <sup>‡</sup>   |
| 7          | 9/01/88     | Region 5 Memorandum      | Wisconsin large slipbase sign support system with W310x32.7 post and no upper hinge sign attachment clips.   |

<sup>†</sup> Supports conform to Federal Highway Administration Requirements based on the 1985 AASHTO *Standard Specifications for Highway Signs, Luminaires and Traffic Signals*. After May 1993, velocity change permitted is 5.0 m/s.

<sup>‡</sup> These small sign supports were only tested in NCHRP Report 230 S-1 strong soil (Report 350 "standard" soil). Should an agency wish to use this system in a "weak" soil, further crash testing is recommended.

**Table 3. Summary of Federal Highway Administration Small Sign Support Acceptance Letters<sup>†</sup> (continued)**

| <b>No.</b> | <b>Date</b> | <b>Addressee</b>       | <b>Description</b>  |
|------------|-------------|------------------------|---|
| 8          | 3/31/89     | Unistrut Corporation   | Telespar small sign supports with a maximum post size of 57-mm square and 2.67-mm thick.  |
| 9          | 3/16/89     | Franklin Steel         | EZE-Erect sign support system—maximum 6.0 kg/m flanged channel posts.   |
| 10         | 5/11/89     | Hwycom Corporation     | 75.2-mm diameter 3.2-mm thick wall fiber-reinforced plastic post (See SS-12).   |
| 11         | 5/18/89     | Allied Tube & Conduit  | Quick-Punch post—maximum size 57-mm square 1.9-mm thick post in non-reinforced 1.27-mm thick sleeve base.   |
| 12         | 8/03/89     | Hwycom Corporation     | Dual Post Installations of 76.2-mm FRP sign post.   |
| 13         | 8/31/89     | Marion Steel           | Single to triple 4.5 kg/m and single or dual 6/0 kg/m Rib-Bak post installations with ground splice. <sup>‡</sup>   |
| 14         | 10/27/89    | Marion Steel           | Rib-Bak Post with Minute Man Coupling. <sup>‡</sup>   |
| 15         | 12/12/89    | Memorandum to Region I | Single 76-mm and 102-mm diameter aluminum 4.76-mm thick wall. Direct burial tube <sup>‡</sup> (See SS-26 for 102-mm tube rescinded).                                    |
| 16         | 12/19/89    | Minute Man Breakaway   | MMB-1HD breakaway device for 4.5 kg/m steel flanged channel U-post.   |
| 17         | 1/08/90     | Transpo Industries     | Type A and Type B breakaway couplings (then type AUX for S-1 soil only, others are foundation mounted). Posts limited to 66 kg/m below the hinge within a 2100-mm span. |

<sup>†</sup> Supports conform to Federal Highway Administration Requirements based on the 1985 AASHTO *Standard Specifications for Highway Signs, Luminaires and Traffic Signals*. After May 1993, velocity change permitted is 5.0 m/s.

<sup>‡</sup> These small sign supports were only tested in NCHRP Report 230 S-1 strong soil (Report 350 “standard” soil). Should an agency wish to use this system in a “weak” soil, further crash testing is recommended.

**Table 3. Summary of Federal Highway Administration Small Sign Support Acceptance Letters<sup>†</sup> (continued)**

| <b>No.</b> | <b>Date</b> | <b>Addressee</b>        | <b>Description</b>  |
|------------|-------------|-------------------------|---|
| 18         | 6/19/90     | Minute Man Breakaway    | MMB-1HD breakaway device for use with two 4.5 kg/m flanged channel U-posts in strong soil (See SS-21 for weak soil letter).   |
| 19         | 7/31/90     | Allied Tube and Conduit | Square-Fit sign post systems.   |
| 20         | 9/20/90     | Franklin Steel          | 3/0 to 4.5 kg/m flanged channel U-posts.  |
| 21         | 12/26/90    | Minute Man Breakaway    | MMB-1HD breakaway device with two 4.5 kg/m flanged channel U-posts in both strong and weak soil.  |
| 22         | 1/04/91     | Trust Joist MacMillan   | Type 'L' MICRO-LAM with revised sawcut.   |
| 23         | 3/14/91     | Memorandum to Region I  | New Jersey breakaway coupling.  |
| 24         | 5/01/91     | Unistrut Corporation    | Triangular slipbases for square tube sign supports.   |
| 25         | 6/04/91     | Memorandum to Regions   | a. Single or dual 89x89-mm undrilled wood post.<br>b. Single 140x184-mm wood with 75-mm holes.<br>c. Single 140x140-mm wood with 50-mm holes.<br>d. Single 89x140-mm wood with 48-mm holes.<br>e. Dual W150x18 steel post on slipbase (up to 27 kg/m for dual supports are acceptable). |
| 26         | 2/11/92     | Unistrut Corporation    | Telespar square perforated tube small sign supports without sleeve around base post.  |
| 27         | 5/15/92     | Montana DOT             | Round wood sign post supports.  |

<sup>†</sup> Supports conform to Federal Highway Administration Requirements based on the 1985 AASHTO *Standard Specifications for Highway Signs, Luminaires and Traffic Signals*. After May 1993, velocity change permitted is 5.0 m/s.

<sup>‡</sup> These small sign supports were only tested in NCHRP Report 230 S-1 strong soil (Report 350 "standard" soil). Should an agency wish to use this system in a "weak" soil, further crash testing is recommended.

**Table 3. Summary of Federal Highway Administration Small Sign Support Acceptance Letters<sup>†</sup> (continued)**

| <b>No.</b> | <b>Date</b>         | <b>Addressee</b>                | <b>Description</b>  |
|------------|---------------------|---------------------------------|---|
| 28         | 5/26/92             | Memorandum to Region 4          | 89-mm diameter thin walled aluminum tube single spliced Marion Steel or Franklin Steel 6 kg/m U-channel post. |
| 29         | 7/15/92             | A.B. Chance                     | Helical screw foundations for motorist aid call boxes.  |
| 30         | 9/17/92             | Hapco Division                  | Cast aluminum shoe base for motorist aid call boxes.  |
| 31         | 10/22/92            | Allied Tube and Conduit         | Single perforated 57-mm square 2.0-mm steel tube post in anchor.  |
| 32         | 10/28/92            | Memorandum to Region 7          | Western red cedar for breakaway wood posts.   |
| 33         | 10/29/92            | Transpo Industries              | Model 201C and 301C breakaway couplings.  |
| 34         | 4/20/93             | Louisiana DOTD                  | Omni-directional single-post sign support.  |
| 35         | 5/28/93             | Imperial, Inc.                  | 60.3-mm diameter aluminum tube sign post.   |
| 36         | 9/03/93             | Memorandum to Regions           | Large and small sign supports pooled fund study—Phase II, wood U-channel, steel tube, slipbase, FRP post.     |
| 37         | 8/13/93             | Greenline                       | Delineator posts.   |
| 38         | 10/27/93            | Unistrut Corporation            | Telespar slipbase sign support system.  |
| 39         | 10/25/93<br>6/24/94 | Recycled Plastic Products, Inc. | Square recycled plastic sign posts.<br>Circular recycled plastic posts.                                       |

<sup>†</sup> Supports conform to Federal Highway Administration Requirements based on the 1985 AASHTO *Standard Specifications for Highway Signs, Luminaires and Traffic Signals*. After May 1993, velocity change permitted is 5.0 m/s.

<sup>‡</sup> These small sign supports were only tested in NCHRP Report 230 S-1 strong soil (Report 350 “standard” soil). Should an agency wish to use this system in a “weak” soil, further crash testing is recommended.

**Table 3. Summary of Federal Highway Administration Small Sign Support Acceptance Letters<sup>†</sup> (continued)**

| <b>No.</b> | <b>Date</b> | <b>Addressee</b>      | <b>Description</b>   |
|------------|-------------|-----------------------|--|
| 40         | 10/27/93    | Unistrut Corporation  | Direct burial single 50-mm square 2.7-mm thick Telespar perforated steel sign posts. |
| 41         | 11/8/93     | Richard Strizki, P.E. | Adjustable anchor and bracket assembly.  |
| 42         | 11/20/93    | Marion Steel Company  | 2 kg/m and smaller A 36M delineator posts.   |
| 43         | 1/18/94     | VSAR Systems          | Speed-E-Rect breakaway device.   |
| 44         | 3/30/94     | Unistrut Corporation  | 1.9-mm thick ASTM A 715M Grade 420 Telespar posts.                                   |
| 45         | 5/11/94     | Memorandum to Regions | Direct burial wood sign posts.   |
| 46         | 6/17/94     | Memorandum to Regions | Unmodified cedar posts.  |
| 47         | 9/14/94     | South Dakota DOT      | Splicing Marion posts to Franklin stubs.   |
| 48         | 9/23/94     | SAFE                  | SAFE foundation support.   |
| 49         | 10/26/94    | Galvacor Inc.         | Flanged channel posts made of A 36M steel unacceptable as sign posts.                |
| 50         | 11/8/94     | Memorandum to Regions | 130x130-mm nominal unmodified wood posts.  |
| 51         | 1/23/95     | Unistrut Corporation  | Perforated square steel tube manufactured using A 570 steel considered acceptable.   |
| 52         | 2/8/95      | Allied Highway Sales  | Allied triangular slipbase for square perforated tube sign posts.                    |
| 53         | 3/9/95      | Lancaster Composite   | 102-mm diameter light-weight concrete-filled FRP post in steel drive-sleeve.         |

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<sup>‡</sup> These small sign supports were only tested in NCHRP Report 230 S-1 strong soil (Report 350 "standard" soil). Should an agency wish to use this system in a "weak" soil, further crash testing is recommended.

**Table 3. Summary of Federal Highway Administration Small Sign Support Acceptance Letters<sup>†</sup> (continued)**

| <b>No.</b> | <b>Date</b> | <b>Addressee</b>      | <b>Description</b>   |
|------------|-------------|-----------------------|--|
| 53a        | 3/19/96     | Lancaster Composite   | Acceptance of some post sizes in strong soil.  |
| 53b        | 9/20/96     | Lancaster Composite   | Acceptance of additional post sizes in various supports.   |
| 54         | 3/28/95     | Chicago Heights Steel | Equivalence of Chicago Heights and Franklin posts.   |
| 55         | 4/24/95     | Colorado DOT          | 90x140-mm wood posts with wide side perpendicular to traffic.  |
| 56         | 7/13/95     | Marion Steel Company  | Rib-bak lap splice for three posts in weak soil.   |
| 56a        | 3/14/96     | Marion Steel Company  | Modified design to use a "bar spacer."   |
| 57         | 9/26/95     | Marion Steel Company  | Report 350 testing of the Minute Man breakaway system with 4.5 kg/m posts in one-, two- or three-post installations. |
| 58         | 9/27/95     | Flexstake             | Flexstake delineator post.   |
| 59         | 3/7/96      | Chicago Heights       | SafetySplice lap splice system for 5.9 kg/m posts or lighter.  |
| 59a        | 4/19/96     | Chicago Heights       | Modify design to use a "bar spacer."   |
| 60         | 10/27/95    | Clifford Dent         | Breakaway sign support coupling.   |
| 60a        | 10/21/96    | Clifford Dent         | Larger bolts with same necked-down diameter as SS-60.  |
| 61         | 2/27/96     | FHWA Region 10        | Revised design for the Oregon multi-directional slipbase.  |

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<sup>‡</sup> These small sign supports were only tested in NCHRP Report 230 S-1 strong soil (Report 350 "standard" soil). Should an agency wish to use this system in a "weak" soil, further crash testing is recommended.

**Table 3. Summary of Federal Highway Administration Small Sign Support Acceptance Letters<sup>†</sup> (continued)**

| <b>No.</b> | <b>Date</b> | <b>Addressee</b>         | <b>Description</b>                                       |
|------------|-------------|--------------------------|--|
| 62         | 6/3/96      | Western Highway Products | Ulti-mate square perforated steel tubes sign supports.   |
| 63         | 7/2/96      | S-Square Tube Products   | Perforated square steel tube sign supports.              |
| 64         | 7/18/96     | Marion Steel             | “Metric” Rib-Bak U-channel steel sign posts.             |
| 65         | 9/5/96      | Southwestern Pipe        | Steel tube slipbase system.                              |
| 66         | 8/8/96      | Universal Anchor         | The Universal Anchoring System for FRP and PozLoc Posts. |
| 67         | 9/9/96      | Franklin Industries      | U-channel post certification.                            |
| 68         | 9/18/96     | X-Cessories Squared      | Slipbase support for a square steel tube post.           |
| 69         | 9/18/96     | Safety Quest             | U-channel slipbase system.                               |
| 70         | 9/25/96     | Richard Buhler           | Sleeve for 100x100 timber posts.                         |

<sup>†</sup> Supports conform to Federal Highway Administration Requirements based on the 1985 AASHTO *Standard Specifications for Highway Signs, Luminaires and Traffic Signals*. After May 1993, velocity change permitted is 5.0 m/s.

<sup>‡</sup> These small sign supports were only tested in NCHRP Report 230 S-1 strong soil (Report 350 “standard” soil). Should an agency wish to use this system in a “weak” soil, further crash testing is recommended.

**Table 4. SUMMARY OF SIGN SUPPORT SYSTEMS ACCEPTABLE TO FHWA**

| System Name                          | Manufacturer                                   | System Designator | Number of posts allowed within a 2100 mm span |             |      |                         |             |      |                  |             |      |                  |     |                      | FHWA Letter |
|--------------------------------------|--|-------------------|---|-------------|------|-------------------------|-------------|------|------------------|-------------|------|------------------|-----|----------------------|-------------|
|                                      |  |                   | 1   |             |      | 2                       |             |      | 3                |             |      |                  |     |                      |             |
|                                      |  |                   | Des.  | Mass (kg/m) | Soil | Des.                    | Mass (kg/m) | Soil | Des.             | Mass (kg/m) | Soil |                  |     |                      |             |
| Break-Safe BS25-LP System            | Transpo Industries                             | SSC01a-b          | --  | 66          | F    | --                      | 33          | F    | --               | --          | --   | --               | --  | 17                   |             |
| Break-Safe B650-LP System            | Transpo Industries                             | SSC02a-b          | --  | 66          | F    | --                      | 33          | F    | --               | --          | --   | --               | --  | 17                   |             |
| Break-Safe A16-LP System             | Transpo Industries                             | SSC03a-b          | --  | 66          | F    | --                      | 33          | F    | --               | --          | --   | --               | --  | 17                   |             |
| Break-Safe A54-LP System             | Transpo Industries                             | SSC04a-b          | --  | 66          | F    | --                      | 33          | F    | --               | --          | --   | --               | --  | 17                   |             |
| Break-Safe A14-LP, A16-LP, A18-LP    | Transpo Industries                             | SSC05a-b          | --  | 66          | F    | --                      | 33          | F    | --               | --          | --   | --               | --  | 17                   |             |
| Break-Safe AUX4, AUX6 & AUX8         | Transpo Industries                             | SSC06a-b          | PPF06<br>PPF16<br>PPF26                       | 6.0         | S    | PPF06<br>PPF16<br>PPF26 | 6.0         | S    | --               | --          | --   | --               | --  | 17                   |             |
| Break-Safe AP3.0-LP - AP4.5-LP       | Transpo Industries                             | SSC07a-b          | --  | 66          | F    | --                      | 33          | F    | --               | --          | --   | --               | 66  | F                    |             |
| Minute Man Breakaway System          | Minute Man Breakaway                           | SSC10a-c          | PPF25   | 4.5         | SW   | PPF25                   | 4.5         | SW   | PPF25            | 4.5         | SW   | PPF25            | 4.5 | SW                   |             |
| Direct Burial Perforated Steel Tube  | Allied Highway Sales<br>Ultimate Highway Sales | SSF01a-b          | PTP12a<br>PTP22b<br>PTP42b                    | 3.6         | S    | PTP12b<br>PTP41b        | 3.1         | SW   | --               | --          | --   | --               | --  | 3 19 40 51<br>62     |             |
| Perforated Steel Tube in Anchor Base | Allied Highway Sales<br>Ultimate Highway Sales | SSF02a-c          | PTP23b<br>PTP43b                              | 4.7         | SW   | PTP22b<br>PTP42b        | 3.6         | SW   | PTP21b<br>PTP41b | 3.1         | SW   | PTP21b<br>PTP41b | 3.1 | SW                   |             |
| FRP Sign Post in Concrete            | HwyCom, Inc.                                   | SSF10a-b          | PPP01   | 1.4         | S    | PPP01                   | 1.4         | S    | --               | --          | --   | --               | --  | 10 12 66             |             |
| Direct Burial Wood Post              | Generic  | SSF20a-b          | PDP24   | NK          | SW   | PDP22                   | NK          | SW   | --               | --          | --   | --               | --  | 25 32 36<br>45 46 50 |             |
| Direct Burial Circular Wood Post     | Generic  | SSF21a            | PDP37   | NK          | --   | --                      | --          | --   | --               | --          | --   | --               | --  | 27 36                |             |
| Rectangular Wood Post in Concrete    | Generic  | SSF22a-b          | PDP24   | NK          | SW   | PDP22                   | NK          | SW   | --               | --          | --   | --               | --  | 32 36                |             |
| Direct Burial Tubular Aluminum post  | Generic  | SSF30a            | PTP32   | NK          | SW   | --                      | --          | --   | --               | --          | --   | --               | --  | 15 28 35             |             |
| Lancaster Direct Burial CP40 Post    | Lancaster Composite                            | SSF31a-b          | PPP02<br>PPP03<br>PPP04                       | NK          | S    | PPP02<br>PPP03<br>PPP04 | NK          | S    | --               | --          | --   | --               | --  | 53 53a 53b           |             |

Soil: F = Foundation Mounted S = Strong Soil W = Weak Soil  
Mass: NK = Not Known



Table 4. SUMMARY OF SIGN SUPPORT SYSTEMS ACCEPTABLE TO FHWA

| System Name                                     | Manufacturer   | System Designator | Number of posts allowed within a 2100 mm span |      |      |                                  |      |      |       |      |      | FHWA Letter |
|---|--|-------------------|---|------|------|----------------------------------|------|------|-------|------|------|-------------|
|   |  |                   | 1   |      |      | 2                                |      |      | 3     |      |      |             |
|   |  |                   | Des.  | Mass | Soil | Des.                             | Mass | Soil | Des.  | Mass | Soil |             |
| Lancaster CP40 Post in Concrete                 | Lancaster Composite                                    | SSF32a-b          | PPF02<br>PPF03<br>PPF04                       | NK   | S    | PPF02<br>PPF03<br>PPF04          | NK   | S    | -     | -    | -    | 53 53a 53b  |
| Lancaster CP40 Post in Steeves                  | Lancaster Composite                                    | SSF33a-b          | PPF02<br>PPF03<br>PPF04                       | NK   | S    | PPF02<br>PPF03<br>PPF04          | NK   | S    | -     | -    | -    | 53 53a 53b  |
| Direct Burial U-Channel Post                    | Marion Steel<br>Chicago Heights<br>Franklin Industries | SSF40a-b          | PPF05<br>PPF15<br>PPF25<br>PPF35              | 4.5  | S    | PPF05<br>PPF15<br>PPF25<br>PPF35 | 4.5  | S    | -     | -    | -    | 5 36        |
| Franklin Base-Bolted Breakaway System           | Franklin Industries                                    | SSF01a-c          | PPF26   | 6.0  | SW   | PPF35                            | 4.5  | SW   | PPF36 | 6.0  | SW   | 20 59 67    |
| Marion Lap Splice Breakaway System              | Marion Steel Company                                   | SSF04a-c          | PPF06   | 6.0  | SW   | PPF06                            | 6.0  | SW   | PPF06 | 6.0  | SW   | 13 56 56a   |
| Safety Splice Breakaway System                  | Chicago Heights Steel                                  | SSF05a-c          | PPF26   | 6.0  | SW   | PPF26                            | 6.0  | SW   | PPF06 | 6.0  | SW   | 59          |
| Erect Ease Breakaway System                     | Chicago Heights Steel                                  | SSF06a            | PPF26   | 6.0  | SW   | PPF26                            | -    | -    | -     | -    | -    | 9           |
| Bracer Bar Breakaway System                     | Chicago Heights Steel                                  | SSF07a-c          | PPF26   | 6.0  | SW   | PPF26                            | 6.0  | SW   | PPF26 | 6.0  | SW   | 59 59a      |
| Franklin Eze-erect                              | Franklin Industries                                    | SSF08a-b          | PPF36   | 6.0  | S    | PPF36                            | 6.0  | S    | -     | -    | -    | 9 32 67     |
| Pos-Loc Yielding Sign Support System            | Southwestern Pipe, Inc.                                | SSF10a-b          | PTF01c  | NK   | S    | PTF01c                           | NK   | S    | -     | -    | -    | 1           |
| Marion Steel Metric Lap Splice Breakaway System | Marion Steel Company                                   | SSF14a-c          | PPF16   | 6.0  | SW   | PPF16                            | 6.0  | SW   | PPF16 | 6.0  | SW   | 13 56 56a   |
| Rectangular Uni-Directional Slipbase            | Generic  | SSS01a            | PWF15a  | 67   | F    | -                                | -    | -    | -     | -    | -    | 5 25        |
| Inclined Rectangular Slipbase                   | Generic  | SSS02a            | PWF25a  | 67   | F    | -                                | -    | -    | -     | -    | -    | 36          |
| Omni-Directional Slipbase with Tube Post        | Generic  | SSS03a            | PTF05a  | 14   | F    | -                                | -    | -    | -     | -    | -    | 36          |
| Omni-Directional Slipbase with W Post           | Generic  | SSS04a            | PWF07a  | 18   | F    | -                                | -    | -    | -     | -    | -    | 36          |
| Unistrut Square Tube Slipbase                   | Unistrut   | SSS05             | PTF24b  | 4.7  | F    | PTF24b                           | 4.7  | F    | PTF24 | 4.7  | F    | 52          |
| Round Post Triangular Slipbase Assembly         | Southwestern Pipe                                      | SSS06a-b          | PTF02c  | -    | F    | PTF02c                           | -    | F    | -     | -    | -    | 63          |
| Inclined Rectangular Slipbase with Tubular Post | Generic  | SSS07a            | PTF06a  | 21   | F    | -                                | -    | -    | -     | -    | -    | 36          |
| Marion Steel Slip Safe (Single)                 | Marion Steel Company                                   | SSS11a-c          | PPF06   | 6.0  | SW   | PPF06                            | 6.0  | SW   | PPF06 | 6.0  | SW   | 64          |
| Marion Steel Slip Safe (Back-to-Back)           | Marion Steel Company                                   | SSS12a-c          | PPF06   | 6.0  | SW   | PPF06                            | 6.0  | SW   | PPF06 | 6.0  | SW   | 64          |

Soil: F = Foundation Mounted S = Strong Soil W = Weak Soil  
 Mass: NK = Not Known

## Index to Names

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| Plain Round Washer . . . . .                   | FWC06a-36a |
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### Post Components

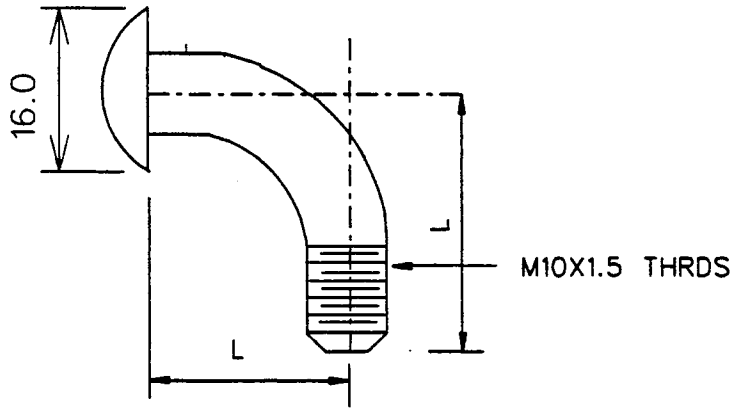
|   |            |
|---|------------|
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## Sign Support Systems

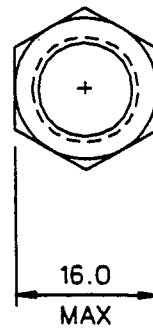
|   |          |
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| Direct Burial Circular Wood Post . . . . .                | SSF21a   |
| Rectangular Wood Post in Concrete . . . . .               | SSF22a-b |
| Direct Burial Tubular Aluminum Post . . . . .             | SSF30a   |
| Lancaster Direct Burial CP40 Post . . . . .               | SSF31a-b |
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| Marion Lap Splice Breakaway System . . . . .              | SSP04a-c |
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| Chicago Heights Erect Ease System . . . . .               | SSP06a   |
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| Unistrut Square Tube Slipbase . . . . .                   | SSS05a-c |
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| Marion Steel Slip Safe Sign Support System . . . . .      | SSS12a-c |

# **FASTENER COMPONENTS**





| DESIGNATOR | L  |
|------------|----|
| FBH05      | 25 |
| FBH06      | 30 |



CLASS 4.6 CORNER BOLT & NUT



FBH05-06

| SHEET NO. | DATE |
|-----------|------|
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### SPECIFICATIONS

Corner bolts shall have M10x1.5 metric threads as defined in ANSI B1.13M for Class 6g threads. Zinc-coated hook bolt material shall conform to ASTM F568 for Class 4.6 bolts (tensile strength 400 MPa and yield strength of 240 MPa). The end of the hook bolt shall be marked with the symbol "4.6". The corner bolt shall conform to the dimensions and tolerances given in IFI 524 for round bend hook bolts.

Zinc-coated nuts shall be manufactured according to the dimensions and tolerances in ANSI B18.2.4.1M for metric Style 1 hex nuts (shown in drawing). Corrosion resistant nuts shall be manufactured according to the dimensions and tolerances in ANSI B18.2.4.6M (not shown in drawing). Threads shall be M10x1.5 Class 6H as defined in ANSI B1.13M. Zinc-coated nuts shall conform to the requirements of AASHTO M291M (ASTM A563M) for Class 5 nuts.

Zinc-coated bolts and nuts shall be treated according to AASHTO M232 (ASTM A153) for Class or AASHTO M298 (ASTM B695) for Class 50.

| Designator | Stress Area of<br>Threaded Bolt Shank<br>(mm <sup>2</sup> ) | Minimum<br>Bolt Strength<br>(kN) |
|------------|---|----------------------------------|
| FBH05-06   | 58.0  | 23.2                             |

Dimensional tolerances not shown or implied are intended to be those consistent with the proper functioning of the part, including its appearance and accepted manufacturing practices.

### INTENDED USE

This corner bolt is for fastening posts to base posts (PTP20a-24b or PTP12a) in the perforated steel tube in anchor base small sign support system (SSF02a-c)

## CLASS 4.6 CORNER BOLT & NUT

# FBH05-06

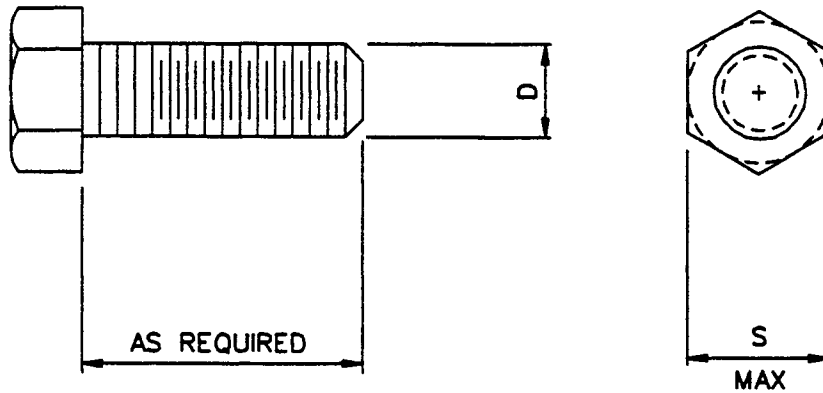
SHEET NO.

DATE

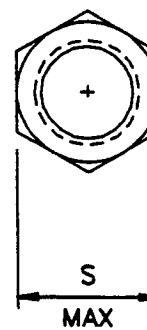
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12-28-96





| DESIGNATOR | ANSI SIZE | D  | M    | S    |
|------------|-----------|----|------|------|
| FBX06a     | M6x1      | 6  | 5.2  | 10.0 |
| FBX08a     | M8x1.25   | 8  | 6.8  | 13.0 |
| FBX10a     | M10x1.5   | 10 | 8.4  | 16.0 |
| FBX12a     | M12x1.75  | 12 | 10.8 | 18.0 |
| FBX14a     | M14x2     | 14 | 12.8 | 21.0 |
| FBX16a     | M16x2     | 16 | 14.8 | 24.0 |
| FBX20a     | M20x3     | 20 | 18.0 | 30.0 |
| FBX24a     | M24x3     | 24 | 21.5 | 36.0 |



## CLASS 4.6 HEX BOLT & NUT



FBX06a-24a

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### SPECIFICATIONS

Class 4.6 bolts shall be manufactured according to the geometric specifications included in ANSI B18.2.3.5M. Threads shall conform to ANSI B1.13M for Class 6g threads. Material for zinc-coated bolts shall conform to ASTM F568 for Class 4.6 (400 MPa tensile strength and 240 MPa yield strength). Material for corrosion resistant bolts shall conform to ASTM F568 for Class 8.8.3 (830 MPa tensile strength and 660 MPa yield strength). Bolt heads shall be marked as specified in ASTM F568 Section 9 with the manufacturer's identification symbol and the symbol "4.6" if zinc-coated and "8.8.3" if corrosion resistant steel is used. ASTM F569 Class 4.6 bolts are essentially equivalent to SAE J429 Grade 2 bolts.

Zinc-coated nuts shall be manufactured according to the dimensions and tolerances in ANSI B18.2.4.1M for metric Style 1 hex nuts (shown in drawing). Corrosion resistant nuts shall be manufactured according to the dimensions and tolerances in ANSI B18.2.4.6M for heavy hex nuts (not shown in drawing). Threads shall conform to ANSI B1.13M for Class 6H. Zinc-coated nuts shall conform to the requirements of AASHTO M291M (ASTM A563M) for Class 5 nuts. Corrosion resistant nuts shall conform to the requirements of AASHTO M291M (ASTM A563M) for Class 8S3 nuts.

Zinc-coated bolts and nuts shall be treated according to either AASHTO M232 (ASTM A153) or AASHTO M298 (ASTM B695) for Class 50.

|        | Stress Area of<br>Designator Threaded Bolt Shank<br>(mm <sup>2</sup> ) | Minimum<br>Bolt Strength<br>(kN) |
|--------|--|----------------------------------|
| FBX06a | 20.1   | 8.0                              |
| FBX08a | 36.6   | 14.6                             |
| FBX10a | 58.0   | 23.2                             |
| FBX12a | 84.3   | 33.7                             |
| FBX14a | 115.0  | 46.0                             |
| FBX16a | 157.0  | 62.8                             |
| FBX20a | 245.0  | 98.0                             |
| FBX24a | 353.0  | 141.0                            |

Dimensional tolerances not shown or implied are intended to be those consistent with the proper functioning of the part, including its appearance and accepted manufacturing practices.

#### INTENDED USE

These bolts and nuts are used in various sign systems.

## CLASS 4.6 HEX BOLT AND NUT

FBX06a-24a

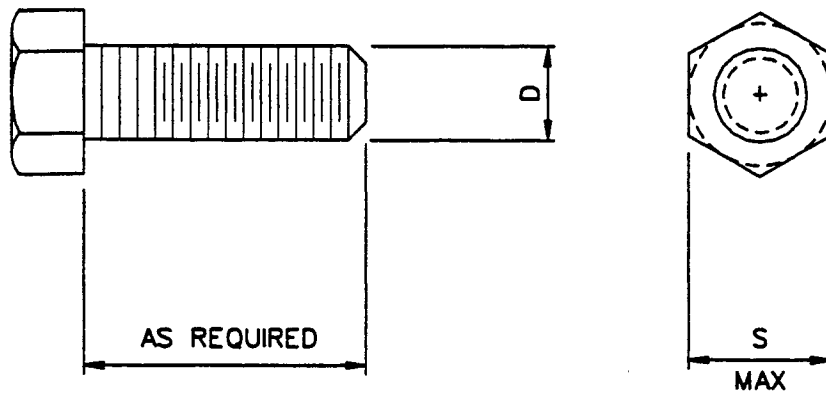


SHEET NO.

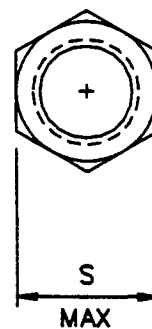
DATE

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| DESIGNATOR | ANSI SIZE | D  | M    | S    |
|------------|-----------|----|------|------|
| FBX06b     | M6x1      | 6  | 5.7  | 10.0 |
| FBX08b     | M8x1.25   | 8  | 7.5  | 13.0 |
| FBX10b     | M10x1.5   | 10 | 9.3  | 16.0 |
| FBX12b     | M12x1.75  | 12 | 12.0 | 18.0 |
| FBX14b     | M14x2     | 14 | 14.1 | 21.0 |



## CLASS 9.8 HEX BOLT & NUT



FBX06b-14b

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### SPECIFICATIONS

Class 9.8 bolts shall be manufactured according to the geometric specifications included in ANSI B18.2.3.5M using material conforming to ASTM F568 Class 9.8 (900 MPa tensile strength and 720 MPa yield strength). Threads shall conform to ANSI B1.13M Class 6g. Bolt heads shall be marked with the symbol "9.8" and the manufacturer's identification symbol as specified in ASTM F568 section 9. ASTM F569 Class 9.8 bolts are essentially equivalent to SAE J429 Grade 5 bolts.

Nuts shall be manufactured according to the dimensions and tolerances in ANSI B18.2.4.2M specifications for metric Style 2 hex nuts. Zinc-coated nuts shall conform to the requirements of AASHTO M291M (ASTM A563M) for Class 12 nuts. Nut threads shall conform to ANSI B1.13M for Class 6H.

Bolts and nuts shall be zinc-coated according to either AASHTO M232 (ASTM A153) for Class C or AASHTO M298 (ASTM B695) Class 50, Type 1.

|        | Stress Area of<br>Designator Threaded Bolt Shank<br>(mm <sup>2</sup> ) | Minimum<br>Bolt Strength<br>(kN) |
|--------|--|----------------------------------|
| FBX06b | 20.1   | 18.1                             |
| FBX08b | 36.6   | 32.9                             |
| FBX10b | 58.0   | 52.2                             |
| FBX12b | 84.3   | 75.9                             |
| FBX14b | 115.0  | 104.0                            |

Dimensional tolerances not shown or implied are intended to be those consistent with the proper functioning of the part, including its appearance and accepted manufacturing practices.

### INTENDED USE

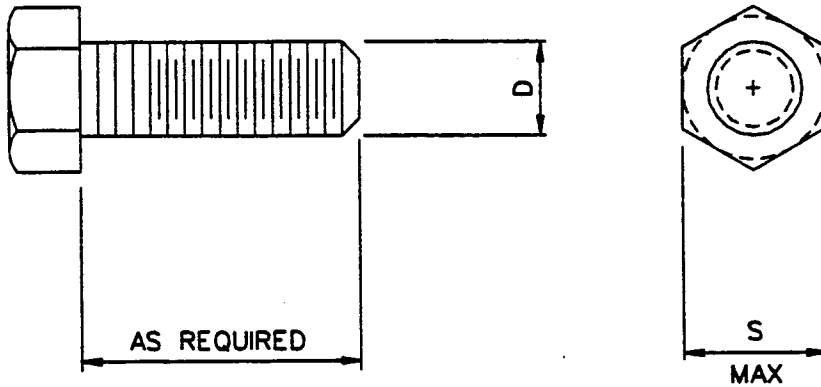
These bolts and nuts are used in various sign systems.

## CLASS 9.8 HEX BOLT AND NUT

FBX06b-14b

|           |          |
|-----------|----------|
| SHEET NO. | DATE     |
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| DESIGNATOR | ANSI SIZE | D  | M    | S    |
|------------|-----------|----|------|------|
| FBX06c     | M6x1      | 6  | 5.2  | 10.0 |
| FBX08c     | M8x1.25   | 8  | 6.8  | 13.0 |
| FBX10c     | M10x1.5   | 10 | 8.4  | 16.0 |
| FBX12c     | M12x1.75  | 12 | 10.8 | 18.0 |
| FBX14c     | M14x2     | 14 | 12.8 | 21.0 |
| FBX16c     | M16x2     | 16 | 14.8 | 24.0 |
| FBX20c     | M20x3     | 20 | 18.0 | 30.0 |
| FBX24c     | M24x3     | 24 | 21.5 | 36.0 |



## CLASS 10.9 HEX BOLT & NUT



FBX06c-24c

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1996

### SPECIFICATIONS

Class 10.9 bolts shall be manufactured according to the geometric specifications included in ANSI B18.2.3.5M. Threads shall conform to ANSI B1.13M for Class 6g threads. Material for zinc-coated bolts shall conform to ASTM F568 for Class 10.9 (1040 MPa tensile strength and 940 MPa yield strength). ASTM F569 Class 10.9 is essentially equivalent to SAE J429 Grade 8 bolts. Bolt heads shall be marked as specified in ASTM F568 Section 9 with the symbol "10S", and the manufacturer's identification symbol.

Zinc-coated nuts shall be manufactured according to the dimensions and tolerances in ANSI B18.2.4.1M for metric Style 1 hex nuts and shall conform to AASHTO M291M (ASTM A563M) for Class 10 nuts. Threads shall conform to ANSI B1.13M for Class 6H.

Zinc-coated bolts and nuts shall be treated according to either AASHTO M232 (ASTM A153) for Class C or AASHTO M298 (ASTM B695) for Class 50, Type 1.

| Designator | Stress Area of<br>Threaded Bolt Shank<br>(mm <sup>2</sup> ) | Minimum<br>Bolt Strength<br>(kN) |
|------------|---|----------------------------------|
| FBX06c     | 20.1  | 20.9                             |
| FBX08c     | 36.6  | 38.1                             |
| FBX10c     | 58.0  | 60.3                             |
| FBX12c     | 84.3  | 87.7                             |
| FBX14c     | 115.0   | 120                              |
| FBX16c     | 157.0   | 163                              |
| FBX20c     | 245.0   | 255                              |
| FBX24c     | 353.0   | 367                              |

Dimensional tolerances not shown or implied are intended to be those consistent with the proper functioning of the part, including its appearance and accepted manufacturing practices.

### INTENDED USE

These bolts and nuts are used in various sign systems.

## CLASS 10.9 HEX BOLT AND NUT

**FBX06c-24c**

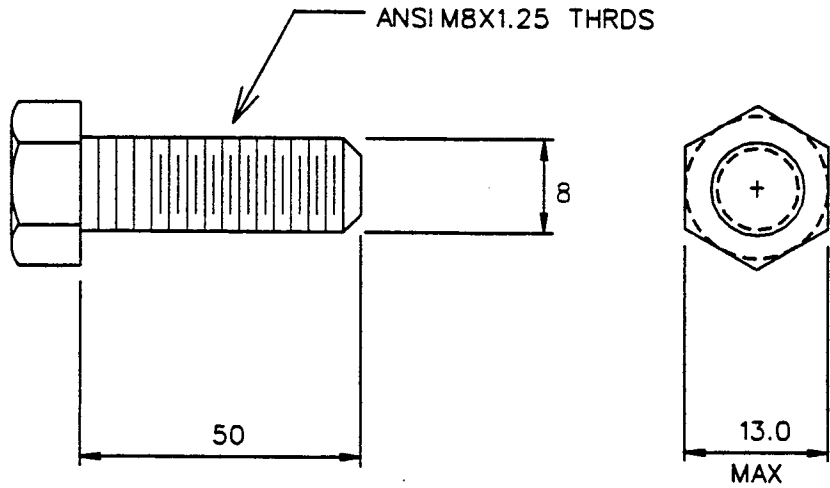
SHEET NO.

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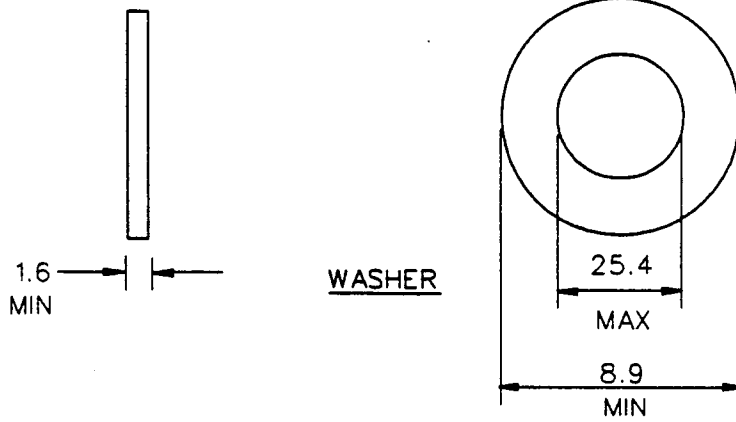
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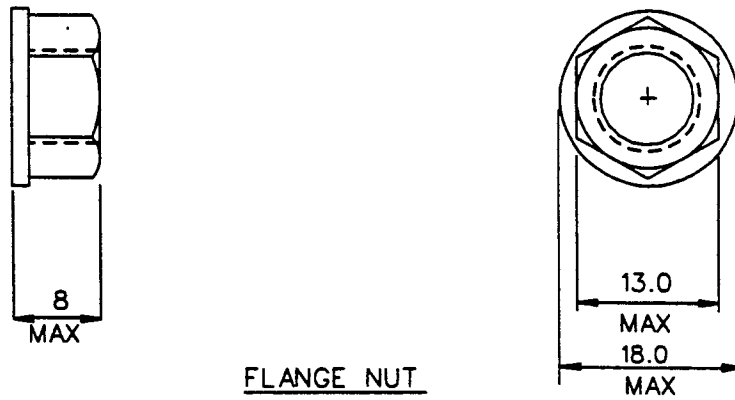




BOLT



WASHER



FLANGE NUT

CLASS 12.9 SPLICE BOLT, WASHER & NUT



FBX08d

SHEET NO.

DATE

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1996

**SPECIFICATIONS**

Class 12.9 bolts shall be manufactured according to the geometric specifications included in ANSI B18.2.3.5M. Threads shall conform to ANSI B1.13M for Class 6g threads. Material for bolts shall conform to ASTM F568 for Class 12.9 (1220 MPa tensile strength and 1100 MPa yield strength). Bolt heads shall be marked as specified in ASTM F568 Section 9 with the manufacturer's identification symbol and the symbol "12.9".

Nuts shall be manufactured according to the dimensions and tolerances in ANSI B18.2.4.4M for metric hex flange nuts. The M8x1.25 threads shall conform to ANSI B1.13M for Class 6H. Nuts shall conform to the requirements of AASHTO M291M (ASTM A563M) for Class 12 nuts. Plain round steel washers shall be manufactured according to the dimensional and tolerances in ANSI B18.22M for regular series washers.

Bolts, nuts, and washers shall be zinc-coated according to either AASHTO M232 (ASTM A153) or AASHTO M298 (ASTM B695) for Class 50.

| Designator | Stress Area of Threaded Bolt Shank (mm <sup>2</sup> ) | Minimum Bolt Strength (kN) |
|------------|---|----------------------------|
| FBX08d     | 36.6  | 44.7                       |

Dimensional tolerances not shown or implied are intended to be those consistent with the proper functioning of the part, including its appearance and accepted manufacturing practices.

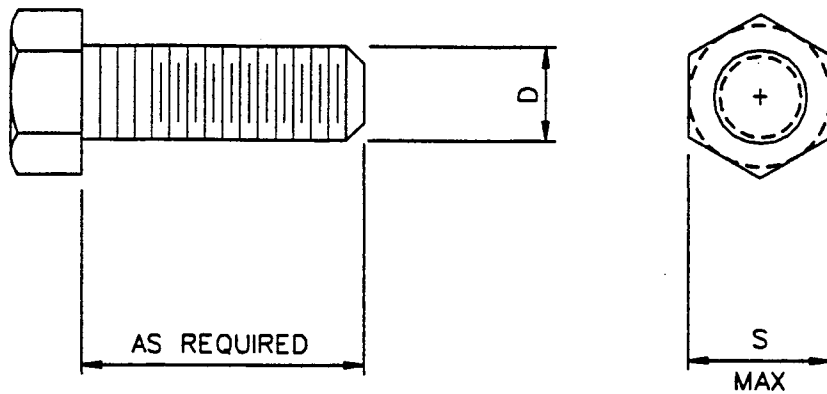
**INTENDED USE**

These bolts, nuts, and washers are used in the SSP04a-c, SSP05a-c, SSP07a-c and SSP14a-c u-channel post splice systems.

**CLASS 12.9 HEX BOLT, WASHER & NUT**

|               |          |
|---------------|----------|
| <b>FBX08d</b> |          |
| SHEET NO.     | DATE     |
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| DESIGNATOR | ANSI SIZE | D  | M    | S    |
|------------|-----------|----|------|------|
| FBX16b     | M16x2     | 16 | 17.1 | 27.0 |
| FBX20b     | M20x2.5   | 20 | 20.7 | 34.0 |
| FBX22b     | M22x2.5   | 22 | 23.6 | 36.0 |
| FBX24b     | M24x3     | 24 | 24.2 | 41.0 |
| FBX27b     | M27x3     | 27 | 27.6 | 46.0 |
| FBX30b     | M30x3.5   | 30 | 30.7 | 50.0 |
| FBX36b     | M36x4     | 36 | 36.6 | 60.0 |



## STRUCTURAL HEX BOLT & NUT



FBX16b-36b

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### SPECIFICATIONS

High-strength heavy hex structural bolts shall conform to the requirements of AASHTO M164M (ASTM A325M) and shall be manufactured according to the geometric specifications included in ANSI B18.2.3.7M. Threads shall conform to ANSI B1.13M for Class 6g. Material for zinc-coated bolts shall conform to AASHTO M164M (ASTM A325M) for Type 1 bolts (800 MPa tensile strength and 660 MPa yield strength) and shall bear the head identification marking "8S" and "A-325M." Material for corrosion resistant bolts shall conform to AASHTO M164M (ASTM A325M) Type 3 bolts and shall bear the head identification marks "8S3", "A 325M", and a symbol identifying the manufacturer

Heavy hex nuts shall be manufactured according to AASHTO M291M (ASTM A563M) using the geometry of ANSI B18.2.4.6M. Threads shall conform to ANSI B1.13M for class 6H threads. Zinc-coated nuts shall conform to AASHTO M291M (ASTM A563M) for Class 10S nuts and shall bear the identification mark "10S", and the manufacturer's identification symbol. Corrosion resistant nuts shall comply to AASHTO M291M (ASTM A563M) for Class 8S3 nuts and shall bear the identification mark "8S3" and the manufacturer's identification symbol.

Zinc-coated bolts and nuts shall be treated according to either AASHTO M232 (ASTM A153) for Class C or AASHTO M298 (ASTM B695) for Class 50, Type 1.

| Designator | Stress Area of Threaded Bolt Shank (mm <sup>2</sup> ) | Minimum Bolt Strength (kN) |
|------------|---|----------------------------|
| FBX16b     | 157.0   | 130.0                      |
| FBX20b     | 245.0   | 203.0                      |
| FBX22b     | 303.0   | 251.0                      |
| FBX24b     | 353.0   | 293.0                      |
| FBX27b     | 459.0   | 381.0                      |
| FBX30b     | 561.0   | 466.0                      |
| FBX36b     | 817.0   | 678.0                      |

Dimensional tolerances not shown or implied are intended to be those consistent with the proper functioning of the part, including its appearance and accepted manufacturing practices.

#### INTENDED USE

These bolts and nuts are used in various sign systems.

## HIGH-STRENGTH STRUCTURAL HEX BOLT & NUT

FBX16b-36b

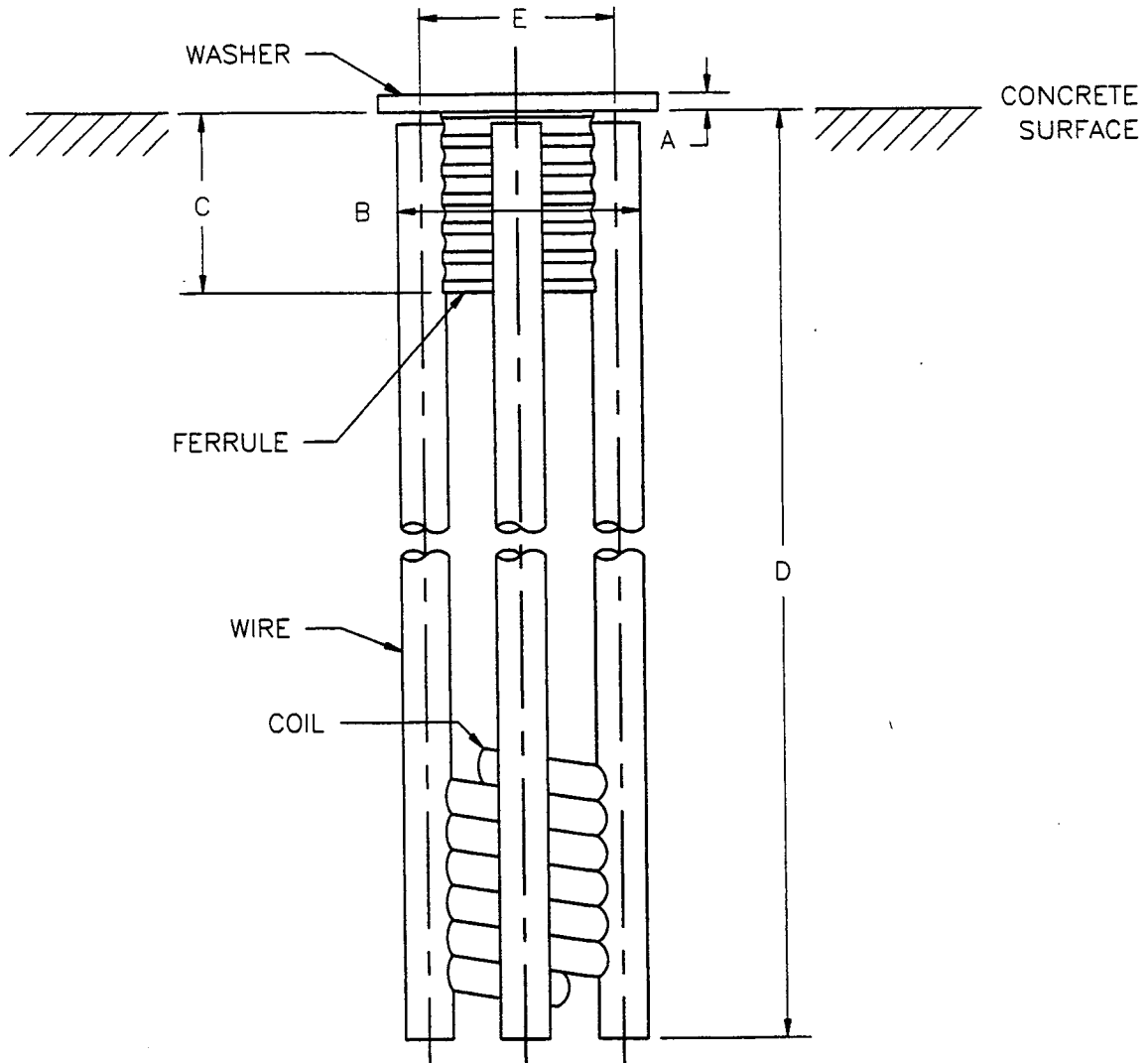
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| DESIGNATOR | A   | B  | C  | D   | E  |
|------------|-----|----|----|-----|----|
| FMA01a     | 1.9 | 39 | 41 | 305 | 16 |
| FMA01b     | 3.0 | 56 | 41 | 381 | 25 |



**BREAK-SAFE<sup>®</sup> TYPE A, TYPE B ANCHOR**

**TRANSPO<sup>®</sup>**  
INDUSTRIES, INC

**FMA01a-b**

|           |         |
|-----------|---------|
| SHEET NO: | DATE    |
| 1 OF 2    | 7/18/95 |

**SPECIFICATIONS**

The Break-Safe Anchor is designed to be embedded in a concrete foundation. The ferrule shall be made using 304 Stainless Steel. The wire shall be AISI 1038 carbon steel and the coil shall be made using AISI 1008 carbon steel. The washer shall be made using 304 stainless steel.

| Designator | A  | B  | C   | D  | E   | Minimum Ultimate<br>Tensile Force (kN) |
|------------|----|----|-----|----|-----|--|
| FMA01a1.9  | 39 | 41 | 305 | 16 | 133 |  |
| FMA01b 3.0 | 56 | 41 | 381 | 25 | 227 |  |

**INTENDED USE**

Transpo Type A and Type B Female Anchors are used with Transpo Industries Breakaway Support Couplings for sign posts or light poles or other systems requiring internally threaded anchor bolts. They minimize the maintenance problem often associated with bent anchor bolts.

**CONTACT INFORMATION**

Transpo Industries, Inc.  
20 Jones Street  
New Rochelle, NY 10801  
Phone: 914-636-1000  
Fax: 914-636-1282

**BREAK-SAFE TYPE A & TYPE B ANCHOR**

**FMA01a-b**



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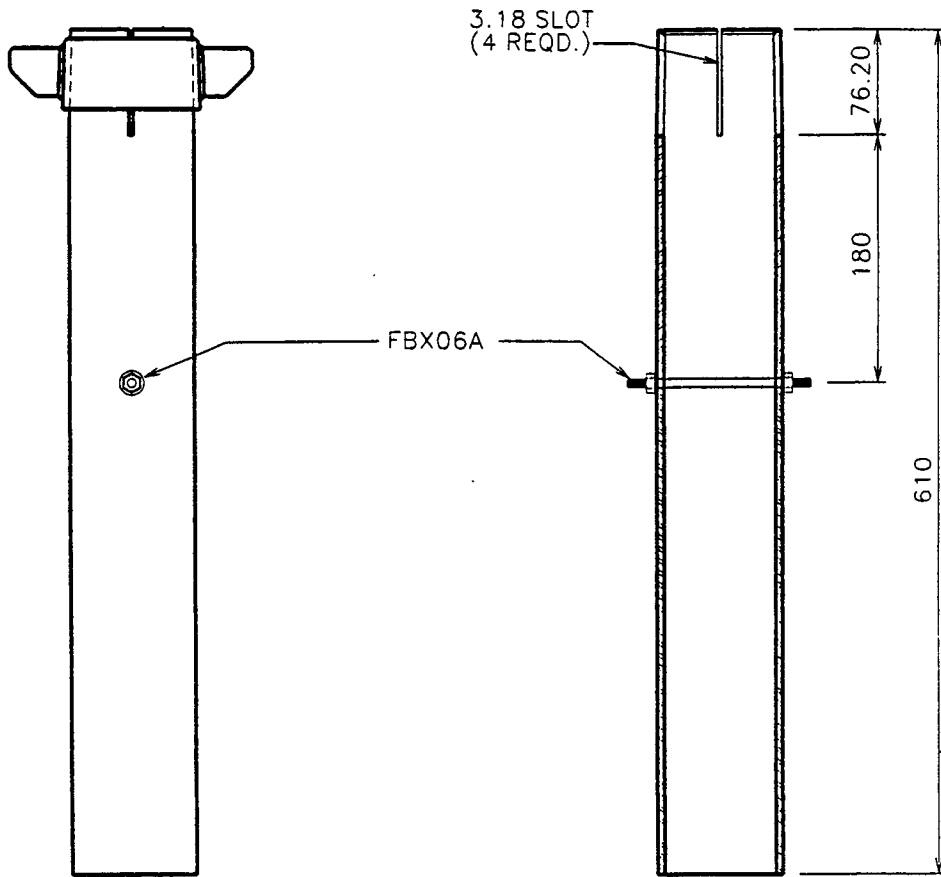
02-01-97



COLLAR

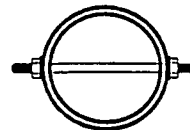


COLLAR SECTION



SIGN POST ANCHOR ASSEMBLED

SIGN POST ANCHOR



# UNIVERSAL SIGN POST ANCHORS



(915) 268-9332 FAX (915) 263-6449  
 110 WEST 22 ND STREET • P. O. BOX 3010  
 BIG SPRING, TX 79721-3010

## FMA02

| SHEET NO. | DATE |
|-----------|------|
| 1 OF 2    | 1996 |

### SPECIFICATIONS

Universal Anchor Systems' anchor consists of a FMA02 anchor consisting of a 76.2 mm pipe with a ductile iron tapered collar. Available with a sleeve insert for PTP01A or PTP01B application.

### INTENDED USE

Universal Anchor Systems' FMA02 anchor can be used in either single or double installations for PTP51 or SSF10a-b. With optional sleeve insert may be used for single application for 60 mm post PTP01A or PTP01B. These systems have been crash tested in strong soil and have been judged to satisfy the requirements of 1985 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaries, and Traffic Signals".

### REFERENCES

Seppo I. Sillan, "Geometric and Roadside Design", Federal Highway Administration Acceptance Letter, SS-66, August 8, 1996.

### CONTACT INFORMATION

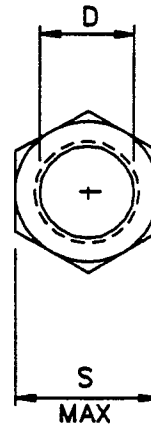
Universal Anchor Systems, L.L.C.  
110 West 22nd Street  
P. O. Box 3010  
Big Spring, TX 79721-3010  
Phone: 915/268-9332  
Fax: 915/263-6449

### UNIVERSAL SIGN POST ANCHORS

|           |      |
|-----------|------|
| FMA02     |      |
| SHEET NO. | DATE |
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(915) 268-9332 FAX (915) 263-6449  
110 WEST 22ND STREET \* P. O. BOX 3010  
BIG SPRING, TX 79721-3010





| DESIGNATOR | ANSI SIZE | D  | M<br>MAX | S<br>MAX |
|------------|-----------|----|----------|----------|
| FNX06a     | M6x1      | 6  | 5.2      | 10.0     |
| FNX08a     | M8x1.25   | 8  | 6.8      | 13.0     |
| FNX10a     | M10x1.5   | 10 | 8.4      | 16.0     |
| FNX12a     | M12x1.75  | 12 | 10.8     | 18.0     |
| FNX14a     | M14x2     | 14 | 12.8     | 21.0     |
| FNX16a     | M16x2     | 16 | 14.8     | 24.0     |
| FNX20a     | M20x3     | 20 | 18.0     | 30.0     |
| FNX24a     | M24x3     | 24 | 21.5     | 36.0     |
| FNX30a     | M30x3.5   | 30 | 25.6     | 46.0     |
| FNX36a     | M36x4     | 36 | 31.0     | 55.0     |

## CLASS 5 HEX NUTS



FNX06a-36a

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### SPECIFICATIONS

Zinc-coated nuts shall be manufactured according to the dimensions and tolerances included in ANSI B18.2.4.1M for Style 1 hex nuts (shown in drawing). Corrosion resistant nuts shall be manufactured according to the dimensions and tolerances in ANSI B18.2.4.6M for heavy hex nuts (not shown in drawing). Nuts shall conform to the requirements of AASHTO M291M (ASTM A563M) for Class 5 nuts. Corrosion resistant nuts shall have geometric properties defined in ANSI B18.2.4.1M but shall have mechanical and material properties conforming to AASHTO M291M (ASTM A563M) for Class 8S3 nuts. Threads shall conform to ANSI B1.13M Class 6H. Zinc-coated nuts shall be treated according to either AASHTO M232 (ASTM A153) for Class C or AASHTO M298 (ASTM B695) for Class 50, Type 1.

Dimensional tolerances not shown or implied are intended to be those consistent with the proper functioning of the part, including its appearance and accepted manufacturing practices.

### INTENDED USE

These nuts are used in various sign support systems.

## CLASS 5 HEX NUTS

**FNX06a-36a**

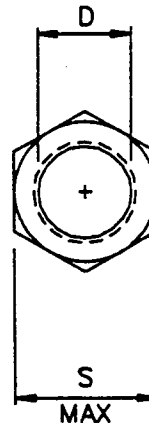
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| DESIGNATOR | ANSI SIZE | D  | M<br>MAX | S<br>MAX |
|------------|-----------|----|----------|----------|
| FNX06b     | M6x1      | 6  | 5.7      | 10.0     |
| FNX08b     | M8x1.25   | 8  | 7.5      | 13.0     |
| FNX10b     | M10x1.5   | 10 | 9.3      | 16.0     |
| FNX12b     | M12x1.75  | 12 | 12.0     | 18.0     |
| FNX14b     | M14x2     | 14 | 14.1     | 21.0     |

## CLASS 12 HEX NUTS



FNX06b-14b

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### SPECIFICATIONS

Nuts shall be manufactured according to the dimensions and tolerances in ANSI B18.2.4.2M for Style 2 hex nuts. Zinc-coated nuts shall conform to AASHTO M291M (ASTM A563M) for Class 12 nuts. Corrosion resistant nuts shall conform to the requirements of AASHTO M291(ASTM A563M) for Class 8S3 nuts. Threads shall conform to ANSI B1.13M for Class 6H. Zinc-coated nuts shall be treated according to either AASHTO M232 (ASTM A153) Class C or AASHTO M298 (ASTM B695) Class 50, Type 1.

Dimensional tolerances not shown or implied are intended to be those consistent with the proper functioning of the part, including its appearance and accepted manufacturing practices.

### INTENDED USE

High strength nuts are used in various sign support systems.

## CLASS 12 HEX NUTS

**FNX06b-14b**

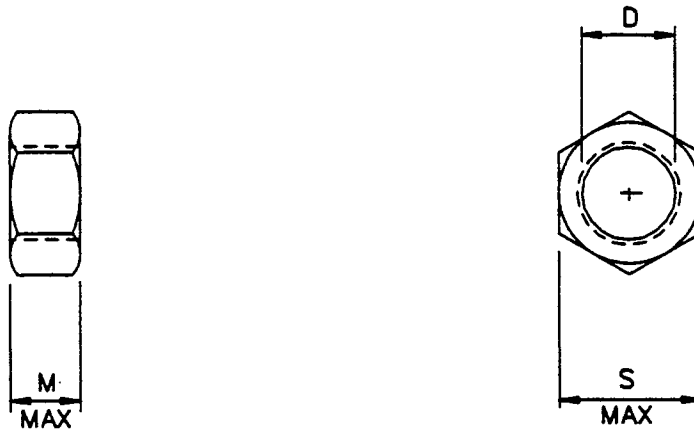
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| DESIGNATOR | ANSI SIZE | D  | M<br>MAX | S<br>MAX |
|------------|-----------|----|----------|----------|
| FNX06c     | M6x1      | 6  | 5.2      | 10.0     |
| FNX08c     | M8x1.25   | 8  | 6.8      | 13.0     |
| FNX10c     | M10x1.5   | 10 | 8.4      | 16.0     |
| FNX12c     | M12x1.75  | 12 | 10.8     | 18.0     |
| FNX14c     | M14x2     | 14 | 12.8     | 21.0     |
| FNX16c     | M16x2     | 16 | 14.8     | 24.0     |
| FNX20c     | M20x3     | 20 | 18.0     | 30.0     |
| FNX24c     | M24x3     | 24 | 21.5     | 36.0     |
| FNX30c     | M30x3.5   | 30 | 25.6     | 46.0     |
| FNX36c     | M36x4     | 36 | 31.0     | 55.0     |

## CLASS 10 HEX NUTS



FNX06c-36c

SHEET NO.

DATE

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1996

### SPECIFICATIONS

Zinc-coated nuts shall be manufactured according to the dimensions and tolerances included in ANSI B18.2.4.1M for Style 1 hex nuts (shown in drawing). Nuts shall conform to the requirements of AASHTO M291M (ASTM A563M) for Class 10 nuts. Threads shall conform to ANSI B1.13M Class 6H. Zinc-coated nuts shall be treated according to either AASHTO M232 (ASTM A153) Class C or AASHTO M298 (ASTM B695) Class 50, Type 1.

Dimensional tolerances not shown or implied are intended to be those consistent with the proper functioning of the part, including its appearance and accepted manufacturing practices.

### INTENDED USE

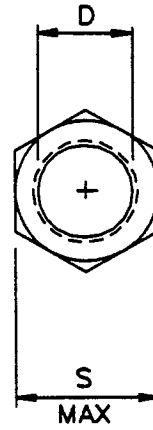
These nuts are used in various sign support systems.

## CLASS 10 HEX NUTS

**FNX06c-36c**

| SHEET NO. | DATE     |
|-----------|----------|
| 2 of 2    | 12-28-96 |





| DESIGNATOR | ANSI SIZE | D  | M<br>MAX | S<br>MAX |
|------------|-----------|----|----------|----------|
| FNX16b     | M16x2     | 16 | 17.1     | 27.0     |
| FNX20b     | M20x2.5   | 20 | 20.7     | 34.0     |
| FNX22b     | M22x2.5   | 22 | 23.6     | 36.0     |
| FNX24b     | M24x3     | 24 | 24.2     | 41.0     |
| FNX27b     | M27x3     | 27 | 27.6     | 46.0     |
| FNX30b     | M30x3.5   | 30 | 30.7     | 50.0     |
| FNX36b     | M36x4     | 36 | 36.6     | 60.0     |

CLASS 10S HEX NUTS



FNX16b-36b

SHEET NO.

DATE

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1996

### SPECIFICATIONS

The dimensions and tolerances of high strength nuts shall conform to ANSI B18.2.4.6M for heavy hex nuts. Zinc-coated nuts shall conform to the requirements of AASHTO M291M (ASTM A563M) for Class 10S nuts and shall bear the identification mark "10S" and the manufacturer's identification symbol. Corrosion resistant nuts shall conform to the requirements of AASHTO M291M (ASTM A563M) for Class 8S3 nuts and shall bear the identification marking "8S3" and the manufacturer's identification symbol. Threads shall conform to ANSI B1.13M Class 6H. Zinc-coated nuts shall be treated according to AASHTO M232 (ASTM A153) Class C or AASHTO M298 (ASTM B695) Class 50, Type 1.

Dimensional tolerances not shown or implied are intended to be those consistent with the proper functioning of the part, including its appearance and accepted manufacturing practices.

### INTENDED USE

High strength nuts are used in various sign support systems.

## CLASS 10S HEX NUTS

**FNX16b-36b**

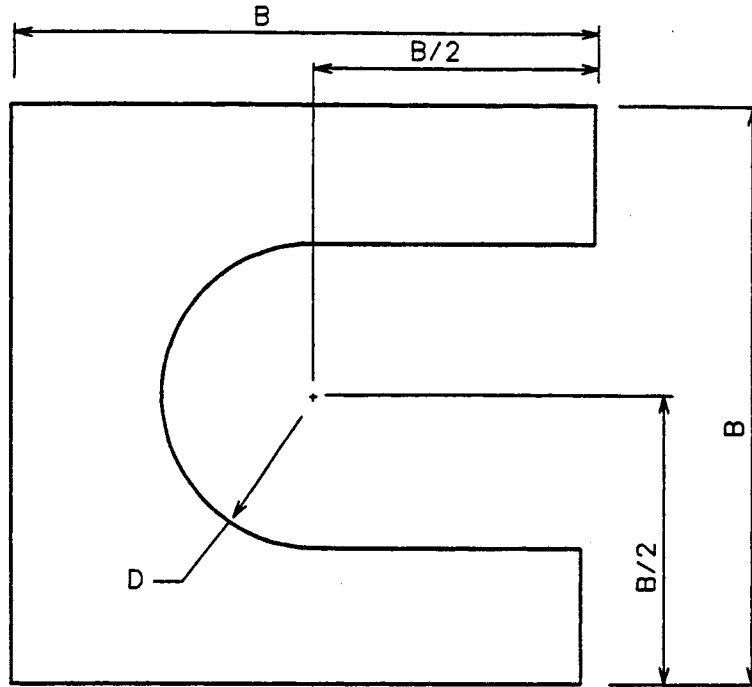
SHEET NO.

DATE

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| DESIGNATOR | THICKNESS |      | D  | B  |
|------------|-----------|------|----|----|
|            | a         | b    |    |    |
| FPP11      | 0.30      | 0.80 | 8  | 40 |
| FPP12      | 0.30      | 0.80 | 10 | 45 |
| FPP13      | 0.30      | 0.80 | 12 | 55 |
| FPP14      | 0.30      | 0.80 | 14 | 60 |
| FPP15      | 0.30      | 0.80 | 15 | 70 |

## SLIPBASE SHIM



FPP11a-15b

SHEET NO:

DATE

1 OF 2

1996

### SPECIFICATIONS

Omni-directional sign support shims shall be manufactured using brass conforming to ASTM B36. Two shims of each thickness should be provided for each of the three bolts in the omni-directional sign support system.

### INTENDED USE

These shims are used in a variety of slipbase small sign support systems including the rectangular uni-directional slipbase (SSS01a-b), the inclined rectangular uni-directional slipbase (SSS02a), omni-directional slipbase with tube post (SSS03a), omni-directional slipbase with W-section sign post (SSS04a), and inclined rectangular slipbase with tubular sign post (SSS07a). The shims are inserted between the upper slipbase plate and the keeper plate in order to level the sign post.

## SLIPBASE SHIM

FPP11a-15b

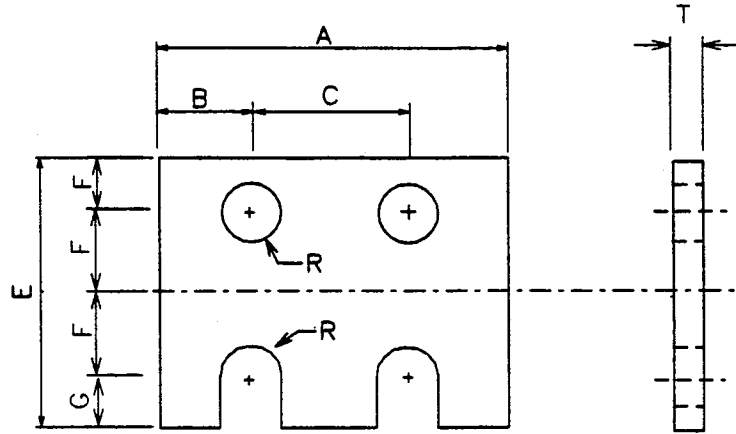
SHEET NO.

DATE

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| DESIGNATOR | BOLT   | POST  | A   | B  | C   | E   | F   | G  | R  | T  |
|------------|--------|-------|-----|----|-----|-----|-----|----|----|----|
| FPP21      | FBX12b | PWF11 | 60  | 11 | 38  | 368 | 92  | 14 | 7  | 10 |
| FPP22      | FBX16b | PWF12 | 100 | 22 | 56  | 368 | 92  | 14 | 9  | 10 |
| FPP23      | FBX20b | PWF13 | 165 | 38 | 89  | 420 | 105 | 15 | 11 | 12 |
| FPP24      | FBX25b | PWF14 | 204 | 32 | 140 | 472 | 118 | 16 | 14 | 16 |
| FPP25      | FBX25b | PWF15 | 254 | 57 | 140 | 560 | 140 | 20 | 14 | 20 |

## FUSE PLATE



FPP21-25

SHEET NO:

DATE

1 of 2

1996



### SPECIFICATIONS

Fuse plates shall be manufactured using AASHTO M183M (ASTM A36M) steel plate. After all cutting and drilling is complete the plate shall be zinc coated according to ASSHTO M111 (ASTM A123).

### INTENDED USE

Fuse plates are used in several slipbase sign support designs that use structural wide-flange shapes as sign posts (SSS01a-b and SSS04a-b). The fuse plate is used to connect a sign post to the upper sign post (PWF11a-15a). The connection is located at least 2100 mm above the ground and just below the sign. During an impact the fuse plate (the plate with two slots) releases from the impact (tension) side of the sign post. The compression flange of the sign post (PWF11a-15a) deforms plastically allowing the sign post to rotate up and let the vehicle pass underneath. The nuts (lubricated) on the bolts connecting the fuse and hinge plates to the wide flange shape must be tightened to the appropriate torque to achieve proper breakaway performance.

Dimensional tolerances not shown or implied are intended to be those consistent with the proper functioning of the part, including its appearance and accepted manufacturing practices.

## FUSE PLATE

**FPP21a-25b**

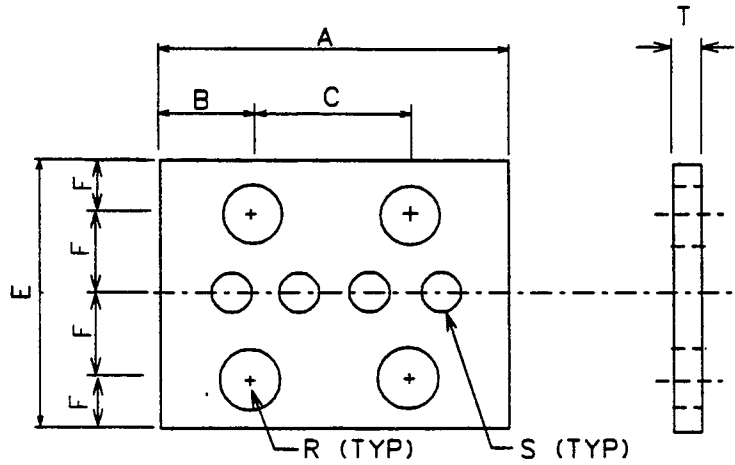
SHEET NO.

DATE

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| DESIGNATOR | BOLT   | POST  | A   | B  | C   | E   | F   | R  | S  | T  |
|------------|--------|-------|-----|----|-----|-----|-----|----|----|----|
| FPP31      | FBX12b | PWF11 | 60  | 11 | 38  | 368 | 92  | 7  | 10 | 10 |
| FPP32      | FBX16b | PWF12 | 100 | 22 | 56  | 368 | 92  | 9  | 20 | 10 |
| FPP33      | FBX20b | PWF13 | 165 | 38 | 89  | 420 | 105 | 11 | 24 | 12 |
| FPP34      | FBX25b | PWF14 | 204 | 32 | 140 | 472 | 118 | 14 | 28 | 16 |
| FPP35      | FBX25b | PWF15 | 254 | 57 | 140 | 560 | 140 | 14 | 34 | 20 |

## PERFORATED FUSE PLATE



FPP31-35

SHEET NO:

DATE

1 of 2

1996

### SPECIFICATIONS

Perforated fuse plates shall be manufactured using AASHTO M183M (ASTM A36M) steel plate. After all cutting and drilling is complete the plate shall be zinc coated according to ASSHTO M111 (ASTM A123). Some recent research has indicated that using AASHTO M223M (ASTM A572) Grade 345 steel plate can improve the connection strength for wind loading without adversely affecting the safety performance of the fuse plate and hinge.

### INTENDED USE

Perforated fuse plates are used in several slipbase sign support designs that use structural wide-flange shapes as sign posts (SSS01a-b and SSS04a-b). The fuse plate is used to connect a sign post to the upper sign post (PWF11a-15a). The connection is located at least 2100 mm above the ground and just below the sign. During an impact the perforated fuse plate tears through the holes on the impact (tension) side of the sign post. The compression flange of the sign post (PWF11a-15a) deforms plastically allowing the sign post to rotate up and let the vehicle pass underneath. The nuts (lubricated) on the bolts connecting the fuse plate to the wide flange shape must be tightened to the appropriate torque to achieve proper breakaway performance.

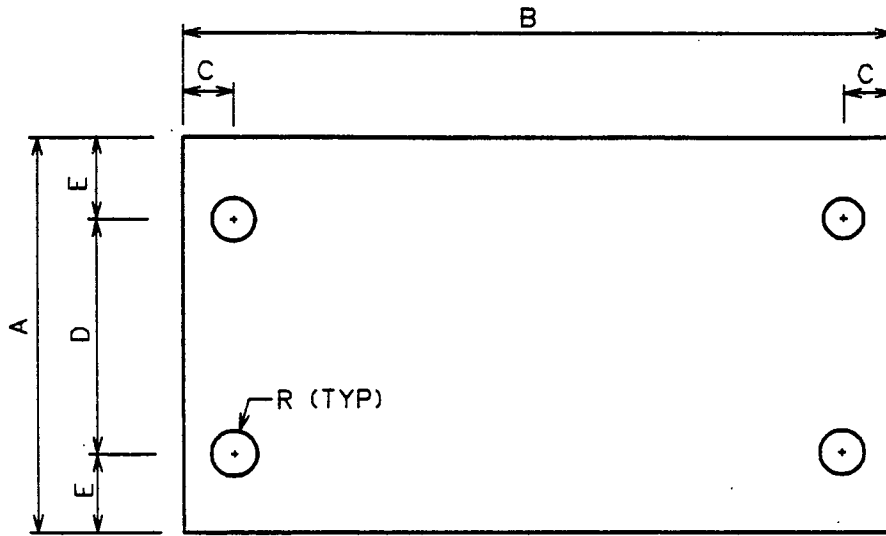
Dimensional tolerances not shown or implied are intended to be those consistent with the proper functioning of the part, including its appearance and accepted manufacturing practices.

### REFERENCE

J. D. Reid, "Development of a Modified Tension Fuse Plate for Dual Support Breakaway Signs," Transportation Research Record, Transportation Research Board, Washington, D.C., 1996.

## PERFORATED FUSE PLATE

|                   |          |  |
|-------------------|----------|--|
| <b>FPP31a-35b</b> |          |    |
| SHEET NO.         | DATE     |  |
| 2 of 2            | 12-28-96 |  |



0.4 THK PLT (28 GAUGE)

| DESIGNATOR | A   | B   | C  | D   | E  | R  |
|------------|-----|-----|----|-----|----|----|
| FPS01      | 100 | 180 | 20 | 50  | 25 | 7  |
| FPS02      | 102 | 250 | 20 | 50  | 26 | 9  |
| FPS03      | 166 | 320 | 22 | 80  | 43 | 11 |
| FPS04      | 202 | 400 | 32 | 120 | 41 | 14 |
| FPS05      | 254 | 450 | 32 | 150 | 52 | 14 |
| FPS06      | 120 | 310 | 20 | 64  | 28 | 9  |

## RECTANGULAR KEEPER PLATE

FPS01-06

|           |      |
|-----------|------|
| SHEET NO: | DATE |
| 1 OF 2    | 1996 |

### SPECIFICATIONS

Rectangular slipbase base keeper plates shall be manufactured from 0.4-mm thick (28 gauge) AASHTO M183M (ASTM A36M) sheet steel. After all cutting and punching is complete, the keeper plate shall be zinc coated according to AASHTO M111 (ASTM A123).

Dimensional tolerances not shown or implied are intended to be those consistent with the proper functioning of the part, including its appearance and accepted manufacturing practices.

### INTENDED USE

Rectangular slipbase keeper plates are a component of the uni-directional slipbase sign support systems (SSS01a-b, SSS02a-b and SSS07a). The keeper plate is installed between the two slipbase plates and is intended to keep the slipbase bolts from moving from the root of slipbase slots during normal operations. During an impact, the slipbase bolts tear through the keeper plate releasing the sign post from the base.

## RECTANGULAR KEEPER PLATE

FPS01-06

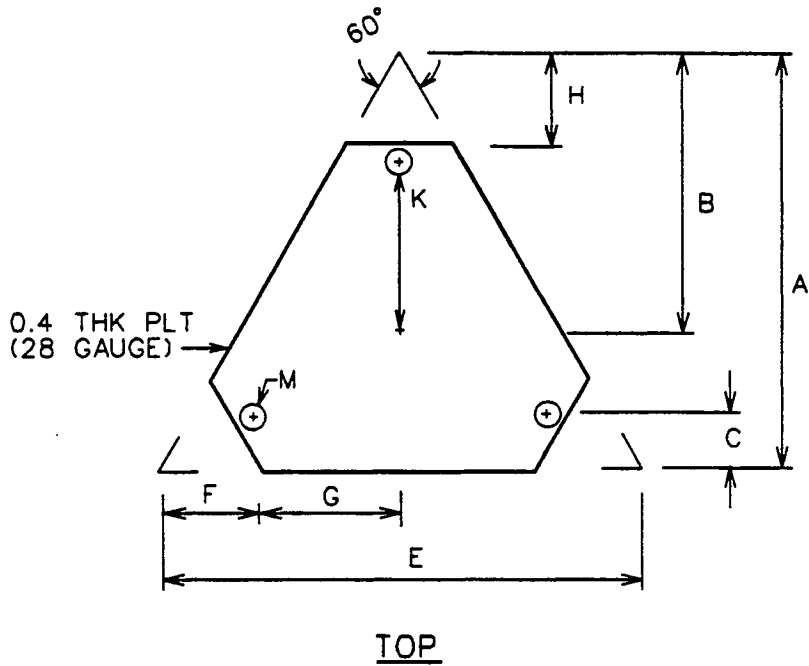
SHEET NO.

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| DESIGNATOR | A   | B   | C  | E   | F  | G  | H  | K   | M  |
|------------|-----|-----|----|-----|----|----|----|-----|----|
| FPS10      | 225 | 150 | 32 | 260 | 57 | 73 | 50 | 90  | 9  |
| FPS11      | 286 | 190 | 38 | 330 | 73 | 92 | 54 | 114 | 15 |

OMNI-DIRECTIONAL KEEPER PLATE



FPS10-11

|           |      |
|-----------|------|
| SHEET NO: | DATE |
| 1 OF 2    | 1996 |

**SPECIFICATIONS**

Omni-directional slipbase base keeper plates shall be manufactured from 0.4-mm thick (28 gauge) AASHTO M183M (ASTM A36M) sheet steel. After all cutting and punching is complete, the keeper plate shall be zinc coated according to AASHTO M111 (ASTM A123).

Dimensional tolerances not shown or implied are intended to be those consistent with the proper functioning of the part, including its appearance and accepted manufacturing practices.

**INTENDED USE**

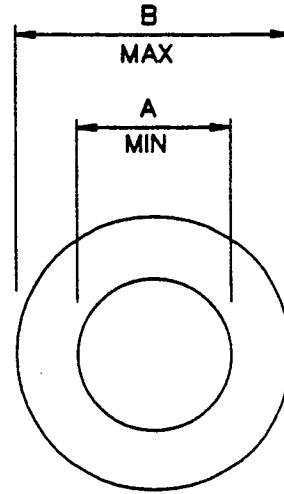
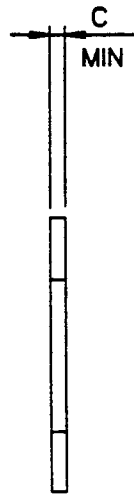
Omni-directional slipbase keeper plates are a components of the omni-directional slipbase sign support systems (SSS03a-b and SSS04a-b). The keeper plate is installed between the two slipbase plates and is intended to keep the slipbase bolts from moving from the root of the slipbase slots during normal operations. During an impact, the slipbase bolts tear through the keeper plate releasing the sign post from the base.

**OMNI-DIRECTIONAL KEEPER PLATE**

**FPS10-11**

|                  |             |
|------------------|-------------|
| <b>SHEET NO.</b> | <b>DATE</b> |
| 2 of 2           | 12-28-96    |





| DESIGNATOR | A<br>MIN | B<br>MAX | C<br>MIN | ANSI<br>SIZE |
|------------|----------|----------|----------|--------------|
| FWC06a     | 6.65     | 18.80    | 1.20     | 6            |
| FWC08a     | 8.90     | 25.40    | 1.60     | 8            |
| FWC10a     | 10.85    | 28.00    | 2.00     | 10           |
| FWC12a     | 13.30    | 34.00    | 2.50     | 12           |
| FWC14a     | 15.25    | 39.00    | 2.50     | 14           |
| FWC16a     | 17.25    | 44.00    | 3.00     | 16           |
| FWC20a     | 21.80    | 50.00    | 3.50     | 20           |
| FWC24a     | 25.60    | 56.00    | 4.00     | 24           |
| FWC30a     | 32.40    | 72.00    | 4.50     | 30           |
| FWC36a     | 38.30    | 90.00    | 5.00     | 36           |

## PLAIN ROUND WASHER



FWC06a-36a

SHEET NO.

REF. NO.

1 of 2

F-13-73



### SPECIFICATIONS

Plain round steel washers shall be manufactured according to the dimensions and tolerances in ANSI B18.22M for regular series washers. Unless corrosion resistant steel is used, washers shall be zinc-coated according to AASHTO M232 (ASTM A153) for Class D or AASHTO M298 (ASTM B695) for Class 50.

Dimensional tolerances not shown or implied are intended to be those consistent with the proper functioning of the part, including its appearance and accepted manufacturing practices.

### INTENDED USE

Plain round steel washers are used in a variety of applications in several barrier systems. These washers are usually used with standard-strength bolts and nuts as shown in this guide for FBX06a-36a.

## PLAIN ROUND WASHER

FWC06a-36a

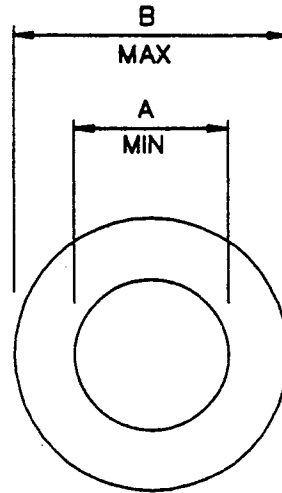
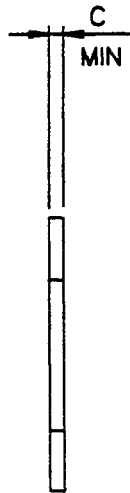
SHEET NO.

DATE

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| DESIGNATOR | A<br>MIN | B<br>MAX | C<br>MIN | ANSI<br>SIZE |
|------------|----------|----------|----------|--------------|
| FWC12b     | 14.0     | 27.0     | 3.1      | 12           |
| FWC14b     | 16.0     | 30.0     | 3.1      | 14           |
| FWC16b     | 18.0     | 34.0     | 3.1      | 16           |
| FWC20b     | 22.0     | 42.0     | 3.1      | 20           |
| FWC22b     | 24.0     | 44.0     | 3.4      | 22           |
| FWC24b     | 26.0     | 50.0     | 3.4      | 24           |
| FWC27b     | 30.0     | 56.0     | 3.4      | 27           |
| FWC30b     | 33.0     | 60.0     | 3.4      | 30           |
| FWC36b     | 39.0     | 72.0     | 3.4      | 36           |

## HARDENED ROUND WASHER



FWC12b-36b

SHEET NO.

REF. NO.

1 of 2

F-11-73

### SPECIFICATIONS

Hardened steel washers shall be manufactured according to the requirements of AASHTO M293M (ASTM A436M). If zinc-coated plain steel washers are required, they shall be treated according to either AASHTO M232 (ASTM A153) for Class D or AASHTO M298 (ASTM B695) for Class 50.

Dimensional tolerances not shown or implied are intended to be those consistent with the proper functioning of the part, including its appearance and accepted manufacturing practices.

### INTENDED USE

Hardened steel washers are used in a variety of applications in several barrier systems. These washers are generally used with AASHTO M164M (ASTM A325M) high-strength structural bolts and AASHTO M291M (ASTM A563M) high-strength heavy-hex nuts such as those shown in this guide for FBX16b-36b high-strength bolts and nuts.

## HARDENED ROUND WASHER

FWC12b-36b

SHEET NO.

DATE

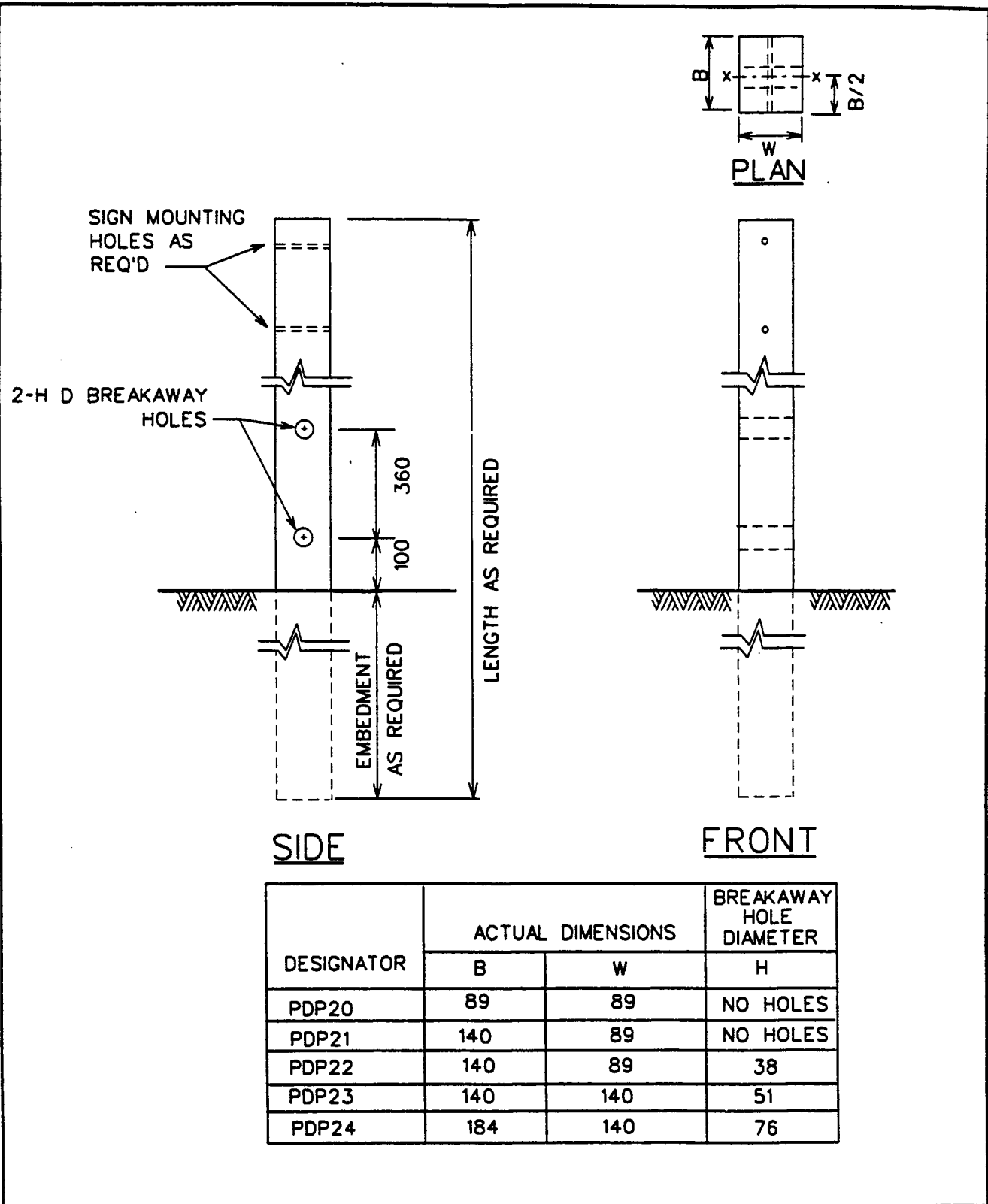
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12-28-96



# **POST COMPONENTS**





RECTANGULAR TIMBER SIGN POST



|           |      |
|-----------|------|
| PDP20-24  |      |
| SHEET NO: | DATE |
| 1 of 2    | 1996 |

### SPECIFICATIONS

Posts of the following species and grades are acceptable as described in American Softwood Lumber Standard PS-20.

| Species           | Grade |
|-------------------|-------|
| Southern Pine     | No. 2 |
| Douglas Fir       | No. 2 |
| Western Hemlock   | No. 1 |
| Ponderosa Pine    | No. 2 |
| Red Pine          | No. 2 |
| Western Red Cedar | No. 1 |

Timber for posts shall be either surfaced four sides (S4S) with nominal dimensions indicated. All timber sign posts shall receive a preservation treatment suitable for ground contact exposure in accordance with AASHTO M133. The preservative shall be applied after the sign post is sawn, dressed and end-trimmed. When required, breakaway holes may be pre-drilled or drilled in the field. Inertial properties shown below are based on the actual dimensions of an S4S post through the breakaway holes.

| Designator | Area<br>(10 <sup>3</sup> mm <sup>2</sup> ) | I <sub>x</sub><br>(10 <sup>6</sup> mm <sup>4</sup> ) | I <sub>y</sub><br>(10 <sup>6</sup> mm <sup>4</sup> ) | S <sub>x</sub><br>(10 <sup>3</sup> mm <sup>3</sup> ) | S <sub>y</sub><br>(10 <sup>3</sup> mm <sup>3</sup> ) |
|------------|--|--|--|--|--|
| PDP20      | 7.9  | 5.2  | 5.2  | 117.5  | 117.7  |
| PDP21      | 12.5                                       | 20.4   | 8.2  | 290.7  | 184.8  |
| PDP22      | 9.1  | 19.9   | 6.0  | 284.9  | 134.7  |
| PDP23      | 12.5                                       | 30.5   | 20.4   | 435.2  | 290.7  |
| PDP24      | 15.2                                       | 67.6   | 24.7   | 752.8  | 352.8  |

Dimensional tolerances not shown or implied are intended to be those consistent with the proper functioning of the part, including its appearance and accepted manufacturing practices.

#### INTENDED USE

These posts are used in the direct burial wood post sign support system (SSF20a-b) and the rectangular wood in concrete small sign support system (SSF22a-b). The posts can be embedded directly in soil but some states prefer to embed the post in either soilcrete or concrete to enhance the breakaway performance.

#### REFERENCE

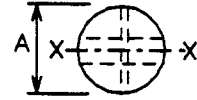
L. A. Staron, "Breakaway Wood Posts," Geometric and Roadside Design Acceptance Letter SS-32, Federal Highway Administration, October 28, 1992.

## RECTANGULAR TIMBER SIGN POST

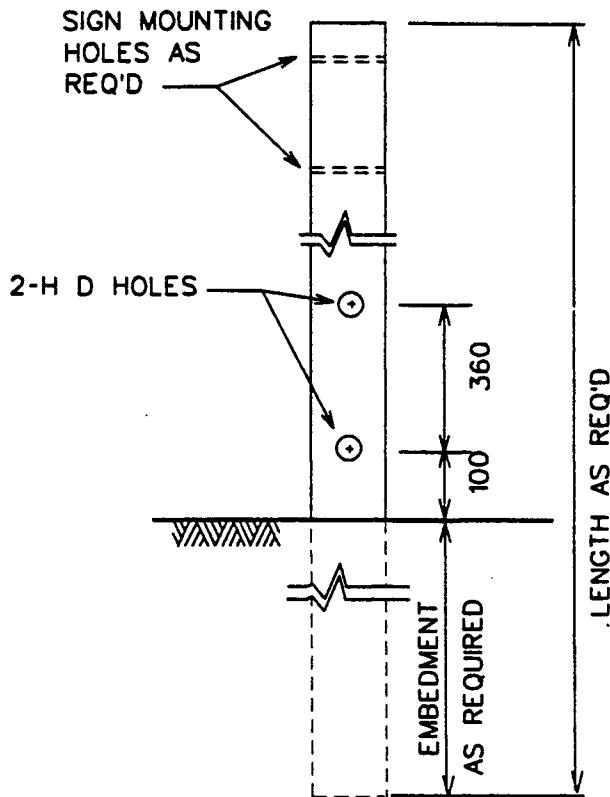
PDP20-24

|           |          |
|-----------|----------|
| SHEET NO. | DATE     |
| 2 of 2    | 12-28-96 |

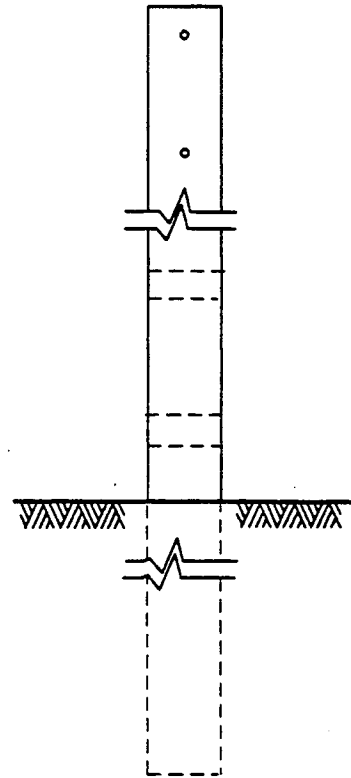




PLAN



SIDE



FRONT

| DESIGNATOR | ACTUAL DIMENSIONS |          |
|------------|-------------------|----------|
|            | A                 | H        |
| PDP30      | 102               | NO HOLES |
| PDP31      | 114               | NO HOLES |
| PDP32      | 127               | NO HOLES |
| PDP33      | 152               | 19       |
| PDP34      | 165               | 32       |
| PDP35      | 178               | 51       |
| PDP36      | 191               | 70       |

CIRCULAR TIMBER SIGN POST



PDP30-36

SHEET NO:

DATE

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1996



## SPECIFICATIONS

Circular posts of the following species and grades are acceptable as described in American Softwood Lumber Standard PS-20.

| Species           | Grade |
|-------------------|-------|
| Southern Pine     | No. 2 |
| Douglas Fir       | No. 2 |
| Western Hemlock   | No. 1 |
| Ponderosa Pine    | No. 2 |
| Red Pine          | No. 2 |
| Western Red Cedar | No. 1 |

All timber sign posts shall receive a preservation treatment suitable for ground contact exposure in accordance with AASHTO M133. The preservative shall be applied after the sign post cut. When required, breakaway holes may be pre-drilled or drilled in the field.

Inertial properties shown below are based on the actual dimensions of the post as measured at the groundline. Circular wood posts generally have a significant taper such that the base of the post may be much larger than the top. It is very important to ensure that the post has the specified dimensions at the groundline otherwise the system may not perform correctly.

| Designator | Diameter<br>(mm) | Area<br>(10 <sup>3</sup> mm <sup>2</sup> ) | I <sub>x</sub><br>(10 <sup>6</sup> mm <sup>4</sup> ) | S <sub>x</sub><br>(10 <sup>3</sup> mm <sup>3</sup> ) |
|------------|------------------|--|--|--|
| PDP30      | 102              | 8.2  | 5.3  | 104  |
| PDP31      | 114              | 10.2                                       | 8.3  | 145  |
| PDP32      | 127              | 12.7                                       | 12.8   | 201  |
| PDP33      | 152              | 17.9                                       | 26.2   | 345  |
| PDP34      | 165              | 20.6                                       | 36.3   | 440  |
| PDP35      | 178              | 22.8                                       | 49.0   | 550  |
| PDP36      | 191              | 24.8                                       | 64.2   | 672  |

Dimensional tolerances not shown or implied are intended to be those consistent with the proper functioning of the part, including its appearance and accepted manufacturing practices.

### INTENDED USE

These posts are used in the direct burial circular wood post small sign support system (SSF21a). While the post may be embedded directly in the soil, many states embed the post in soilcrete or concrete to enhance the breakaway performance of the system.

### REFERENCES

L. A. Staron, "Breakaway Wood Posts," Geometric and Roadside Design Acceptance Letter SS-27, Federal Highway Administration, May 15, 1992.

## CIRCULAR TIMBER SIGN POST

PDP30-36

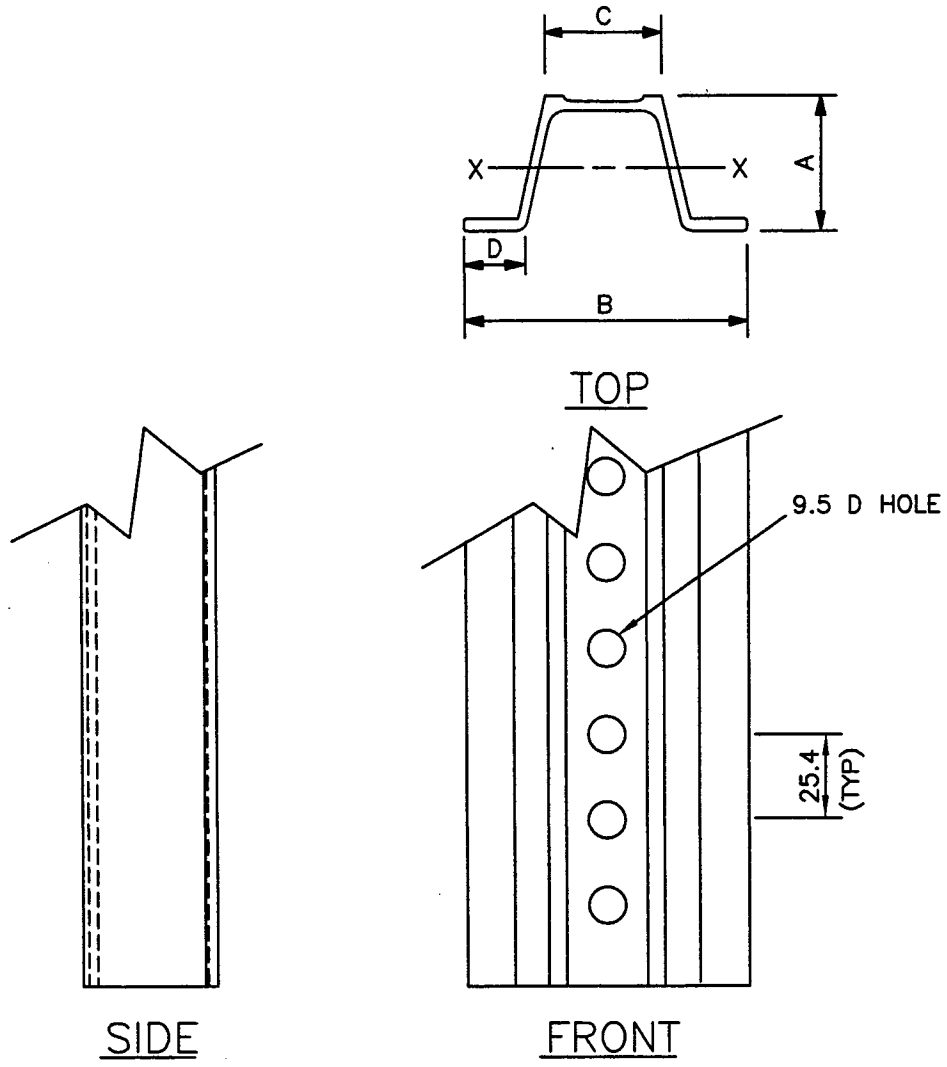
SHEET NO.

DATE

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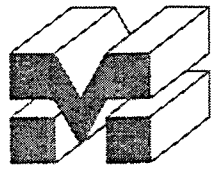




| DESIGNATOR | MASS<br>kg/m* | DIMENSIONS* |      |      |      |
|------------|---------------|-------------|------|------|------|
|            |               | A           | B    | C    | D    |
| PFP02      | 2.98          | 37.1        | 77.8 | 32.5 | 17.0 |
| PFP03      | 3.72          | 38.5        | 77.8 | 32.5 | 17.0 |
| PFP04      | 4.09          | 39.0        | 77.8 | 32.5 | 17.0 |
| PFP05      | 4.46          | 47.8        | 88.9 | 34.0 | 21.2 |
| PFP06      | 5.95          | 50.1        | 88.9 | 34.0 | 21.2 |

\* ±5%

RIB-BAK U-CHANNEL POSTS



MARION STEEL COMPANY  
 912 CHENEY AVENUE  
 MARION, OH 43301-1801

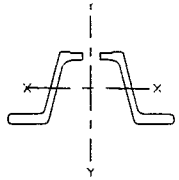
|           |           |
|-----------|-----------|
| PFP02-06  |           |
| SHEET NO: | DATE      |
| 1 of 2    | 26 JAN 97 |

### SPECIFICATIONS

Posts shall be a uniform, modified, flanged channel section - of the Marion Steel Company Rib-Bak design. Posts shall be fabricated from hot rolled carbon steel bars conforming to the requirements of Marion Steel Company Grade SP-80. Yield point of the steel shall be 552 MPa minimum. The cast heat analysis of the steel shall conform to the following requirements:

| <u>Element</u>   | <u>Composition (%)</u> |
|------------------|------------------------|
| Carbon           | 0.67 - 0.82            |
| Manganese        | 0.70 - 1.10            |
| Phosphorus (max) | 0.04                   |
| Sulphur (max)    | 0.05                   |
| Silicon          | 0.10 - 0.25            |

Posts shall be machine straightened to have a smooth uniform finish, free from defects affecting their strength, durability, or appearance. All holes and rough edges shall be free from burrs. The permissible tolerance for straightness shall be 6.35 mm in 1524 mm. Posts shall be punched with continuous 9.5-mm diameter holes on 25.4-mm centers for the entire length of the post. The first hole shall be 25.4 mm from the top of the post. After fabrication, posts shall be painted or galvanized. Galvanizing shall be in accordance with the requirements of ASTM A123.

| Post Designator | Area (mm <sup>2</sup> ) | I <sub>x</sub> (10 <sup>3</sup> mm <sup>4</sup> ) | I <sub>y</sub> (10 <sup>3</sup> mm <sup>4</sup> ) | S <sub>x</sub> (mm <sup>3</sup> ) | S <sub>y</sub> (mm <sup>3</sup> ) | Post Orientation to Axes   |
|-----------------|-------------------------|---|---|-----------------------------------|-----------------------------------|--|
| PFP02           | 359                     | 64.5  | 175.7   | 3,195                             | 4,523                             |  |
| PFP03           | 452                     | 86.6  | 228.9   | 4,080                             | 5,883                             |  |
| PFP04           | 488                     | 94.9  | 248.9   | 4,425                             | 6,407                             |  |
| PFP05           | 542                     | 156.5   | 358.4   | 5,572                             | 7,833                             |  |
| PFP06           | 717                     | 224.8   | 477.5   | 7,653                             | 10,734                            |  |

Dimensional tolerances not shown or implied are intended to be those consistent with the proper functioning of the part, including its appearance and accepted manufacturing practices. All section properties are calculated based with a 9.5 mm hole.

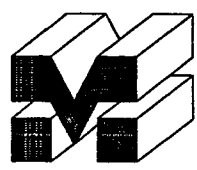
### INTENDED USE

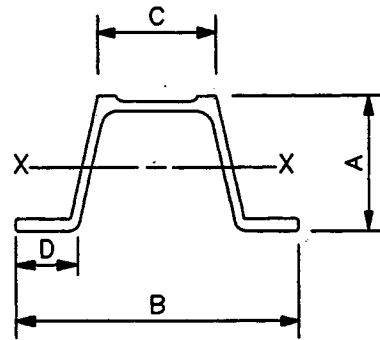
The Rib-Bak U-channel posts are used in the Direct Burial U-Post system (SSF40a-b), Ground-Line Splice U-Post in Soil system (SSP01a-c), Mid-Height Spliced U-Post in Soil system (SSP02a-c), Braced Spliced U-Post in Soil system (SSP03a-c), Marion Lap Splice Spacer Bar system (SSP04a-c), Minute-Man system (SSC10a-c), and the Slip Safe systems (SSS11a-c) and (SSS12a-c).

### CONTACT INFORMATION

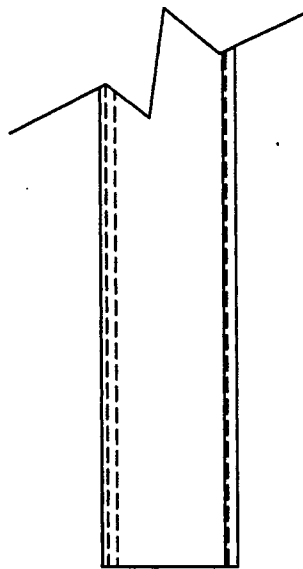
The Marion Steel Company, 912 Cheney Avenue, Marion, Ohio 43301-1801  
(800) 333-4011

## RIB-BAK U-CHANNEL POSTS

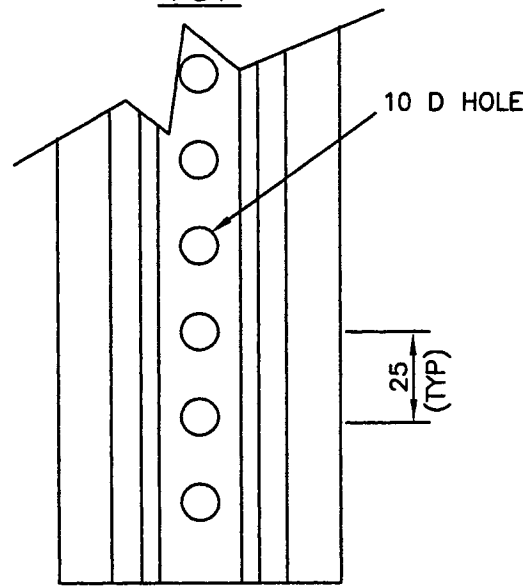
|                 |         |   |                             |  |
|-----------------|---------|---|-----------------------------|--|
| <b>PFP02-06</b> |         |  | <b>MARION STEEL COMPANY</b> |  |
|                 |         |   | 912 CHENEY AVENUE           |  |
|                 |         |   | MARION, OH 43301-1801       |  |
| SHEET NO.       | DATE    |   |                             |  |
| 2 of 2          | 4/15/97 |   |                             |  |



TOP



SIDE

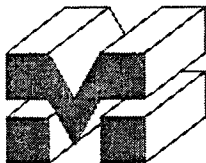


FRONT

| DESIGNATOR | MASS<br>kg/m* | DIMENSIONS* |      |      |      |
|------------|---------------|-------------|------|------|------|
|            |               | A           | B    | C    | D    |
| PFP12      | 3.00          | 37.1        | 77.8 | 32.5 | 17.0 |
| PFP13      | 3.75          | 38.5        | 77.8 | 32.5 | 17.0 |
| PFP14      | 4.00          | 39.0        | 77.8 | 32.5 | 17.0 |
| PFP15      | 4.50          | 47.8        | 88.9 | 34.0 | 21.2 |
| PFP16      | 6.00          | 50.1        | 88.9 | 34.0 | 21.2 |

\* ±5%

## METRIC RIB-BAK U-CHANNEL POSTS



MARION STEEL COMPANY  
912 CHENEY AVENUE  
MARION, OH 43301-1801

PFP12-16

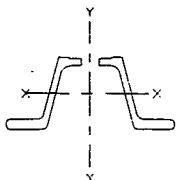
|           |           |
|-----------|-----------|
| SHEET NO: | DATE      |
| 1 of 2    | 26 JAN 97 |

### SPECIFICATIONS

Posts shall be a uniform, modified, flanged channel section - of the Marion Steel Company Rib-Bak design. Posts shall be fabricated from hot rolled carbon steel bars conforming to the requirements of Marion Steel Company Grade SP-80. Yield point of the steel shall be 552 MPa minimum. The cast heat analysis of the steel shall conform to the following requirements:

| <u>Element</u>   | <u>Composition (%)</u> |
|------------------|------------------------|
| Carbon           | 0.67 - 0.82            |
| Manganese        | 0.70 - 1.10            |
| Phosphorus (max) | 0.04                   |
| Sulfur (max)     | 0.05                   |
| Silicon          | 0.10 - 0.25            |

Posts shall be machine straightened to have a smooth uniform finish, free from defects affecting their strength, durability, or appearance. All holes and rough edges shall be free from burrs. The permissible tolerance for straightness shall be 6 mm in 1525 mm. Posts shall be punched with continuous 10-mm diameter holes on 25-mm centers for the entire length of the post. The first hole shall be 25 mm from the top of the post. After fabrication, posts shall be painted or galvanized. Galvanizing shall be in accordance with the requirements of ASTM A123.

| Post Designator | Area<br>(mm <sup>2</sup> ) | I <sub>x</sub><br>(10 <sup>3</sup> mm <sup>4</sup> ) | I <sub>y</sub><br>(10 <sup>3</sup> mm <sup>4</sup> ) | S <sub>x</sub><br>(mm <sup>3</sup> ) | S <sub>y</sub><br>(mm <sup>3</sup> ) | Post Orientation to Axes   |
|-----------------|----------------------------|--|--|--------------------------------------|--------------------------------------|--|
| PFP02           | 357                        | 64.1   | 175.2  | 3,163                                | 4,523                                |  |
| PFP03           | 450                        | 85.7   | 228.9  | 4,031                                | 5,883                                |  |
| PFP04           | 485                        | 93.7   | 248.9  | 4,343                                | 6,407                                |  |
| PFP05           | 540                        | 155.3  | 348.4  | 5,506                                | 7,833                                |  |
| PFP06           | 714                        | 222.6  | 477.4  | 7,554                                | 10,734                               |  |

Dimensional tolerances not shown or implied are intended to be those consistent with the proper functioning of the part, including its appearance and accepted manufacturing practices. All section properties are calculated based with a 10 mm hole.


### INTENDED USE

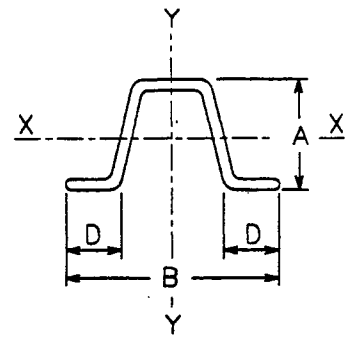
These posts are used in the Direct Burial U-Post system (SSF40a-b), the Ground-Line Splice U-Post in Soil system (SSP01a-c), the Mid-Height Spliced U-Post in Soil system (SSP02a-c), the Braced Spliced U-Post in Soil system (SSP03a-c), the Marion Lap Splice Spacer Bar system (SSP14a-c), and the Slip Safe systems (SSS11a-c) and (SSS12a-c).

### CONTACT INFORMATION

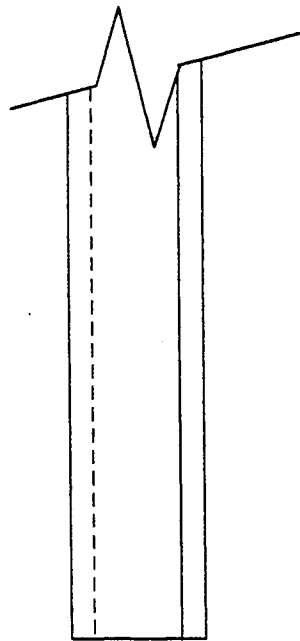
The Marion Steel Company, 912 Cheney Avenue, Marion, Ohio 43301-1801,  
(800) 333-4011

## METRIC RIB-BAK U-CHANNEL POSTS

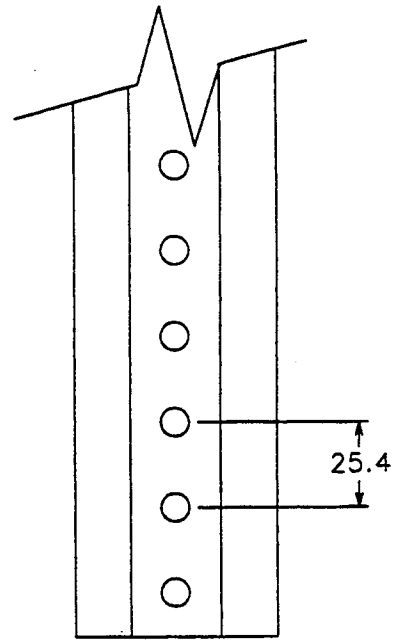
|                 |         |   |                             |
|-----------------|---------|---|-----------------------------|
| <b>PFP12-16</b> |         |  | <b>MARION STEEL COMPANY</b> |
|                 |         |   | 912 CHENEY AVENUE           |
|                 |         |   | MARION, OH 43301-1801       |
| SHEET NO.       | DATE    |   |                             |
| 2 of 2          | 4/15/97 |   |                             |



TOP



SIDE



FRONT

| FLANGED CHANNEL DIMENSIONS |                 |      |      |      |
|----------------------------|-----------------|------|------|------|
| MASS<br>kg/m               | DIMENSIONS (mm) |      |      |      |
|                            | A               | B    | C    | D    |
| 2.98                       | 38.5            | 79.4 | 31.8 | 15.9 |
| 3.35                       | 38.9            | 79.4 | 31.8 | 15.9 |
| 3.72                       | 39.7            | 79.4 | 31.8 | 15.9 |
| 4.09                       | 40.1            | 79.4 | 31.8 | 15.9 |
| 4.46                       | 44.5            | 88.9 | 41.3 | 18.2 |
| 5.95                       | 44.5            | 88.9 | 42.4 | 18.2 |

U-CHANNEL SIGN POSTS



CHICAGO HEIGHTS STEEL  
 211 E. MAIN  
 CHICAGO HEIGHTS, IL 60411

PFP23-26

| SHEET NO: | DATE      |
|-----------|-----------|
| 1 of 2    | 13 SEP 96 |

### SPECIFICATIONS

Posts shall be hot rolled flanged channel section rolled from high strength hot rolled steel conforming to ASTM A-499, grade 60 modified to 480 MPa min. yield. Posts shall be machine straightened to have a smooth uniform finish, free from defects affecting their strength, durability, or appearance. All hole and edges shall be free from burrs. The permissible tolerance for straightness shall be 6.4 mm in a 1530 mm span. Posts shall be punched with continuous 9.5 mm diameter holes on 25.4 mm centers for the entire length of the post, beginning 25.4 mm from one end of the post. After fabrication, the posts shall be painted green or black, or hot dip galvanized according to ASTM A-123. Post mass per M designation are plus or minus 5 percent.

### FLANGED CHANNEL PROPERTIES

| AREA<br>(mm <sup>2</sup> ) | X-X AXIS                            |                                     | Y-Y AXIS                            |                                     |
|----------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
|                            | I(10 <sup>3</sup> mm <sup>4</sup> ) | S(10 <sup>3</sup> mm <sup>3</sup> ) | I(10 <sup>3</sup> mm <sup>4</sup> ) | S(10 <sup>3</sup> mm <sup>3</sup> ) |
| 381                        | 74.5                                | 3.69                                | 183.9                               | 4.64                                |
| 418                        | 83.7                                | 4.16                                | 197.2                               | 4.97                                |
| 483                        | 97.0                                | 4.74                                | 229.3                               | 5.78                                |
| 528                        | 112.8                               | 5.39                                | 252.7                               | 6.37                                |
| 592                        | 154.8                               | 6.60                                | 362.1                               | 8.14                                |
| 768                        | 208.1                               | 9.18                                | 495.3                               | 17.86                               |

### INTENDED USE

These U-channel posts may be used in the Direct Burial U-Post system (SSF40a-b), the Ground-Line Splice U-Post in Soil system (SSP01a-c), the Mid-Height Spliced U-Post in Soil system (SSP02a-c), the Braced Spliced U-Post in Soil system (SSP03a-c), the Chicago Heights Steel Safety Splice System (SSP05a-c), the Chicago Heights Steel Erect Ease System (SSP06a), and the Chicago Heights Steel Bracer Bar System (SSP07a-c).

### CONTACT INFORMATION

Chicago Heights Steel  
 211 E. Main Street  
 P.O. Box 129  
 Chicago Heights, IL 60411  
 800-424-4487  
 700-756-5619  
 708-756-5628 Fax

\* All Chicago Heights Steel products are produced from 100% recycled steel.

## U-CHANNEL SIGN SUPPORTS

# PFP23-26



CHICAGO HEIGHTS STEEL  
 211 E. MAIN

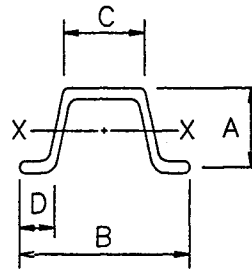
SHEET NO.

DATE

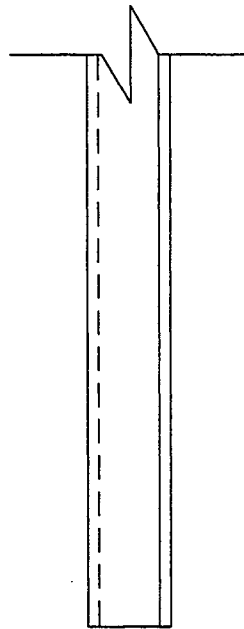
2 of 2

09-13-96

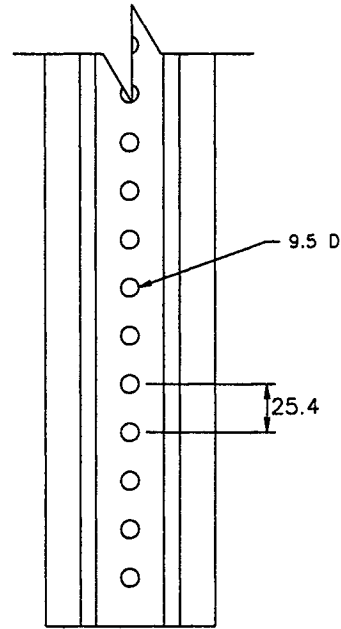
CHICAGO HEIGHTS, IL 60411



TOP



SIDE

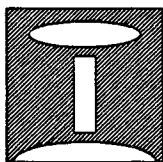


FRONT

SECTION PROPERTIES

| DESIGNATOR | UNIT MASS<br>kg/m | DIMENSIONS |       |       |       |
|------------|-------------------|------------|-------|-------|-------|
|            |                   | A          | B     | C     | D     |
| PFP33      | 3.0               | 38.51      | 79.38 | 31.75 | 15.88 |
| PFP34      | 3.7               | 39.67      | 79.38 | 31.75 | 15.88 |
| PFP35      | 4.5               | 44.45      | 88.90 | 41.28 | 18.26 |
| PFP36      | 6.0               | 44.53      | 88.41 | 42.47 | 18.82 |

FRANKLIN DIRECT U-CHANNEL SIGN SUPPORT SYSTEM



FRANKLIN INDUSTRIES COMPANY  
P.O. BOX 671  
FRANKLIN, PA 16323

PFP33-36

SHEET NO.

DATE:

1 OF 2

1-28-97



## SPECIFICATIONS

The Franklin Industries hot rolled flanged U-channel sign supports shall be manufactured from high strength rail steel according to ASTM A499-81, Grade 60. Posts shall be punched full length with 9.5 mm diameter holes spaced on 25.4-mm centers. The first hole shall be 25.4-mm from the top of the post and the bottom of the post shall be tapered. Posts may be finished with either a green weather resistant enamel paint or galvanized per ASTM 123. Posts shall typically be 1800 mm, 2100 mm, 2400 mm, 2700 mm, 3000 mm, 3400 mm, or 3700 mm long. The weight of the sign post sizes are 3.0 kg/m, 3.7 kg/m, 4.5 kg/m, and 6.0 kg/m (PFP33-36).

| Designator | Area | I <sub>x</sub> | Z <sub>x</sub> | I <sub>y</sub> | Z <sub>y</sub> | X    |
|------------|------|----------------|----------------|----------------|----------------|------|
| PFP33      | 355  | 66.6           | 3.1            | 174.8          | 4.4            | 20.6 |
| PFP34      | 445  | 87.4           | 4.3            | 228.9          | 5.7            | 21.1 |
| PFP35      | 555  | 141.5          | 5.9            | 362.1          | 8.2            | 23.9 |
| PFP36      | 742  | 187.3          | 7.7            | 503.6          | 11.3           | 24.4 |

## INTENDED USE

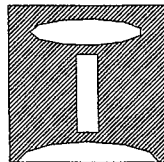
The Franklin Industries U-channel sign posts can be used in a variety of up to 2100-mm wide sign support systems including up to two PFP35 posts directly buried with no splice in strong soil, a SSP08 installation utilizing up to a PFP36 in strong or weak soil, and SSP01a-c sign support systems also utilizing up to PFP36 posts in strong or weak soil. Soil plates are required in SSP01a-c installations in weak soil.

## CONTACT INFORMATION

Franklin Industries Company  
P.O. Box 671  
Franklin, PA 16323  
(814) 437-3726  
Fax: (814) 432-7556

## FRANKLIN DIRECT U-CHANNEL SIGN SUPPORT SYSTEM

PFP33-36



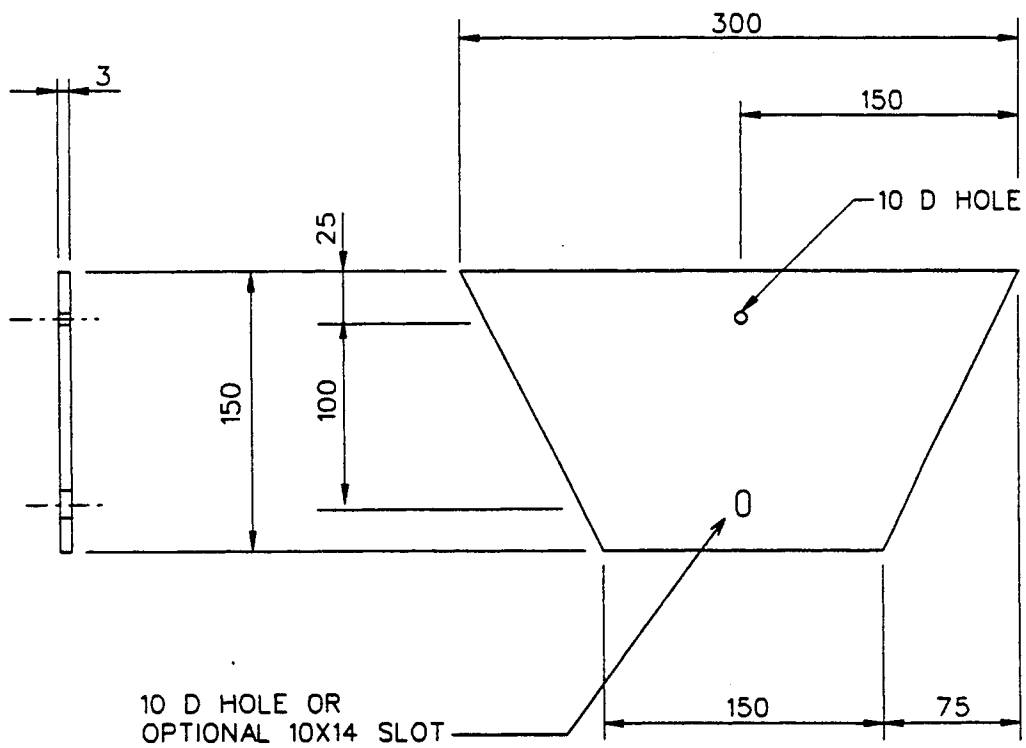
FRANKLIN INDUSTRIES COMPANY  
P.O. BOX 671  
FRANKLIN, PA 16323

SHEET NO.

DATE:

2 OF 2

1-28-97



TRAPEZOIDAL SOIL PLATE



PLS02

|           |      |
|-----------|------|
| SHEET NO. | DATE |
| 1 of 2    | 1996 |

### SPECIFICATIONS

The trapezoidal soil plate shall be manufactured using AASHTO M183M (ASTM A36M) steel. After all punching, drilling, stamping and welding is complete the soil plate shall be zinc coated according to AASHTO M111 (ASTM A123) or painted.

Dimensional tolerances not shown or implied are intended to be those consistent with the proper functioning of the part, including its appearance and accepted manufacturing practices.

### INTENDED USE

The trapezoidal soil plate can be optionally used with a variety of small sign support systems including the SSP04 and SSP14 Marion lap splice system. The soil plate provides additional support in poor soil conditions. The soil plate is attached to the post using two 65-mm long FBX08a bolts and nuts.

## TRAPEZOIDAL SOIL PLATE

PLS02

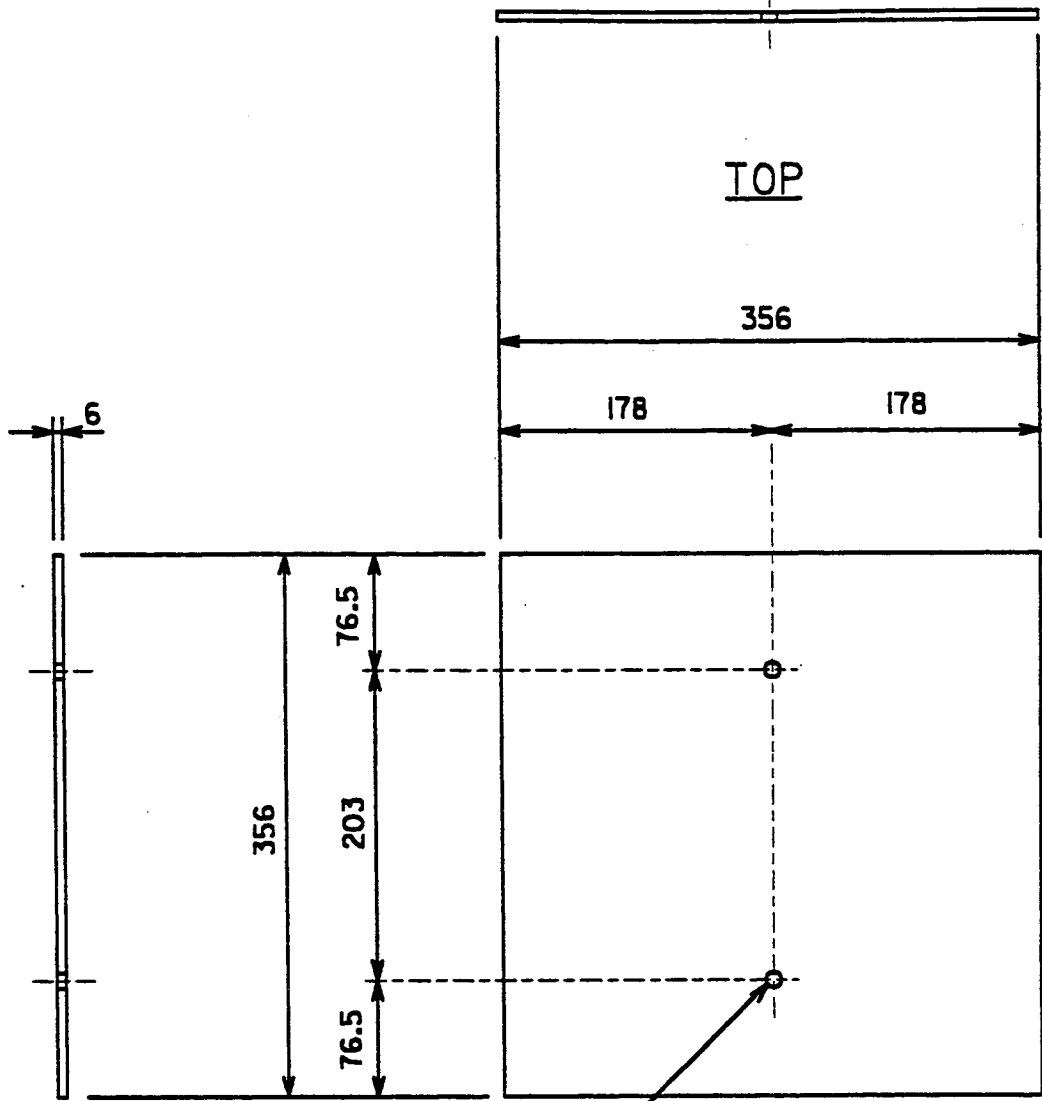
SHEET NO.

DATE

2 of 2

12-28-96





10D HOLE OR  
OPTIONAL 10X14 SLOT

SIDE

FRONT

SOIL PLATE



CHICAGO HEIGHTS STEEL  
211 E. MAIN  
CHICAGO HEIGHTS, IL 60411

PLS03

SHEET NO:

DATE

1 of 2

13 SEP 96

**SPECIFICATIONS**

The soil plate shall be manufactured using AASHTO M183M (ASTM A36M) steel. After all punching, drilling, stamping and welding is complete the soil plate shall be zinc-coated according to AASHTO M111 (ASTM A123) or painted.

Dimensional tolerances not shown or implied are intended to be those consistent with the proper functioning of the part, including its appearance and accepted manufacturing practices.

**INTENDED USE**

The soil plate can be optionally used with a variety of small sign support systems including the SSP05 Safety Splice System and the SSP07 Bracer Bar System. The soil plate provides additional support in poor soil conditions. The soil plate is attached to the post using 2 65-mm long FBX08a bolts and nuts.

**SOIL PLATE**

**PLS03**

SHEET NO.

2 of 2

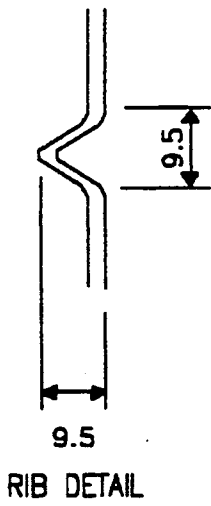
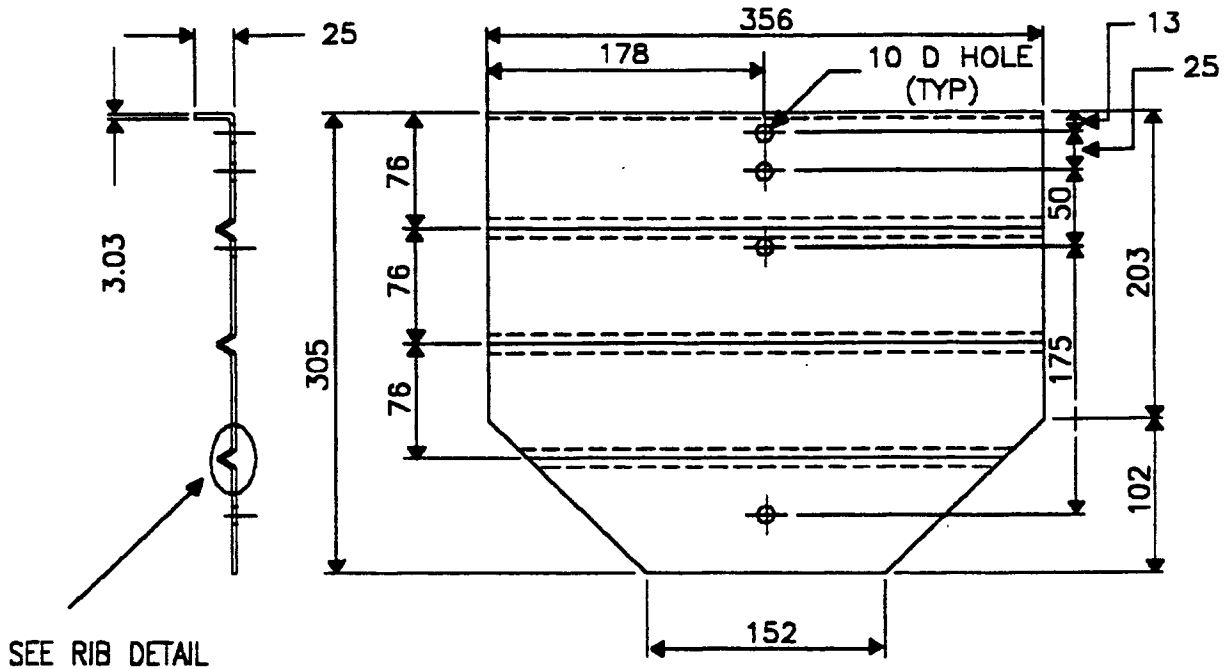
DATE

09-13-96

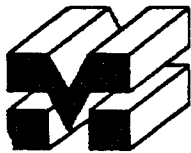


CHICAGO HEIGHTS STEEL  
211 E. MAIN

CHICAGO HEIGHTS, IL 60411



SOIL PLATE (MINUTE MAN)



MARION STEEL COMPANY  
 912 CHENEY AVENUE  
 MARION, OH 43301-1801

PLS04

SHEET NO:

DATE

1 of 2

13 SEP 96

### SPECIFICATIONS

The Minute Man Soil Plate shall be manufactured using AASHTO M183M (ASTM A36M) steel. After all punching, drilling, stamping and welding is complete the soil plate shall be zinc-coated according to AASHTO M111 (ASTM A123) or painted.

### INTENDED USE

This optional soil stabilization plate can be used with the SSC10a-c Minute Man Breakaway Coupling system. The soil stabilization plate is optional for one and two-post installations (SSC10a and SSC10b) and is required for three-post installations (SSC10c). The soil plate is attached to the base post using four 65-mm long FBX08a bolts and nuts. The primary function of the soil plate is to provide support to the post for wind load as well as to assure integrity of the base post during vehicle impacts.

### CONTACT INFORMATION

The Marion Steel Company  
912 Cheney Avenue  
Marion, Ohio 43301-1801  
800 333-4011  
614 383-6429 Fax

### SOIL PLATE (MINUTE MAN)

**PLS04**



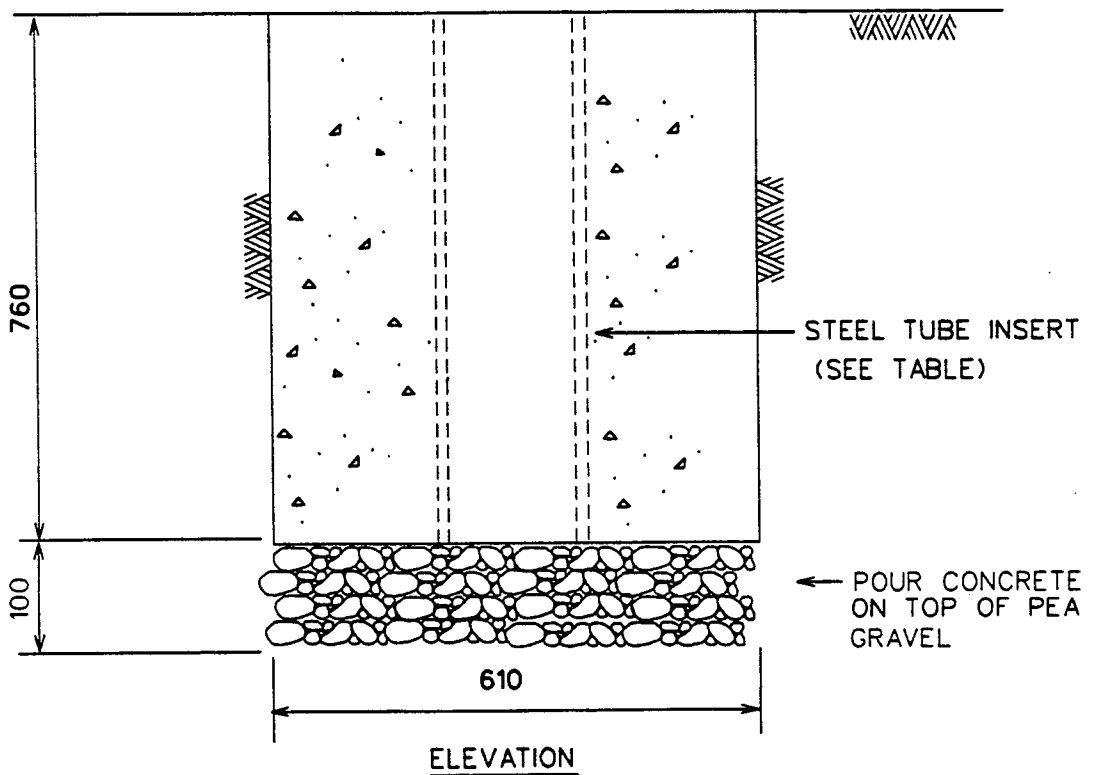
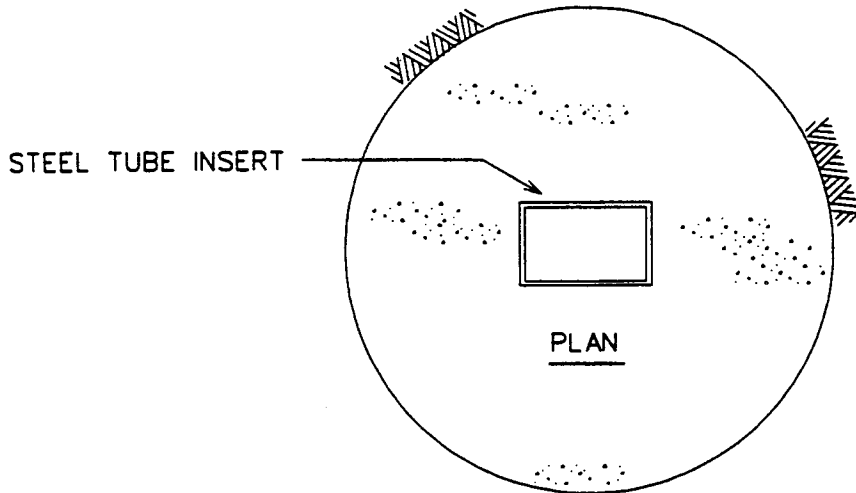
**MARION STEEL COMPANY**  
912 CHENEY AVENUE  
MARION, OH 43301-1801

SHEET NO.

DATE

2 of 2

9-13-96



| DESIGNATOR | TUBE INSERT   |
|------------|---------------|
| POF05      | TS102X102X4.8 |
| POF06      | TS152X102X4.8 |
| POF07      | TS203X152X4.8 |
| POF08      | TS203X152X4.8 |

## CONCRETE FOUNDATION WITH STEEL TUBE



POF05-08

|           |      |
|-----------|------|
| SHEET NO: | DATE |
| 1 of 2    | 1996 |



### SPECIFICATIONS

The concrete foundation with steel tube insert shall be assembled on-site by inserting a steel tube in the desired position inside a circular form and pouring 20 MPa concrete between the form and the outside of the steel tube. The 20 MPa concrete shall include a cement that conforms to AASTHO M85 Type II. The foundation need not be reinforced. Structural tubing shall conform to ASTM A500B and shall be zinc coated according to AASHTO M111 (ASTM A123).

Dimensional tolerances not shown or implied are intended to be those consistent with the proper functioning of the part, including its appearance and accepted manufacturing practices.

### INTENDED USE

The concrete foundation with steel tube insert is used with the rectangular wood post in concrete small sign support system (SSF22a-b). POF05 foundations are used with rectangular wood posts with nominal dimensions of 89 by 89 mm (PDP20); POF06 foundations are used with wood posts with nominal dimensions of 89 by 140 mm (PDE21 and PDE22); POF07 foundations are used with wood posts with dimensions of 140 by 140 mm (PDE23); and POF08 foundations are used with rectangular wood posts with dimensions of 184 by 140 mm (PDE24).

## CONCRETE FOUNDATION WITH STEEL TUBE

POF05-08

|           |          |
|-----------|----------|
| SHEET NO. | DATE     |
| 2 of 2    | 12-28-96 |

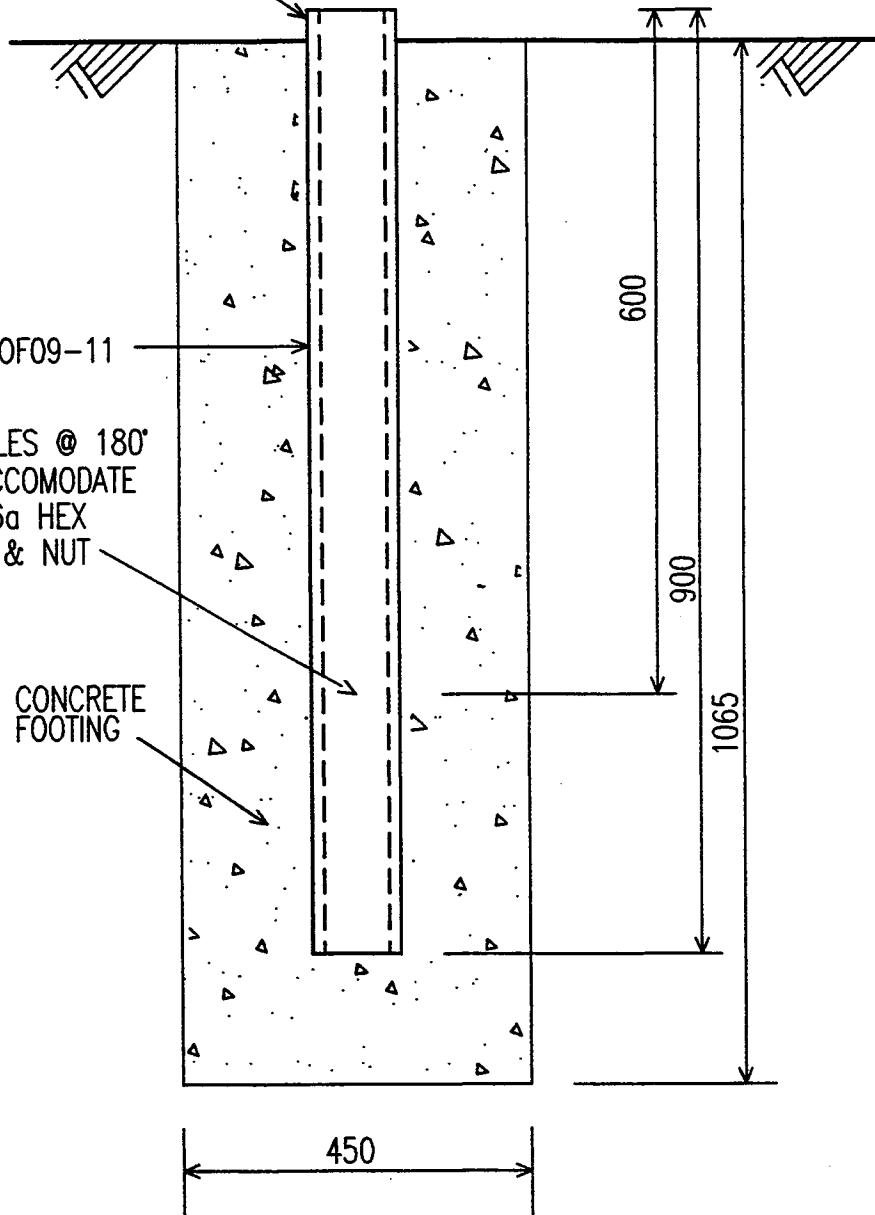


2 HOLES @ 180°  
TO ACCOMODATE  
FBX06a HEX  
BOLT & NUT

POF09-11

2 HOLES @ 180°  
TO ACCOMODATE  
FBX06a HEX  
BOLT & NUT

CONCRETE  
FOOTING



## STEEL TUBE SET SLEEVE

LANCASTER  
COMPOSITE

(717) 684-4440 FAX (717) 684-4445  
1000 HOUSTON STREET - P.O. BOX 247  
COLUMBIA, PA 17512-0247

POF09-11

SHEET NO.

DATE

1 OF 2

1996

### SPECIFICATIONS

Lancaster Composite's Steel Tube Set Sleeves shall be hot-dipped galvanized after fabrication according to ASTM A123.

### INTENDED USE

The POF09-11 sleeves are designed to be a component of either the SSF32a or SSF32b sign support systems. The table below lists the three different set sleeve components and the CP40 posts they are designed to support.

| SET SLEEVE | CP40 POST |
|------------|-----------|
| POF09      | PPP02     |
| POF10      | PPP03     |
| POF11      | PPP04     |

### CONTACT INFORMATION

Lancaster Composite, Inc.  
CP40 Sign Support Systems  
P.O. Box 247  
Columbia, PA 17512-0247  
Phone: (717) 684-4440  
Fax: (717) 684-4445

## STEEL TUBE SET SLEEVE

**POF09-11**

SHEET NO.

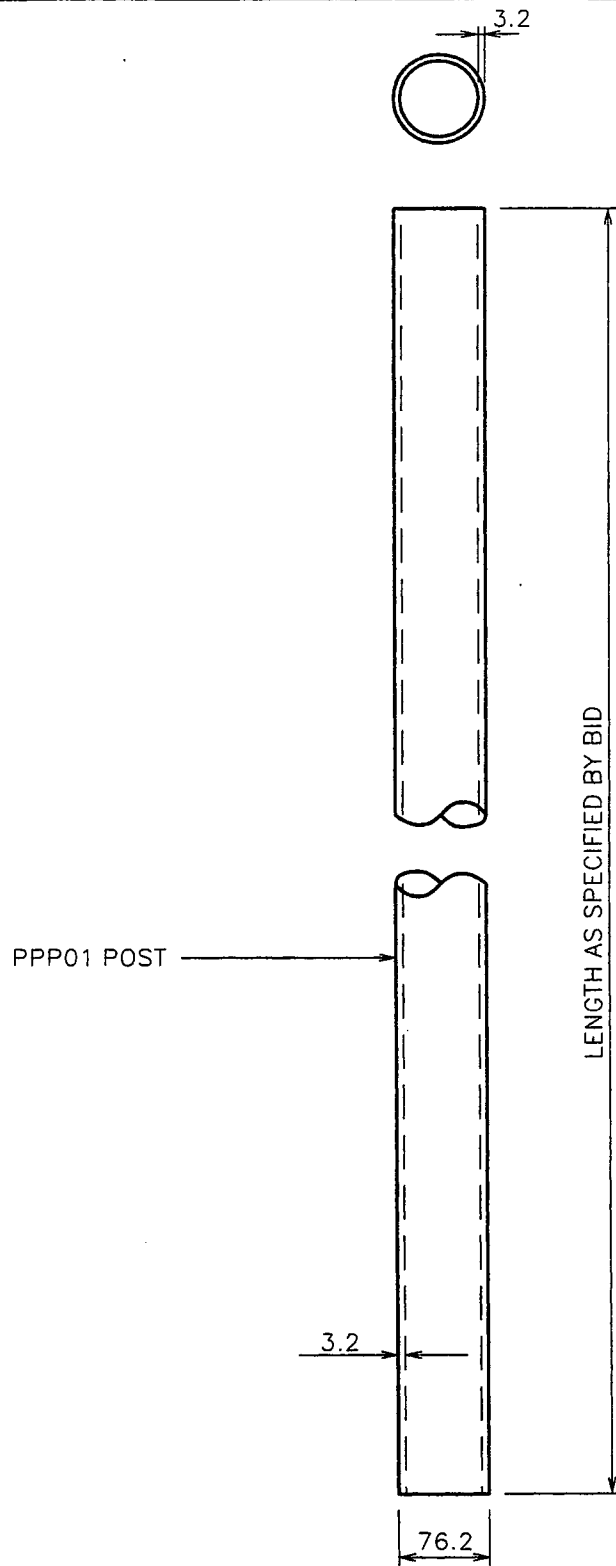
DATE

2 OF 2

1996

(717) 684-4440 FAX (717) 684-4445  
1000 HOUSTON STREET - P.O. BOX 247  
COLUMBIA, PA 17512-0247

**LANCASTER  
COMPOSITE**



## FRP SIGN POST



**HwyCom**.inc.  
FIBER-LITE Sign Post System

(915) 267-4565 FAX (915) 263-6449  
110 WEST 22 ND STREET \* P. O. BOX 3010  
BIG SPRING, TX 79721-3010

PPP01

SHEET NO.

DATE

1 OF 2

1996

## SPECIFICATIONS

Hwycom's Fiberglass Reinforced Plastic (FRP) Signpost consists of a PTP51 FRP hollow post composed of polyester resin and glass fiber reinforcement with permanent color and UV protection. Available in either yellow or gray.

The fiber reinforced tube is manufactured by a process called "Pultrusion" whereby longitudinal and diagonal glass fibers are combined with a resin and cured in a continuous process which results in a 76.2 mm diameter post with 3.2 mm wall thickness. The finished post is inserted into a FMA02 anchor system.

## INTENDED USE

Hwycom's FRP Sign Supports can be used in single or double installations. These systems have been crash tested in strong soil and have been judged to satisfy the requirements of 1985 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals".

## CONTACT INFORMATION

Hwycom, Inc.  
Fiber-Lite Sign Post Systems  
110 West 22nd Street  
P. O. Box 3010  
Big Spring, TX 79721-3010  
Phone: 915/267-4565  
Fax: 915/263-6449

## FRP SIGN POST

PPP01

(915) 267-4565 FAX (915) 263-6449  
110 WEST 22 ND STREET \* P. O. BOX 3010  
BIG SPRING, TX 79721-3010

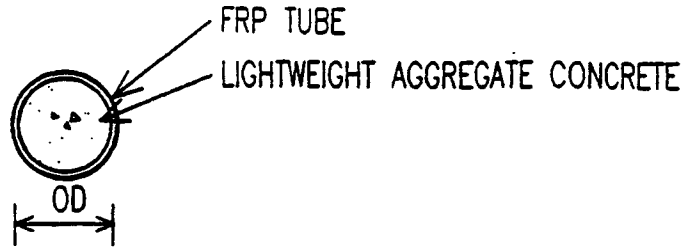


DATE

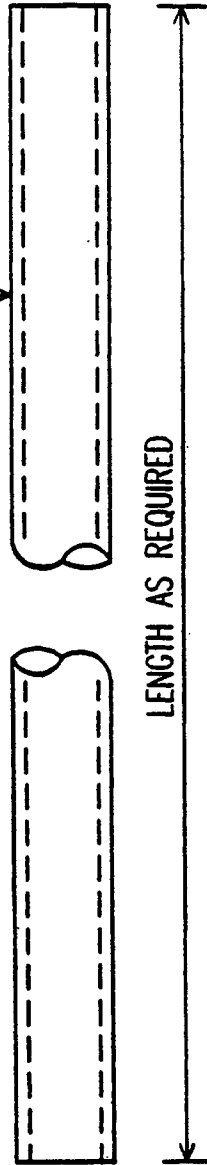
SHEET NO.

1996

2 OF 2

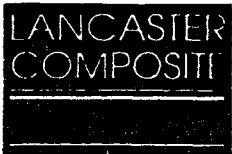


PPP02-04



| DESIGNATOR | OD MIN |
|------------|--------|
| PPP02      | 60     |
| PPP03      | 73     |
| PPP04      | 102    |

## CP40 SIGN POST



(717) 684-4440 FAX (717) 684-4445  
 1000 HOUSTON STREET - P.O. BOX 247  
 COLUMBIA, PA 17512-0247

**PPPO2-04**

| SHEET NO. | DATE |
|-----------|------|
| 1 OF 2    | 1996 |

## SPECIFICATIONS

Composite posts to be produced from unsaturated polyester or epoxy resin reinforced with E-glass and appropriate filler material to form a rigid structural support member. Tensile modulus of tube to be not less than 182,500 kg/cm<sup>2</sup>. Posts to be equal in strength to Schedule 40 steel pipe for the same diameter. Posts to have bending strength equal to the requirements of AASHTO M-181 and ASTM F-669 for the same diameter.

Posts to exhibit superior corrosion and ultraviolet resistance as demonstrated when exposed to accelerated environmental test chamber for not less than 3,600 hours. The post will show no structural failure (i.e., >10% loss of strength) as a result of exposure to moisture and lamps required in ASTM G-23, G-26 and G-53. Posts will be wrapped in a protective veil for further moisture and U.V. protection.

Where color is specified it will be permanent. Posts will be coated with not less than a 75 micron dry film thickness that when cured meets the following requirements after 3,600 hours exposure, in compliance with ASTM G-23, G-26, and G-53: 90% adhesion, ASTM-4541, Maximum color change of 25, Delta-E.

## INTENDED USE

The CP40 sign post is a component of the SSF31, SSF32 and SSF34 sign support systems. The table below lists the designators for the three sizes of CP40 posts, their outside diameter and the set/drive sleeve components which can be used to support them.

| C40 POST | POST OD (mm) | COMPONENTS     |
|----------|--------------|----------------|
| PPP02    | 60           | POF09<br>PTF07 |
| PPP03    | 73           | POF10<br>PTF08 |
| PPP04    | 102          | POF11<br>PTF09 |

## CONTACT INFORMATION

Lancaster Composite, Inc.  
 CP40 Sign Support Systems  
 P.O. Box 247  
 Columbia, PA 17512-0247  
 Phone: (717) 684-4440  
 Fax: (717) 684-4445

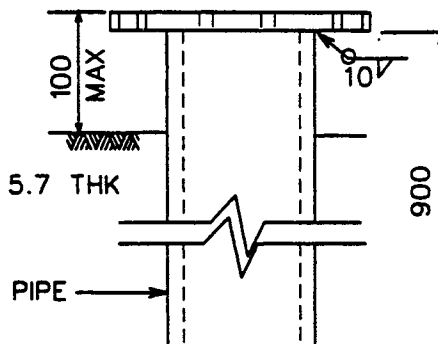
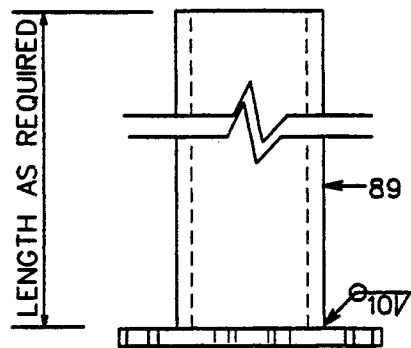
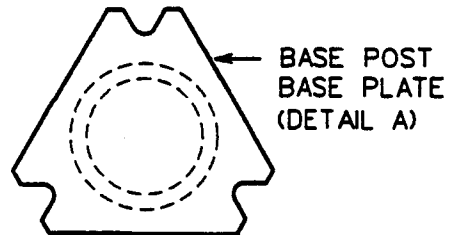
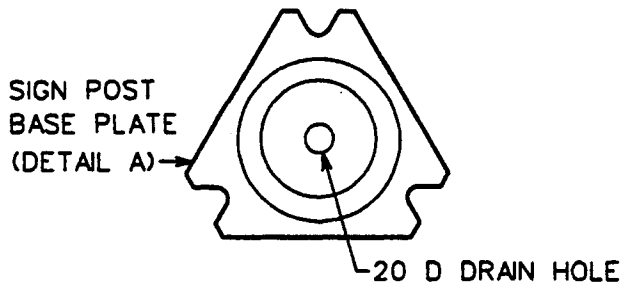
# CP40 SIGN POST

**PPP02-04**

|           |      |
|-----------|------|
| SHEET NO. | DATE |
| 2 OF 2    | 1996 |

(717) 684-4440 FAX (717) 684-4445  
 1000 HOUSTON STREET - P.O. BOX 247  
 COLUMBIA, PA 17512-0247





PTF05a: SIGN POST

PTF05b: BASE POST

POST ASSEMBLIES

OMNI-DIRECTIONAL SLIPBASE BASE & SIGN POST



PTF05a-b

SHEET NO:

DATE

1 OF 4

1996



### SPECIFICATIONS

The omni-directional slipbase sign and base post assemblies consist of a slipbase base plate welded to a steel pipe base post and a slipbase plate welded to a steel pipe sign post. The standard structural steel pipe sections shall conform to ASTM A53. Base plates shall be manufactured from AASHTO M183M (ASTM A36M) 16-mm thick steel plate. All welding shall conform to ANSI/AASHTO/AWS D1.5. After all welding is complete the base-plate/base-post assembly shall be zinc coated according to AASHTO M111 (ASTM A123).

| Designator | Area<br>(10 <sup>3</sup> mm <sup>2</sup> ) | I <sub>x</sub><br>(10 <sup>6</sup> mm <sup>4</sup> ) | I <sub>y</sub><br>(10 <sup>6</sup> mm <sup>4</sup> ) | S <sub>x</sub><br>(10 <sup>3</sup> mm <sup>4</sup> ) | S <sub>y</sub><br>(10 <sup>3</sup> mm <sup>4</sup> ) |
|------------|--|--|--|--|--|
| PTF05a-b   | 1.7  | 2.0  | 2.0  | 39.2   | 39.2   |

Dimensional tolerances not shown or implied are intended to be those consistent with the proper functioning of the part, including its appearance and accepted manufacturing practices.

### INTENDED USE

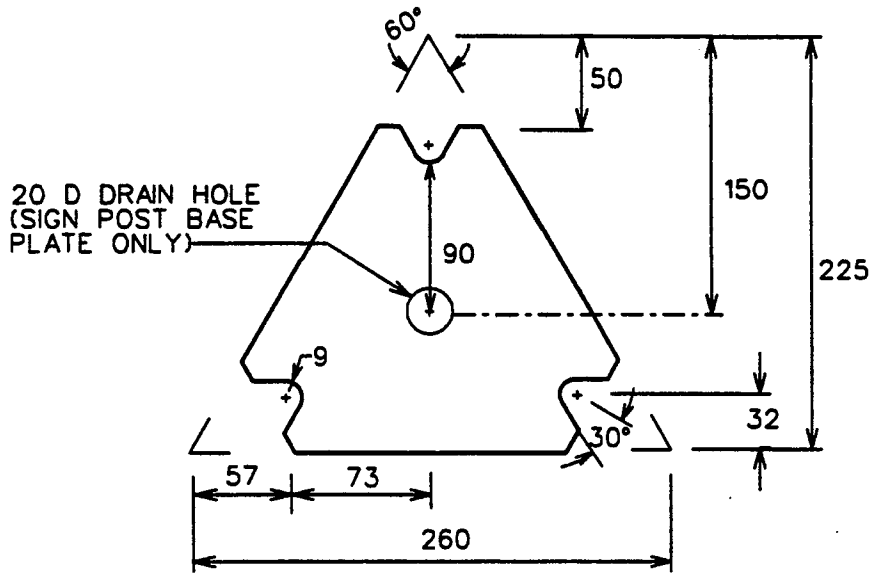
The omni-directional slipbase sign and base posts are components of the omni-directional slipbase sign support system (SSS03a-b).

## OMNI-DIRECTIONAL SLIPBASE BASE & SIGN POST

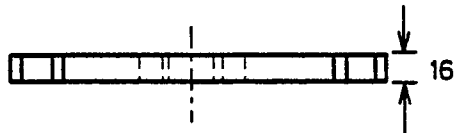
PTF05a-b

|           |          |
|-----------|----------|
| SHEET NO. | DATE     |
| 2 of 4    | 12-28-96 |





TOP



ELEVATION

DETAIL A: SLIPBASE PLATE

OMNI-DIRECTIONAL SLIPBASE BASE & SIGN POST



PTF05a-b

|           |      |
|-----------|------|
| SHEET NO: | DATE |
| 3 OF 4    | 1996 |

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# OMNI-DIRECTIONAL SLIPBASE BASE & SIGN POST

PTF05a-b

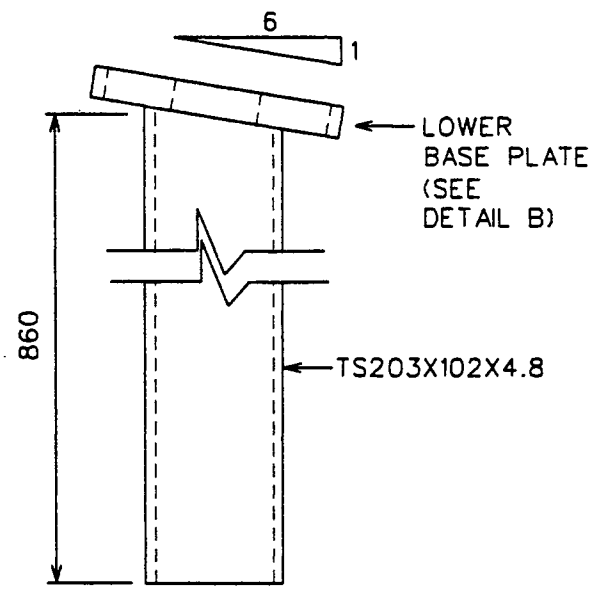
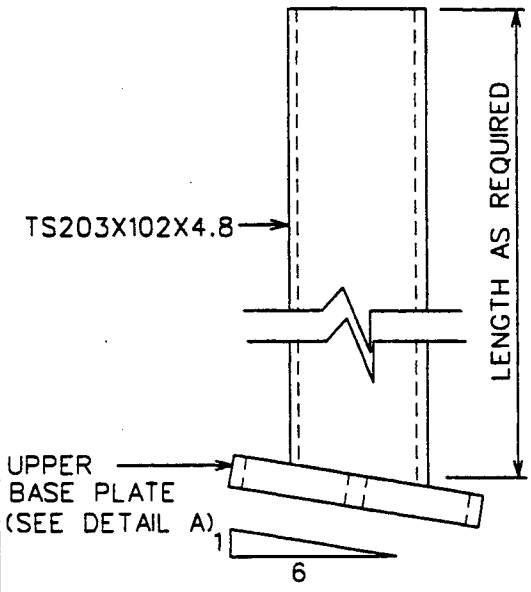
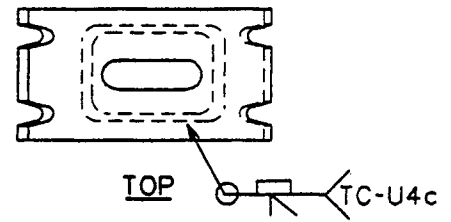
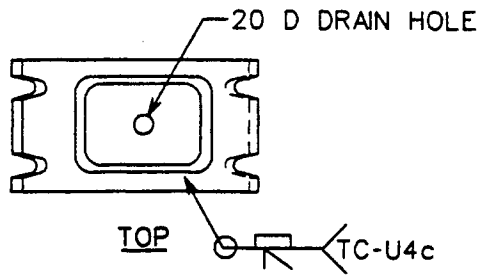
SHEET NO.

DATE

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12-28-96





FRONT

PTF06a: SIGN POST

PTF06b: BASE POST

RECTANGULAR SLIPBASE TUBE SIGN & BASE POST



PTF06a-b

|           |      |
|-----------|------|
| SHEET NO: | DATE |
| 1 OF 4    | 1996 |

### SPECIFICATIONS

The rectangular steel tube sign and base posts shall be manufactured using ASTM A500B steel. The section shall be manufactured such that it conforms to the geometry of ASTM A500 for TS 203x102x4.8 structural tubing. The steel shall conform to ASTM A500 Grade B material. Component PTF06a is the sign post and PTF06b is the base post.

The base plate shall be manufactured from AASHTO M183M (ASTM A36) steel plates. The base plate shall be welded onto the sign post and the base post. The weld joining the post to the base plate shall be a TC-U4c joint as specified in ANSI/AASHTO/AWS D1.5. After all welding is complete the base-plate/base-post assembly shall be zinc coated according to AASHTO M111 (ASTM A123).

| Designator | Area<br>(10 <sup>3</sup> mm <sup>2</sup> ) | I <sub>x</sub><br>(10 <sup>6</sup> mm <sup>4</sup> ) | I <sub>y</sub><br>(10 <sup>6</sup> mm <sup>4</sup> ) | S <sub>x</sub><br>(10 <sup>3</sup> mm <sup>4</sup> ) | S <sub>y</sub><br>(10 <sup>3</sup> mm <sup>4</sup> ) |
|------------|--|--|--|--|--|
| PTF06a-b   | 2.8  | 14.7   | 5.1  | 145  | 99   |

Dimensional tolerances not shown or implied are intended to be those consistent with the proper functioning of the part, including its appearance and accepted manufacturing practices.

### INTENDED USE

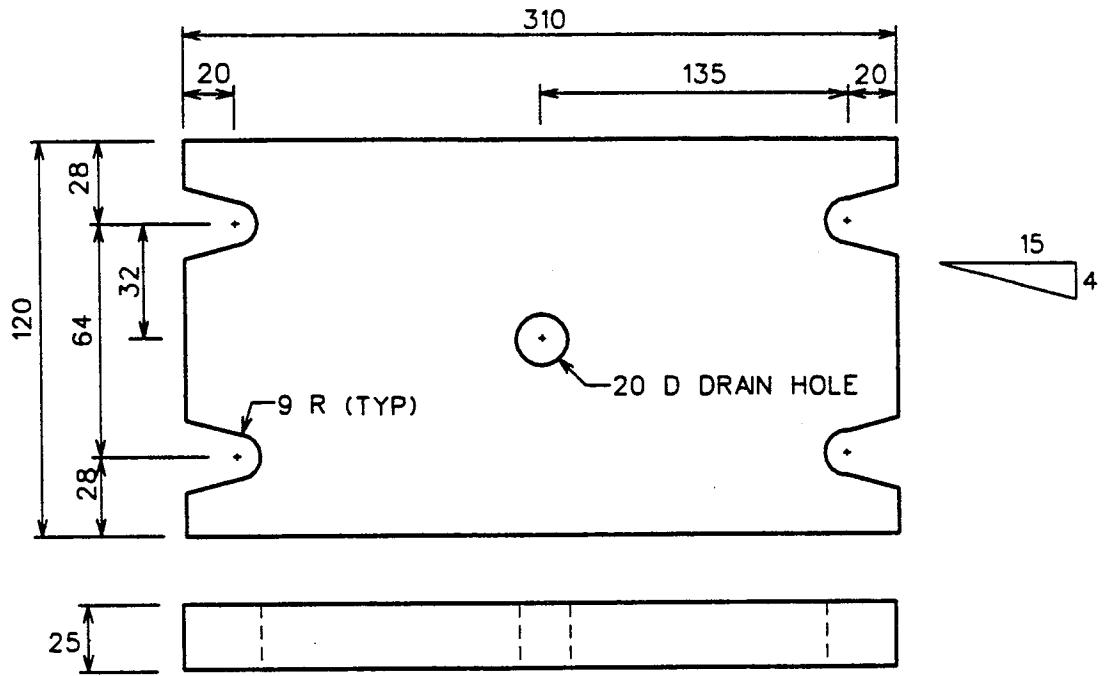
The rectangular steel tube sign and base posts are components of the tubular inclined uni-directional slipbase (SSS07a).

## RECTANGULAR SLIPBASE TUBE SIGN & BASE POST

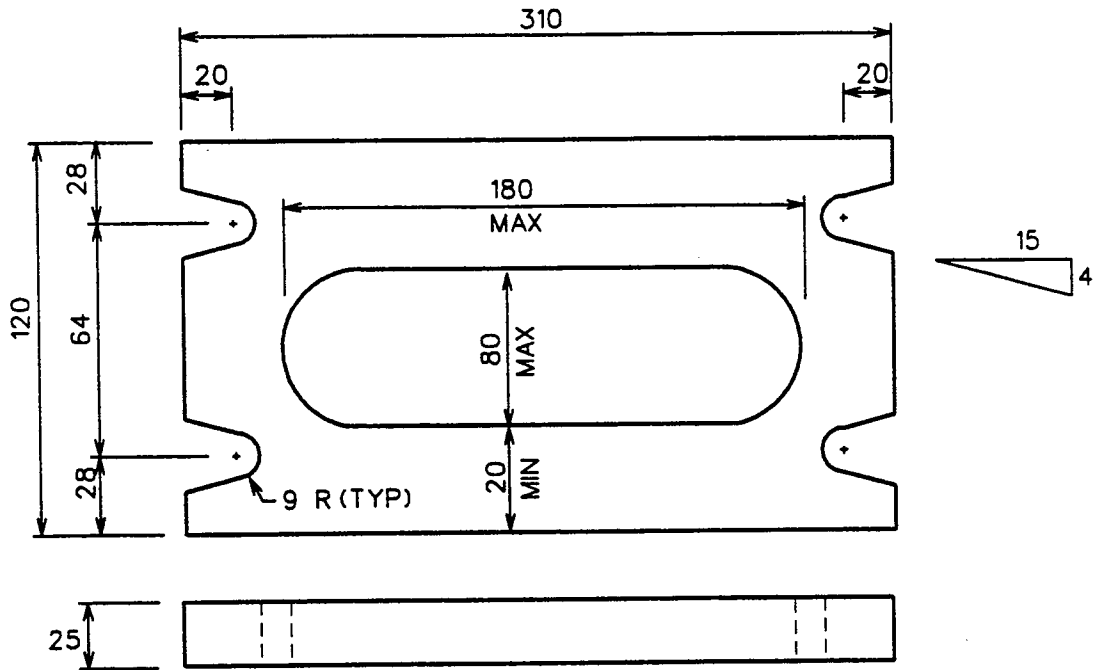
PTF06a-b

|           |          |
|-----------|----------|
| SHEET NO. | DATE     |
| 2 of 4    | 12-28-96 |





DETAIL A: UPPER BASE PLT



DETAIL B: LOWER BASE PLT

RECTANGULAR SLIPBASE TUBE SIGN & BASE PLATE



PTF06a-b

SHEET NO:  
3 OF 4

DATE  
1996

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**RECTANGULAR SLIPBASE TUBE SIGN & BASE POST**

**PTF06a-b**

**SHEET NO.**

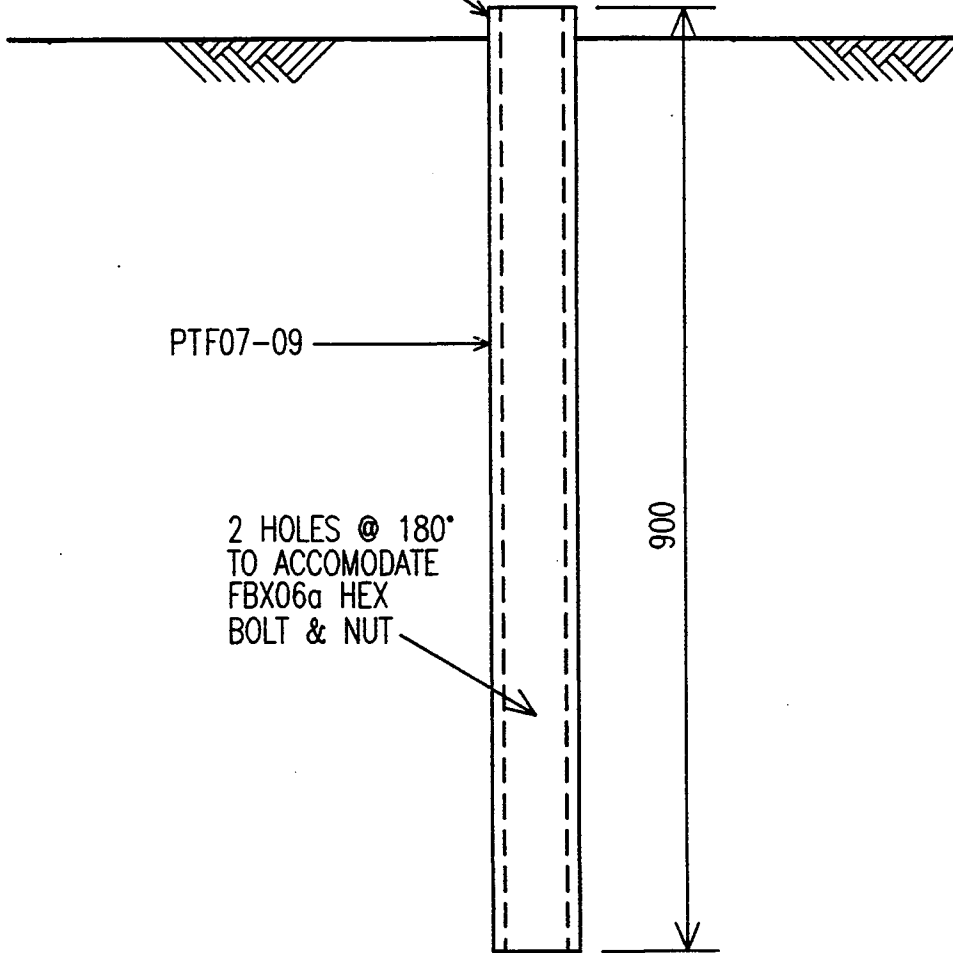
**DATE**

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12-28-96



2 HOLES @ 180°  
TO ACCOMODATE  
FBX06a HEX  
BOLT & NUT



PTF07-09

2 HOLES @ 180°  
TO ACCOMODATE  
FBX06a HEX  
BOLT & NUT

900

## STEEL TUBE DRIVE SLEEVE

LANCASTER  
COMPOSITE

(717) 684-4440 FAX (717) 684-4445  
1000 HOUSTON STREET - P.O. BOX 247  
COLUMBIA, PA 17512-0247

PTF07-09

SHEET NO.

DATE

1 OF 2

1996



### SPECIFICATIONS

Lancaster Composite's Steel Tube Drive Sleeves shall be hot-dipped galvanized after fabrication according to ASTM A123.

### INTENDED USE

The PTF07-09 sleeves are designed to be a component of the either the SSF34a or SSF34b sign support systems. The table below lists the three different drive sleeve components and the CP40 posts they are designed to support.

| DRIVE SLEEVE | CP40 POST |
|--------------|-----------|
| PTF07        | PPP02     |
| PTF08        | PPP03     |
| PTF09        | PPP04     |

### CONTACT INFORMATION

Lancaster Composite, Inc.  
CP40 Sign Support Systems  
P.O. Box 247  
Columbia, PA 17512-0247  
Phone: (717) 684-4440  
Fax: (717) 684-4445

## STEEL TUBE DRIVE SLEEVE

**PTF07-09**

SHEET NO.

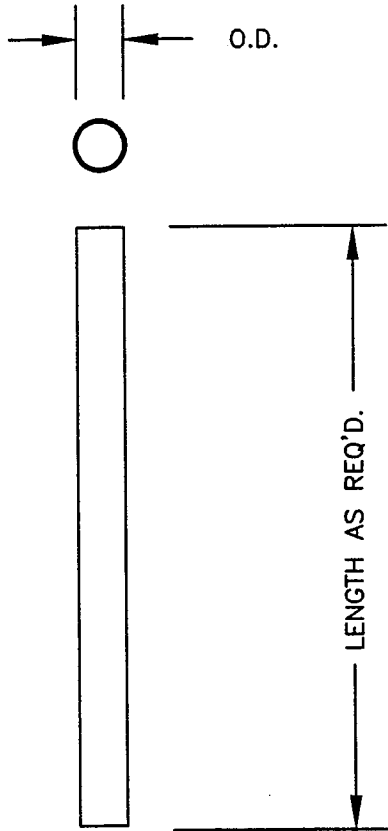
DATE

2 OF 2

1996

(717) 684-4440 FAX (717) 684-4445  
1000 HOUSTON STREET - P.O. BOX 247  
COLUMBIA, PA 17512-0247

**LANCASTER  
COMPOSITE**



### POST SCHEDULE

| DESIGNATOR | O.D. | WALL THK. |
|------------|------|-----------|
| PTP01a     | 60   | 2.0       |
| PTP01b     | 60   | 2.4       |
| PTP02a     | 73   | 3.0       |
| PTP02b     | 73   | 5.0       |
| PTP02c     | 73   | 7.0       |

### POZ-LOC ROUND SIGN POST

SOUTHWESTERN PIPE, INC.  
Houston, TX

PTP01a-02c

|           |         |
|-----------|---------|
| SHEET NO: | DATE    |
| 1 of 2    | 1/20/97 |

**SPECIFICATIONS**

POZ-LOC steel tubular sign posts are manufactured according to ASTM A-787 for galvanized high strength steel tubing. The raw material for precoated steel tubing shall be ASTM A-653 with a zinc coating weight designation of G-90 1.25 commercial weight. The exterior shall be coated with 12 microns of clear acrylic coating or optionally 60 microns of polyester powder coating. The minimum allowable yield strength of the steel tubing shall be 380 MPa. Section properties are as follows:

| Designator | Diameter<br>(mm) | Thickness<br>(mm) | I<br>(10 <sup>3</sup> mm <sup>4</sup> ) | S<br>(10 <sup>3</sup> mm <sup>3</sup> ) |
|------------|------------------|-------------------|---|---|
| PTP01a     | 60               | 2.0               | 160                                     | 5.3                                     |
| PTP01b     | 60               | 2.4               | 180                                     | 6.0                                     |
| PTP02a     | 73               | 3.0               | 405                                     | 11.3                                    |
| PTP02b     | 73               | 5.2               | 637                                     | 17.4                                    |
| PTP02c     | 73               | 7.0               | 801                                     | 21.9                                    |

Dimensional tolerances not shown or implied are intended to be those consistent with the proper functioning of the part, including its appearance and accepted manufacturing practices.

**INTENDED USE**

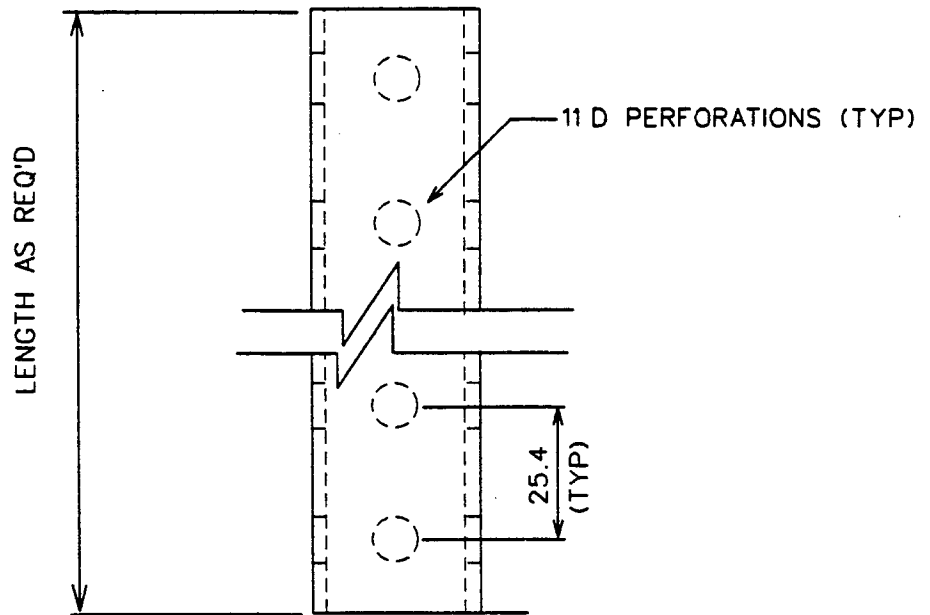
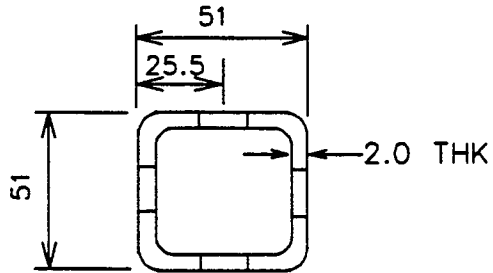
Tubular steel sign posts PTP01a and PTP01b are used in the POZ-LOC yielding small sign support system (SSP10a-b). PTP02a-c are used in the Round-Post Triangular Slip Base System (SSS06a).

**CONTACT INFORMATION**

Southwestern Pipe, Inc.  
P.O. Box 2002, Houston, TX 77252  
(713) 863-4300  
(713) 863-4313 (Fax)

**POZ-LOC ROUND SIGN POST**

|                   |          |  |  |
|-------------------|----------|--|--|
| <b>PTP01a-02c</b> |          | <b>SOUTHWESTERN PIPE, INC.</b><br>PO Box 2002, Houston, TX 77252<br>(713) 863-4300<br>(713) 863-4313 (Fax) |  |
|                   |          |  |  |
| 2 of 2            | 01-20-97 |  |  |



**QWIK-PUNCH PERFORATED STEEL SIGN POST**



UNISTRUT  
 16100 South Lathrop Avenue  
 Harvey IL 60426  
 800-882-5543  
 798-339-2399 (Fax)

PTP12a

| SHEET NO: | DATE |
|-----------|------|
| 1 OF 2    | 1996 |

### SPECIFICATIONS

Qwik-Punch steel perforated sign posts shall be manufactured using ASTM A570 Grade 50 steel. Posts shall be carefully formed to the specified size and induction-welded at the corner in such a manner that neither weld nor flash shall interfere with the telescoping properties of the post. Posts shall have 11-mm diameter knock-out perforations spaced at 25.4 mm along the entire length of the post on all four sides.

Qwik-Punch steel perforated sign posts are finished with a hot-dip zinc coating. Posts are given triple coated protection by an in-line application of hot-dip zinc as specified in AASHTO M120 followed by a chromate conversion coating and a clear organic polymer top-coat.

Inertial properties shown below are based on the dimensions through the perforations.

| Designator | Size<br>(mm) | Area<br>(mm <sup>2</sup> ) | Mass<br>(kg/m) | I<br>(10 <sup>3</sup> mm <sup>4</sup> ) | S<br>(10 <sup>3</sup> mm <sup>3</sup> ) | r<br>(mm) |
|------------|--------------|----------------------------|----------------|---|---|-----------|
| PTP12a     | 51           | 277                        | 2.74           | 90.7                                    | 4.60                                    | 18        |

Dimensional tolerances not shown or implied are intended to be those consistent with the proper functioning of the part, including its appearance and accepted manufacturing practices.


### INTENDED USE

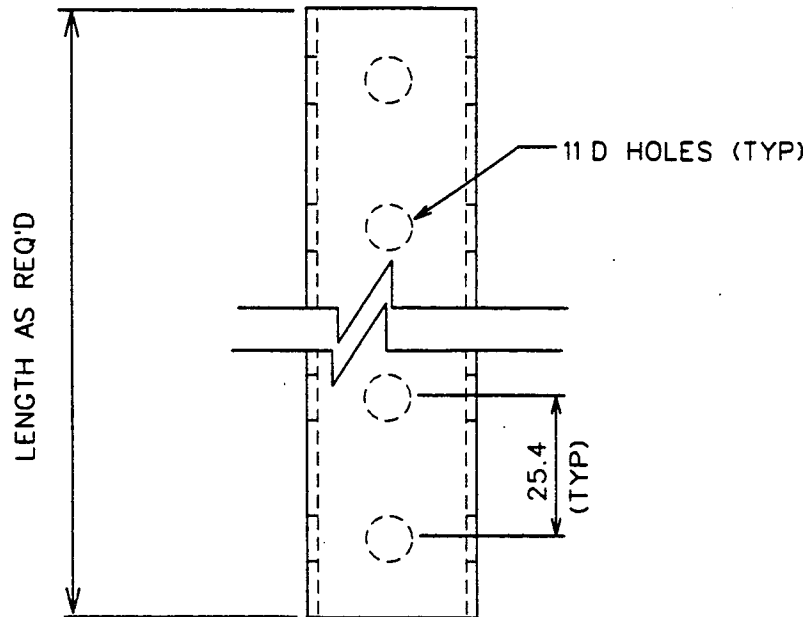
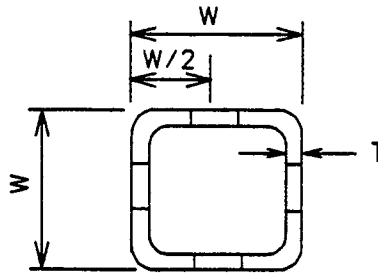
Qwik-Punch sign posts can be used in a variety of sign support systems including the SSF01a-b direct burial perforated tube sign support system, the SSF02a-c perforated tube in anchor system, and the SSS05 perforated tube on triangular slipbase.

### CONTACT INFORMATION

Unistrut  
16100 South Lathrop Avenue  
Harvey, IL 60426  
800-882-5543  
708-339-2399 (fax)

## QWIK-PUNCH PERFORATED STEEL SIGN POST

|               |          |   |  |
|---------------|----------|---|--|
| <b>PTP12a</b> |          |  | <b>UNISTRUT</b><br>16100 South Lathrop Avenue<br>Harvey IL 60426<br>800-882-5543<br>798-339-2399 (Fax) |
| SHEET NO.     | DATE     |   |  |
| 2 of 2        | 12-28-96 |   |  |



| DESIGNATOR | W  | T   |     |
|------------|----|-----|-----|
|            |    | a   | b   |
| PTP20      | 38 | --  | 2.7 |
| PTP21      | 45 | 2.0 | 2.7 |
| PTP22      | 51 | 2.0 | 2.7 |
| PTP23      | 57 | --  | 2.7 |
| PTP24      | 64 | --  | 2.7 |

TELESPAR PERFORATED STEEL SIGN POST



UNISTRUT  
 16100 South Lathrop Avenue  
 Harvey IL 60426  
 800-882-5543  
 798-339-2399 (Fax)

PTP20a-24b

|           |      |
|-----------|------|
| SHEET NO: | DATE |
| 1 OF 2    | 1996 |

### SPECIFICATIONS

Telespar steel perforated sign posts shall be manufactured using ASTM A653 Grade 50 Grade 50 steel. Posts shall be carefully formed to the specified size and high-frequency resistance welded at the corner in such a manner that neither weld nor flash shall interfere with the telescoping properties of the post. Posts shall have 11-mm diameter holes spaced at 25.4 mm along the entire length of the post on all four sides.

Telespar steel perforated sign posts may be finished with either a hot-dip zinc coating or paint. Sign posts shall be manufactured from hot-dipped galvanized steel conforming to ASTM A653 G90 structural quality Grade 50 Class 1. The steel is also coated with a chromate conversion coating and a clear organic polymer top-coat. Painted sign posts shall be carefully cleaned and phosphated. Immediately after phosphating, tubes shall be coated with an acrylic paint by electro-deposition and thoroughly baked. Color shall conform to Federal Specification No. 595-A color number 14109 (dark limit V).

Inertial properties shown below are based on the dimensions through the perforations.

| Designator          | Size<br>(mm) | Area<br>(mm <sup>2</sup> ) | Mass<br>(kg/m) | I<br>(10 <sup>3</sup> mm <sup>4</sup> ) | S<br>(10 <sup>3</sup> mm <sup>3</sup> ) | r<br>(mm) |
|---------------------|--------------|----------------------------|----------------|---|---|-----------|
| PTP20b <i>12 ga</i> | 38           | 245                        | 2.53           | 53.7                                    | 2.82                                    | 15        |
| PTP21a              | 45           | 228                        | 2.34           | 73.7                                    | 3.31                                    | 18        |
| PTP21b ×            | 45           | 313                        | 3.07           | 96.1                                    | 4.33                                    | 18        |
| PTP22a              | 51           | 277                        | 2.74           | 90.7                                    | 4.60                                    | 18        |
| PTP22b ×            | 51           | 381                        | 3.60           | 154.8                                   | 6.10                                    | 20        |
| PTP23b              | 57           | 448                        | 4.13           | 233.5                                   | 8.18                                    | 23        |
| PTP24b ×            | 64           | 518                        | 4.67           | 334.6                                   | 10.54                                   | 25        |

Dimensional tolerances not shown or implied are intended to be those consistent with the proper functioning of the part, including its appearance and accepted manufacturing practices.


### INTENDED USE

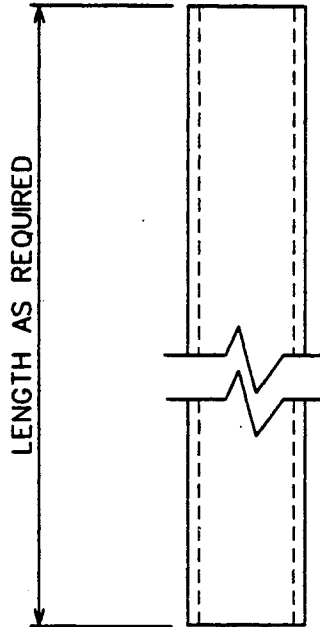
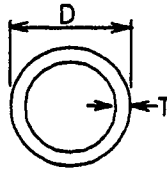
Telespar sign posts can be used in a variety of sign support systems including the SSF01a-b direct burial perforated tube sign support system, the SSF02a-c perforated tube in anchor system, and the SSS05 perforated tube on triangular slipbase.

### CONTACT INFORMATION

Unistrut  
16100 South Lathrop Avenue  
Harvey, IL 60426  
800-882-5543  
708-339-2399 (fax)

## TELESPAR PERFORATED STEEL SIGN POST

|                   |          |   |  |
|-------------------|----------|---|--|
| <b>PTP20a-24b</b> |          |  | <b>UNISTRUT</b><br>16100 South Lathrop Avenue<br>Harvey IL 60426<br>800-882-5543<br>798-339-2399 (Fax) |
| SHEET NO.         | DATE     |   |  |
| 2 of 2            | 12-28-96 |   |  |



| DESIGNATOR | D  | T   |
|------------|----|-----|
| PTP30      | 60 | 5.5 |
| PTP31      | 75 | 4.8 |
| PTP32      | 89 | 4.8 |

ALUMINUM TUBE POST



PTP30-32

SHEET NO:

DATE

1 OF 2

1996



### SPECIFICATIONS

The aluminum tube sign post shall be manufactured using either 6061-T6 alloy or 6063-T6 alloy.

| Designator | Area<br>(mm <sup>2</sup> ) | I<br>(10 <sup>3</sup> mm <sup>4</sup> ) | S<br>(10 <sup>3</sup> mm <sup>4</sup> ) |
|------------|----------------------------|---|---|
| PTF30      | 940                        | 353                                     | 11.8                                    |
| PTF31      | 1060                       | 655                                     | 17.5                                    |
| PTF32      | 1270                       | 113                                     | 25.4                                    |

Dimensional tolerances not shown or implied are intended to be those consistent with the proper functioning of the part, including its appearance and accepted manufacturing practices.

### INTENDED USE

The aluminum tube sign post is the only component of the direct burial aluminum tube small sign support system (SSF30a).

## ALUMINUM TUBE POST

PTP30-32

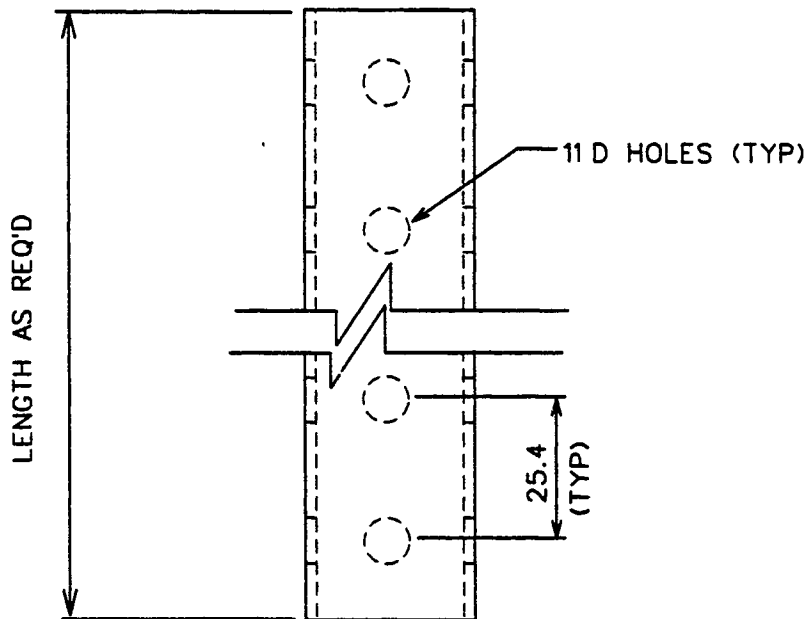
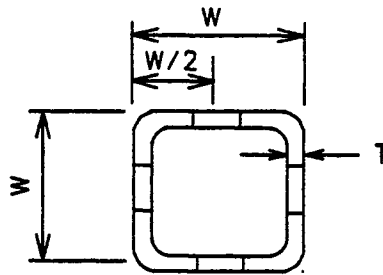
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| DESIGNATOR | W  | T   |     |
|------------|----|-----|-----|
|            |    | a   | b   |
| PTP40      | 38 | --  | 2.7 |
| PTP41      | 45 | 2.1 | 2.7 |
| PTP42      | 51 | 2.1 | 2.7 |
| PTP43      | 57 | 2.1 | 2.7 |
| PTP44      | 64 | --  | 2.7 |

ULTI-MATE SQUARE TUBE STEEL SIGN POST



PTP40a-44b

|           |      |
|-----------|------|
| SHEET NO: | DATE |
| 1 OF 2    | 1996 |

### SPECIFICATIONS

Ulti-Mate square steel sign posts that are 2.7-mm thick (designators ending in "b") shall be made using ASTM A653M Grade 275 structural quality steel. Sections that are 2.1-mm thick (designators ending in "a") shall be made using ASTM A653M Grade 340 modified to Grade 375. Posts shall be formed to the specified size and welded at the corner edge in such a manner that neither weld nor flash shall interfere with the telescoping properties of the post. Posts shall have 11-mm diameter holes spaced at 25.4 mm along the entire length of the post on all four sides. Ulti-mate square steel sign posts shall be zinc coated as per ASTM A653M coating type Z-275.

Inertial properties shown below are based on the dimensions through the perforations.

| Designator | Size<br>(mm) | Area<br>(mm <sup>2</sup> ) | Mass<br>(kg/m) | I<br>(10 <sup>3</sup> mm <sup>4</sup> ) | S<br>(10 <sup>3</sup> mm <sup>3</sup> ) | r<br>(mm) |
|------------|--------------|----------------------------|----------------|---|---|-----------|
| PTP40b     | 38           | 245                        | 2.59           | 53.7                                    | 2.82                                    | 15        |
| PTP41a     | 45           | 253                        | 2.54           | 83.6                                    | 3.31                                    | 18        |
| PTP41b     | 45           | 313                        | 3.11           | 96.1                                    | 4.33                                    | 18        |
| PTP42a     | 51           | 306                        | 2.96           | 123.1                                   | 6.10                                    | 20        |
| PTP42b     | 51           | 381                        | 3.63           | 154.8                                   | 6.10                                    | 20        |
| PTP43a     | 57           | 360                        | 3.39           | 195.1                                   | 6.84                                    | 23        |
| PTP43b     | 57           | 448                        | 4.16           | 233.4                                   | 8.18                                    | 23        |
| PTP44b     | 64           | 518                        | 4.69           | 334.5                                   | 10.54                                   | 25        |

Dimensional tolerances not shown or implied are intended to be those consistent with the proper functioning of the part, including its appearance and accepted manufacturing practices.

### INTENDED USE

Ulti-mate square steel sign posts can be used in a variety of sign support systems including the SSF01a-b direct burial perforated tube sign support system and the SSF02a-c perforated tube in anchor system.

### REFERENCE

S. I. Sillan, "Acceptable Uses of Perforated Square Steel Tube Sign Post Per Request of Western Highway Products," Geometric and Roadside Design Acceptance letter 62, Federal Highway Administration, June 3, 1996.

### CONTACT INFORMATION

|  |   |
|--|---|
| In California:<br>Western Highway Products, Inc.<br>Traffic Signs and Safety Products<br>10650 Fern Avenue | Outside California:<br>Ultimate Highway Sales, Inc.<br>7804 College Drive<br>Suite 3 N.E. |
|--|---|

## ULTI-MATE SQUARE TUBE STEEL SIGN POST

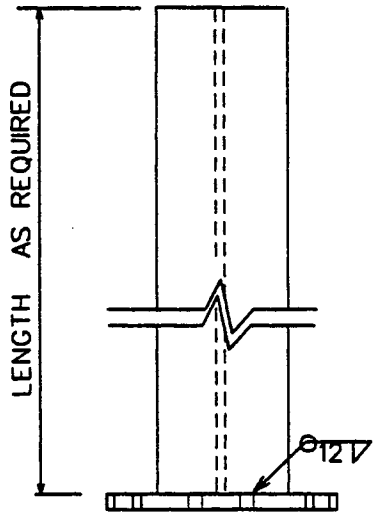
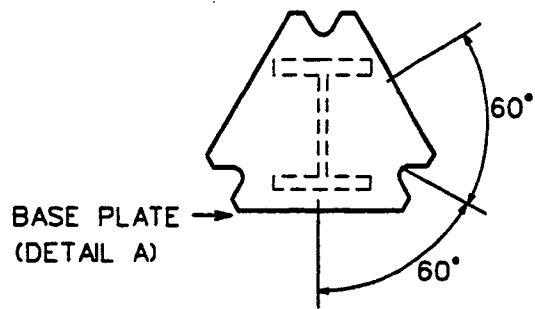
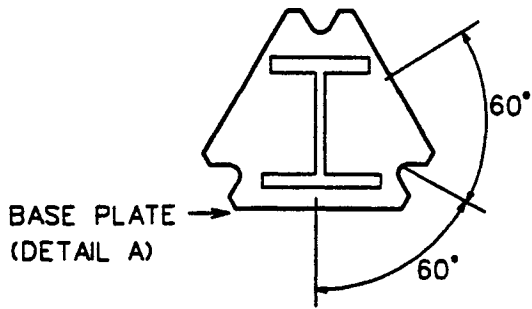
PTP40a-44b

SHEET NO.

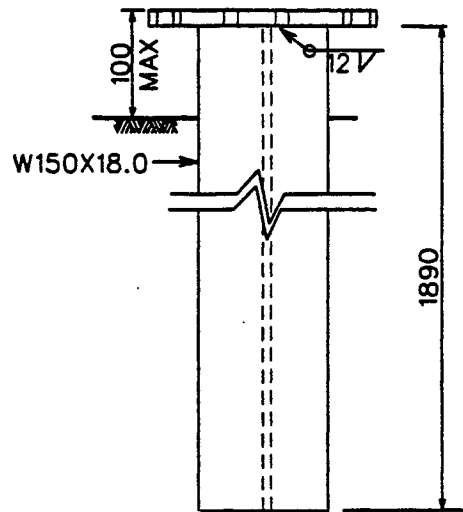
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PWF07a: SIGN POST



PWF07b: BASE POST

OMNI-DIRECTIONAL SLIPBASE W - SIGN & BASE POST



PWF07a-b

SHEET NO:

DATE

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1996

### SPECIFICATIONS

The omni-directional slipbase sign (PWF07a) and base (PWF07b) posts consist of a slipbase base plate welded to a base post and a slipbase base welded to a sign post. The W150x18.0 structural steel wide-flange shape as defined in AASHTO M160M (ASTM A6M) shall be made using AASHTO M183M (ASTM A36M) structural steel. The base plate shall be manufactured from AASHTO M183M (ASTM A36A) 38-mm thick steel plate. The lower base plate shall be welded onto the base post and the upper base plate (FPS11a) shall be welded onto the sign post. All welding shall conform to ANSI/AASHTO/AWS D1.5. After all welding is complete the base-plate/base-post assembly shall be zinc coated according to AASHTO M111 (ASTM A123).

Dimensional tolerances not shown or implied are intended to be those consistent with the proper functioning of the part, including its appearance and accepted manufacturing practices.

### INTENDED USE

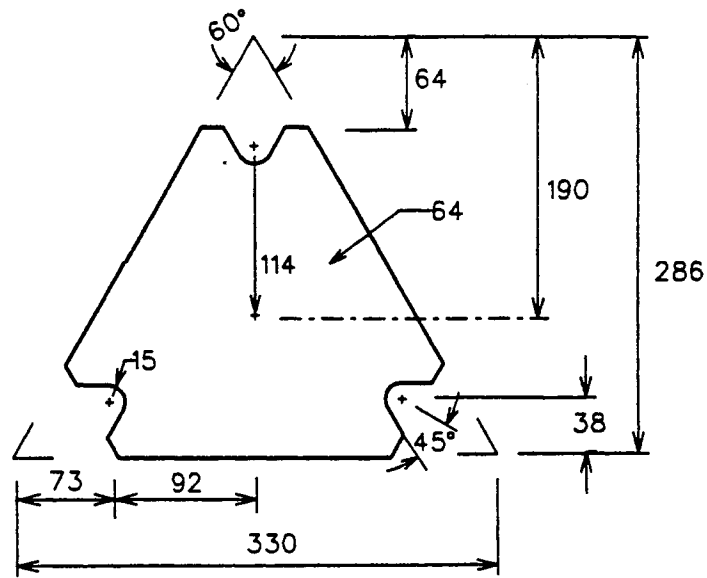
The omni-directional W-post slipbase base sign posts are components of the omni-directional slipbase W-post sign support system (SSS04a-b).

## OMNI-DIRECTIONAL SLIPBASE W-SIGN & BASE POST

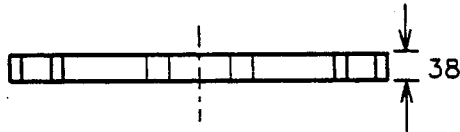
PWF07a-b



|           |          |
|-----------|----------|
| SHEET NO. | DATE     |
| 2 of 4    | 12-28-96 |



TOP



ELEVATION

DETAIL A: SLIPBASE PLATE

OMNI-DIRECTIONAL SLIPBASE W SIGN & BASE POST



PWF07a-b

|           |      |
|-----------|------|
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# OMNI-DIRECTIONAL SLIPBASE W-SIGN & BASE POST

PWF07a-b

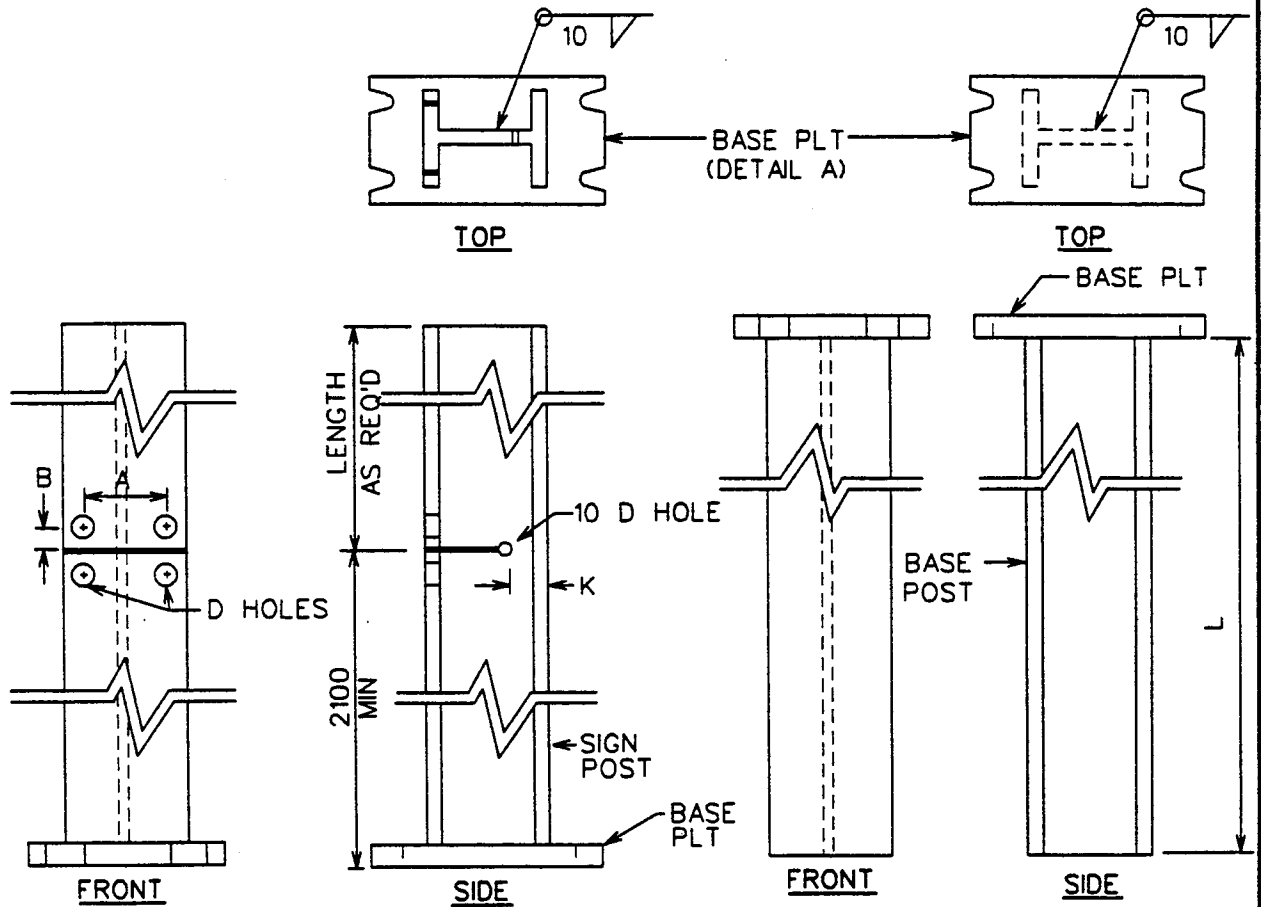
SHEET NO.

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SIGN POST: PWF11a-15a

BASE POST: PWF11b-PWF15b

| DESIGNATOR | POST      | BASE PLT | A   | B   | C  | L    | K  |
|------------|-----------|----------|-----|-----|----|------|----|
| PWF11a-b   | S75X8.5   | FPS01    | 38  | 92  | 14 | 995  | 20 |
| PWF12a-b   | W150X18.0 | FPS02    | 56  | 92  | 18 | 1280 | 20 |
| PWF13a-b   | W200X35.9 | FPS03    | 89  | 105 | 22 | 1885 | 25 |
| PWF14a-b   | W250X49.1 | FPS04    | 140 | 118 | 28 | 2490 | 30 |
| PWF15a-b   | W310X67   | FPS05    | 140 | 140 | 28 | 2490 | 35 |

## WIDE FLANGE BASE & SIGN POST



PWF11a-15b

SHEET NO:

DATE

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1996



### SPECIFICATIONS

Wide flange sign and base posts shall be manufactured using AASHTO M183M (ASTM A36M) steel with dimensions that conform to the sizes given in AASHTO M160M (ASTM A6M). Rectangular slipbase base plates shall be manufactured from AASHTO M183M (ASTM A36M) steel plate. A slipbase plate shall be welded onto the sign post (PWF11a-15a) and base post (PWF11b-15b) using a fillet welded all around the structural shape profile. All welding shall conform to ANSI/AASHTO/AWS D1.5. After all welding is complete the base-plate/base-post assembly shall be zinc coated according to AASHTO M111 (ASTM A123).

| Designator | Area<br>(10 <sup>3</sup> mm <sup>2</sup> ) | I <sub>x</sub><br>(10 <sup>6</sup> mm <sup>4</sup> ) | I <sub>y</sub><br>(10 <sup>6</sup> mm <sup>4</sup> ) | S <sub>x</sub><br>(10 <sup>3</sup> mm <sup>3</sup> ) | S <sub>y</sub><br>(10 <sup>3</sup> mm <sup>3</sup> ) |
|------------|--|--|--|--|--|
| PWF11a-b   | 1.8  | 1.1  | 0.2  | 27.6   | 6.4  |
| PWF12a-b   | 2.3  | 9.2  | 1.3  | 120.0  | 24.7   |
| PWF13a-b   | 4.6  | 34.4   | 7.6  | 342.0  | 92.6   |
| PWF14a-b   | 6.3  | 113.0  | 38.8   | 893.0  | 306.0  |
| PWF15a-b   | 8.5  | 145.0  | 20.7   | 948.0  | 203.0  |

Dimensional tolerances not shown or implied are intended to be those consistent with the proper functioning of the part, including its appearance and accepted manufacturing practices.

### INTENDED USE

These wide flange sign and base posts are used in the rectangular uni-directional slipbase (SSS01a-b).

## WIDE FLANGE BASE & SIGN POST

**PWF11a-15b**

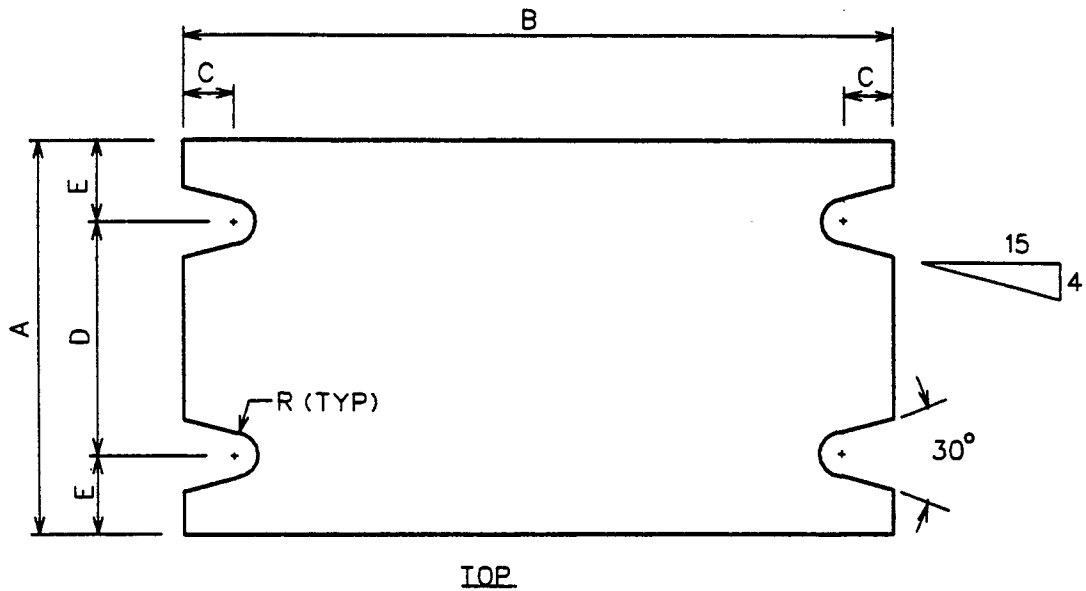
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DETAIL A: SLIPBASE PLATE

| DESIGNATOR | A   | B   | C  | D   | E  | R  | T  |
|------------|-----|-----|----|-----|----|----|----|
| PWF11a-b   | 100 | 180 | 20 | 50  | 25 | 7  | 25 |
| PWF12a-b   | 102 | 250 | 20 | 50  | 26 | 9  | 40 |
| PWF13a-b   | 166 | 320 | 22 | 80  | 43 | 11 | 45 |
| PWF14a-b   | 202 | 400 | 32 | 120 | 41 | 14 | 50 |
| PWF15a-b   | 254 | 450 | 32 | 150 | 52 | 14 | 50 |

## WIDE FLANGE BASE & SIGN POST



PWF11a-15b

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1996

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**WIDE FLANGE BASE & SIGN POST**

**PWF11a-15b**

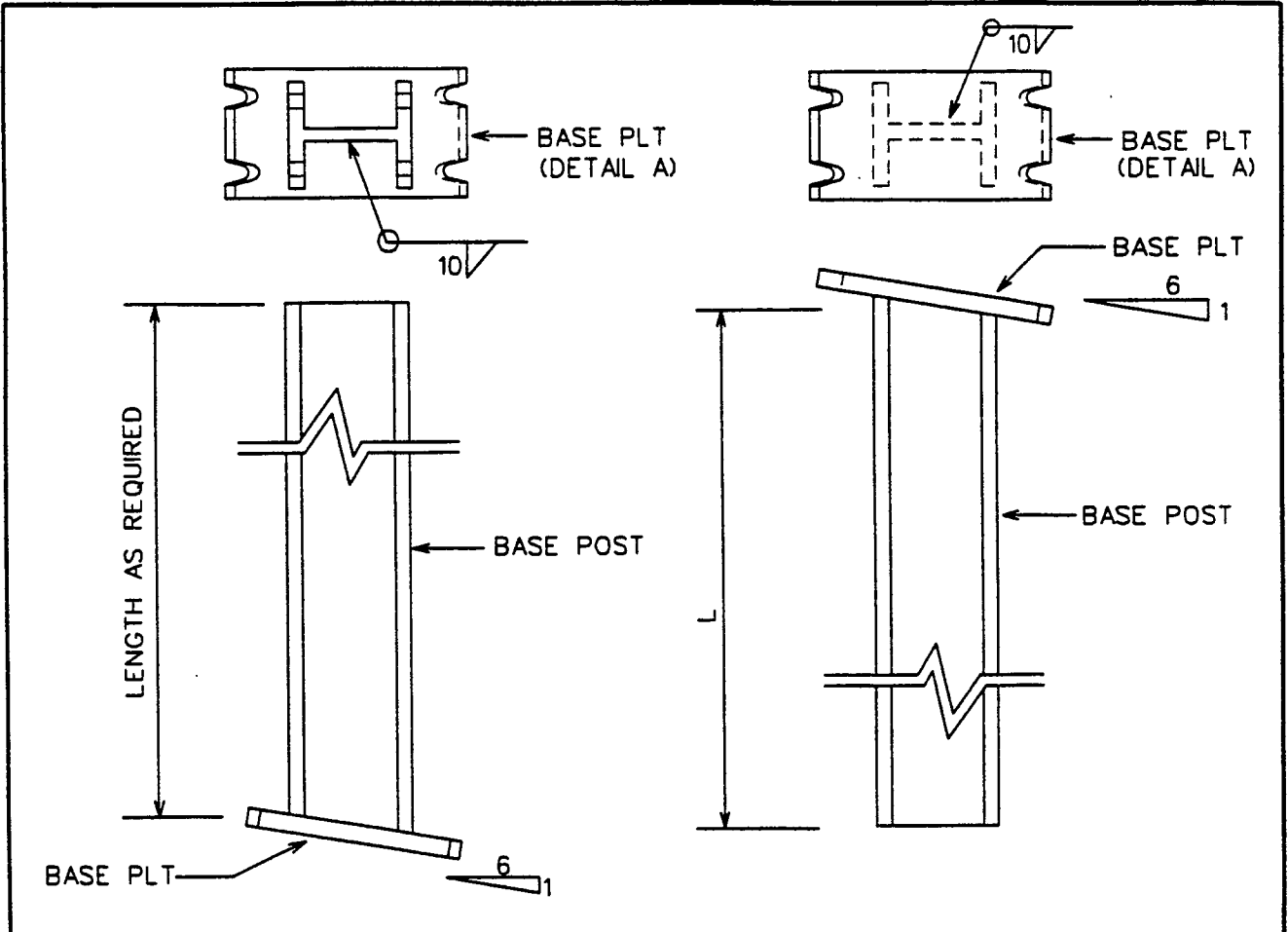
SHEET NO.

DATE

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SIGN POST: PWF21a-25a

BASE POST: PWF21b-25b

| DESIGNATOR | POST      | L    |
|------------|-----------|------|
| PWF21a-b   | S75X8.5   | 995  |
| PWF22a-b   | W150X18.0 | 1280 |
| PWF23a-b   | W200X35.9 | 1885 |
| PWF24a-b   | W250X49.1 | 2490 |
| PWF25a-b   | W310X67   | 2490 |

INCLINED WIDE FLANGE BASE & SIGN POST



PWF21a-25b

|           |      |
|-----------|------|
| SHEET NO: | DATE |
| 1 OF 4    | 1996 |

### SPECIFICATIONS

Inclined wide flange sign and base posts shall be manufactured using AASHTO M183M (ASTM A36M) steel with dimensions that conform to the sizes given in AASHTO M160M (ASTM A6M). The base plate shall be manufactured from AASHTO M183M (ASTM A36M) steel plates. Two slipbase plates shall be welded, one each, to the sign and base posts (PWF21a-25a) using a fillet weld all around the structural shape profile. All welding shall conform to ANSI/AASHTO/AWS D1.5. After all welding is complete the base-plate/base-post assembly shall be zinc coated according to AASHTO M111 (ASTM A123).

| Designator | Area<br>(10 <sup>3</sup> mm <sup>2</sup> ) | I <sub>x</sub><br>(10 <sup>6</sup> mm <sup>4</sup> ) | I <sub>y</sub><br>(10 <sup>6</sup> mm <sup>4</sup> ) | S <sub>x</sub><br>(10 <sup>3</sup> mm <sup>3</sup> ) | S <sub>y</sub><br>(10 <sup>3</sup> mm <sup>3</sup> ) |
|------------|--|--|--|--|--|
| PWF21a-b   | 1.8  | 1.1  | 0.2  | 27.6   | 6.4  |
| PWF22a-b   | 2.3  | 9.2  | 1.3  | 120.0  | 24.7   |
| PWF23a-b   | 4.6  | 34.4   | 7.6  | 342.0  | 92.6   |
| PWF24a-b   | 6.3  | 113.0  | 38.8   | 893.0  | 306.0  |
| PWF25a-b   | 8.5  | 145.0  | 20.7   | 948.0  | 203.0  |

Dimensional tolerances not shown or implied are intended to be those consistent with the proper functioning of the part, including its appearance and accepted manufacturing practices.

### INTENDED USE

Inclined wide flange sign and base posts are a component of the inclined rectangular uni-directional slipbase small sign support system (SSS02a-b).

## INCLINED WIDE FLANGE BASE & SIGN POST

**PWF21a-25b**

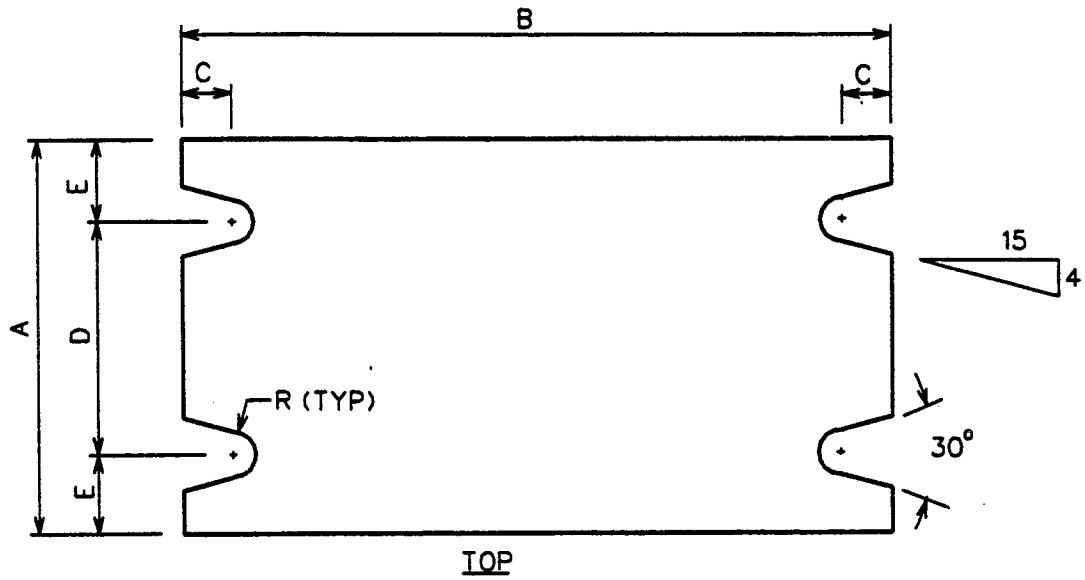
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ELEVATION

DETAIL A: SLIPBASE PLATE

| DESIGNATOR | A   | B   | C  | D   | E  | R  | T  |
|------------|-----|-----|----|-----|----|----|----|
| PWF21a-b   | 100 | 180 | 20 | 50  | 25 | 7  | 25 |
| PWF22a-b   | 102 | 250 | 20 | 50  | 26 | 9  | 40 |
| PWF23a-b   | 166 | 320 | 22 | 80  | 43 | 11 | 45 |
| PWF24a-b   | 202 | 400 | 32 | 120 | 41 | 14 | 50 |
| PWF25a-b   | 254 | 450 | 32 | 150 | 52 | 14 | 50 |

INCLINED WIDE FLANGE BASE & SIGN POST



PWF21a-25b

|           |      |
|-----------|------|
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**INCLINED WIDE FLANGE BASE & SIGN POST**

**PWF21a-25b**

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DATE

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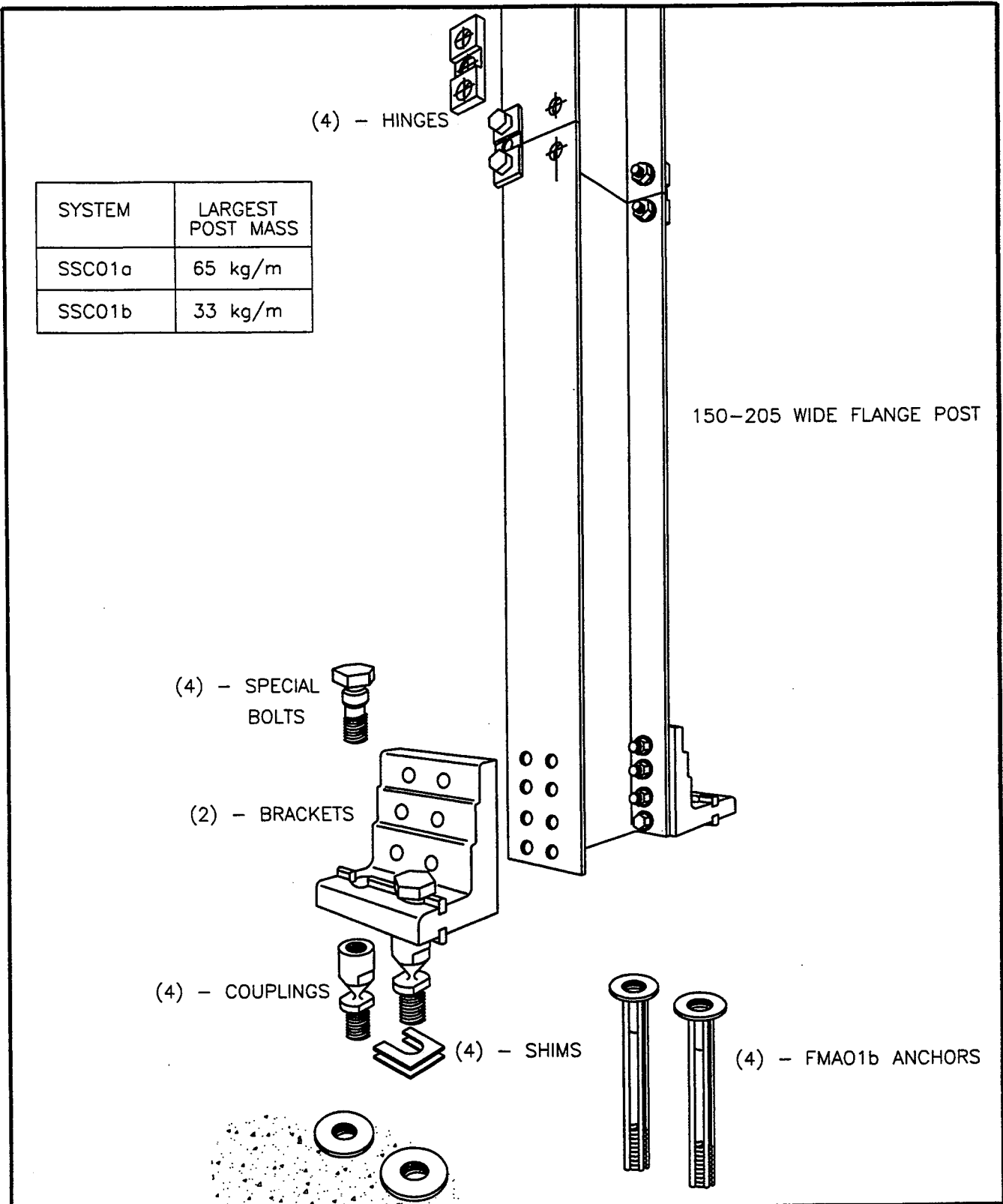
12-28-96



# **SIGN SUPPORT SYSTEMS**







**BREAK-SAFE® B525-LP SYSTEM**



**SSC01a-b**

|           |         |
|-----------|---------|
| SHEET NO: | DATE    |
| 1 OF 2    | 7/18/95 |

### SPECIFICATIONS

The Break-Safe Model B525-LP is an omni-directional bolt-on breakaway system for use with 150-mm to 205-mm wide I-beams and rectangular steel or aluminum single (SSC01a) or multiple (SSC01b) ground-mounted sign posts. The system uses concrete foundations and does not require initial or continued bolt torque maintenance. It is installed flush with the top of the foundation minimizing the possibility of snagging the vehicle undercarriage.

The system actuates when hit from any direction at bumper height, causing the frangible couplings and hinges to break, usually, without damaging the sign panel or the sign posts. This allows for quick and easy re-deployment of the sign by on-site replacement of the frangible components.

The system has been evaluated in accordance with NCHRP Report 350 guidelines and has met or exceeded all requirements of 1994 AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*. It has also been approved by FHWA for use on Federal Aid projects. Detailed shop drawings, specifications and post selection tables for wide range of sign panels are available from the manufacturer on request.

### COMPONENTS

| Designator | Component    | Description               | Quantity |
|------------|--------------|---------------------------|----------|
| FMAO1b     | Anchor       | Break-Safe Type B         | 4        |
| --         | Bracket      | 6061-T6 Extruded Aluminum | 2        |
| --         | Coupling     | AMS 6378D Steel           | 4        |
| --         | Hinge        | AISI 4130 Steel           | 4        |
| --         | Special Bolt | ASTM A449 Steel           | 4        |
| --         | Fasteners    | ASTM A325 Steel           | 24       |
| --         | Shim         | Galv. Steel Sheet         | 1        |
| --         | Post         | By Others                 | 1        |

### REFERENCES

L. A. Staron, Breakaway Sign Supports, Geometrics and Roadside Design Acceptance Letter Number SS-17, Federal Highway Administration, January 8, 1990.

### CONTACT INFORMATION

Transpo Industries, Inc.  
20 Jones Street  
New Rochelle, NY 10801  
Phone: 914-636-1000  
Fax: 914-636-1282

## BREAK-SAFE B525-LP SYSTEM

# SSC01a-b

SHEET NO.

DATE

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**TRANSPO**<sup>®</sup>  
INDUSTRIES, INC

| SYSTEM | LARGEST POST MASS |
|--------|-------------------|
| SSC02a | 65 kg/m           |
| SSC02b | 33 kg/m           |

(4) - HINGES

255-530 WIDE FLANGE POST

(4) - SPECIAL BOLTS

(2) - BRACKETS

(4) - COUPLINGS

(4) - SHIMS

(4) - FMA01b ANCHORS

**BREAK-SAFE® B650-LP SYSTEM**



**SSCO2a-b**

|           |         |
|-----------|---------|
| SHEET NO: | DATE    |
| 1 OF 2    | 7/18/95 |

### SPECIFICATIONS

The Break-Safe Model B650-LP is an omni-directional bolt-on breakaway system for use with 255-mm to 530-mm wide I-beams and rectangular steel or aluminum single (SSC02a) or multiple (SSC02b) ground-mounted sign posts. The system uses concrete foundations and does not require initial or continued bolt torque maintenance. It is installed flush with the top of the foundation minimizing the possibility of snagging the vehicle undercarriage.

The system actuates when hit from any direction at bumper height causing the frangible couplings and hinges to break, usually, without damaging the sign panel or the sign posts. This allows for quick and easy re-deployment of the sign by on-site replacement of the frangible components.

The system has been evaluated in accordance with NCHRP Report 350 guidelines and has met or exceeded all requirements of 1994 AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*. It has also been approved by FHWA for use on Federal Aid projects. Detailed shop drawings, specifications and post selection tables for a wide range of sign panels are available from the manufacturer on request.

### COMPONENTS

| Designator | Component    | Description               | Quantity |
|------------|--------------|---------------------------|----------|
| FMA01b     | Anchor       | BreakSafe Type B          | 4        |
| --         | Bracket      | 6061-T6 Extruded Aluminum | 2        |
| --         | Coupling     | AMS 6378D Steel           | 4        |
| --         | Hinge        | AISI 4130 Steel           | 4        |
| --         | Special Bolt | ASTM A449 Steel           | 4        |
| --         | Fasteners    | ASTM A325 Steel           | 24       |
| --         | Shim         | Galv. Steel Sheet         | 4        |
| --         | Post         | Other Manufacturers       | 1        |

### REFERENCES

L. A. Staron, Breakaway Sign Supports, Geometrics and Roadside Design Acceptance Letter Number SS-17, Federal Highway Administration, January 8, 1990.

### CONTACT INFORMATION

Transpo Industries, Inc.  
20 Jones Street  
New Rochelle, NY 10801  
Phone: 914-636-1000  
Fax: 914-636-1282

## BREAK-SAFE B650-LP SYSTEM

# SSC02a-b

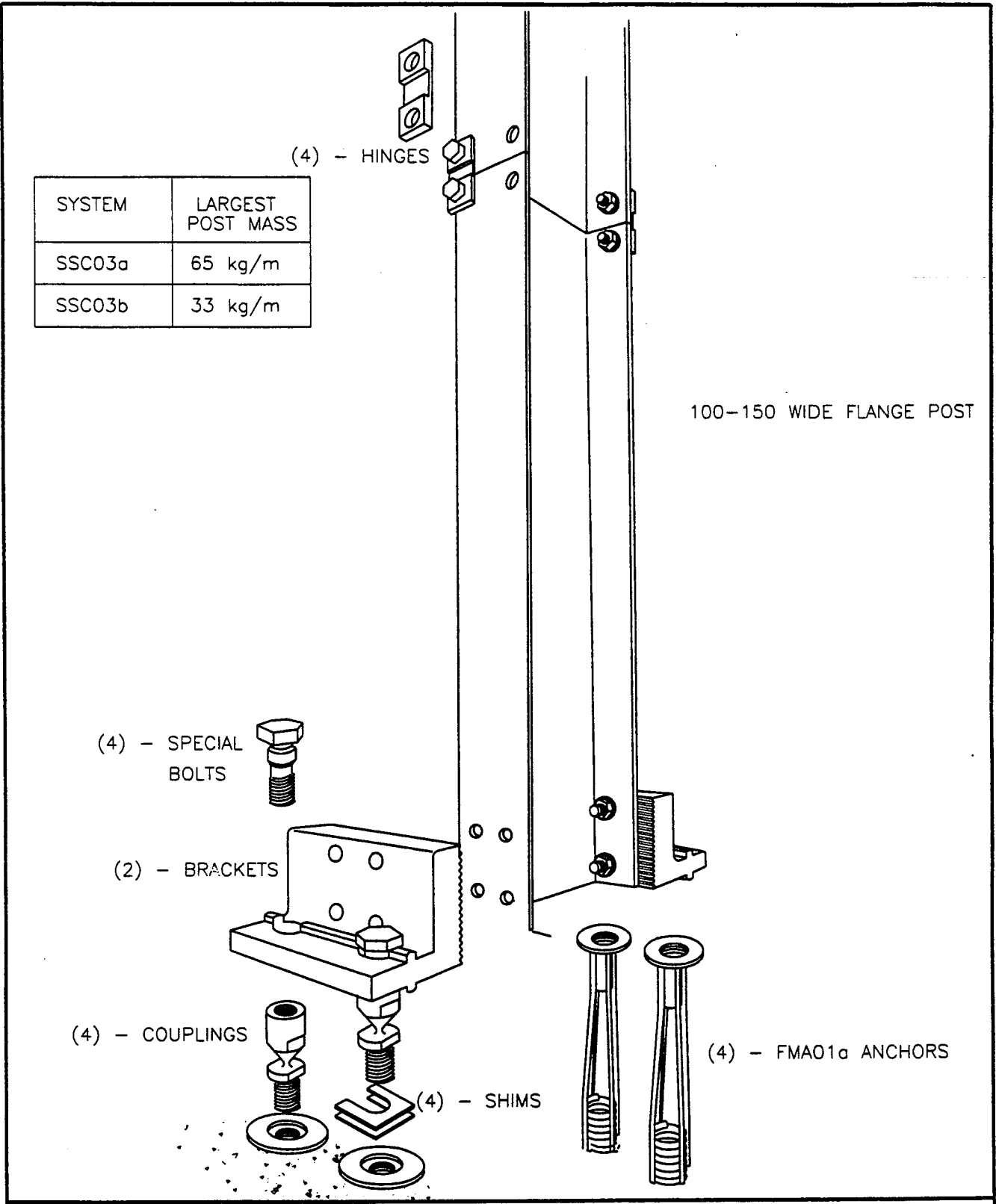


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**BREAK-SAFE® AI6-LP SYSTEM**



**SSCO3a-b**

|           |         |
|-----------|---------|
| SHEET NO: | DATE    |
| 1 OF 2    | 7/18/95 |

### SPECIFICATIONS

The Break-Safe Model A165-LP is an omni-directional bolt-on breakaway system for use with 100-mm to 150-mm deep steel or aluminum, single (SSC03a) or multiple (SSC03b), ground mounted I-beam posts. The system uses concrete foundations and does not require initial or continued bolt torque maintenance. Moreover, it is installed flush with top of foundation, thus, eliminating any snagging of vehicles' undercarriage.

The system actuates when hit from any direction, at bumper height, causing the frangible couplings and hinges to break, usually, without damaging the sign panel or the sign posts. This allows for quick and easy re-deployment of the sign by on-site replacement of the frangible components.

The system has been evaluated in accordance with NCHRP report 350 guidelines and has proven to meet or exceeded all requirements of 1994 AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*. It has also been approved by FHWA for use on Federal Aid projects. Detailed shop drawings, specifications and post selection tables for a wide range of sign panels are available from the manufacturer on request.

### COMPONENTS

| Designator | Component    | Material Description      | Quantity |
|------------|--------------|---------------------------|----------|
| FMA01a     | Anchor       | BreakSafe Type A          | 4        |
| --         | Bracket      | 6061-T6 Extruded Aluminum | 2        |
| --         | Coupling     | AMS 6378D Steel           | 4        |
| --         | Hinge        | AISI 4130 Steel           | 4        |
| --         | Special Bolt | ASTM A449 Steel           | 4        |
| --         | Fasteners    | ASTM A325                 | 16       |
| --         | Shim         | Galv. Steel Sheet         | 4        |
| --         | Post         | By Others                 | 1        |

### REFERENCES

L. A. Staron, Breakaway Sign Supports, Geometrics and Roadside Design Acceptance Letter Number SS-17, Federal Highway Administration, January 8, 1990.

### CONTACT INFORMATION

Transpo Industries, Inc.  
20 Jones Street  
New Rochelle, NY 10801  
Phone: 914-636-1000  
Fax: 914-636-1282

## BREAK-SAFE A16-LP SYSTEM

# SSC03a-b

SHEET NO.

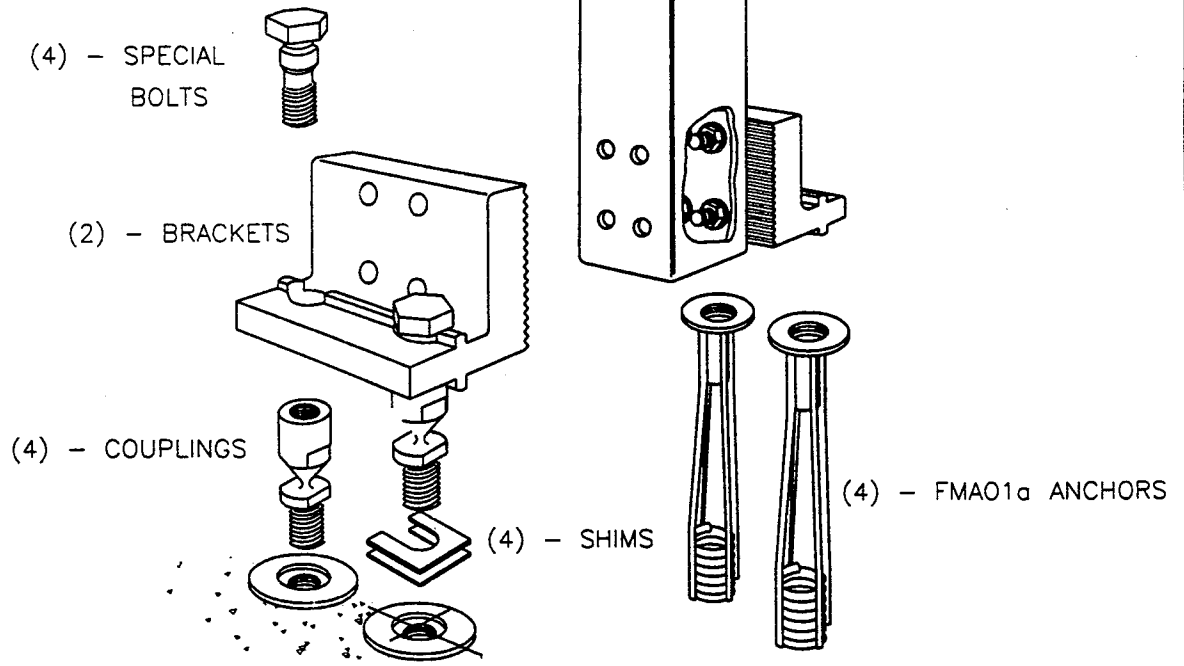
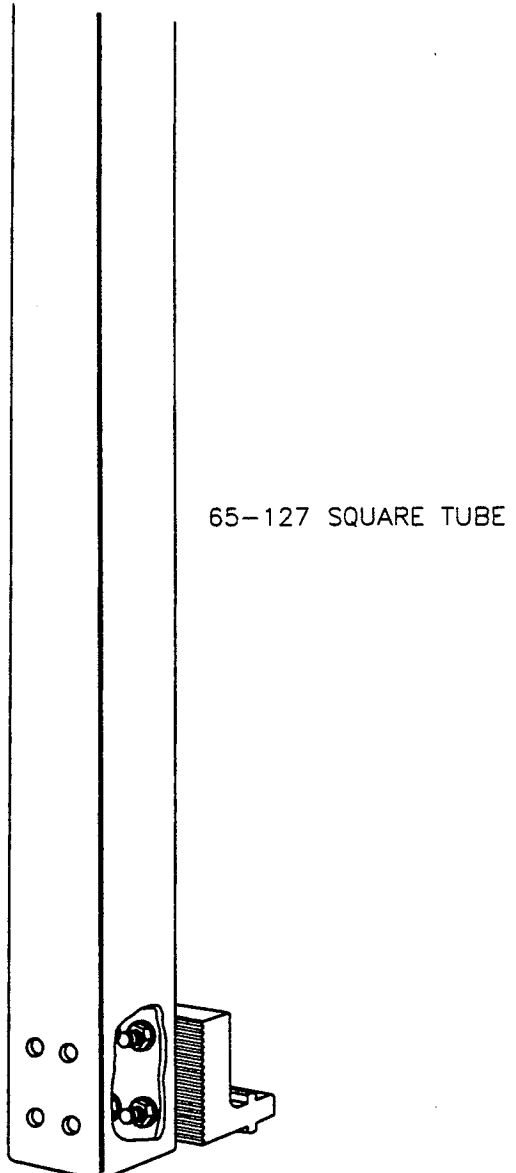
DATE

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2/2/97

**TRANSPO**<sup>®</sup>  
INDUSTRIES, INC

| SYSTEM | LARGEST POST MASS |
|--------|-------------------|
| SSC04a | 65 kg/m           |
| SSC04b | 33 kg/m           |



**BREAK-SAFE® AS4-LP SYSTEM**



**SSCO4a-b**

|           |         |
|-----------|---------|
| SHEET NO: | DATE    |
| 1 OF 2    | 7/18/95 |



### SPECIFICATIONS

Break-Safe Model AS4-LP is an omni-directional bolt-on breakaway system for 65-mm to 127-mm steel or aluminum, single (SSC04a) or multiple (SSC04b), ground-mounted square sign posts. The system uses concrete foundations and does not require initial or continued bolt torque maintenance. It is installed flush with the top of the foundation minimizing the possibility of snagging of the vehicle undercarriage.

The system actuates when hit from any direction at bumper height causing the frangible couplings to break, usually, without damaging the sign posts. This allows for quick and easy re-deployment of the sign by on-site replacement of the frangible components.

The system has been evaluated in accordance with NCHRP Report 350 guidelines and has met or exceeded all requirements of 1994 AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*. It has also been approved by FHWA for use on Federal Aid projects. Detailed shop drawings, specifications and post selection tables for a wide range of sign panels are available from the manufacturer on request.

| Designator | Component    | COMPONENTS                |          |
|------------|--------------|---------------------------|----------|
|            |              | Description               | Quantity |
| FMA01a     | Anchor       | BreakSafe Type A          | 4        |
| --         | Bracket      | 6061-T6 Extruded Aluminum | 2        |
| --         | Coupling     | AMS 6378D Steel           | 4        |
| --         | Special Bolt | ASTM A449 Steel           | 4        |
| --         | Fasteners    | ASTM A325                 | 8        |
| --         | Shim         | Galv. Steel Sheet         | 4        |
| --         | Post         | Other Manufacturers       | 1        |

### REFERENCES

L.A. Staron, Breakaway Sign Supports, Geometrics and Roadside Design Acceptance Letter Number SS-17, Federal Highway Administration, January 8, 1990.

### CONTACT INFORMATION

Transpo Industries, Inc.  
20 Jones Street  
New Rochelle, NY 10801  
Phone: 914-636-1000  
Fax: 914-636-1282

## BREAK-SAFE AS4-LP SYSTEM

# SSC04a-b

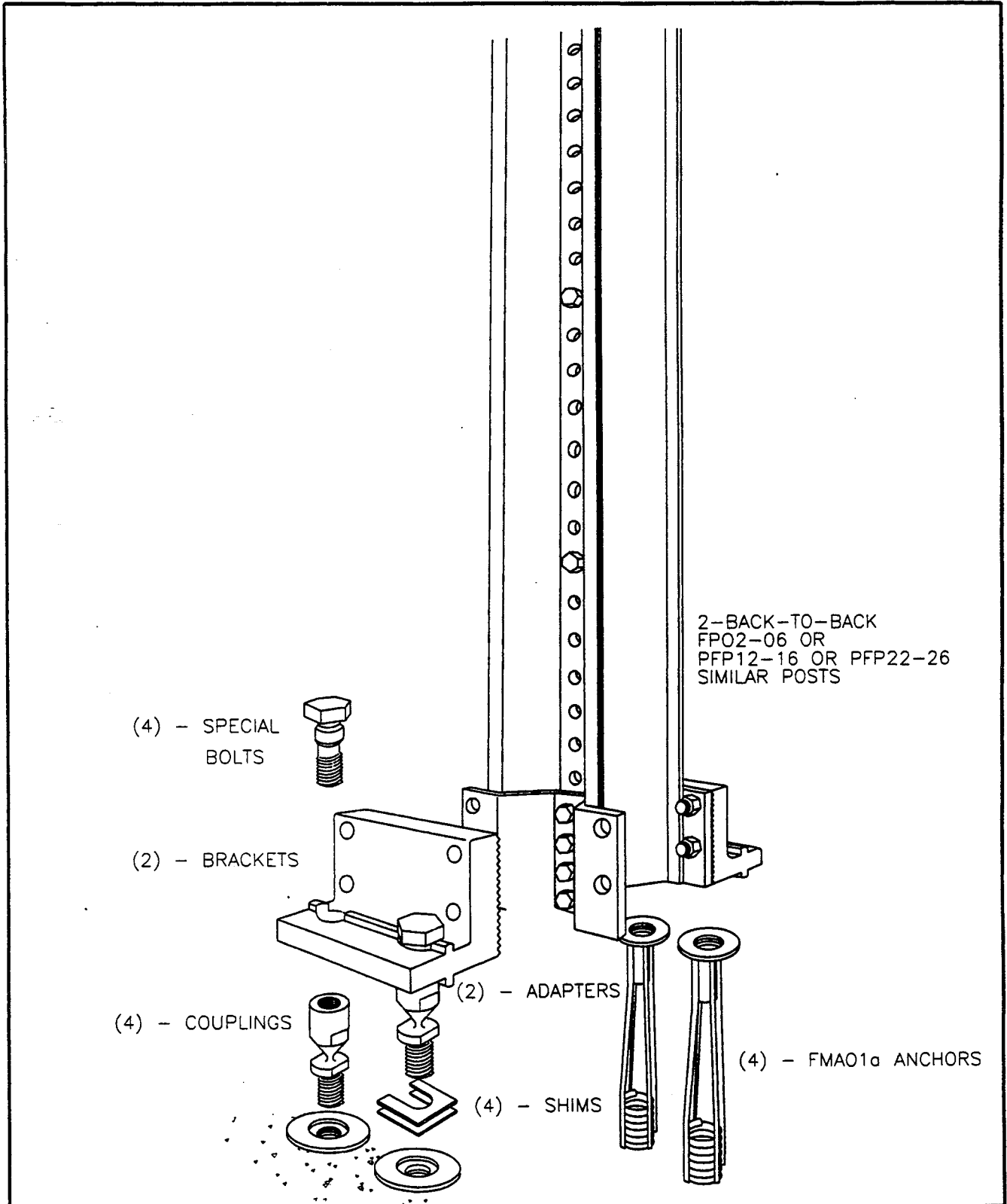


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DATE

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**BREAK-SAFE<sup>®</sup> AU4-LP, AU6-LP, AU8-LP SYSTEM**

**TRANSPO<sup>®</sup>**  
INDUSTRIES, INC

**SSCO5a-b**

|           |         |
|-----------|---------|
| SHEET NO: | DATE    |
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### SPECIFICATIONS

The Break-Safe Models AU4-LP, AU6-LP & AU8-LP are omni-directional bolt-on breakaway systems for 3.0 - 6.0 kg/m single (SSC05a) or multiple (SSC05b), ground-mounted back-to-back u-channel sign posts (PFP02 - 06 or PFP12 - 16). The systems use concrete foundations and do not require initial or continued bolt torque maintenance. It is installed flush with the top of the foundation minimizing the possibility of snagging the vehicle undercarriage.

The system actuates when hit from any direction at bumper height causing the frangible couplings to break, usually, without damaging the sign panel or the sign posts. This allows for quick and easy re-deployment of the sign by on-site replacement of the frangible components.

The system has been evaluated in accordance with NCHRP Report 350 guidelines and has met or exceeded all requirements of 1994 AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*. It has also been approved by FHWA for use on Federal Aid projects. Detailed shop drawings, specifications and post selection tables for a wide range of sign panels are available from the manufacturer on request.

### COMPONENTS

| Designator | Component    | Description                 | Quantity |
|------------|--------------|-----------------------------|----------|
| FMA01a     | Anchor       | 304 Stainless Steel Ferrule | 4        |
| --         | Bracket      | 6061-T6 Extruded Aluminum   | 2        |
| --         | Adapter      | C.R. Galv. Steel Sheet      | 2        |
| --         | Coupling     | AMS 6378D Steel             | 4        |
| --         | Special Bolt | ASTM A449 Steel             | 4        |
| --         | Fasteners    | ASTM A325 Steel             | 12       |
| --         | Shim         | Galv. Steel Sheet           | 4        |
| PFP02-06   | Post         | Other Manufacturers         | 1        |

### REFERENCES

L. A. Staron, Breakaway Sign Supports, Geometrics and Roadside Design Acceptance Letter Number SS-17, Federal Highway Administration, January 8, 1990.

### CONTACT INFORMATION

Transpo Industries, Inc.  
 20 Jones Street  
 New Rochelle, NY 10801  
 Phone: 914-636-1000  
 Fax: 914-636-1282

## BREAK-SAFE AU4-LP, AU6-LP & AU8-LP SYSTEM

# SSC05a-b

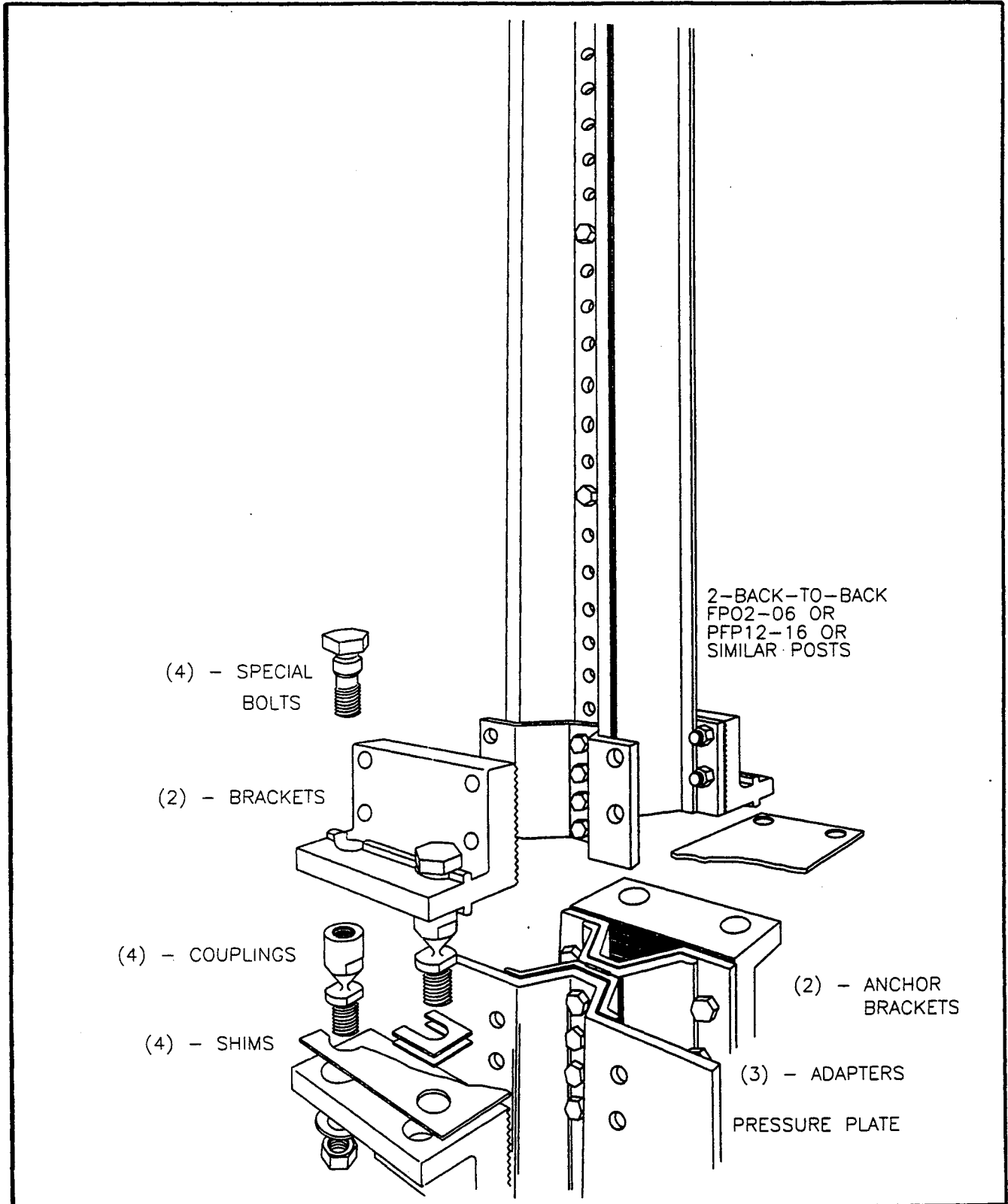
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2/2/97

  
 INDUSTRIES, INC



**BREAK-SAFE<sup>®</sup> AUX4, AUX6, AUX8 SYSTEM**

**TRANSPO<sup>®</sup>**  
INDUSTRIES, INC

**SSCO6a-b**

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7/30/95

### SPECIFICATIONS

The Break-Safe Model AUX4, AUX6 & AUX8 is an omni-directional bolt-on breakaway system for 3.0 - 6.0 kg/m single (SSC06a) or multiple (SSC06b), ground-mounted back-to-back U-channel sign posts (PFP02 - 06 or PFP12 - 16). The system is embedded in a strong soil and does not require concrete foundation, it also does not require initial or continued bolt torque maintenance. It is installed flush with the top of the foundation minimizing the possibility of snagging the vehicle undercarriage.

The system actuates when hit from any direction at bumper height causing the frangible couplings to break, usually, without damaging the sign panel or the sign posts. This allows for quick and easy re-deployment of the sign by on-site replacement of the frangible components.

The system has been evaluated in accordance with NCHRP Report 350 guidelines and has met or exceeded all requirements of 1994 AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*. It has also been approved by FHWA for use in strong soil on Federal Aid projects. Detailed shop drawings, specifications and post selection tables for a wide range of sign panels are available from the manufacturer on request.

### COMPONENTS

| Designator | Component      | Description               | Quantity |
|------------|----------------|---------------------------|----------|
| --         | Bracket        | 6061-T6 Extruded Aluminum | 2        |
| --         | Coupling       | AMS 6378D Steel           | 4        |
| --         | Special Bolt   | ASTM A449 Steel           | 4        |
| --         | Adapter        | C.R. Galv. Steel          | 1        |
| --         | Pressure Plate | C.R. Galv. Steel          | 1        |
| --         | Pop Plate      | ASTM A569 Steel           | 1        |
| --         | Shim           | Galv. Steel Sheet         | 4        |
| PFPO2-06   | Post           | Other Manufacturers       | 1        |

### REFERENCES

L. A. Staron, Breakaway Sign Supports, Geometrics and Roadside Design Acceptance Letter Number SS-17, Federal Highway Administration, January 8, 1990.

### CONTACT INFORMATION

Transpo Industries, Inc.  
 20 Jones Street  
 New Rochelle, NY 10801  
 Phone: 914-636-1000  
 Fax: 914-636-1282

## BREAK-SAFE AUX4, AUX6 & AUX8 SYSTEM

# SSC06a-b

SHEET NO.

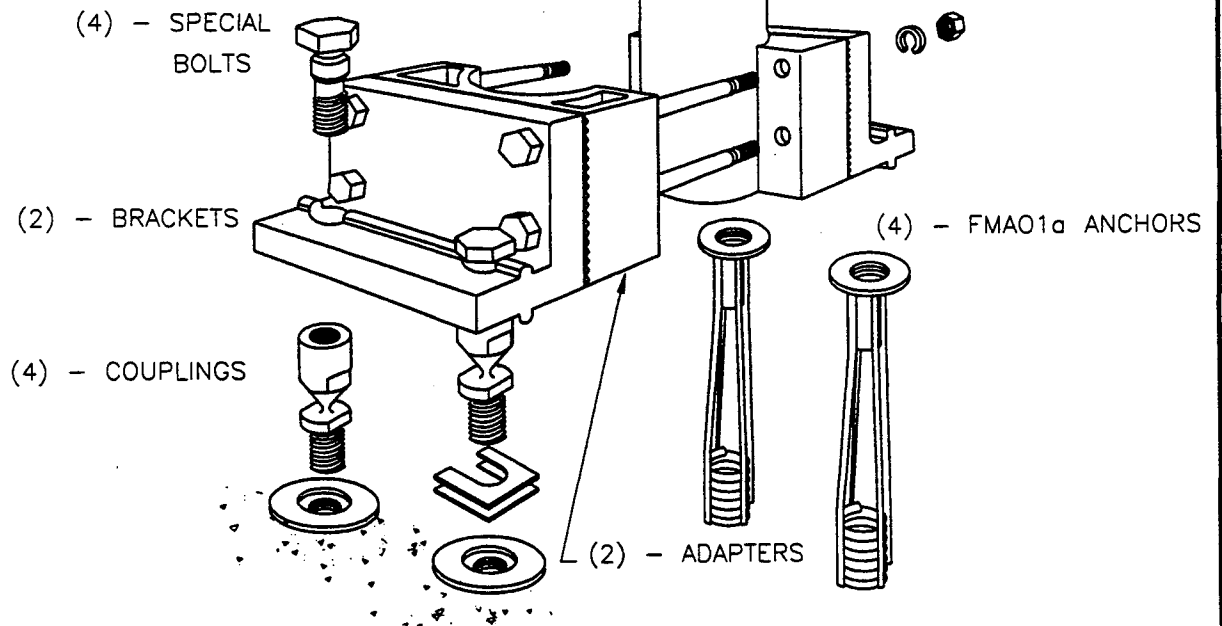
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| SYSTEM | LARGEST POST MASS |
|--------|-------------------|
| SSC07a | 65 kg/m           |
| SSC07b | 33 kg/m           |



**BREAK-SAFE® AP3.0-LP - AP4.5-LP SYSTEM**

**TRANSPO®**  
INDUSTRIES, INC

**SSC07a-b**

|           |         |
|-----------|---------|
| SHEET NO: | DATE    |
| 1 OF 2    | 7/18/95 |

**SPECIFICATIONS**

Break-Safe Models AP3-LP, AP3.5-LP, AP4.0-LP & AP4.5-LP are omni-directional, bolt-on breakaway systems for 76-mm, 89-mm, 102-mm and 114-mm OD steel or aluminum round steel posts. The systems use concrete foundations and do not require initial or continued bolt torque maintenance. It is installed flush with the top of the foundation minimizing the possibility of snagging the vehicle undercarriage.

The system actuates when hit from any direction at bumper height causing the frangible couplings to break, usually, without damaging the sign panel or the sign posts. This allows for quick and easy re-deployment of the sign by on-site replacement of the frangible components.

The system has been evaluated in accordance with NCHRP Report 350 guidelines and has met or exceeded all requirements of 1994 AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*. It has also been approved by FHWA for use on Federal Aid projects. Detailed shop drawings, specifications and post selection tables for a wide range of sign panels are available from the manufacturer on request.

**COMPONENTS**

| Designator | Component    | Description               | Quantity |
|------------|--------------|---------------------------|----------|
| --         | Anchor       | Break-Safe Type A         | 4        |
| --         | Adapter      | 6061-T6 Extruded Aluminum | 2        |
| --         | Bracket      | 6061-T6 Extruded Aluminum | 2        |
| --         | Coupling     | AMS 6378D Steel           | 4        |
| --         | Special Bolt | ASTM A449 Steel           | 4        |
| --         | Fasteners    | ASTM A325                 | 4        |
| --         | Shim         | Galv. Steel Sheet         | 4        |
| PFPO2-06   | Post         | Other Manufacturers       | 1        |

**REFERENCES**

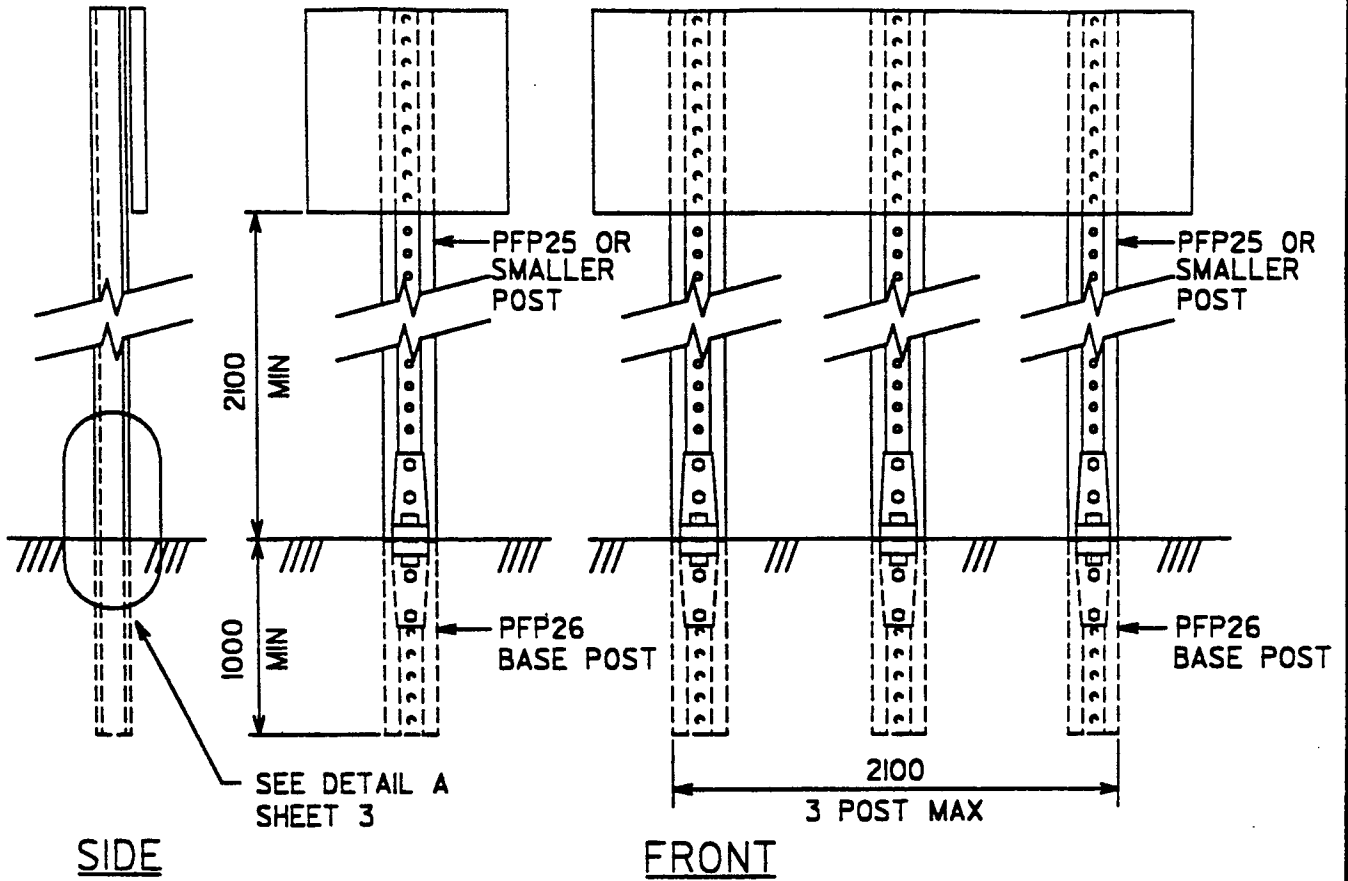
L. A. Staron, Breakaway Sign Supports, Geometrics and Roadside Design Acceptance Letter Number SS-17, Federal Highway Administration, January 8, 1990.

**CONTACT INFORMATION**

Transpo Industries, Inc.  
 20 Jones Street  
 New Rochelle, NY 10801  
 Phone: 914-636-1000  
 Fax: 914-636-1282

**BREAK-SAFE AP3.0-LP - AP4.5-LP SYSTEM**

|                 |        |  |
|-----------------|--------|--|
| <b>SSC07a-b</b> |        |  |
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| SYSTEM   | LARGEST POST | LARGEST BASE POST |
|----------|--------------|-------------------|
| SSC10a-c | PPF02, PPF23 | PPF06, PPF26      |
| SSC10a-c | PPF03, PPF24 | PPF06, PPF26      |
| SSC10a-c | PPF05, PPF25 | PPF06, PPF26      |

## MINUTE MAN BREAKAWAY SYSTEM

MINUTE MAN BREAKAWAY, INC.  
 305 WEST KING STREET  
 EAST FLATROCK, NC 28726

SSC10a-c

|           |           |
|-----------|-----------|
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### INTENDED USE

The Minute Man breakaway coupling system can be used as a single (SSC10a), double (SSC10b), or triple post (SSC10c) sign support system within a 2100-mm span. These systems have been crash tested in both weak and strong soil conditions and have been judged to satisfy the requirements of 1985 AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals*. Testing has been completed according to the guidelines of NCHRP Report 350.

### COMPONENTS

The Minute Man system consists of three parts: a base post (PFP06), a sign post (PFP06 and PFP16 or smaller posts), and the Minute Man coupling assembly. The base post shall be a PFP06 (6 kg/m). The base post shall be 1200-mm long, tapered at one end and having at least 18 9.5-mm holes starting 25.4 mm from the top and continuing on 25.4 mm centers. The base post may be installed with a maximum of 100 mm exposed above ground level, however, reusability is increased if the base post is installed flush with ground level.

The sign post weight shall be as specified by the user (PFP02 - PFP05). The sign post lengths shall be supplied in 152.4-mm increments from 1062 mm to 5974 mm as required for the installation location. (Post weights are plus or minus five percent before punching).

The Minute Man assembly consists of two ductile iron castings that uniquely mate to the Rib-Bak post (PFP02-05). The base post and sign post are connected with a single shear pin. No post other than the Marion Steel Rib-Bak will mate properly to the castings. The Minute Man castings are produced using ASTM A536 Grade 80 steel and are zinc-coated according to AASHTO M111 (ASTM A123). The M14x2 shear pin and nut are manufactured from ASTM A108 steel and zinc plated with a mechanical galvanized coating. The Minute Man casting attachment hardware consists of six FBX08c bolts and nuts with 8-mm lock washers. A 6-mm galvanized safety retention cable is available as an option.

A soil stabilization plate (PLS04) is available for the Minute Man system. The soil plate is attached to the base post using 4 65-mm long FBX09a bolts and nuts. The soil plate is optional for one-and two-post systems (SSC10a-b) but is required on all three-post installations (SSC10c).

## MINUTE MAN® BREAKAWAY SIGN SUPPORT

# SSC10a-c

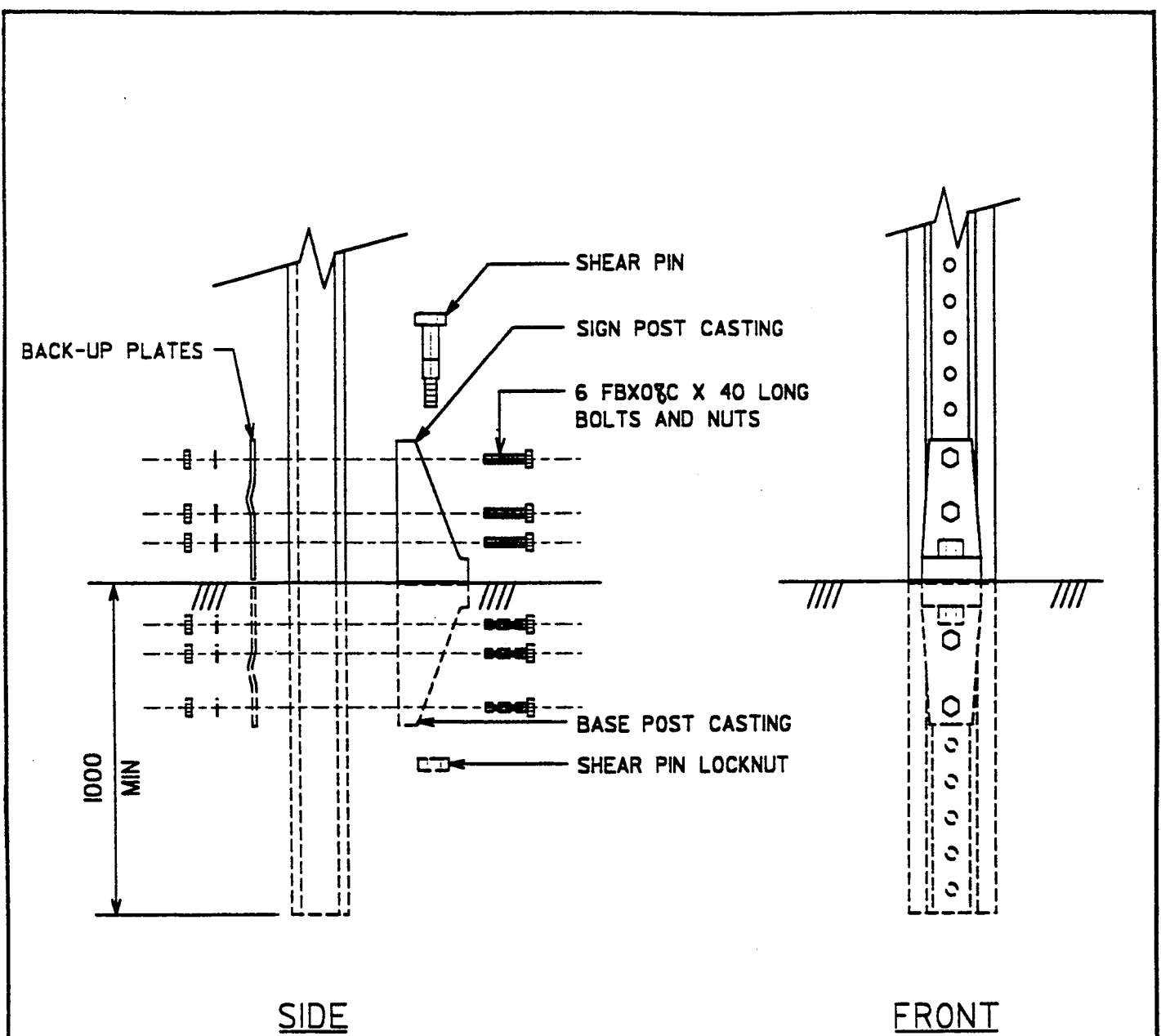
MINUTE MAN BREAKAWAY SYSTEM  
305 WEST KING STREET  
EAST FLATROCK, NC 28726

SHEET NO.

DATE

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03-23-96



DETAIL A  
 SPLICE CONNECTION

MINUTE MAN BREAKAWAY SYSTEM

MINUTE MAN BREAKAWAY, INC.  
 305 WEST KING STREET  
 EAST FLATROCK, NC 28726

SSC10a-c

|           |           |
|-----------|-----------|
| SHEET NO: | DATE      |
| 3 of 4    | 13 SEP 96 |

**REFERENCES**

L. A. Staron, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter SS-04, Federal Highway Administration, Washington, D.C., January 29, 1987.

L. A. Staron, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter SS-06, Federal Highway Administration, Washington, D.C., March 10, 1988.

L. A. Staron, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter SS-14, Federal Highway Administration, Washington, D.C., October 27, 1989.

L. A. Staron, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter SS-18, Federal Highway Administration, Washington, D.C., June 19, 1990

L. A. Staron, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter SS-21, Federal Highway Administration, Washington, D.C., December 26, 1990.

L. A. Staron, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter SS-57, Federal Highway Administration, Washington, D.C., 1995.

**CONTACT INFORMATION**

Minute Man Breakaway, Inc.  
305 West King Street  
East Flatrock, NC 28726

**MINUTE MAN® BREAKAWAY SIGN SUPPORT**

**SSC10a-c**

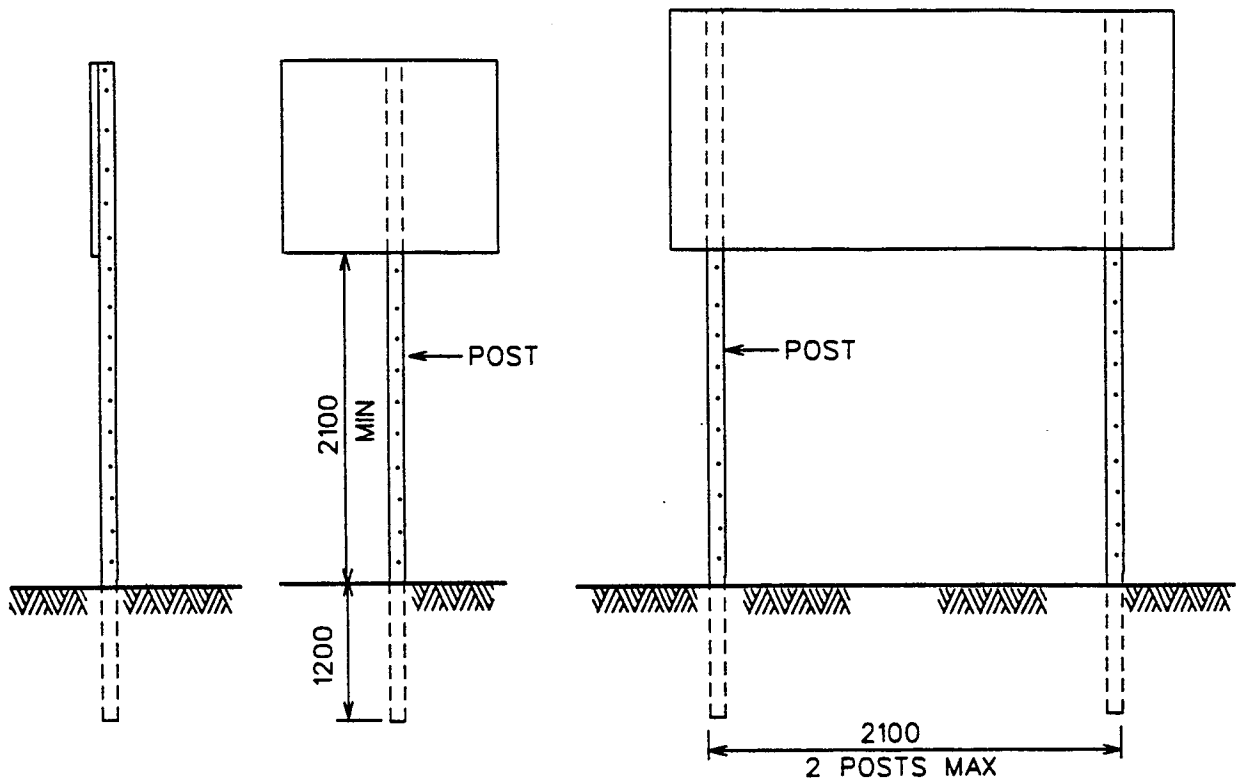
**MINUTE MAN BREAKAWAY SYSTEM  
305 WEST KING STREET  
EAST FLATROCK, NC 28726**

SHEET NO.

DATE

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03-23-96



SSF01a

SSF01b

| SYSTEM DESIGNATOR | ACCEPTABLE POSTS |
|-------------------|------------------|
| SSF01a            | PTP20b to PTP22b |
|                   | PTP21a to PTP22a |
|                   | PTP12a           |
|                   | PTP40b to PTP42b |
|                   | PTP40a to PTP43a |
| SSF01b            | PTP12a           |
|                   | PTP21a to PTP22a |
|                   | PTP20b to PTP21b |
|                   | PTP40a to PTP42a |
|                   | PTP40b to PTP41b |

**DIRECT BURIAL PERFORATED STEEL TUBE**



SSF01a-b

SHEET NO.:  
1 OF 2

DATE  
1996

### INTENDED USE

The direct burial perforated steel tube small sign support system is a yielding breakaway system that can be used as a single-post (SSF01a) or double-post (SSF01b) sign support system where all the posts are within a 2100-mm span. The largest mass post acceptable in a single-post system (SSF01a) is 3.6 kg/m (PTP12a, PTP20a-PTP22b, or PTP40a-42b). The largest mass post acceptable for two post system (SSF01b) is 3.1 kg/m (PTP12a, PTP20a-PTP21b, or PTP40a-41b). The system is considered to meet the requirements of the 1985 AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*. These systems have been successfully crash tested for a variety of soil and post configurations and may be used in either strong or weak soil with one or two posts.

### COMPONENTS

The direct burial perforated steel tube sign support system consists of a square steel post with either knock-outs (PTP12a) or hole perforations (PTP20a-22b or PTP40a-42b) on all four tube faces. The post is driven at least 1200-mm into the soil such that the bottom of the sign panel is at least 2100-mm above the ground.

### REFERENCES

L. A. Staron, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter SS-03, Federal Highway Administration, October 3, 1986.

L. A. Staron, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter SS-19, Federal Highway Administration, July 31, 1990.

L. A. Staron, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter SS-40, Federal Highway Administration, October 27, 1993.

S. I. Sillan, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter SS-62, Federal Highway Administration, June 3, 1996.

## DIRECT BURIAL PERFORATED STEEL TUBE

SSF01a-b

SHEET NO.

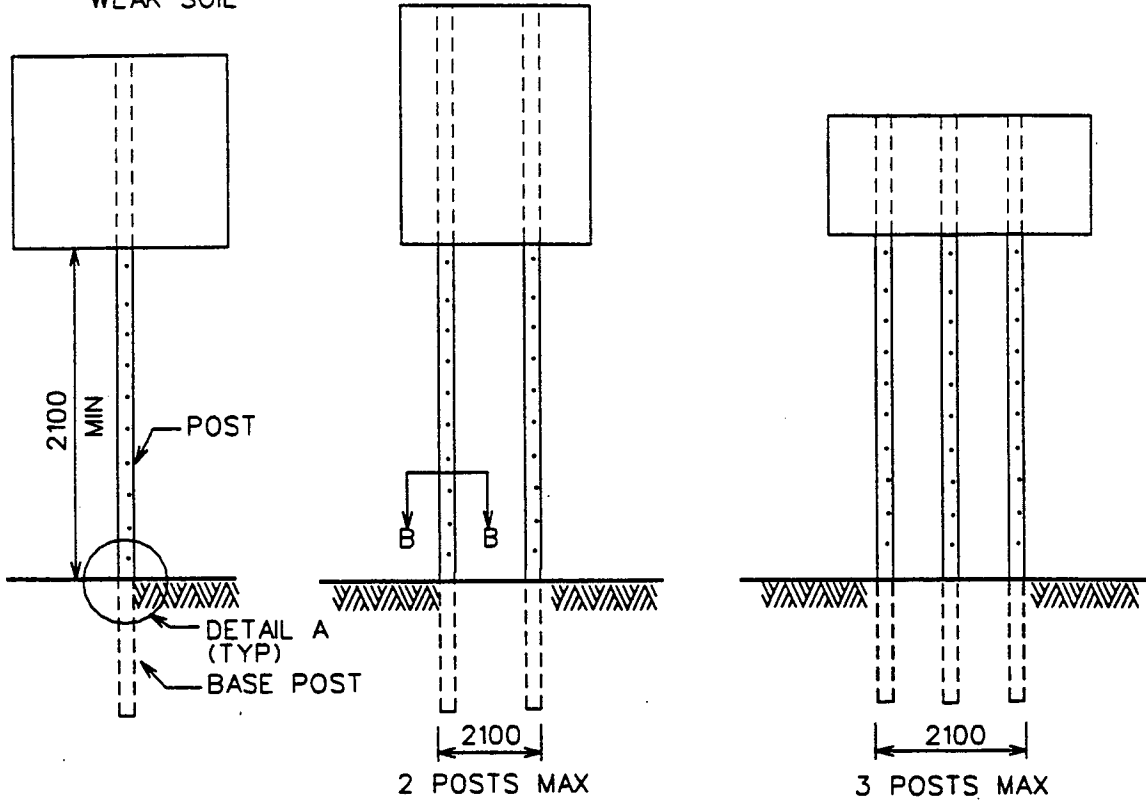
DATE

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12-29-96



NOTE: POSTS SHALL BE EMBEDDED AT LEAST 860 INTO STRONG SOIL OR 1400 INTO WEAK SOIL



SSF02a

SSF02b

SSF02c

| SYSTEM | LARGEST POST | LARGEST BASE | LARGEST OPTIONAL REINFORCING SLEEVE | CORNER BOLT |
|--------|--------------|--------------|-------------------------------------|-------------|
| SSF02a | PTP23b       | PTP24b       | --                                  | FBH06       |
|        | PTP43b       | PTP44b       | --                                  | FBH06       |
| SSF02b | PTP22b       | PTP23b       | PTP24b                              | FBH06       |
|        | PTP42b       | PTP43b       | PTP44b                              | FBH06       |
| SSF02c | PTP21b       | PTP22b       | PTP23b                              | FBH05       |
|        | PTP41b       | PTP42b       | PTP43b                              | FBH05       |

PERFORATED STEEL TUBE IN ANCHOR BASE



SSF02a-c

SHEET NO.:

DATE

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1996

### INTENDED USE

The perforated steel tube in a steel tube anchor base small sign support system can be used as a single-post (SSF02a), double-post (SSF02b), or triple-post (SSF02c) sign support system where all the posts are within a 2100-mm span. The system is considered to meet the requirements of the 1985 AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals* and may be used in either strong or weak soil. The largest mass post available for the three systems are: 4.1 kg/m (PTP23b or PTP43b) for the single-post system (SSF02a), 3.6 kg/m (PTP22b or PTP42b) for the two-post system (SSF02b) and 3.1 kg/m (PTP21b or PTP41b) for the three-post system (SSF02c).

### COMPONENTS

The perforated steel tube in a perforated steel tube anchor base small sign support system is a yielding breakaway system consisting of a tubular post (PTP12a, PTP20a-PTP23b or PTP40a-43b), an anchor base (PTP21b-PTP24b or PTP41b-44b), fasteners and an optional reinforcing sleeve (PTP22b-PTP24b or PTP42b-44b). The tubular post shall have either knock-outs or holes on all four tube faces. The post telescopes inside a base post which is the next higher tube size (e.g., a PTP20b post telescopes into a PTP21b anchor base). The anchor base can also be telescoped into a reinforcing sleeve made of a 450-mm long section of the next higher tube (e.g., a PTP20b post, a PTP21b anchor base and a PTP22b reinforcing sleeve). When used in a strong soil the base post shall be embedded at least 860 mm and when used in a weak soil the base post shall be embedded at least 1400 mm in the soil. The anchor base is driven into the soil until approximately 25-mm of the anchor base protrudes above the ground surface. The anchor base may also be set in soilcrete or concrete if desired. The square tube sign post is then placed inside the anchor sleeve such that the bottom of the post is approximately 200-mm below the ground and the bottom of the sign panel is at least 2100-mm above the ground. The post is fastened to the anchor sleeve using the appropriate corner bolt and nut (FBH05-07).

### REFERENCES

- L. A. Staron, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter SS-03, Federal Highway Administration, October 3, 1986.
- L. A. Staron, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter SS-11, Federal Highway Administration, May 18, 1989.
- L. A. Staron, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter SS-19, Federal Highway Administration, July 31, 1990.
- L. A. Staron, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter SS-26, Federal Highway Administration, February 11, 1992.
- L. A. Staron, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter

## PERFORATED STEEL TUBE IN ANCHOR BASE

SSF02a-c

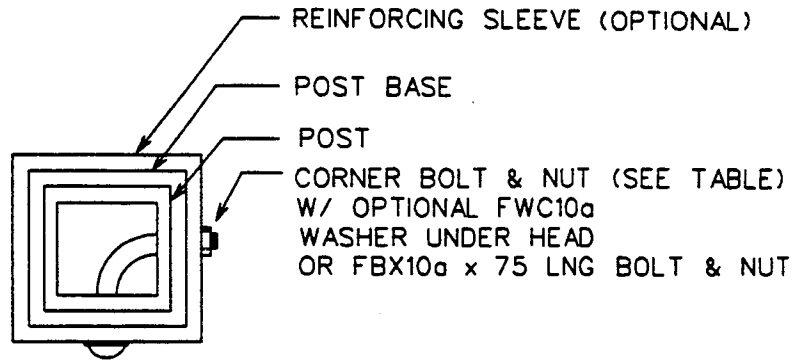
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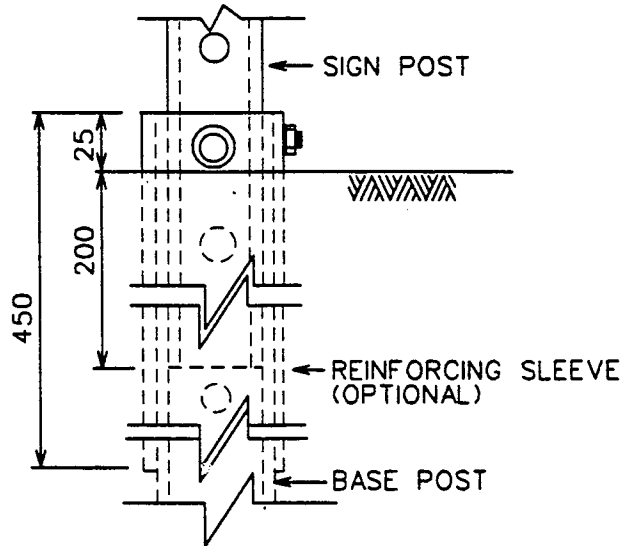
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12-29-96





SECTION B-B



DETAIL A: ANCHOR BASE

PERFORATED STEEL TUBE IN ANCHOR BASE



SSF02a-c

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## PERFORATED STEEL TUBE IN ANCHOR BASE

SSF02a-c

SHEET NO.

DATE

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12-29-96



PLASTIC OR FIBERGLASS  
PLUG OR CAP

PPP01 POST

D D

GROUND LEVEL

COLLAR

FMA02 ANCHOR

95

FBX06a

E E

NON-REINFORCED  
CONCRETE FOOTING  
OR CEMENT-  
STABILIZED SOIL

515

FRICTION CAP

300

SSF10a

FRP SIGN POST IN CONCRETE



(915) 267-4565 FAX (915) 263-6449  
110 WEST 22 ND STREET \* P. O. BOX 3010  
BIG SPRING, TX 79721-3010

SSF10a-b

|           |      |
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| SHEET NO. | DATE |
| 1 OF 4    | 1996 |

## SPECIFICATIONS

Hwycom's Fiberglass Reinforced Plastic (FRP) Signpost System consists of a PTP51 FRP hollow post composed of polyester resin and glass fiber reinforcement with permanent color and UV protection.

The fiber reinforced tube is manufactured by a process called "Pultrusion" whereby longitudinal and diagonal glass fibers are combined with a resin and cured in a continuous process which results in a 76.2 mm diameter post with 3.2 mm wall thickness. The finished post is inserted into a FMA02 anchor system.

## INTENDED USE

Hwycom's FRP Sign Supports can be used in single or double installation. These systems have been crash tested in strong soil and have been judged to satisfy the requirements of 1985 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals".

## REFERENCES

L. A. Staron, "Breakaway Sign Supports", Federal Highway Administration Acceptance Letter, SS-10, May 11, 1989.

L. A. Staron, "Breakaway Sign Supports", Federal Highway Administration Acceptance Letter, SS-12, August 3, 1989.

## CONTACT INFORMATION

Hwycom, Inc.  
Fiber-Lite Sign Post Systems  
110 West 22nd Street  
P. O. Box 3010  
Big Spring, TX 79721-3010  
Phone: 915/267-4565  
Fax: 915/263-6449

# FRP SIGN POST IN CONCRETE

SSF10a-b

(915) 267-4565 FAX (915) 263-6449  
110 WEST 22 ND STREET • P. O. BOX 3010  
BIG SPRING, TX 79721-3010

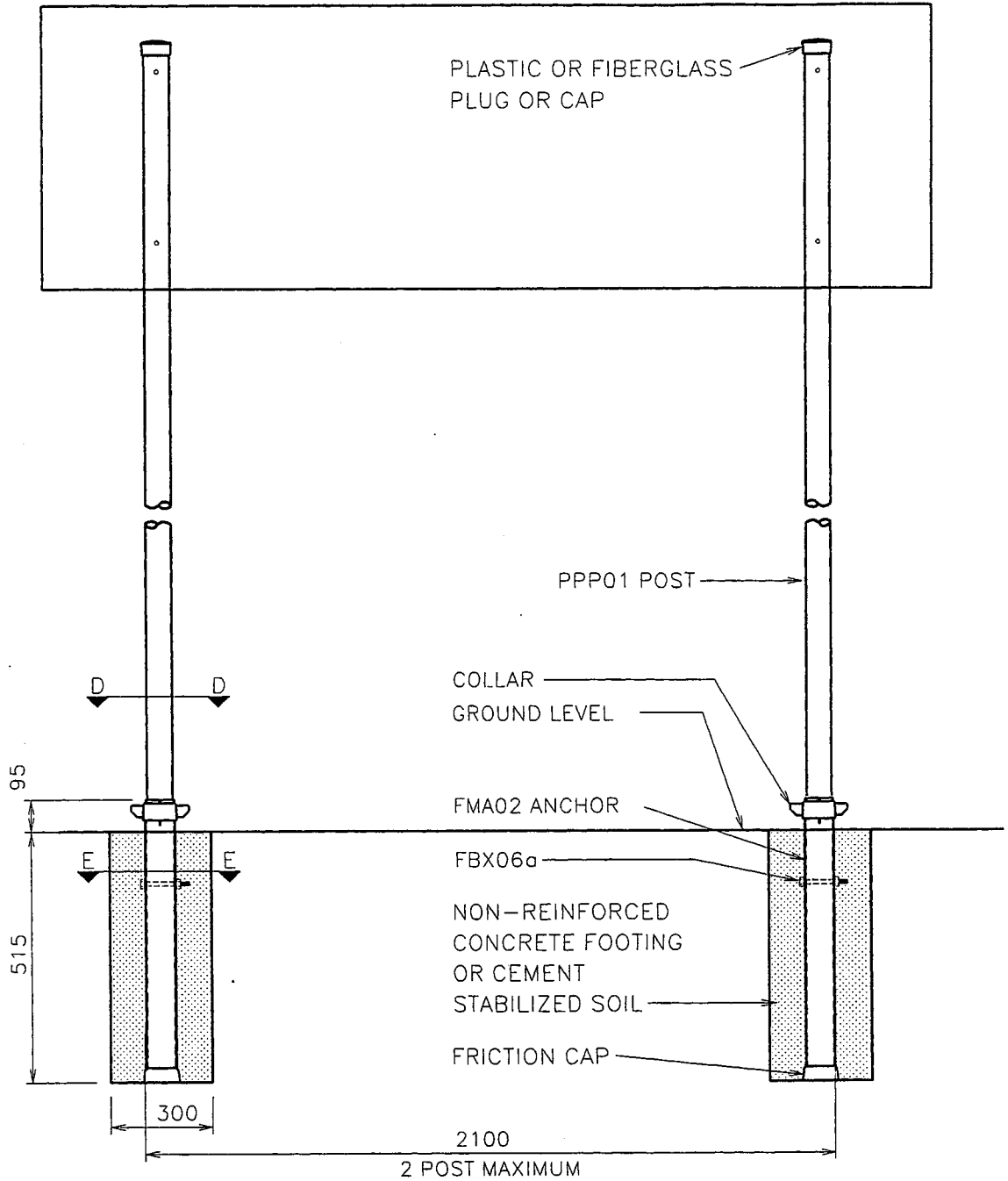


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1996



SSF10b

FRP SIGN POST IN CONCRETE



(915) 267-4565 FAX (915) 263-6449  
110 WEST 22 ND STREET \* P. O. BOX 3010  
BIG SPRING, TX 79721-3010

SSF10a-b

SHEET NO.

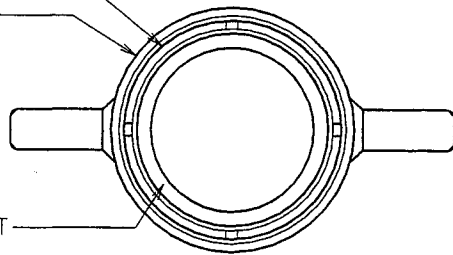
DATE

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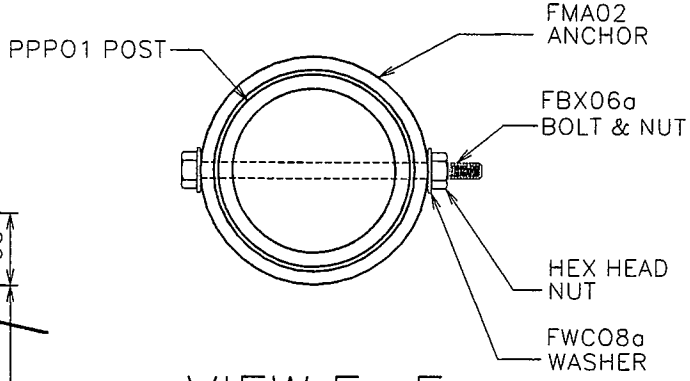
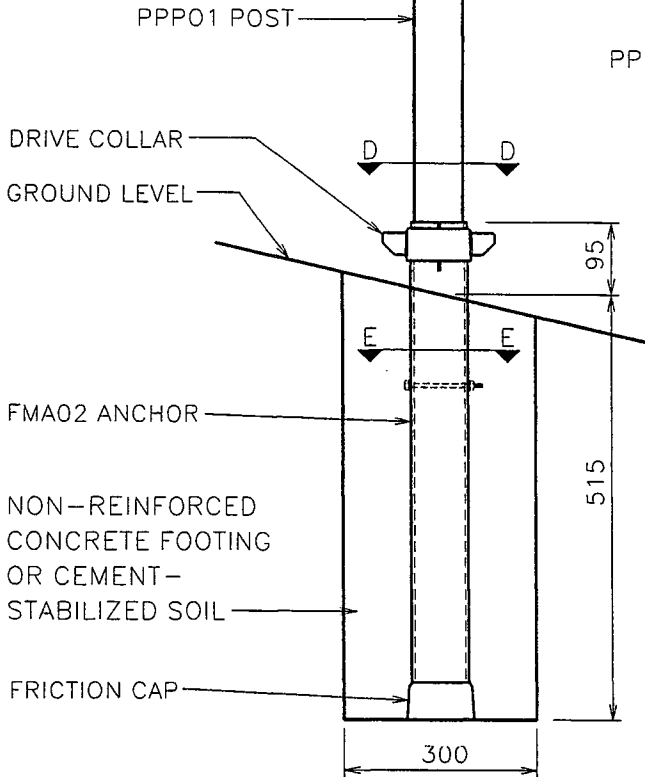
PLASTIC OR FIBERGLASS  
PLUG OR CAP

FMA-02  
ANCHOR  
COLLAR



PPP01 POST

VIEW D-D



VIEW E-E

FOUNDATION DETAIL

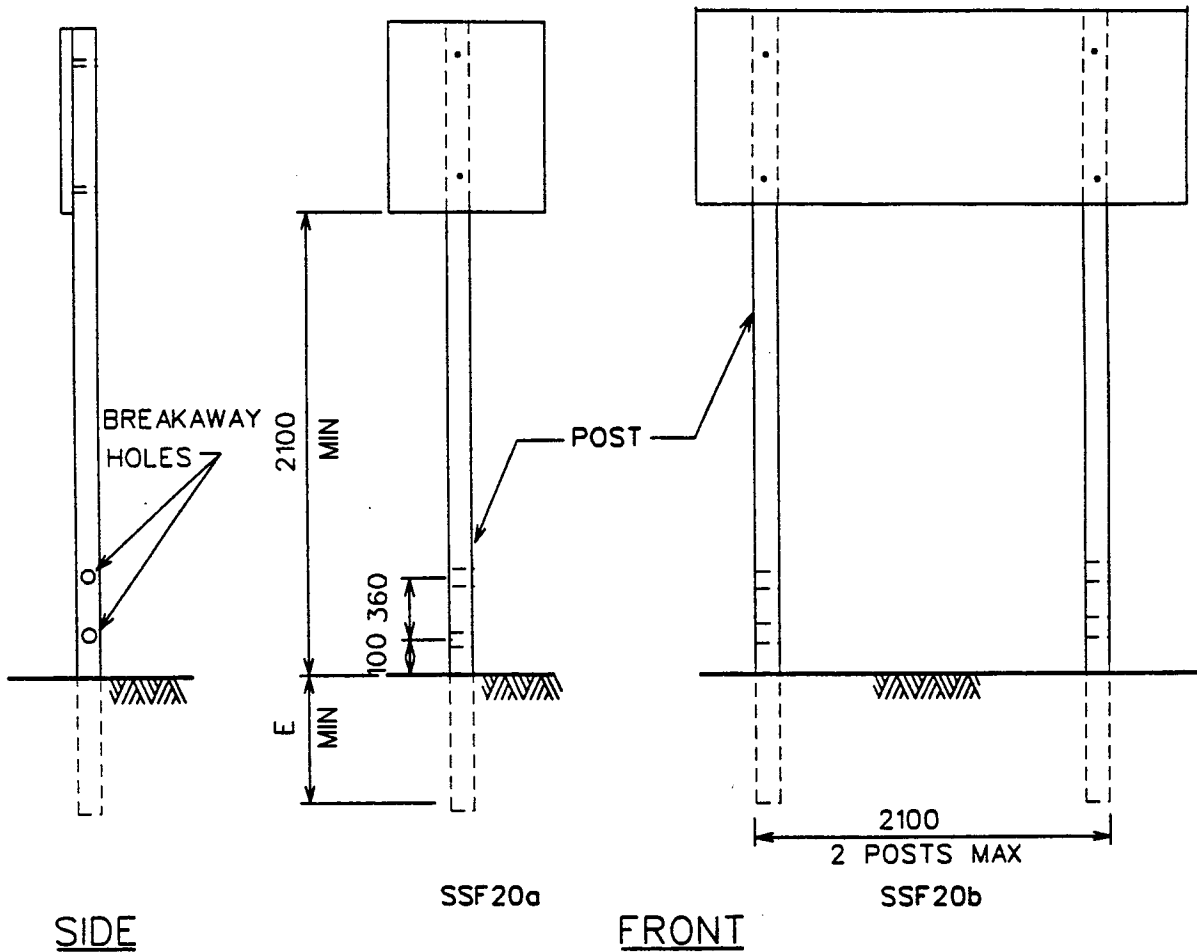
FRP SIGN POST IN CONCRETE

SSF10 a-b

(915) 267-4565 FAX (915) 263-6449  
110 WEST 22 ND STREET \* P. O. BOX 3010  
BIG SPRING, TX 79721-3010



|           |      |
|-----------|------|
| SHEET NO. | DATE |
| 4 OF 4    | 1996 |



| SYSTEM    | POST  | E    |
|-----------|-------|------|
| SSF 20a-b | PDP20 | 920  |
| SSF 20a-b | PDP22 | 1000 |
| SSF 20a   | PDP23 | 1000 |
| SSF 20a   | PDP24 | 1200 |

## DIRECT BURIAL WOOD POST



SSF20a-b

|           |      |
|-----------|------|
| SHEET NO: | DATE |
| 1 of 2    | 1996 |

### INTENDED USE

The direct burial wood small sign support system consists of a rectangular wood post buried directly in soil. These successfully crash tested systems can be used in both weak and strong soils and as single-post (SSF20a) or double-post (SSF20b) sign support systems where both posts are within a 2100-mm span. These systems have been judged to meet the requirements of the 1985 AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*.

### COMPONENTS

The direct burial wood post sign support system has only one component, the sign post. Four different size sign posts can be used (PDP20, PDP22, PDP23 and PDP24). With the exception of PDP20, each post has two weakening holes; one hole located 100 mm and the other located 460 mm above the ground. Only PDP20 and PDP22 may be used in the two-post system (SSF20b) where both posts are within a 2100-mm span. The larger posts may be used in dual-post systems if the posts are more than 2100 mm apart. These holes ensure proper breakaway performance and limit the stub height to less than 100 mm.

### REFERENCES

- R. L. Stoughton, J. R. Stoker and E. F. Nordlin, "Vehicle Impact Tests Breakaway Wood Supports for Dual-Support Roadside Signs," Transportation Research Record 868, Transportation Research Board, Washington, D.C., 1982.
- L. A. Staron, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter SS-25, Federal Highway Administration, June 4, 1991.
- L. A. Staron, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter SS-32, Federal Highway Administration, October 28, 1992.
- L. A. Staron, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter SS-36, Federal Highway Administration, September 3, 1993.
- L. A. Staron, "Pennsylvania Breakaway Wood Sign," Geometric and Roadside Design Acceptance Letter SS-45, Federal Highway Administration, May 11, 1994.
- L. A. Staron, "Breakaway Sign Supports -- Unmodified Cedar," Geometric and Roadside Design Acceptance Letter SS-46, Federal Highway Administration, June 17, 1994.
- S. I. Sillan, "5-inch by 5-inch sign post," Geometric and Roadside Design Acceptance Letter SS-50, Federal Highway Administration, November 8, 1994.

## DIRECT BURIAL WOOD POST

SSF20a-b

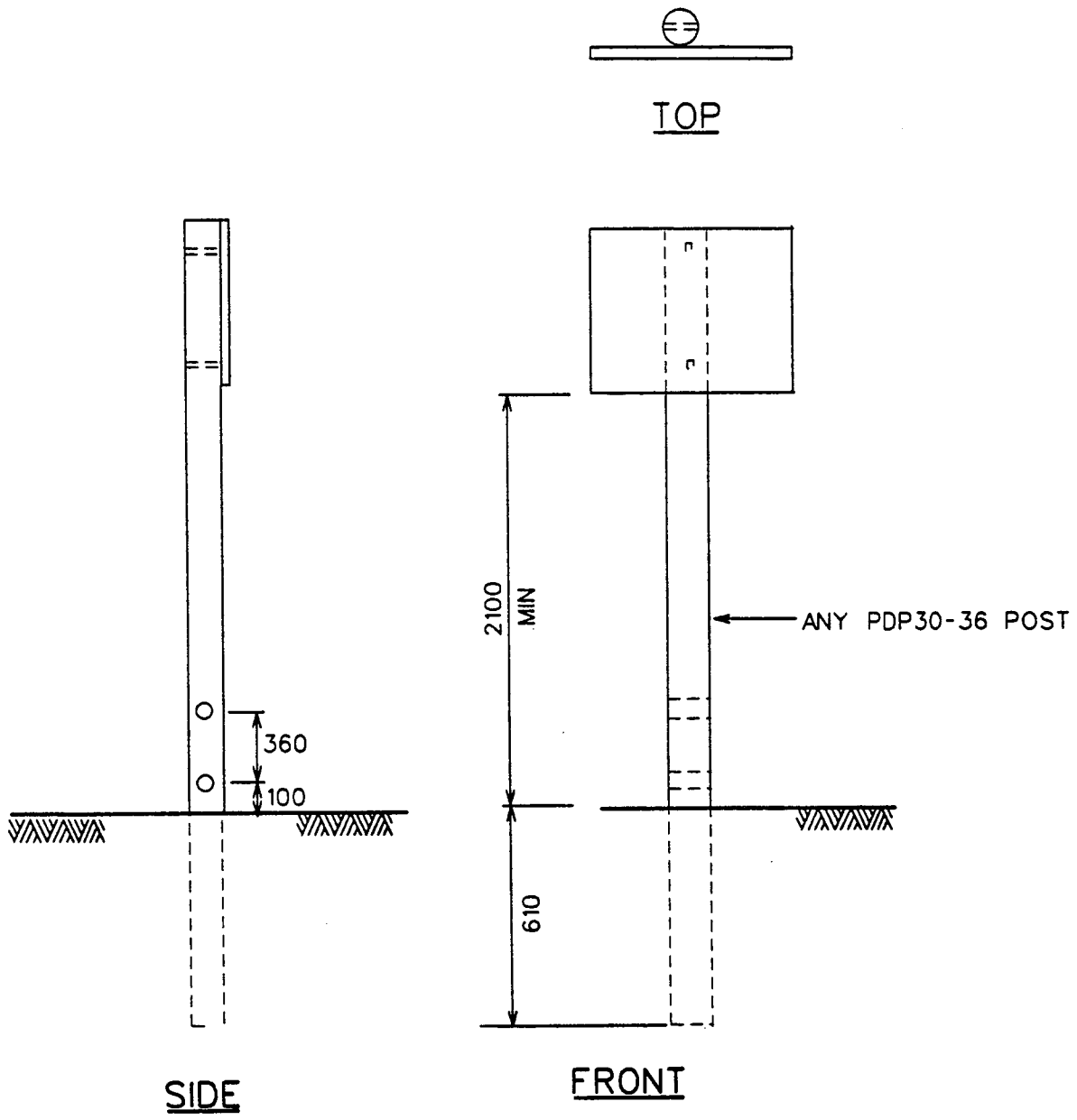
SHEET NO.

DATE

2 of 2

12-29-96





DIRECT BURIAL CIRCULAR WOOD POST



SSF21a

SHEET NO:

DATE

1 of 2

1996



### INTENDED USE

The direct burial circular wood post small sign support system is a single-post (SSF21a) system that is similar to the direct burial wood post system (SSF20a-b). The 127-mm circular wood post (PDP33) with two 50-mm breakaway holes was tested and judged to meet the requirements of the 1985 AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals* for both strong and weak soil conditions. Systems using the other post sizes have not been tested but have been approved based on the results of the test described above and tests of rectangular wood post systems (SSF20a-b).

### COMPONENTS

The direct burial circular wood post small sign support system consists of a circular wood post (PDP30-37) set directly in the soil. Any circular wood post with a section modulus less than 80 percent of that of a 184-mm by 140-mm rectangular timber post (PDP24) is considered acceptable. Circular timber posts with section moduli of  $294 (10)^3 \text{ mm}^3$  or less (PDP36), therefore, may be used. Care must be taken to ensure that the dimensions that determine moment of inertia are at the groundline since circular wood posts generally have a significant taper. Many agencies embed this system in soilcrete or concrete as well.

### REFERENCES

R. L. Stoughton, J. R. Stoker and E. F. Nordlin, "Vehicle Impact Tests Breakaway Wood Supports for Dual-Support Roadside Signs," Transportation Research Record 868, Transportation Research Board, Washington, D.C., 1982.

L. A. Staron, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter SS-27, Federal Highway Administration, May 15, 1992.

L. A. Staron, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter SS-36, Federal Highway Administration, September 3, 1993.

## DIRECT BURIAL CIRCULAR WOOD POST

SSF21a

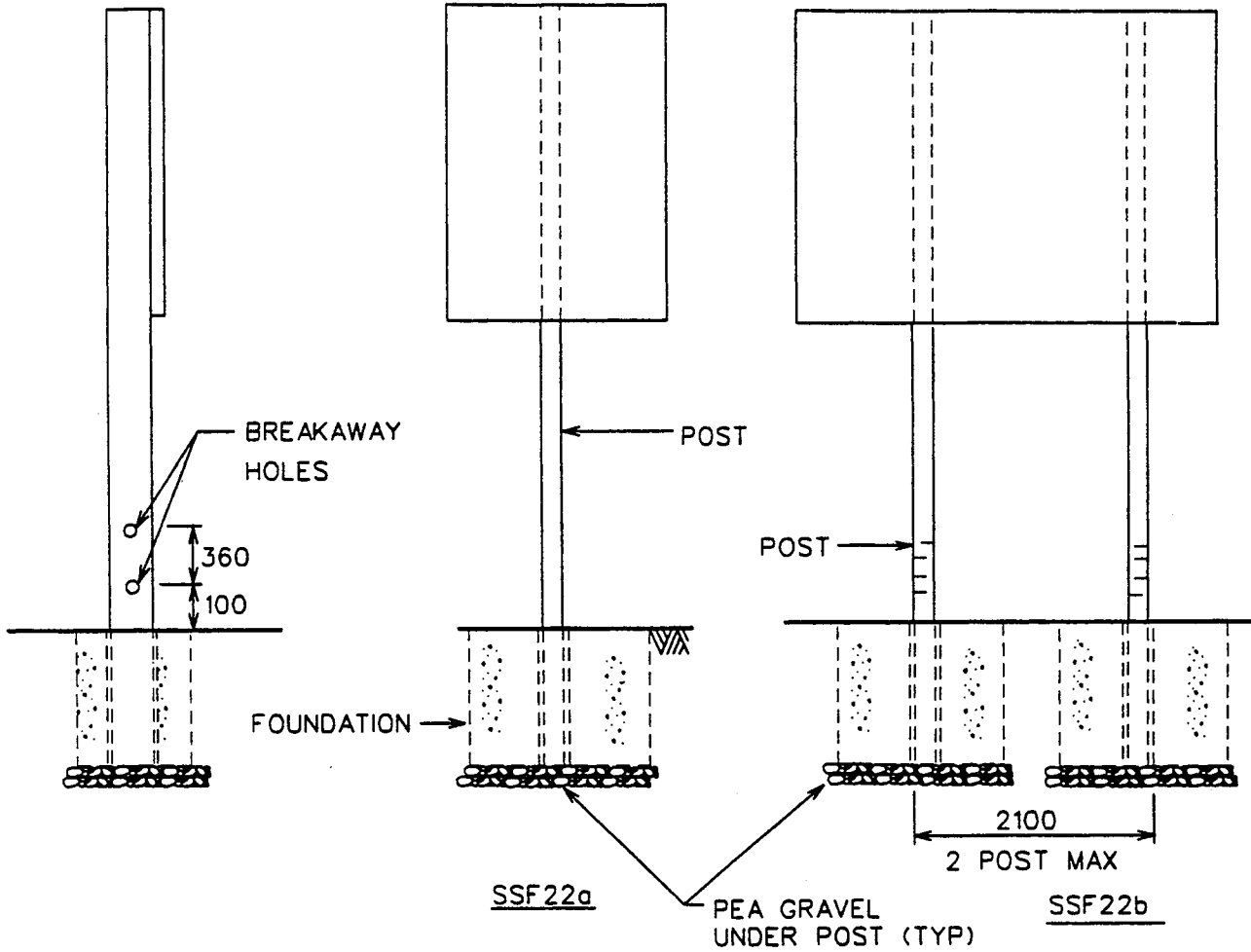
SHEET NO.

DATE

2 of 2

12-29-96





SIDE

FRONT

| SYSTEM  | POST  | FOUNDATION |
|---------|-------|------------|
| SSF 22a | PDP20 | POF05      |
|         | PDP21 | POF06      |
|         | PDP22 | POF06      |
|         | PDP23 | POF07      |
|         | PDP24 | POF08      |
| SSF 22b | PDP20 | POF05      |
|         | PDP21 | POF06      |
|         | PDP22 | POF06      |

RECTANGULAR WOOD POST IN CONCRETE



SSF22a-b

|           |      |
|-----------|------|
| SHEET NO: | DATE |
| 1 of 2    | 1996 |

### INTENDED USE

The rectangular wood post in concrete small sign support system can be used as a one-post (SSF22a) or a two-post (SSF22b) sign support system where both posts are within a 2100-mm span. PDP20 through PDP24 posts may be used in the one-post system (SSF22a) but only PDP20 through PDP22 may be used in the two-post systems (SSF22b) where both posts are within a 2100-mm span. The larger posts (PDP23 and PDP24) may be used in a two-post system but the posts must be at least 2100 mm apart. The system has been successfully crash tested with the base embedded in a concrete foundation with steel tube insert (POF05-08). The system is considered to meet the requirements of the 1985 AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals* for both strong or weak soil.

### COMPONENTS

The rectangular wood post in concrete small sign support system consists of either one post (PDP20 through PDP24) or two posts (PDP20 through PDP22) placed in a concrete foundation with a steel tube insert (POF05 or POF08). The steel tube facilitates replacing the post if the post is struck and broken off. PDP20 posts must be used with POF05 foundations; PDP21 and PDP22 posts must be used with POF06 foundations; PDP23 posts must be used with POF07 foundations and PDP24 posts must be used with POF08 foundations. The steel tube insert is just large enough to allow the timber post to slide into it.

### REFERENCES

- L. A. Staron, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter SS-32, Federal Highway Administration, October 28, 1992.
- L. A. Staron, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter SS-36, Federal Highway Administration, September 3, 1993.

## RECTANGULAR WOOD POST IN CONCRETE

SSF22a-b

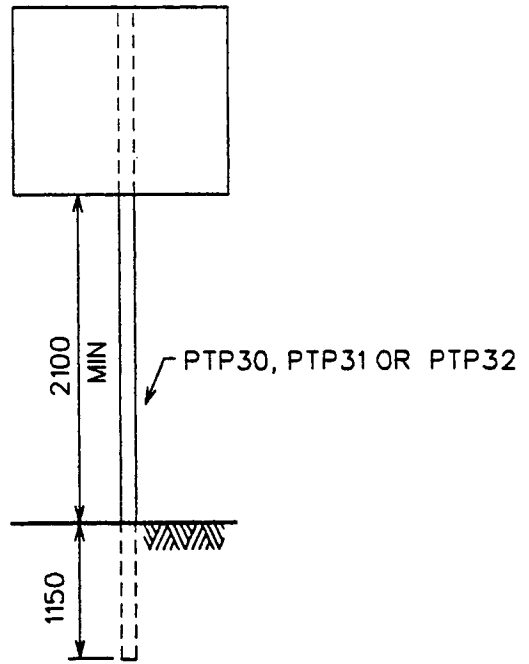
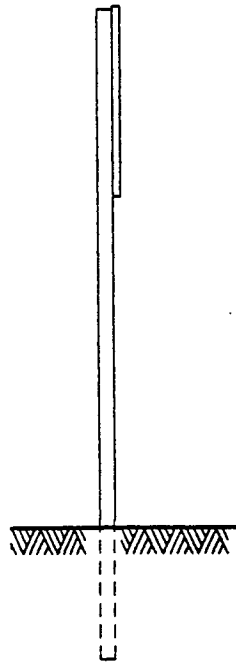
SHEET NO.

DATE

2 of 2

12-29-96





DIRECT BURIAL TUBULAR ALUMINUM POST



SSF30a

|            |      |
|------------|------|
| SHEET NO.: | DATE |
| 1 OF 2     | 1996 |

### INTENDED USE

The direct burial tubular aluminum post small sign support system can be used as a one-post (SSF30a) sign support system. The system has been successfully crash tested with the sign post driven directly into a strong soil. The system, when driven into strong soil, is considered to meet the requirements of the 1985 AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*. The performance of this system in weak-soil full-scale crash tests was not satisfactory since the post did not fracture as intended.

### COMPONENTS

The direct burial tubular aluminum small sign support system consists of one component, an aluminum sign post (PTP30-32).

### REFERENCES

- L. A. Staron, "Vermont - Tubular Aluminum Signs," Geometric and Roadside Design Acceptance Letter SS-15, Federal Highway Administration, December 12, 1989.
- L. A. Staron, "Florida Crash Test Results of Small Sign Supports," Geometric and Roadside Design Acceptance Letter SS-28, Federal Highway Administration, May 26, 1992.
- L. A. Staron, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter SS-35, Federal Highway Administration, May 28, 1993.

## DIRECT BURIAL TUBULAR ALUMINUM POST

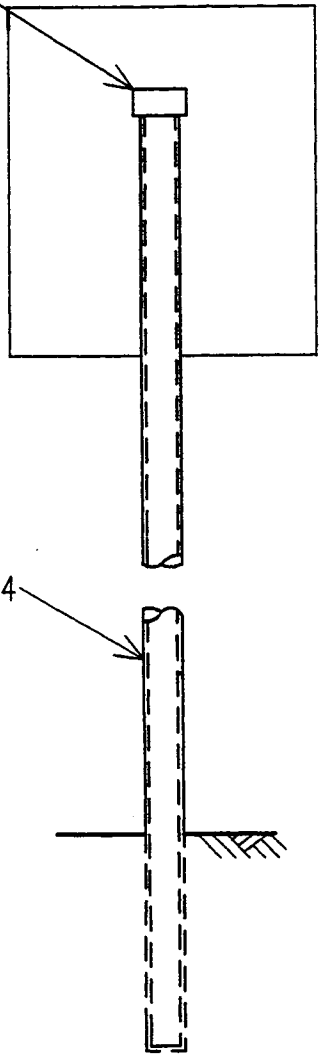
SSF30a

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| 2 of 2    | 12-29-96 |

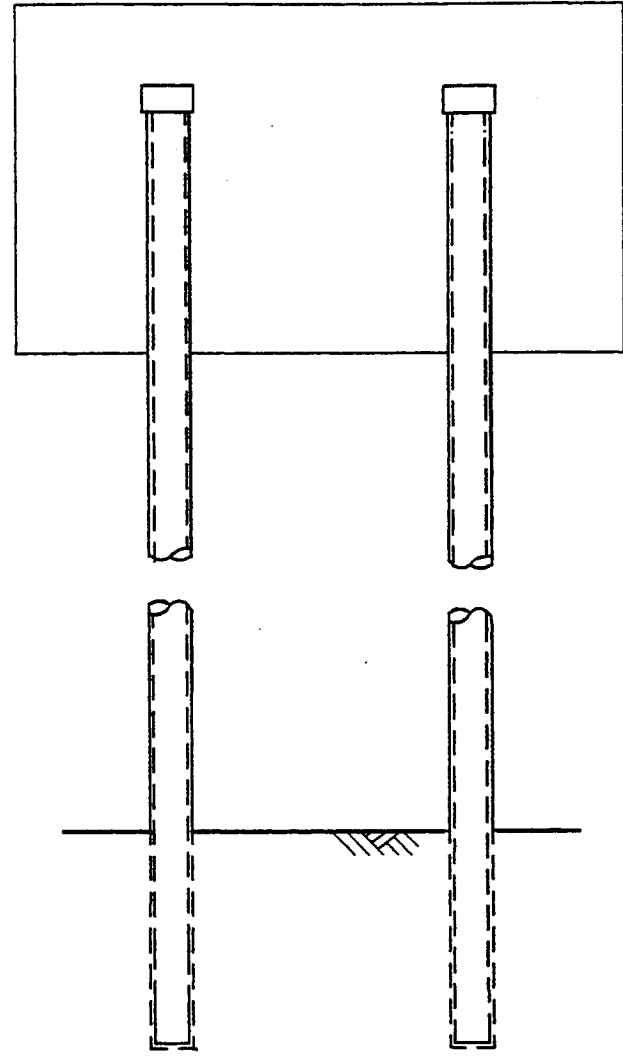


PLASTIC CAP

PPP02-04



SSF31a



SSF31b

### DIRECT BURIAL CP40 POST



(717) 684-4440 FAX (717) 684-4445  
 1000 HOUSTON STREET - P.O. BOX 247  
 COLUMBIA, PA 17512-0247

|                 |      |
|-----------------|------|
| <b>SSF31a-b</b> |      |
| SHEET NO.       | DATE |
| 1 OF 2          | 1996 |

### INTENDED USE

Lancaster Composite's CP40 sign supports can be used in either single post (SSF31a) or multiple post (SSF31b) installations. These systems have been crash tested in strong soil, and have been judged to satisfy the requirements of the AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals, 1994".

### COMPONENTS

The SSF31 sign support system is simply a CP40 post (PPP02-04) set directly in the soil. A soil plate is optional for both single (SSF31a) and multiple post (SSF31b) installations depending on local soil conditions and anticipated wind loads.

### REFERENCES

S. I. Sillan, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter SS-53a, Federal Highway Administration, March 19, 1996.

S. I. Sillan, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter SS-53b, Federal Highway Administration, September 20, 1996.

### CONTACT INFORMATION

Lancaster Composite, Inc.  
CP40 Sign Support Systems  
P.O. Box 247  
Columbia, PA 17512-0247  
Phone: (717) 684-4440  
Fax: (717) 684-4445

## DIRECT BURIAL CP40 POST

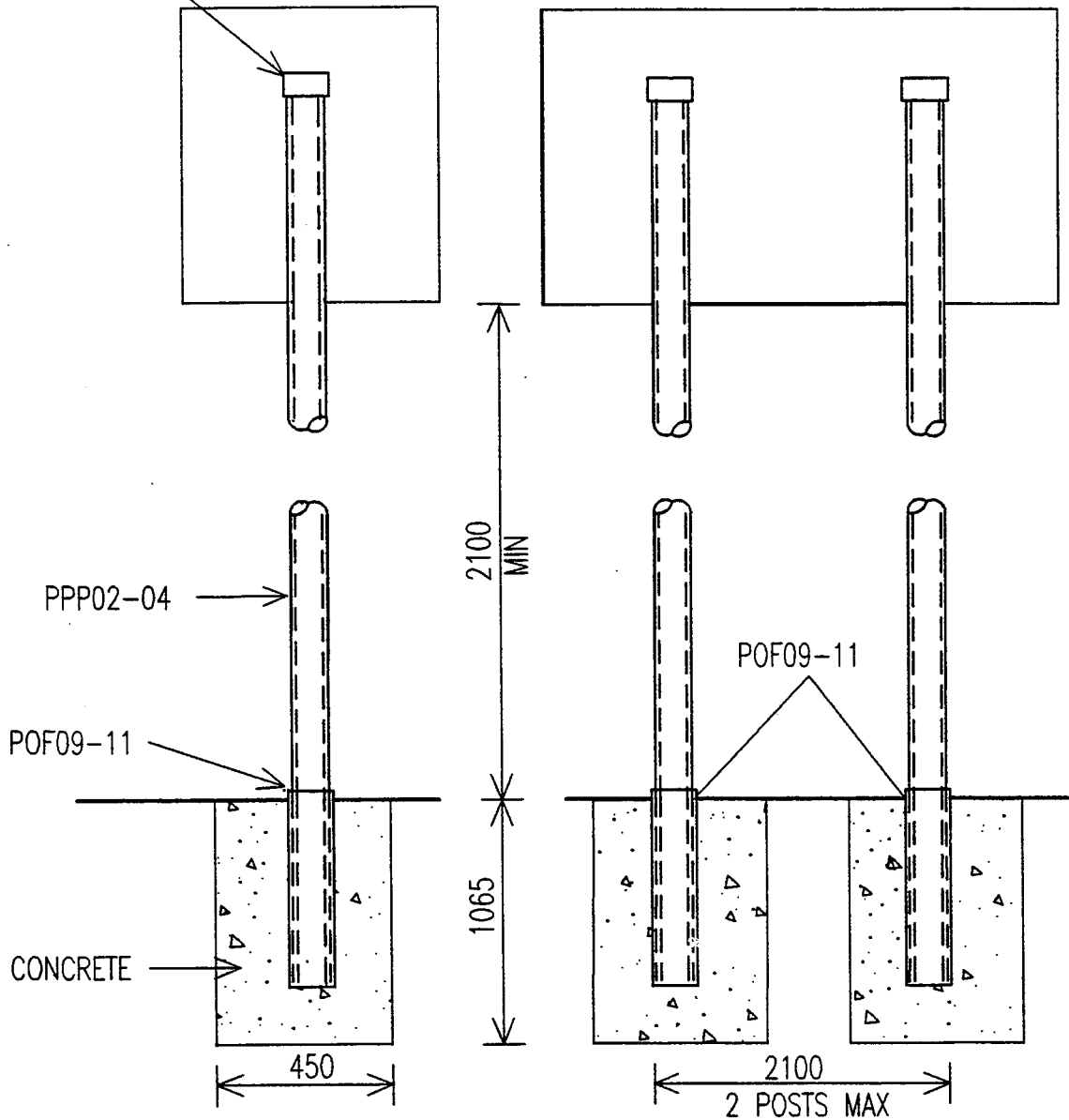
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| 2 OF 2    | 1996 |

(717) 684-4440 FAX (717) 684-4445  
1000 HOUSTON STREET - P.O. BOX 247  
COLUMBIA, PA 17512-0247



PLASTIC CAP



SSF32a

SSF32b

### CP40 POST IN SET SLEEVES



(717) 684-4440 FAX (717) 684-4445  
1000 HOUSTON STREET - P.O. BOX 247  
COLUMBIA, PA 17512-0247

SSF32a-b

| SHEET NO. | DATE |
|-----------|------|
| 1 OF 2    | 1996 |



### INTENDED USE

Lancaster Composite's CP40 sign supports can be used in either single post (SSF32a) or multiple post (SSF32b) installations. These systems have been crash tested in both strong and weak soil, and have been judged to satisfy the requirements of the AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals, 1994".

### COMPONENTS

The components of the SSF32 sign support system include the CP40 post (PPP02-04) and the appropriate size set sleeve (POF09-11). For single support installations (SSF32a), the predrilled post slides into the set sleeve and is secured in place by a FBX06a hex bolt and nut. Multiple post installations (SSF32b) do not require the FBX06a to secure the post in place in so much as there are no concerns about the post rotating under wind load.

### REFERENCES

J. L. Poston, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter SS-53, Federal Highway Administration, March 3, 1995.

S. I. Sillan, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter SS-53a, Federal Highway Administration, March 19, 1996.

S. I. Sillan, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter SS-53b, Federal Highway Administration, September 20, 1996.

### CONTACT INFORMATION

Lancaster Composite, Inc.  
CP40 Sign Support Systems  
P.O. Box 247  
Columbia, PA 17512-0247  
Phone: (717) 684-4440  
Fax: (717) 684-4445

## CP40 POST IN SET SLEEVES

**SSF32a-b**

| SHEET NO. | DATE |
|-----------|------|
| 2 OF 2    | 1996 |

(717) 684-4440 FAX (717) 684-4445  
1000 HOUSTON STREET - P.O. BOX 247  
COLUMBIA, PA 17512-0247



PLASTIC CAP

PPP02-04

PTF07-09

2100  
MIN

900

PTF07-09

2100  
2 POST MAX

SSF34a

SSF34b

### CP40 POST IN DRIVE SLEEVES

**LANCASTER  
COMPOSITE**

(717) 684-4440 FAX (717) 684-4445  
1000 HOUSTON STREET - P.O. BOX 247  
COLUMBIA, PA 17512-0247

**SSF34a-b**

SHEET NO.

DATE

1 OF 2

1996

### INTENDED USE

Lancaster Composite's CP40 sign supports can be used in either single post (SSF34a) or multiple post (SSF34b) installations. These systems have been crash tested in strong soil, and have been judged to satisfy the requirements of the AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals, 1994".

### COMPONENTS

The components of the SSF34 sign support system include the CP40 post (PPP02-04) and the appropriate size drive sleeve (PTF07-09). For single support installations (SSF34a), the predrilled post slides into the drive sleeve and is secured in place by a FBX06a hex bolt and nut. Multiple post installations (SSF34b) do not require the FBX06a to secure the post in place in so much as there are no concerns with the post rotating under wind load.

### REFERENCES

J. L. Poston, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter SS-53, Federal Highway Administration, March 3, 1995.

S. I. Sillan, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter SS-53a, Federal Highway Administration, March 19, 1996.

S. I. Sillan, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter SS-53b, Federal Highway Administration, September 20, 1996.

### CONTACT INFORMATION

Lancaster Composite, Inc.  
CP40 Sign Support Systems  
P.O. Box 247  
Columbia, PA 17512-0247  
Phone: (717) 684-4440  
Fax: (717) 684-4445

## CP40 POST IN DRIVE SLEEVES

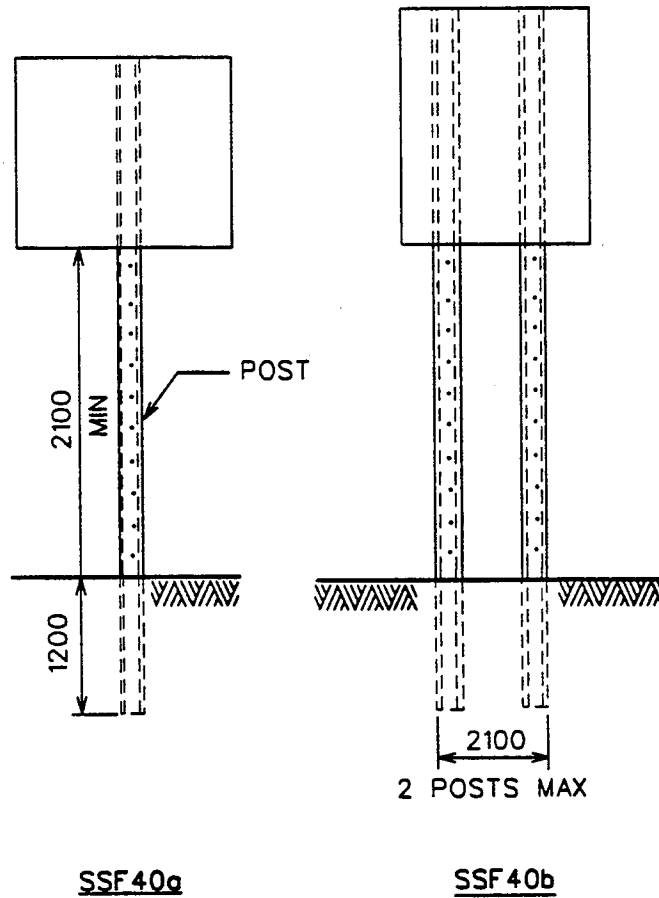
**SSF34a-b**

| SHEET NO. | DATE |
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| 2 OF 2    | 1996 |

(717) 684-4440 FAX (717) 684-4445  
1000 HOUSTON STREET - P.O. BOX 247  
COLUMBIA, PA 17512-0247



NOTE: THE FOLLOWING POSTS ARE  
ACCEPTABLE FOR USE IN EITHER THE  
SINGLE (SSF40a) OR DUAL-POST (SSF40b)  
SYSTEMS: PFP02-05, PFP12-15, PFP21-25 OR PFP32-35



DIRECT BURIAL U-CHANNEL POST



SSF40a-b

|            |      |
|------------|------|
| SHEET NO.: | DATE |
| 1 OF 2     | 1996 |

### INTENDED USE

The direct U-channel sign support system can be used as a one-post (SSF40a) or two-post (SSF40b) sign support system where both posts are within 2100-mm of each other. The system has been successfully crash tested with the sign post driven directly into a strong soil. The system, when driven into strong soil, is considered to meet the requirements of the 1985 AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*. The performance of this system in weak-soil full-scale crash tests was not satisfactory since the post did not fracture as intended. Some agencies use this system with a structural splice (e.g., a splice that is meant to rigidly connect two posts) at a height above the bumper (610 mm). Structural splices should have at least four bolts equally spaced along an overlap of 610 mm. A system with a structural splice has been successfully crash tested in strong soil.

### COMPONENTS

The direct burial U-channel post small sign support system consists of PFP02-05, PFP12-15, PFP22-25, or PFP32-35 posts driven at least 1200-mm into a strong soil.

### REFERENCES

H. E. Ross, Jr. and K. C. Walker, "Crash Tests of Single Post Sign Installations Using Subcompact Automobiles," Federal Highway Administration, Report No. FHWA-RD-80-503, Washington, D.C., May 1980.

L. A. Staron, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter SS-05, Federal Highway Administration, June 15, 1987.

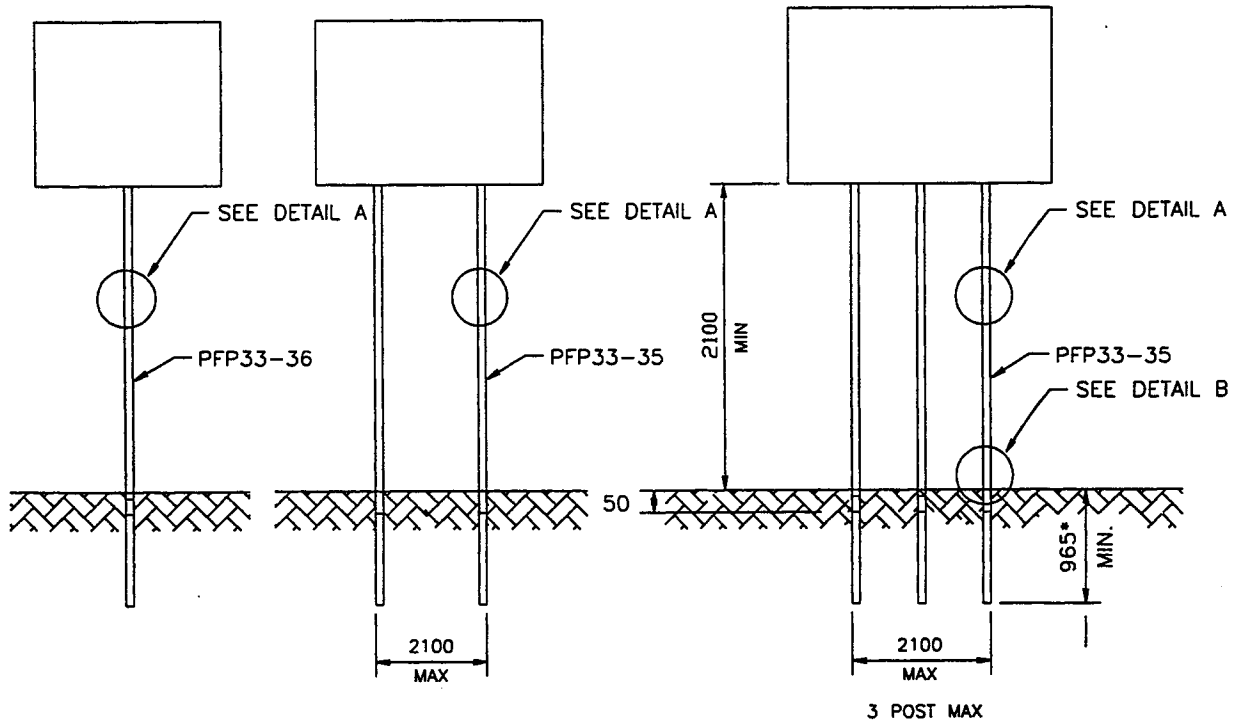
L. A. Staron, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter SS-36 Federal Highway Administration, September 3, 1993.

## DIRECT BURIAL U-CHANNEL POST

SSF40a-b

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|-----------|----------|
| 2 of 2    | 12-29-96 |



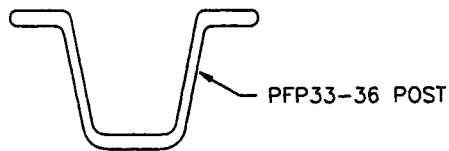


SSP01a

SSP01b

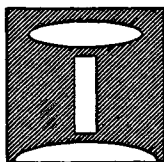
SSP01c

\* - 1500 mm REQUIRED IN WEAK SOIL



DETAIL A: CROSS SECTION

FRANKLIN BASE-BOLTED SIGN SUPPORT SYSTEM



FRANKLIN INDUSTRIES COMPANY  
 P.O. BOX 671  
 FRANKLIN, PA 16323

SSP01a-c

SHEET NO.

DATE:

1 OF 4

1-28-97

### INTENDED USE

The Franklin Industries base-bolted system can be used as a single (SSP01a), double (SSP01b), or triple (SSP01c) post sign support where all posts are within 2100-mm of each other. The system may be driven in strong or weak soil and does not require a concrete foundation, however, when installed in weak soil a soil plate is required on each base post. These systems have been crash tested in strong and weak soil and have been judged to satisfy the requirements of 1985 AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals* and the National Cooperative Highway Research Program Report 230.

### COMPONENTS

The Franklin Industries base-bolted system consists of three components: a base post (PFP33-06), a sign post (PFP33-06) and the splice hardware. The splice hardware consists of two 25-mm diameter by 16-mm thick steel spacers and bolts (FBX08d), washers and nuts. The splice bolts and nuts are 50-mm long FXB08d M8x1.25 Class 12.9 plated hex head bolts and nuts. The splice hardware is cadmium plated in accordance with the requirements of ASTM A165-80, Type OS, except using clear chromate.

### REFERENCES

L.A. Staron, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter, Federal Highway Administration, Washington D.C., August 31, 1989.

L.A. Staron, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter, Federal Highway Administration, Washington D.C., September 20, 19.

S.I. Sillan, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter SS-59, Federal Highway Administration, Washington D.C., March 7, 1996.

S.I. Sillan, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter SS-67, Federal Highway Administration, Washington D.C., September 9, 1996.

### CONTACT INFORMATION

Franklin Industries Company  
P.O. Box 671  
Franklin, PA 16323  
(814) 437-3726  
Fax: (814) 432-7556

## FRANKLIN BASE-BOLTED SIGN SUPPORT SYSTEM

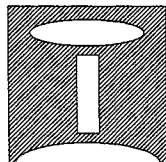
SSP01a-c

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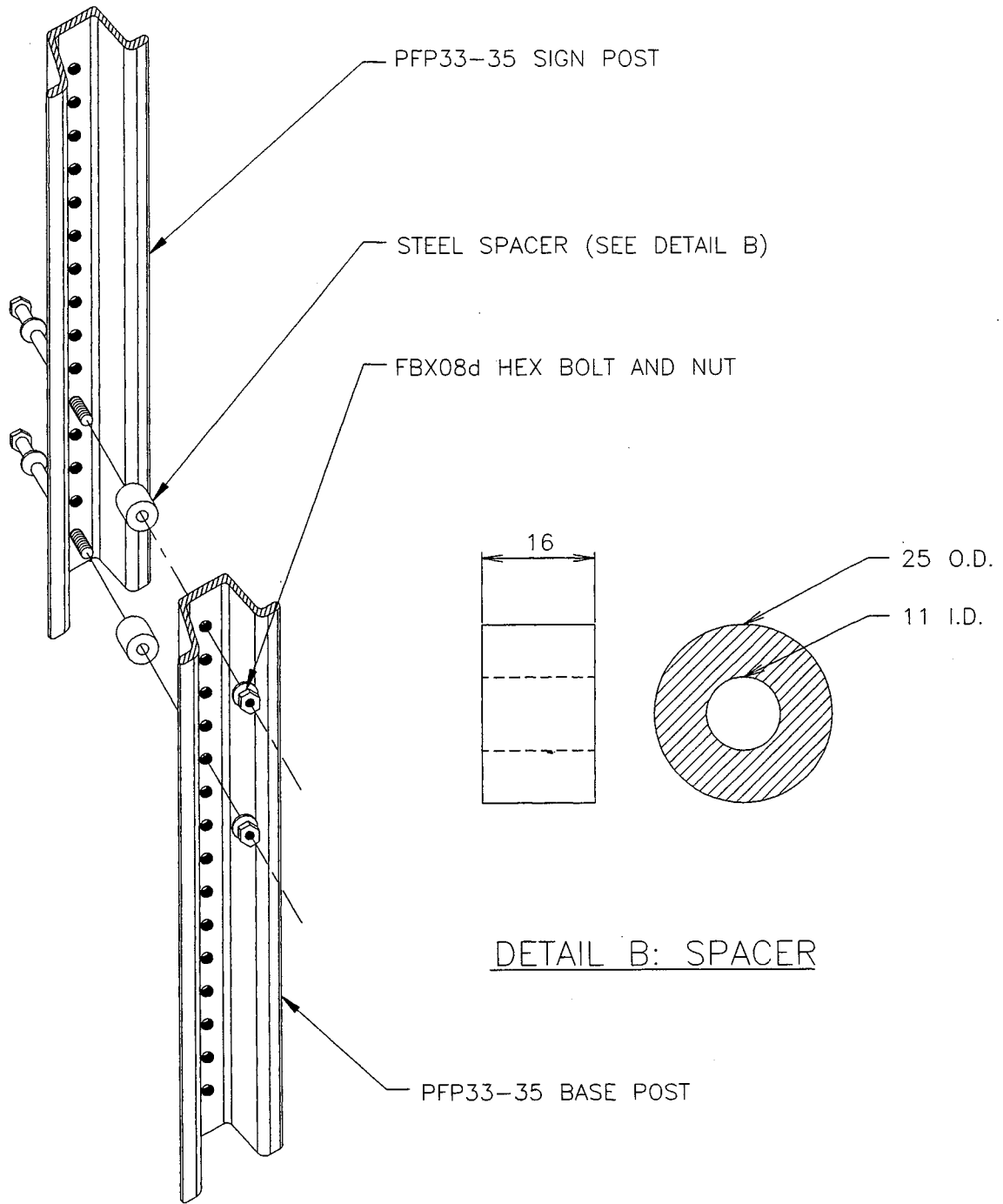
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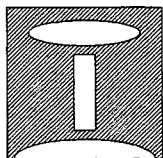


FRANKLIN INDUSTRIES COMPANY  
P.O. BOX 671  
FRANKLIN, PA 16323



DETAIL A: SPLICE

FRANKLIN BASE-BOLTED SIGN SUPPORT SYSTEM



FRANKLIN INDUSTRIES COMPANY  
 P.O. BOX 671  
 FRANKLIN, PA 16323

SSP01a-c

SHEET NO.

DATE:

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1-28-97



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FRANKLIN BASE-BOLTED SIGN SUPPORT SYSTEM

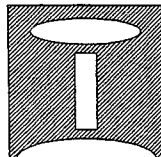
SSP01a-c

SHEET NO.

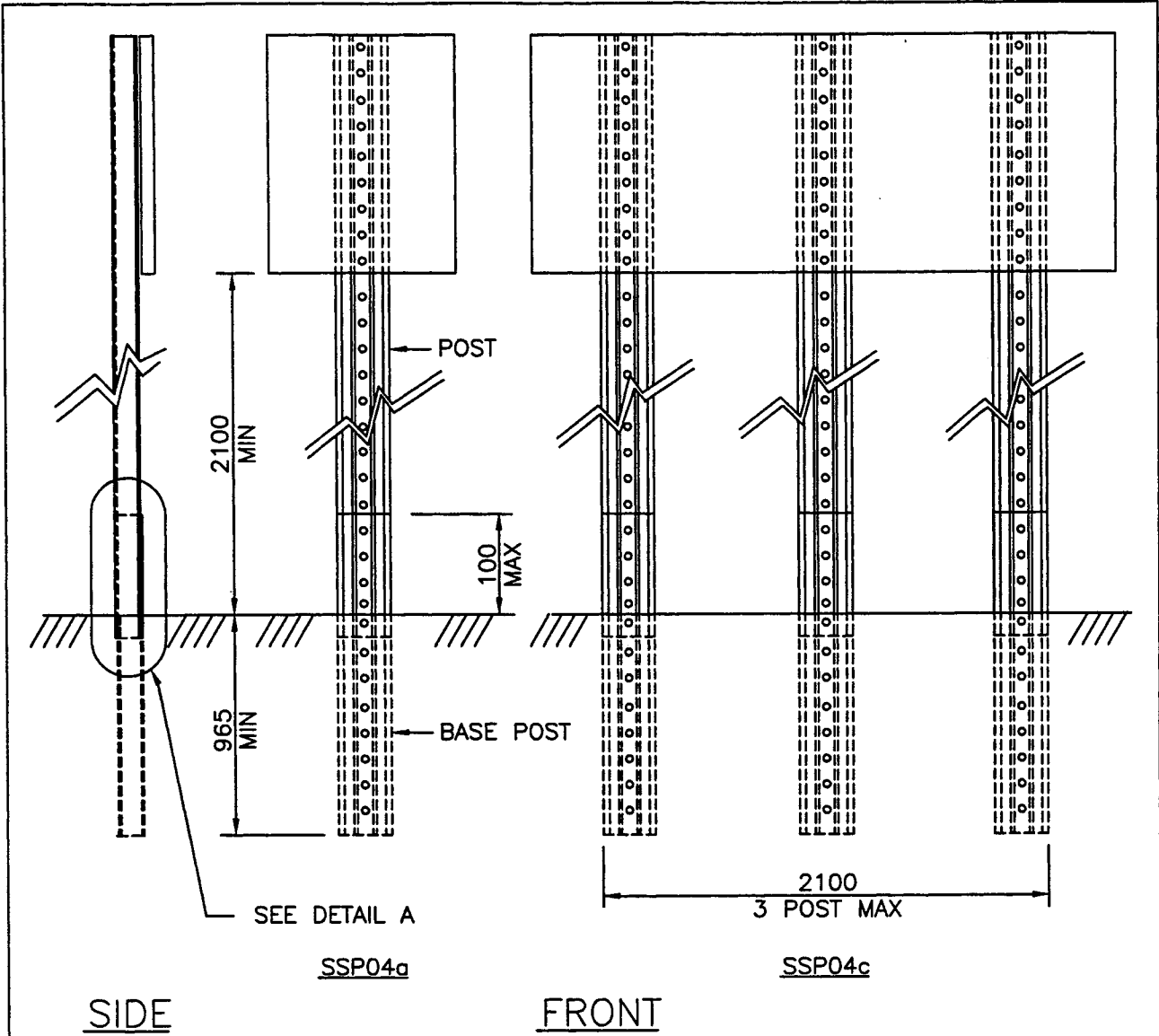
DATE:

4 OF 4

1-28-97



FRANKLIN INDUSTRIES COMPANY  
P.O. BOX 671  
FRANKLIN, PA 16323



SSP04a

SSP04c

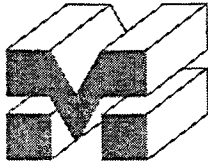
SIDE

FRONT

| POST DESIGNATOR | POST DESIGNATOR BASE |
|-----------------|----------------------|
| PFP02           | PFP02                |
| PFP03           | PFP03                |
| PFP04           | PFP04                |
| PFP05           | PFP05                |
| PFP06           | PFP06                |

SSP04b Not Shown

MARION LAP SPLICE BREAKAWAY SYSTEM



MARION STEEL COMPANY  
 912 CHENEY AVENUE  
 MARION, OH 43301-1801

SSP04a-c

| SHEET NO: | DATE      |
|-----------|-----------|
| 1 of 4    | 26 JAN 97 |

### INTENDED USE

The patented Marion Steel Lap Splice breakaway system can be used as a single (SSP04a), double (SSP04b), or triple post (SSP04c) sign support system within a 2100-mm span. These systems have been crash tested in both weak and strong soil and have been judged to satisfy the requirements of the 1985 AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals*. Testing was performed according to the of NCHRP Report 350.

### COMPONENTS

The Marion Steel Lap Splice breakaway system shall consist of three parts: a base post (PFP02-PFP06), a sign post (PFP02-PFP06), and the splice hardware which includes a special threaded spacer bar. The base post shall be 1067-mm long and can be optionally tapered at one end. The base post and sign post shall be of like weight, as specified by the user (PFP02-PFP06). The sign post lengths shall be supplied in 152.4-mm increments from 1067 mm to 5974 mm as required for the installation location. Post weights are plus or minus five percent before punching.

Proprietary Lap Splice Spacer Bar hardware consists of two fully threaded 7.9-mm diameter 37.5-mm long plated hex head bolts, two flat washers, and two locking flange nuts (the hex bolts are identified by head markings of "M 180," as well as a red finish), one 127.0 mm by 19.0 mm by 9.5 mm or 127.0 by 19.0 by 12.7 mm threaded spacer bar. The spacer bars are color coded for use with specific weights of posts; silver colored 9.5-mm thick spacer bars are used with PFP02 through PFP04 posts; gold colored 12.7-mm thick spacer bars are used with PFP05 and PFP06 posts. Each spacer bar will be drilled and tapped. The spacer bar shall be fabricated from hot rolled carbon steel bars conforming to AASHTO M183M (ASTM A36M) or M1020. Splice hardware shall be cadmium plated in accordance with the requirements of ASTM A165 or zinc plated in accordance with the requirements of ASTM B633.

A soil stabilization plate (PLS02) is available for situations when additional soil support is needed. The plate's primary function is providing increased stability to the base post for greater wind load carrying purposes, and increasing the integrity of the base post during vehicular impact. The soil plate is required in soft soil for triple-post installations (SSP04c) that use the PFP06 sign post and is optional in all other configurations.

## MARION LAP SPLICE® BREAKAWAY SYSTEM

### SSP04a-c



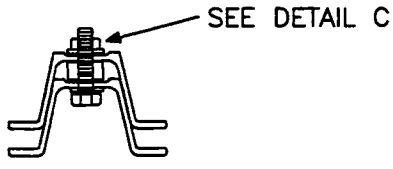
MARION STEEL COMPANY  
912 CHENEY AVENUE  
MARION, OH 43301-1801

SHEET NO.

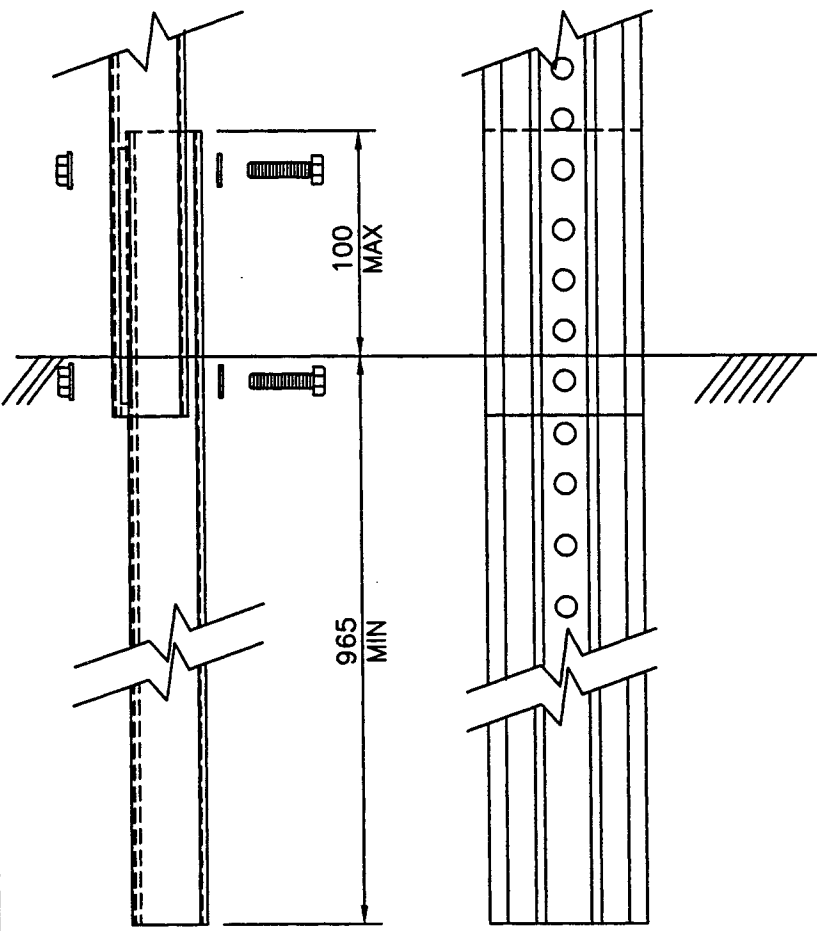
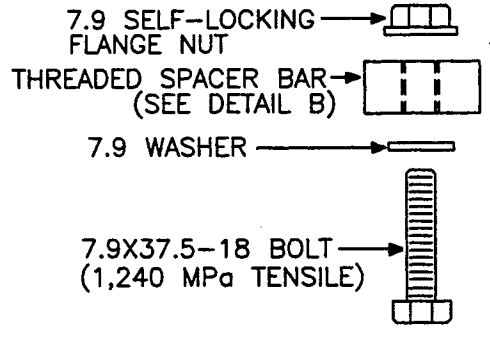
DATE

2 of 4

1/28/97



TOP

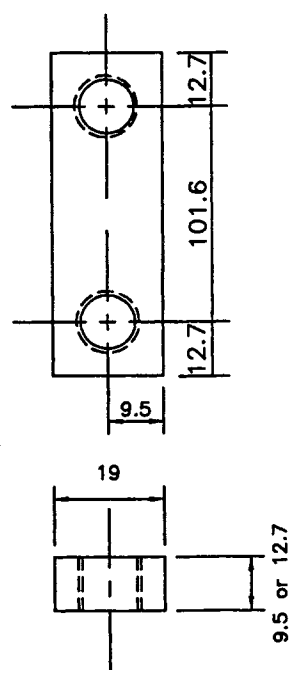


SIDE

FRONT

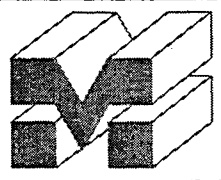
DETAIL A  
SPLICE CONNECTION

DETAIL C  
CONNECTORS  
(PROPRIETARY)



DETAIL B  
LAP SPLICE SPACER BAR  
(PROPRIETARY)

MARION STEEL LAP SPLICE BREAKAWAY SYSTEM



MARION STEEL COMPANY  
912 CHENEY AVENUE  
MARION, OH 43301-1801

SSP04a-c

| SHEET NO: | DATE      |
|-----------|-----------|
| 3 of 4    | 26 JAN 97 |

**REFERENCES**

L.A. Staron, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter SS-13, Federal Highway Administration, Washington, D.C., October 2, 1989.

L.A. Staron, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter SS-13, Federal Highway Administration, Washington, D.C., July 13, 1996.

S.I. Sillan, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter SS-13, Federal Highway Administration, Washington, D.C., March 14, 1996.

**CONTACT INFORMATION**

The Marion Steel Company  
912 Cheney Avenue  
Marion, Ohio 43301-1801  
(800) 333-4011  
Fax (614) 383-6429

*\* All Marion Steel posts are produced from 100% recycled steel.*



**MARION LAP SPLICE® BREAKAWAY SYSTEM**

**SSP04a-c**



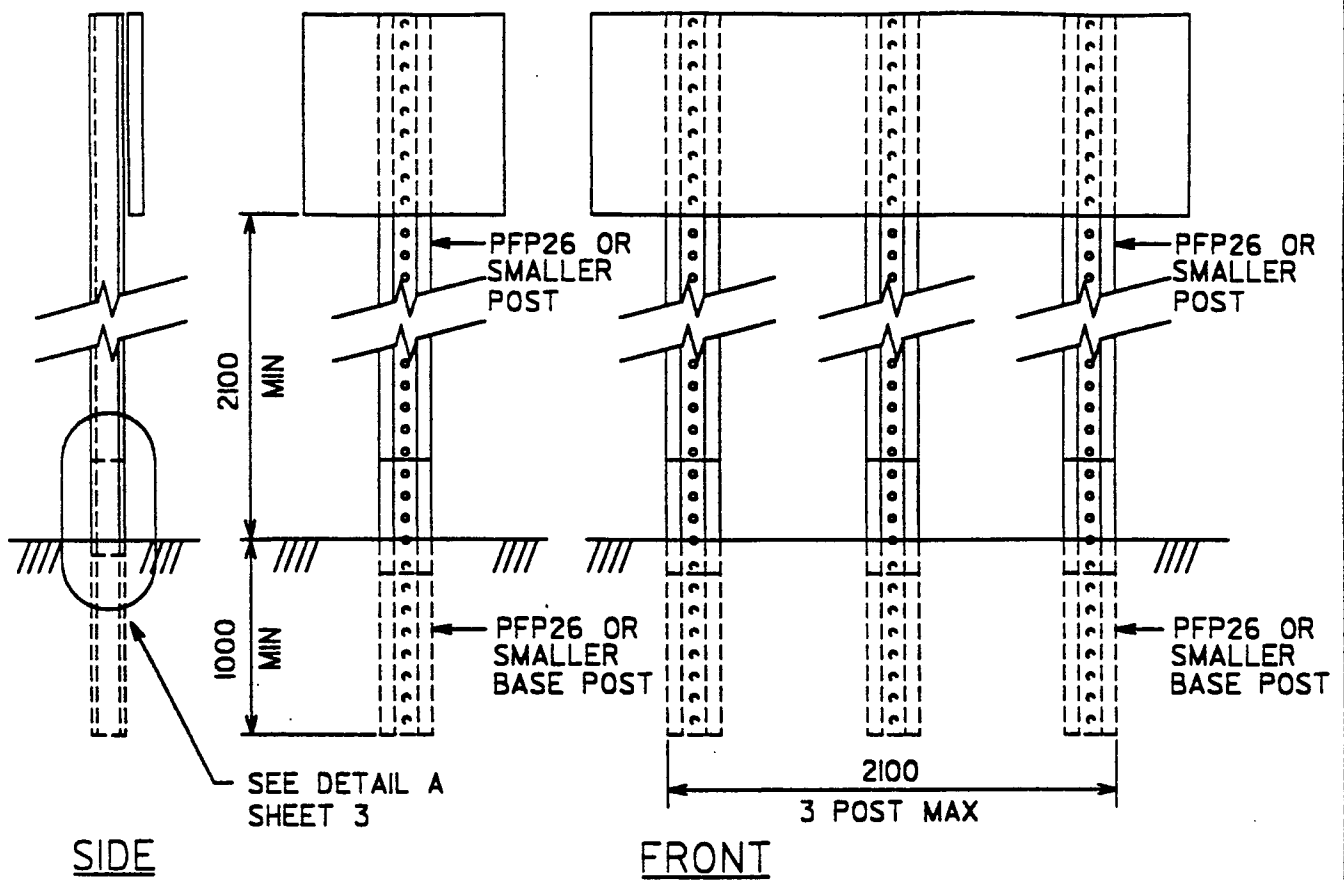
**MARION STEEL COMPANY**  
912 CHENEY AVENUE  
MARION, OH 43301-1801

SHEET NO.

DATE

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1/28/97



| SYSTEM          | LARGEST POST | LARGEST BASE POST |
|-----------------|--------------|-------------------|
| SSP05a (1 POST) | PFP26        | PFP26             |
| SSP05b (2 POST) | PFP26        | PFP26             |
| SSP05c (3 POST) | PFP26        | PFP26             |

## SAFETY SPLICE BREAKAWAY SYSTEM



CHICAGO HEIGHTS STEEL  
 211 E. MAIN  
 CHICAGO HEIGHTS, IL 60411

SSP05a-c

|           |           |
|-----------|-----------|
| SHEET NO: | DATE      |
| 1 of 4    | 13 SEP 96 |

### INTENDED USE

The Chicago Heights Safety Splice breakaway system can be used as a single (SSP05a), double (SSP05b), or triple post (SSP05c) sign support system within a 2100 mm span with up to and including a PFP26 upper and lower post. These systems have been crash tested in both strong and weak soils and have been judged to satisfy the requirements of 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals. Testing was conducted in accordance with the requirements of NCHRP Report 350.

### COMPONENTS

The Chicago Heights Steel Safety Splice System consists of three components: a base post (PFP23-26), a sign post (PFP23-26), and the splice hardware which includes special, round shaped spacers. The round spacers are provided in two different sizes, depending on the mass of post being erected. The sign post and base post shall be of like weight per meter, as specified by the user. (PFP23-26). The sign post lengths shall be supplied in 300 mm increments beginning from 1800 mm to 6100 mm as required for the installation location.

The splice hardware required is proprietary and consists of two 7.9 mm proprietary, Grade 9 bolts, nuts and washers with rubber backed washers. Two 22.2 mm diameter spacers shall be used per splice to stiffen the connection. Each spacer shall be drilled with a 9.5 mm diameter hole, traversing its entire length, along the center line of the spacer. The spacer shall be fabricated from hot rolled carbon steel bars conforming to AASHTO M183 (ASTM A-36) or M1020 steel. The spacer length is determined by the mass of post to be spliced, to wit:

|                |         |
|----------------|---------|
| PFP23, PFP24 - | 15.9 mm |
| PFP25, PFP26 - | 9.5 mm  |

Splice hardware shall be cadmium plated pursuant to ASTM A-165 or zinc plated pursuant to ASTM B-633.

A special soil stabilization plate [PLS03] is available for situations when additional soil support is needed. It is required in weak soil installations and is optional in strong soil settings.

## SAFETY SPLICE BREAKAWAY SYSTEM

# SSP05a-c

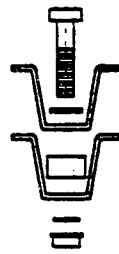
CHICAGO HEIGHTS STEEL  
211 EAST MAIN  
CHICAGO HEIGHTS, IL 60411

SHEET NO.

DATE

2 of 4

09-13-96



TOP

PROPRIETARY FBX08d  
BOLT, NUT & WASHER



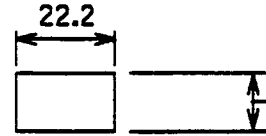
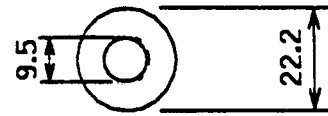
PROPRIETARY  
SPACER  
SEE DETAIL B



PROPRIETARY  
RUBBER BACKED  
WASHER

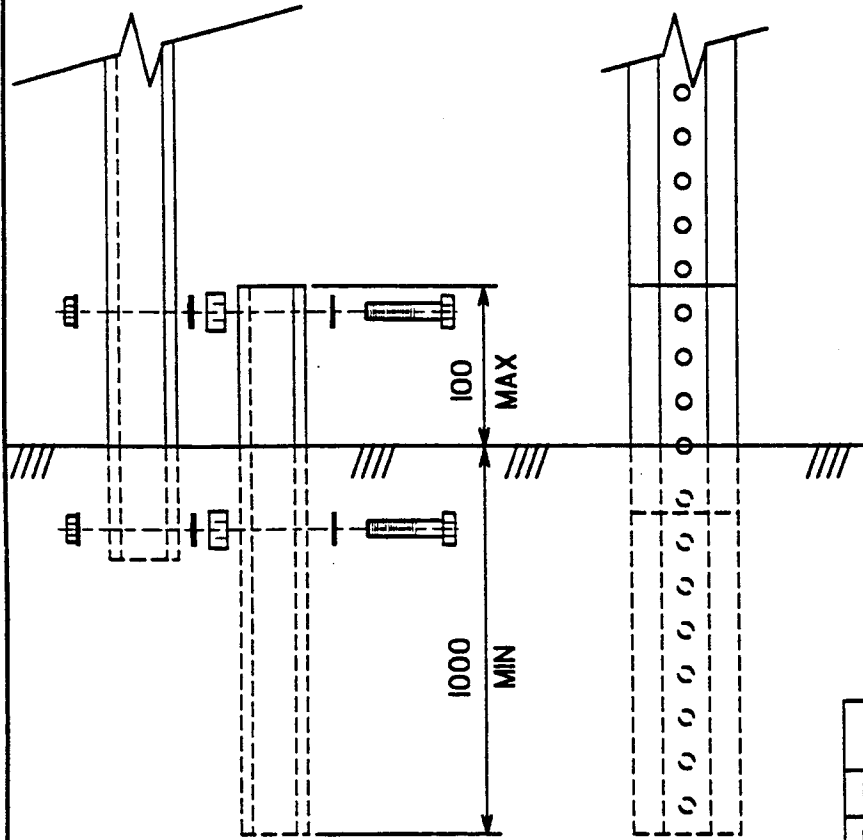


DETAIL C  
CONNECTORS



SEE TABLE BELOW FOR SPACER HEIGHT

DETAIL B  
SPACER



SIDE

FRONT

DETAIL A  
SPLICE CONNECTION

| POST          | SPACER HEIGHT |
|---------------|---------------|
| PFP23 & PFP24 | 9.5 mm        |
| PFP25 & PFP26 | 15.9 mm       |

SAFETY SPLICE BREAKAWAY SYSTEM



CHICAGO HEIGHTS STEEL  
211 E. MAIN  
CHICAGO HEIGHTS, IL 60411

SSP05a-c

SHEET NO:

DATE

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13 SEP 96



**REFERENCES**

S.I. Sillan, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter SS-59, Federal Highway Administration, Washington D.C., March 7, 1996.

**CONTACT INFORMATION**

Chicago Heights Steel  
211 E. Main Street  
P.O. Box 129  
Chicago Heights, IL 60411  
800-424-4487  
708-7565619  
708-756-5628 FAX

**SAFETY SPLICE BREAKAWAY SYSTEM**

**SSP05a-c**

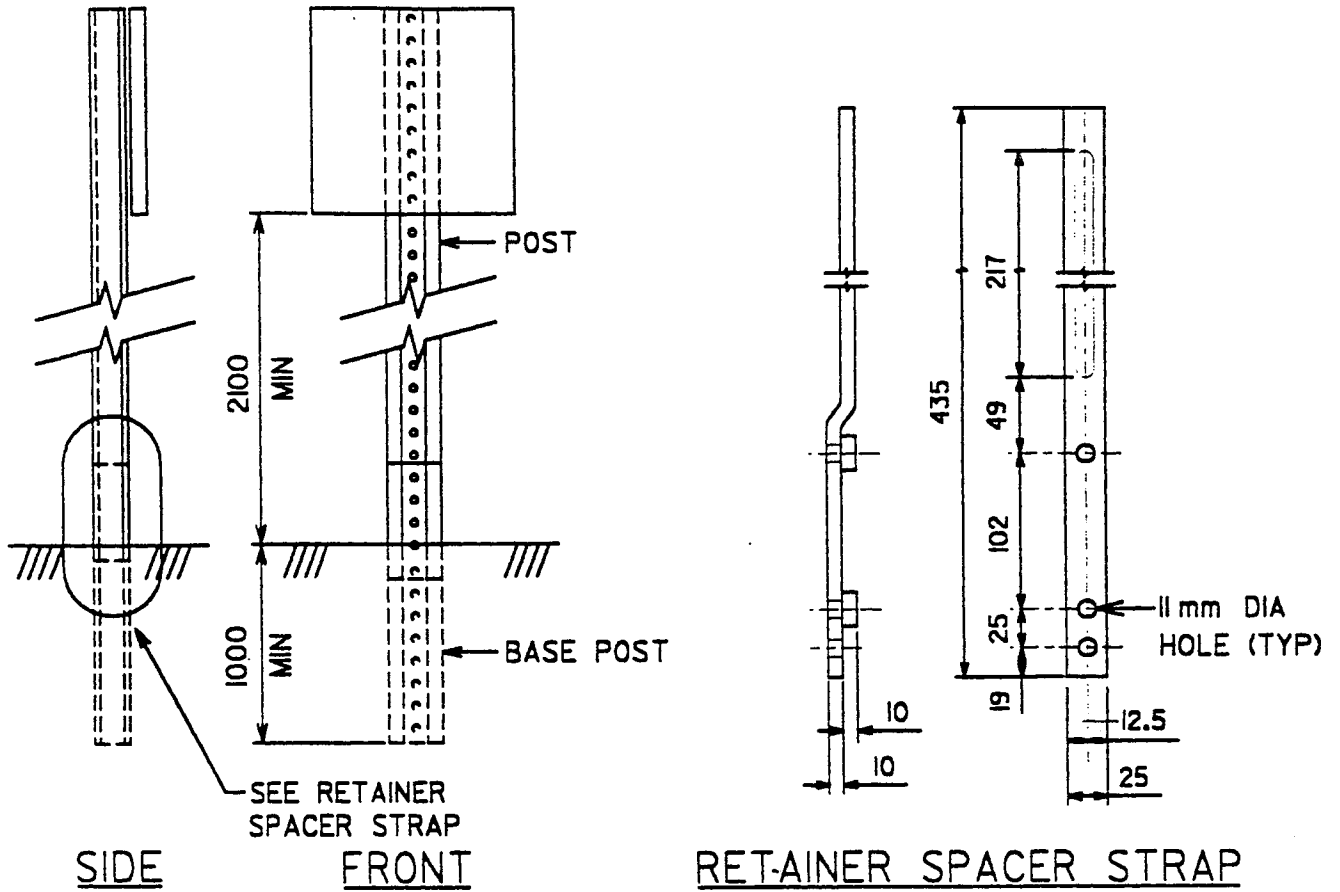
**CHICAGO HEIGHTS STEEL  
211 EAST MAIN  
CHICAGO HEIGHTS, IL 60411**

SHEET NO.

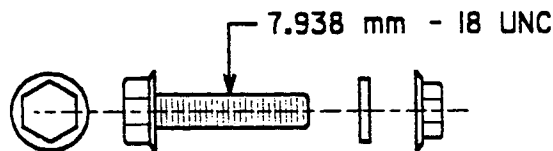
DATE

4 of 4

09-13-96



| SYSTEM         | LARGEST POST | LARGEST BASE POST |
|----------------|--------------|-------------------|
| SSP05a (1POST) | PFP26        | PFP26             |



ANCHOR BOLT  
NUT AND LOCK WASHER

ERECT EASE BREAKAWAY SYSTEM



CHICAGO HEIGHTS STEEL  
211 E. MAIN  
CHICAGO HEIGHTS, IL 60411

SSP06a

|           |           |
|-----------|-----------|
| SHEET NO: | DATE      |
| 1 of 2    | 13 SEP 96 |

### INTENDED USE

The Chicago Heights Erect Ease breakaway system can be used as a single (SSP06a) sign support system within a 2100 mm span. These systems have been crash tested in both strong and weak soils and have been judged to satisfy the requirements of 1985 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals. Testing was conducted in accordance with the requirements of NCHRP Report 350.

### COMPONENTS

The Chicago Heights Erect Ease Breakaway System consists of three components: a base post (PFP23-26), a sign post (PFP23-26), and the splice hardware which includes a spacer-retainer strap with associated attachment hardware consisting of four 7.9 mm proprietary, Grade 9 bolts, nuts and washer.

Splice hardware shall be cadmium plated pursuant to ASTM A-165 or zinc plated pursuant to ASTM B-633.

A trapezoidal (PLS02) soil stabilization plate is available for situations when additional soil support is needed. It is required in weak soil installations and is optional in strong soil settings.

### REFERENCES

L.A. Sparon, "Eze-Erect sign posts," Geometric and Roadway Design acceptance letter SS-9, Federal Highway Administration, 3-16-89,4-7-89.

### CONTACT INFORMATION

Chicago Heights Steel  
211 E. Main Street  
P.O. Box 129  
Chicago Heights, IL 60411  
800-424-4487  
708-756-5619  
708-756-5628 Fax

## ERECT EASE BREAKAWAY SYSTEM

# SSP06a

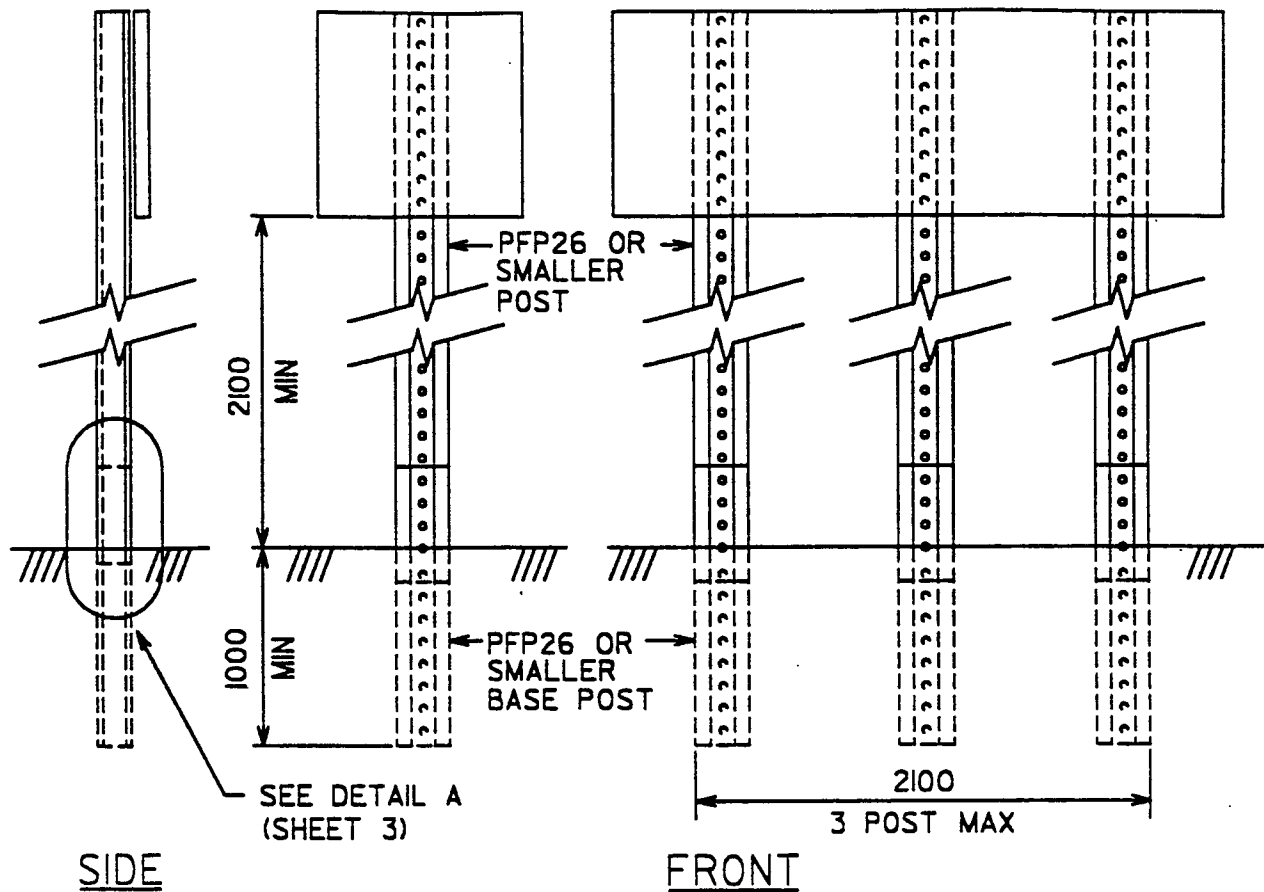
CHICAGO HEIGHTS STEEL  
211 EAST MAIN  
CHICAGO HEIGHTS, IL 60411

SHEET NO.

DATE

2 of 2

09-13-96



| SYSTEM          | LARGEST POST | LARGEST BASE POST |
|-----------------|--------------|-------------------|
| SSP07a (1 POST) | PFP26        | PFP26             |
| SSP07b (2 POST) | PFP26        | PFP26             |
| SSP07c (3 POST) | PFP26        | PFP26             |

## BRACER BAR BREAKAWAY SYSTEM



CHICAGO HEIGHTS STEEL  
 211 E. MAIN  
 CHICAGO HEIGHTS, IL 60411

SSP07a-c

SHEET NO:

DATE

1 of 4

13 SEP 96

### INTENDED USE

The Chicago Heights Bracer Bar breakaway system can be used as a single (SSP07a), double (SSP07b), or triple post (SSP07c) sign support system within a 2100 mm span with up to and including a PFP26 upper and lower post. These systems have been approved by the Federal Highway Administration for use in both strong and weak soil pursuant to the requirements of 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals. Testing was conducted in accordance with the requirements of NCHRP Report 350.

### COMPONENTS

The Chicago Heights Steel Bracer Bar System consists of three components: a base post (PFP23-26), a sign post (PFP23-26), and splice hardware which includes a special threaded spacer bar. The sign post and base post shall be of like mass, as specified by the user, (PFP23-26). The sign post lengths shall be supplied in 300 mm increments beginning from 1800 mm to 6100 mm as required for the installation location.

The splice hardware required is part of a proprietary breakaway splice system that consists of two 7.9 mm proprietary, Grade 9 bolt, nut and washer combinations. One proprietary bar spacer (see sheet 3) is used per splice to stiffen the connection, thereby providing remarkable torsional rigidity to the post around and about the splice area. The spacer bar shall incorporate two holes located 101.6 mm along the center line of the bar. Each hole shall be drilled and tapped in such a way as to accommodate the proprietary hardware. The spacer bar shall be fabricated from hot rolled carbon steel bars conforming to AASHTO M183 (ASTM A-36) or M1020 steel.

Splice hardware shall be cadmium plated as specified by ASTM A-165 or zinc plated as per ASTM B-633.

A trapezoidal soil stabilization plate (PLS02) or square soil plate or square soil plate [PLS03] is available for situations when additional soil support is needed. It is required in weak soil installations and is optional in strong soil settings.

## BRACER BAR BREAKAWAY SYSTEM

# SSP07a-c

CHICAGO HEIGHTS STEEL  
211 EAST MAIN

CHICAGO HEIGHTS, IL 60411

SHEET NO.

DATE

2 of 4

09-13-96



TOP

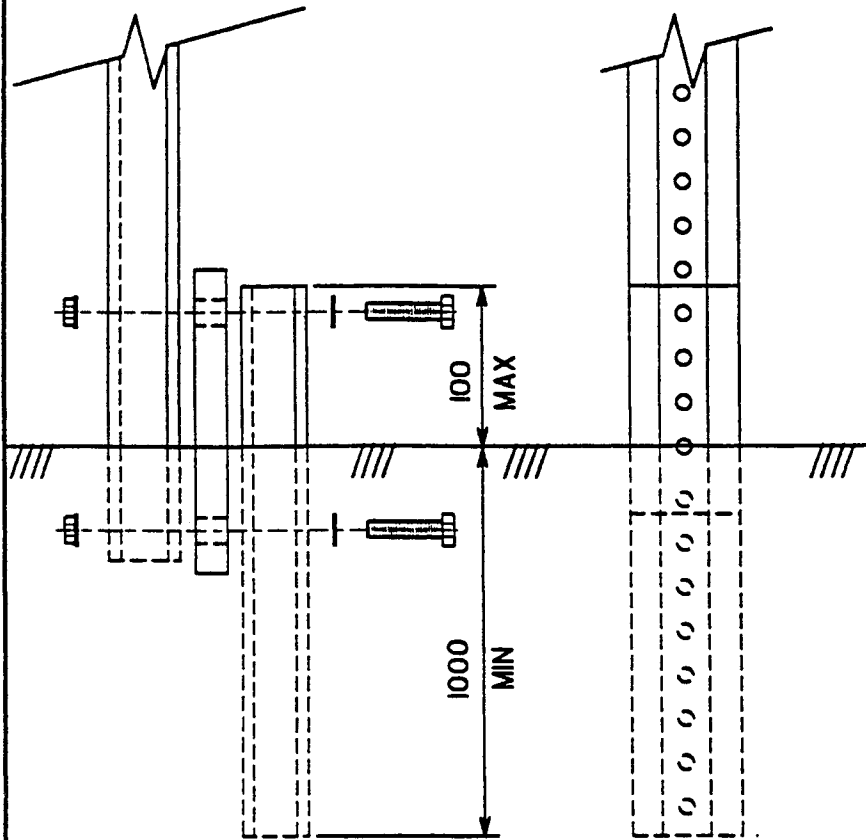
PROPRIETARY BOLT

PROPRIETARY WASHER

PROPRIETARY BRACER BAR (SEE DETAIL B)

PROPRIETARY FLANGE NUT

DETAIL C CONNECTORS

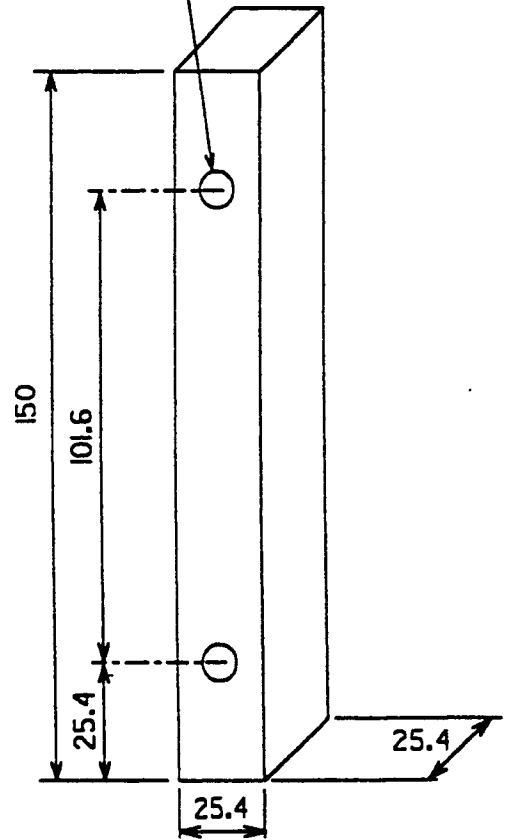


SIDE

FRONT

DETAIL A  
SPLICE CONNECTION

M8X1.25 FULL DEPTH  
THREAD (TYP)



DETAIL C  
BRACER BAR

BRACER BAR BREAKAWAY SYSTEM



CHICAGO HEIGHTS STEEL  
211 E. MAIN  
CHICAGO HEIGHTS, IL 60411

SSP07a-c

SHEET NO:

DATE

3 of 4

13 SEP 96

**REFERENCES**

S.I. Sillan, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter SS-59, Federal Highway Administration, Washington, D.C., March 7, 1996.

S.I. Sillan, "Breakaway Sign Supports," Supplement to Geometric and Roadside Design Acceptance Letter SS-59, Federal Highway Administration, Washington, D.C., April 29, 1996.

**CONTACT INFORMATION**

Chicago Heights Steel  
211 E. Main Street  
P.O. Box 129  
Chicago Heights, IL 60411  
800-424-4487  
708-7565619  
708-756-5628 FAX

**BRACER BAR BREAKAWAY SYSTEM**

**SSP07a-c**

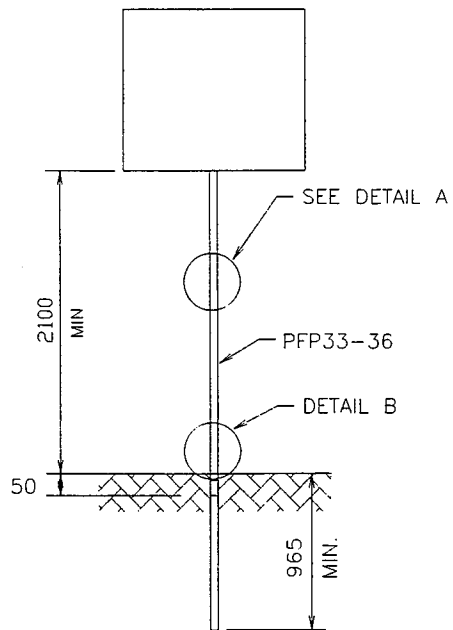
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211 EAST MAIN  
CHICAGO HEIGHTS, IL 60411**

SHEET NO.

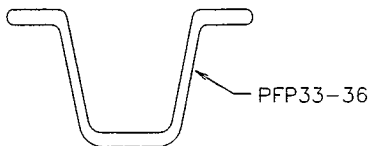
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4 of 4

09-13-96

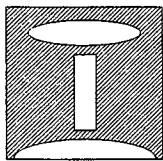


SSP08b



DETAIL A: CROSS SECTION

FRANKLIN EZE-ERECT SIGN SUPPORT SYSTEM



FRANKLIN INDUSTRIES COMPANY  
 P.O. BOX 671  
 FRANKLIN, PA 16323

SSP08a-b

SHEET NO.

DATE:

1 OF 4

1-28-97



### INTENDED USE

The Franklin Industries Eze-Erect system can be used as a single- (SSP08a) or dual- (SSP08b) post sign support installation. The system may be driven into strong soil and does not require a concrete foundation. These systems have been successfully crash tested in strong soil and have been judged to satisfy the requirements of 1985 AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals* and the National Cooperative Highway Research Program Report 230.

### COMPONENTS

The Franklin Industries Eze-Erect system consists of three components: a base post (PFP33-36), a sign post (PFP33-36) and the Eze-Erect splice hardware. The Eze-Erect splice hardware consists of a retainer-spacer strap, bolts (FBX08d), washers and nuts. The splice bolts and nuts are 50-mm long FXB08d M8x1.25 Class 12.9 bolts and nuts. The external toothed lockwashers are 10-mm diameter style, and heavy duty. The bolt, nut, and lockwasher hardware are cadmium plated in accordance with the requirements of ASTM A165-80, Type OS, except using clear chromate. The retainer-spacer strap finish shall be galvanized conforming to ASTM A123.

### REFERENCES

L.A. Staron, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter SS-9, Federal Highway Administration, Washington D.C., March 16, 1989.

L.A. Staron, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter, Federal Highway Administration, Washington D.C., April 7, 1989.

S.I. Sillan, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter SS-67, Federal Highway Administration, Washington D.C., September 9, 1996.

### CONTACT INFORMATION

Franklin Industries Company  
P.O. Box 671  
Franklin, PA 16323  
(814) 437-3726  
Fax: (814) 432-7556

## FRANKLIN EZE-ERECT SIGN SUPPORT SYSTEM

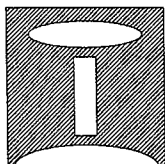
SSP08a-b

SHEET NO.

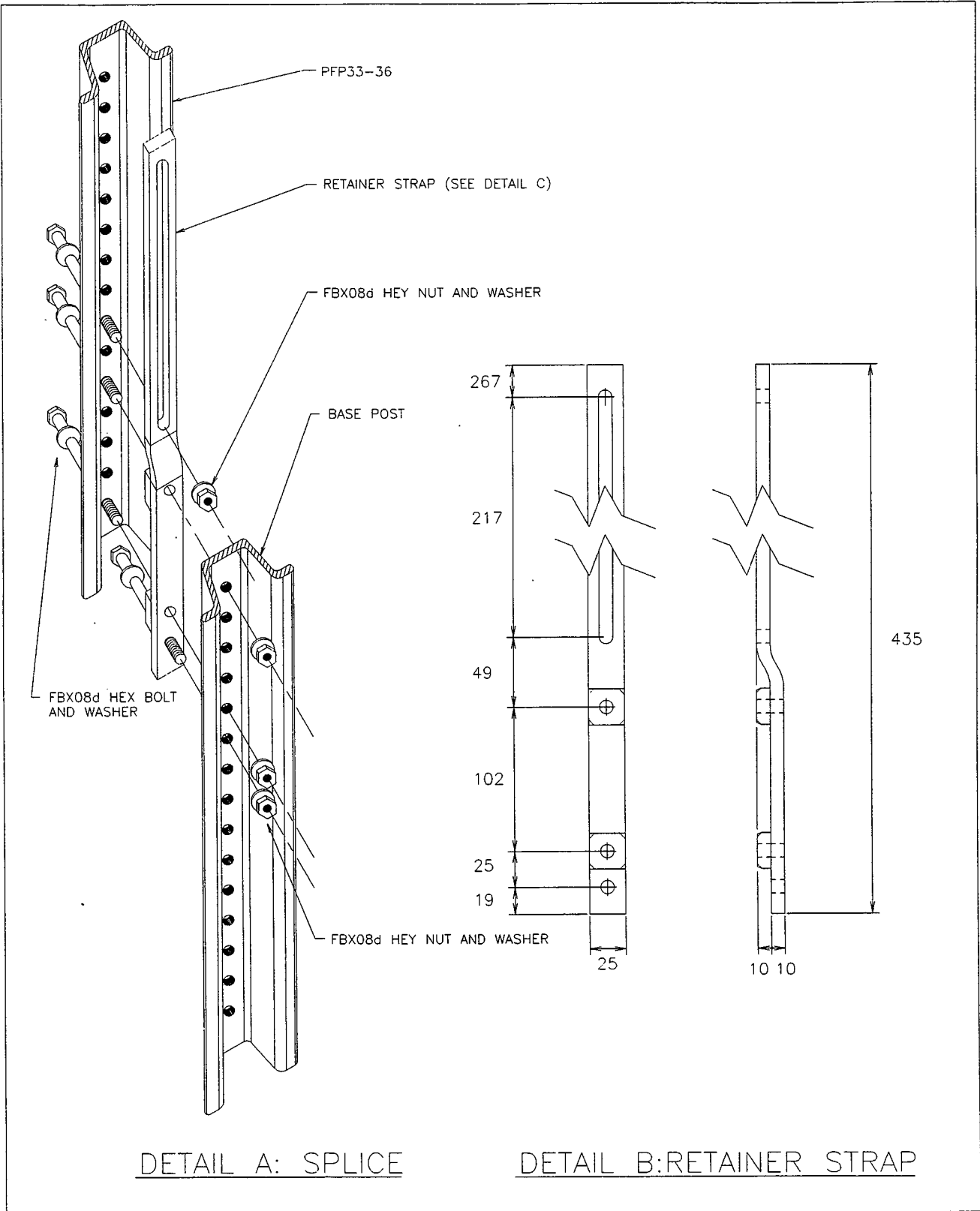
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2 OF 4

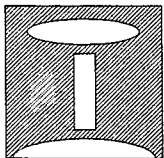
1-28-97



FRANKLIN INDUSTRIES COMPANY  
P.O. BOX 671  
FRANKLIN, PA 16323



FRANKLIN EZE-ERECT SIGN SUPPORT SYSTEM



FRANKLIN INDUSTRIES COMPANY  
 P.O. BOX 671  
 FRANKLIN, PA 16323

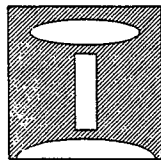
SSP08a

|           |         |
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| SHEET NO. | DATE:   |
| 3 of 4    | 1-28-97 |

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FRANKLIN EZE-ERECT SIGN SUPPORT SYSTEM

SSP08a



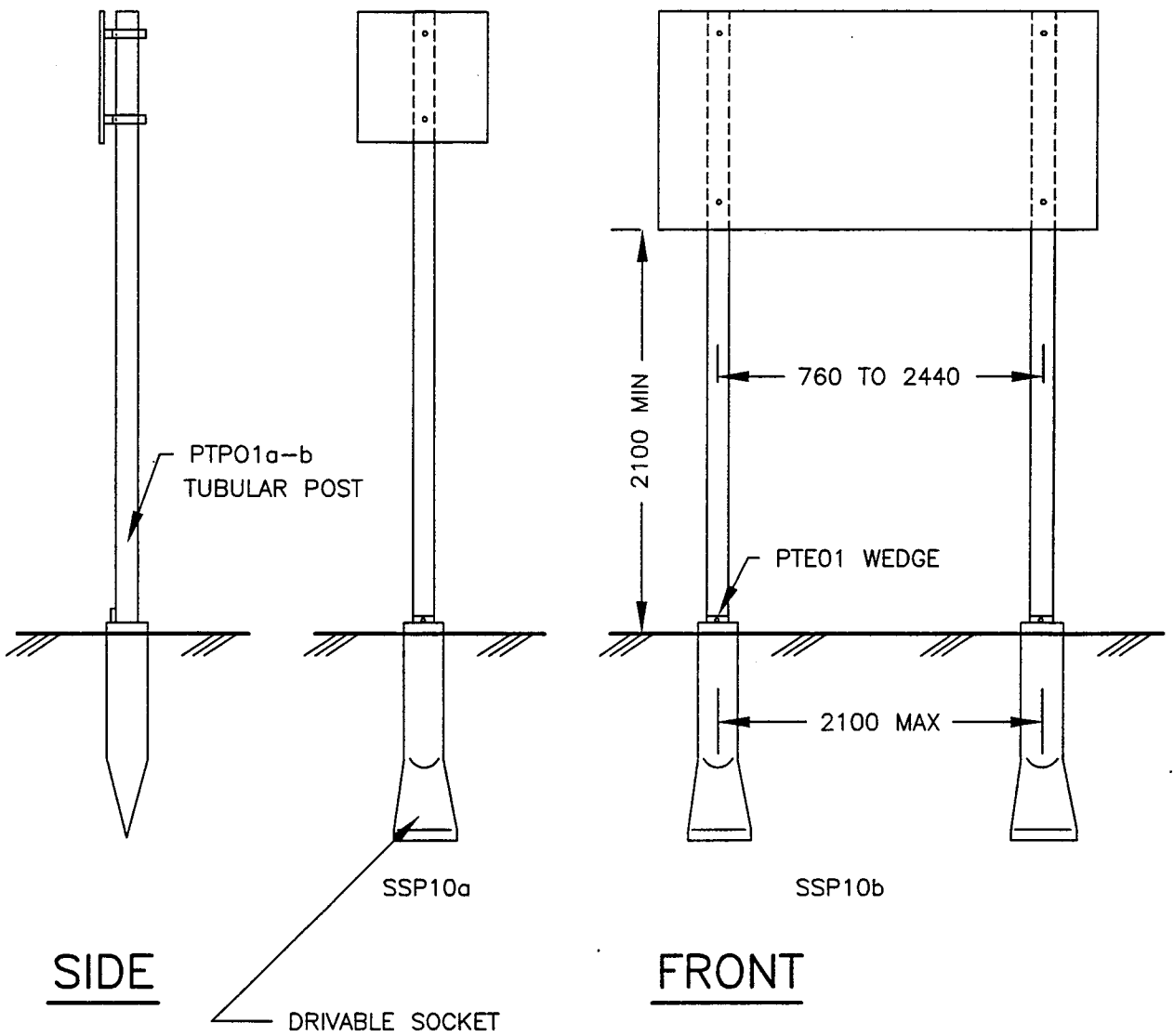
FRANKLIN INDUSTRIES COMPANY  
P.O. BOX 671  
FRANKLIN, PA 16323

SHEET NO.

DATE:

4 OF 4

1-28-97



POZ-LOC YIELDING SIGN SUPPORT SYSTEM

SOUTHWESTERN PIPE, INC.  
Houston, TX

SSP10a-b

| SHEET NO: | DATE    |
|-----------|---------|
| 1 of 4    | 1/20/97 |

### INTENDED USE

The POZ-LOC steel tubular sign support system can be used as a single- (SSP10a) or double-leg (SSP10b) sign support system. These systems can be used as a drivable base in strong soil or set in a concrete footing. This system has been judged to meet the requirements of the 1985 AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*.

### COMPONENTS

The components of the POZ-LOC steel tubular sign support system include the steel tube post (PTP01a-b) and the wedge and socket foundation (sheet 3 of 4). The post slides into the socket and is secured in place by the locking wedge. The POZ-LOC drivable socket is manufactured from 2.67-mm thick ASTM A787 galvanized steel tubing. The material for the precoated steel tubing shall be ASTM A653 with a zinc coating conforming to weight designation ASTM A653 G90. The exterior shall be coated with 12 microns of clear acrylic coating. The POZ-LOC locking wedge shall be manufactured from 3.03-mm thick ASTM A525 steel sheet with a zinc coating weight designation ASTM A653 G90.

### REFERENCES

M. E. Bronstad, "Mini-car Crash Tests of Small Sign Support," Southwest Research Institute, Project No. 06-8909-0001, April, 1986.

N. J. VanNess, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter SS-01, Federal Highway Administration, May 13, 1986.

### CONTACT INFORMATION

Southwestern Pipe, Inc.  
P.O. Box 2002  
Houston, TX 77252  
(713) 863-4300  
(713) 863-4313 (Fax)

## POZ-LOC YIELDING SIGN SUPPORT SYSTEM

# SSP10a-b

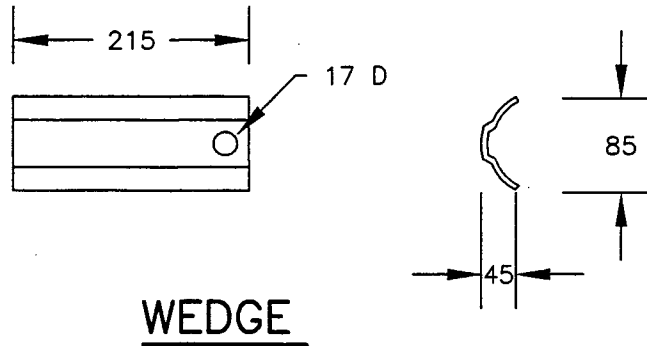
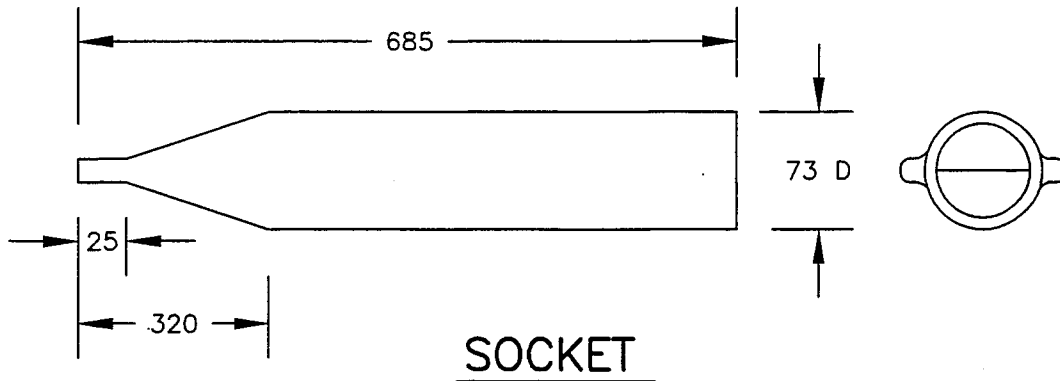
**SOUTHWESTERN PIPE, INC.**  
PO Box 2002, Houston, TX 77252  
(713) 863-4300  
(713) 863-4313 (Fax)

SHEET NO.

DATE

2 of 4

1-20-97



POZ-LOC WEDGE AND SOCKET FOUNDATION

SOUTHWESTERN PIPE, INC.  
Houston, TX

SSP10a-b

| SHEET NO: | DATE    |
|-----------|---------|
| 3 of 4    | 1/20/97 |

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**POZ-LOC YIELDING SIGN SUPPORT SYSTEM**

**SSP10a-b**

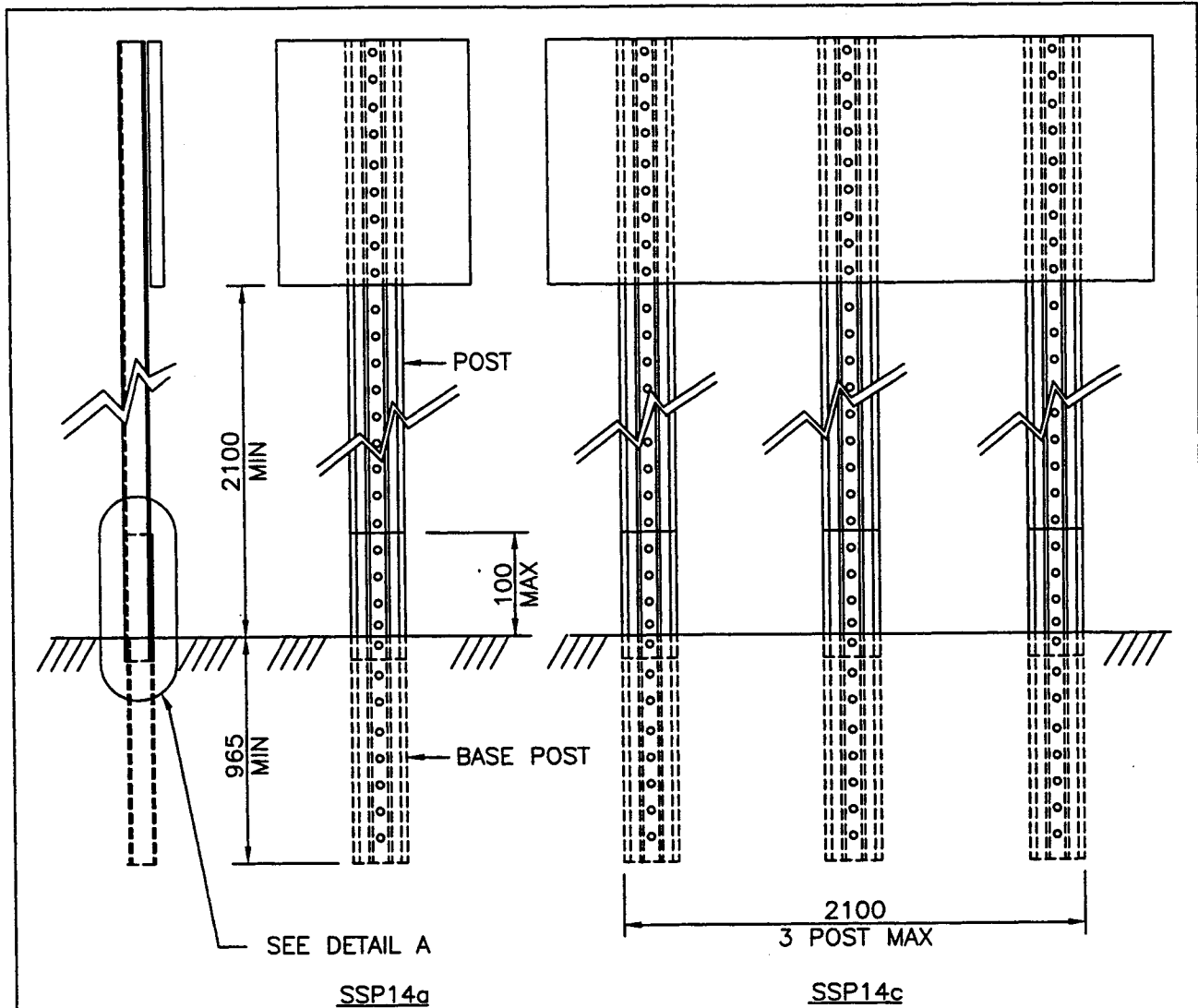
**SOUTHWESTERN PIPE, INC.**  
PO Box 2002, Houston, TX 77252  
(713) 863-4300  
(713) 863-4313 (Fax)

SHEET NO.

DATE

4 of 4

01-20-97



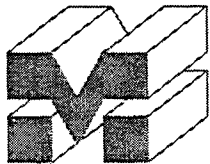
SIDE

FRONT

| POST DESIGNATOR | POST DESIGNATOR BASE |
|-----------------|----------------------|
| PFP12           | PFP12                |
| PFP13           | PFP13                |
| PFP14           | PFP14                |
| PFP15           | PFP15                |
| PFP16           | PFP16                |

SSP14b Not Shown

MARION STEEL METRIC LAP SPLICE BREAKAWAY SYSTEM



MARION STEEL COMPANY  
 912 CHENEY AVENUE  
 MARION, OH 43301-1801

SSP14a-c

SHEET NO:

DATE

1 of 4

26 JAN 97



### INTENDED USE

The patented Marion Steel Lap Splice breakaway system can be used as a single (SSP14a), double (SSP14b), or triple post (SSP14c) sign support system within a 2100-mm span. These systems have been crash tested in both weak and strong soil and have been judged to satisfy the requirements of the 1985 AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals*. Testing was performed according to the of NCHRP Report 350.

### COMPONENTS

The Marion Steel Lap Splice breakaway system shall consist of three parts: a base post (PFP12-PFP16), a sign post (PFP12-PFP16), and the splice hardware which includes a special threaded spacer bar. The base post shall be 1065-mm long and can be optionally tapered at one end. The base post and sign post shall be of like weight, as specified by the user (PFP12-PFP16). The sign post lengths shall be supplied in 150-mm increments from 1050 mm to 6000 mm as required for the installation location. Post weights are plus or minus five percent before punching.

Proprietary Lap Splice Spacer Bar hardware consists of two fully 40-mm long M8x1.25 plated hex head bolts, two flat washers, and two locking flange nuts (the hex bolts are identified by head markings of "M 180," as well as a blue finish), one 127.0 mm by 19.0 mm by 9.5 mm or 127.0 by 19.0 by 12.7 mm threaded spacer bar. The spacer bars are color coded for use with specific weights of posts; black colored 9.5-mm thick spacer bars are used with PFP12 through PFP14 posts; blue colored 12.7-mm thick spacer bars are used with PFP15 and PFP16 posts. Each spacer bar will be drilled and tapped with M8x1.25 threads as specified in ANSI B1.13M for Class g threads. The spacer bar shall be fabricated from hot rolled carbon steel bars conforming to AASHTO M183M (ASTM A36M) or M1020. Splice hardware shall be cadmium plated in accordance with the requirements of ASTM A165 or zinc plated in accordance with the requirements of ASTM B633.

A soil stabilization plate (PLS02) is available for situations when additional soil support is needed. The plate's primary function is providing increased stability to the base post for greater wind load carrying purposes, and increasing the integrity of the base post during vehicular impact. The soil plate is required in soft soil for triple-post installations (SSP14c) that use the PFP16 sign post and is optional in all other configurations.

## MARION LAP SPLICE BAR® BREAKAWAY SYSTEM

**SSP14a-c**

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DATE

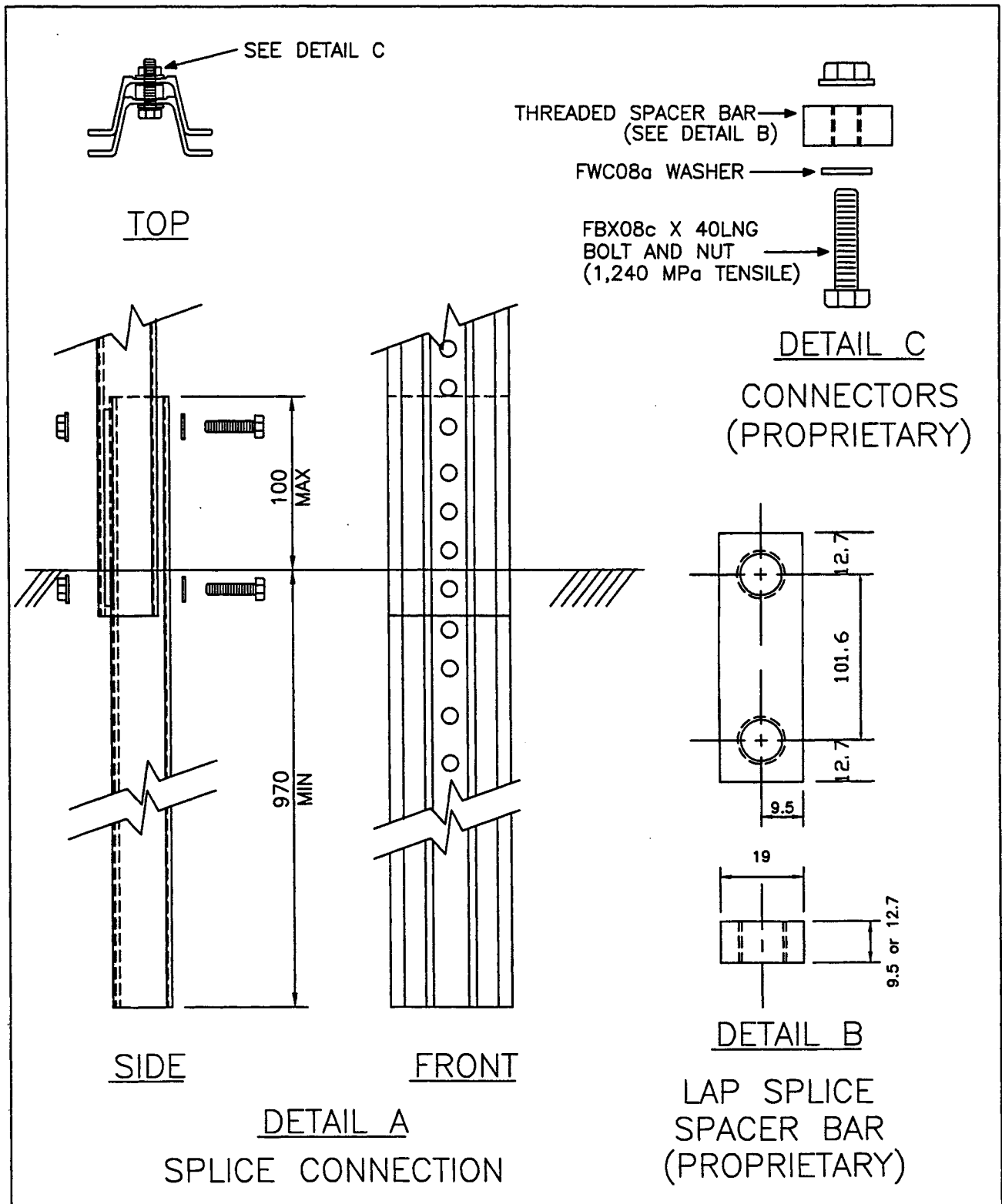
1/28/97



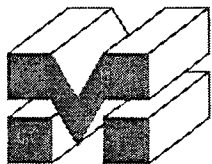
**MARION STEEL COMPANY**

912 CHENEY AVENUE

MARION, OH 43301-1801



MARION STEEL METRIC LAP SPLICE BREAKAWAY SYSTEM



MARION STEEL COMPANY  
 912 CHENEY AVENUE  
 MARION, OH 43301-1801

SSP14a-c

|           |           |
|-----------|-----------|
| SHEET NO: | DATE      |
| 3 of 4    | 26 JAN 97 |

### REFERENCES

L.A. Staron, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter SS-13, Federal Highway Administration, Washington, D.C., October 2, 1989.

L.A. Staron, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter SS-13, Federal Highway Administration, Washington, D.C., July 13, 1996.

S.I. Sillan, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter SS-13, Federal Highway Administration, Washington, D.C., March 14, 1996.

### CONTACT INFORMATION

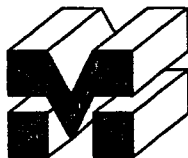
The Marion Steel Company  
912 Cheney Avenue  
Marion, Ohio 43301-1801  
(800) 333-4011  
Fax (614) 383-6429

*\* All Marion Steel posts are produced from 100% recycled steel.*



## MARION LAP SPLICE ® BREAKAWAY SYSTEM

### SSP14a-c



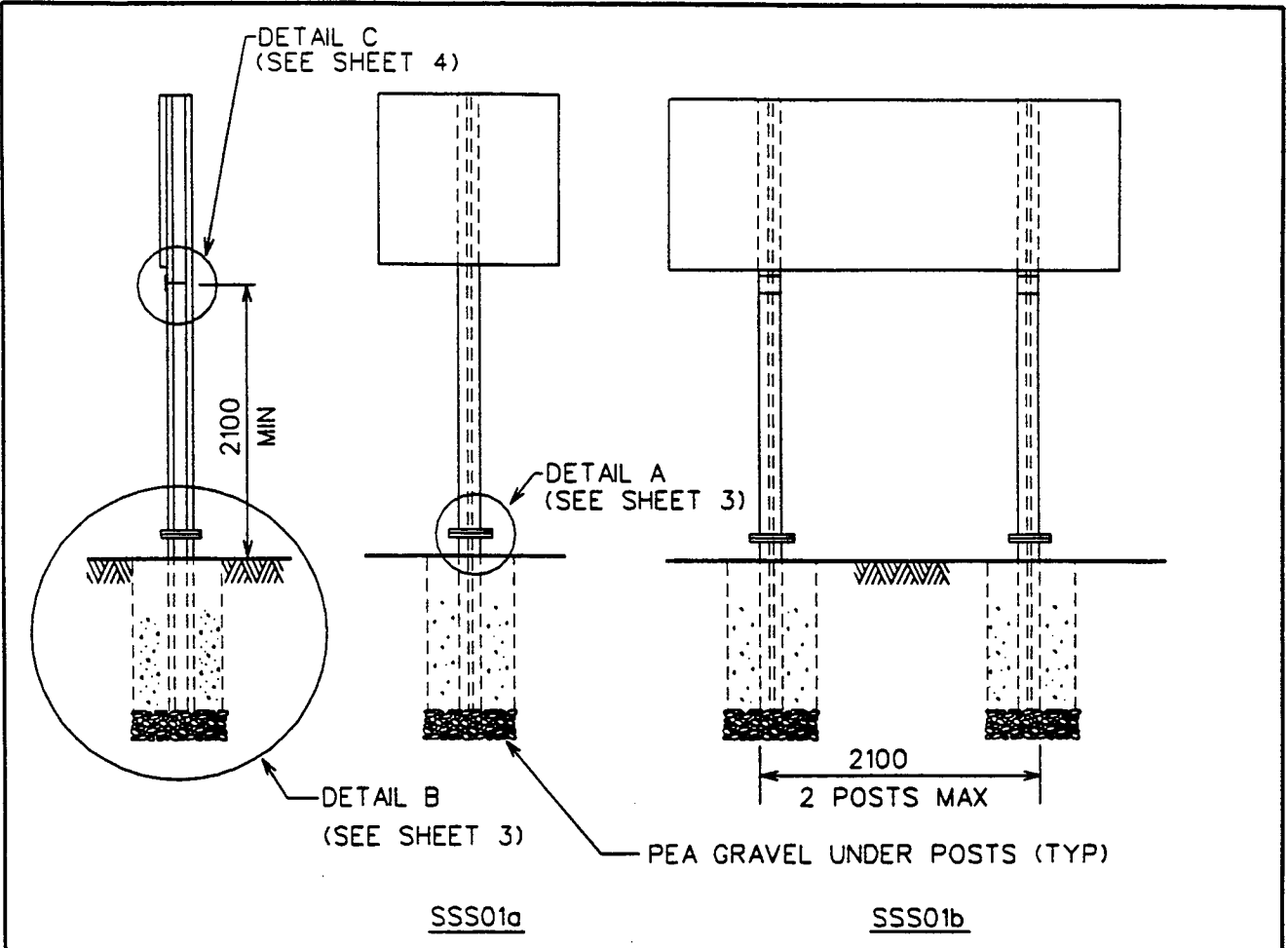
**MARION STEEL COMPANY**  
912 CHENEY AVENUE  
MARION, OH 43301-1801

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DATE

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1/28/97



| SIGN POST | BASE POST | KEEPER PLT | SLIPBASE BOLTS & NUTS | SLIPBASE WASHER | SLIPBASE SHIMS | SLIPBASE TORQUE | SYSTEM          |
|-----------|-----------|------------|-----------------------|-----------------|----------------|-----------------|-----------------|
| PWF11a    | PWF11b    | FPS01      | FBX12b                | FWC12b          | FPP11a-b       | 10 +/- 2        | SSS01a & SSS01b |
| PWF12a    | PWF12b    | FPS02      | FBX16b                | FWC16b          | FPP12a-b       | 30 +/- 5        | SSS01a & SSS01b |
| PWF13a    | PWF13b    | FPS03      | FBX20b                | FWC20b          | FPP13a-b       | 50 +/- 8        | SSS01a ONLY     |
| PWF14a    | PWF14b    | FPS04      | FBX24b                | FWC24b          | FPP14a-b       | 65 +/- 10       | SSS01a ONLY     |
| PWF15a    | PWF15b    | FPS05      | FBX24b                | FWC24b          | FPP15a-b       | 65 +/- 10       | SSS01a ONLY     |

RECTANGULAR UNI-DIRECTIONAL SLIPBASE



SSS01a-b

|            |      |
|------------|------|
| SHEET NO.: | DATE |
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### INTENDED USE

The rectangular unidirectional slipbase sign support system can be used as a single-post (SSS01a) or double-post (SSS01b) sign support system where both posts are within a 2100-mm span. Single post installations (SSS01a) may use any post up to a mass of 67 kg/m (PWF15a or smaller). Two-post systems with both posts within a 2100-mm span must use posts with a mass of 27 kg/m or less (PWF12a or smaller). Larger posts with masses up to 67 kg/m (PWF15a or smaller) may also be used as dual post systems but the posts must be more than 2100 mm apart. In no case, however, should the total mass of all the sign posts above the slip-plane and below the hinge be greater than 270 kg. Several versions of this system have been successfully crash tested with the base post embedded in concrete. The system is considered to meet the requirements of the 1985 AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*.

### COMPONENTS

The rectangular unidirectional slipbase sign support system consists of a base and sign post (PWF11a-15a), four bolts and nuts each with three washers, and a keeper plate. The sign post and base post are connected using four bolts and nuts with two washers under each head and one washer under each nut. The bolts pass through the keeper plate (FPS01-05) fitted between the two slipbase plates. The keeper plate keeps the bolts from sliding out of the assembly in windy conditions. The bolts tear through the keeper plate during a collision allowing the sign post and base post to separate. The post may be leveled by inserting shims (FPP11a-15b) between the keeper plate and upper slipbase as required. The slipbase nuts, coated with a dry lubricant, must be tightened to the torque shown on the drawings to achieve proper performance.

The base-post assembly (PWF11b-15b) shall be embedded in a 20 MPa concrete with cement conforming to AASHTO M85 (ASTM C150) Type II. The concrete foundation shall be reinforced with 8 vertical bars of Grade 400 MPa bars conforming to either AASHTO M284M (ASTM D3936D) or AASHTO M31M (ASTM A615M). The spiral reinforcing shall conform to either ASTM A306 or AASHTO M32 (ASTM A82) and shall have 2 flat turns at the top and bottom and a 150-mm pitch.

The fuse plate (either FPP21-25 or FPP31-35) shall be attached to the expected impact side of the sign post (PWF11a-15a). When the slipping fuse plate is used (FPP21-25) the four bolts and nuts shall be tightened one third turn past snug using the turn-of-the-nut method. When the perforated fuse plate is used (FPP31-35) the bolts must be at least snug. There should be a washer under both the head and nut. The fuse plate is designed to either slip (FPP21-25) or fracture (FPP31-35) allowing the compression flange of the sign post (PWF11a-15a) to act as a hinge. The hinge mechanism allows the post to rotate upward away from the impacting vehicle. The fuse plate assembly is only required for the two-post system (SSS01b).

## RECTANGULAR UNI-DIRECTIONAL SLIPBASE

SSS01a-b

SHEET NO.

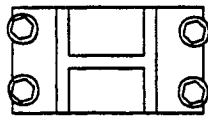
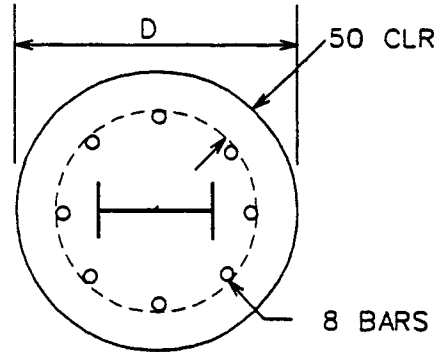
DATE

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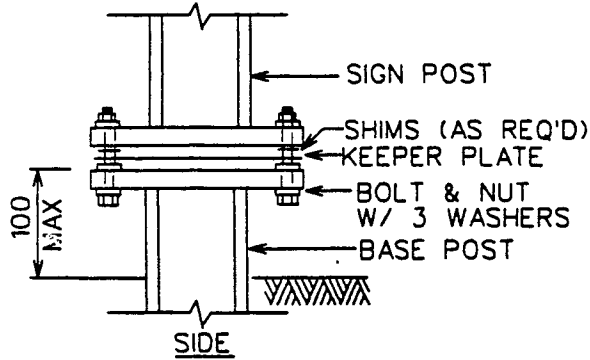
12-29-96



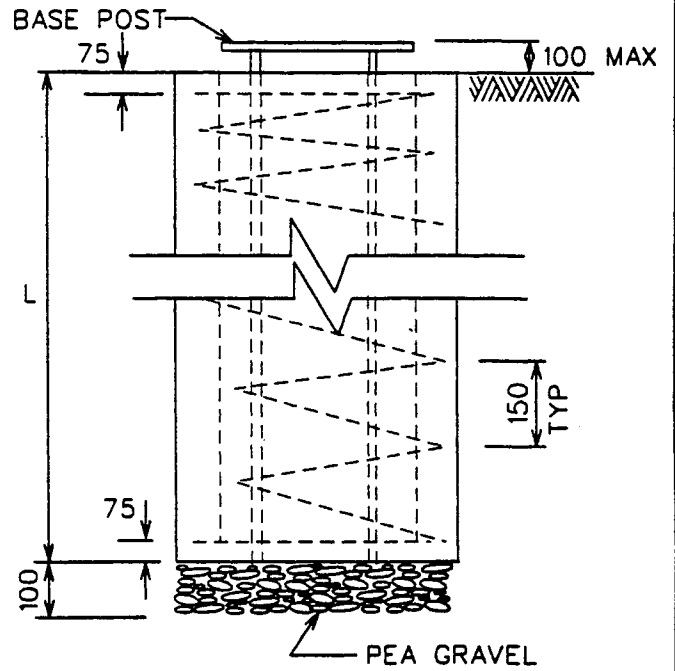
| SIGN POST | D   | L    | BAR SIZE |
|-----------|-----|------|----------|
| PWF11a    | 460 | 920  | NONE     |
| PWF12a    | 610 | 1220 | 15       |
| PWF13a    | 610 | 1830 | 20       |
| PWF14a    | 610 | 2440 | 30       |
| PWF15a    | 920 | 2440 | 30       |



TOP



DETAIL A: SLIPBASE ASSEMBLY



DETAIL B: FOUNDATION

## RECTANGULAR UNI-DIRECTIONAL SLIPBASE



SSS01a-b

|            |      |
|------------|------|
| SHEET NO.: | DATE |
| 3 OF 6     | 1996 |

**REFERENCES**

L. A. Staron, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter SS-5, Federal Highway Administration, January 29, 1987.

L. A. Staron, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter SS-25, Federal Highway Administration, June 4, 1991.

**RECTANGULAR UNI-DIRECTIONAL SLIPBASE**

**SSS01a-b**

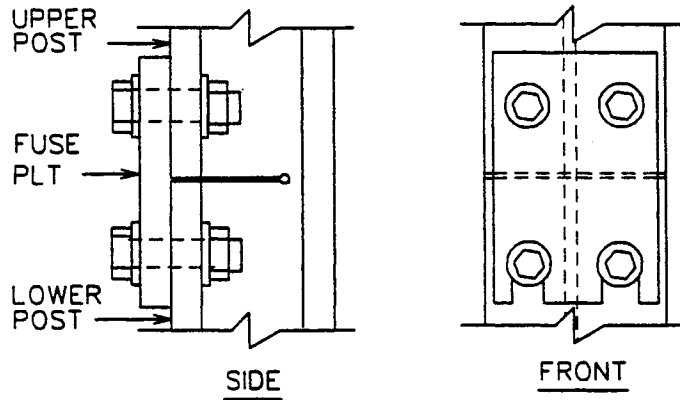


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DETAIL C: FUSE PLATE ASSEMBLY

| SIGN POST | FUSE PLATE     | FUSE PLT BOLT & NUT | FUSE PLT WASHERS |
|-----------|----------------|---------------------|------------------|
| PWF11a    | FPP21 or FPP31 | FBX12b              | FWC12b           |
| PWF12a    | FPP22 or FPP32 | FBX12b              | FWC12b           |
| PWF13a    | FPP23 or FPP33 | FBX16b              | FWC16b           |
| PWF14a    | FPP24 or FPP34 | FBX20b              | FWC20b           |
| PWF15a    | FPP25 or FPP35 | FBX22b              | FWC22b           |

RECTANGULAR UNI-DIRECTIONAL SLIPBASE



SSS01a-b

|            |      |
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## RECTANGULAR UNI-DIRECTIONAL SLIPBASE

SSS01a-b

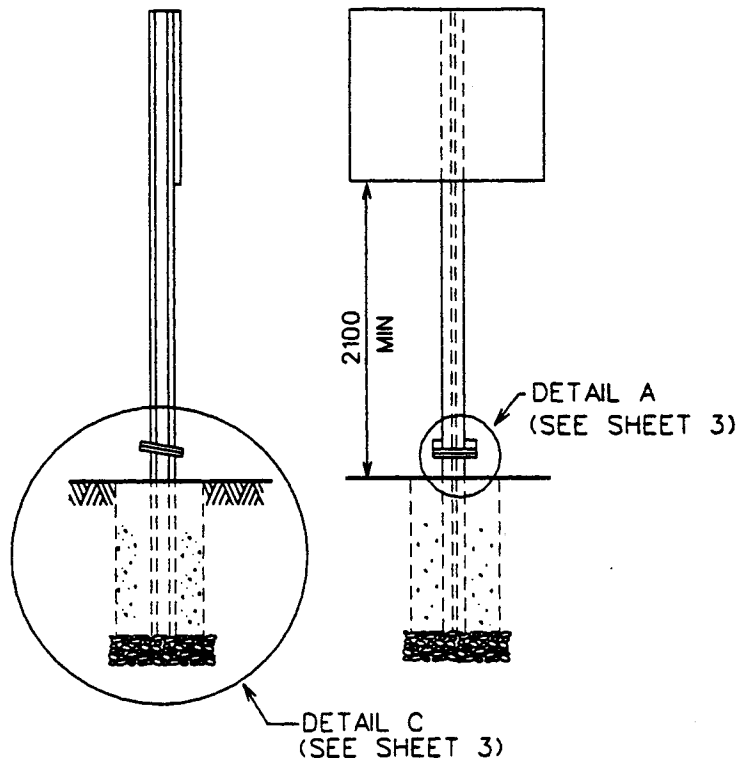
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| SIGN POST | BASE POST | KEEPER PLT | SLIPBASE BOLTS & NUTS | SLIPBASE WASHER | TORQUE    |
|-----------|-----------|------------|-----------------------|-----------------|-----------|
| PWF21a    | PWF21b    | FPS01      | FBX12b                | FWC12b          | 10 +/- 2  |
| PWF22a    | PWF22b    | FPS02      | FBX16b                | FWC16b          | 30 +/- 7  |
| PWF23a    | PWF23b    | FPS03      | FBX20b                | FWC20b          | 50 +/- 10 |
| PWF24a    | PWF24b    | FPS04      | FBX24b                | FWC24b          | 65 +/- 16 |
| PWF25a    | PWF25b    | FPS05      | FBX24b                | FWC24b          | 65 +/- 16 |

## INCLINED RECTANGULAR UNI-DIRECTIONAL SLIPBASE



SSS02a

SHEET NO.:

DATE

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1996

### INTENDED USE

The inclined rectangular slipbase sign support system is a single-post (SSS02a) sign support system where wide-flange posts 67 kg/m or lighter (PWF25 and smaller) are acceptable. The inclined base plate is intended to propel the single sign post upward and over the vehicle in an impact. Although the system has been successfully tested with two posts, the inclined slipbase is generally used as a single post system. In a dual-post system the hinge plate system would serve the function of rotating the sign post up and away from the vehicle. In no case, however, should the total mass of all the sign post above the slip-plane be greater than 270 kg. The system has been successfully crash tested with the base embedded in concrete. The system is considered to meet the requirements of the 1985 AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*. Careful attention should be given to tightening the slipbase bolts to the appropriate torques shown in the drawing.

### COMPONENTS

The inclined rectangular uni-directional slipbase sign support system consists of a base and a sign post (PWF21a-25b), four bolts and nuts each with three washers and a keeper plate. The sign post and base post are connected using four bolts and nuts with two washers under each head and one washer under each nut. The bolts pass through the keeper plate (FPS01-05) fitted between the two slipbase plates. The keeper plate keeps the bolts from sliding out of the assembly in windy conditions. The bolts tear through the keeper plate during a collision allowing the sign post and base post to separate. The post may be leveled by inserting shims (FPP11a-15b) between the keeper plate and upper slipbase as required. The slipbase bolts, coated with a dry lubricant, must be tightened to the torque shown on the drawings to achieve proper performance.

The base-post assembly (PWF21a-25b) shall be embedded in a 20 Mpa concrete with a cement conforming to AASHTO M85 (ASTM C150) Type II. The concrete foundation shall be reinforced with 8 vertical bars of Grade 400 MPa bars conforming to either AASHTO M284M (ASTM D3936D) or AASHTO M31M (ASTM A615M). The spiral reinforcing shall conform to either ASTM A306 or AASHTO M32 (ASTM A82) and shall have 2 flat turns at the top and bottom and a 150-mm pitch.

### REFERENCES

H. E. Ross, Jr., D. L. Sicking, W. L. Campise, and R. A. Zimmer, "Small Sign Support Analysis," Texas Transportation Institute, Report No. 7024-1, College Station, TX, January 1986.

L. A. Staron, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter SS-36, Federal Highway Administration, September 3, 1993.

## INCLINED RECTANGULAR UNI-DIRECTIONAL SLIPBASE

SSS02a

SHEET NO.

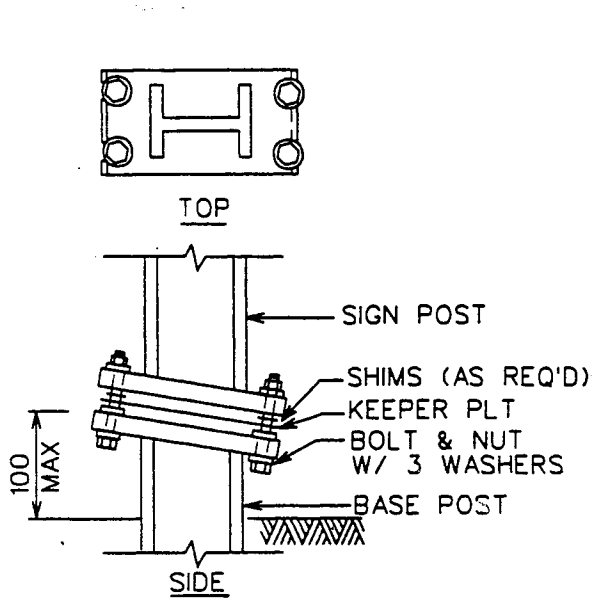
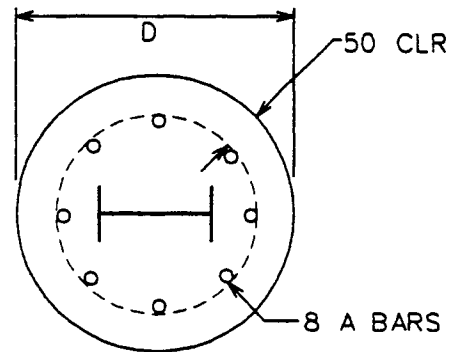
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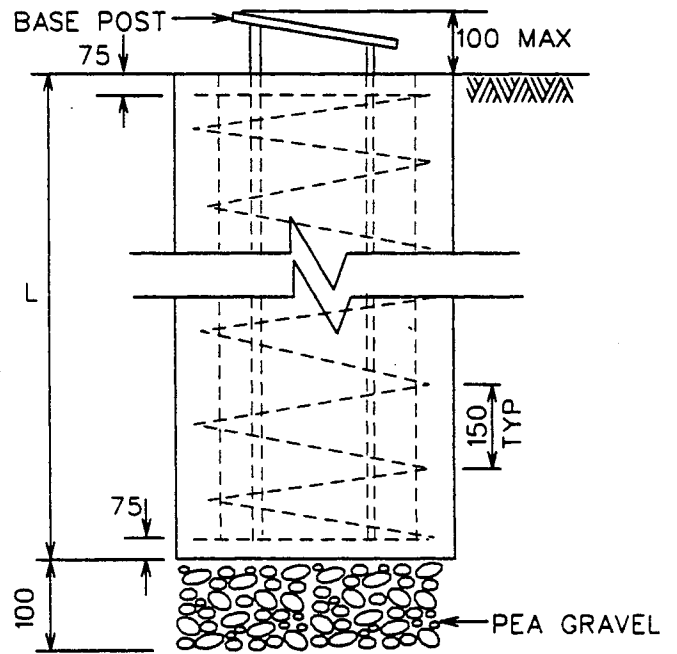
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| SIGN POST | BASE POST | D   | L    | SHIMS    | BAR SIZE A |
|-----------|-----------|-----|------|----------|------------|
| PWF21a    | PWF21b    | 460 | 920  | FPP11a-b | NONE       |
| PWF22b    | PWF22b    | 610 | 1220 | FPP12a-b | 15         |
| PWF23b    | PWF23b    | 610 | 1830 | FPP13a-b | 20         |
| PWF24b    | PWF24b    | 610 | 2440 | FPP14a-b | 30         |
| PWF25b    | PWF25b    | 920 | 2440 | FPP15a-b | 30         |



DETAIL B: SLIPBASE ASSEMBLY



DETAIL C: FOUNDATION

INCLINED RECTANGULAR UNI-DIRECTIONAL SLIPBASE



SSS02a

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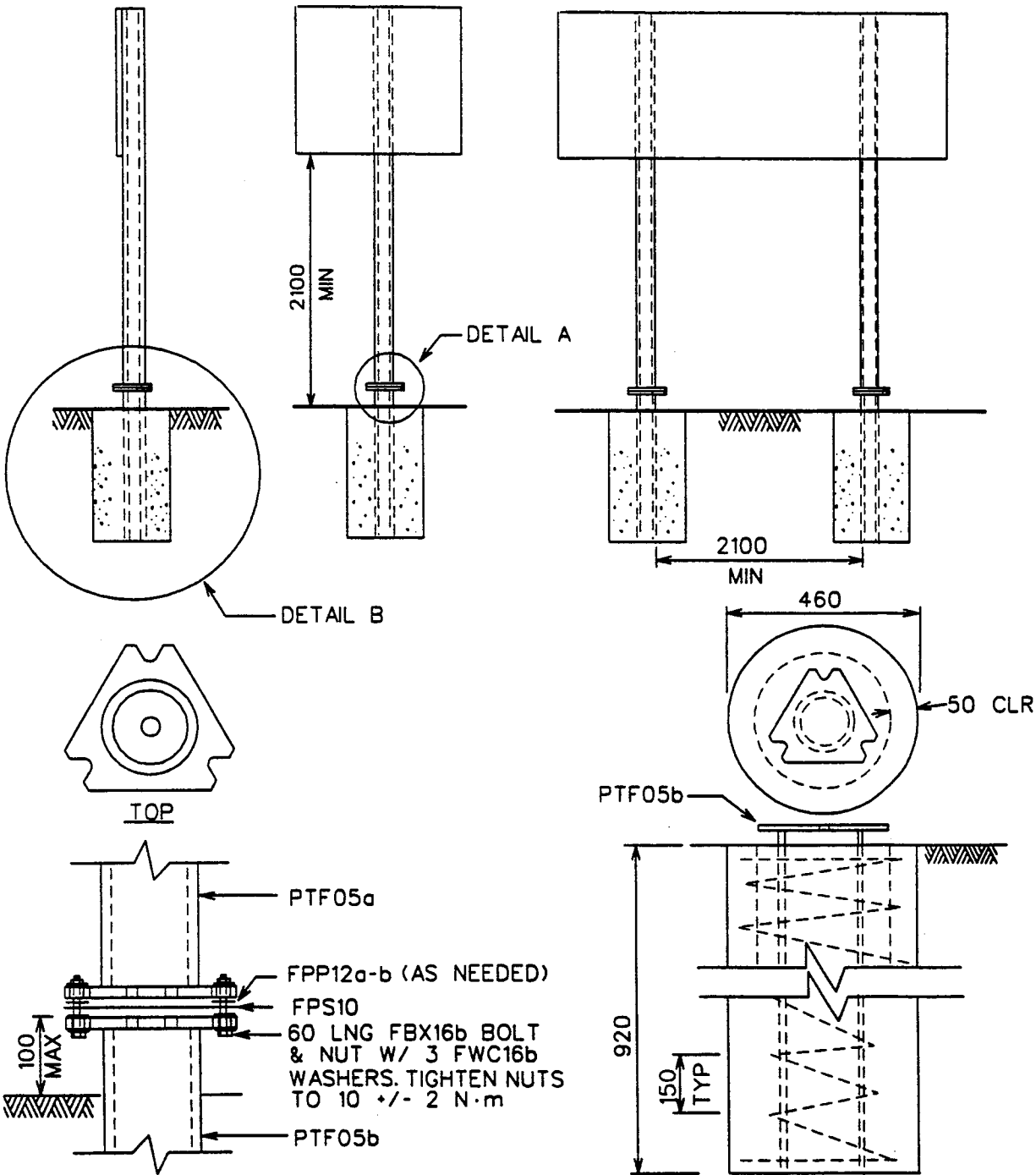
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**INCLINED RECTANGULAR UNI-DIRECTIONAL SLIPBASE**

**SSS02a**

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DETAIL A: SLIPBASE ASSEMBLY

DETAIL B: FOUNDATION

OMNI-DIRECTIONAL SLIPBASE WITH TUBE POST



SSS03a

|            |      |
|------------|------|
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### INTENDED USE

The omni-directional slipbase tube postsign support system is a single-post (SSS03a) sign support system. The system may also be used as a two-post system as long as the posts are at least 2100 mm apart. The total mass of all the sign posts above the slip-plane must be less than 270 kg. The system has been successfully crash tested with the base embedded in concrete. The system is considered to meet the requirements of the 1985 AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*.

### COMPONENTS

The omni-directional slipbase sign support system consists of a sign post (PTF05a), a base post (PTF05b), three FBX16b bolts and nuts, three FWC16b hardened steel washers for each bolt and a FPS30 keeper plate. Slipbase shims (FPP12a-b) may be added between the keeper plate and upper slipbase as needed to level the sign post. The three FBX16b bolts pass through the keeper plate fitted between the two slipbase plates, one on each end of the sign and base posts. The keeper plate (FPS10) keeps the bolts from sliding out of the assembly in windy conditions. The bolts tear through the keeper plate during a collision allowing the sign post and base post to separate. The three slipbase nuts, coated with a dry lubricant, shall be tightened to a torque of 10 N-m +/- 2 N-m.

The base-post assembly (PTF05b) shall be embedded in 20 MPa concrete with cement conforming to AASHTO M85 (ASTM C150) Type II. The concrete foundation shall be reinforced with 8 vertical bars of Grade 400 MPa bars conforming to either AASHTO M284M (ASTM D3936D) or AASHTO M31M (ASTM A615M). The spiral reinforcing shall conform to either ASTM A306 or AASHTO M32 (ASTM A82) and shall have 2 flat turns at the top and bottom and a 150-mm pitch.

### REFERENCES

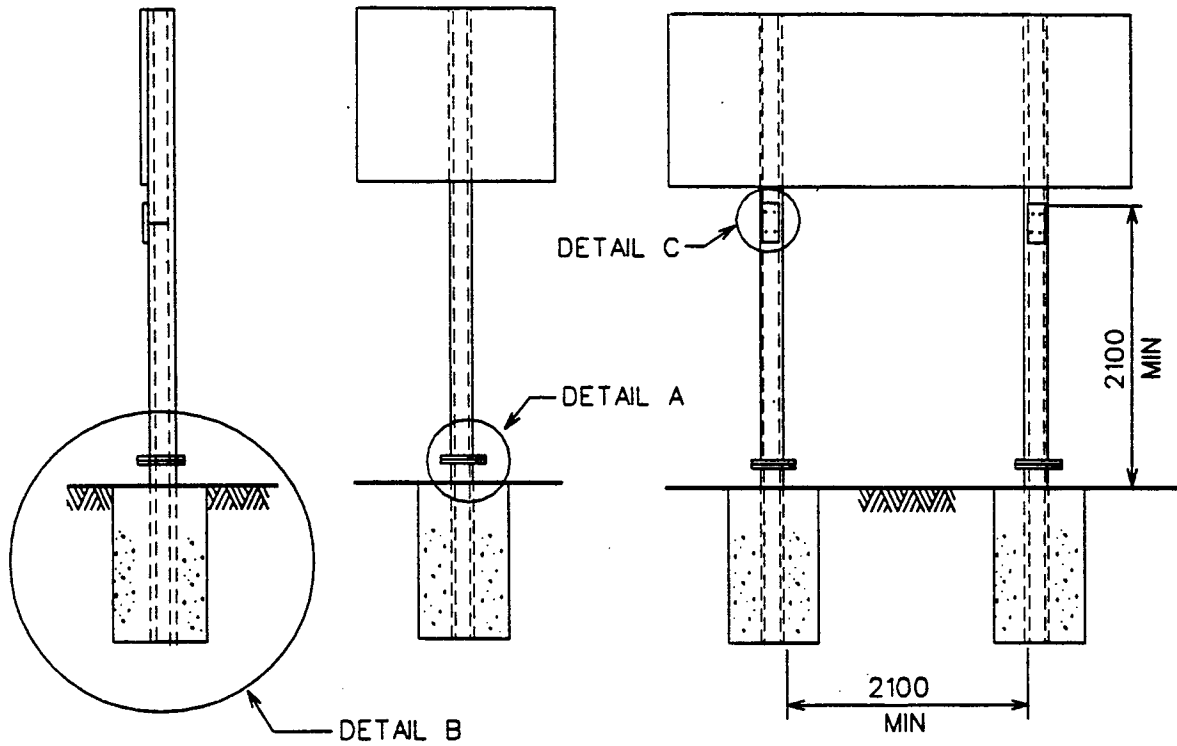
- T. J. Hirsch, "Crash Test and Evaluation of Single Post Highway Signs," Texas Transportation Institute, Research Report No. 146-11, College Station, TX, August 1973.
- J. R. Morgan and L. D. Breaux, "Generic Small Sign Support System and Validation of Acceptable Support Performance," Texas Transportation Institute, Research Report No. FHWA-TX-90-1122-1F, College Station, TX, April 1990.
- L. A. Staron, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter SS-34, Federal Highway Administration, April 20, 1993.
- D. L. Bullard, "Crash Testing of Louisiana's Multi-directional, single post, small sign support," Texas Transportation Institute, College Station, March 1993.

## OMNI-DIRECTIONAL SLIPBASE WITH TUBE POST

SSS03a

|           |          |
|-----------|----------|
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OMNI-DIRECTIONAL SLIPBASE WITH W-POST



SSS04a

|            |      |
|------------|------|
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### INTENDED USE

The omni-directional slipbase with W-section post sign support system is a single-post (SSS04a) sign support system although two posts may be used as long as the post are at least 2100-mm apart. In no case, however, should the total mass of all the sign posts above the slip-plane and below the hinge be greater than 270 kg. The system has been successfully crash tested with the base embedded in concrete. The system is considered to meet the requirements of the 1985 AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*.

### COMPONENTS

The omni-directional slipbase with W-section post sign support system consists of a sign post (PWF07a), a base post (PTF07b), three FBX28b bolts and nuts, three FWC28b hardened steel washers for each bolt and a FPS11 keeper plate. The three FBX28b bolts pass through the FPS11 keeper plate fitted between the two slipbase plates, one on each end of the sign and base posts. The keeper plate keeps the bolts from sliding out of the assembly in windy conditions. The bolts tear through the keeper plate during a collision allowing the sign post and base post to separate. The post may be leveled by inserting shims (FPP15a-b) between the keeper plate and upper slipbase as required. The three slipbase nuts, coated with a dry lubricant, shall be tightened to a torque of 30 N-m +/- 5 N-m.

The base-post assembly (PWF07b) shall be embedded in a 20 MPa concrete with cement conforming to AASHTO M85 (ASTM C150) Type II. The concrete foundation shall be reinforced with 8 vertical bars of Grade 400 MPa bars conforming to either AASHTO M284M (ASTM D3936D) or AASHTO M31M (ASTM A615M). The spiral reinforcing shall conform to either ASTM A306 or AASHTO M32 (ASTM A82) and shall have 2 flat turns at the top and bottom and a 150-mm pitch.

The fuse plate (either FPP22 or FPP32) shall be attached to the expected impact side of the sign post (PWF12a). When the slipping fuse plate (FPP21-25) is used, the four FBX12b bolts and nuts shall be tightened one third turn past snug using the turn-of-the-nut method. When the perforated fuse plate (FPP31-35) is used the bolts must be at least snug. There should be a FWC12b washer under both the head and nut. The fuse plate is designed to either slip (FPP22) or fracture (FPP32) allowing the compression flange of the sign post (PWF12a) to act as a hinge. The hinge mechanism allows the post to rotate upward away from the impacting vehicle. The fuse plate assembly is only required for the two-post system (SSS04b).

## OMNI-DIRECTIONAL SLIP-BASE WITH W-POST

**SSS04a**

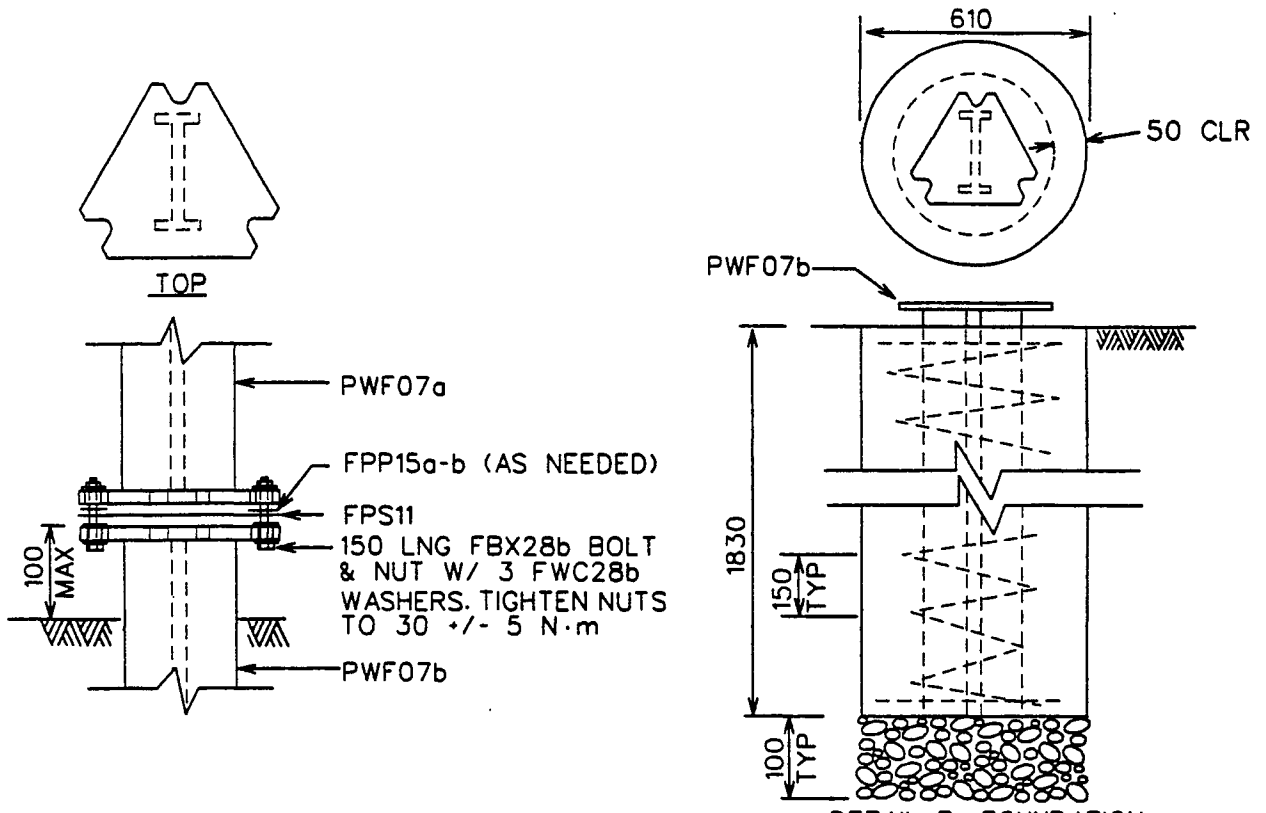
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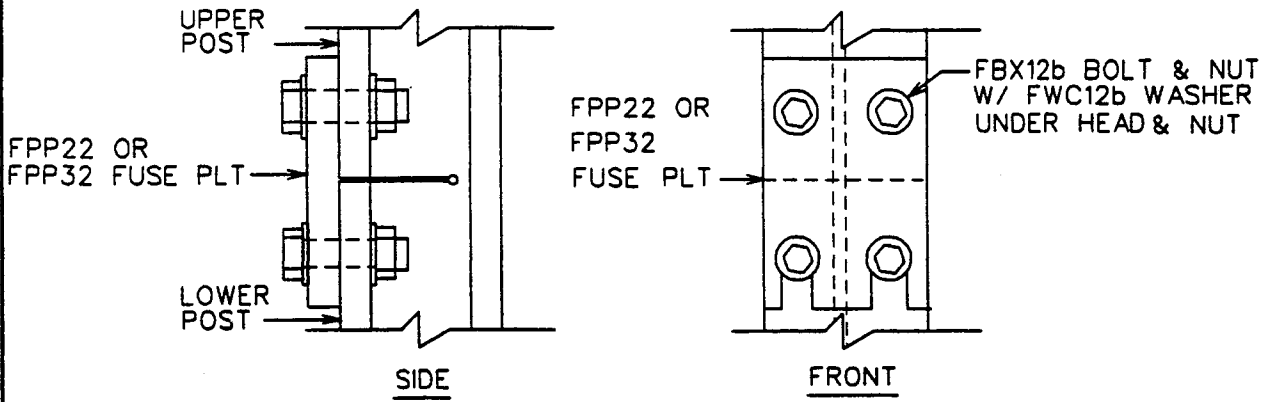
12-29-96





**DETAIL A: SLIPBASE ASSEMBLY**

**DETAIL B: FOUNDATION**



**DETAIL C: FUSE PLATE ASSEMBLY**

**OMNI-DIRECTIONAL SLIPBASE WITH W-POST**



**SSS04a**

|            |      |
|------------|------|
| SHEET NO.: | DATE |
| 3 OF 4     | 1996 |

**REFERENCES**

T. J. Hirsch, "Crash Test and Evaluation of Single Post Highway Signs," Texas Transportation Institute, Research Report No. 146-11, College Station, TX, August 1973.

K. C. Hahn and J. E. Bryden, "Crash Tests of Omnidirectional Slipbase Sign Supports," Transportation Research Record 868, Transportation Research Board, Washington, D.C., 1983.

J. R. Morgan and L. D. Breaux, "Generic Small Sign Support System and Validation of Acceptable Support Performance," Texas Transportation Institute, Research Report No. FHWA-TX-90-1122-1F, College Station, TX, April 1990.

L. A. Staron, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter SS-34, Federal Highway Administration, April 20, 1993.

D. L. Bullard, "Crash Testing of Louisiana's Multi-directional, single post, small sign support," Texas Transportation Institute, College Station, March 1993.

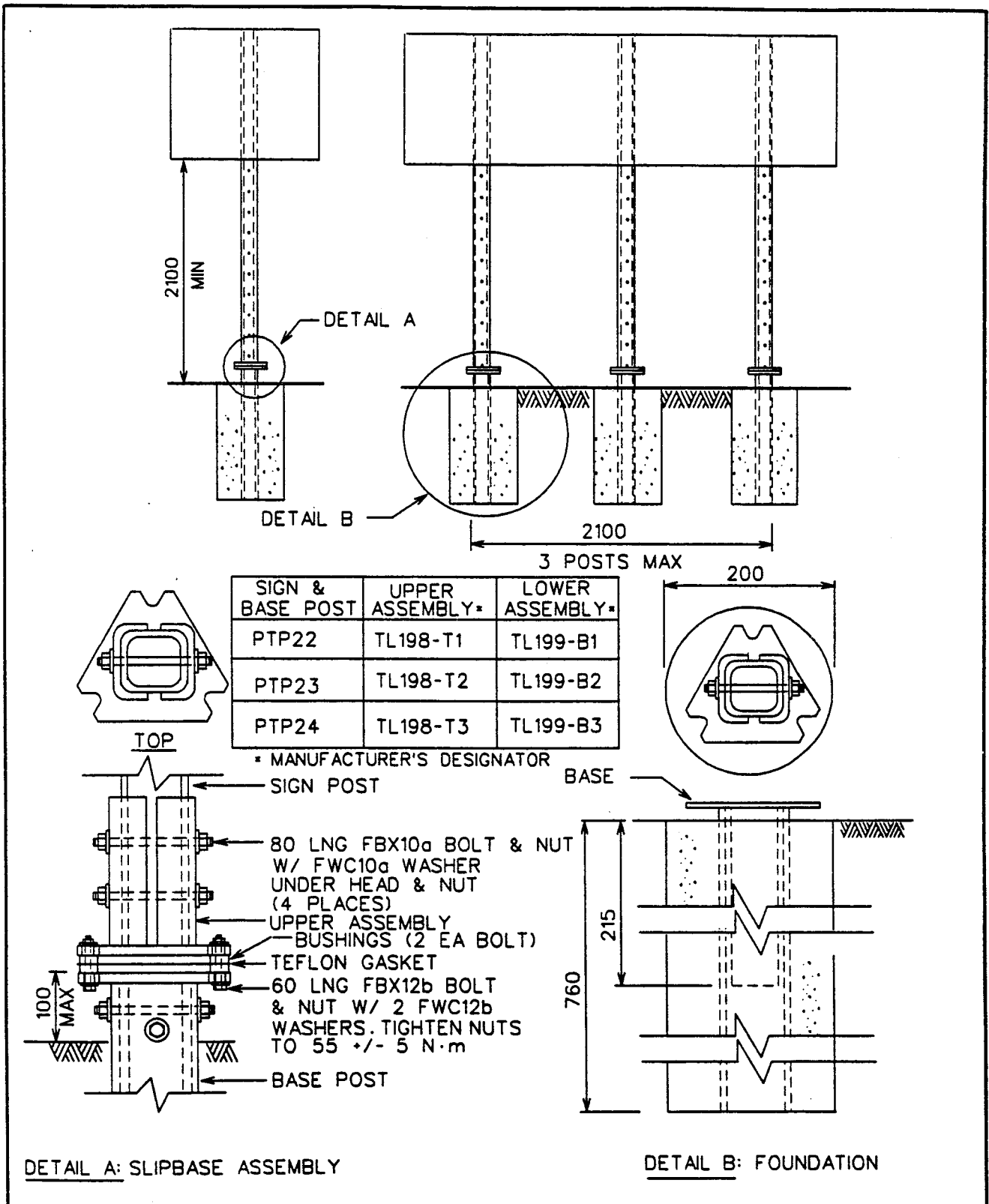
L. A. Staron, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter SS-36, Federal Highway Administration, September 3, 1993.

**OMNI-DIRECTIONAL SLIP-BASE WITH W-POST**

**SSS04a**

|                  |             |
|------------------|-------------|
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## UNISTRUT SQUARE TUBE SLIPBASE



UNISTRUT  
 16100 South Lathrop Avenue  
 Harvey IL 60426  
 800-882-5543  
 798-339-2399 (Fax)

SSS05a-c

|            |      |
|------------|------|
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### INTENDED USE

The Unistrut triangular slipbase sign support system can be used as a single-post (SSS05a), double-post (SSS05b) or triple-post (SSS05c) sign support system where all the posts are within a 2100-mm span. The system has been successfully crash tested with the base embedded in a 200-mm diameter 760-mm deep concrete foundation in strong soil. The system is considered to meet the requirements of the 1985 AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*.

### COMPONENTS

The Unistrut triangular slipbase sign support system consists of a lower slipbase assembly which telescopes into a base embedded in concrete, an upper slipbase assembly, a sign post, and slipbase fasteners. PTP22b, PTP23b or PTP24b sign posts may be used with corresponding upper slipbase assemblies. The sign post is fastened to the upper slipbase assembly using two 80-mm long FBX10a bolts and nuts with an FWC10a washer under both the head and nut. PTP22b, PTP23b or PTP24b base posts are embedded in a concrete foundation and the lower slipbase assembly telescopes into the base post. The base post is fastened to the lower slipbase assembly using two 80-mm long FBX10a bolts and nuts with an FWC10a washer under both the head and nut. The upper and lower slipbase assemblies are connected using three 60-mm long FBX12b bolts and nuts with a FWC12b washers under each head and nut. The bolts pass through two stainless steel release bushings, one over and the other under the teflon retainer gasket fitted between the two slipbase plates. The retainer gasket keeps the bolts from sliding out of the assembly in windy conditions and the release bushings help to promote tearing of the retainer gasket in an impact.

### REFERENCES

L. A. Staron, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter SS-24, Federal Highway Administration, May 1, 1991.

L. A. Staron, Breakaway Sign Supports, Geometrics and Roadside Design Acceptance Letter Number SS-38, Federal Highway Administration, October 27, 1993.

### CONTACT INFORMATION

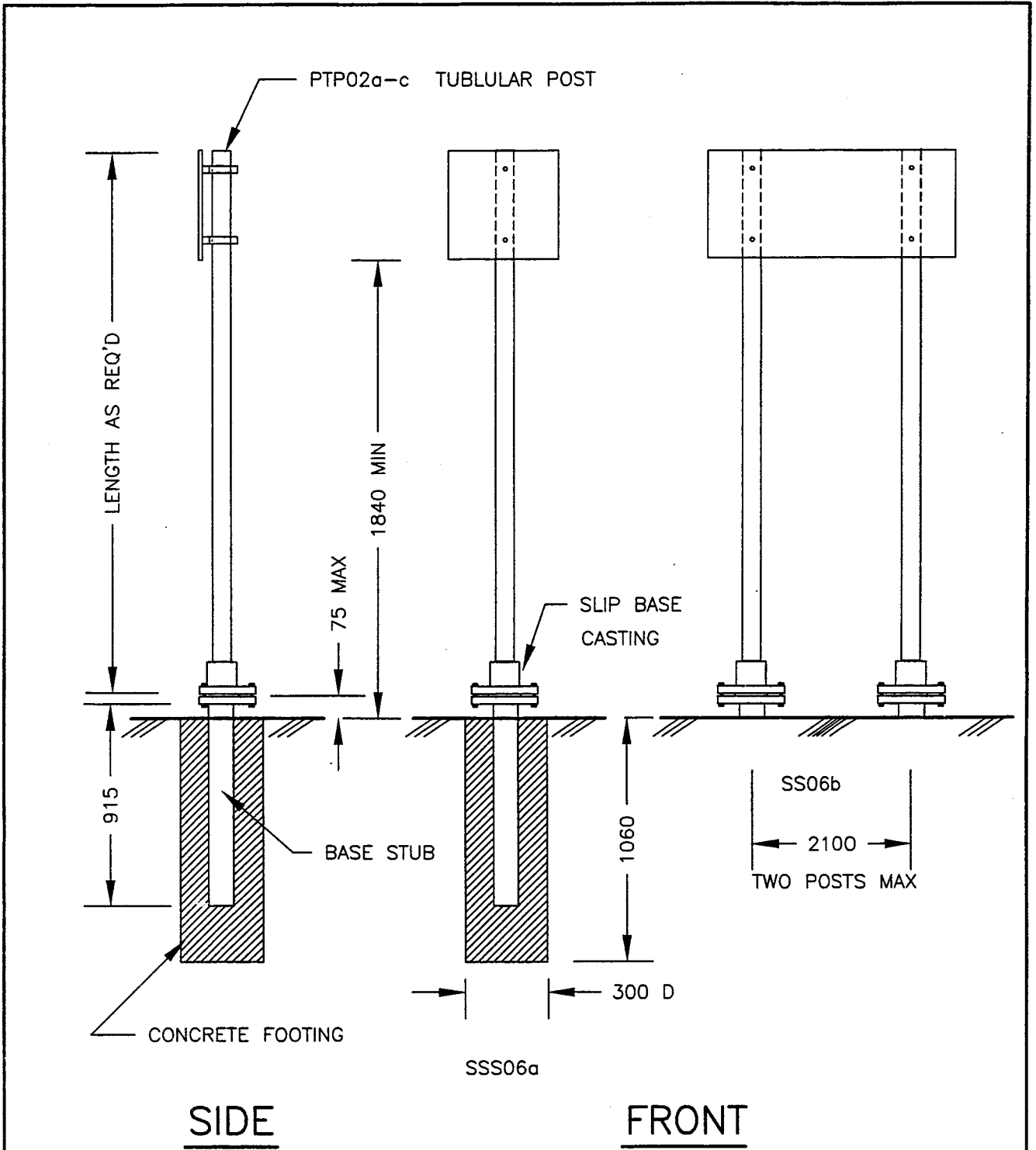
Unistrut  
16100 South Lathrop Avenue  
Harvey, IL 60426  
800-882-5543  
708-339-2399 (fax)

## UNISTRUT SQUARE TUBE SLIPBASE

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| SHEET NO. | DATE     |
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UNISTRUT  
16100 South Lathrop Avenue  
Harvey IL 60426  
800-882-5543  
798-339-2399 (Fax)



ROUND POST TRIANGULAR SLIPBASE SYSTEM

SOUTHWESTERN PIPE, INC.  
Houston, TX

SSS06a-b

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### INTENDED USE

The POZ-LOC triangular slipbase sign support system is normally a single-post sign support system. Two posts, however, may be used as long as the posts are more than 2100-mm apart. These systems are designed to be embedded in concrete footings and have been tested to satisfy the requirements of 1985 AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*.

### COMPONENTS

The components include the tubular post, base stub, slipbase casting, split shaft collar, bolt retainer plate and nuts, bolts, and washers. Except for the slipbase casting which acts as the post retainer, the system is similar to the generic, fabricated triangular slipbase. The advantage of this system is that no weld fabrication is required and the post is easily replaced after a crash. The slipbase bolts and nuts shall be tightened to a torque of 55 N-m. Lubrication of the slipbase nuts is not required when the bolts are being tightened.

The triangular slipbase ground stub is made using ASTM A53 Grade B pipe and ASTM A36 or A570 steel plate. The assembly is galvanized after fabrication according to ASTM A123 (AASHTO M111).

The bolt retainer plate is used to align the bolts and keep them in place under service loads. The retainer strap is stamped from 0.31-mm thick ASTM A653 steel sheet.

The slipbase casting is made using ASTM A536 Grade 64-45-12 ductile iron and hot-dip galvanized according to ASTM A153 (AASHTO M232).

### REFERENCES

S. I. Sillan, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter SS-65, Federal Highway Administration, September 1996.

### CONTACT INFORMATION

Southwestern Pipe, Inc.  
PO Box 2002, Houston, TX 77252  
(713) 863-4300  
(713) 863-4313 (Fax)

## ROUND POST TRIANGULAR SLIPBASE SYSTEM

# SSS06a-b

**SOUTHWESTERN PIPE, INC.**  
PO Box 2002, Houston, TX 77252

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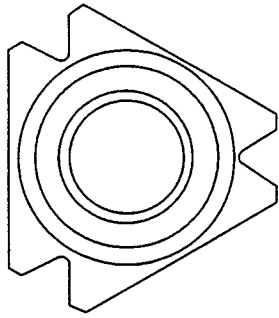
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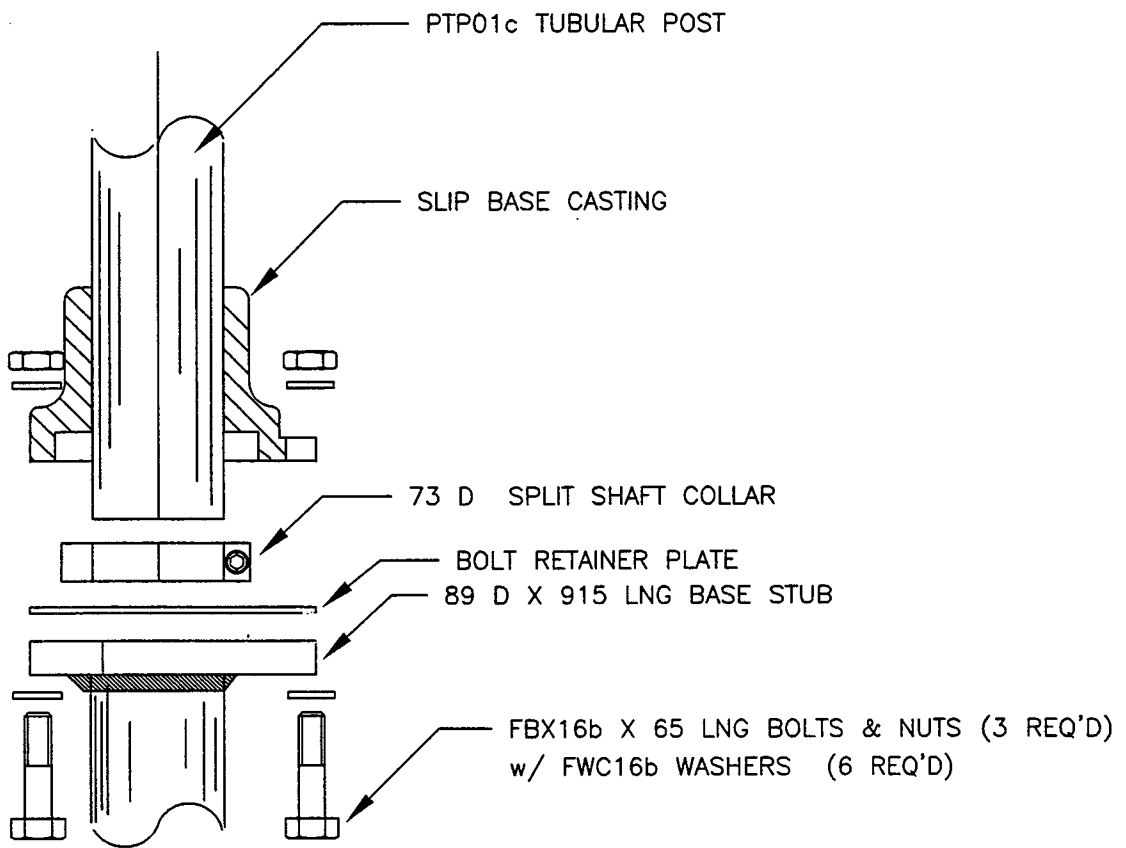
1-20-97

(713) 863-4300

(713) 863-4313 (Fax)



TOP



SIDE

ROUND POST TRIANGULAR SLIPBASE ASSEMBLY

SOUTHWESTERN PIPE, INC.  
Houston, TX

SSS06a-b

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**ROUND POST TRIANGULAR SLIPBASE SYSTEM**

**SSS06a**

**SOUTHWESTERN PIPE, INC.**  
PO Box 2002, Houston, TX 77252

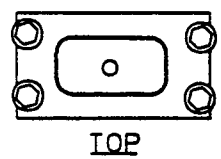
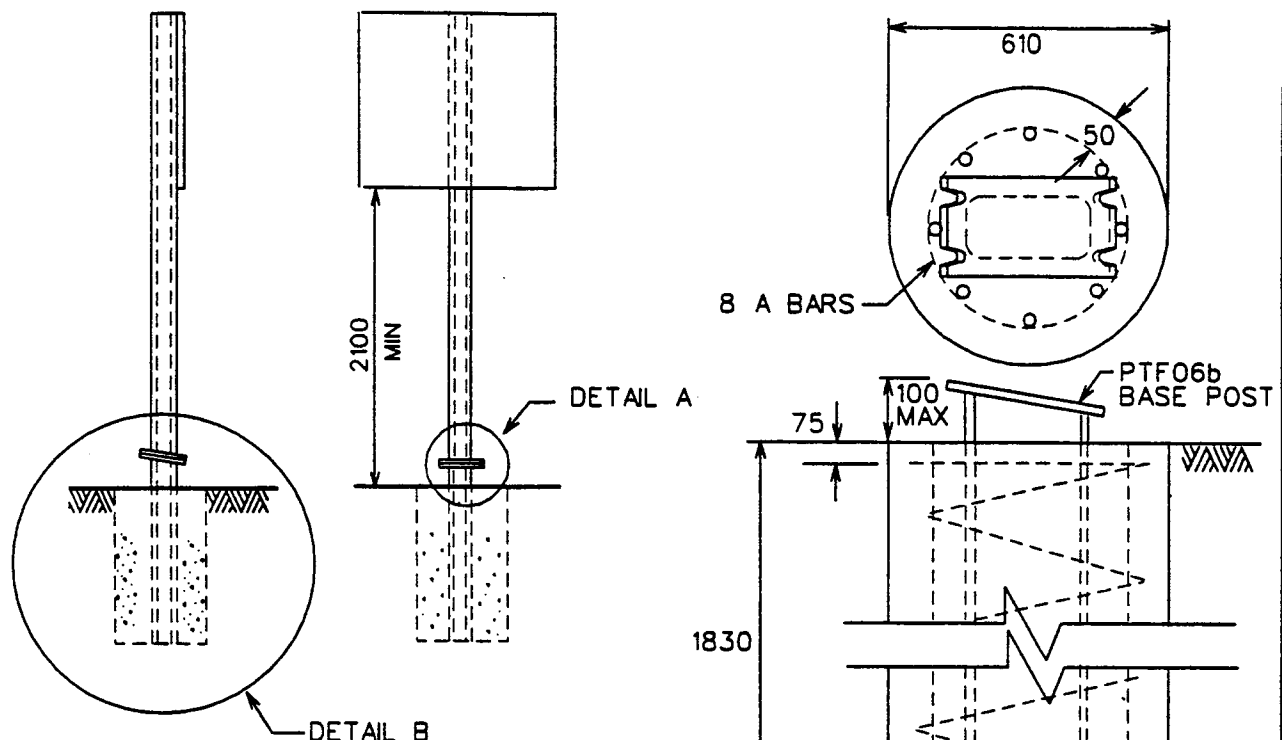
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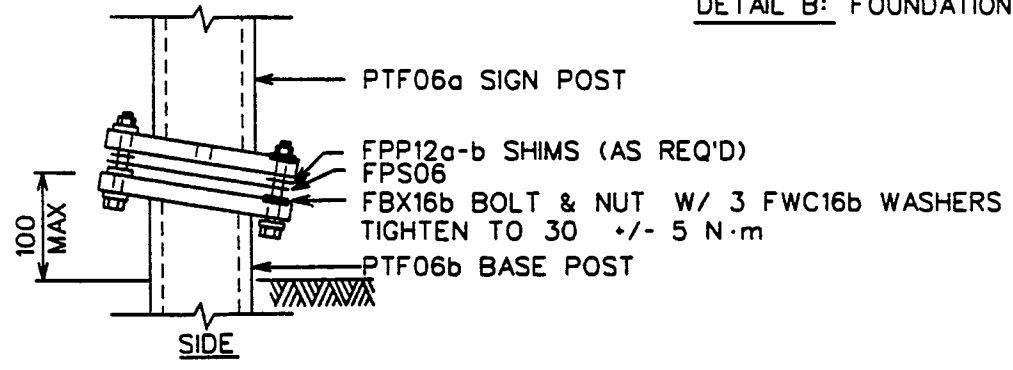
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(713) 863-4300  
(713) 863-4313 (Fax)



DETAIL B: FOUNDATION



DETAIL A: SLIPBASE ASSEMBLY

INCLINED RECTANGULAR SLIPBASE W/ TUBULAR POST



SSS07a

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### INTENDED USE

The inclined rectangular slipbase with rectangular tube sign support system is a single-post (SSS07a) sign support system. Only the PTF06a-b rectangular tube should be used because smaller tubes may bend before the slipbase activates and larger tubes may be too massive. In no case, however, should the total mass of all the sign posts above the slip-plane and below the hinge be greater than 270 kg. The system has been successfully crash tested with the base embedded in concrete. The system is considered to meet the requirements of the 1985 AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*.

### COMPONENTS

The inclined rectangular slipbase with rectangular steel tube sign support system consists of a steel tube sign post (PTF06a), a steel tube base post (PTF06b), a keeper plate (FPS06) and FBX16b high-strength bolts and nuts with three FWC16b hardened washers. One washer is located under each bolt head, another is located under each nut and another is located between the lower slipbase plate and the keeper plate. Shims (FPP12a-b) may be added between the keeper plate and upper slipbase as needed to level the sign post. The slipbase bolts shall be tightened to a torque of 30 N-m +/- 5 N-m.

The base-post assembly (PTF06b) shall be embedded in a 20 MPa concrete with cement conforming to AASHTO M85 (ASTM C150) Type II. The concrete foundation shall be reinforced with 8 vertical bars of Grade 400 MPa bars conforming to either AASHTO M284M (ASTM D3936D) or AASHTO M31M (ASTM A615M). The spiral reinforcing shall conform to either ASTM A306 or AASHTO M32 (ASTM A82) and shall have 2 flat turns at the top and bottom and a 150-mm pitch.

### REFERENCES

L. A. Staron, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter SS-36, Federal Highway Administration, September 3, 1993.

## INCLINED RECTANGULAR SLIPBASE W/ TUBULAR

SSS07a

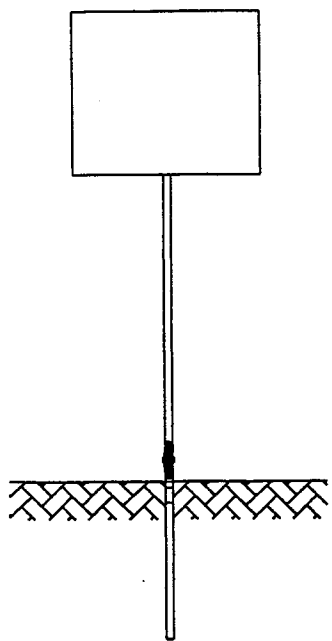
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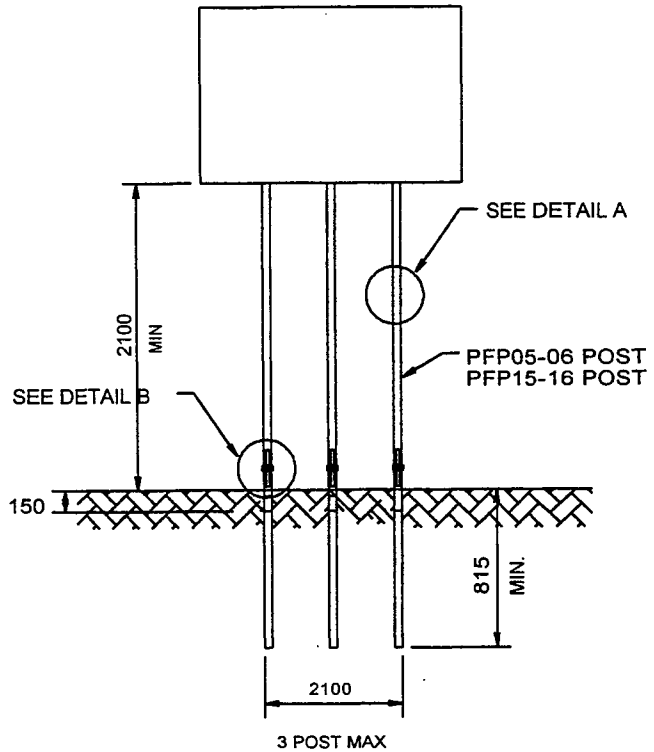
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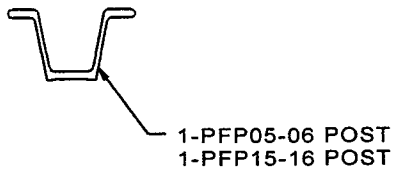




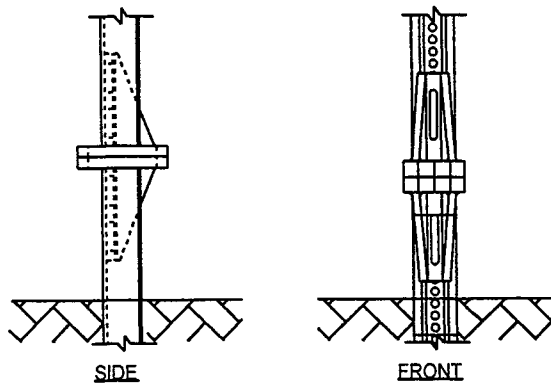
**SSS11a**



**SSS11c**



**DETAIL A: CROSS SECTION**



**DETAIL B: SLIPBASE ASSEMBLY**

**MARION STEEL SLIP SAFE SIGN SUPPORT SYSTEM**



**MARION STEEL COMPANY**  
**912 CHENEY AVENUE**  
**MARION, OH 43301-1801**

**SSS11a-c**

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### INTENDED USE

The Marion Single Safe Slip system is an omni-directional, bolt-on breakaway system for steel U-channel sign supports. The Marion Slip Safe can be used with single (SSS12a), double (SSS12b), or triple (SSS12c) post sign support installations in both strong and weak soils. The system may be driven in soil and does not require a concrete foundation. When installed in "weak soil" a soil plate (PLS04) is required on each base post. In addition, the embedment depth for the base post in "weak soil" is 1500 mm. When installed, the top of the lower slipbase plane may be as low as 40 mm but must be no higher than 100 mm to minimize the potential for snagging the vehicle undercarriage.

### COMPONENTS

The Marion Single Slip Safe system consists of three main components: a base post, a sign post and the Marion Steel Slip Safe assembly. Marion Steel Co. manufactures steel U-channel in both English (PFP02-06) and Metric (PFP12-16) post masses. The base post and sign post may be PFP05-06 or PFP15-16 (Up to 6 kg/m) posts. The base post shall be a minimum of 815 mm long, tapered at one end and having holes on at least 190 mm of its length starting at a nominal 25 mm from the top and continuing on 25 mm centers.

The Marion Single Safe Slip assembly consists of two ductile iron castings that nest inside the trough of the Rib-Bak base and sign post. The base post and sign are connected together with the Marion Slip Safe system. The Marion Slip Safe castings are produced using ASTM A536 Grade 65 steel and are zinc coated according to AASHTO M111 (ASTM A123). The two slipbase components are attached together using two 13 mm diameter SAE Grade 8 FBX08c bolts, nuts, and FWC08a washers that are zinc coated with a mechanical deposition process. A 0.38 mm (28 gauge) galvanized keeper plate is installed between the two slipbase plates for bolt retention. The keeper plate is fabricated from AASHTO M138M (ASTM A36M) sheet steel and zinc coated according to AASHTO M111 (ASTM A123) after all cutting and punching is done.

### REFERENCES

S.I. Sillan, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter 64, Federal Highway Administration, Washington D.C., September 1996.

### CONTACT INFORMATION

The Marion Steel Company  
912 Cheney Avenue  
Marion, OH 43301-1801  
800-333-4011  
Fax: (614) 383-6429

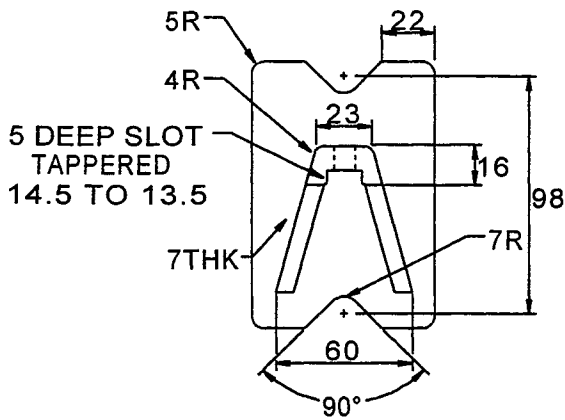
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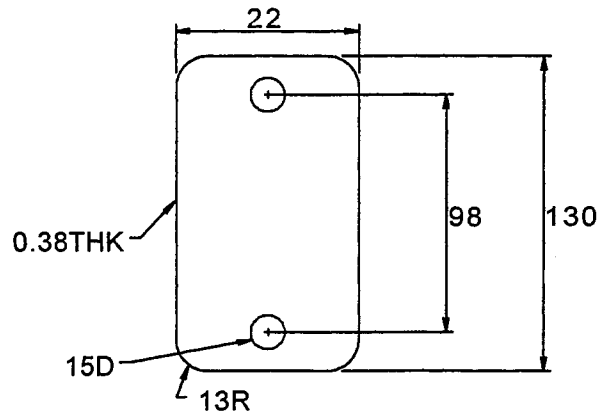
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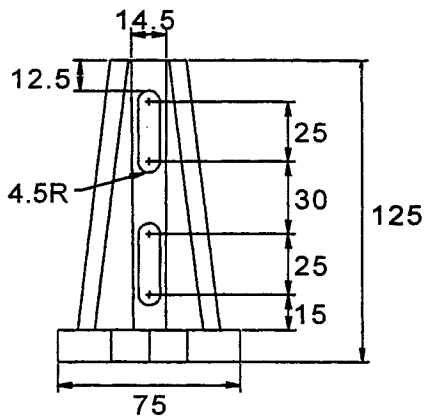
MARION STEEL COMPANY  
912 CHENEY AVENUE  
MARION, OH 43301-1801



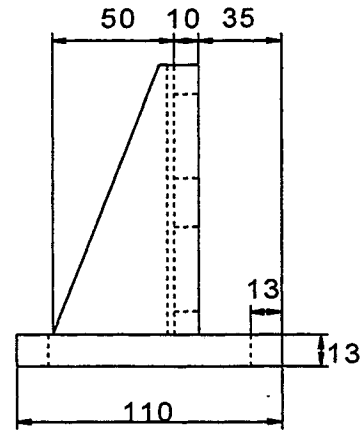
TOP



KEEPER PLATE



FRONT



SIDE

MARION STEEL SLIP SAFE SIGN SUPPORT SYSTEM



MARION STEEL COMPANY  
 912 CHENEY AVENUE  
 MARION, OH 43301-1801

SSS11a-c

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MARION STEEL SLIP SAFE SIGN SUPPORT SYSTEM

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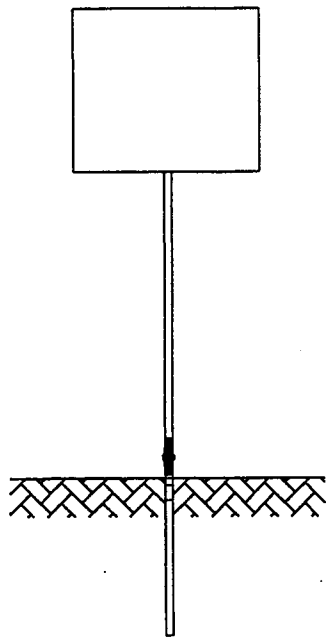
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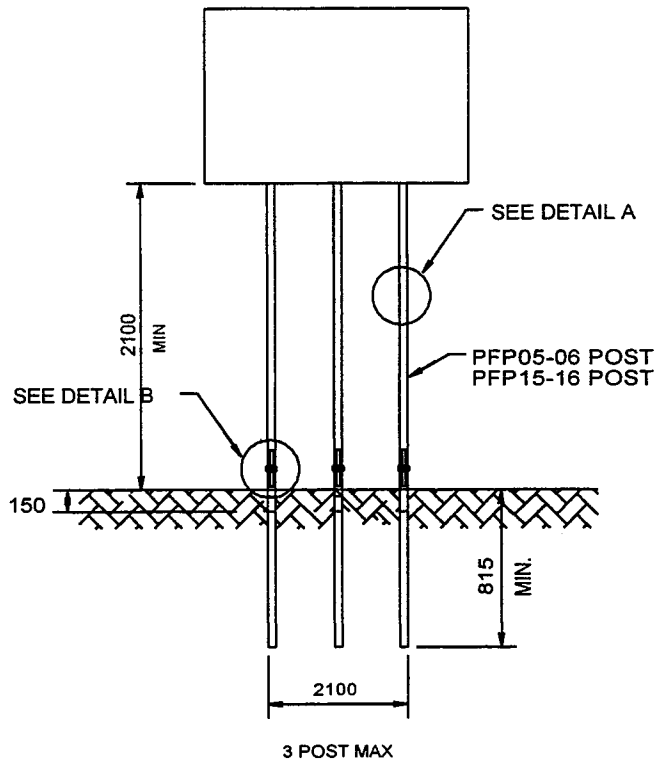
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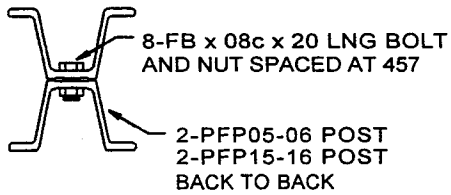
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912 CHENEY AVENUE  
MARION, OH 43301-1801



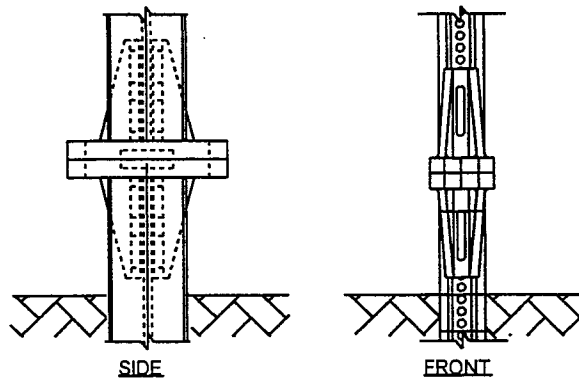
**SSS11a**



**SSS11c**



**DETAIL A: CROSS SECTION**



**DETAIL B: SLIPBASE ASSEMBLY**

**MARION STEEL SLIP SAFE SIGN SUPPORT SYSTEM**



MARION STEEL COMPANY  
912 CHENEY AVENUE  
MARION, OH 43301-1801

**SSS12a-c**

SHEET NO.

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### INTENDED USE

The Marion Back-to back Safe Slip system is an omni-directional, bolt-on breakaway system for back-to-back steel U-channel sign supports. The Marion Slip Safe can be used with single (SSS12a), double (SSS12b), or triple (SSS12c) post sign support installations in both strong and weak soils. The system may be driven in soil and does not require a concrete foundation. When installed in "weak soil" a soil plate (PLS04) is required on each base post. In addition, the embedment depth for the base post in "weak soil" is 1500 mm. When installed, the top of the lower slipbase plane may be as low as 40 mm but no higher than 100 mm to minimize the potential for snagging the vehicle undercarriage.

### COMPONENTS

The Marion Slip Safe system consists of three main components: a base post, a sign post and the Marion Steel Slip Safe assembly. Marion Steel Company manufactures steel U-channel posts in both English (PFP02-06) and Metric (PFP12-16) post masses. The base post and sign post may be PFP05-06 or PFP15-16 (up to 6 kg/m) posts. The base post shall be a minimum of 815 mm long, tapered at one end and having holes along at least 190 mm of the base post starting at a nominal 25 mm from the top and continuing on 25 mm centers.

The Marion Back-to-back Safe Slip assembly consists of two sets of ductile iron castings that nest inside the trough of the Rib-Bak base and sign posts. The base post and sign are connected together with the Marion Slip Safe system. The Marion Slip Safe castings are produced using ASTM A536 Grade 65 steel and are zinc coated according to AASHTO M111 (ASTM A123). The two slipbase components are attached together using two 20 mm diameter SAE Grade 8 FBX08c bolts, nuts, and FWC08a washers and lock washers that are zinc coated with a mechanical deposition process. A 0.38 mm (28 gauge) galvanized keeper plate is installed between the two slipbase plates for bolt retention. The keeper plate is fabricated from AASHTO M138M (ASTM A36M) sheet steel and zinc coated according to AASHTO M111 (ASTM A123) after all cutting and punching is done.

### REFERENCES

S.I. Sillan, "Breakaway Sign Supports," Geometric and Roadside Design Acceptance Letter 64, Federal Highway Administration, Washington D.C., September 1996.

### CONTACT INFORMATION

The Marion Steel Company  
912 Cheney Avenue  
Marion, OH 43301-1801  
800-333-4011  
Fax: (614) 383-6429

## MARION STEEL SLIP SAFE SIGN SUPPORT SYSTEM

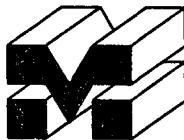
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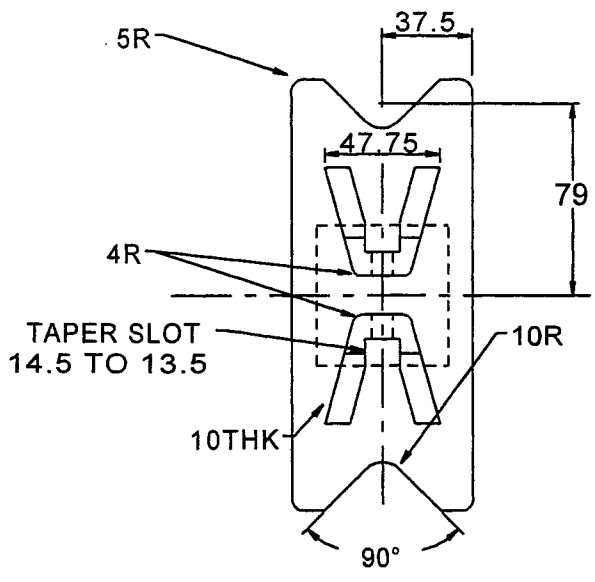
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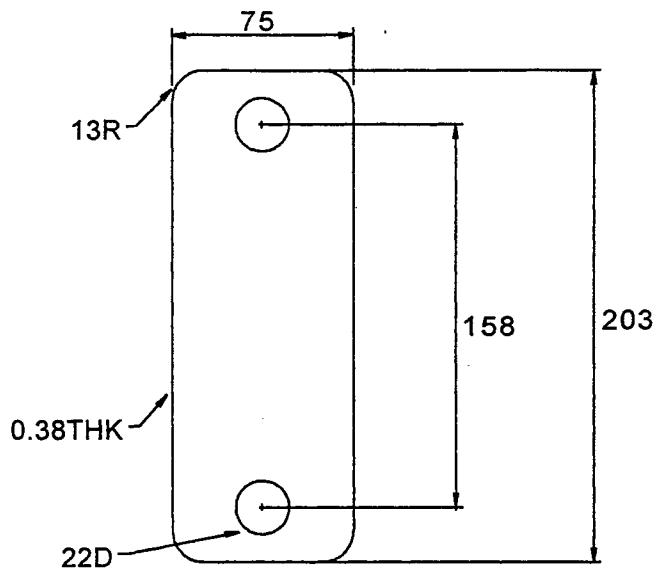
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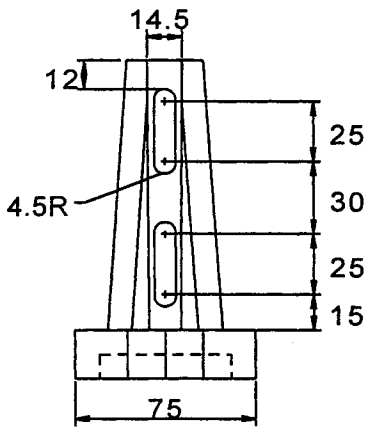
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912 CHENEY AVENUE  
MARION, OH 43301-1801



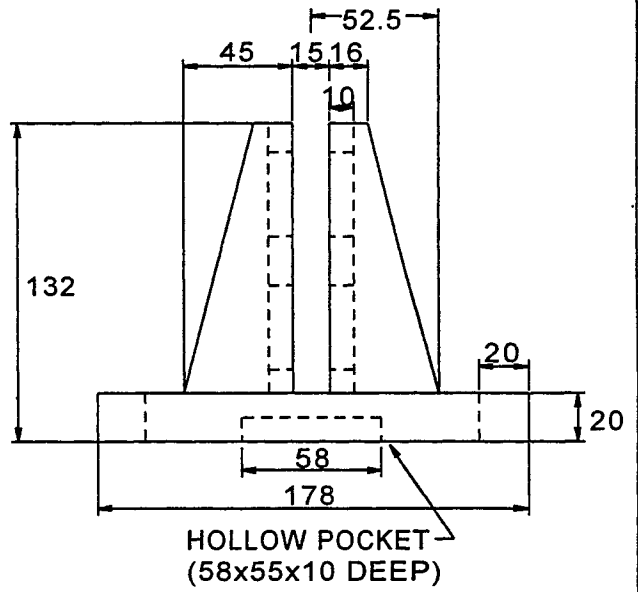
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**KEEPER PLATE**

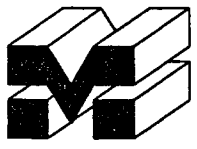


**FRONT**



**SIDE**

**MARION STEEL SLIP SAFE SIGN SUPPORT SYSTEM**



**MARION STEEL COMPANY**  
 912 CHENEY AVENUE  
 MARION, OH 43301-1801

**SSS12a-c**

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MARION STEEL SLIP SAFE SIGN SUPPORT SYSTEM

**SSS12a-c**

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MARION STEEL COMPANY  
912 CHENEY AVENUE  
MARION, OH 43301-1801

## References

1. AASHTO, *Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Other Traffic Signals*, American Association of State Highway and Transportation Officials, Washington, D.C., 1994.
2. Ross, Jr., H. E., D. L. Sicking, R. A. Zimmer, and J. D. Michie, Recommended Procedures for the Safety Performance Evaluation of Highway Features, *Report 350*, National Cooperative Highway Research Program (NCHRP), Transportation Research Board, Washington, D.C., 1993.
3. J. D. Michie, Recommended Procedures for the Safety Performance Evaluation of Highway Features, *Report 230*, National Cooperative Highway Research Program (NCHRP), Transportation Research Board, Washington, D.C., 1981.
4. AASHTO, *Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Other Traffic Signals* (with interim revisions), American Association of State Highway and Transportation Officials, Washington, D.C., 1985.
5. Task Force 13, *A Standardized Guide to Highway Barrier Hardware*, a joint publication of the American Association of State Highway and Transportation Officials (AASHTO), the American Road and Transportation Builders Association (ARTBA), and the Associated General Contractors (AGC), Washington, D.C., 1995.
6. Rutherford, Thomas R., et. al., *Metric Guide for Federal Construction*, National Institute of Building Sciences, Subcommittee on Construction, Washington, D.C., 1991.
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