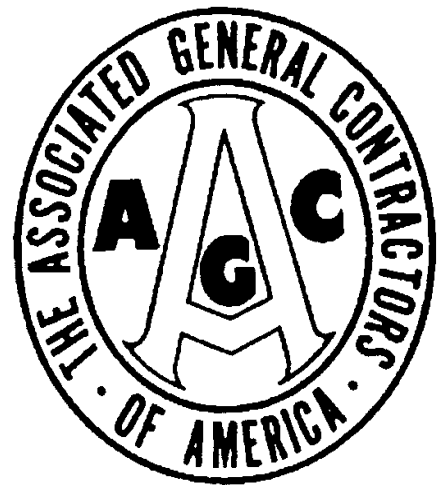

AASHTO-AGC-ARTBA Joint Committee

**Subcommittee On
New Highway Materials**

Task Force 13 Report

**A GUIDE TO STANDARDIZED HIGHWAY
BARRIER HARDWARE**



AASHTO-AGC-ARTBA Joint Cooperative Committee
Subcommittee on New Highway Materials
Task Force 13
Standardization of Details for Bridge and Road Hardware

MEMBERS

Kenneth J. Boedecker, Jr. (chairman)
Specifications Engineer
W. R. Grace and Company, Inc.

Norval P. Knapp
Bridge Design Engineer
Louisiana Department of Transportation

Jack F. Caraway
Assistant Chief Engineer
Alabama Department of Transportation

David R. Lewis
Consultant
Syro, Inc.

Arthur M. Dinitz
President
Transpo Industries, Inc.

Paul J. Mack
Deputy Chief Engineer
New York Department of Transportation

John P. Dusel, Jr.
Senior Materials and Research Engineer
California Department of Transportation

John D. O'Doherty
Engineer of Maintenance
Michigan Department of Transportation

James G. Gehler
Chief, Bureau of Materials and Physical Research
Illinois Department of Transportation

David H. Pope
Bridge Engineer
Wyoming Transportation Department

James Hatton, Jr. (secretary)
Safety Design Engineer
Federal Highway Administration

Charles C. Terry
Engineer of Bridge Design
Texas Department of Transportation

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Richard Atkinson The Burke-Parsons- Bowlby Corporation	John C. Durkos Energy Absorption Systems, Inc.	International Corporation John J. Panak D-5 Engineering
Joseph Bately Buffalo Specialty Products	John Dusel, Jr. California DOT Steve Easton Trinity/Syro	Dave Pope Wyoming DOT
Donald C. Bennet Bennet Bolt Works, Inc.	Ronald K. Faller University of Nebraska at Lincoln	John Prusak Buffalo Specialty Products Inc.
Kenneth Boedecker W.R. Grace and Company, Inc.	Steven Garrett Burke-Parsons-Bowlby Corporation	Masoud Rasoulian Louisiana Transportation Research Center
John H. Botts J. H. Botts, Inc	Don Graham Trinity Industries, Inc.	Malcolm H. Ray Momentum Engineering, Inc.
Christopher M. Brown Consultant	William Gray Colorado Department of Transportation	David Reese Trinity/Syro
Dennis Bunke Ohio DOT	Kenneth Gregory Elderlee, Inc.	Len Roberts Trinity/Syro
John F. Carney III Vanderbilt University	Kathleen L. Hancock Momentum Engineering, Inc.	Ainsley Rockwood Buffalo Specialty Products
B. Patrick Collins Wyoming DOT	James Hatton, Jr. Federal Highway Administration	Robert Rook Elderle, Inc.
Joseph Condolora Elderlee, Inc.	William E. Hopkins New York DOT	Robert Seavy Mobil Chemical Co.
John Dallain EASI-SET Industries	Walter Humber Consultant	Larry Sessions Florida DOT
Owen Denman Energy Absorption Systems, Inc.	Roger Kellison Kelken-Gold Inc.	James E. Siebels Colorado Department of Highways
Arthur Dinitz Transpo Industries, Inc.	Warren Kelly Elderlee, Inc.	Heath E. Valentine Valentine & Company
	Malcolm T. Kerley Virginia DOT	Charles Vaughn Structural Affiliates International
	Charles F. McDevitt Federal Highway Administration	Charles Wilson Industrial Fastener Institute
	William O'Donnell Structural Affiliates	Randy Wingate Highway Safety

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INTRODUCTION

Use

This guide supersedes the 1979 publication *A Guide to Standardized Highway Barrier Rail Hardware* ⁽¹⁾ published jointly by the American Association of State Highway and Transportation Officials (AASHTO), the American Road and Transportation Builders Association (ARTBA) and the Association of General Contractors (AGC). This revision also incorporates materials from the 1990 publication *Work Zone Barrier Supplement to "A Guide to Standardized Highway Rail Hardware"* ⁽²⁾ also published jointly by AASHTO, ARTBA and AGC.

This Guide contains drawings and specifications for roadside safety appurtenances. The components and systems included in this Guide are a representative sample of what is used throughout the United States but there are many perfectly adequate designs that were not included. The designs included are the ones thought to be most widely used and therefore the most logical systems and components for standardization. No one State uses all the hardware in this Guide and many States use systems and components that differ somewhat from the details shown herein. Proprietary items are included in this Guide for the convenience of users. The inclusion of a proprietary item does not confer or imply any approval by AASHTO, ARTBA, AGC or the FHWA. The proprietary materials were provided by the manufacturers so users should satisfy themselves as to the accuracy and appropriateness of the information. This document is provided as a Guide and States may modify particular details to suit their own specific requirements.

All members of the roadside safety community, be they State engineers, manufacturers of hardware, installation contractors, or researchers, agree for the need to standardize the materials and components that make up roadside safety appurtenances. This was the original objective of AASHTO, ARTBA, and AGC when they formed Task Force 13 in the late 1960s. *A Guide to Standardized Highway Barrier Rail Hardware* was first published in 1971, supplemented in 1973 and extensively revised in 1979. These documents have served an important role in providing transportation agencies, barrier component manufacturers and barrier developers with a consistent set of specifications that can be used to obtain and design hardware elements for barrier systems. The 1979 version has been widely used throughout the United States and Canada as well as in parts of Europe and Asia.

In the decade since the 1979 version of the standard hardware guide was published, three issues have made revising the guide necessary. First, researchers, designers, and manufacturers were very active during the past decade designing new hardware and improving old designs. As a result, a large number of new components and systems that are now in common use were not represented in the guide. Second, many components and systems have become obsolete and are seldom used today and should be removed from the guide. Third, the Federal mandate to use the International System (SI) of units has necessitated a fresh look at standardizing components and converting dimensions and specifications to the SI unit system. Both the Federal Highway Administration (FHWA) and AASHTO have committed themselves to using the SI system and the FHWA will require all Federal Aid construction to be designed and bid in SI units by September 30, 1996. A new expanded and updated guide is crucial to providing designers, administrators, contractors and researchers with the most complete and up-to-date information possible about roadside safety hardware. This guide is intended to satisfy that need.

This revised guide has been completely reorganized with special consideration being given to a format that would facilitate more frequent revisions. Task Force 13 will periodically update this

document so that it will become an effective and timely means of transmitting barrier hardware information throughout the roadside safety community and hardware manufacturing industry. This guide must be continually updated and revised to remain valuable to designers and researchers. Suggestions for material to be included in subsequent revisions should be forwarded to Task Force 13 through either AASHTO, AGC or ARTBA. Comments and suggestions may be forwarded directly to the Task Force by communicating with the Task Force's secretary at the following address:

Secretary, AASHTO-ARTBA-AGC Task Force 13
Department of Transportation Headquarters Building
Federal Highway Administration, HNG-14
400 7th Street, S.W.
Washington, D.C. 20590

The drawings for the non-proprietary hardware and systems in this guide were produced using Intergraph Microstation version 5. The text specifications were produced using WordPerfect 5.1. Both the text and the CAD drawings are available from a variety of sources including:

PCTRANS	MACTRANS
University of Kansas	University of Florida
Transportation Center	Center for Microcomputers in Transportation
2011 Learned Hall	512 Weil Hall
Lawrence, Kansas 66045	P. O. Box 116585
Phone (913) 864-5655	Phone (904) 392-0378
Fax (800) 245-8760	(800) 226-1013
	Fax (904) 392-3224

There are numerous benefits to be realized from using this catalog of standard barrier hardware and systems that will be realized by the various professions involved with designing, purchasing and installing roadside safety hardware:

Administrators

- ! Economy in both new construction and maintenance operations.
- ! Improved availability of parts permitting faster opening and returning of roads to full operation.

Designers

- ! Readily available details and specifications for parts for many common barrier systems in SI dimensions.
- ! Facilitates the design of new barrier systems by providing a catalog of easily obtained and economical components.

Maintenance Personnel

- ! Reduced repair time and reduced inventory of replacement parts because of interchangeability of parts and their greater availability from suppliers nationwide.

This revised guide includes not only components of barriers but drawings and specifications for common barrier systems. Some of the details shown in this guide have been revised from earlier details in the belief that doing so would result in more balanced and versatile designs. Every effort has been made to assure the correctness of the drawings and specifications at the time of

publication but a designer wishing to use details in this guide should assure themselves of the geometric and structural adequacy of the design. Citations to the roadside safety literature have been provided so that the designer may search out the test results and become familiar with the development of each barrier system.

Organization

This guide is organized into five sections. The first section, including this subsection, contains the introductory material, tables of contents, cross references and basic general information. The next three sections contain drawings and specifications of fastener, post, and rail components. The last section contains drawings of barrier systems. The barrier system drawings and specifications show how the components shown in the fastener, post and rail sections of the guide can be assembled to produce a variety of barrier systems.

Fasteners include bolts, nuts, and washers. Post components are those parts that serve as guardrail and bridge rail posts and parts connected to them. Soil plates and guardrail post blockouts are classified as post components as well as the actual post itself. Rail elements include the parts required to splice rail elements together, special elements like those used in terminals as well as the actual rails themselves. 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.

There are two indices in the guide that can be used to find a component or system. The first index cross-references the common name of the components and systems by their designator. The second index contains parts that were in the 1979 version. This list is cross-referenced by common name, the designator used in the 1979 guide and the designator used in the present guide.

Units

This guide has been produced totally 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 Newtons (N) and units of mass are kilo-grams (kg). Units of length are not shown on the drawings since all dimensions are in millimeters. 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 AASHTO R1-91 I (ASTM E 380-89a).

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⁽³⁾. Basic SI definitions and guidelines for metrication can be found in AASHTO R1 (ASTM E-380), *Standard Practice for use of the International System of Units (SI)*. Inertial and cross-sectional properties of structural shapes were taken from the AISC *Metric Properties of Structural Shapes*. Thicknesses of steel plate were taken from draft recommendations for "Preferred Plate Thickness" from the American Institute of Steel Construction (AISC). 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
! Billet reinforcement	AASHTO M-31M
! Epoxy-coated reinforcement	AASHTO M-284M
! Aluminum metallurgy	ANSI H35.1M
! Aluminum tolerances	ANSI H35.2M

Design Considerations

The materials in this Guide represent the accumulated experience of the roadside safety hardware community gained over the past thirty years. Some of the systems shown in this Guide were designed prior to any formal crash testing criteria and warranting guidelines. Others have been developed using the most recently published crash testing and evaluation criteria. Essentially all of the systems shown in this guide have been crash tested although many have not been crash tested according to the most recent testing recommendations. The following list is included to assist users in determining what crash testing recommendations were applicable when each device was originally developed.

Highway Research Board Circular 482, published in September of 1962, was the first widely recognized set of recommendations for performing full-scale crash tests of guardrails.⁽⁴⁾

NCHRP Report 153 was published in 1974.⁽⁵⁾ The types of devices addressed were expanded to include crash cushions, breakaway and yielding supports, guardrail terminals, transitions as well as guardrails and median barriers.

TRC Circular Number 191, published in February of 1978, was an interim modification of Report 153.⁽⁶⁾

NCHRP Report 230, published in March of 1981, introduced many now-standard test and evaluation criteria.⁽⁷⁾ Report 230, like Report 153 and Circular 191, addressed crash cushions, breakaway and yielding supports, terminals, median barriers and guardrails.

The AASHTO Guide Specifications for Bridge Railings, published in 1989, presented test and evaluation criteria aimed specifically at bridge railings.⁽⁸⁾ This document introduced the multiple performance level concept as applied to bridge railings used in the system portion of this Guide.

NCHRP Report 350, published in 1993, is the most recently published test and evaluation criteria for roadside hardware.⁽⁹⁾ In addition to guardrails, median barriers, terminals, transitions, crash cushions, and breakaway and yielding supports, Report 350 addresses truck mounted attenuators and workzone traffic control devices.

Users of the materials in this Guide should take care to use each barrier system appropriately. A roadside barrier must work within the limitations of the site. Like crash testing recommendations, a number of documents have been published that address specific issues related to the selection,

placement and maintenance of traffic barriers. The most recent of these guides is the AASHTO Roadside Design Guide.⁽¹⁰⁾

Designing bridge decks to properly support bridge railings is a very important aspect of bridge design. If decks are not carefully integrated with the bridge railing serious deck fatigue and even complete deck failure may occur. Repairing a damaged bridge deck will often entail higher expense and more lane closures than repairing a damaged barrier so deck damage should, in general, be minimized. Bridge deck designs are not shown in this Guide since showing general deck designs would do little to assist the user in designing a specific bridge deck. Several recent research efforts should assist bridge designers in formulating deck designs that are adequate for the impact loads experienced in a collision. Soon AASHTO is expected to adopt a Load-Resistance-Factor Design procedure (LRFD) for designing bridges.⁽¹¹⁾ Designs based on the ultimate strength of the barrier and deck should result in reduced distress after impacts. One of the most challenging deck design problems involved metal post-and-beam railings bolted to the deck. The impact forces in such situations are concentrated at the post locations and preventing deck distress can be very difficult.⁽¹²⁾ Several of the bridge railing designs shown in this guide feature breakaway posts which are intended specifically for use with relatively weak bridge decks.

Abbreviations

The following abbreviations are 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 overlap and duplication between the AASHTO and ASTM material specifications. In this document, the AASHTO version of a specification is generally considered the primary reference and the ASTM reference is included for convenience. For this reason, the ASTM specification designators usually are included in parentheses after an AASHTO specification.

Table 1. Abbreviations.

CLR = Clear distance	D = Diameter	EA = Each
OC = On center	LONGIT = Longitudinal reinforcement	
LNG = Long	MAX = Maximum	MIN = Minimum

Table 2 shows abbreviations used in drawings throughout this guide.

Component Nomenclature

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

The designator identifies a general functional group of components (fastener, post, or rail) followed by a more specific categorization of the component function. Thus, an FWC01 component is recognized as a fastener (**FWC20**) that is a washer (**FWC20**). The designator further indicates this is a circular washer (**FWC01**) and it is the twentieth in the series of circular washers (**FWC20**). Post and rail components are organized in a similar manner. For example RWM02a is recognized as a rail component (**RWM02a**) which is made from a W-beam section (**RWM02a**). The component is a main rail element (**RWM02a**) and is the second in the series of W-beam main rail elements (**RWM02a**) and lastly it is an AASHTO M-180 Class A rail (**RWM02a**).

Several additional features of the designator system are pointed out below to aid the user in remembering the appropriate designator. Often when particular components are used together they have been given the same sequence number. For example the RAM02 aluminum rail is used with the RAS02 rail splice and the RAE02 aluminum rail cap. Likewise the PAF03 aluminum post is used with the PAB03 aluminum base plate. While this rule does not always hold it provides a good starting place for finding components that are used together.

Threaded fasteners like bolts, screws, nuts and circular washers use the nominal diameter of the fastener as the two digit part of the designator. Thus, FBX16a can be readily recognized as a 16-mm diameter hex head bolt.

Threaded fasteners including hex bolts, hex nuts, anchor bolts and washers use the optional strength designator "a" and "b" to denote standard strength and high strength components. Standard strength is always denoted with an "a" and high strength is always denoted with a "b" at the end of the designator. The user therefore will know that an FBX16a bolt should

COMPONENTS

Function	Type	Sequence Number	Option	
Fastener	Bolt/Screw	Button Head Bolt	01-99	
		Carriage Bolt	01-99	
		Hook Bolt	01-99	
		Lag Screw	01-99	
		Cap Screw	01-99	
		Toggle Bolt	01-99	
		HeX Head Bolt	01-99	a-b
	Cable	Anchor Cable	01-99	
Cable Clip		01-99		
Miscellaneous	Miscellaneous	01-99		
	Work Zone	01-99		
Nut	Square Nut	01-99		
	HeX Nut	01-99	a-b	
Plate	Anchor Plate	01-99		
	Bearing Plate	01-99		
	Clamp Plate	01-99		
	Post Fitting	01-99		
Rod/Bar	Hooked Anchor Stud	01-99	a-b	
	J-Hook Anchor Stud	01-99	a-b	
	Straight Anchor Stud	01-99	a-b	
	Threaded Rod	01-99	a-b	
Washer	Circular	01-99	a-b	
	Rectangular	01-99		

(continued on next page)

COMPONENTS

	Function	Type	Sequence Number	Option
Post	Aluminum	Blockout/Bracket	01-99	
	C-section	Soil Embedded		
	Wood	Foundation Mounted		
	Flange Channel	Soil Plate		
	Plate			
	Concrete			
	S-section			
	Tube Steel			
	W-section			
Rail	Aluminum	Backup Plate	01-99	a-b
	Box	End Section		
	Cable	Main Member		
	Wood	Rub Rail		
	Plate	Splice		
	Channel	Transition		
	Concrete	Spacer/Expansion		
	Pipe			
	Thrie Beam			
	W-beam			

generally be used with an FNX16a nut and FWC16a washer. When used as the last character in a threaded fastener component, the letter "a" always means that the component is either an ASTM F568 Class 4.6 bolt or is meant to be used with one. ASTM F568 Class 4.6 hardware is used wherever a designer would normally use ASTM A307 bolts when designing in English units. The "b" designator means that the component is either an ASTM A325M bolt or is meant to be used with one. For example, FWC16b is a hardened steel washer required when using high strength ASTM A325M bolts (e.g. an FBX16b bolt and nut). FWC16a is a plain washer conforming to ANSI B18.22M (e.g. an FBX16a bolt and nut).

W and thrie beam rails with numbers less than ten correspond to the number of spacings in a standard 3810-mm panel. The user therefore will know that RWM02a and RTM02a have two 1905-mm post spacings in the 3810-mm panel whereas RWM03a and RTM03a have three 1270-mm post spacing in the same length panel. Numbers above ten are simply sequential and have no particular meaning.

The last character in the designator for W- and thrie-beam guardrail components correspond to AASHTO M-180 Class A or B. RWE04a can, therefore, immediately be recognized as made of Class A material (i.e. 2.67-mm thick -- 12 gauge) and an RWM02b can be recognized as Class B (i.e. 3.43-mm thick -- 10 gauge).

System Nomenclature

The second type of designator describes barrier systems. All system designators begin with the letter **S**. The second column identifies the type of barrier, for example a guardrail (**SGR03a**) or a bridge rail (**SBA03a**). The third column identifies a family of similar barriers. For example all soil-mounted strong-post W-beam guardrails are in the AASHTO G4 family so the appropriate

designator is **SGR04a-c** with particular variations identified by a lower case letter. The designator **SGR04b**, therefore, identifies a barrier system (**SGR04b**) which is a guardrail (**SGR04b**) used in roadside (**SGR04b**) applications. This particular system is the AASHTO G4 w-beam guardrail (**SGR04b**), in particular the timber strong-post W-beam G4(2W) guardrail (**SGR04b**). Like components, system designator are always composed of three upper-case letters, two digits and an optional lower-case designator to identify options.

Several additional features of the designator system are pointed out below to aid the user in remembering the appropriate designator. The last character in the bridge rail designations corresponds to the AASHTO performance level of the bridge railing. Performance level one systems are designated with an "a" as in **SBA03a**. Performance level two and three systems are designated with a "b" and "c" respectively as in **SBC04b** and **SBC04c**.

The numerical sequence for guardrails and median barriers corresponds to the 1977 AASHTO Barrier Guide designation if one exists. For example, the **SGR01a** is a G1 cable guardrail and **SGM04a** is an M4(1S). The designations in the 1977 barrier guide progress from more flexible barriers to stiffer barriers. This convention has been retained even for systems not in the 1977 barrier guide.

SYSTEMS

	Function	Type	Sequence Number	Option
System	Bridge Rail	Aluminum Box Concrete Shape Wood Thrie Beam W-beam	01-99	a-c
	Crash Cushion	Independent W beam Thrie beam	01-99	
	End Treatment or Terminal	Box Cable Thrie Beam W-beam Rigid	01-99	a-z
	Guardrail	Roadside barrier Median barrier	01-99	a-z
	Transitions	Guardrail to Bridge rail Guardrail to guardrail	01-99	a-z
	Work zone	Concrete Miscellaneous	01-99	

INDEX TO NAMES

Fastener Components

Guardrail Bolt and Recessed Nut	FBB01-05
Carriage Bolt	FBC10-20
Cable Hook Bolt and Nut	FBH01-03
Shouldered Cable Hook Bolt and Nut	FBH04
Lag Screw	FBL05-24
Cap Screw and Washer	FBS12-16
Toggle Bolt	FBT12
Hex Bolt and Nut	FBX06a-24a
High-Strength Hex Bolt and Nut	FBX06b-14b
High-Strength Structural Hex Bolt and Nut	FBX16b-36b
BCT Cable Anchor Assembly	FCA01-02
U-bolt Cable Clips	FCC20
Cable Wedge	FMM01
BCT Post Sleeve	FMM02
Pipe Sleeve Spacer	FMM03-04
Tubular W-beam Splice Positioner	FMM07
Rebar Loop Connector	FMW01
Square Nut	FNS20
Hex Nuts	FNX06a-36a
High-Strength Hex Nuts	FNX06b-14b
High-Strength Structural Hex Nuts	FNX16b-36b
Guardrail Anchor Bracket	FPA01
Cable Guardrail Anchor Bracket	FPA02
BCT Bearing Plate	FPB01
Terminal Connector Bearing Plate	FPB02
Anchor Bolt Bearing Plate	FPB03
Anchor Bolt Bearing Plate	FPB04
Bearing Plate	FPB05
Embedded Anchor Bolt Plate	FPB06
Thrie Beam Terminal Connector Plate	FPB07
Anchor Bolt Bearing Plate	FPB08
Tubular Post Base Plate	FPB09
Anchor Bolt Bearing Plate	FPB10
Bearing Plate	FPB11
Anchor Bolt Bearing Plate	FPB12
Aluminum Rail Clamp Bar	FPC01-02
Variable Resistance Post Clamp Bar	FPC09
Box Beam Guardrail Support Bracket	FPP01
Shelf Angle Bracket	FPP02
Box Beam Terminal Support Bracket	FPP03
Box Beam Rail Support Plate	FPP04
Driveway End Post Bracket	FPP05
Hooked Anchor Stud and Nut	FRH16a-36b
J-Hook Anchor Stud and Nut	FRJ16a-36b
Straight Anchor Stud and Nuts	FRS16a-36b
Plain Round Washer	FWC06a-36a

Hardened Round Washer	FWC12b-36b
Square Guardrail Washer	FWR01
Rectangular Guardrail Plate Washer	FWR03
Plate Washer	FWR06
Anchor Plate	FWR07
3-Cable Guardrail Back-up Washer	FWR08
Tubular Bridge Post Bearing Plate	FWR09

Post Components

BR1 Type C Aluminum Post Base Plate	PAB02
BR2 Type C Aluminum Post Base Plate	PAB03
Variable Resistance Extruded Post	PAF01
BR1 Type C Aluminum Bridge Post	PAF02
BR2 Type C Aluminum Bridge Post	PAF03
BR2 Type A Aluminum Bridge Post	PAF07
W-Beam Timber Blockout	PDB01
Thrie Beam Timber Blockout	PDB02
Transition Spacer Blockouts	PDB03-07
W-beam Timber Blockout	PDB08
Timber Guardrail Post	PDE01-08
CRT Timber Post	PDE09
Weakened Round Timber Cable Guardrail Post	PDE11
Strong Round Timber Guardrail Post	PDE13
Strong Round Timber Median Barrier Post	PDE14
Timber Median Barrier Post	PDE15
BCT Timber Post	PDF01
Long BCT Timber Post	PDF02-03
Flanged-Channel Post	PFE01
Strut and Yoke Assembly	PFP01
Weak Post Soil Plate	PLS01
Trapezoidal Soil Plate	PLS02
Foundation Tube Soil Plate	PLS03
Concrete Timber-Post Foundation	POF01-02
Cable Guardrail Terminal Anchor Assembly	POF03
Weak-Post Turned Down Terminal Anchor	POF04
Cable Guardrail Post & Welded Soil Plate	PSE01
Weak Post Guardrail Post & Welded Soil Plate	PSE03
Box Beam Anchor Post	PSE05
Cable Guardrail Anchor Post	PSE06
Weak Post Box Beam Post & Welded Soil Plate	PSE07-09
Foundation Tube	PTE05
Tubular Bridge Post	PTF01
W-Beam Guardrail Blockout	PWB01
Thrie Beam Guardrail Blockout	PWB02
Modified Thrie Beam Blockout	PWB03
Wide-Flange Guardrail Post	PWE01-04
Wide-Flange Median Barrier Post	PWE05
Culvert Mounted Guardrail Post	PWF01
Deck Mounted Bridge Rail Post	PWF02
Side-Mounted Bridge Post	PWF03

Deck-Mounted Bridge Post	PWF04
Deck-Mounted Bridge Railing Post	PWF05
Deck-Mounted Bridge Railing Post	PWF06

Rail Components

Round Aluminum Rail End Cap	RAE02
Round Tube Aluminum Bridge Rail	RAM02
Semi-Elliptical Aluminum Bridge Rail	RAM06
Large Semi-Elliptical Aluminum Bridge Rail	RAM07
TRU-Beam Aluminum Barrier Rail	RAM08
Round Tube Aluminum Rail Splice	RAS02
Semi-Elliptical Aluminum Rail Splice	RAS06
Large Semi-Elliptical Aluminum Rail Splice	RAS07
TRU-Beam Rail Splice	RAS08
Square Box Beam Rail	RBM01
Box Beam Guardrail End Rail	RBM05
Rectangular Tube Bridge Rail	RBM06
Rectangular Tube Bridge Railing	RBM07a-c
Square Tube Bridge Rail	RBM08a-b
Small Square Tube Bridge Rail	RBM09
Rectangular Tube Bridge Rail	RBM10
Box Beam Median Barrier Rail	RBM11
Box Beam Guardrail End Rail	RBM13
Square Box Beam Splice	RBS01
Rectangular Box Beam Splice	RBS02
Tube Rail Splice	RBS03
Compensating Cable End Assembly	RCE01
Cable End Fitting	RCE03
Wire Rope	RCM01
MELT Diaphragm Plate	REE01
Bent Plate Rub Rail	RER01
Channel-Section Rub Rail and Splice	RLR01
Safety Shape Portable Concrete Barrier	ROM01
F Shape Portable Concrete Barrier	ROM02
Visi-Barrier New Jersey Shape	ROM04
Visi-Barrier F Shape	ROM05
Collapsing Tube	RPX01
Thrie-Beam Back-up Plate	RTB01a-b
Thrie-Beam Terminal Connector	RTE01b
Thrie-Beam End Section (Rounded)	RTE02a
Thrie-Beam End Section (Buffer)	RTE03a-04b
1- and 2-Space Thrie-Beam Guardrail	RTM01a-02b
3-Spaced Thrie-Beam Guardrail	RTM03a-b
4-Spaced Thrie-Beam Guardrail	RTM04a-b
6-Spaced Thrie-Beam Guardrail	RTM06a-b
W-Beam Back-Up Plate	RWB01a-b
W-Beam End Section (Flared)	RWE01a-b
W-Beam Terminal Connector	RWE02a-b
W-Beam End Section (Rounded)	RWE03a
MELT W-Beam End Section	RWE04a

W-Beam End Section (Buffer)	RWE05a-07b
W-Beam Spacer Guardrail	RWM01a-b
2-Space W-Beam Guardrail	RWM02a-b
3-Space W-Beam Guardrail	RWM03a-b
4-Space W-Beam Guardrail	RWM04a-b
6-Space W-Beam Guardrail	RWM06a-b
8-Space W-Beam Guardrail	RWM08a-b
Tubular W-Beam Rail	RWM10a
Turned-Down W-Beam Terminal Section	RWM11a
Bullnose Anchor Rail Section	RWM13a
BCT Terminal Rail Section	RWM14a
Long 2-Space W-Beam Guardrail	RWM22a-b
W-Thrie Beam Transition Section	RWT01a-b

System Drawings

Chicago Barrier Railing	SBA01a
BR2 Type A Aluminum Bridge Railing	SBA02a
BR1 Type C Aluminum Bridge Railing	SBA03a
Tru-Beam Bridge Railing	SBA04a
2-Tube Curb-Mounted Bridge Railing	SBB01a
2-Tube Curb-Mounted Bridge Railing	SBB01b
W and Tube Beam Bridge Railing	SBB02a
Side-Mounted Rectangular Tube Bridge Railing	SBB03a
Vertical-Wall Bridge Railing	SBC01a-c
Open-Profile Concrete Bridge Railing	SBC02a
Aesthetic Balustrade Bridge Railing	SBC03a
F Shape Concrete Bridge Railing	SBC04b-c
Safety-Shape Concrete Bridge Railing	SBC05b
Safety-Shape Concrete Bridge Railing	SBC06b
Permanent Parapet Precast Concrete Barrier	SBC17b
Permanent Half Section Precast Concrete Barrier	SBC18b
Permanent Median Precast Concrete Barrier	SBC19b
Visi-Barrier, Safety Shape System	SBC20a
Side-Mounted Thrie-Beam Bridge Railing	SBT01a
Tubular W-Beam Bridge Railing	SBW01a
G-R-E-A-T System	SCI01a
G-R-E-A-T CZ System	SCI01b
Hi-Dro Cell Cluster	SCI02
Hi-Dro Sandwich System	SCI03
Hex-Foam Sandwich System	SCI04
Low Maintenance Attenuator	SCI05
Energite	SCI06a
Fitch Universal Module	SCI06b
Connecticut Impact Attenuation System	SCI07
Narrow Connecticut Impact Attenuation System	SCI08
ADIEM Energy Absorbing End Treatment	SCI09
N-E-A-T System	SCI10
Box-Beam Guardrail Anchor	SEB01
WY-BET Wyoming Box Beam End Terminal	SEB03
WY-BET Wyoming Box Beam End Terminal (Median)	SEB04

Cable Guardrail Anchor	SEC01
Low-Profile Construction-Zone End Treatment	SER01
Trend System	SET01
Weak-Post W-Beam Terminal	SEW01
Trailing End Terminal - Foundation Tube Option	SEW02a
Trailing End Terminal - Concrete Footing Option	SEW02b
Timber Post Breakaway Cable Terminal	SEW03a-b
Steel-Post Breakaway Cable Terminal	SEW04a-b
Modified Eccentric Loader Breakaway Cable Terminal	SEW05
Brakemaster System	SEW06
ET-2000 Guardrail Extruder Terminal	SEW07
C-A-T Crash-Cushion/Attenuating Terminal	SEW08
Bullnose Median Barrier Terminal	SEW09
Wide Bullnose Median Barrier Terminal	SEW10
Slotted Rail Terminal (SRT-75)	SEW11
Slotted Rail Terminal (SRT-100)	SEW12
Sentre System	SEW13
Weak-Post W-Beam Median Barrier	SGM02
Weak-Post Box-Beam Median Barrier	SGM03
Strong-Post W-Beam Median Barrier	SGM04a-b
Strong-Post Median Barrier with Rubrail	SGM06a-b
Strong-Post Thrie-Beam Median Barrier	SGM09a-c
F-Shape Median Barrier	SGM10a-b
Safety-Shape Median Barrier	SGM11a
Tall-Wall Median Barrier	SGM12
3N Median Barrier	SGM13
BarrierGate	SGM20
Weak-Steel Post Cable Guardrail	SGR01a-b
Weak-Timber Post Cable Guardrail	SGR01c
Weak-Post W-Beam Guardrail	SGR02
Weak-Post Box-Beam Guardrail	SGR03
Strong-Post W-Beam Guardrail	SGR04a-b
Culvert Mounted W-Beam Guardrail	SGR05
Strong-Post Thrie-Beam Guardrail	SGR09a-c
3N Guardrail	SGR13
Safety-Shape to Vertical Wall Transition	STB01
W-Beam to Flared Concrete Wall Transition	STB02
W-Beam to Curved Back Wall Transition	STB03
Nested W-Beam to Vertical Wall Transition	STB04
Nested Thrie-Beam to Vertical Wall Transition	STB05
Nested Thrie-Beam to Flared Wall Transition	STB06
W- to Thrie-Beam Transition	STG01
Quickchange Movable Barrier	SWC01
J-J Hooks Portable Concrete Barrier	SWC02
Low-Profile Construction-Zone Barrier	SWC03
Pin and Rebar Portable Concrete Barrier	SWC04
Removakel Temporary Work Zone Barrier Anchors	SWC08
Triton Barrier	SWM01
Dragnet Vehicle Arresting Barrier	SWM02

INDEX TO 1979 DESIGNATORS

The following list contains the components retained in this guide that were included in the 1979 *A Guide to Standardized Barrier Rail Hardware*. The components are listed using the 1979 designator cross-referenced to the new designator and followed by the component drawing title.

1979 Designator	New Designator	Title
Fastener Components		
F-1-76	FBH01-03	Cable Hook Bolt and Nut
	FBH04	Shouldered Cable Hook Bolt and Nut
F-3-76	FBB01-05	Trimmed Guardrail Bolt and Recessed Nut
F-4-76	FWR01	Square Guardrail Washer
F-5-76	FBX10a	Hex Bolt and Nut
F-6-76	FBX12a	Hex Bolt and Nut
	FNX12a	Hex Nut
F-7-76	FBX12b	High-Strength Hex Bolt and Nut
	FNX12b	High-Strength Hex Nuts
F-8-76	FBX16a	Hex Bolt and Nut
	FNX16a	Hex Nut
F-9-73	FBC16	Carriage Bolt
F-10-79	FBX20a	Hex Bolt and Nut
	FNX20a	Hex Nut
F-11-73	FBX20b	High-Strength Structural Hex Bolt and Nut
	FNX20b	High-Strength Structural Hex Nuts
	FWC20b	Hardened Round Washer
F-12-73	FWR03	Rectangular Guardrail Plate Washer
F-13-73	FWC16a	Plain Round Washer
F-20-73	FPC01-02	Aluminum Rail Clamp Bar
F-25-73	FBT12	Toggle Bolts
F-26-73	FBX24b	Hex Bolt and Nut
F-28-79	FRS22b	Straight Anchor Stud and Nuts
F-30-73	FRS16a	Straight Anchor Stud and Nuts
F-31-73	FRS20b	Straight Anchor Stud and Nuts
F-32-73	FRS28a	Straight Anchor Stud and Nuts
F-34-76	FMM02	BCT Post Sleeve
	FMM03-04	Pipe Sleeve Spacer
F-35-76	FWC24a	Plain Round Washer
F-36-79	FPB01	BCT Bearing Plate
F-37-76	FCA01	BCT Cable Anchor Assembly
F-42-79	FBX16b	High-Strength Structural Hex Bolt and Nut

1979 Designator	New Designator	Title
F-44-79	FRH20b FRJ20b	Hooked Anchor Stud and Nuts J-Hook Anchor Stud and Nuts
Post Components		
P-1-76	PSE01	Cable Guardrail Post & Welded Soil Plate
P-3-76	PSE03	Weak Post Guardrail Post & Welded Soil Plate
P-4-76	PLS01	Weak Post Soil Plate
	PSE08	Weak Post Box-Beam Post and Welded Soil Plate
P-5-76	FPP01	Box Beam Guardrail Support Bracket
P-6-79	PSE07	Weak Post Box-Beam Post and Welded Soil Plate
P-7-76	FPP04	Box Beam Rail Support Plate
P-10-79	PWB01	W-Beam Guardrail Blockout
	PWE02	Wide-Flange Guardrail Post
P-11-79	PDB01	W-beam Timber Blockout
	PDE02	Timber Guardrail Post
P-30-73	PAF07	BR2 Type A Aluminum Bridge Post
P-35-73	PAF02	BR1 Type C Aluminum Bridge Post
P-36-73	PAB02	BR1 Type C Aluminum Base Plate
P-37-73	PAF03	BR2 Type C Aluminum Bridge Post
P-38-73	PAB03	BR2 Type C Aluminum Base Plate
P-42-79	PWF01	Culvert Mounted Guardrail Post
P-54-79	PWB02	Thrie Beam Guardrail Blockout
	PWE03	Wide-flange Guardrail Post
P-55-79	PDB02	Thrie-beam Timber Blockout
	PDE04	Timber Guardrail Post
P-59-76	PDF01	BCT Timber Post
	PDF02	Long BCT Timber Post
Rail Components		
RE-1-76	FMM01	Cable Wedge
	RCE01	Compensating Cable End Assembly
	RCE03	Cable End Fitting
	RCM01	Wire Rope
RE-3-73	RWM01a	W-Beam Spacer Guardrail
	RWM02a	2-Space W-Beam Guardrail
	RWM03a	3-Space W-Beam Guardrail
	RWM04a	4-Space W-Beam Guardrail
	RWM06a	6-Space W-Beam Guardrail
	RWM08a	8-Space W-Beam Guardrail
	RWM22a	Long 2-Space W-Beam Guardrail
RE-4-76	RWB01a	W-Beam Back-up Plate

1979 Designator	New Designator	Title
RE-5-76	RWE01a	W-Beam End-Section (Flared)
RE-6-79	RWE03a	W-Beam End Section (Rounded)
RE-7-79	RWE04a	MELT W-Beam End Section
	RWE05a-07a	W-Beam End Section (Buffer)
RE-8-79	RWE02b	W-Beam Terminal Connector
RE-9-73	RLR01	Channel-Section Rub Rail and Splice
RE-10-76	RBM01	Square Box Beam Rail
RE-11-73	RBS01	Square Box Beam Splice
RE-12-76	RBM11	Box Beam Median Barrier Rail
RE-13-73	RBS02	Rectangular Box Beam Splice
RE-39-73	RAM02	Round Tube Aluminum Bridge Rail
RE-40-73	RAS02	Round Tube Aluminum Rail Splice
RE-41-73	RAE02	Round Aluminum Rail End Cap
RE-58-73	RAM06	Semi-Elliptical Aluminum Bridge Rail
RE-59-73	RAS06	Semi-Elliptical Aluminum Rail Splice
RE-63-76	RTM02a	2-Space Thrie Beam Guardrail
	RTM03a	3-Spaced Thrie Beam Guardrail
	RTM04a	4-Spaced Thrie Beam Guardrail
	RTM06a	6-Spaced Thrie Beam Guardrail
RE-64-76	RTB01a	Thrie-Beam Back-up Plate
RE-65-79	RTE02a	Thrie-Beam End Section (Rounded)
RE-66-79	RTE03a-04a	Thrie-Beam End Section (Buffer)
RE-67-76	RTE01b	Thrie-Beam Terminal Connector
RE-68-79	RTM01a	1-Spaced Thrie Beam Guardrail
RE-69-76	RWT01a-b	W-Thrie Beam Transition Section
RE-71-79	FPA01	Guardrail Anchor Bracket
RE-72-76	RER01	Bent Plate Rub Rail
A.7.1	RAM07	Large Semi-Elliptical Aluminum Bridge Rail
A.7.2	RAS07	Large Semi-Elliptical Aluminum Rail Splice
Work-Zone Supplement		
PCB-5-88	FMW01	Pin and Rebar PCB Connector
PCB-8-88	ROM01	Safety Shape Portable Concrete Barrier
PCB-12-88	ROM02	F Shape Portable Concrete Barrier

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