Program for the Analysis and Rating of
Truss Bridges

BRASS-TRUSS™

Version 2.2

User Manual
May 2016

Disclaimer

Portions of the contents of this system were developed cooperatively by the New York Department of Transportation and the Wyoming Department of Transportation Bridge Program. The New York Department of Transportation and the Wyoming Department of Transportation assume no liability or responsibility for and make no representations or warranties as to applicability or suitability of this computer system. Anyone making use thereof or relying thereon assumes all responsibility and liability arising from such use or reliance.

AASHTO Specifications

The Working Stress Analysis (WSD) portions of BRASS-TRUSS™ are current with the AASHTO Specifications for Highway Bridges, Sixteenth Edition - 1996, with Interims.

Additional Information and Technical Assistance

Wyoming Department of Transportation
Bridge Program
5300 Bishop Boulevard
Cheyenne, WY 82009-3340
Telephone: (307) 777-4427
Fax: (307) 777-4279
Web Page: www.dot.state.wy.us/home/engineering_technical_programs/bridge/brass.html
FTP Site: ftp://brass:*password*@wydot-filestore.dot.state.wy.us

Technical assistance may be obtained from:

Telephone: (307) 777-4489
E-mail: BRASSTechSupport@wyo.gov

Purchasing, billing and licensing assistance may be obtained from:

Telephone: (307) 777-4489
E-mail: BRASSBilling@wyo.gov

When requesting technical assistance, please visit the incident tracking system at www.wydot-brass.com. Users without an account on the incident tracking system can request an account by clicking on the "Open a Technical Support Account" link/button and e-mailing the address or calling the phone number listed. A username and password will be created and sent to the user. With this system, you may upload your data file and a description of the incident, any error messages, any bridge drawings, and any hand computations, which illustrate the concern. An Incident number will be assigned to track the progress of resolving the incident.

How to Use this Manual

The first sections of this manual are designed to act as a self help guide for the novice user and as a reference guide for the more experienced user. In this manual, TRUSS and BRASS all refer to BRASS-TRUSS™.

To the Novice:

Recommended reading is the General Information, (Section 1) and then a brief look through Section 3, Typical Commands Sets. Next, thirty minutes or more reviewing the rest of the manual section by section is recommended to get an idea of the types of commands available for defining a problem.

One or two commands should be studied in detail noting the format of the command description and the structure of the command and following parameters. Each problem in TRUSS is made up of a set of commands and associated parameters.

The next step recommended for the novice is to pick out a set of plans for a very simple bridge and code a set of commands. A structure should be chosen which closely matches one of the Typical Command Sets. The description of the Section in which the command resides should be read carefully. These descriptions are on the first pages of each tabbed Section.

If the above procedure is followed, the novice should be able to assemble a proper command set. If the Command set does not work, contact your BRASS Advisor.

To the User of Previous BRASS Versions:

BRASS-TRUSS™ input is based on commands followed by up to 18 parameters. The parameters can be integer or floating point (contain a decimal) and need only be separated by a space, column location does not matter so the input is "free format". Note: BRASS-TRUSS™ uses spaces as delimiters, not commas like the other BRASS programs. Several of the examples should be studied to get an idea of how the command structure language appears.

We also suggest you read "To the Novice" preceding this and follow the procedures as necessary.

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TRUSS/GIRDER - FLOORBEAM - STRINGER BRIDGE RATING PROGRAM

1. GENERAL INFORMATION BRASS-TRUSS™ is a system of computer programs designed to assist a bridge engineer in the analysis and load rating of simple or continuous truss or girder bridges with floorbeams and stringers. It generates properties, computes truss coordinates and weights, analyzes each simple or continuous span for dead load and live load moments and shears, and determines the structural rating for each type of member submitted. This component was originally developed by the New York Department of Transportation.

The following is a list of items describing some of the internal procedures and assumptions used in BRASS-TRUSS™ :

1. The effective column length factor, K is 0.875 for pinned truss member ends and 0.75 for riveted, welded or bolted ends. These values are from AASHTO, Standard Specifications for Highway Bridges 1996, Appendix C, Page 635. They are set in Subroutine RDGTRS.

2. To account for the weight of miscellaneous hardware and minor structural items such as gusset plates, BRASS-TRUSS™ adds 70 percent more weight per foot to each truss member (not including stringers or floorbeams). This is set in Subroutine RDGTRS.

3. To calculate the dead load of the truss to apply to a panel point, BRASS-TRUSS™ adds one half of the panel dead load on each side of the panel point.

4. The live loads automatically applied by BRASS-TRUSS™ are HS20 truck and lane, H20 truck and lane, Type 3, Type 3S3, and Type 3-3 as described in AASHTO Manual for Maintenance Inspection of Bridges 1983, Page 50. A future enhancement will allow live loads to be selected from the truck library "TRUCK.BLB". This library may be modified using the UTIL.EXE utility program as described in Chapter 15. **THIS CAPABILITY IS NOT YET OPERATIONAL.**

5. For all members (except truss chords) the allowable stress for inventory is the input stress multiplied by 0.55 and for operating 0.75.

6. The program does not include any dead load for handrails, curbs or lateral bracing other than the addition of 70% to all truss member weights.

7. BRASS-TRUSS™ rounds rating tonnages down to the nearest whole ton.

8. BRASS-TRUSS™ only rates an interior stringer. If more than one intermediate floorbeam is input, BRASS-TRUSS™ will only rate the last floorbeam entered in the Command Set.

9. BRASS-TRUSS™ uses input timber dimensions.

10. The length of stringers must be equal to or a multiple of the panel length, ±10 percent.

11. BRASS-TRUSS™ will only rate at mid-span for simple span girder-floorbeam systems.

12. Floorbeams are rated at mid-span and are assumed to be simple spans.

13. BRASS-TRUSS™ considers the wearing surface on a concrete deck a superimposed dead load and divides it equally to all stringers. The weight per foot of the concrete deck applied to a stringer is the stringer spacing multiplied by the deck depth in feet times 0.150.

The following types of structures may be rated by this component.

(1) Steel Girders - Simple or up to 8 spans continuous

(a) Deck Girders (up to 3 Main Members* per Rating Unit)
- There must be 3 or less Main Members in the Bridge Cross-section.
- Floorbeams (up to 4 per Rating Unit)**
- Stringers (up to 4 per Rating Unit)
- Sleepers (up to 2 per Rating Unit)
- Connections (up to 4 per Rating Unit)

(b) Thru Girders (up to 3 Main Members* per Rating Unit)
- There must be 3 or less Main Members in the Bridge Cross-section.
- Floorbeams (up to 4 per Rating Unit)**
- Stringers (up to 4 per Rating Unit)
- Sleepers (up to 2 per Rating Unit)
- Connections (up to 4 per Rating Unit)

(2) Steel Trusses (Simple or up to 13 spans continuous)
- There must be 3 or less Main Members* in the Bridge Cross-section.

(a) Deck Trusses (up to 3 Main Members* Per Rating Unit)
- Floorbeams (up to 4 per Rating Unit)**
- Stringers (up to 4 per Rating Unit)
- Sleepers (up to 2 per Rating Unit)
- Connections (up to 4 per Rating Unit)

(b) Pony Trusses (up to 3 Main Members* per Rating Unit)
- Floorbeams (up to 4 per Rating Unit)**
- Stringers (up to 4 per Rating Unit)
- Sleepers (up to 2 per Rating Unit)
- Connections (up to 4 per Rating Unit)

(c) Thru Trusses (up to 3 Main Members* per Rating Unit)
- Floorbeams (up to 4 per Rating Unit)**
- Stringers (up to 4 per Rating Unit)
- Sleepers (up to 2 per Rating Unit)
- Connections (up to 4 per Rating Unit)

* A “Main Member” is defined as the truss unit as a whole or the main steel girder (Deck or Thru). In the event the left or right (or middle) trusses or girders differ, BRASS allows the user to input a maximum of 3 Main Members.

** Only the last floorbeam entered in the Command Set will be rated

All directions of "LEFT" and "RIGHT", or "SPAN" number, “AHEAD”, “BACK” etc. must agree with the Bridge Inventory and Inspection data for orientation purposes.

The decision to submit more than one main member on a truss/girder span of a bridge may be made by the engineer, using the following criteria. If both main members have the same configuration and have no rust deterioration, then only one main member and required additional members are to be submitted for each span. For cases where deterioration is present in one or both of the main members of this type of structure then both main members are to be submitted.

Two stringers, one fascia and one interior, and two floorbeams, one end and one intermediate, are expected in each data set, however, the fascia stringer and the end floorbeam are not rated. They are shown in the output for information purposes only. The only reason for any omissions would be for members that do not exist.

Dimension values used are the normal engineering units, in the English System, that are used to size the particular part of the bridge under consideration. Roadway widths, member lengths, spans, etc., are understood to be in feet. Roadway thickness, member cross section data, etc., are understood to be in inches. The section dimensions measured should be of original unrusted or nondeteriorated sections as determined by the engineer in the field. The tolerances for dimensioning are as follows:

Timber members	Nearest 0.25 inches
Concrete members	Nearest 0.50 inches
Asphalt Surfacing	Nearest 0.50 inches
Steel Rolled Sections and Plates	Nearest 0.10 inches (Widths & Depths) Nearest 0.05 inches (Thickness)
Span Lengths and Roadway Dimensions	Nearest 0.1 feet
Deck Span Lengths	Nearest 0.05 feet

Input Format

The commands guide the user in building an ASCII data file. This data file is developed in a command format. Each line begins with a Bridge Identification Number (BIN) followed by a command which describes up to 18 data entries hereinafter referred to as parameters.

The data may be entered as a real (including a decimal), integer (excluding a decimal point) or an alpha character. Zero is not the same as a blank. Alpha characters are case sensitive. Default entries are given by omission of the command in those cases where all default values are desired.

To facilitate database functionality, the "BRIDGE INDENT. NUMBER" field must be used with all commands. This numeric field must contain 7 characters and must be greater than 1000000.

Spaces, NOT COMMAS, are used to delineate parameters. The number of spaces between parameters has no meaning, however, do not use tabs to separate entries. For example, if the third entry of a command is the only entry required, any of the following would be valid.

```
1000000 COMMAND-EXAMPLE          0     0     2.0
1000000 COMMAND-EXAMPLE          0 0 2
```

When a command is used, all parameters must be entered. No parameter may be left blank. If a parameter does not apply, enter zero. Data may be entered anywhere after a command with or without decimal points in the case of whole numbers. A blank space must separate the command and all parameters. No more than 132 columns per line may be input.

Executing BRASS-TRUSS™

BRASS-TRUSS™ is basically a DOS based application. A Microsoft Windows™ Graphical User Interface has not yet been developed. BRASS-TRUSS™ can be run outside the Windows™ environment or as a DOS shell within Windows™. BRASS-TRUSS™ consists of two executable programs (RATINGED.EXE and RATINGST.EXE), a section library file (STSECT.DAT), and other utility files (TRUSS.PIF, R_EDITS.DAT, etc.).

Running BRASS-TRUSS™ is a two step process. First, the user screens the data set for errors, then chooses an analysis procedure. There are two types of analysis procedures available. Pages 3.1 through 3.2 of the Users Manual detail the commands required for a girder-floorbeam-string bridge and a truss-floorbeam-stringer bridge.

From Windows™, double click the BRASS-TRUSS™ icon. This action will place you at the 'c:\truss\exe>' prompt. At the prompt, type '**ratinged**'. BRASS-TRUSS™ will automatically prompt you for the input file name (i.e. *filename*.dat) and will assign the output file name (i.e. *filename*.out). (Optionally, you may enter '**ratinged** *filename***.dat**' to bypass the screen prompt.) The '**ratinged**' command will check the validity of the input data set, look for missing required commands, check the ranges of key values, and look for many common errors in the input data set. There are two classifications of errors reported by **ratinged** - "FATAL EDITS" and "NON-FATAL EDITS". When **ratinged** detects a serious error or omission which would prevent execution, a "FATAL EDIT" error message will be placed in the output file and the user will be unable to perform a girder or truss analysis. When **ratinged** detects a particular value which is entered wrong or may be out of an acceptable range, a "NON-FATAL EDIT" error message may be printed. At this point the engineer may continue analysis or correct the error.

If **ratinged** is successful, BRASS-TRUSS™ will create three files: *filename*.out, *filename*.te1, and *filename*.pas. If **ratinged** is not successful, BRASS-TRUSS™ will create: *filename*.out, *filename*.te1, and *filename*.err to help you debug the file. **Note:** BRASS-TRUSS™ will not overwrite an existing output. Therefore, you will need to delete *filename*.out and *filename*.te1 (or rename *filename*.out to another filename) before re-running **ratinged**. Temporary files such as *filename*.PAS, *filename*.FRC, etc. are created and deleted as TRUSS runs.

The second part of running BRASS-TRUSS™ is selecting the desired analysis engine. To analyze a stringer-floorbeam-truss system, enter '**ratingst**' at the 'c:\truss\exe>' prompt. To analyze a girder-floorbeam-stringer system, enter '**ratingsg**' at the 'c:\truss\exe>' prompt. Either analysis method will prompt the user for the same input data set filename and will append the results to the existing output file. (Optionally, you may enter '**ratingst** *filename***.dat**' or '**ratingsg** *filename***.dat**' to bypass the screen prompt.)

Bugs, Gremlins and Other Problems

Inevitably, every user will have an input data set that will not run properly. Based on past experience, approximately 90% of all problem logs are user error. Naturally, this should be the first place to look when BRASS won't run. A lot of error and warning messages have been written into the source code to handle the most common errors. It is nearly impossible to anticipate every error which may occur. When searching for coding errors, check the output file and/or screen messages for clues to the problem.

Common error messages are *Math Error* or *Divide by Zero Error*. These messages usually indicate that some required data was not input. Check your input data set for omissions.
If you cannot resolve the problem, you can request technical assistance using the procedures listed on page i.

The BRASS™ Suite

BRASS™ is a suite of programs that assists the engineer in many aspects of bridge design and rating. These programs are described below:

BRASS-GIRDER™ Performs a design review and/or rating of highway bridges decks and girders using plane frame analysis and the AASHTO Standard Specifications. Load factor and working stress computations are performed.

BRASS-GIRDER(LRFD)™ -- A comprehensive system for the design and/or rating of highway bridges decks and girders using finite element theory of analysis and current AASHTO LRFD Specifications.

BRASS-PIER™ -- Performs an analysis of a bridge transverse section at pier locations. The program provides a comprehensive analysis of bridge decks, piers, and selected foundation types. All AASHTO loads and group loads are considered. Live load is automatically positioned for maximum actions. Load factor and working stress computations are performed.

BRASS-PIER(LRFD)™ -- Performs analysis of a bridge transverse section at pier locations. Provides a comprehensive analysis of bridge decks, piers, and selected foundation types. All AASHTO (LRFD) loads and group loads are considered. Live load is automatically positioned for maximum actions.

BRASS-CULVERT™ -- Designs, analyzes, and/or rates one, two, three, or four barrel reinforced concrete rigid or flexible box culverts, with or without bottom slab. End skews can also be defined. Wall and slab thickness may be specified or the program will set the thickness. AASHTO guidelines are followed and Service Load Design, Load Factor Design, or Load and Resistance Factor Design may be specified. Member capacities are designed based on applied truck load, soil fill, self weight and water pressure. Standard AASHTO and user defined truck loadings can be specified. Output generated by the program includes: culvert geometry; moments, shears, and axial forces at tenth points; stresses; required area of reinforcement; steel design table; splice length; weights and volumes of steel and concrete; and influence ordinates. Critical design moments, shears, and axial forces for each member are summarized.

BRASS-SPLICE™ -- Performs the design of field splices for rolled beam or welded plate steel girders. Design criteria are in compliance with the AASHTO Load Factor Design Standard Specifications and WYDOT design practice.

BRASS-POLE™ -- Performs a working stress analysis of cantilever sign, luminaire and signal support structures. Round or polygonal steel poles may be analyzed according to the AASHTO Standard Specifications.

BRASS-DIST™ -- Performs a finite-strip element analysis to determine the factor for wheel load distribution for any axle spacing or width and any tire configuration of a truck placed at any position on the bridge deck. Standard trucks may also be used. NOTE: AASHTO formulas are based on empirical data and are applicable to six foot axle widths. BRASS-DIST™ will also give results for a simple beam "deck-to-girder" analysis for dead loads.

BRASS-PAD™ -- Performs analysis and design of steel or fabric reinforced elastomeric bearing pads according to the AASHTO Standard or LRFD Specifications.

2. COMMAND DESCRIPTION INDEX (In Alphabetical Order)

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DETERIORATION		13.1
FLOORBEAMS		
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Right	120	5.9
SLEEPERS		
Steel	210	7.10
Timber	220	7.12
SPANS	10	4.2
STRESSES	70	4.16
STRINGERS		
Channel	270	8.10
Rolled	280	8.12
Sidewalk		
Left	240	8.4
Right	250	8.6
Timber	290	8.14
TRACK LAYOUT	160	6.6
TRUCK-CODE (Not currently operational)	60	4.14
TRUSS MEMBERS		
Box (Angles & Plates)	380	10.16
Box (Channels & Plates)	370	10.12
Eyebar	410	10.28
Isec	400	10.24
Rolled	390	10.20
Threaded	420	10.32
UTILITIES	170	6.8
WEARING SURFACE	90	5.2
YEARS	50	4.12

3. TYPICAL COMMAND SETS

3.1 GIRDER, FLOORBEAM, STRINGER BRIDGES - RATINGSG.EXE

Command Name	Usage
SPANS	Required
DATE	Optional
BRIDGE	Required
LOCATION	Required
DEBUG	Optional
YEARS	Required
TRUCK-CODE (Not currently operational)	Optional
STRESSES	Required
COMMENTS	Optional
WEARING SURFACE	Required
PAVEMENT	Required
LEFT SIDEWALK	Required
RIGHT SIDEWALK	Required
MEDIAN	Optional
MEMBER LAYOUT	Optional
RAILWAY	Optional
TRACK LAYOUT	Optional
UTILITIES	Optional
CONCRETE DECK	
GRATING DECK	Req'd *
TIMBER DECK	
STEEL SLEEPERS	Optional
TIMBER SLEEPERS	Optional
SECONDARY MEMBER LONGITUDINAL STRINGER	Required**
LEFT SIDEWALK STRINGER	Optional
RIGHT SIDEWALK STRINGER	Optional
CONCRETE PROTECTION - LONGITUDINAL STRINGER	Optional
CHANNEL STRINGER - FASCIA OR INTERIOR	
ROLLED STRINGER - FASCIA OR INTERIOR	Req'd.***
TIMBER STRINGER - FASCIA OR INTERIOR	
SECONDARY MEMBER TRANSVERSE FLOORBEAM	Required
CONCRETE PROTECTION - TRANSVERSE FLOORBEAM	Optional
CHANNEL FLOORBEAM - END OR INTERMEDIATE	
ROLLED FLOORBEAM - END OR INTERMEDIATE	Req'd ***
ISEC FLOORBEAM - END OR INTERMEDIATE	
MAIN MEMBER - GIRDER	Required
MAIN MEMBER - CONCRETE PROTECTION	Optional
RIVETED	
ROLLED	
WELDED	Req'd.***
CHANNEL	
TIMBER	
CONNECTION	Optional
FRAMED	
HANGER	Optional
HINGE	

* Only one command from this group can be used in a single data set.
** This command is required when a stringer is present.
*** At least one command from this group must be used in each data set.

3.2 TRUSS, FLOORBEAM, STRINGER BRIDGES - RATINGST.EXE

Command Name	Usage
SPANS	Required
DATE	Optional
BRIDGE	Required
LOCATION	Required
DEBUG	Optional
YEARS	Required
TRUCK-CODE (Not currently operational)	Optional
STRESSES	Required
COMMENTS	Optional
WEARING SURFACE	Required
PAVEMENT	Required
LEFT SIDEWALK	Required
RIGHT SIDEWALK	Required
MEDIAN	Optional
MEMBER LAYOUT	Optional
RAILWAY	Optional
TRACK LAYOUT	Optional
UTILITIES	Optional
CONCRETE DECK	
GRATING DECK	Req'd. *
TIMBER DECK	
STEEL SLEEPERS	Optional
TIMBER SLEEPERS	Optional
SECONDARY MEMBER LONGITUDINAL STRINGER	Required**
LEFT SIDEWALK STRINGER	Optional
RIGHT SIDEWALK STRINGER	Optional
CONCRETE PROTECTION - LONGITUDINAL STRINGER	Optional
CHANNEL STRINGER - FASCIA OR INTERIOR	
ROLLED STRINGER - FASCIA OR INTERIOR	Required***
TIMBER STRINGER - FASCIA OR INTERIOR	
SECONDARY MEMBER TRANSVERSE FLOORBEAM	Required
CONCRETE PROTECTION - TRANSVERSE FLOORBEAM	Optional
CHANNEL FLOORBEAM - END OR INTERMEDIATE	
ROLLED FLOORBEAM - END OR INTERMEDIATE	Required***
ISEC FLOORBEAM - END OR INTERMEDIATE	
MAIN MEMBER - TRUSS	Required
CONTINUOUS TRUSS SUPPORTS	Optional
CBX	
ABX	
ROLLED	Required***
ISEC	
EYEBAR	
THREADED	
CONNECTION	Optional
FRAMED	
HANGER	Optional
HINGE	

* Only one command from this group can be used in a single data set.
** This command is required when a stringer is present.
*** At least one command from this group must be used in each data set.

4. CODING INSTRUCTIONS FOR BRIDGE SUMMARY, LIVE LOADS AND ALLOWABLE STRESSES

4.1 GENERAL INFORMATION

These commands are intended to provide a record of the total number of spans on this project and what span, if any, were rated. Each span (or multiple rating unit) is identified and it is noted how the span was rated. If it was not rated, a code is placed to explain the reason the unit could not be rated.

A rating unit is defined as a single span or a multi-span continuous structure that the program can handle as one unit.

These commands also specify the live load and allowable stresses.

10	BRASS-TRUSS™	COMMAND DESCRIPTION

COMMAND NAME	SPANS
PURPOSE	This command defines the ramp attachment and the total number of spans or rating units to be rated. This command is required. REMEMBER: All commands must be preceded by a seven digit numeric Bridge Identification Number, greater than 1000000, followed by a space.
3 COMMAND PARAMETERS	
Span Number Ramp Bridge Only	For a ramp bridge only, enter the Main Bridge span number that the ramp is attached to. If there are no ramps, enter 0.
Ramp Letter Ramp Bridge Only	For a ramp bridge only, enter the ramp letter designation for the particular ramp span to be rated. If there are no ramps, enter 0.
Total Bridge Spans	Enter the total number of spans on the bridge, viaduct, etc. This parameter cannot be 0 (Zero). If fictitious additional spans are needed to input a bridge, keep this number equal to the actual Number of Spans in the bridge.

EXAMPLE

1234567 SPANS 0 0 1

FIGURES

NOTES

20	BRASS-TRUSS™	COMMAND DESCRIPTION

COMMAND NAME	DATE
PURPOSE	This command allows the user to record up to 4 inspection dates. This command is optional.
4 COMMAND PARAMETERS	
Date #1 Format = mm/yy	Enter the month and year the bridge was inspected. These dates are for recording purposes only and are Y2K Compliant.
Date #2	Enter the month and year the bridge was inspected.
Date #3	Enter the month and year the bridge was inspected.
Date #4	Enter the month and year the bridge was inspected.

EXAMPLE

1234567 DATE 10/78 8/82 9/85 5/87

FIGURES

NOTES

30	BRASS-TRUSS™	COMMAND DESCRIPTION

COMMAND NAME	BRIDGE
PURPOSE	This command defines the spans and members to be rated. It also defines the member type. This command is required.
12 COMMAND PARAMETERS	
Beginning Span Number	Enter the span number of the first span in the unit that is being rated.
Ending Span Number	Enter the span number of the last span in the unit that is being rated. For simple spans, enter the same span number as entered in the previous parameter.
Beginning Span Identical Units	If there are any other spans or rating units that are identical to the unit being rated, enter the beginning span number of that unit or series of units. It will not be necessary to rate these spans separately. If none exist, enter 0.
Ending Span Identical Units	If there are any other spans or rating units that are identical to the unit being rated, enter the ending span number of that unit or series of units. If there is only one span, enter the same span number as entered in the previous parameter. If 0 was entered in the previous parameter, enter 0 here also.
Main Member Type	Enter "ARCH", "CULVERT", "FRAME", "GIRDER", "SUSPEN", "BOX", "I-BEAM", "T-BEAM", "SLAB" or "TRUSS". The word "GIRDER" includes Rolled Beams as main members. No other words are acceptable. See Note on Page 1.2 for the definition of "Main Member".
Design Type	Enter "S" or "C" to indicate a simple span or a continuous span rating unit. No other letters are acceptable. Any other characters will generate a Fatal Edit Message which will stop the run.
Number of Main Members to be Rated (Continued)	Enter the number of main members to be rated. Up to three main members are allowed. The presence of a number in this parameter indicates that commands are included in the data set for this rating unit. If the main member data for the unit is not submitted, enter the appropriate Non-Rating Code. (See Notes)

COMMAND PARAMETERS (Cont.)	
Number of End Floorbeams	Enter the number of end floorbeams. A total of four floorbeams (end and interior combined) are allowed. If the stringers rest directly on the abutment, enter 0. If none are present, enter 0. If the floorbeam data is not submitted, enter the appropriate Non-Rating Code. (See Notes)
Number of Interior Floorbeams	Enter the number of interior floorbeams to be rated. A total of four floorbeams (end and interior combined) are allowed. If the floorbeam data is not submitted, enter the appropriate Non-Rating Code. (See Notes)
Number of Exterior (Fascia) Stringers	Enter the number of exterior (fascia) stringers. A total of four stringers (fascia and interior combined) are allowed. If the slab rests on a shelf angle on the main member of a "THRU GIRDER" bridge, enter 0. For a multigirder unit, or if none exist, enter 0. If the stringer data is not submitted, enter the appropriate Non-Rating Code. (See Notes)
Number of Interior Stringers	Enter the number of interior stringers to be rated. A total of four stringers (fascia and interior combined) are allowed. If the slab rests on a shelf angle on the main member of a "THRU GIRDER" bridge, enter 0. For a multigirder unit, or in none exist, enter 0. If the stringer data is not submitted, enter the appropriate Non-Rating Code. (See Notes)
Number of Connections	Enter the number of connections. Up to four connections are allowed. For multigirder or concrete units, enter 0. If the connection data is not submitted, enter the appropriate Non-Rating Code. Connections cannot be rated. (See Notes)

EXAMPLE

For a simple span truss with three main members, one end floorbeam, one interior floorbeam, one exterior stringer, one interior stringer, and an unknown connection configuration, code:

1234567 BRIDGE 1 1 0 0 TRUSS S 3 1 1 1 1 UNKN

FIGURES

NOTES

NON-RATING CODES

UNRA - UNRATABLE STRUCTURAL TYPE
Use this code if the member cannot be rated by this program, such as suspension bridges, curved girders, rigid frames, arches or post-tensioned bridges.

SEVE - SEVERE DETERIORATION
Use this code if the member is severely deteriorated so that it is beyond the scope of the project to accurately rate the member. (This code is to be used only for extreme cases of deterioration.)

INAC - INACCESSIBLE MEMBER
Use this code if the member is inaccessible and cannot be measured, such as a member over electrified wires.

UNKN - UNKNOWN SECTION PROPERTIES
Use this code when plans are not available and the member cannot be measured because of embedment in concrete, blast protection coverage or some similar situation.

40	BRASS-TRUSS™	COMMAND DESCRIPTION

COMMAND NAME	LOCATION
PURPOSE	This command defines the span to be rated and data to describe the location of the structure. This command is required. See Notes.
6 COMMAND PARAMETERS	
Span Number	Enter the span number being rated. For continuous structures, use the first span of the continuous unit. When a ramp span is being rated, enter the span number of the main bridge span where the ramp span joins onto or separates from the main bridge.
Ramp Letter	Enter the ramp letter. If no ramps exist, enter 0.
Ramp Span Number	If ramp letter is 0, enter 0 here. Otherwise enter the span number for the ramp span that is being rated.
District & County Number	Enter the district number in the first digit of this two digit numeric parameter and the county number in the next digit. Only two digits are allowed.
Route Number	Enter the Interstate, U.S., State, County or City Highway numbers and letter, if present, for bridges carrying highway traffic. Enter the railroad initials, (UPRR, BNRR, etc.) for bridges carrying railway traffic. If none of these are available, enter 0. Only four letters and/or digits are allowed, hyphens are not allowed.
Consultant Code	Enter the consultant code. This must be a Letter (A-Z) followed by a number (00-99).

EXAMPLE

```
1234567 LOCATION   1   0   0   46   0   R04
```

FIGURES

NOTES

Each LOCATION command must correspond to a ‘BRIDGE’ record previously defined. If there are 3 ‘BRIDGE’ records, there must be 3 ‘LOCATIONS’. In this manner, several rating units can be run together in a single input data set.

50	BRASS-TRUSS™	COMMAND DESCRIPTION

COMMAND NAME	YEARS
PURPOSE	This command defines the year of original construction and the years replacement of members were performed. These four digit years are used to define the allowable yield strength in the members. This command is required.

5 COMMAND PARAMETERS	
Year of Original Construction	Enter the 4-digit year taken from erection plans, bridge superstructure plans, inventory file or other information considered to be reliable for the superstructure.
Replacement Dates, Deck	If the deck, including sleepers (if needed) were replaced, enter the 4-digit year of construction of the latest deck replacement. Otherwise enter 0. (See Notes)
Replacement Dates, Stringers	If the stringers were replaced, enter the 4-digit year of construction of the latest stringer replacement. Otherwise enter 0. (See Notes)
Replacement Dates, Floorbeams	If the floorbeams were replaced, enter the 4-digit year of construction of the latest floorbeam replacement. Otherwise enter 0. (See Notes)
Replacement Dates, Main Members	If the main members were replaced, enter the 4-digit year of construction of the latest main member replacement. Otherwise enter 0. (See Notes)

EXAMPLE

1234567 YEARS 1923 1942 0 0 0

FIGURES

NOTES

If years are input for replacement dates, the default values for yield stresses will override any value entered in the STRESSES command.

60	BRASS-TRUSS™	COMMAND DESCRIPTION

COMMAND NAME	TRUCK-CODE
PURPOSE	NOTE: This command is not yet operational. This command defines truck loads by a "truck code". This truck code must have been previously stored in the Truck Library along with axle weight and spacing data defining the truck. See command 600 for an explanation of printing the Truck Library. This command is optional. However, if this command is used, it must be repeated to define a total of five trucks.
1 COMMAND PARAMETER	
Truck Code	Enter the truck code to be applied to the structure. Repeat this command for 4 additional trucks. IMPORTANT: If this command is used, it must be repeated to define a total of five trucks. See Notes.

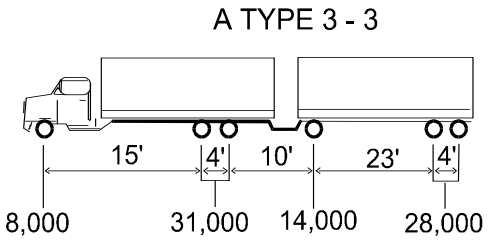
EXAMPLE

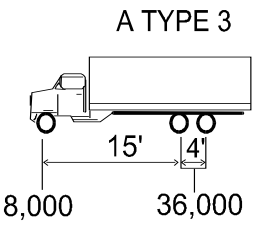
This command is not yet operational.

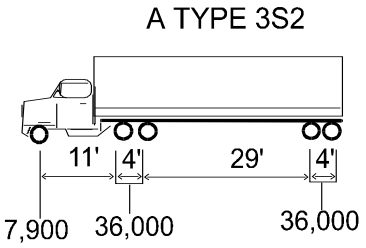
```
1234567 TRUCK-CODE    HS20T
1234567 TRUCK-CODE    H20T
1234567 TRUCK-CODE    ATYPE3
1234567 TRUCK-CODE    ATYPE3S2
1234567 TRUCK-CODE    ATYPE3-3
```

One truck per line. Repeat as necessary.

FIGURES







NOTES

For HS vehicles having a variable axle spacing, the shortest distance will be used.

If this command is omitted, the following trucks will be analyzed: HS20T, H20T, ATYPE3, ATYPE 3S2, ATYPE3-3 (the ATYPExxx trucks are the AASHTO rating vehicles as defined in the AASHTO Manual for Maintenance Inspection of Bridges 1983, Page 50).

When the Wyoming trucks are used, enter “TRUCK-CODE WYOMING”

70	BRASS-TRUSS™	COMMAND DESCRIPTION

COMMAND NAME	STRESSES
PURPOSE	This command is used to define the allowable yield strength of the members and fastener diameter. This command is required.
6 COMMAND PARAMETERS	
Fy Steel Default = See Notes	Enter the steel yield strength in ksi. If unknown or there are no structural steel members in the bridge superstructure, enter 0 and a default value based on the year of original construction will be used. For hybrid girders, enter the yield strength of the web.
Fy Reinforcing Steel	Enter the reinforcing steel yield strength in ksi. If unknown or there is no reinforcing steel in the bridge superstructure, enter 0 and a default value based on the year of original construction will be used.
Fpc Concrete Default = 3.3 ksi	Enter the concrete compressive strength in ksi. If unknown or there is no concrete in the bridge superstructure, enter 0 and a default value based on the year of original construction will be used.
Fy Timber Default = 1.8 ksi	Enter the timber bending strength in ksi. If unknown or there are no wood members in the bridge superstructure, enter 0 and a default value based on the year of original construction will be used. This value will be multiplied by 0.55 for inventory stress level and by 0.75 for operating stress level. Reference material for these stresses are found in the following specifications: A.A.S.H.T.O. A.I.S.C. A.S.T.M.
Fastener Diameter	Enter the diameter of the fasteners used to fabricate the individual member, in inches. This is NOT the fasteners used in the connections. If this cannot be determined, enter 0 (Zero) and 7/8" diameter fasteners will be assumed. Diameters available are: 1.125, 1.000, 0.875, 0.750, 0.625, and 0.500 only. No other values are acceptable.
Hybrid Truss Fy Steel	If there are two steel types used on a Truss, enter the higher steel yield strength, in ksi.

EXAMPLE

1234567 STRESSES 33.0 33.0 2.70 0. 0.875 33.0

FIGURES

NOTES

Steel Yield Strength Defaults (Fy)

YEAR	Fy(ksi)
<1900	23
1900 - 1904	26
1905 - 1935	30
1936 - 1962	33
1963 - (2050)	36

80	BRASS-TRUSS™	COMMAND DESCRIPTION

COMMAND NAME	COMMENTS
PURPOSE	The COMMENTS command may be used to document information concerning this bridge and to list information that cannot be recorded on any other command. This command may be repeated up to 999 times and may be placed anywhere in the data set **prior to the commands given in Chapter 10.**
1 COMMAND PARAMETER	
Comments	Each comment may contain up to 60 characters of descriptive data.

EXAMPLE

1234567 COMMENTS BR OVER LITTLE WIND RIVER

FIGURES

NOTES

5. CODING INSTRUCTIONS FOR ROADWAY DETAILS

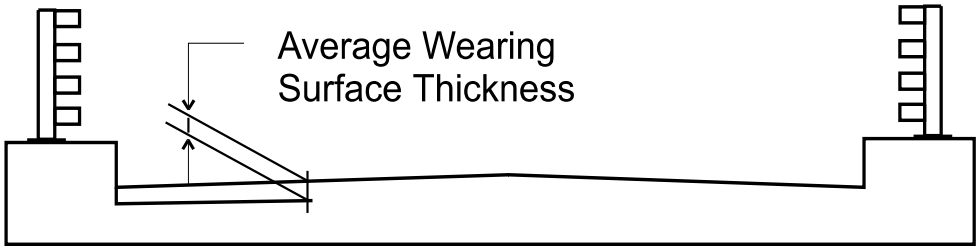
90	BRASS-TRUSS™	COMMAND DESCRIPTION

COMMAND NAME	WEARING SURFACE
PURPOSE	This command is used to define the wearing surface thickness and type. This command is required.
2 COMMAND PARAMETERS	
Wearing Surface Thickness	Enter the average distance, in inches, from the roadway to the top of the structural deck. If the wearing surface thickness cannot be determined, omit the entire command. See Figure. (Maximum = 12 inches, Minimum = 0 inches)
Wearing Surface Type	Enter "CONCRETE", "ASPHALT", "TIMBER" or "NONE". No other words are acceptable. If the deck is Open Steel Grating, enter "NONE". If more than one type of overlay material is used, enter only one type with an equivalent thickness to obtain the proper unit weight.

EXAMPLE

1234567 WEARING SURFACE 1.25 ASPHALT

FIGURES



NOTES

Wearing Surface Weight = Roadway Width x Wearing Surface Thickness x Unit Weight

MATERIAL	UNIT WEIGHT
Concrete	150 lbs. per cubic foot
Timber	50 lbs. per cubic foot
Asphalt	144 lbs. per cubic foot

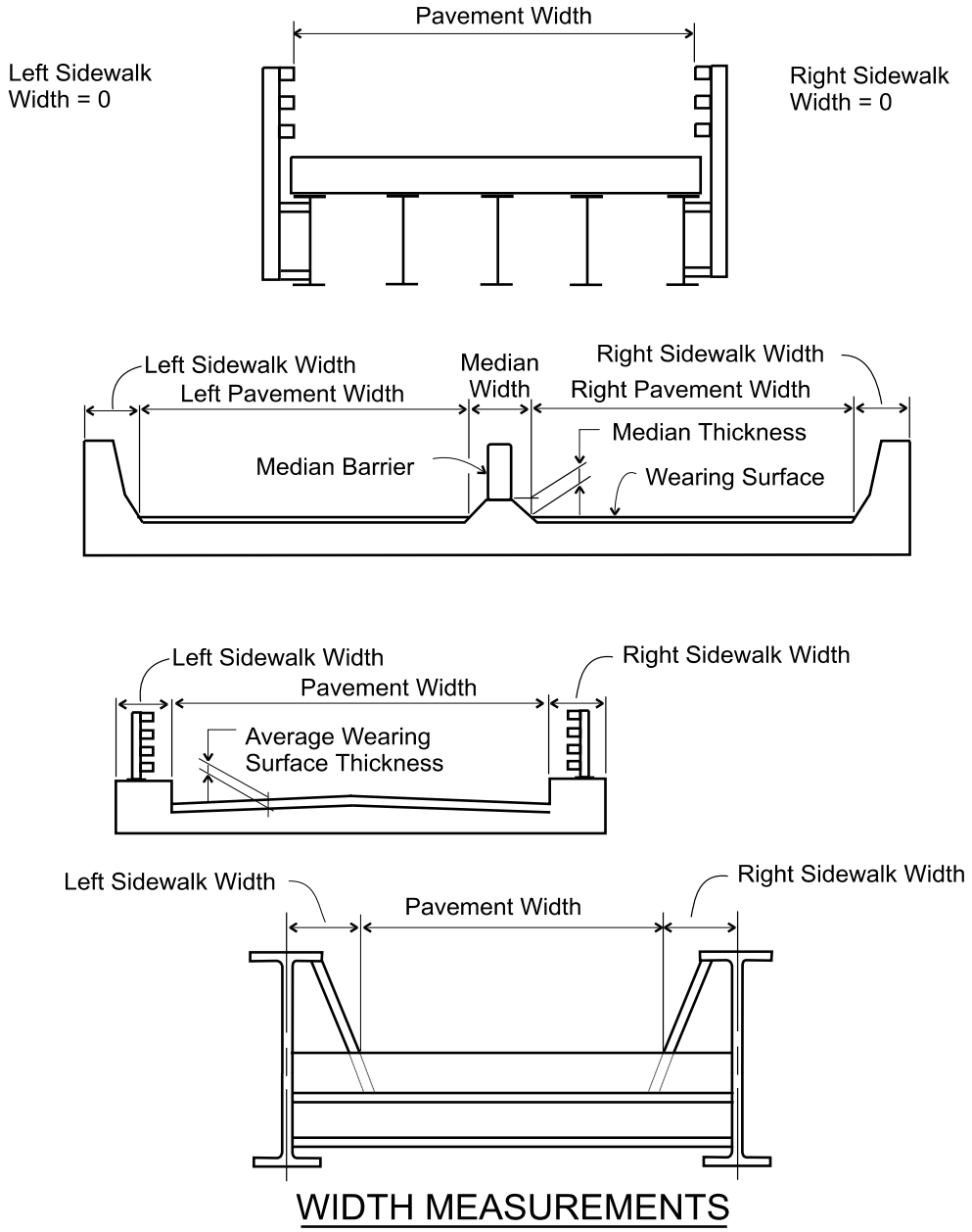
100	BRASS-TRUSS™	COMMAND DESCRIPTION

COMMAND NAME	PAVEMENT
PURPOSE	This command defines the pavement width. This command is required.
2 COMMAND PARAMETERS	
Left Pavement Width	Enter the distance, in feet, between the curbs, or the face of the railings, parapets or other obstructions to the lateral movement of a vehicle on the bridge, on the left of the median. Use this parameter for bridges without medians. See Figures. (Maximum = 75 feet, Minimum = 8 feet)
Right Pavement Width	Enter the distance, in feet, between the curbs or the face of the railings, parapets or other obstructions to the lateral movement of a vehicle on the bridge, on the right of the median. If there is no median on the bridge, enter 0 in this parameter. See Figures. (Maximum = 75 feet, Minimum = 0 feet)

EXAMPLE

1234567 PAVEMENT 24.0 0

FIGURES



WIDTH MEASUREMENTS

NOTES

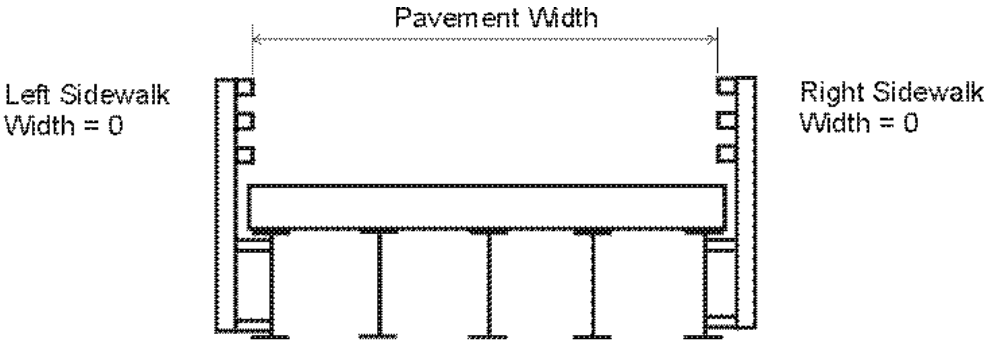
110	BRASS-TRUSS™	COMMAND DESCRIPTION

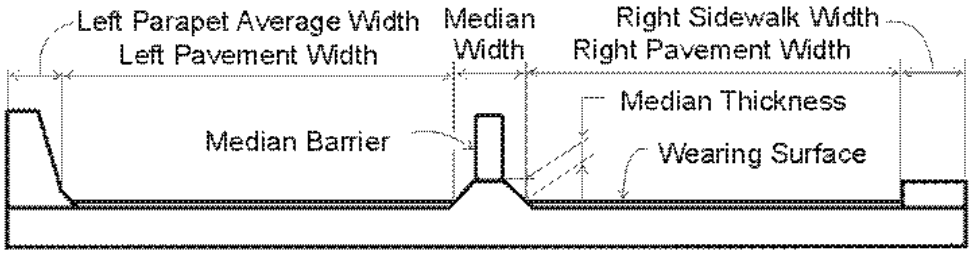
COMMAND NAME	LEFT SIDEWALK
PURPOSE	This command defines the left sidewalk and/or parapets on the deck. This command is required.
6 COMMAND PARAMETERS	
Left Sidewalk Width	Enter the distance, in feet, from the curb line to the outside edge of the left sidewalk if one is present. See Figures for all dimensions. (Maximum = 12 feet, Minimum = 0 feet)
Left Sidewalk Thickness	Enter the sidewalk thickness in inches. (Maximum = 18 inches, Minimum = 0 inches)
Left Sidewalk or Parapet Material	Enter "STEEL", "TIMBER", "CONCRETE", "GRATING", "ASPHALT" or "NONE". No other words are acceptable.
Left Sidewalk Railing Material	Enter "ALUMINUM", "STEEL", "TIMBER", "CONCRETE" or "NONE". No other words are acceptable.
Left Concrete Parapet Width	Enter the average distance, in feet, from the inner face to the other face of the parapets. (Maximum = 2 feet, Minimum = 0 feet)
Left Concrete Parapet Height	Enter the distance, in feet, from the top of the deck or sidewalk to the top of the parapet. (Maximum = 4 feet, Minimum = 0 feet)

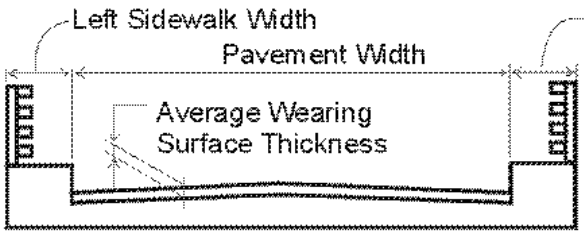
EXAMPLE

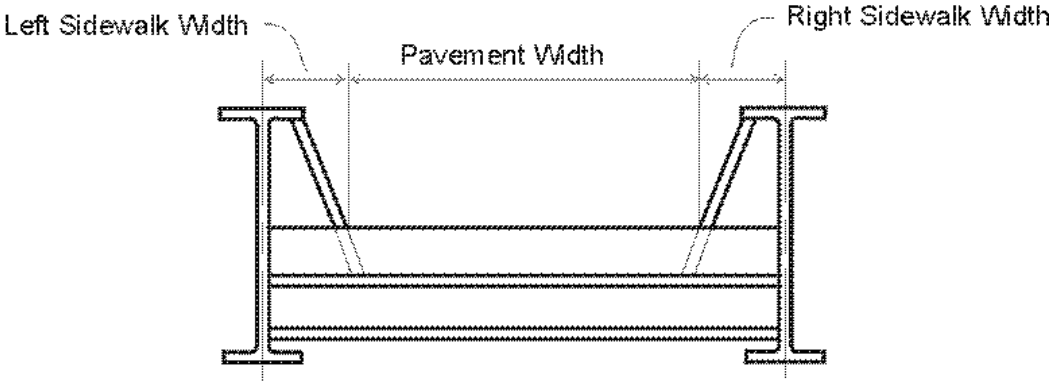
1234567 LEFT SIDEWALK 0 0 NONE NONE 0 0

FIGURES





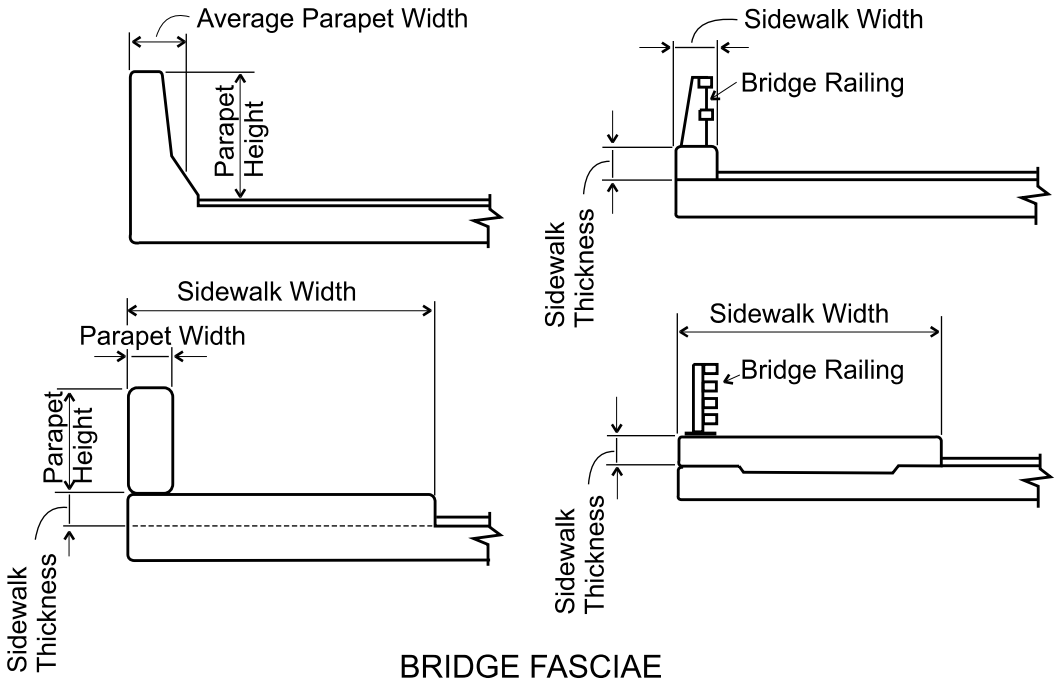




WIDTH MEASUREMENTS

(Continued)

FIGURES
(Cont.)



BRIDGE FASCIAE

NOTES

Railing weights are based on the type of material input:

MATERIAL	WEIGHT
Steel	50 lbs. per linear foot
Concrete	200 lbs. per linear foot
Timber	20 lbs. per linear foot
Aluminum	30 lbs. per linear foot

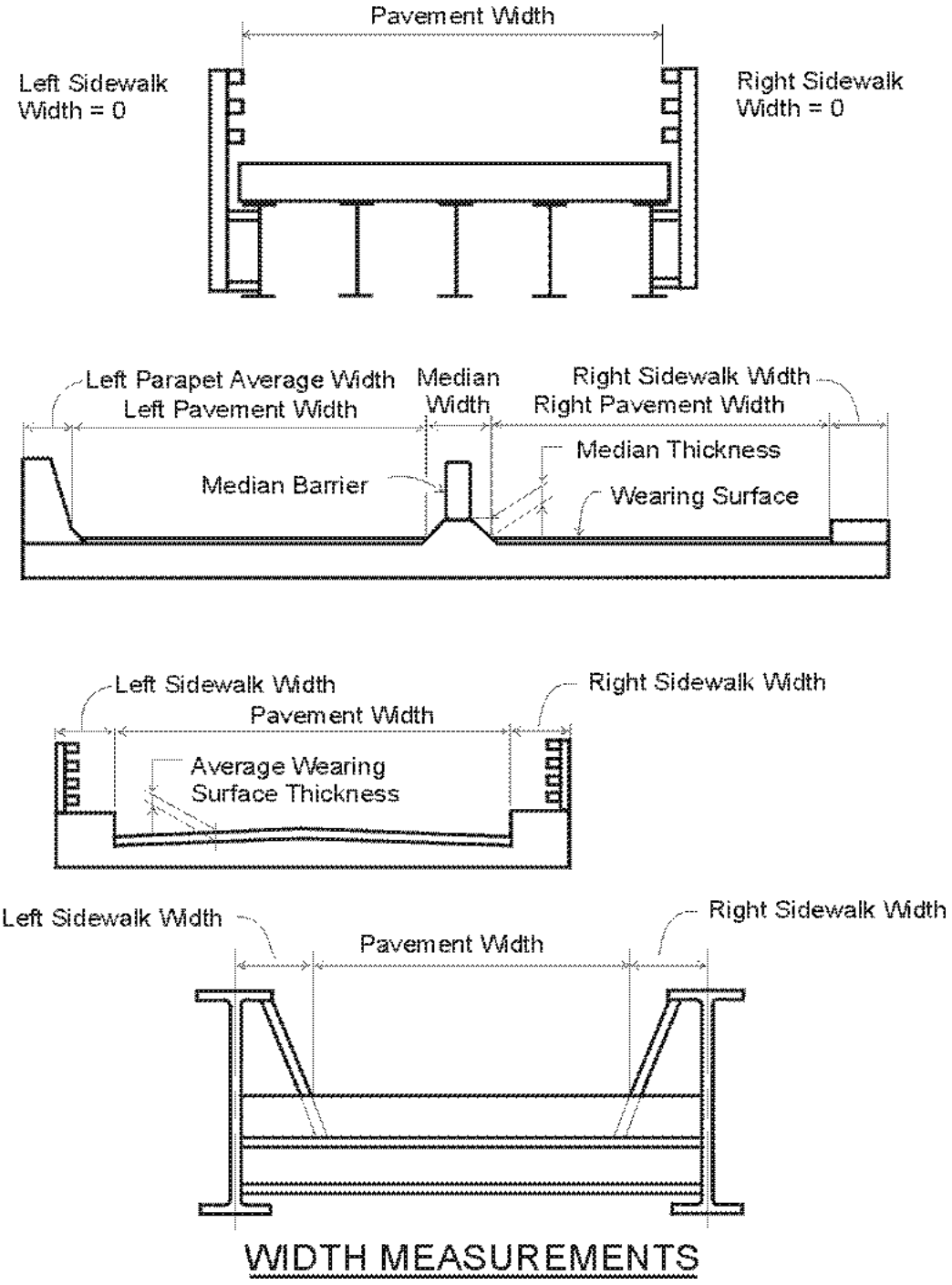
120	BRASS-TRUSS™	COMMAND DESCRIPTION

COMMAND NAME	RIGHT SIDEWALK
PURPOSE	This command defines the right sidewalk and/or parapets on the deck. This command is required.
6 COMMAND PARAMETERS	
Right Sidewalk Width	Enter the distance, in feet, from the curb line to the outside edge of the right sidewalk if one is present. See Figures for all dimensions. (Maximum = 12 feet, Minimum = 0 feet)
Right Sidewalk Thickness	Enter the sidewalk thickness in inches. (Maximum = 18 inches, Minimum = 0 inches)
Right Sidewalk or Parapet Material	Enter "STEEL", "TIMBER", "CONCRETE", "GRATING", "ASPHALT" or "NONE". No other words are acceptable.
Right Sidewalk Railing Material	Enter "ALUMINUM", "STEEL", "TIMBER", "CONCRETE" or "NONE". No other words are acceptable.
Right Concrete Parapet Width	Enter the average distance, in feet, from the inner face to the other face of the parapets. (Maximum = 2 feet, Minimum = 0 feet)
Right Concrete Parapet Height	Enter the distance, in feet, from the top of the deck or sidewalk to the top of the parapet. (Maximum = 4 feet, Minimum = 0 feet.

EXAMPLE

1234567 RIGHT SIDEWALK 0 0 NONE NONE 0 0

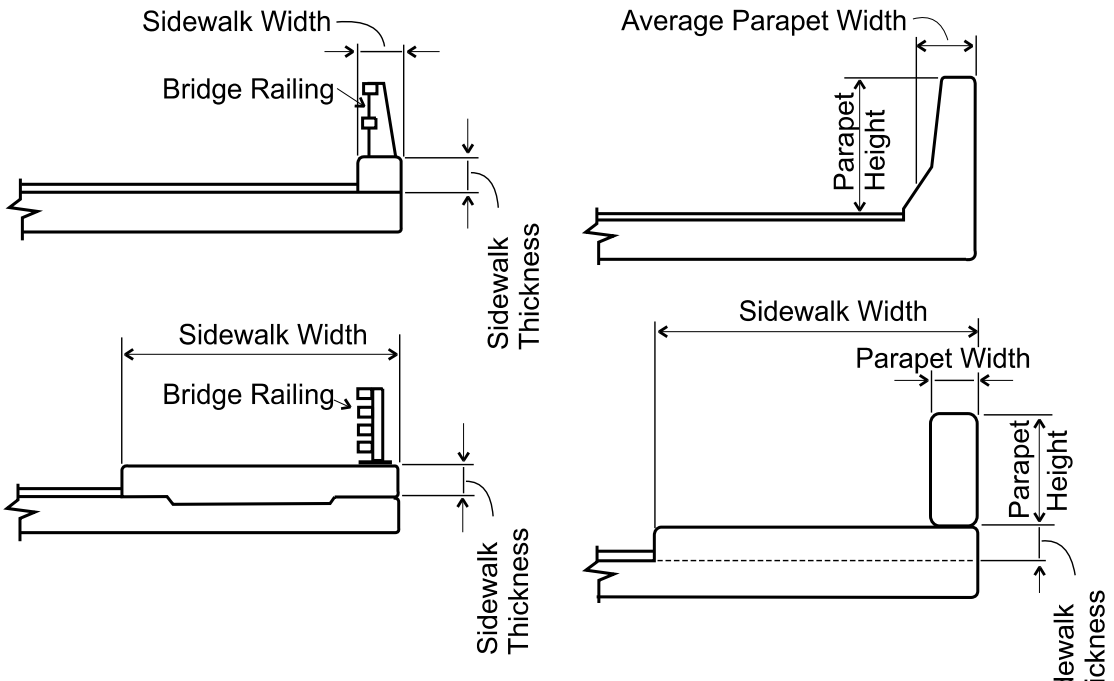
FIGURES



WIDTH MEASUREMENTS

(Continued)

FIGURES
(Cont.)



BRIDGE FASCIAE

NOTES

Railing weights are based on the type of material input:

MATERIAL	WEIGHT
Steel	50 lbs. per linear foot
Concrete	200 lbs. per linear foot
Timber	20 lbs. per linear foot
Aluminum	30 lbs. per linear foot

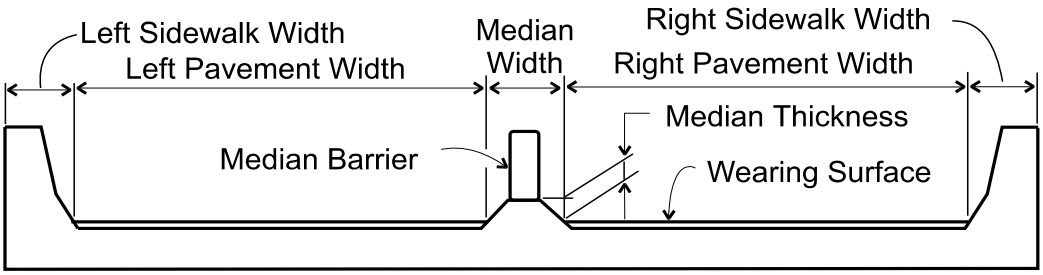
130	BRASS-TRUSS™	COMMAND DESCRIPTION

COMMAND NAME	MEDIAN
PURPOSE	This command defines the median and barrier on the deck. This command is optional.
4 COMMAND PARAMETERS	
Median Width	Enter the width of the median in feet. See Figures. (Maximum = 40 feet, Minimum = 0.2 feet)
Median Thickness	Enter the distance, in inches, from the top of the median surface to the top of the roadway surface. (Maximum = 18 inches, Minimum = 0 inches)
Median Material	Enter "CONCRETE", "ASPHALT", "STEEL", "TIMBER" or "NONE". No other words are acceptable.
Barrier Material	Enter "CONCRETE", "STEEL", "TIMBER", "ALUMINUM" or "NONE". No other words are acceptable.

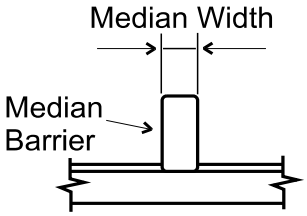
EXAMPLE

1234567 MEDIAN 10.0 9.0 CONCRETE STEEL

FIGURES



WIDTH MEASUREMENTS



FLUSH MEDIAN

NOTES

6. CODING INSTRUCTIONS FOR RAILWAY AND UTILITIES DETAILS

140	BRASS-TRUSS™	COMMAND DESCRIPTION
COMMAND NAME		**MEMBER LAYOUT**
PURPOSE		This command defines the locations of the main members. This command is optional. This command is required for railway bridges only.
9 COMMAND PARAMETERS		
Bridge Edge to Main Member		Enter the distance, in feet, from the left edge of the bridge to the center line of the left main member. For thru-type structures, this dimension will probably be 0. For deck structures with ties or some other type of track support, use the left edge of this support.
Main Member Spacing #1		Enter the distance, in feet, between the center lines of the main members.
Main Member to Bridge Edge or Main Member Spacing #2		Enter the distance*, in feet, from the center line of the last main member to the edge of the bridge or to the center line of the next main member.
Main Member to Bridge Edge or Main Member Spacing #3		Enter the distance*, in feet, from the center line of the last main member to the edge of the bridge or to the center line of the next main member.
Main Member to Bridge Edge or Main Member Spacing #4		Enter the distance*, in feet, from the center line of the last main member to the edge of the bridge or to the center line of the next main member.
Main Member to Bridge Edge or Main Member Spacing #5		Enter the distance*, in feet, from the center line of the last main member to the edge of the bridge or to the center line of the next main member.
Main Member to Bridge Edge or Main Member Spacing #6		Enter the distance*, in feet, from the center line of the last main member to the edge of the bridge or to the center line of the next main member.
Main Member to Bridge Edge or Main Member Spacing #7		Enter the distance*, in feet, from the center line of the last main member to the edge of the bridge or to the center line of the next main member.
Main Member to Bridge Edge or Main Member Spacing #8		Enter the distance*, in feet, from the center line of the last main member to the edge of the bridge or to the center line of the next main member. *If this measurement is to the edge of the bridge, trailing zeros for the remaining parameters are not required.

EXAMPLE

1234567 MEMBER LAYOUT 4.5 6.0 4.5

FIGURES

NOTES

150	BRASS-TRUSS™	COMMAND DESCRIPTION

COMMAND NAME	RAILWAY
PURPOSE	This command defines the maximum permitted railway speed, the track radius, and track super elevation when tracks are on the bridge. This command is optional.
3 COMMAND PARAMETERS	
Track Speed	Enter the maximum permitted speed for the section of track when the track is in perfect condition (no "Slow Orders"). Speed is in Miles Per Hour.
Track Radius	Enter the Center-of-track Radius, in feet, for any curved track on the bridge. If the track alignment is straight, enter 0.
Super-Elevation	Enter the difference in elevation, in inches, between the tops of the rails of the track whose radius has been entered in "TRACK RADIUS".

EXAMPLE

1234567 RAILWAY 40 0 0

FIGURES

NOTES

160	BRASS-TRUSS™	COMMAND DESCRIPTION

COMMAND NAME	TRACK LAYOUT
PURPOSE	This command defines the position of a railway track on a bridge. This command maybe repeated and is optional.
5 COMMAND PARAMETERS	
Bridge Edge to Left Rail Track 1	Enter the distance, in feet, from the left edge of the bridge to the inside face of the top portion of the left rail* for each track. For thru type of structures, use the center line of the truss or girder as the edge of the bridge. For deck structures with ties or some other type of track support, use the left edge of this support. If there are less than 4 tracks, enter 0 where tracks do not exist.
Bridge Edge to Left Rail Track 2	Enter the distance, in feet, from the left edge of the bridge to the inside face of the top portion of the left rail* for each track. For thru type of structures, use the center line of the truss or girder as the edge of the bridge. For deck structures with ties or some other type of track support, use the left edge of this support. If there are less than 4 tracks, enter 0 where tracks do not exist.
Bridge Edge to Left Rail Track 3	Enter the distance, in feet, from the left edge of the bridge to the inside face of the top portion of the left rail* for each track. For thru type of structures, use the center line of the truss or girder as the edge of the bridge. For deck structures with ties or some other type of track support, use the left edge of this support. If there are less than 4 tracks, enter 0 where tracks do not exist.
Bridge Edge to Left Rail Track 4	Enter the distance, in feet, from the left edge of the bridge to the inside face of the top portion of the left rail* for each track. For thru type of structures, use the center line of the truss or girder as the edge of the bridge. For deck structures with ties or some other type of track support, use the left edge of this support. If there are less than 4 tracks, enter 0 where tracks do not exist.
Left Rail to Bridge Edge	Enter the distance, in feet, from the inside face of the top portion of the left rail* of the last track to the edge of the bridge. NOTE: If there is a middle main member, measure up to that member on the first "TRACK LAYOUT". Start from the middle main member and continue on the second "TRACK LAYOUT" command. *This is commonly called the "Gage Line".

EXAMPLE

```
1234567 TRACK  LAYOUT   12.0   0   0   0   16.0
```

FIGURES

NOTES

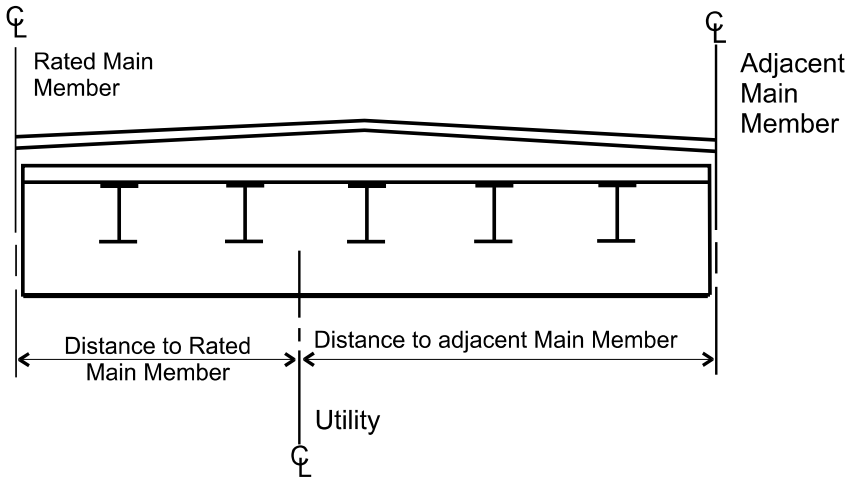
170	BRASS-TRUSS™	COMMAND DESCRIPTION
COMMAND NAME		**UTILITIES**
PURPOSE		This command is used to input utilities information. If the utilities are embedded in the sidewalk slab, do not enter them here, note them in the COMMENTS. This command is optional.
8 COMMAND PARAMETERS		
Type		Enter "CABLE", "FLUID", "GAS" or "UNKN" to identify the material carried in the conduits or pipes. No other words are acceptable. If there are more than one type, repeat this command for each type.
Number		Enter the number of each type of utility in a grouping.
Diameter		Enter the diameter, in inches, of the individual conduit or pipe used to carry the utility on the bridge.
Material		Enter the kind of conduit or pipe used. "ALUMINUM", "STEEL", and "OTHER" are the only acceptable words. The word "STEEL" is to include cast iron and other similar weight metals.
Weight Per Foot		Enter the weight per foot, in pounds, of each type and/or size of utility, if this value is known. If it is unknown, enter 0. This weight is for information only and is not used in computing superimposed dead loads. If the user wishes to include this dead load, increase the weight of the Wearing Surface.
Member Providing Supported		Enter one of the names listed below to describe the structural element of the bridge that receives the weight of the utility first. Allowable names are: "FLOORBEAM", "INTERIOR STRINGER", "FASCIA STRINGER", "LEFT TRUSS", "RIGHT TRUSS", "LEFT GIRDER", "RIGHT GIRDER", "INTERIOR GIRDER", "FASCIA GIRDER" or "SLAB".
Distance from Main Member to be Rated to Location of Utility		For a floorbeam, enter the distance, in feet, from the main member being rated to the location of the utility (see Figure 1). For an interior stringer or a fascia stringer enter the distance, in feet, from the stringer being rated to the location of the utility (see Figure 2). For all other types of main members being rated, enter 0 (see Figures 3 and 4).
Distance from Adjacent Main Member to Location of Utility		For a floorbeam, enter the distance, in feet, from the adjacent main member to the location of the utility (see Figure 1). For an interior stringer or a fascia stringer, enter the distance, in feet, from the adjacent stringer to the location of the utility (see Figure 2). For all other types of adjacent members, enter 0 (see Figures 3 and 4)

EXAMPLE

1234567 UTILITIES FLUID 1 6 STEEL 3.5 FLOORBEAM 1 21

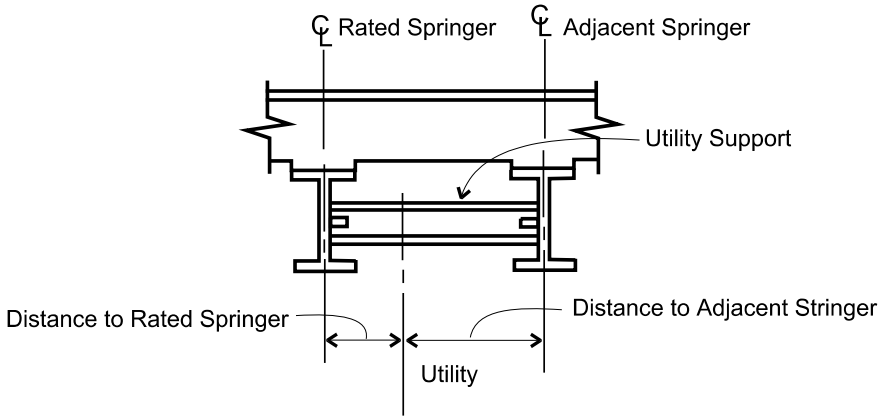
FIGURES

Figure 1



FLOOR BEAM

Figure 2



STRINGER

UTILITY MOUNTINGS

NOTES

(Continued)

FIGURES (Cont.)

Figure 3

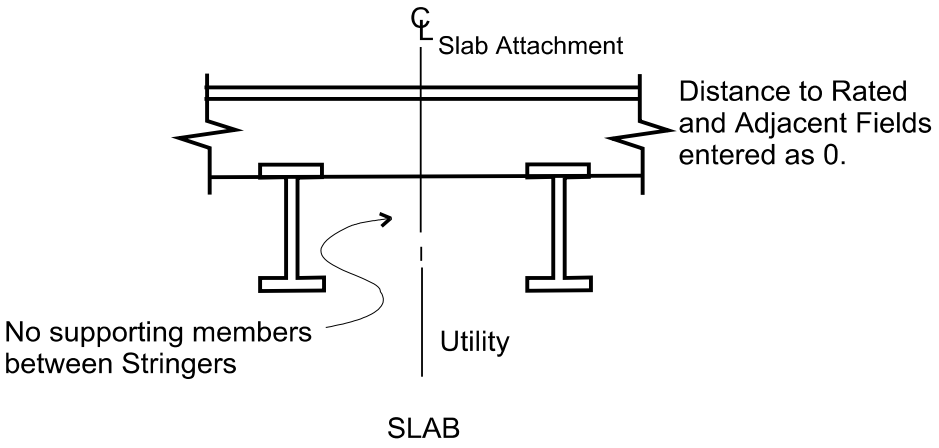
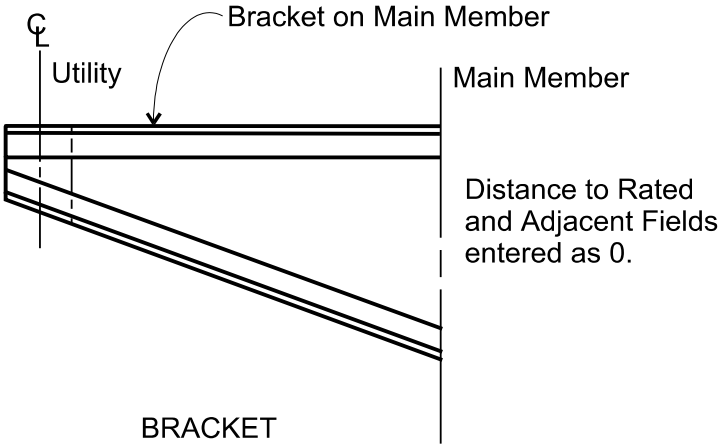


Figure 4



UTILITY MOUNTINGS

NOTES

7. CODING INSTRUCTIONS FOR DECK CROSS-SECTION AND SLEEPERS

7.1 GENERAL INFORMATION

Only one type of deck may be entered. If the “GRATING DECK” command is used, only the “STEEL SLEEPERS” command may be used. If the “TIMBER DECK” command is used, either “SLEEPERS” command may be used.

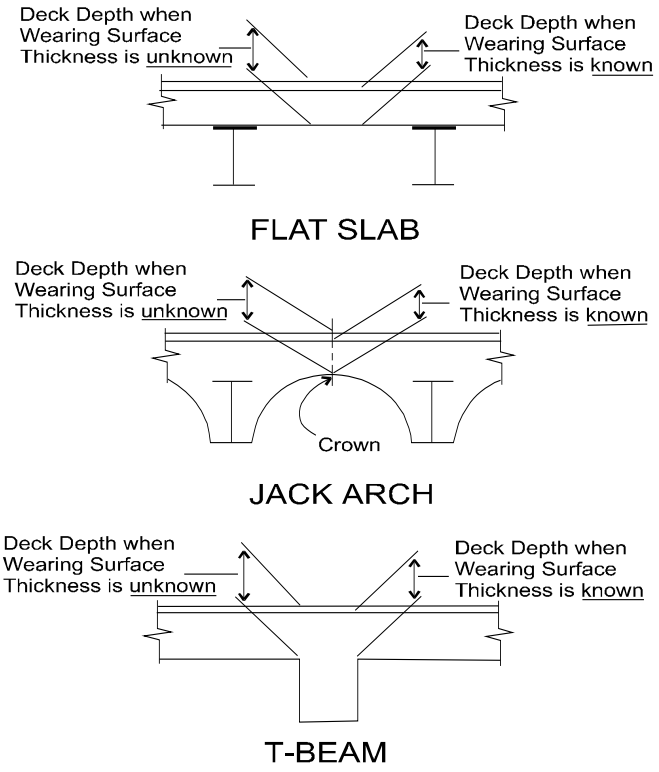
180	BRASS-TRUSS™	COMMAND DESCRIPTION

COMMAND NAME	CONCRETE DECK
PURPOSE	This command defines the concrete deck on a bridge. At least one type of DECK command is required.
7 COMMAND PARAMETERS	
Span	Enter the center-to-center distance, in feet, between the members supporting the deck. Enter 0 for reinforced concrete slab bridges. (Maximum = 30 feet, Minimum = 0 feet)
Depth	Enter the distance, in inches, from the top of the structural concrete deck to the underside of a flat deck or to the crown of a jack-arch deck. If there is a wearing surface thickness that is unknown, use the total thickness from the roadway to the bottom of the deck. For Stay in Place (SIP) forms, measure the depth from the top of the SIP Forms. (See Figure 1) Range = 24 inches to 5 inches and 0.
Type	Enter "FLAT", "ENCASED", "SIP", "NONE" or "JACK" in this parameter. No other words are acceptable. A slab spanning between concrete members is considered "FLAT". (See Figures 2 and 3) If an asphalt wearing surface over corrugated metal is used as a deck, use this command. The depth is taken from the top of the asphalt to the lower surface of the corrugated metal. The type is "FLAT", and note this on the COMMENTS command. For "BLAST", "ENCASED", or "JACK", the CONCRETE PROTECTION command is to be used to determine the proper size of each profile. NOTE: If 0 is entered in the Span or Depth parameter, enter 0 in the 4 remaining parameters.
Number of Bottom Bars	Enter the number of bottom bars per foot in the concrete deck.
Size of Bottom Bars	Enter the size of the bottom bars used in the slab. (Range = #7 to #3)
Number of Top Bars	Enter the number of top bars per foot in the concrete deck.
Size of Top Bars	Enter the size of the top bars used in the slab. (Range = #7 to #3)

EXAMPLE

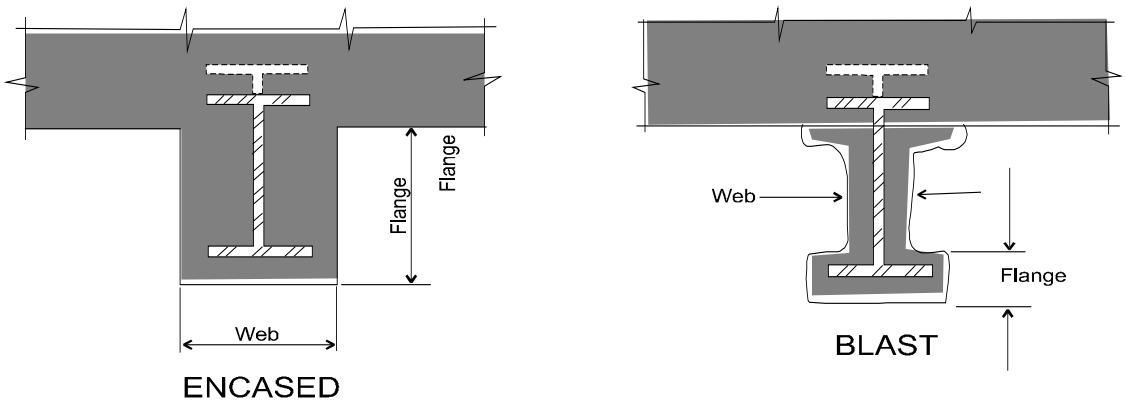
1234567 CONCRETE DECK 4.5 9 FLAT 4 5 5 5

FIGURES



DECK DEPTH

Figure 1

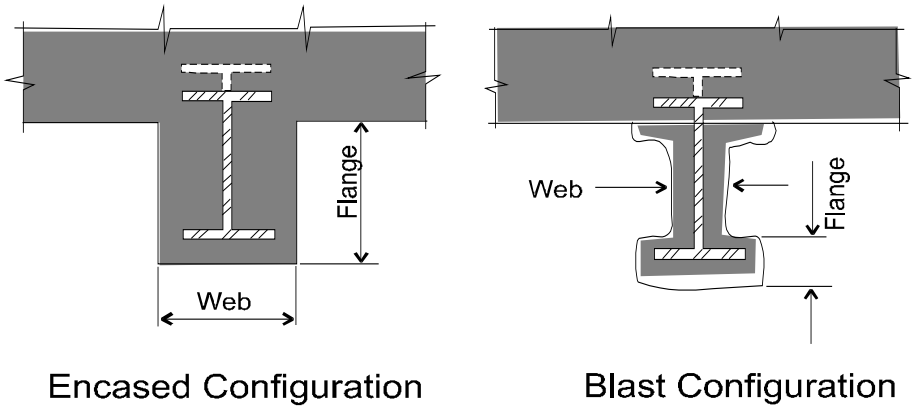


STRINGER

Figure 2

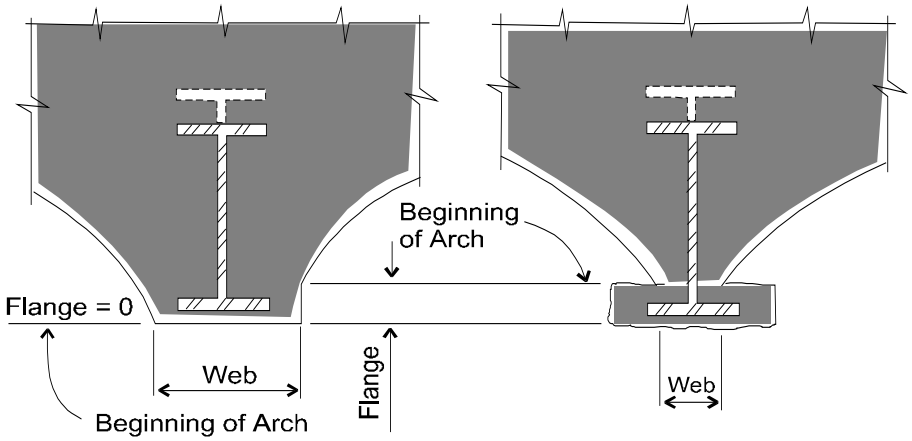
(Continued)

FIGURES
(Cont)



Encased Configuration Blast Configuration

FLAT DECK



Encased Configuration Blast Configuration

JACK DECK

Figure 3

NOTES

190	BRASS-TRUSS™	COMMAND DESCRIPTION

COMMAND NAME	GRATING DECK
PURPOSE	This command defines the grating deck on a bridge. At least one type of DECK command is required.

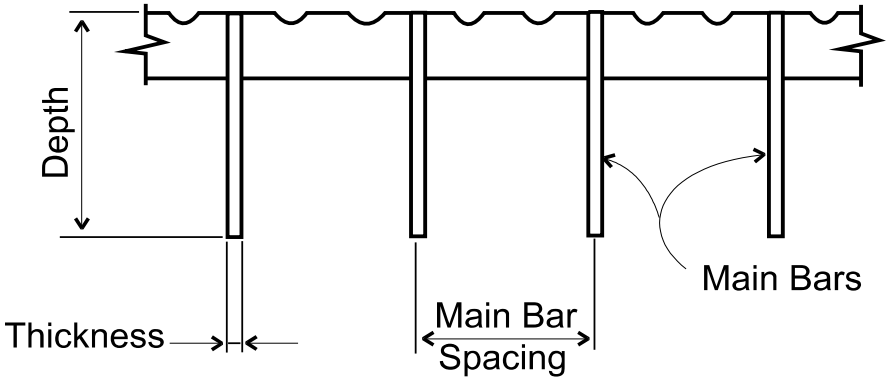
5 COMMAND PARAMETERS

Span	Enter the center-to-center distance, in feet, of the members supporting the deck. (Maximum = 9 feet, Minimum = 1 foot)
Main Bar Depth	Enter the depth, in inches, of the deepest grating bars that are being supported on the next level below the grating whose center-to-center distance was entered above. (See Figures) (Maximum = 9 inches, Minimum = 2 inches)
Main Bar Thickness	Enter the thickness, in inches, of the main bars. (Maximum = 1 inch, Minimum = 0.1 inch)
Main Bar Spacing	Enter the center-to-center distance, in inches, of the main bars. (Maximum = 15 inches, Minimum = 2 inches)
Type	Enter the type of grating construction; either "FILLED" or "OPEN". No other words are acceptable.

EXAMPLE

1234567 GRATING DECK 4.5 8 .5 9 OPEN

FIGURES



OPEN STEEL BRIDGE FLOORING

NOTES

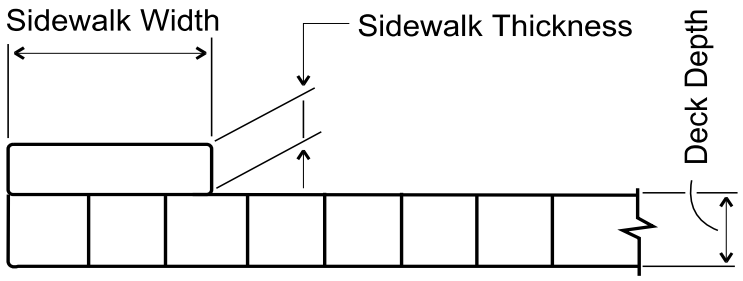
200	BRASS-TRUSS™	COMMAND DESCRIPTION

COMMAND NAME	TIMBER DECK
PURPOSE	This command defines the timber deck on a bridge. At least one type of DECK command is required.
4 COMMAND PARAMETERS	
Span	Enter the center-to-center distance, in feet, of the members supporting the deck. (Maximum = 9 feet, Minimum = 1 foot) NOTE: When there is no timber deck on top of timber girders, enter 0 in all of the remaining fields and note on the "COMMENTS" command.
Depth	Enter the depth, in inches, of the timbers that are used as deck members. (See Figures) (Maximum = 18 inches, Minimum = 2 inches)
Width	Enter the width, in inches, of the timbers. (Maximum = 12 inches, Minimum = 0.75 inches)
Stress Grade	If the stress grade, in ksi, was not zero on the "STRESSES" command, and/or the stress grade for the timber deck is different than the one given on the "STRESSES" command, enter it here. If the two values are equal or the value for the timber deck is unknown, enter 0.

EXAMPLE

1234567 TIMBER DECK 5.5 8.5 5.5 0

FIGURES



TIMBER DECK

NOTES

210	BRASS-TRUSS™	COMMAND DESCRIPTION

COMMAND NAME	STEEL SLEEPERS
PURPOSE	This command defines the steel sleepers on a bridge. This command is optional.
4 COMMAND PARAMETERS	
Span	Enter the center-to-center distance, in feet, between the members supporting the sleepers. (See Figure) (Maximum = 9 feet, Minimum = 1 foot) For deterioration of the section, enter the word "RUST". See Note 1.
Depth	Enter the depth, in inches, of the members that are used as the sleepers. See Note 2. (Maximum = 12 inches, Minimum = 2 inches)
Flange Width **or** "W" + Weight per Foot	Enter the width, in inches, of the flange(s). If a channel or rolled beam section is specified on the "As Built" plans, enter the letter "W" followed by the weight per foot from these plans. See Note 2. (Maximum = 11.5 inches, Minimum = 1.5 inches)
Flange Thickness	Enter the average thickness, in inches, of the flange(s). If the weight per foot was entered above, enter 0. (Range = 1 inch to .15 inch and 0)

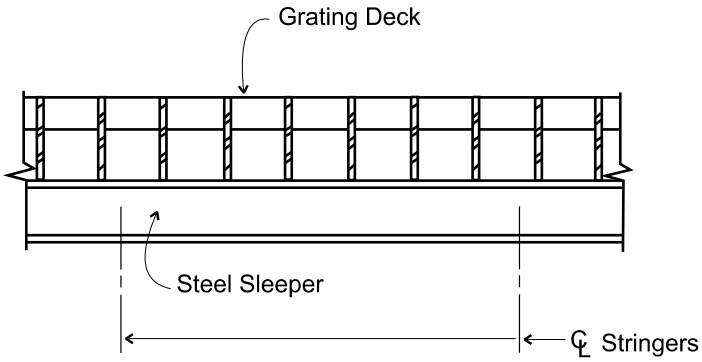
EXAMPLE

1234567 STEEL SLEEPERS 4.5 10 3.033 0.436 (Channel)

1234567 STEEL SLEEPERS 4.5 18 W55 0 (WN18x55 - First 18x55 section listed)

1234567 STEEL SLEEPERS 4.5 18 6.000 0.691 (W18x55 - Second 18x55 section listed)

FIGURES



GRATING DECK WITH SLEEPERS

NOTES

1. If there is any deterioration of any sleepers, enter one command fully as normal. Then repeat this command and enter the word "RUST" in the first parameter. For the remainder of the second command enter the percentage of area loss for a particular element, or the percentage of dimension loss for the appropriate element. See Chapter 13 for a detailed explanation of the information required for deterioration.

2. There are two ways the user can select a sleeper from the sections library. 1) The user may input a section depth and flange width in Parameters 2 and 3. The program will search the library for the **first occurance** of this combination of values. If a section is not found in the library, the program tries to find a section within ⅛" of the dimensions input. If a section is not found, an error message appears in the output. 2) If a W Section or Channel is specified on the "As Built" plans, the user may input a one or two digit integer section depth corresponding to the beam depth as listed under "Designation" in the AISC *Manual of Steel Construction* in Parameter 2 and input the letter "W" followed by the weight per foot in Parameter 3. The program will search the library for the **first occurance** of the combination of depth and weight. **Note:** The use of the letter "W" does not restrict the user to W sections in the AISC *Manual of Steel Construction*. The letter "W" is merely a flag to tell the program to search for a rolled section (W section, channel, or angle). If a section is not found, an error message appears in the output. **Note:** In the standard sections library, some standard shapes begin with "W" and "WN" (i.e., W24X76 and WN24X76). In 1985, AISC changed the dimensions of several steel shapes while keeping the same designation. To differentiate between the two types (especially when the older shape is needed to perform a rating) an "N" was added to the shape designation to indicate a NEW shape. In the event the user wishes to select the **second occurance** of a section listed in the library, use the first method described above and input the specific flange width as it appears in the library. See the example above. Note: A zero **must be entered** in Parameter 4 when an AISC shape is entered in Parameters 2 and 3.

The shape you enter **must exist in the standard shapes library**, *stsect.dat*. This library is a binary file and is not easily readable. An ASCII copy of this file has been placed on the FTP Server for viewing.

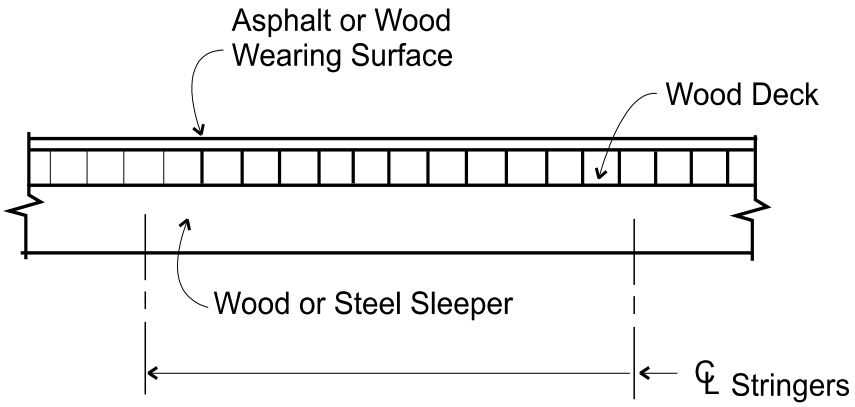
220	BRASS-TRUSS™	COMMAND DESCRIPTION

COMMAND NAME	TIMBER SLEEPERS
PURPOSE	This command defines the timber sleepers on a bridge. This command is optional.
4 COMMAND PARAMETERS	
Span	Enter the center-to-center distance, in feet, between the members supporting the sleepers. (See Figure) (Maximum = 9 feet, Minimum = 1 foot) For deterioration of the section, enter the word "ROT". (See Notes)
Depth	Enter the depth, in inches, of the timbers that are used as the sleepers. (Maximum = 18 inches, Minimum = 4 inches)
Width	Enter the width, in inches, of the timbers. (Maximum = 12 inches, Minimum = 2 inches)
Stress	If the stress grade was not 0 on the "STRESSES" command, and/or the stress grade for the timber sleepers is different than the one given on the "STRESSES" command, enter it here, in ksi. If the two values are equal or the value for the timber sleepers is unknown, enter 0.

EXAMPLE

1234567 TIMBER SLEEPERS 4.5 8 5.5 0

FIGURES



WOOD DECK WITH SLEEPERS

NOTES

If there is any deterioration of any sleepers, enter one command fully as normal. Then repeat this command and enter the word "ROT" in the first parameter. For the remainder of the second command enter the percentage of area loss for a particular element, or the percentage of dimension loss for the appropriate element. See Chapter 13 for a detailed explanation of the information required for deterioration.

8. CODING INSTRUCTIONS FOR SECONDARY MEMBERS - STRINGERS

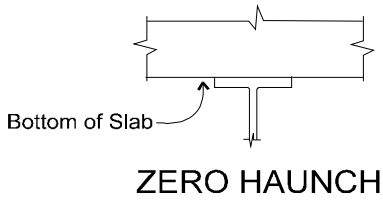
230	BRASS-TRUSS™	COMMAND DESCRIPTION

COMMAND NAME	SECONDARY MEMBER LONGITUDINAL STRINGER
PURPOSE	This command defines the secondary member - longitudinal stringers on the bridge. This command is required when stringers are present.
5 COMMAND PARAMETERS	
Span	Enter the center-to-center distance, in feet, of the members supporting the stringers. (Maximum = 50 feet, Minimum = 3 feet)
Number of Continuous Spans	Enter the number of spans through which the stringers are acting continuously. Enter 0 for a simple span. (Maximum = 8 spans, Minimum = 0 spans, 1 is not acceptable)
Haunch Depth	Enter the average distance, in inches, from the top of the stringer flange to the bottom of the concrete deck. If the top of the stringer top flange is at or above the bottom of the slab, enter 0. If non-composite, enter 0. See Figure 1. (Maximum = 6 inches, Minimum = 0 inches)
Number of Stringers	Enter the number of stringers that support the roadway.
Compression Flange Restraint	Enter "YES" or "NO", "Y" or "N". Nothing else is acceptable. Use "YES" or "Y" if any of the following conditions exists: 1) The presence of shear connectors. 2) The stringers are encased, have blast protection, or are enclosed by jack arch construction. See Figure 2. 3) The concrete deck extends down to the bottom of the top flange (zero haunch, see Figure 1). 4) The sleepers or the steel grating is adequately attached to the top flange. Use "NO" or "N" for ALL other conditions.

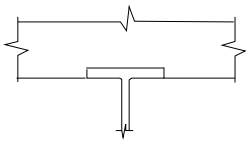
EXAMPLE

1234567 SECONDARY MEMBER LONGITUDINAL STRINGER 20 0 0 5 YES

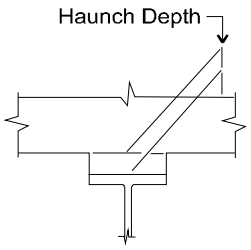
FIGURES



ZERO HAUNCH



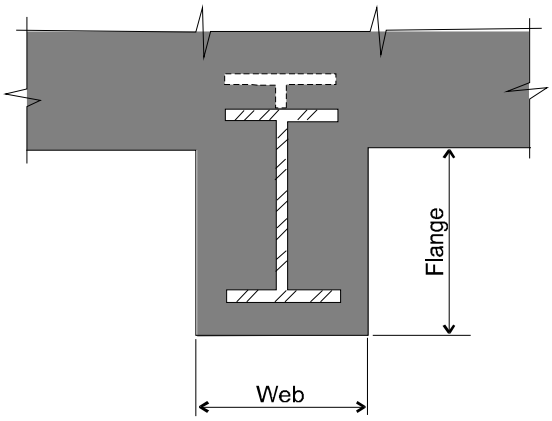
ZERO HAUNCH



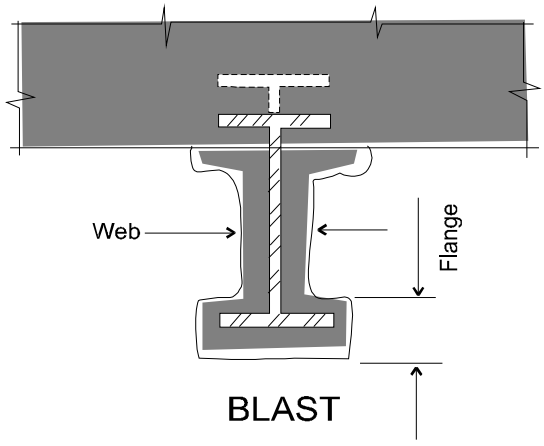
HAUNCH DETAILS

HAUNCH DEPTH

Figure 1



ENCASED



BLAST

STRINGER

Figure 2

NOTES

240	BRASS-TRUSS™	COMMAND DESCRIPTION

COMMAND NAME	LEFT SIDEWALK STRINGER
PURPOSE	This command defines the left sidewalk stringer on a bridge. This command is optional.
5 COMMAND PARAMETERS	
Type of Supporting Members	Enter "TIMBER", "CHANNEL" or "ROLLED" to describe the kind of members supporting the left sidewalk. No other words are acceptable. See Figures.
Member Depth	Enter the depth, in inches, of the left sidewalk stringer. See Notes. (Maximum = 37 inches, Minimum = 3 inches)
Member Flange Width **or** "W" + Weight per Foot	Enter the flange width, in inches. If a channel or rolled beam section is specified on the "As Built" plans, enter the letter "W" followed by the weight per foot from these plans. See Notes. Enter the width, in inches, of timber members. (Maximum = 17 inches, Minimum = 1.5 inches)
Member Flange Thickness	Enter the average flange thickness, in inches. If the weight per foot was entered above, or the type of supporting members is timber, enter 0. (Maximum = 1.7 inches, Minimum = 0 inches)
Number of Members	Enter the number of stringers supporting the left sidewalk. NOTE: For special loads in the sidewalk area (trusses left in place that are carried by new thru or deck girders, heavy utility vaults, etc.), on bridge types that allow the use of stringers, enter "ROLLED" in the Type of Supporting Member parameter. Enter "99" in the Member Depth parameters. Enter "W" and the weight per foot needed to account for the actual sidewalk stringers, if present, plus the special load in the Member Flange Width parameter. Enter "0" in the Member Flange Thickness parameter. Enter "1" in the Number of Members parameter. Note the actual conditions in the Comments.

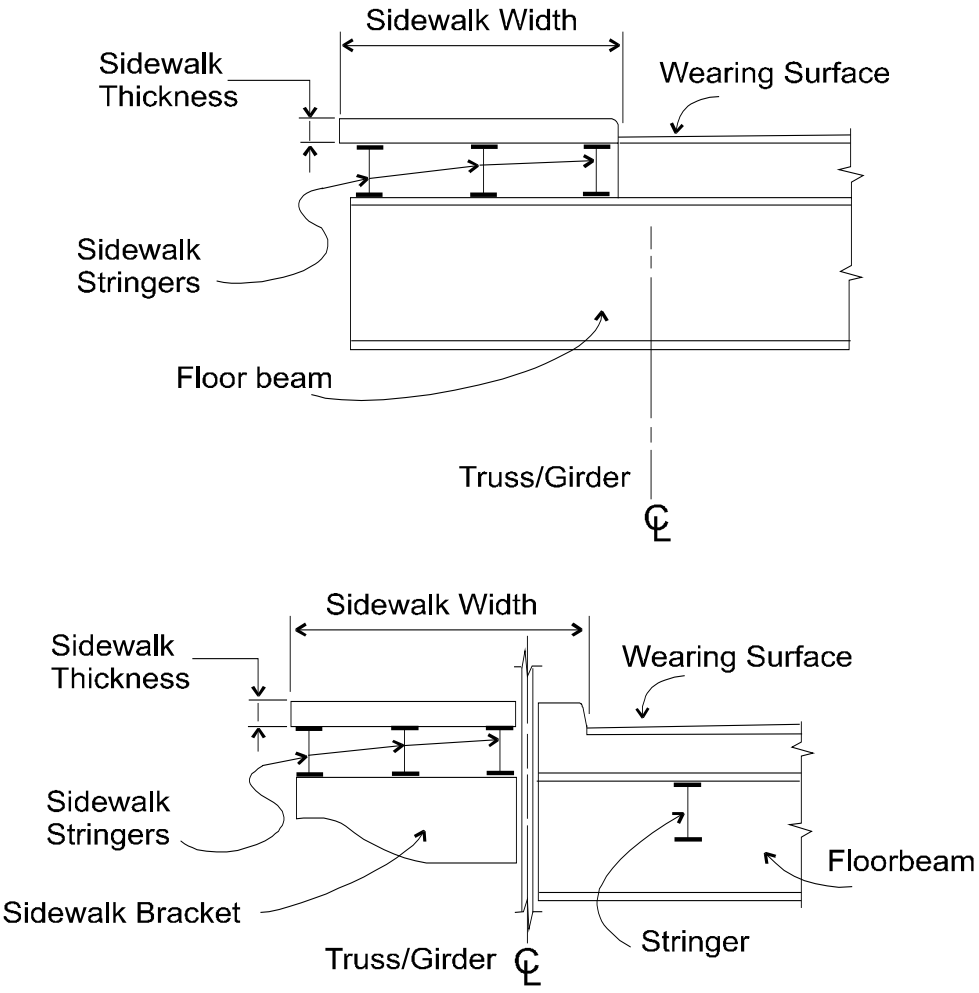
EXAMPLE

1234567 LEFT SIDEWALK STRINGER ROLLED 18 W55 0 3
(WN 18x55 - First 18x55 section listed in sections library)

1234567 LEFT SIDEWALK STRINGER ROLLED 18 6.000 0.691 3
(W 18x55 - Second 18x55 section listed in sections library)

1234567 LEFT SIDEWALK STRINGER CHANNEL 9 W20 0 2

FIGURES



SIDEWALK STRINGERS

Left Sidewalk

NOTES

There are two ways the user can select a stringer from the sections library. 1) The user may input a section depth and flange width in Parameters 2 and 3. The program will search the library for the **first occurrence** of this combination of values. If a section is not found in the library, the program tries to find a section within ⅛" of the dimensions input. If a section is not found, an error message appears in the output. 2) If a W Section or Channel is specified on the "As Built" plans, the user may input a one or two digit integer section depth corresponding to the beam depth as listed under "Designation" in the AISC *Manual of Steel Construction* in Parameter 2 and input the letter "W" followed by the weight per foot in Parameter 3. The program will search the library for the **first occurrence** of the combination of depth and weight. **Note:** The use of the letter "W" does not restrict the user to W sections in the AISC *Manual of Steel Construction*. The letter "W" is merely a flag to tell the program to search for a rolled section (W section, channel, or angle). If a section is not found, an error message appears in the output. **Note:** In the standard sections library, some standard shapes begin with "W" and "WN" (i.e., W24X76 and WN24X76). In 1985, AISC changed the dimensions of several steel shapes while keeping the same designation. To differentiate between the two types (especially when the older shape is needed to perform a rating) an "N" was added to the shape designation to indicate a NEW shape. In the event the user wishes to select the **second occurrence** of a section listed in the library, use the first method described above and input the specific flange width as it appears in the library. See the example above. Note: A zero **must be entered** in Parameter 4 when an AISC shape is entered in Parameters 2 and 3.

The shape you enter **must exist in the standard shapes library**, *stsect.dat*. This library is a binary file and is not easily readable. An ASCII copy of this file has been placed on the FTP Server for viewing.

250	BRASS-TRUSS™	COMMAND DESCRIPTION

COMMAND NAME	RIGHT SIDEWALK STRINGER
PURPOSE	This command defines the right sidewalk stringer on a bridge. This command is optional.
5 COMMAND PARAMETERS	
Type of Supporting Members	Enter "TIMBER", "CHANNEL" or "ROLLED" to describe the kind of members supporting the right sidewalk. No other words are acceptable. See Figures.
Member Depth	Enter the depth, in inches, of the right sidewalk stringer. See Notes. (Maximum = 37 inches, Minimum = 3 inches)
Member Flange Width **or** "W" + Weight per Foot	Enter the flange width, in inches. If a channel or rolled beam section is specified on the "As Built" plans, enter the letter "W" followed by the weight per foot from these plans. See Notes. Enter the width, in inches, of timber members. (Maximum = 17 inches, Minimum = 1.5 inches)
Member Flange Thickness	Enter the average flange thickness, in inches. If the weight per foot was entered above, or the type of supporting members is timber, enter 0. (Maximum = 1.7 inches, Minimum = 0 inches)
Number of Members	Enter the number of stringers supporting the right sidewalk. NOTE: For special loads in the sidewalk area (trusses left in place that are carried by new thru or deck girders, heavy utility vaults, etc.), on bridge types that allow the use of stringers, enter "ROLLED" in the Type of Supporting Member parameter. Enter "99" in the Member Depth parameters. Enter "W" and the weight per foot needed to account for the actual sidewalk stringers, if present, plus the special load in the Member Flange Width parameter. Enter "0" in the Member Flange Thickness parameter. Enter "1" in the Number of Members parameter. Note the actual conditions in the Comments.

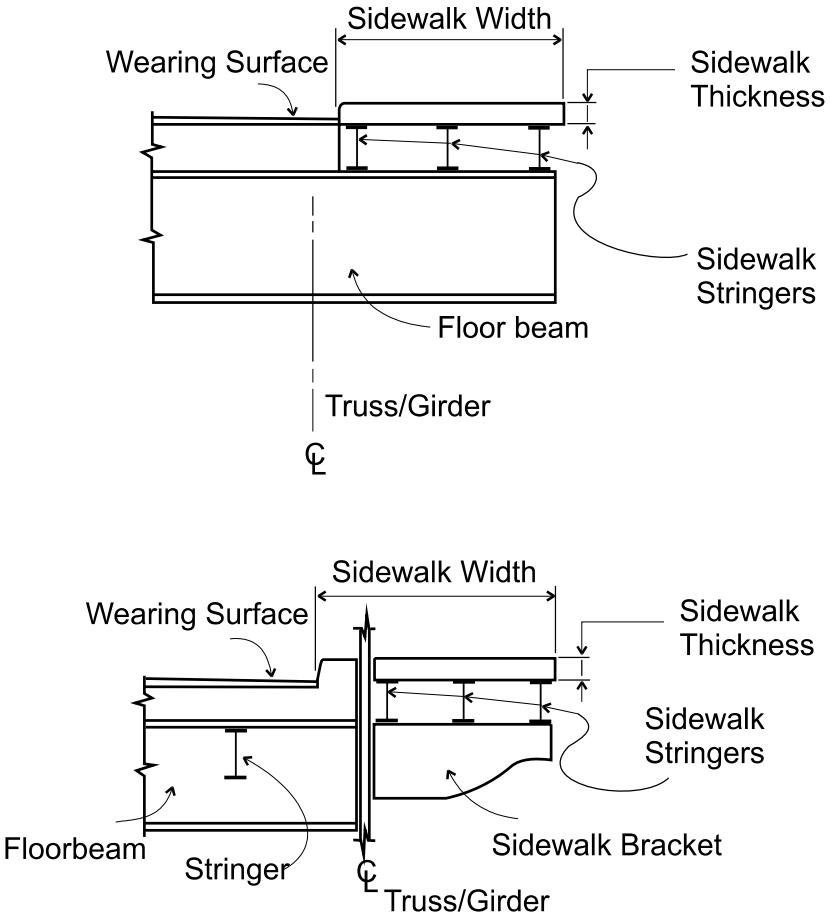
EXAMPLE

1234567 RIGHT SIDEWALK STRINGER ROLLED 18 W55 0 3
(WN 18x55 - First 18x55 section listed in sections library)

1234567 RIGHT SIDEWALK STRINGER ROLLED 18 6.000 0.691 3
(W 18x55 - Second 18x55 section listed in sections library)

1234567 RIGHT SIDEWALK STRINGER CHANNEL 9 W20 0 2

FIGURES



SIDEWALK STRINGERS

Right Sidewalk

NOTES

There are two ways the user can select a stringer from the sections library. 1) The user may input a section depth and flange width in Parameters 2 and 3. The program will search the library for the **first occurrence** of this combination of values. If a section is not found in the library, the program tries to find a section within ⅛" of the dimensions input. If a section is not found, an error message appears in the output. 2) If a W Section or Channel is specified on the "As Built" plans, the user may input a one or two digit integer section depth corresponding to the beam depth as listed under "Designation" in the AISC *Manual of Steel Construction* in Parameter 2 and input the letter "W" followed by the weight per foot in Parameter 3. The program will search the library for the **first occurrence** of the combination of depth and weight. **Note:** The use of the letter "W" does not restrict the user to W sections in the AISC *Manual of Steel Construction*. The letter "W" is merely a flag to tell the program to search for a rolled section (W section, channel, or angle). If a section is not found, an error message appears in the output. **Note:** In the standard sections library, some standard shapes begin with "W" and "WN" (i.e., W24X76 and WN24X76). In 1985, AISC changed the dimensions of several steel shapes while keeping the same designation. To differentiate between the two types (especially when the older shape is needed to perform a rating) an "N" was added to the shape designation to indicate a NEW shape. In the event the user wishes to select the **second occurrence** of a section listed in the library, use the first method described above and input the specific flange width as it appears in the library. See the example above. Note: A zero **must be entered** in Parameter 4 when an AISC shape is entered in Parameters 2 and 3.

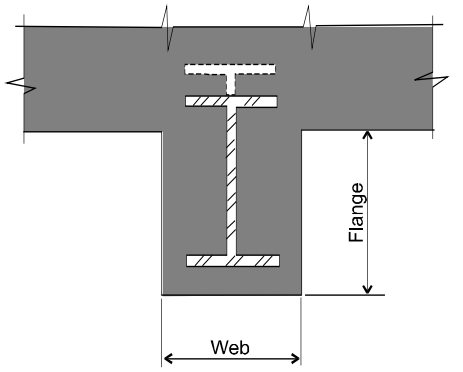
The shape you enter **must exist in the standard shapes library**, *stsect.dat*. This library is a binary file and is not easily readable. An ASCII copy of this file has been placed on the FTP Server for viewing.

COMMAND NAME	CONCRETE PROTECTION LONGITUDINAL STRINGER
PURPOSE	This command defines the concrete protection on a longitudinal stringer. This command is optional.
2 COMMAND PARAMETERS	
Flange Depth	If "BLAST" is entered in the Type parameter on the CONCRETE DECK command, enter the distance, in inches, from the bottom of the concrete to the top of the concrete that is covering the bottom flange. If "ENCASED" is entered in the Type parameter on the CONCRETE DECK command, enter the distance, in inches, from the bottom of the concrete slab to the bottom of the concrete that is covering the bottom flange. See Figures.
Web Thickness	If "BLAST" is entered in the Type parameter on the CONCRETE DECK command, enter the distance, in inches, from one side of the concrete covering the web to the other above the bottom flange. If "ENCASED" is entered in the Type parameter on the CONCRETE DECK command, enter the distance, in inches, from one side of the concrete to the other. See Figures.

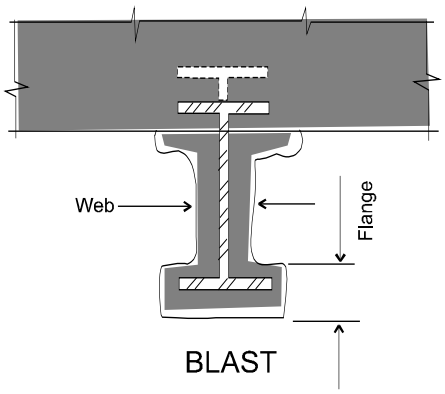
EXAMPLE

1234567 CONCRETE PROTECTION LONGITUDINAL STRINGER 12 2

FIGURES



ENCASED



BLAST

STRINGER

NOTES

270	BRASS-TRUSS™	COMMAND DESCRIPTION

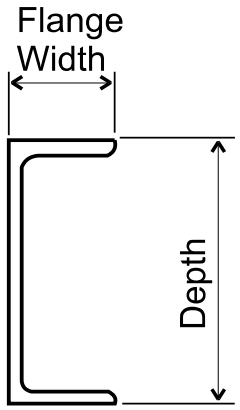
COMMAND NAME	CHANNEL STRINGER
PURPOSE	This command defines channel stringers. At least one type of STRINGER command is required. This command maybe repeated to define a fascia and interior channel stringer.
3 COMMAND PARAMETERS	
Location	Enter the location of the stringer being defined. Only the words "FASCIA" or "INTERIOR" are allowed. For deterioration of the section, enter the word "RUST". See Note 1.
Depth	Enter the depth, in inches, of the channel stringer. See Note 2. (Maximum = 18 inches, Minimum = 3 inches)
Flange Width **or** "W" + Weight per Foot	Enter the flange width, in inches, of the channel stringer. If the channel section is specified on the "As Built" plans, enter the letter "W" followed by the weight per foot from these plans. See Note 2. (Maximum = 4.2 inches, Minimum = 1.4 inches or Maximum = 58 lbs., Minimum = 4.1 lbs.)

EXAMPLE

1234567 CHANNEL STRINGER FASCIA 15 3.716

1234567 CHANNEL STRINGER INTERIOR 12 W30

FIGURES



CHANNEL

NOTES

1. If there is deterioration of any stringers, enter one command fully as normal. Then repeat this command and enter the word "RUST" in the first parameter. For the remainder of the second command, enter the percentage of area loss for a particular element or the percentage of dimension loss for the appropriate element. See Chapter 13 for a detailed explanation of the information required for deterioration.

2. There are two ways the user can select a channel stringer from the sections library. 1) The user may input a section depth and flange width in Parameters 2 and 3. The program will search the library for the **first occurrence** of this combination of values. If a section is not found in the library, the program tries to find a section within ⅛" of the dimensions input. If a section is not found, an error message appears in the output. 2) If a Channel is specified on the "As Built" plans, the user may input a one or two digit integer section depth corresponding to the beam depth as listed under "Designation" in the AISC *Manual of Steel Construction* in Parameter 2 and input the letter "W" followed by the weight per foot in Parameter 3. The program will search the library for the **first occurrence** of the combination of depth and weight. **Note:** The use of the letter "W" does not mean that a W section will be selected. The letter "W" is merely a flag to tell the program to search for a rolled channel section. If a section is not found, an error message appears in the output.

The shape you enter **must exist in the standard shapes library**, *stsect.dat*. This library is a binary file and is not easily readable. An ASCII copy of this file has been placed on the FTP Server for viewing.

280	BRASS-TRUSS™	COMMAND DESCRIPTION

COMMAND NAME	ROLLED STRINGER
PURPOSE	This command defines rolled stringers. At least one type of STRINGER command is required. This command may be repeated to define a fascia and interior rolled beam stringer.
4 COMMAND PARAMETERS	
Location	Enter the location of the stringer being defined. Only the words "FASCIA" or "INTERIOR" are allowed. For deterioration of the section, enter the word "RUST". See Note 1.
Depth	Enter the depth, in inches, of the rolled beam stringer. See Note 2. (Maximum = 37 inches, Minimum = 3 inches)
Flange Width **or** "W" + Weight per Foot	Enter the flange width, in inches, of the rolled beam stringer. If the rolled beam section is specified on the "As Built" plans, enter the letter "W" followed by the weight per foot from these plans. See Note 2. (Maximum = 18 inches, Minimum = 2 inches or Maximum = 730 lbs., Minimum = 5.1 lbs.)
Flange Thickness	Enter the average flange thickness, in inches, of the rolled beam stringer. If the weight per foot was entered in Flange Width, enter 0. (Maximum = 5 inches, Minimum = 0.18 inches or 0 inches)

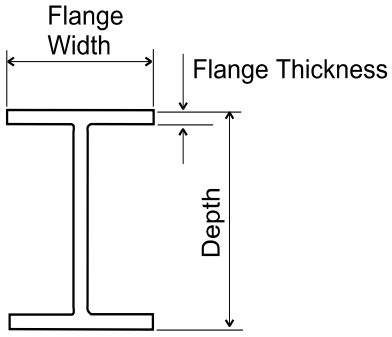
EXAMPLE

1234567 ROLLED STRINGER INTERIOR 21 8.355 0.835

1234567 ROLLED STRINGER FASCIA 24 W104 0
(WN 24x104 - First 24x104 section listed in sections library)

1234567 ROLLED STRINGER FASCIA 24 9.775 0.942
(W 24x104 - Second 24x104 section listed in sections library)

FIGURES



ROLLED BEAM

NOTES

1. If there is deterioration of any stringers, enter one command fully as normal. Then repeat this command and enter the word "RUST" in the first parameter. For the remainder of the second command, enter the percentage of area loss for a particular element, or the percentage of dimension loss for the appropriate element. See Chapter 13 for a detailed explanation of the information required for deterioration.

2. There are two ways the user can select a rolled stringer from the sections library. 1) The user may input a section depth and flange width in Parameters 2 and 3. The program will search the library for the **first occurrence** of this combination of values. If a section is not found in the library, the program tries to find a section within ⅛" of the dimensions input. If a section is not found, an error message appears in the output. 2) If a W section is specified on the "As Built" plans, the user may input a one or two digit integer section depth corresponding to the beam depth as listed under "Designation" in the AISC *Manual of Steel Construction* in Parameter 2 and input the letter "W" followed by the weight per foot in Parameter 3. The program will search the library for the **first occurrence** of the combination of depth and weight. If a section is not found, an error message appears in the output. **Note:** In the standard sections library, some standard shapes begin with "W" and "WN" (i.e., W24X76 and WN24X76). In 1985, AISC changed the dimensions of several steel shapes while keeping the same designation. To differentiate between the two types (especially when the older shape is needed to perform a rating) an "N" was added to the shape designation to indicate a NEW shape. In the event the user wishes to select the **second occurrence** of a section listed in the library, use the first method described above and input the specific flange width as it appears in the library. See the example above. Note: A zero **must be entered** in Parameter 4 when an AISC shape is entered in Parameters 2 and 3.

The shape you enter **must exist in the standard shapes library**, *stsect.dat*. This library is a binary file and is not easily readable. An ASCII copy of this file has been placed on the FTP Server for viewing.

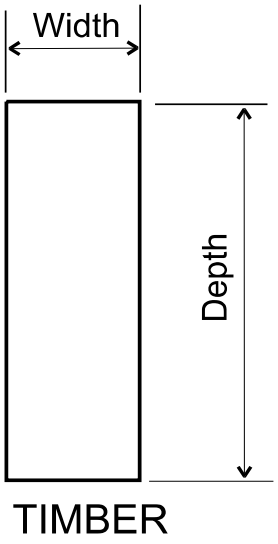
290	BRASS-TRUSS™	COMMAND DESCRIPTION

COMMAND NAME	TIMBER STRINGER
PURPOSE	This command defines timber stringers. At least one type of STRINGER command is required. This command may be repeated to define a fascia and interior timber stringer.
4 COMMAND PARAMETERS	
Location	Enter the location of the stringer being defined. Only the words "FASCIA" or "INTERIOR" are allowed. For deterioration of the section, enter the word "ROT" (See Notes).
Depth	Enter the depth, in inches, of the timber stringer. (Maximum = 18 inches, Minimum = 6 inches)
Width	Enter the width, in inches, of the timber stringer. (Maximum = 12 inches, Minimum = 2 inches)
Stress Grade	If the stress grade was not 0 on the STRESSES command, and/or the stress grade for the timber stringers is different than the one given on the STRESSES command, enter it here, in ksi. If the two values are equal or the value for the timber stringers is unknown, enter 0.

EXAMPLE

1234567 TIMBER STRINGER FASCIA 18 9 0
1234567 TIMBER STRINGER ROT

FIGURES



NOTES

If there is a deterioration of any stringers, enter one command fully as normal. Then repeat this command and enter the word "ROT" in the first parameter. For the remainder of the second command enter the percentage of area loss for a particular element, or the percentage of dimension loss for the appropriate element. See Chapter 13 for a detailed explanation of the information required for deterioration.

9. CODING INSTRUCTIONS FOR SECONDARY MEMBERS - FLOORBEAMS

9.1 GENERAL INFORMATION

If a “TIMBER” floorbeam is encountered, enter it as an equal weight steel “ISEC” with only a “WEB PLATE” of equal depth. Note the actual size of the COMMENTS command.

300	BRASS-TRUSS™	COMMAND DESCRIPTION

COMMAND NAME	SECONDARY MEMBER TRANSVERSE FLOORBEAM
PURPOSE	This command defines the secondary member transverse floor beams. This command is required.

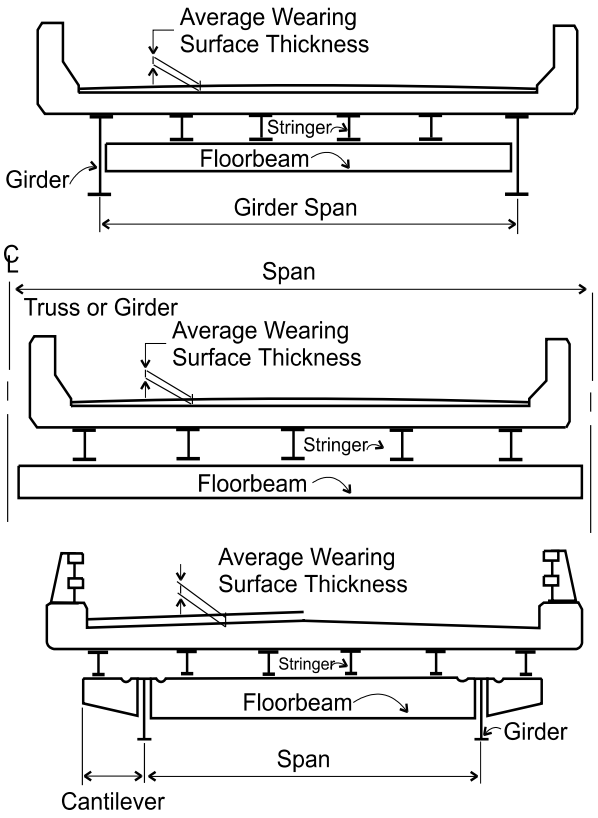
6 COMMAND PARAMETERS

Span	Enter the center-to-center distance, in feet, of the members supporting the floorbeams. (Maximum = 60 feet, Minimum = 8 feet) See Figure 1.
Left Floorbeam Cantilever Length	Enter the distance, in feet, from the center of the member supporting the floorbeam to the outer extremity of the floorbeam for "DECK" Type Bridges. For "TRUSSES" with inverted "U"-bolt hanger connections, enter the sidewalk width from the curb line to the end of the floorbeam and the floorbeam cantilever dimension from the hanger to the end of the floorbeam. (Maximum = 35 feet, Minimum = 0 feet)
Right Floorbeam Cantilever Length	Enter the distance, in feet, from the center of the member supporting the floorbeam to the outer extremity of the floorbeam for "DECK" Type Bridges. For "TRUSSES" with inverted "U"-bolt hanger connections, enter the sidewalk width from the curb line to the end of the floorbeam and the floorbeam cantilever dimension from the hanger to the end of the floorbeam. (Maximum = 35 feet, Minimum = 0 feet)
Haunch Depth	If the space between the bottom of the concrete deck and the top of the floorbeam flange is filled with concrete, enter this distance, in inches. If the bottom of the concrete deck is flush with the top of the floorbeam flange or this space is not filled with concrete, enter 0. If non-composite, enter 0. See Figure 2. (Maximum = 9 inches, Minimum = 0 inches)
Floorbeam Skew Angle	Enter the angle, in degrees, between the centerline of the floorbeam and a line perpendicular to the roadway centerline. (Maximum 75°, Minimum 0°)
Compression Flange Restraint	Enter "YES" or "NO", "Y" or "N". Nothing else is acceptable. Use "YES" or "Y" if any of the following conditions exist: 1) The presence of shear connectors. 2) The floorbeams are encased, have blast protection or are enclosed by jack arch construction. 3) The concrete deck extends down to the bottom of the top flange. 4) The grating is adequately attached to the top flange. 5) The stringers are framed into or the top flange is seated on the floorbeam at 5.0' or less. Use "NO" or "N" for ALL other conditions.

EXAMPLE

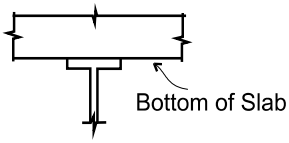
1234567 SECONDARY MEMBER TRANSVERSE FLOORBEAM 24 0 0 0 0 N

FIGURES

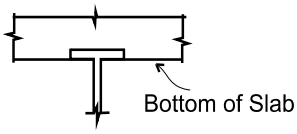


STRINGER FLOORBEAM SYSTEM

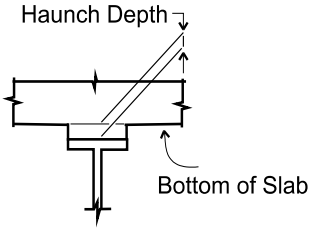
Figure 1



ZERO HAUNCH



ZERO HAUNCH



HAUNCH DETAILS

Figure 2

NOTES

Floorbeams are analyzed as Non-Composite.

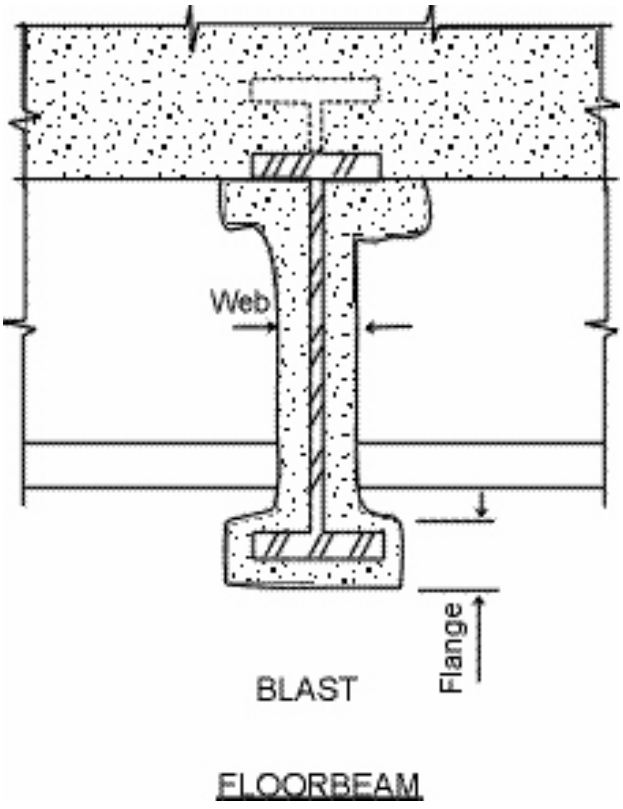
310	BRASS-TRUSS™	COMMAND DESCRIPTION

COMMAND NAME	CONCRETE PROTECTION TRANSVERSE FLOORBEAM
PURPOSE	This command defines the concrete protection on the secondary member transverse floorbeam. This command is optional.
2 COMMAND PARAMETERS	
Flange Thickness	If "BLAST" is entered in the Type parameter on the CONCRETE DECK command, enter the distance, in inches, from the bottom of the concrete to the top of the concrete that is covering the bottom flange. See Figures.
Web Thickness	If "BLAST" is entered in the Type parameter on the CONCRETE DECK command, enter the distance, in inches, from one side of the concrete covering the web to the other above the bottom flange. See Figures.

EXAMPLE

1234567 CONCRETE PROTECTION TRANSVERSE FLOORBEAM 4 4

FIGURES



NOTES

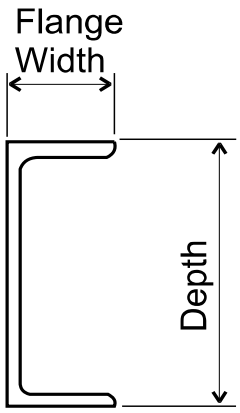
320	BRASS-TRUSS™	COMMAND DESCRIPTION
COMMAND NAME	**CHANNEL FLOORBEAM**	
PURPOSE	This command defines channel floorbeams. At least one type of FLOORBEAM command is required. This command may be repeated to define an end and intermediate floorbeam.	
3 COMMAND PARAMETERS		
Location	Enter the location of the floorbeam being defined. Only the words "END" or "INTERMEDIATE" are allowed. For deterioration of the section, enter the word "RUST". See Note 1.	
Depth	Enter the depth, in inches, of the channel floorbeam. See Note 3. (Maximum = 18 inches, Minimum = 3 inches)	
Flange Width **or** "W" + Weight per Foot	Enter the flange width, in inches, of the channel floorbeam. If the channel section is specified on the "As Built" plans, enter the letter "W" followed by the weight per foot from these plans. See Note 2. and 3. (Maximum = 4.2 inches, Minimum = 1.4 inches, or Maximum = 58 lbs., Minimum = 4.1 lbs.)	

EXAMPLE

1234567 CHANNEL FLOORBEAM END 15 3.716

1234567 CHANNEL FLOORBEAM INTERMEDIATE 12 W30

FIGURES



CHANNEL

NOTES

1. If there is deterioration of the floorbeams, enter one command fully as normal. Then repeat this command and enter the word "RUST" in the first parameter. For the remainder of the second command, enter the percentage of area loss for a particular element, or the percentage of dimension loss for the appropriate element. See Chapter 13 for a detailed explanation of the information required for deterioration.

2. Cover plates may not be used with a channel floorbeam. If cover plates exist, convert the section to an equivalent I-Section.

3. There are two ways the user can select a channel floorbeam from the sections library. 1) The user may input a section depth and flange width in Parameters 2 and 3. The program will search the library for the **first occurrence** of this combination of values. If a section is not found in the library, the program tries to find a section within ⅛" of the dimensions input. If a section is not found, an error message appears in the output. 2) If a Channel is specified on the "As Built" plans, the user may input a one or two digit integer section depth corresponding to the beam depth as listed under "Designation" in the AISC *Manual of Steel Construction* in Parameter 2 and input the letter "W" followed by the weight per foot in Parameter 3. The program will search the library for the **first occurrence** of the combination of depth and weight. **Note:** The use of the letter "W" does not mean that a W section will be selected. The letter "W" is merely a flag to tell the program to search for a rolled channel section. If a section is not found, an error message appears in the output.

The shape you enter **must exist in the standard shapes library**, *stsect.dat*. This library is a binary file and is not easily readable. An ASCII copy of this file has been placed on the FTP Server for viewing.

330	BRASS-TRUSS™	COMMAND DESCRIPTION
COMMAND NAME		**ROLLED FLOORBEAM**
PURPOSE		This command defines rolled beam floorbeams. At least one type of FLOORBEAM command is required. This command may be repeated to define an end and intermediate floorbeam.
8 COMMAND PARAMETERS		
Location		Enter the location of the floorbeam being defined. Only the words "END" or "INTERMEDIATE" are allowed. For deterioration of the section, enter the word "RUST". See Note 1
Depth		Enter the depth, in inches, of the rolled beam floorbeam. See Note 2. (Maximum = 37 inches, Minimum = 3 inches)
Flange Width **or** "W" + Weight per Foot		Enter the flange width, in inches, of the rolled beam floorbeam. If the rolled beam section is specified on the "As Built" plans, enter the letter "W" followed by the weight per foot from these plans. See Note 2. (Maximum = 18 inches, Minimum = 2 inches or Maximum = 730 lbs., Minimum = 5.1 lbs.)
Flange Thickness		Enter the average flange thickness, in inches, of the rolled beam floorbeam. If the weight per foot was entered in Flange Width, enter 0. (Range = 5 inches to 0.18 inches and 0)
Top Cover Plate Width		Enter the width of the top cover plate, in inches.
Top Cover Plate Thickness		Enter the thickness of the top cover plate, in inches.
Bottom Cover Plate Width		Enter the width of the bottom cover plate, in inches.
Bottom Cover Plate Thickness		Enter the thickness of the bottom cover plate, in inches.

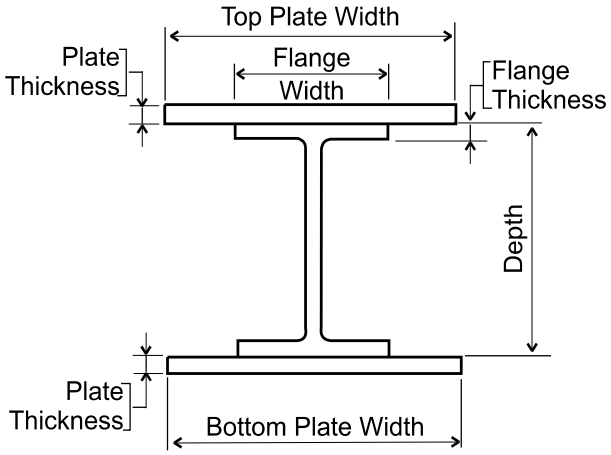
EXAMPLE

1234567 ROLLED FLOORBEAM END 21 8.355 0.835 0 0 0

1234567 ROLLED FLOORBEAM INTERMEDIATE 24 W104 0 0 0 0
(WN 24x104 - First 24x104 section listed in sections library)

1234567 ROLLED FLOORBEAM INTERMEDIATE 24 9.775 0.942 0 0 0
(W 24x104 - Second 24x104 section listed in sections library)

FIGURES



ROLLED BEAM

NOTES

1. If there is deterioration of the floorbeams, enter one command fully as normal. Then repeat this command and enter the word "RUST" in the first parameter. For the remainder of the second command, enter the percentage of area loss for a particular elemtent, or the percentage of dimension loss for the appropriate element. See Chapter 13 for a detailed explanation of the information required for deterioration.

2. There are two ways the user can select a rolled floorbeam from the sections library. 1) The user may input a section depth and flange width in Parameters 2 and 3. The program will search the library for the **first occurrence** of this combination of values. If a section is not found in the library, the program tries to find a section within ⅛" of the dimensions input. If a section is not found, an error message appears in the output. 2) If a W section is specified on the "As Built" plans, the user may input a one or two digit integer section depth corresponding to the beam depth as listed under "Designation" in the AISC *Manual of Steel Construction* in Parameter 2 and input the letter "W" followed by the weight per foot in Parameter 3. The program will search the library for the **first occurrence** of the combination of depth and weight. If a section is not found, an error message appears in the output. **Note:** In the standard sections library, some standard shapes begin with "W" and "WN" (i.e., W24X76 and WN24X76). In 1985, AISC changed the dimensions of several steel shapes while keeping the same designation. To differentiate between the two types (especially when the older shape is needed to perform a rating) an "N" was added to the shape designation to indicate a NEW shape. In the event the user wishes to select the **second occurrence** of a section listed in the library, use the first method described above and input the specific flange width as it appears in the library. See the example above. Note: A zero **must be entered** in Parameter 4 when an AISC shape is entered in Parameters 2 and 3. The shape you enter **must exist in the standard shapes library**, *stsect.dat*. This library is a binary file and is not easily readable. An ASCII copy of this file has been placed on the FTP Server for viewing.

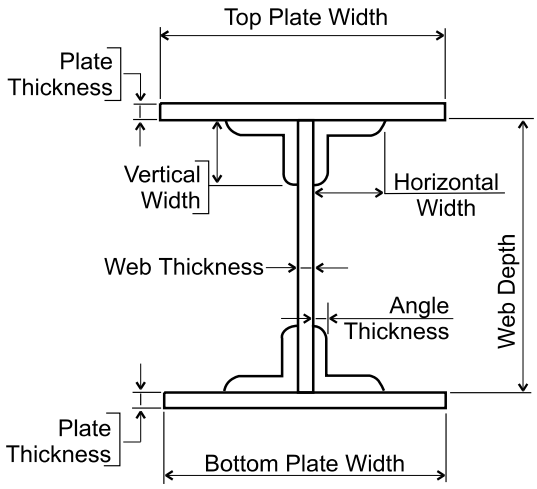
340	BRASS-TRUSS™	COMMAND DESCRIPTION

COMMAND NAME	ISEC FLOORBEAM
PURPOSE	This command defines a welded plate girder (I-Section) floorbeams. At least one type of FLOORBEAM command is required. This command may be repeated to define an end and intermediate floorbeam.
10 COMMAND PARAMETERS	
Location	Enter the location of the floorbeam being defined. Only the words "END" or "INTERMEDIATE" are allowed. For deterioration of the section, enter the word "RUST" See Note 1.
Top Plate Width	Enter the average width, in inches, of all of the top plates of the floorbeam. (Range = 30 inches to 5 inches and 0)
Top Plate Thickness	Enter the total thickness, in inches, of all of the top plates. (Range = 4 inches to 0.18 inches and 0)
Angles Width Horizontal Leg	Enter the width, in inches, of the angle leg that is attached to the top or bottom plate. If there are no angles, enter 0. See Note 2. (Range = 9 inches to 1.0 inches and 0)
Angles Width Vertical Leg	Enter the width, in inches, of the angle leg that is attached to the web plate. If there are no angles, enter 0. See Note 2. (Range = 9 inches to 1.0 inches and 0)
Angles Thickness	Enter the thickness, in inches, of the flange angles. If there are no angles, enter 0. (Range - 1.125 inches to 0.125 inches)
Web Plate Depth	Enter the distance, in inches, from the bottom of the top flange plate to the top of the bottom flange plate. This is commonly called the "Back-to-Back of Angles" dimension. (Maximum = 50 inches, Minimum = 12 inches)
Web Plate Thickness	Enter the thickness, in inches, of the full depth web plate. (Maximum = 1.5 inches, Minimum = 0.18 inches)
Bottom Plate Width	Enter the average width, in inches, of all of the bottom plates of the floorbeam. (Range = 30 inches to 5 inches and 0)
Bottom Plate Thickness	Enter the total thickness, in inches, of all of the bottom cover plates. (Range = 4 inches to 0.18 inches and 0).

EXAMPLE

1234567 ISEC FLOORBEAM INTERMEDIATE 12 0.5 0 0 0 36 0.5 12 0.5

FIGURES



I-SECTION

NOTES

1. If there is deterioration of the floorbeams, enter one command fully as normal. Then repeat this command and enter the word "RUST" in the first parameter. For the remainder of the second command, enter the percentage of area loss for a particular element, or the percentage of dimension loss for the appropriate element. See Chapter 13 for a detailed explanation of the information required for deterioration.

2. For riveted sections, the net section is computed by deducting the number of holes for each leg an angle can have. The same number of holes are deducted from the plates that attach to those angles. This applies to axial loaded members only.

10. CODING INSTRUCTIONS FOR MAIN MEMBERS - TRUSSES

10.1 GENERAL INFORMATION FOR TRUSSES

On trusses that have a middle panel (a truss with an odd number of panels), like truss 1 on Page 10.2, the diagonals in the middle panel can NOT be connected. They must be entered as a full-length member from the top to the bottom chords.

On trusses like 5 and 6, there must be a panel point on the opposite chord from where the diagonals meet the chords. In Truss 5, there must be panel points in the bottom chord that correspond to those where the diagonals intersect the top chord (L02, L04, and L06). In truss 6, which does not have any verticals, the same requirement applies to each chord. U02, U04, and U06 must be added to the top chord and L01, L03, L05, and L07 must be added to the bottom chord. In addition, there must be full-height dummy verticals added at the odd panel points; 1, 3, 5, and 7. These are entered as "ISEC" Type members with "0" (zero) in the Member Length parameter. The remaining parameters may be left blank.

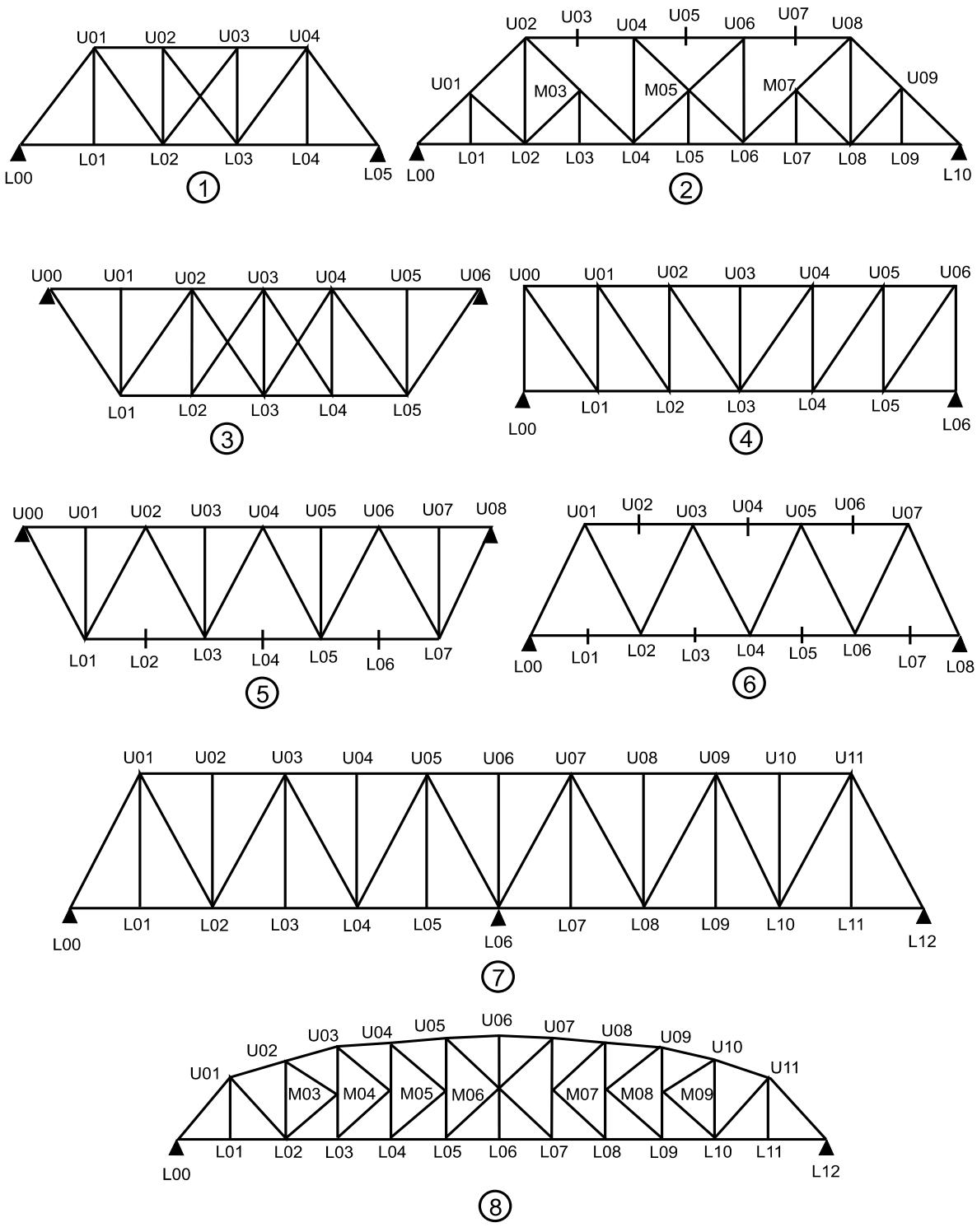
On Single Lattice Trusses, like truss 9 on Page 10.3, all of the diagonal intersections must be considered as middle (M) panel points. There must be corresponding panel points above and below these "M" panel points on each chord. Also, there must be full-height dummy verticals added from each "M" panel point down to the bottom chord. None are needed from the "M" panel points up to the top chord. Double and Triple Lattice Trusses are unratable.

On trusses that are a combination of Deck, Pony, and Thru Types, like truss 10, enter the truss type as "DECK". Enter " 0 0 COMB" at the end of the MAIN MEMBER truss command. Be sure to enter the blank spaces as shown here. Establish a Datum Line from one end of the truss to the other at the top of the end verticals. The bottom of each vertical member must be located off of this Datum Line. Add a dimension, in feet, called the Drop Distance, from the Datum Line to the bottom of each vertical at the end of the command describing each vertical member. Generally the bottom of the verticals will be below the Datum Line and will be preceded by a blank space and a minus sign " -5.0". If the bottom of the vertical is above the Datum Line, precede the drop distance with a blank space and a plus sign " +5.0".

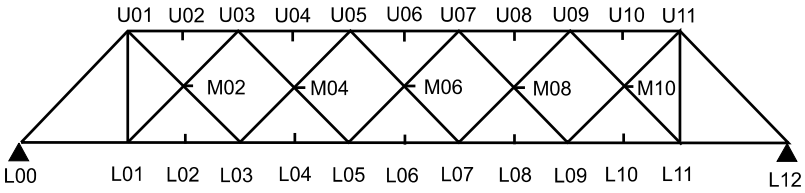
On Lenticular Trusses, like truss 11, establish a datum line through the end points of the truss (U00-U08 in this example). Enter the Drop Distances, as mentioned in the preceding paragraph, from this Datum Line to locate the bottom of each vertical. If there are posts or short columns, supporting the trusses at the ends, (U00L00 and U08L08 in this example) do not enter them as truss members. If there are tie members from the bottom of these posts to the bottom chord (L00L01 and L07L08 in this example) do not enter them as truss members. Note the composition of the posts and ties in the COMMENTS command.

The program output will list the truss panel types, by number, which the user has input. This can help visualize the computer model, especially when debugging a run. These truss panel types are shown on Page 10.4.

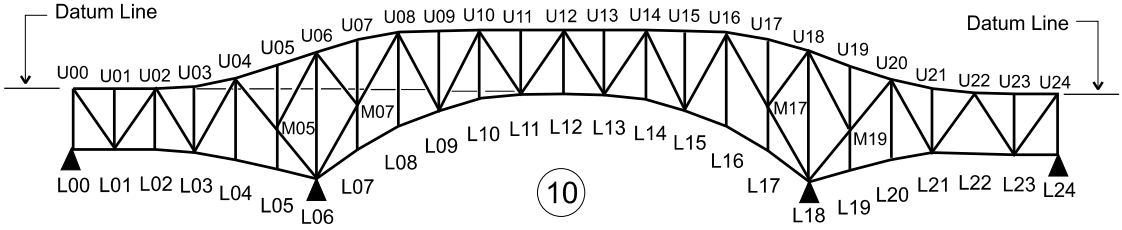
If a welded box section (double-element web) is encountered as a Truss Member, use the "ABX" or "ABH" command and enter a "0" (zero) in all the parameters that pertain to the angles.



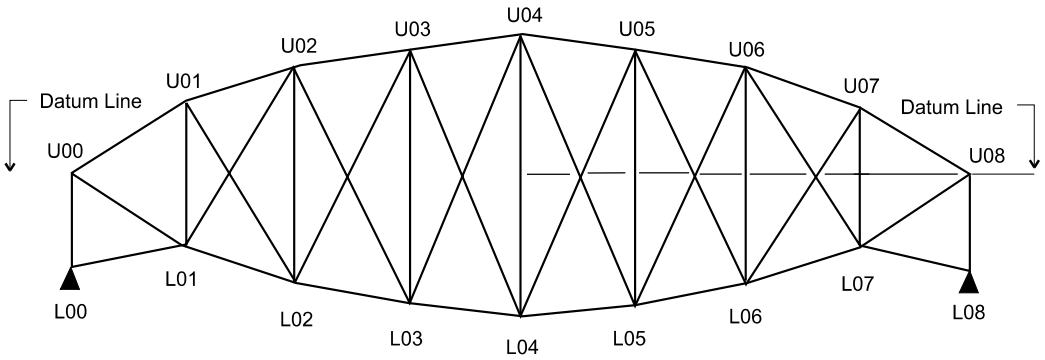
TYPICAL TRUSSES



9

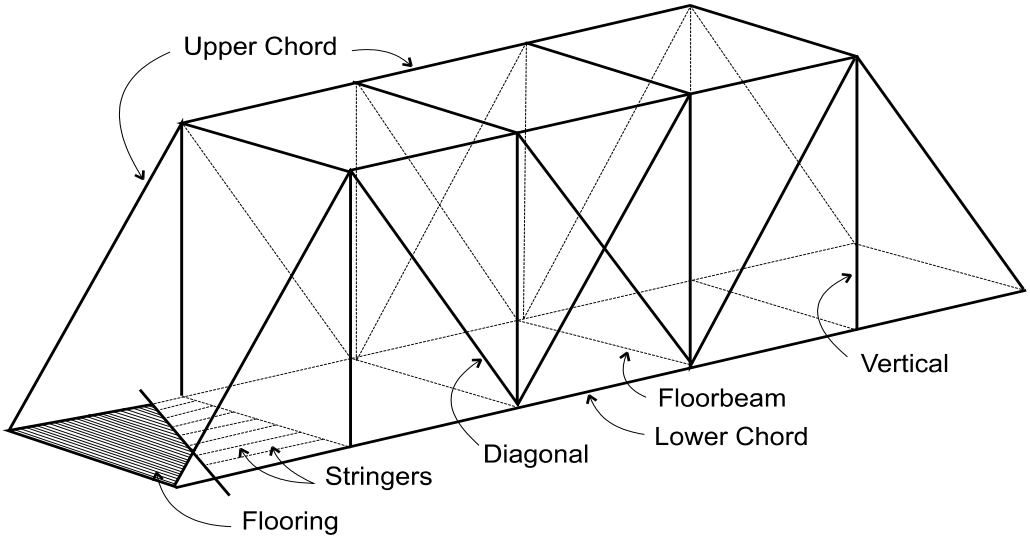


10

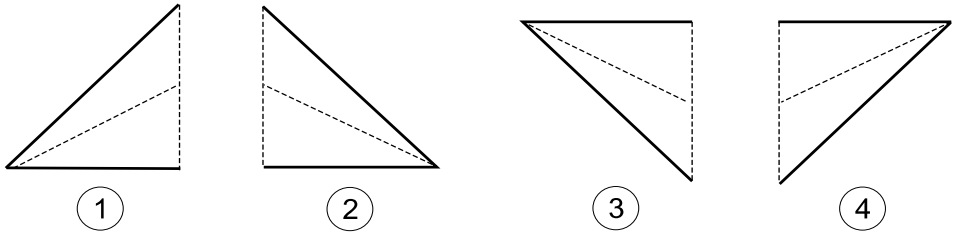


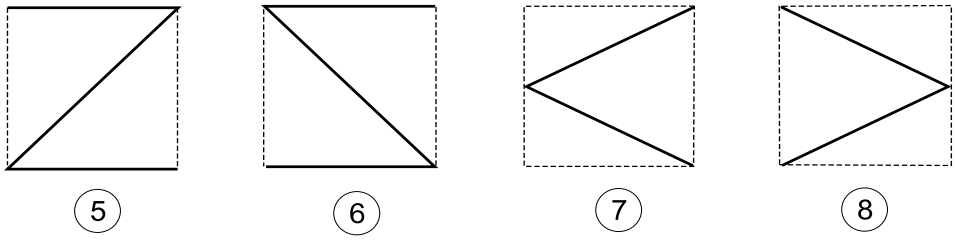
11

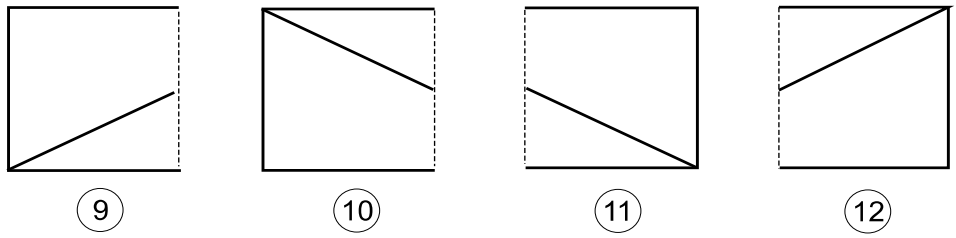
TYPICAL TRUSSES

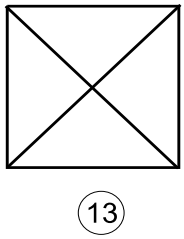


TRUSS NOMENCLATURE









NOTE: SOLID LINE = REQUIRED MEMBERS
DASHED LINE = OPTIONAL MEMBERS

TRUSS PANEL TYPES

10.2 GENERAL DETERIORATION INFORMATION FOR TRUSS MEMBERS

If there is any deterioration of any Truss Member, fill out one command fully as normal. Then repeat this command and fill in the same data as on the preceding command up through and including the field heading "TYPE", or "I or O" if present. Under the heading "LENGTH" enter the word "RUST". For the remainder of the second command, see the detailed explanation of the information required for deterioration under the section "DETERIORATION INFORMATION", Page 13.1.

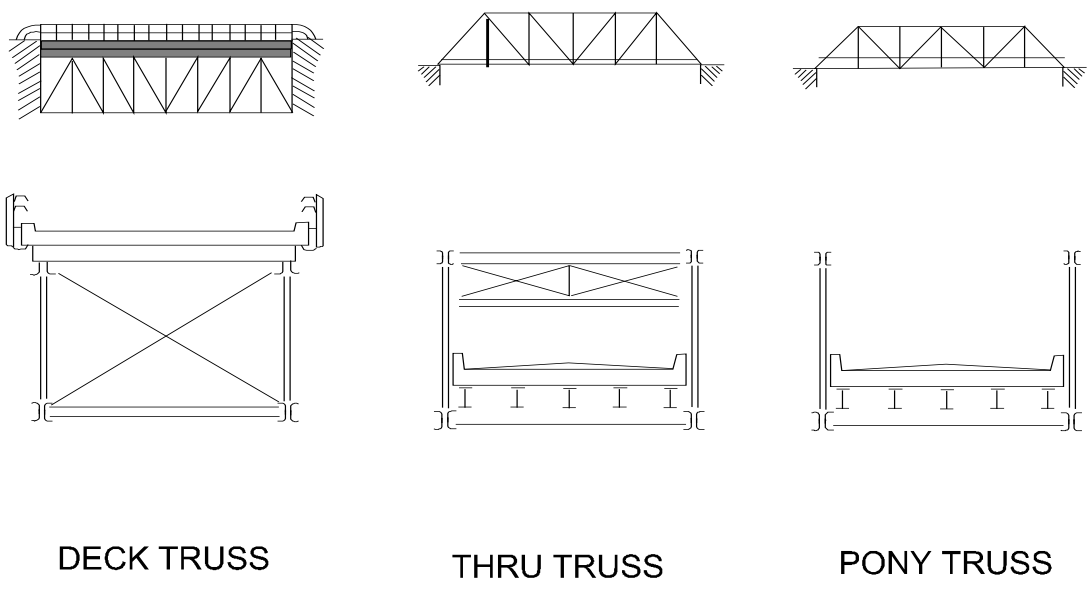
350	BRASS-TRUSS™	COMMAND DESCRIPTION

COMMAND NAME	MAIN MEMBER
PURPOSE	This command defines the type of truss and panel dimensions. This command is required for trusses.
8 COMMAND PARAMETERS	
Truss Type	Enter "DECK", "THRU" or "PONY". No other words are acceptable. See Figures.
Truss Main Member	Enter "TRUSS". No other words are acceptable.
Truss Member Construction	Enter "RIVETED" or "WELDED" as determined by the type of construction of the individual truss members. No other words are acceptable. See Note 1.
Truss Orientation	If there are two trusses that are different, enter "LEFT" or "RIGHT", depending on which one the data is supplied for. If the two trusses are the same, enter "EITHER". If there are more than two trusses, enter "MIDDLE" if data is supplied for other than the outside trusses. Only "LEFT", "RIGHT", "EITHER or "MIDDLE" are acceptable.
Type of Connection	Enter "PINNED", "RIVETED", "WELDED" or "BOLTED" as determined by the type of end connections used to join the truss members together. No other words are acceptable.
Panel Height	Enter the distance, in feet, between the centerlines of the top and bottom chords of the truss only if the chords are parallel. Otherwise enter 0. (Maximum = 150 feet)
Panel Width	Enter the width, in feet, of any panels that have the same width. If all the panel widths vary, enter 0. (Maximum = 50 feet)
Combination Truss Code	If this is a combination of a Deck, Pony, and/or Thru Type truss (see Figure 10 on Page 10.3), enter " 0 0 COMB". Be sure to enter a blank space on each side of the zero.

EXAMPLE

1234567 MAIN MEMBER PONY TRUSS RIVETED EITHER RIVETED 10.0 10.0

FIGURES



TRUSS BRIDGES

NOTES

1. For riveted sections, the net section is computed by deducting the number of holes for each leg an angle can have. The same number of holes are deducted from the plates that attach to those angles. This applies to axial loaded members only. For riveted truss sections, the output has a table numbered “12345" which shows the number of holes deducted. The numbers “12345” refer to top plate, web, bottom plate, top angles, and bottom angles respectively.

360	BRASS-TRUSS™	COMMAND DESCRIPTION

COMMAND NAME	CONTINUOUS TRUSS SUPPORTS
PURPOSE	This command defines the truss support and hinge locations. This command is optional. This command may be repeated to define up to fourteen support points. Only four hinge points are allowed. See Notes.

10 COMMAND PARAMETERS

Panel Point Location Support #1	For continuous trusses, enter the panel point location for support #1. For simple trusses omit this command.
Panel Point Location Support #2	For continuous trusses, enter the panel point location for support #2. For simple trusses omit this command.
Panel Point Location Support #3	For continuous trusses, enter the panel point location for support #3. For simple trusses omit this command.
Panel Point Location Support #4	For continuous trusses, enter the panel point location for support #4. For simple trusses omit this command.
Panel Point Location Support #5	For continuous trusses, enter the panel point location for support #5. For simple trusses omit this command.
Panel Point Location Support #6	For continuous trusses, enter the panel point location for support #6. For simple trusses omit this command.
Panel Point Location Hinge #1	Enter the panel point location for hinge #1. NOTE: When hinges are encountered with sliding members in the other chord, enter at least one sliding member per hinge by adding the following line immediately after the description of sliding member(s): BIN — MEMBER I.D. — MEMBER TYPE — Word "HINGE" **See Example**

(Continued)

COMMAND PARAMETERS (Cont.)	
Panel Point Location Hinge #2	Enter the panel point location for hinge #2. NOTE: When hinges are encountered with sliding members in the other chord, enter at least one sliding member per hinge by adding the following line immediately after the description of sliding member(s): BIN MEMBER I.D. MEMBER TYPE Word "HINGE" **See Example**
Panel Point Location Hinge #3	Enter the panel point location for hinge #3. NOTE: When hinges are encountered with sliding members in the other chord, enter at least one sliding member per hinge by adding the following line immediately after the description of sliding member(s): BIN MEMBER I.D. MEMBER TYPE Word "HINGE" **See Example**
Panel Point Location Hinge #4	Enter the panel point location for hinge #4. NOTE: When hinges are encountered with sliding members in the other chord, enter at least one sliding member per hinge by adding the following line immediately after the description of sliding member(s): BIN MEMBER I.D. MEMBER TYPE Word "HINGE" **See Example**

EXAMPLE

```
1234567 CONTINUOUS TRUSS SUPPORTS   L00   L15   L30   L45
1234567 L11L12      CBXO     0     17.0     0    15   3.375  0     0      17.0      0
1234567 L11L12      CBXO     HINGE
```

FIGURES

NOTES

For continuous trusses, ignore the output entitled "LEFT REACTION = _____
RIGHT REACTION = _____". This output is meant for simple span trusses only.

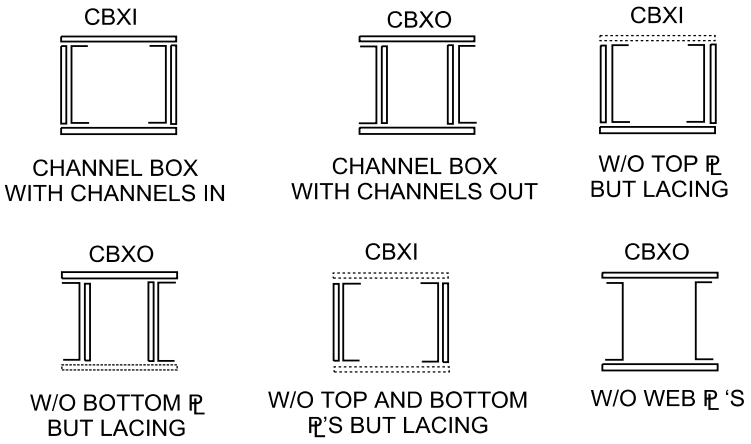
370	BRASS-TRUSS™	COMMAND DESCRIPTION
COMMAND NAME	**CBX or CBH**	
PURPOSE	This command defines truss members composed of channels and plates. This command is required when channel members exist and may be repeated as often as needed to describe all the channel members. Use the command "CBX' or "CBH". The "X" or "H" are used to determine the Yield Strength for this member. "X" is to be used when the Yield Strength is the same as that listed on the STRESSES command or set by the Year of Original Construction parameter on the YEARS command. "H" is to be used when the Yield Strength is the same as that listed in the Hybrid Truss FY steel parameter on the STRESSES command.	
15 COMMAND PARAMETERS		
NOTE: The following four parameters are placed BEFORE the command.		
Member Beginning Location, Left or Top	Enter the letter that corresponds to the vertical location of the beginning of the truss member of this type. "U" is for upper, "M" is for middle, and "L" is for lower panel points. If there are more than 99 panels, change the "U" to "T", change "M" to "C", and change the "L" to "B" for those members over 99. See Page 10.2 for numbering convention. DO NOT place a blank space between this parameter and the following parameter.	
Member Panel Point, Left or Top	Enter the two-digit number that corresponds to the horizontal location of the beginning of the truss member of this type. Numbers less than ten start with 0. DO NOT place a blank space between this parameter and the following parameter.	
Member End Location, Right or Bottom	Enter the letter that corresponds to the vertical location of the end of the truss member of this type. "U" is for upper, "M" is for middle, and "L" is for lower panel points. If there are more than 99 panels, change the "U" to "T", change "M" to "C", and change the "L" to "B" for those members over 99. DO NOT place a blank space between this parameter and the following parameter.	
Member Panel Point, Right or Bottom	Enter the two-digit number that corresponds to the horizontal location of the end of the truss member of this type. Numbers less than ten start with the 0. Insert a space, followed by the command after this parameter. See Example.	
Flange Orientation (Continued)	Two letters are used to determine which way the channel flanges in box sections are pointing. Enter "I" for inward and "O" for outward. Do Not place a blank space between the command and this parameter. Place a space after this parameter, as usual. See Example and Figure 1.	

COMMAND PARAMETERS (Cont.)	
Member Length	Enter the length, in feet, of any vertical or horizontal member of this type whose length is different than the Panel Height or Panel Length dimensions, respectively, that were given on the MAIN MEMBER TRUSS command. If the length of any vertical or horizontal member is the same as these dimensions, or the member is a diagonal, enter 0.
Top Plates Width	Enter the width, in inches, of the continuous top plates or the top tie plates. If lacing bars are used, and there are no continuous top flange plates, enter the out-to-out dimension of the channels. See Figure 2 for all dimensions. (Maximum = 30 inches, Minimum = 5 inches or 0 inches)
Top Plates Thickness	Enter the total thickness, in inches, of all the continuous top plates. If there are no continuous top plates or if top lacing bars are used, enter 0. (Maximum = 4 inches, Minimum = 0.18 inches or 0 inches)
Channel Depth	Enter the actual depth of channel in inches. See Notes. (Maximum = 18 inches, Minimum = 3 inches)
Channel Flange Width **or** "W" + Weight per Foot	Enter the flange width, in inches, of the channel. If the channel section is specified on the "As Built" plans, enter the letter "W" followed by the weight per foot from these plans. See Notes. (Maximum = 4.2 inches, Minimum = 1.4 inches or Maximum = 58 lbs., Minimum = 4.1 lbs.)
Side Plates Depth	Enter the width, in inches, of any continuous side plates. If there are none, enter 0. (Maximum = Channel Depth, Minimum = 0 inches)
Side Plates Thickness	Enter the total thickness, in inches, of all the continuous side plates attached to one channel. If there are none, enter 0. (Maximum = 1 inch, Minimum = 0.25 inches or 0 inches)
Bottom Plates Width	Enter the width, in inches, of the continuous bottom plates or the bottom tie plates. If lacing bars are used or there are no continuous bottom flange plates, enter the out-to-out dimension of the channels. (Maximum = 30 inches, Minimum = 5 inches or 0 inches)
Bottom Plates Thickness	Enter the total thickness, in inches, of all the continuous bottom plates. If there are no continuous bottom plates or if bottom lacing bars are used, enter 0. (Maximum = 4 inches, Minimum = 0.18 inches or 0 inches)
Drop Distance From Datum	If this is a vertical member in a combination truss (see Page 10.1), enter the distance, in feet, from the datum line to the bottom of this member, preceeded with a blank space and a minus sign (i.e. " -5"). If the bottom of thevertical is above the datum line, use a plus symbol (i.e. " +5").

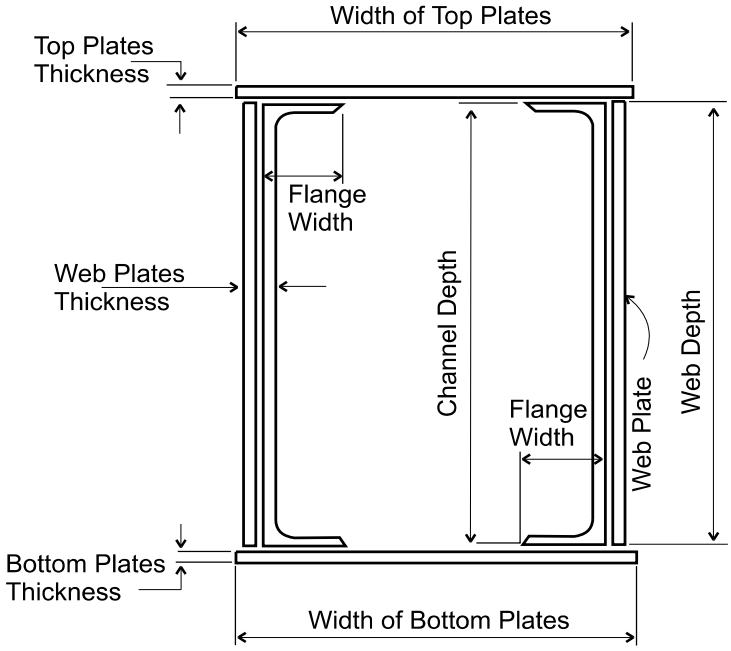
EXAMPLE

```
1234567 U06U07   CBXO   0   17.0   0.38   10.0   2.74   0   0   16.5   0
1234567 L10L11   CBXO   0   22     0      15     W40    12      0.438     22     0
```

FIGURES



FLANGE ORIENTATION
Figure 1



CHANNEL BOX TRUSS MEMBER
Figure 2

NOTES

There are two ways the user can select a channel truss member from the sections library. 1) The user may input a section depth and flange width in Parameters 9 and 10. The program will search the library for the **first occurrence** of this combination of values. If a section is not found in the library, the program tries to find a section within ⅛" of the dimensions input. If a section is not found, an error message appears in the output. 2) If a Channel is specified on the "As Built" plans, the user may input a one or two digit integer section depth corresponding to the beam depth as listed under "Designation" in the AISC *Manual of Steel Construction* in Parameter 9 and input the letter "W" followed by the weight per foot in Parameter 10. The program will search the library for the **first occurrence** of the combination of depth and weight. **Note:** The use of the letter "W" does not mean that a W section will be selected. The letter "W" is merely a flag to tell the program to search for a rolled channel section. If a section is not found, an error message appears in the output.

The shape you enter **must exist in the standard shapes library**, *stsect.dat*. This library is a binary file and is not easily readable. An ASCII copy of this file has been placed on the FTP Server for viewing.

380	BRASS-TRUSS™	COMMAND DESCRIPTION
COMMAND NAME		**ABX or ABH**
PURPOSE		This command defines truss members composed of angles and plates. This command is required when angle members exist and may be repeated as often as needed to describe all the angle members. Use the command "ABX" or "ABH". The "X" or "H" are used to determine the Yield Strength for this member. "X" is to be used when the Yield Strength is the same as that listed on the STRESSES command or set by the Year of Original Construction parameter on the YEARS command. "H" is to be used when the Yield Strength is the same as that listed in the Hybrid Truss FY Steel parameter on the STRESSES command.
19 COMMAND PARAMETERS		
NOTE: The following four parameters are placed BEFORE the command.		
Member Beginning Location, Left or Top		Enter the letter that corresponds to the vertical location of the beginning of the truss member of this type. "U" is for upper, "M" is for middle, and "L" is for lower panel points. If there are more than 99 panels, change the "U" to "T", change "M" to "C", and change the "L" to "B" for those members over 99. See Page 10.2 for numbering convention. DO NOT place a blank space between this parameter and the following parameter.
Member Panel Point, Left or Top		Enter the two-digit number that corresponds to the horizontal location of the beginning of the truss member of this type. Numbers less than ten start with the 0. DO NOT place a blank space between this parameter and the following parameter.
Member End Location, Right or Bottom		Enter the letter that corresponds to the vertical location of the end of the truss member of this type. "U" is for upper, "M" is for middle, and "L" is for lower panel points. If there are more than 99 panels, change the "U" to "T", change "M" to "C", and change the "L" to "B" for those members over 99. DO NOT place a blank space between this parameter and the following parameter.
Member Panel Point, Right or Bottom (Continued)		Enter the two-digit number that corresponds to the horizontal location of the end of the truss member of this type. Number less than ten start with the 0. Insert a space, followed by the command after this parameter. See Example.

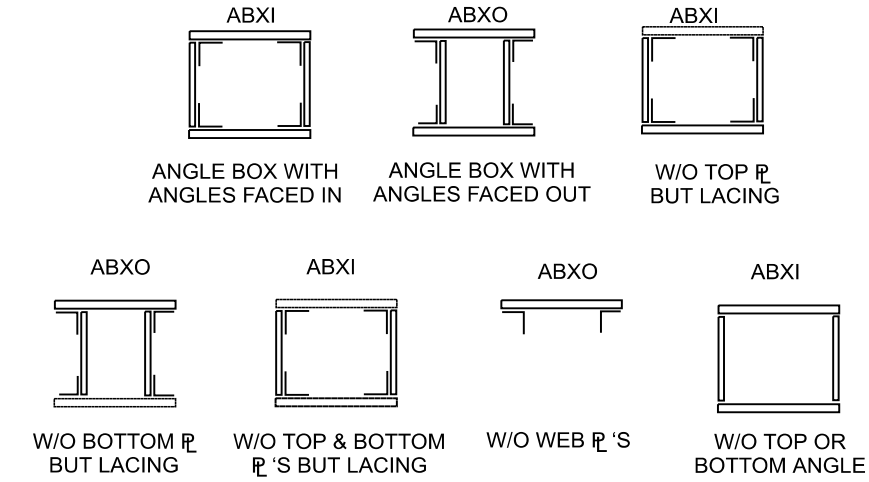
COMMAND PARAMETERS (Cont.)	
Flange Orientation	Two letters are used to determine which way the horizontal angles in box sections are pointing. Enter "I" for inward and "O" for outward. DO NOT place a blank space between the command and this parameter. Place a space after this parameter, as usual. See Example and Figure 1.
Member Length	Enter the length, in feet, of any vertical or horizontal member of this type whose length is different than the Panel Height or Panel Length dimensions, respectively, that were given on the MAIN MEMBER TRUSS command. If the length of any vertical or horizontal member is the same as these dimensions, or the member is a diagonal, enter 0.
Top Plates Width	Enter the width, in inches, of the continuous top plates or top tie plates. If lacing bars are used and there are no continuous top flange plates, enter the out-to-out dimension of the top angles. See Figure 2 for all dimensions. (Maximum = 50 inches, Minimum = 5 inches or 0)
Top Plates Thickness	Enter the total thickness, in inches, of all the continuous top plates. If there are no continuous top plates, or if top lacing bars are used, enter 0. (Maximum = 4 inches, Minimum = 0.18 inches or 0)
Top Angles Width Horizontal Leg	Enter the width, in inches, of the top angle leg that is attached to the top plates. If there are no angles, enter 0. (Maximum = 9 inches, Minimum = 1.0 inches or 0)
Top Angles Width Vertical Leg	Enter the width, in inches, of the top angle leg that is attached to the web plate. If there are no angles, enter 0. (Maximum = 9 inches, Minimum = 1.0 inches or 0)
Top Angles Thickness	Enter the thickness, in inches, of the top angle. If there are no angles, enter 0. (Maximum = 1.125 inches, Minimum = 0.125 inches or 0)
Web Plates Depth	Enter the back-to-back distance, in inches, between the top or bottom angles. If there are no angles, enter the depth of the web plate. (Maximum = 60 inches, Minimum = 5 inches or 0)
Web Plates Thickness	Enter the thickness of the full-depth continuous web plates. If there are no full-depth continuous web plates, or if lacing bars are used, enter 0. (Maximum = 4 inches, Minimum = 0.18 inches or 0)
Bottom Angles Width Horizontal Leg (Continued)	Enter the width, in inches, of the bottom angle leg that is attached to the bottom plates. If there are no angles, enter 0. (Maximum = 9 inches, Minimum = 1.0 inches or 0)

COMMAND PARAMETERS (Cont.)	
Bottom Angles Width Vertical Leg	Enter the width, in inches, of the bottom angle leg that is attached to the web plates. If there are no angles, enter 0. (Maximum = 9 inches, Minimum = 1.0 inches or 0)
Bottom Angles Thickness	Enter the thickness, in inches, of the bottom angle. If there are no angles, enter 0. (Maximum = 1.125 inches, Minimum = 0.125 inches or 0)
Bottom Plates Width	Enter the width, in inches, of the continuous bottom plates or bottom tie plates. If lacing bars are used, and there are no continuous top flange plates, enter the out-to-out dimension of the angles. (Maximum = 50 inches, Minimum = 5 inches or 0)
Bottom Plates Thickness	Enter the total thickness, in inches, of all the continuous bottom plates. If there are no continuous bottom plates or if bottom lacing bars are used, enter 0. (Maximum = 4 inches, Minimum = 0.18 inches or 0)
Drop Distance From Datum	If this is a vertical member in a combination truss (see Page 10.1), enter the distance, in feet, from the datum line to the bottom of this member, preceeded with a blank space and a minus sign (i.e. " -5"). If the bottom of the vertical is above the datum line, use a plus symbol (i.e. " +5").

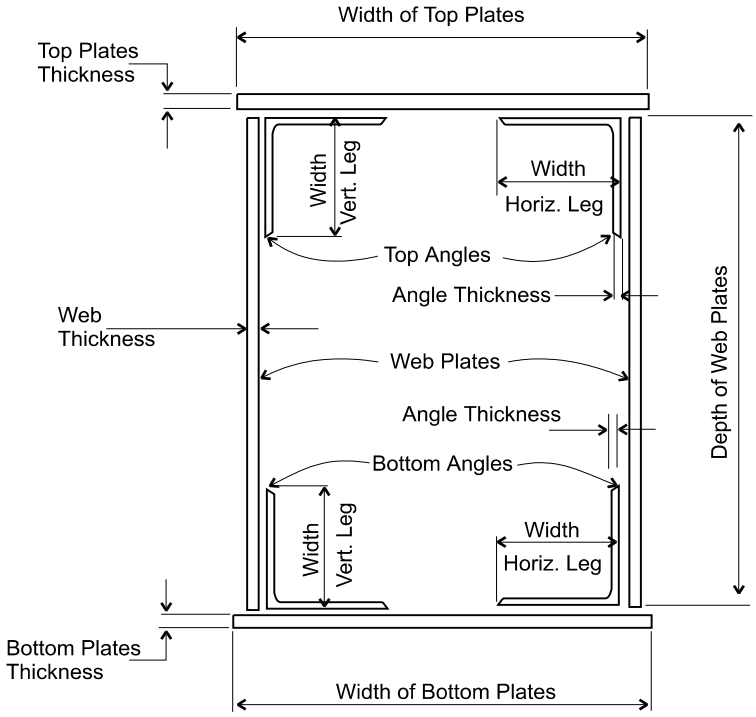
EXAMPLE

1234567 L02U02 ABXI 9.0 8.0 0 3.0 3.0 0.31 0 0 0 0 0 0 0

FIGURES



FLANGE ORIENTATION
Figure 1



ANGLE BOX TRUSS MEMBER
Figure 2

NOTES

390	BRASS-TRUSS™	COMMAND DESCRIPTION

COMMAND NAME	ROLLED or ROLHED
PURPOSE	This command defines truss members composed of a rolled beam and plates. This command is required when rolled beam members exist and may be repeated as often as needed to describe all the rolled beam members. Use the command "ROLLED" or "ROLHED". The "L" or "H" are used to determine the Yield Strength for this member. "L" is to be used when the Yield Strength is the same as that listed on the STRESSES command or set by the Year of Original Construction parameter on the YEARS command. "H" is to be used when the Yield Strength is the same as that listed in the Hybrid Truss FY Steel parameter on the STRESSES command.
13 COMMAND PARAMETERS	
NOTE: The following four parameters are placed BEFORE the command.	
Member Beginning Location, Left or Top	Enter the letter that corresponds to the vertical location of the beginning of the truss member of this type. "U" is for upper, "M" is for middle, and "L" is for lower panel points. If there are more than 99 panels, change the "U" to "T", change "M" to "C", and change "L" to "B" for those members over 99. See Page 10.2 for numbering convention. DO NOT place a blank space between this parameter and the following parameter.
Member Panel Point, Left or Top	Enter the two-digit number that corresponds to the horizontal location of the beginning of the truss member of this type. Number less than ten start with the 0. DO NOT place a blank space between this parameter and the following parameter.
Member End Location, Right or Bottom	Enter the letter that corresponds to the vertical location of the end of the truss member of this type. "U" is for upper, "M" is for middle, and "L" is for lower panel points. If there are more than 99 panels, change the "U" to "T", change "M" to "C", and change the "L" to "B" for those members over 99. DO NOT place a blank space between this parameter and the following parameter.
Member Panel Point, Right or Bottom (Continued)	Enter the two-digit number that corresponds to the horizontal location of the end of the truss member of this type. Numbers less than ten start with the 0. Insert a space, followed by the command after this parameter. Place a space after this command, as usual. See Example.

COMMAND PARAMETERS (Cont.)	
Member Length	Enter the length, in feet, of any vertical or horizontal member of this type whose length is different than the Panel Height or Panel Length dimensions, respectively, that were given on the MAIN MEMBER TRUSS command. If the length of any vertical or horizontal member is the same as these dimensions, or the member is a diagonal, enter 0.
Top Plates Width	Enter the average width, in inches, of all the continuous top flange cover plates. If none exist, enter 0. See Figures for all dimensions. (Maximum = 36 inches, Minimum = Rolled Beam Flange Width minus 2 inches or 0)
Top Plates Thickness	Enter the total thickness, in inches, of all the continuous top flange cover plates. If none exist, enter 0. (Maximum = 3 inches, Minimum = 0.5 inches or 0)
Rolled Beam Depth	Enter the depth, in inches, of the rolled beam. See Notes. (Maximum = 37 inches, Minimum = 5 inches)
Rolled Beam Flange Width **or** "W" + Weight per Foot	Enter the width, in inches, of the rolled beam flange. If the rolled beam section is specified on the "As Built" plans, enter the letter "W" followed by the weight per foot from these plans. See Notes. (Maximum = 23 inches, Minimum = 2 inches or Maximum = 730 lbs., Minimum = 8 lbs)
Rolled Beam Flange Thickness	Enter the average thickness, in inches, of the rolled beam flange. If the weight per foot was entered under Rolled Beam Flange Width, enter 0. (Maximum = 5 inches, Minimum = 0.18 inches or 0)
Bottom Plates Width	Enter the average width, in inches, of all the continuous bottom flange cover plates. If none exist, enter 0. (Maximum = 36 inches, Minimum = Rolled Beam Flange Width minus 2 inches or 0)
Bottom Plates Thickness	Enter the total thickness, in inches, of all the continuous bottom flange cover plates. If none exist, enter 0. (Maximum = 3 inches, Minimum = 0.5 inches or 0)
Drop Distance From Datum	If this is a vertical member in a combination truss (see Page 10.1), enter the distance, in feet, from the datum line to the bottom of this member, preceeded with a blank space and a minus sign (i.e. " -5"). If the bottom of the vertical is above the datum line, use a plus symbol (i.e. " +5").

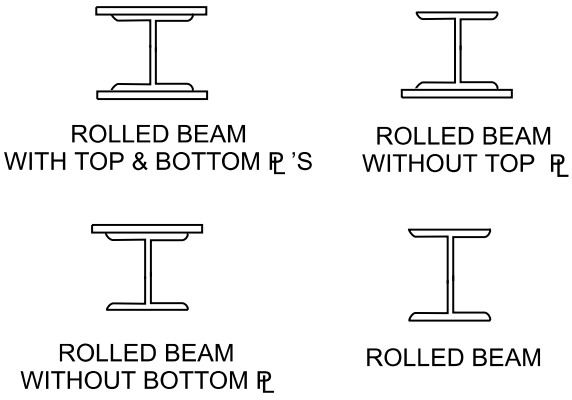
EXAMPLE

1234567 L01U01 ROLLED 8.0 0 0 21 8.355 0.835 0 0

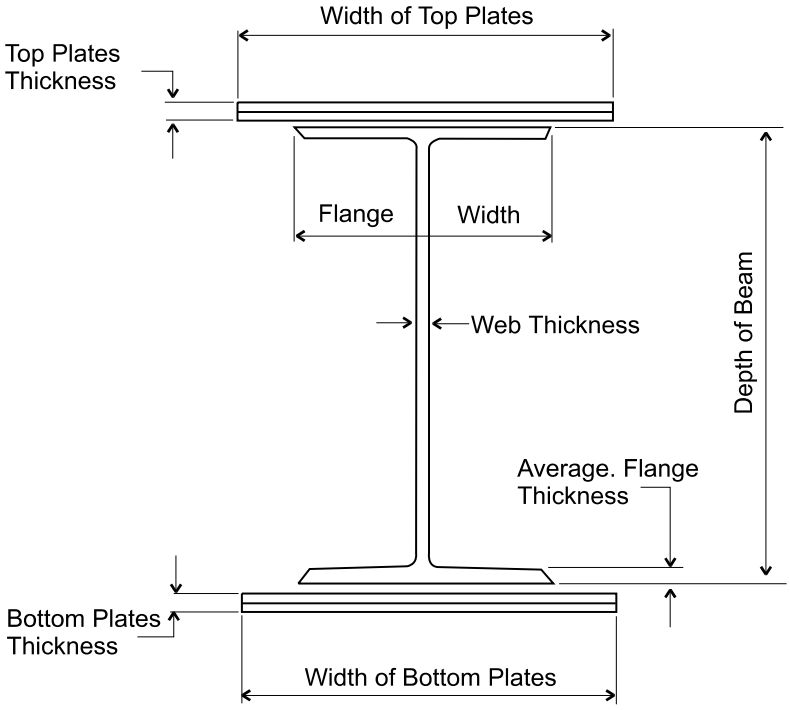
1234567 L02L03 ROLLED 0 0 0 24 W104 0 16 1.08
(WN 24x104 - First 24x104 section listed in sections library)

1234567 L02L03 ROLLED 0 0 0 24 9.775 0.942 16 1.08
(W 24x104 - Second 24x104 section listed in sections library)

FIGURES



BEAM AND PLATE ORIENTATION
Figure 2



ROLLED BEAM TRUSS MEMBER
Figure 2

NOTES

There are two ways the user can select a rolled truss member from the sections library. 1) The user may input a section depth and flange width in Parameters 8 and 9. The program will search the library for the **first occurrence** of this combination of values. If a section is not found in the library, the program tries to find a section within ⅛" of the dimensions input. If a section is not found, an error message appears in the output. 2) If a W section is specified on the "As Built" plans, the user may input a one or two digit integer section depth corresponding to the beam depth as listed under "Designation" in the AISC *Manual of Steel Construction* in Parameter 8 and input the letter "W" followed by the weight per foot in Parameter 9. The program will search the library for the **first occurrence** of the combination of depth and weight. If a section is not found, an error message appears in the output. **Note:** In the standard sections library, some standard shapes begin with "W" and "WN" (i.e., W24X76 and WN24X76). In 1985, AISC changed the dimensions of several steel shapes while keeping the same designation. To differentiate between the two types (especially when the older shape is needed to perform a rating) an "N" was added to the shape designation to indicate a NEW shape. In the event the user wishes to select the **second occurrence** of a section listed in the library, use the first method described above and input the specific flange width as it appears in the library. See the example above. **Note:** A zero **must be entered** in Parameter 10 when an AISC shape is entered in Parameters 8 and 9.

The shape you enter **must exist in the standard shapes library**, *stsect.dat*. This library is a binary file and is not easily readable. An ASCII copy of this file has been placed on the FTP Server for viewing.

400	BRASS-TRUSS™	COMMAND DESCRIPTION

COMMAND NAME	ISEC or ISEH
PURPOSE	This command defines truss members composed of plates configured as an I-section, angles, and cover plates. This command is required when welded plate members exist and may be repeated as often as needed to describe all the I-section members. Use the command "ISEC" or "ISEH". The "C" or "H" are used to determine the Yield Strength for this member. "C" is to be used when the Yield Strength is the same as that listed on the STRESSES command or set by the Year of Original Construction parameter on the YEARS command. "H" is to be used when the Yield Strength is the same as that listed in the Hybrid Truss FY Steel parameter on the STRESSES command.

18 COMMAND PARAMETERS	
NOTE The following four parameters are placed BEFORE the command.	
Member Beginning Location, Left or Top	Enter the letter that corresponds to the vertical location of the beginning of the truss member of this type. "U" is for upper, "M" is for middle, and "L" is for lower panel points. If there are more than 99 panels, change the "U" to "T", change the "M" to "C", and change the "L" to "B" for those members over 99. See Page 10.2 for numbering convention. DO NOT place a blank space between this parameter and the following parameter.
Member Panel Point, Left or Top	Enter the two-digit number that corresponds to the horizontal location of the beginning of the truss member of this type. Numbers less than ten start with the 0. DO NOT place a blank space between this parameter and the following parameter.
Member End Location, Right or Bottom	Enter the letter that corresponds to the vertical location of the end of the truss member of this type. "U" is for upper, "M" is for middle, and "L" is for lower panel points. If there are more than 99 panels, change the "U" to "T", change "M" to "C", and change the "L" to "B" for those members over 99. DO NOT place a blank space between this parameter and the following parameter.
(Continued)	

COMMAND PARAMETERS (Cont.)	
Member Panel Point, Right or Bottom	Enter the two-digit number that corresponds to the horizontal location of the end of the truss member of this type. Numbers less than ten start with the 0. Insert a space, followed by the command after this parameter. Place a space after this command, as usual. See Example.
Member Length	Enter the length, in feet, of any vertical or horizontal member of this type whose length is different than the Panel Height or Panel Length dimensions, respectively, that were given on the MAIN MEMBER TRUSS command. If the length of any vertical or horizontal member is the same as these dimensions, or the member is a diagonal, enter 0.
Top Plates Width	Enter the average width, in inches, of all the continuous top flange plates. If none exist, enter 0. See Figures for all dimensions. (Maximum = 24 inches, Minimum = 5 inches or 0)
Top Plates Thickness	Enter the total thickness, in inches, of all the continuous top flange plates. If none exist, enter 0. (Maximum = 3 inches, Minimum = 0.18 inches or 0)
Top Angles Width Horizontal Leg	Enter the width, in inches, of the angle leg that is attached to the top flange plates. If there are no angles enter 0. (Maximum = 9 inches, Minimum = 1.0 inches or 0)
Top Angles Width Vertical Leg	Enter the width, in inches, of the angle leg that is attached to the web plate(s). If there are no angles, enter 0. (Maximum = 9 inches, Minimum = 1.0 inches or 0)
Top Angles Thickness	Enter the thickness, in inches, of the top flange angle. If there are no angles, enter 0. (Maximum = 1.125 inches, Minimum = 0.125 inches or 0)
Web Plates Depth	Enter the back-to-back distance, in inches, between the top and bottom angles. If there are no angles, enter the depth of the web plate. (Maximum = 40 inches, Minimum = 5 inches or 0)
Web Plates Thickness	Enter the thickness, in inches, of the full depth web plate(s). If there are no full depth web plates or lacing bars are used, enter 0. (Maximum = 1 inch, Minimum = 0.18 inches or 0)
Bottom Angles Width Horizontal Leg	Enter the width, in inches, of the angle leg that is attached to the bottom flange plates. If there are no angles, enter 0. (Maximum = 9 inches, Minimum = 1.0 inches or 0)
Bottom Angles Width Vertical Leg (Continued)	Enter the width, in inches, of the angle leg that is attached to the web plate(s). If there are no angles, enter 0. (Maximum = 9 inches, Minimum = 1.0 inches or 0)

COMMAND PARAMETERS (Cont.)	
Bottom Angle Thickness	Enter the thickness, in inches, of the bottom angle. If there are no angles, enter 0. (Maximum = 1.125 inches, Minimum = 0.125 inches or 0)
Bottom Plates Width	Enter the average width, in inches, of all the continuous bottom flange plates. If none exist, enter 0. (Maximum = 24 inches, Minimum = 5 inches or 0)
Bottom Plates Thickness	Enter the total thickness, in inches, of all the continuous bottom flange plates. If none exist, enter 0. (Maximum = 3 inches, Minimum = 0.18 inches or 0)
Drop Distance From Datum	If this is a vertical member in a combination truss (see Page 10.1), enter the distance, in feet, from the datum line to the bottom of this member, preceeded with a blank space and a minus sign (i.e. " -5"). If the bottom of the vertical is above the datum line, use a plus symbol (i.e. " +5").

EXAMPLE

1234567 U05U06 ISEC 0 15.0 .625 7 3.5 .625 7.5 0.75 7 3.5 .625 15.5 .625

FIGURES

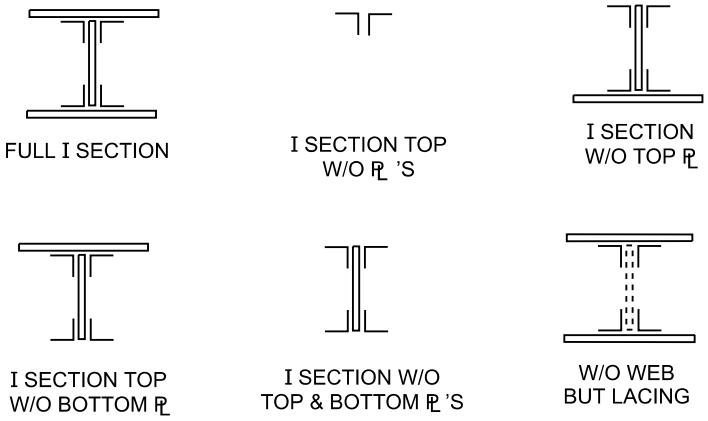
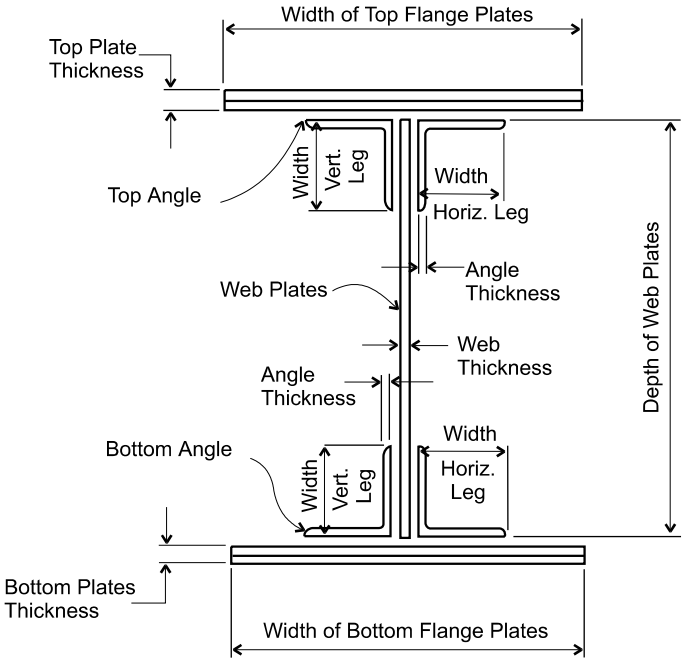


PLATE AND ANGLE ORIENTATION
Figure 1



I-SECTION TRUSS MEMBER
Figure 2

NOTES

410	BRASS-TRUSS™	COMMAND DESCRIPTION

COMMAND NAME	EYEBAR or EYEHAR
PURPOSE	This command defines truss members composed of eyebars. This command is required when eyebar members exist and may be repeated as often as needed to describe all the eyebar members. Use the command "EYEBAR" or "EYEHAR". The "B" or "H" are used to determine the Yield Strength for this member. "B" is to be used when the Yield Strength is the same as that listed on the STRESSES command or set by the Year of Original Construction parameter on the YEARS command. "H" is to be used when the Yield Strength is the same as that listed in the Hybrid Truss FY Steel parameter on the STRESSES command.
9 COMMAND PARAMETERS	
NOTE: The following four parameters are placed BEFORE the command.	
Member Beginning Location, Left or Top	Enter the letter that corresponds to the vertical location of the beginning of the truss member of this type. "U" is for upper, "M" is for middle, and "L" is for lower panel points. If there are more that 99 panels, change the "U" to "T", change "M" to "C", and change the "L" to "B" for those members over 99. See Page 10.2 for numbering convention. DO NOT place a blank space between this parameter and the following parameter.
Member Panel Point, Left or Top	Etner the two-digit number that corresponds to the horizontal location of the beginning of the truss member of this type. Numbers less than ten start with 0. DO NOT place a blank space between this parameter and the following parameter.
Member End Location, Right or Bottom	Enter the letter that corresponds to the vertical location of the end of the truss member of this type. "U" is for upper, "M" is for middle, and "L" is for lower panel points. If there are more than 99 panels, change the "U" to "T", change "M" to "C", and change the "L" to "B" for those members over 99. DO NOT place a blank space between this parameter and the following parameter.
Member Panel Point, Right or Bottom (Continued)	Enter the two-digit number that corresponds to the horizontal location of the end of the truss member of this type. Numbers less than ten start with the 0. Insert a space, followed by the command after this parameter. Place a space after this command, as usual. See Example.

COMMAND PARAMETERS (Cont.)	
Member Length	Enter the length, in feet, of any vertical or horizontal member of this type whose length is different than the Panel Height or Panel Length dimensions, respectively, that were given on the MAIN MEMBER TRUSS command. If the length of any vertical or horizontal member is the same as these dimensions, or the member is a diagonal, enter 0.
Number of Elements	Enter the number of elements that make up the member. (Maximum = 9, Minimum = 1)
Eyebar Width	Enter the largest dimension, in inches, of the individual element cross section. See Figures for all dimensions. (Maximum = 8 inches, Minimum = 0.50 inches)
Eyebar Thickness	Enter the smallest dimension, in inches, of the individual element cross section. (Maximum = 2 inches, Minimum = 0.25 inches) NOTE: For loop bars, provide the dimensions for 80% of the individual bar area.
Drop Distance From Datum	If this is a vertical member in a combination truss (see Page 10.1), enter the distance, in feet, from the datum line to the bottom of this member, preceeded with a blank space and a minus sign (i.e. " -5"). If the bottom of the vertical is above the datum line, use a plus symbol (i.e. " +5").

EXAMPLE

1234567 L01U02 EYEBAR 0 2 3.0 1.0

FIGURES

EYEBAR

NOTES

420	BRASS-TRUSS™	COMMAND DESCRIPTION

COMMAND NAME	THREADED or THRHADED
PURPOSE	This command defines truss members composed of threaded bars. This command is required when threaded bar members exist and may be repeated as often as needed to describe all the threaded members. Use the command "THREADED" or "THRHADED". The "E" or "H" are used to determine the Yield Strength for this member. "E" is to be used when the Yield Strength is the same as that listed on the STRESSES command or set by the Year of Original Construction parameter on the YEARS command. "H" is to be used when the Yield Strength is the same as that listed in the Hybrid Truss FY Steel parameter on the STRESSES command.

9 COMMAND PARAMETERS

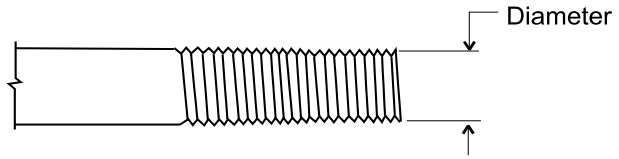
NOTE: The following four parameters are placed BEFORE the command. Member Beginning Location, Left or Top	Enter the letter that corresponds to the vertical location of the beginning of the truss member of this type. "U" is for upper, "M" is for middle, and "L" is for lower panel points. If there are more than 99 panels, change the "U" to "T", change "M" to "C", and change "L" to "B" for those members over 99. See page 10.2 for numbering convention. DO NOT place a blank space between this parameter and the following parameter.
Member Panel Point, Left or Top	Enter the two-digit number that corresponds to the horizontal location of the beginning of the truss member of this type. Numbers less than ten start with the 0. DO NOT place a blank space between this parameter and the following parameter.
Member End Location, Right or Bottom (Continued)	Enter the letter that corresponds to the vertical location of the end of the truss member of this type. "U" is for upper, "M" is for middle, and "L" is for lower panel points. If there are more than 99 panels, change the "U" to "T", change "M" to "C", and change the "L" to "B" for those member over 99. DO NOT place a blank space between this parameter and the following parameter.

COMMAND PARAMETERS (Cont.)	
Member Panel Point, Right or Bottom	Enter the two-digit number that corresponds to the horizontal location of the end of the truss member of this type. Numbers less than ten start with 0. Insert a space, followed by the command after this parameter. Place a space after this command, as usual. See Example.
Member Length	Enter the length, in feet, of any vertical or horizontal member of this type whose length is different than the Panel Height or Panel Length dimensions, respectively, that were given on the MAIN MEMBER TRUSS command. If the length of any vertical or horizontal member is the same as these dimensions, or the member is a diagonal, enter 0.
Number of Bars	Enter the number of elements that make up the member. (Maximum = 9, Minimum = 1)
Outside Thread Diameter	Enter the outside diameter, in inches, of the individual threaded elements at the threaded portions. See Figures for all dimensions. (Maximum = 4 inches, Minimum = 0.75 inches)
End Configuration	Enter either "UPSET" or "CUT" to describe the manner in which the threads are applied to the ends of the bars. No other words are acceptable.
Drop Distance From Datum	If this is a vertical member in a combination truss (see Page 10.1), enter the distance, in feet, from the datum line to the bottom of this member, preceeded with a blank space and a minus sign (i.e. " -5"). If the bottom of the vertical is above the datum line, use a plus symbol (i.e. " +5").

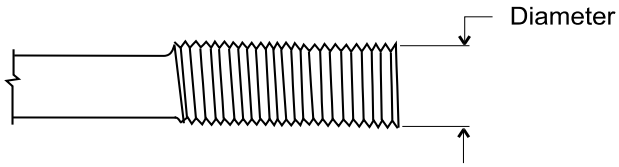
EXAMPLE

1234567 L01U02 THREADED 2 1.25 CUT

FIGURES



END CONFIGURATION - CUT



END CONFIGURATION - UPSET

NOTES

11. CODING INSTRUCTIONS FOR MAIN MEMBERS - GIRDERS

11.1. GENERAL DETERIORATION INFORMATION FOR GIRDER MEMBERS

If there is deterioration of any girder member, fill out one command as you would normally for a girder member, with the "RANGE" parameter used to signify the end of the deteriorated area. The "RANGE" parameter from the normal command before this command will locate the beginning of the deteriorated area. The next command will be the command with the deterioration data for the area located by the preceding command of this pair. On this deterioration command, fill out the headings up through and including the parameter heading Span Number. For the parameter Range, enter the word "RUST". For the remainder of this command, see the detailed explanation of the information required for deterioration in section "DETERIORATION INFORMATION", Page 13.1.

430	BRASS-TRUSS™	COMMAND DESCRIPTION

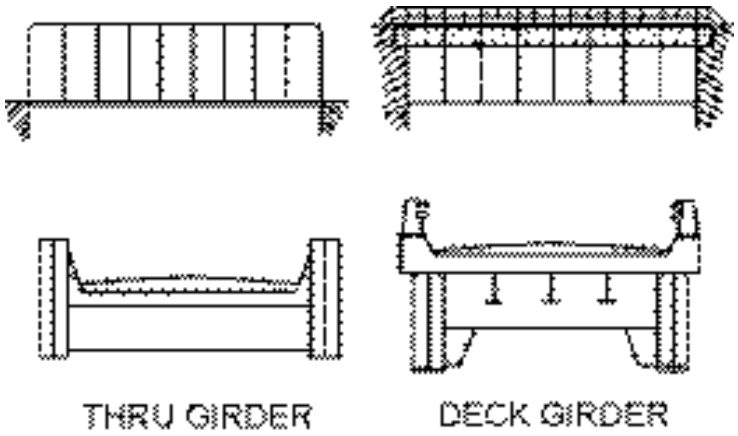
COMMAND NAME	MAIN MEMBER
PURPOSE	This command defines the type of girder configuration for girder bridges. This command is required for girder bridges.
10 COMMAND PARAMETERS	
Girder Type	Enter "DECK" or "THRU" to describe the general type of bridge construction with girders as the main supporting members. No other words are acceptable. See Figure 1.
Girder Main Member	Enter "GIRDER". No other words are acceptable.
Girder Construction	Enter "RIVETED", "WELDED" or "TIMBER" to describe the type of girder construction. No other words are acceptable. If the girder is a rolled beam without cover plates, enter "WELDED". See Note 1.
Girder Orientation	If the Girder Type is "DECK" or "THRU", enter "LEFT", "MIDDLE", "RIGHT" or "EITHER". No other words are acceptable.
Haunch Depth	If the Girder Type is "THRU", enter 0. Otherwise, if the space between the bottom of the concrete deck and the top of the girder top flange is filled with concrete, enter this distance, in inches. If the bottom of the concrete slab is flush with, or below, the top of the girder top flange or this space is not filled with concrete, enter 0. (Maximum = 12 inches, Minimum = 0 inches) See Figure 2.
Number of Continuous Spans	Enter the number of spans through which the girders are acting continuously. Use 0 for a simple span. (Maximum = 8 spans, Minimum = 0 spans, 1 is not acceptable).
Spacing of Diaphragms or Knee Braces	Enter the spacing, in feet, of any diaphragms or knee bracing. If none exist, enter 0 and note it in the COMMENTS command.
(Continued)	

COMMAND PARAMETERS (Cont.)	
Compression Flange Restraint	Enter "YES" or "NO", "Y" or "N". Nothing else is acceptable. Use "YES" or "Y" if any of the following conditions exist: 1) The presence of shear connectors. 2) The girders are encased, have blast protection, or are enclosed by jack arch construction. See Figure 3. 3) The concrete deck extends down to the bottom of the top flange. 4) Sleepers or grating is adequately attached to the top flange. Use "NO" or "N" for <u>ALL</u> other conditions.
Number of Girders	Enter the number of girders that support the bridge cross-section.
Fascia Girder Overhang	Enter the distance, in feet from the centerline of the fascia girder to the outer-most part of the deck, sidewalk, or parapet.

EXAMPLE

1234567 MAIN MEMBER THRU GIRDER WELDED EITHER 0 0 20 N 2 0

FIGURES



GIRDER BRIDGES
Figure 1

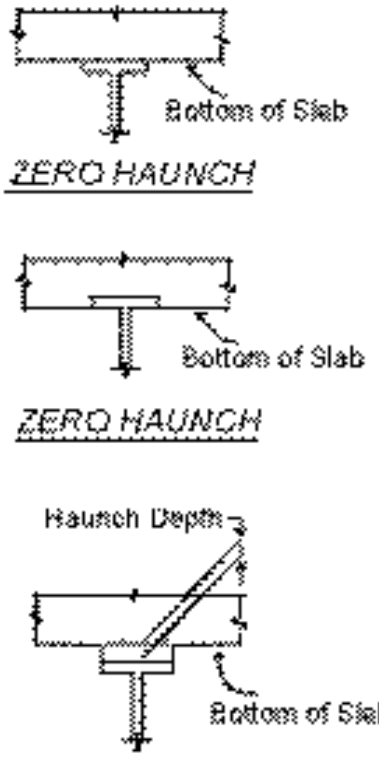


Figure 2

(Continued)

FIGURES
(Cont.)

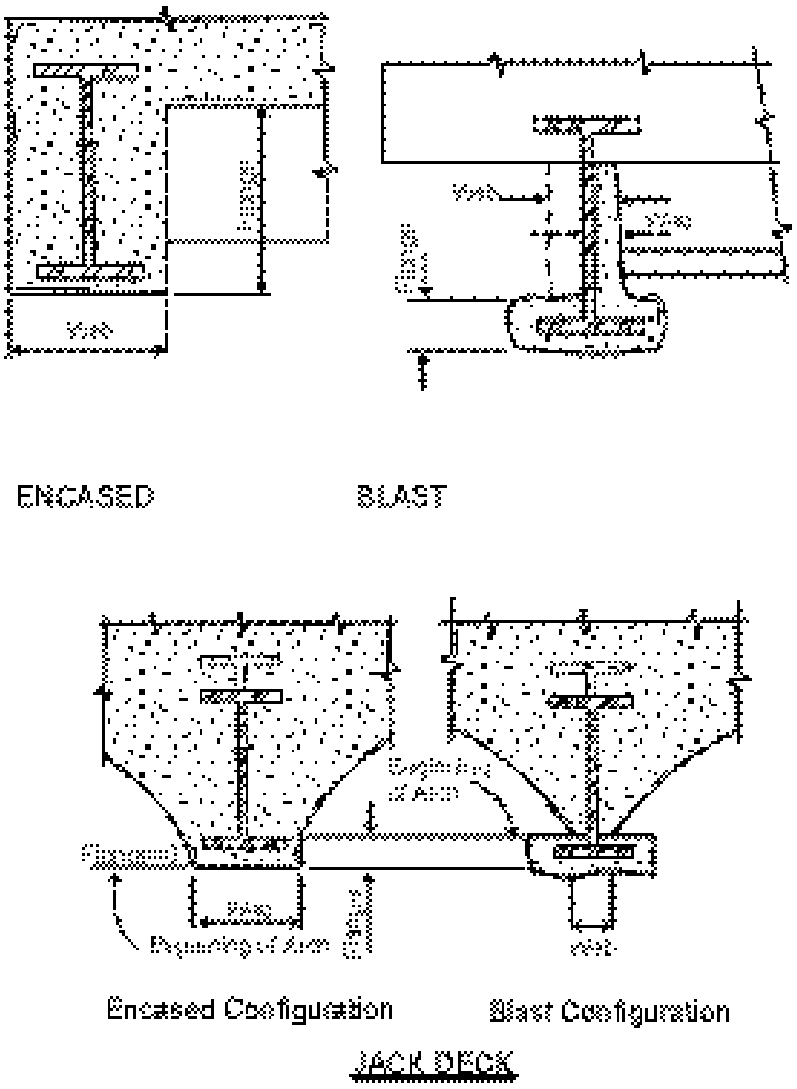


Figure 3

NOTES

1. For riveted sections, the net section is computed by deducting the number of holes for each leg an angle can have. The same number of holes are deducted from the plates that attach to those angles. This applies to axial loaded members only.

440	BRASS-TRUSS™	COMMAND DESCRIPTION

COMMAND NAME	HINGE
PURPOSE	This command defines the location up to two hinges per span. This command is optional and may be repeated for additional spans.

3 COMMAND PARAMETERS	
Span Number	Enter the span number where the hinge is located.
Distance from Beginning Span to Hinge #1	Enter the distance, in feet, to the first hinge from the beginning of the span.
Distance from Beginning Span to Hinge #2	Enter the distance, in feet, to the second hinge from the beginning of the span. If there is only one hinge in this span, enter 0.

EXAMPLE

1234567 HINGE 2 15 85

FIGURES

NOTES

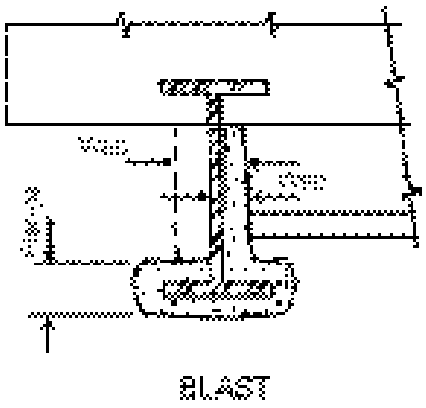
450	BRASS-TRUSS™	COMMAND DESCRIPTION

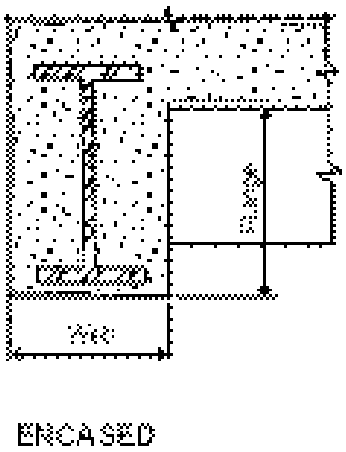
COMMAND NAME	MAIN MEMBER CONCRETE PROTECTION
PURPOSE	This command defines the concrete protection on the girder main member. This command is optional.
2 COMMAND PARAMETERS	
Flange Depth (Encased) or Thickness (Blast)	If "BLAST" is entered in the Type parameter on the CONCRETE DECK command, enter the distance, in inches, from the bottom of the concrete to the top of the concrete that is covering the bottom flange. If "ENCASED" is entered in the Type parameter on the CONCRETE DECK command, enter the distance, in inches, from the bottom of the concrete covering the bottom flange up to either the top of the encasement or the bottom of the concrete slab if the encasement extends up to it. See Figures.
Web Thickness	If "BLAST" is entered in the Type parameter on the CONCRETE DECK command, enter the distance, in inches, from one side of the concrete covering the web to the other above the bottom flange. If "ENCASED" is entered in the Type parameter on the CONCRETE DECK command, enter the distance, in inches, from one side of the concrete to the other. See Figures.

EXAMPLE

1234567 MAIN MEMBER CONCRETE PROTECTION 18 12

FIGURES





NOTES

460	BRASS-TRUSS™	COMMAND DESCRIPTION

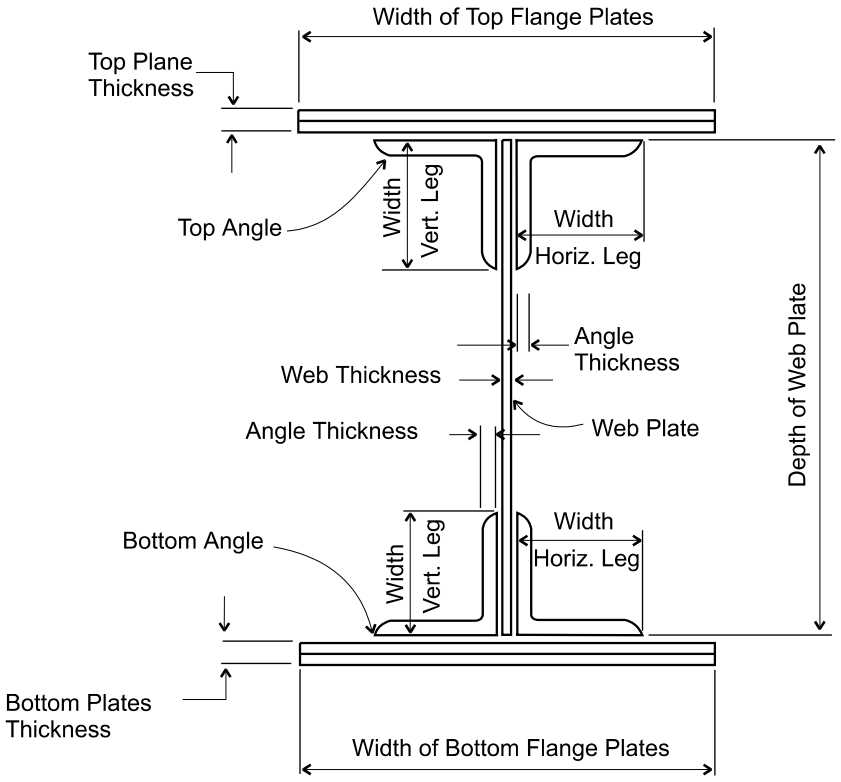
COMMAND NAME	RIVETED
PURPOSE	This command defines the components of a riveted girder. At least one girder type command is required.
14 COMMAND PARAMETERS	
Span Number	Enter the span number of the span being rated.
Range	Range is defined as a portion or length of a span, in feet, for which there are no changes in any elements of the girder. The position of the range within the span is defined by giving the distance (range) from the support to the far end of the range. In the case of a linear or parabolic variation in the web depth, a range is the portion of the span for which the slope or parabolic constant remains constant. Each span is to be treated separately. Up to 30 ranges (sections) may be described with the last Range dimension equal to the span length.
Top Plates Width	Enter the average width, in inches, of all the top flange plates. See Figures for all dimensions. (Maximum = 36 inches, Minimum = 8 inches or 0)
Top Plates Thickness	Enter the total thickness, in inches, of all the top flange plates. (Maximum = 4 inches, Minimum = 0.18 inches or 0)
Top Angles Width Horizontal Leg	Enter the width, in inches, of the top flange angle leg that is attached to the top flange plate. (Maximum = 9 inches, Minimum = 1.0 inches)
Top Angles Width Vertical Leg	Enter the width, in inches, of the top flange angle leg that is attached to the web plate. (Maximum = 9 inches, Minimum = 1.0 inches)
Top Angle Thickness	Enter the thickness, in inches, of the top flange angle. (Maximum = 1.125 inches, Minimum = 0.125 inches)
Web Plates Depth	Enter the distance, in inches, back-to-back of the angle legs comprising the girder flanges. (Maximum = 150 inches, Minimum = 24 inches) See Figure.
(Continued)	

COMMAND PARAMETERS (Cont.)	
Web Plates Thickness	Enter the thickness, in inches, of the full-depth web plate. (Maximum = 1.5 inches, Minimum = 0.18 inches)
Bottom Angles Width Horizontal Leg	Enter the width, in inches, of the bottom flange angle leg that is attached to the bottom flange plate. (Maximum = 9 inches, Minimum = 1.0 inches)
Bottom Angles Width Vertical Leg	Enter the width, in inches, of the bottom flange angle leg that is attached to the web plate. (Maximum = 9 inches, Minimum = 1.0 inches)
Bottom Angles Thickness	Enter the thickness, in inches, of the bottom flange angle. (Maximum = 1.125 inches, Minimum = 0.125 inches)
Bottom Plates Width	Enter the average width, in inches, of all the bottom flange plates. (Maximum = 36 inches, Minimum = 8 inches or 0)
Bottom Plates Thickness	Enter the total thickness, in inches, of all the bottom flange plates. (Maximum = 4 inches, Minimum = 0.18 inches or 0)

EXAMPLE

1234567 RIVETED 2 41.3 9.0 1.0 3.5 3.5 .40 40.0 .50 3.5 3.5 .40 9.0 1.0

FIGURES



RIVETED GIRDER

NOTES

470	BRASS-TRUSS™	COMMAND DESCRIPTION

COMMAND NAME	ROLLED
PURPOSE	This command defines the rolled beam girder. At least one girder type command is required.
11 COMMAND PARAMETERS	
Span Number	Enter the span number of the span rated.
Range	Range is defined as a portion or length of a span, in feet, for which there are no changes in any elements of the girder. The position of the range within the span is defined by giving the distance (range) from the support to the far end of the range. Each span is to be treated separately. Up to 30 ranges (sections) may be described with the last Range dimension equal to the span length.
Top Plates Width	Enter the average width, in inches, of all the top plates. See Figures for all dimensions. (Maximum = 30 inches, Minimum = 6 inches or 0)
Top Plates Thickness	Enter the total thickness, in inches, of all the top flange plates. (Maximum = 2 inches, Minimum = 0.375 inches or 0)
Rolled Beam Depth	Enter the depth, in inches, of the rolled beam girder. See Notes. (Maximum = 37 inches, Minimum = 3 inches)
Rolled Beam Flange Width **or** "W" + Weight per Foot	Enter the flange width, in inches, of the rolled beam girder. If the Rolled Beam section is specified on the "As Built" plans, enter the letter "W" followed by the weight per foot from these plans. See Notes. (Maximum = 18 inches, Minimum = 2 inches or Maximum = 730 lbs., Minimum = 5 lbs.)
Rolled Beam Flange Thickness	Enter the average flange thickness, in inches, of the rolled beam girder. If the weight per foot was entered under "ROLLED BEAM FLANGE WIDTH", enter 0. (Maximum = 5 inches, Minimum = 0.18 inches or 0)
Bottom Plates Width	Enter the average width, in inches, of all the bottom flange plates. (Maximum = 30 inches, Minimum = 6 inches or 0)
Bottom Plates Thickness	Enter the thickness, in inches, of all the bottom flange plates. (Maximum = 2 inches, Minimum = 0.375 inches or 0)
(Continued)	

COMMAND PARAMETERS (Cont.)	
Composite	Enter “N” or “Y” to designate no or yes for composite action. No other letters are acceptable.
FY	Enter the Yield Strength, in ksi, of the flange plates if they are different than the values given on the STRESSES command. If they are the same, or there are no flange plates, enter 0.

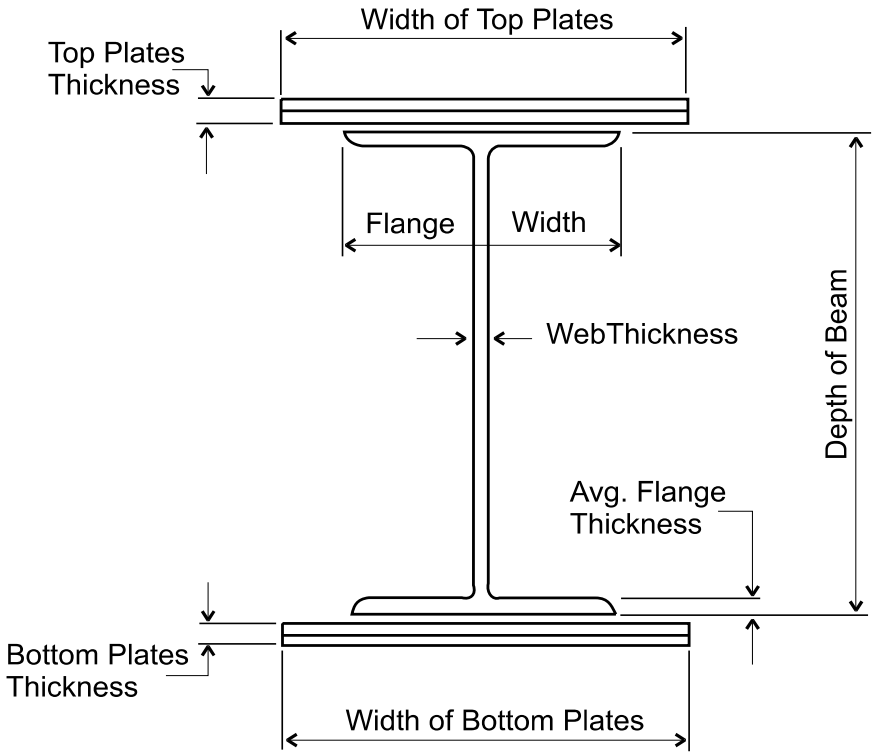
EXAMPLE

1234567 ROLLED 1 23.0 0 0 15.0 5.75 0.45 0 0 N 0

1234567 ROLLED 1 55.0 0 0 24 W104 0 0 0 N 0
(WN 24x104 - First 24x104 section listed in sections library)

1234567 ROLLED 1 55.0 0 0 24 9.775 0.942 0 0 N 0
(W 24x104 - Second 24x104 section listed in sections library)

FIGURES



ROLLED BEAM GIRDER WITH PLATES

NOTES

There are two ways the user can select a rolled beam girder from the sections library. 1) The user may input a section depth and flange width in Parameters 5 and 6. The program will search the library for the **first occurrence** of this combination of values. If a section is not found in the library, the program tries to find a section within ⅛" of the dimensions input. If a section is not found, an error message appears in the output. 2) If a W section is specified on the "As Built" plans, the user may input a one or two digit integer section depth corresponding to the beam depth as listed under "Designation" in the AISC *Manual of Steel Construction* in Parameter 5 and input the letter "W" followed by the weight per foot in Parameter 6. The program will search the library for the **first occurrence** of the combination of depth and weight. If a section is not found, an error message appears in the output. In this case, enter the beam as "WELDED" and enter the web thickness. If the web thickness is not input, BRASS-TRUSS™ will assume the web thickness to be 0.678 x Flange Thickness. **Note:** In the standard sections library, some standard shapes begin with "W" and "WN" (i.e., W24X76 and WN24X76). In 1985, AISC changed the dimensions of several steel shapes while keeping the same designation. To differentiate between the two types (especially when the older shape is needed to perform a rating) an "N" was added to the shape designation to indicate a NEW shape. In the event the user wishes to select the **second occurrence** of a section listed in the library, use the first method described above and input the specific flange width as it appears in the library. See the example above. **Note:** A zero **must be entered** in Parameter 7 when an AISC shape is entered in Parameters 5 and 6.

The shape you enter **must exist in the standard shapes library**, *stsect.dat*. This library is a binary file and is not easily readable. An ASCII copy of this file has been placed on the FTP Server for viewing.

480	BRASS-TRUSS™	COMMAND DESCRIPTION

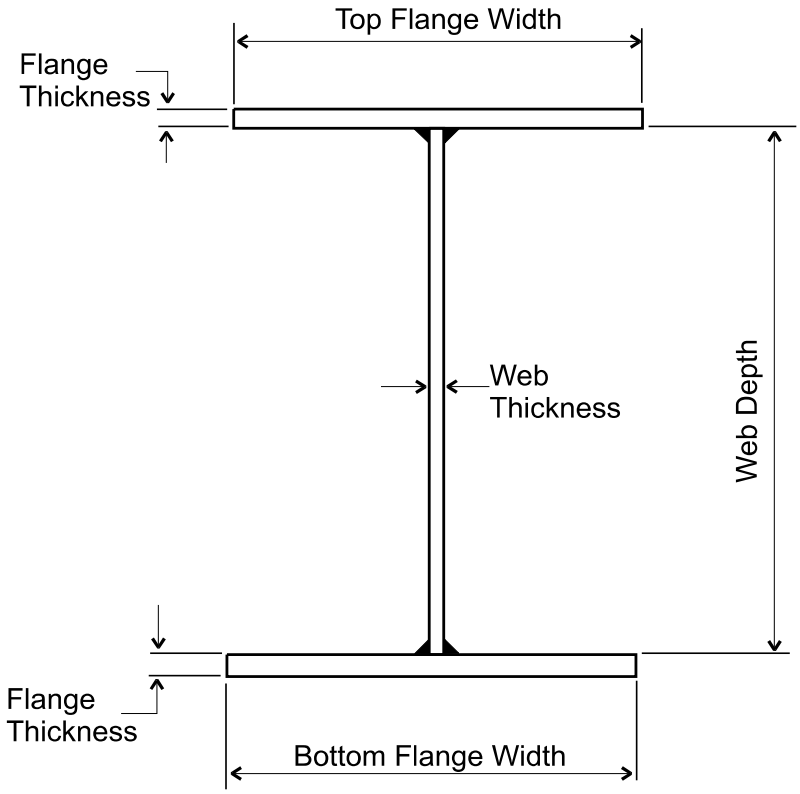
COMMAND NAME	WELDED
PURPOSE	This command defines the components of a welded plate girder. At least one girder type command is required.

10 COMMAND PARAMETERS	
Span No.	Enter the span number of the span being rated.
Range	Range is defined as a portion or length of a span, in feet, for which there are no changes in any elements of the girder. The position of the range within the span is defined by giving the distance (range) from the support to the far end of the range. In the case of a linear or parabolic variation in the web depth, a range is the portion of the span for which the slope or parabolic constant remains constant. Each span is to be treated separately. Up to 30 ranges may be described with the last Range dimension equal to the span length.
Top Plates Width	Enter the average width, in inches, of all the top plates. See Figures for all dimensions. (Maximum = 42 inches, Minimum = 8 inches)
Top Plates Thickness	Enter the thickness, in inches, of all the top plates. (Maximum = 4 inches, Minimum = 0.5 inches)
Web Plates Depth	Enter the depth, in inches, of the web plate. (Maximum = 150 inches, Minimum = 18 inches)
Web Plates Thickness	Enter the thickness, in inches, of the web plate. (Maximum = 1.5 inches, Minimum = 0.25 inches)
Bottom Plates Width	Enter the average width, in inches, of all the bottom plates. (Maximum = 42 inches, Minimum = 8 inches)
Bottom Plates Thickness	Enter the thickness, in inches, of all the bottom plates. (Maximum = 3 inches, Minimum = 0.5 inches)
Composite	Enter "N" or "Y" to designate no or yes for composite action. No other letters are acceptable.
FY	Enter the yield strength, in ksi, of the flanges, if it is different than that of the web.

EXAMPLE

1234567 WELDED 1 110 22 1.5 84 0.625 22 1.5 N 46

FIGURES



WELDED GIRDER

NOTES

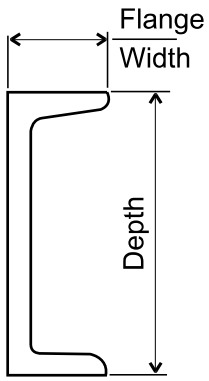
490	BRASS-TRUSS™	COMMAND DESCRIPTION

COMMAND NAME	CHANNEL
PURPOSE	This command is used to describe a channel girder. At least one type of girder command is required.
5 COMMAND PARAMETERS	
Span No.	Enter the span number of the span being rated.
Range	Range is defined as a portion or length of a span, in feet, for which there are no changes in any elements of the girder. The position of the range within the span is defined by giving the distance (range) from the support to the far end of the range. Each span is to be treated separately. Up to 30 ranges (sections) may be described with the last Range dimension equal to the span length.
Depth	Enter the depth, in inches, of the channel girder. See Notes. See Figure for all dimensions. (Maximum = 18 inches, Minimum = 3 inches)
Flange Width **or** "W" + Weight per Foot	Enter the flange width, in inches, of the channel girder. If the channel beam section is specified on the "As Built" plans, enter the letter "W" followed by the weight per foot from these plans. See Notes. (Maximum = 4 inches, Minimum = 1.4 inches or Maximum = 58 lbs., Minimum = 4.1 lbs.)
Composite	Enter "N" or "Y" to designate no or yes for composite action. No other letters are acceptable.

EXAMPLE

```
1234567 CHANNEL   2   65   14   4   N
1234567 CHANNEL   2   65   15   W40   N
```

FIGURES



CHANNEL GIRDER

NOTES

There are two ways the user can select a channel girder from the sections library. 1) The user may input a section depth and flange width in Parameters 3 and 4. The program will search the library for the **first occurrence** of this combination of values. If a section is not found in the library, the program tries to find a section within ⅛" of the dimensions input. If a section is not found, an error message appears in the output. 2) If a Channel is specified on the "As Built" plans, the user may input a one or two digit integer section depth corresponding to the beam depth as listed under "Designation" in the AISC *Manual of Steel Construction* in Parameter 3 and input the letter "W" followed by the weight per foot in Parameter 4. The program will search the library for the **first occurrence** of the combination of depth and weight. **Note:** The use of the letter "W" does not mean that a W section will be selected. The letter "W" is merely a flag to tell the program to search for a rolled channel section. If a section is not found, an error message appears in the output.

The shape you enter **must exist in the standard shapes library**, *stsect.dat*. This library is a binary file and is not easily readable. An ASCII copy of this file has been placed on the FTP Server for viewing.

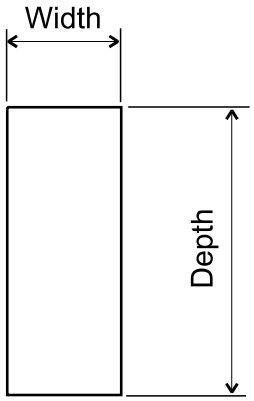
500	BRASS-TRUSS™	COMMAND DESCRIPTION

COMMAND NAME	TIMBER
PURPOSE	This command is used to describe a timber girder. At least one type of girder command is required.
4 COMMAND PARAMETERS	
Span No.	Enter the span number of the span being rated.
Range	Range is defined as a portion or length of a span, in feet, for which there are no changes in any elements of the girder. The position of the range within the span is defined by giving the distance (range) from the support to the far end of the range. Each span is to be treated separately. Up to 30 ranges (sections) may be described with the last Range dimension equal to the span length.
Depth	Enter the depth, in inches, of the timber girder. See Figure for all dimensions. (Maximum = 24 inches, Minimum = 6 inches)
Width	Enter the width, in inches, of the timber girder. (Maximum = 18 inches, Minimum = 4 inches)

EXAMPLE

1234567 TIMBER 1 60 18 8.5

FIGURES



TIMBER GIRDER

NOTES

12. CODING INSTRUCTIONS FOR CONNECTIONS

510	BRASS-TRUSS™	COMMAND DESCRIPTION

COMMAND NAME	CONNECTION
PURPOSE	This command defines the type and location of connections. This command is optional.
5 COMMAND PARAMETERS	
NOTE: The following parameter is placed BEFORE the command. Type	Enter the word "FRAMED", "HANGER" or "HINGE" to describe the type of connection to be rated. No other words are acceptable. Insert a space, followed by the command after this parameter. Place a space after the command as usual. See Example.
Location	Enter "INTERIOR" or "EXTERIOR" if the next parameter is to be "STRINGER". Enter "END" or "INTERMEDIATE" if the next parameter is to be "FLOORBEAM". Enter "LEFT", "RIGHT", "EITHER" or "MIDDLE" if the next parameter is to be "TRUSS". Enter "LEFT", "RIGHT", "EITHER", "INTERIOR" or "FASCIA" if the next parameter is to be "GIRDER". No other combinations are acceptable.
Connecting Member Type	Enter "STRINGER", "FLOORBEAM", "TRUSS" or "GIRDER" followed by the word "TO". No other words are acceptable. If the Type is "HINGE", "FLOORBEAM" is not acceptable.
Location	Enter "INTERIOR" or "EXTERIOR" if the next parameter is to be "STRINGER" and the Type is "HINGE". Enter "END" or "INTERMEDIATE" if the next parameter is to be "FLOORBEAM". Enter "LEFT", "RIGHT", "EITHER" or "MIDDLE" if the next parameter is to be "TRUSS". Enter "LEFT", "RIGHT", "EITHER", "INTERIOR" or "FASCIA" if the next parameter is to be "GIRDER". If the Type is "HINGE", both Location parameters must be the same. No other combinations are acceptable.
Supporting Member Type	If the Type is Hinge and the Connecting Member Type is "STRINGER", enter "STRINGER". Otherwise "FLOORBEAM", "TRUSS" or "GIRDER" may be entered. If the Type is "HINGE" this parameter must be the same as Connecting Member Type. No other combinations are acceptable.

EXAMPLE

1234567 FRAMED CONNECTION INTERMEDIATE FLOORBEAM TO EITHER TRUSS

FIGURES

NOTES

Connection information is entered for informational purposes only. BRASS-TRUSS™ does not analyze the connections.

520	BRASS-TRUSS™	COMMAND DESCRIPTION

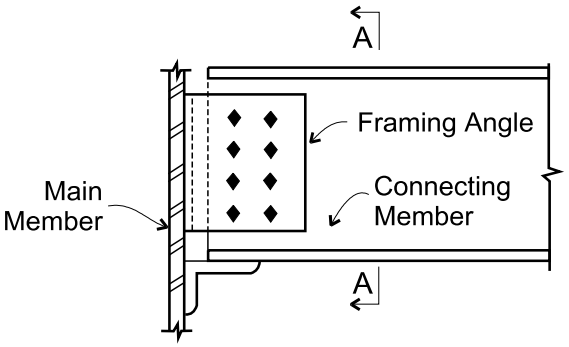
COMMAND NAME	FRAMED DETAILS
PURPOSE	This command defines the components of framed connections. This command is optional.
13 COMMAND PARAMETERS	
Framing Angles Side	Enter “1" or “2" as determined by the number of sides of the connecting member web with angles on them.
Framing Angles Width Outside Leg	Enter the width, in inches, of the leg that is connected to the supporting member. See Figures. (Maximum = 9 inches, Minimum = 1.0 inches)
Framing Angles Width Other Leg	Enter the width, in inches of the leg that is against the connecting member. (Maximum = 9 inches, Minimum = 1.0 inches)
Framing Angles Thickness	Enter the thickness, in inches, of the framing angles. (Maximum = 1.125 inches, Minimum = 0.125 inches)
Connecting Member Number of Lines	Enter the number of horizontal lines of connectors that pass through the web of the connecting member.
Connecting Member Number of Rows	Enter the number of vertical rows of connectors, either “1" or “2", that pass through the web of the connecting member.
Connecting Member Fastener Diameter	Enter the diameter of the fasteners that pass through the web of the connecting member in decimals of an inch. (Maximum = 1.25 inches, Minimum = 0.625 inches)
Main Member Number of Lines	Enter the number of horizontal lines of connectors that pass through the web of the supporting member.
Main Member Number of Rows	Enter the number of vertical rows of connectors, either “2" or “4", that pass through the web of the supporting member.
Main Member Fastener Diameter	Enter the diameter of the fasteners that pass through the web of the supporting member in decimals of an inch. (Maximum = 1.25 inches, Minimum = 0.625 inches)
(Continued)	

COMMAND PARAMETERS (Cont.)	
Shelf Angle Width Outside Leg	If a shelf angle is present, enter the width of the leg that is under the connecting member, in inches. Otherwise, enter 0. (Maximum = 9 inches, Minimum = 1.0 inches or 0)
Shelf Angle Width Other Leg	If a shelf angle is present, enter the width of the leg that is against the web of the supporting member, in inches. Otherwise, enter 0. (Maximum = 9 inches, Minimum = 1.0 inches or 0)
Shelf Angle Thickness	If a shelf angle is present, enter the thickness, in inches. Otherwise, enter 0. (Maximum = 1.125 inches, Minimum = 0.125 inches or 0) NOTE: If the fastener pattern is irregular, do not rate the connection. Enter "UNRA" on the BRIDGE command and mention this on the COMMENTS command.

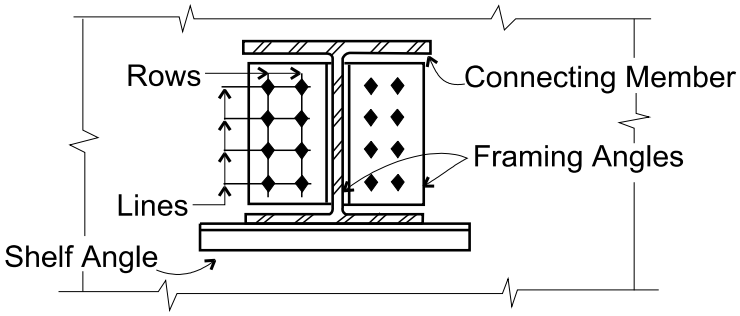
EXAMPLE

```
1234567 FRAMED DETAILS  2.0  4.0   6.0   0.50   9.0   2.0   0.75   9.0   2.0   0.75   0   0   0
```

FIGURES



CONNECTION DETAILS



SECTION A-A

NOTES

Connection information is entered for informational purposes only.
BRASS - TRUSS does not analyze the connections.

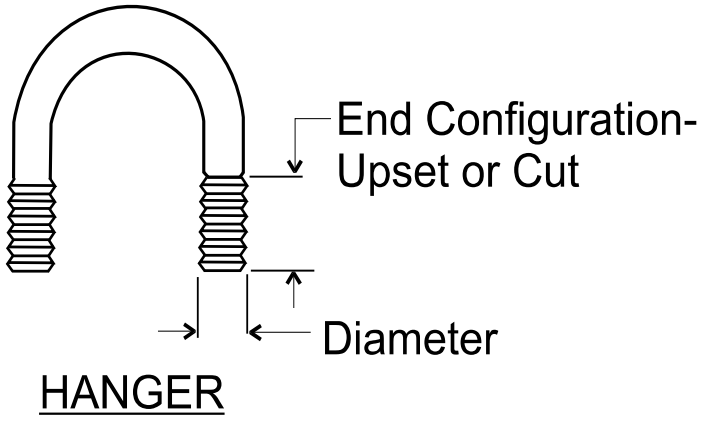
530	BRASS-TRUSS™	COMMAND DESCRIPTION

COMMAND NAME	HANGER DETAILS
PURPOSE	This command defines hanger connections. This command is optional.
3 COMMAND PARAMETERS	
Number of U-Bolts	Enter the number of U-Bolts that support the connecting member.
Hanger Diameter	Enter the outside diameter of the threads on the U-Bolts in decimals of an inch. See Figures. (Maximum = 3 inches, Minimum = 0.75 inches)
Hanger End Configuration	Enter either "UPSET" or "CUT" to describe the manner in which the threads are applied to the ends of the U-Bolts. No other words are acceptable.

EXAMPLE

1234567 HANGER DETAILS 2.0 1.125 UPSET

FIGURES



NOTES

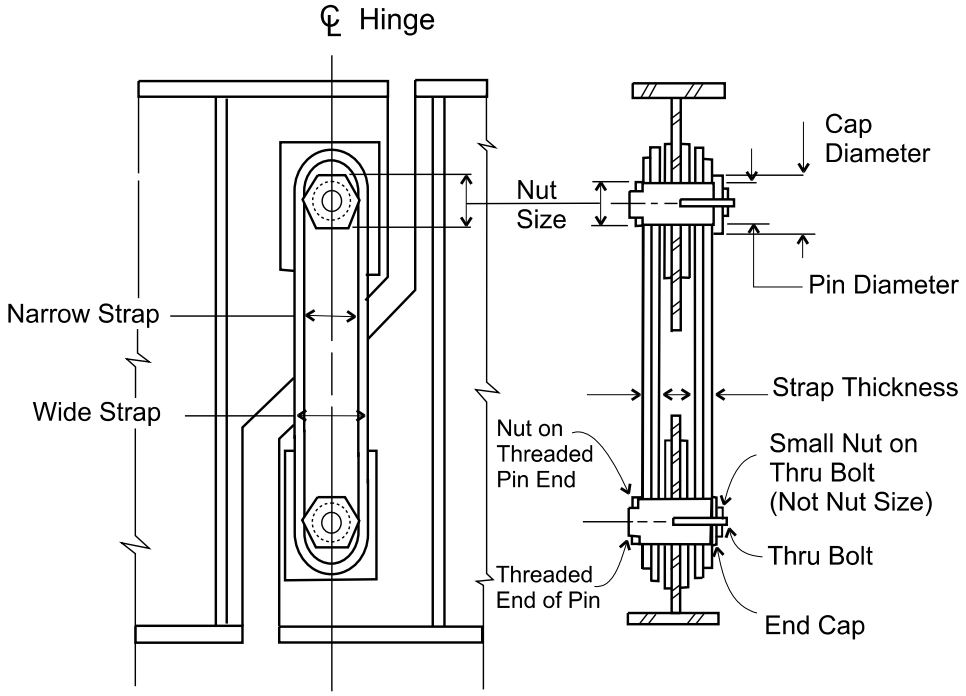
540	BRASS-TRUSS™	COMMAND DESCRIPTION

COMMAND NAME	HINGE DETAILS
PURPOSE	This command defines the components of a hinge. This command is optional.
5 COMMAND PARAMETERS	
Pin Diameter	Enter the outside diameter of the pin, in inches. If it is inaccessible, enter 0 and fill in the Nut Size or Cap Diameter parameters. See Figures. (Maximum = 24 inches, Minimum = 1 inch or 0)
Nut Size	Enter the short nut diameter, in inches. This is the dimension across the flats. This parameter is to be used only when the Pin Diameter and Cap Diameter parameters are 0. Enter 0 here if the Pin Diameter or Cap Diameter parameters are not 0. (Maximum = 13 inches, Minimum = 2 inches or 0)
Cap Diameter	Enter the cap diameter, in inches. This parameter is to be used only when the Pin Diameter and Nut Size parameters are 0. Enter 0 here if the Pin Diameter or Nut Size parameters are not 0. (Maximum = 25 inches, Minimum = 10 inches or 0)
Strap Width	Enter the AVERAGE width of ALL the straps, in inches. If none exist, enter 0. (Maximum = 24 inches, Minimum = 4 inches or 0)
Strap Thickness	Enter the TOTAL thickness of ALL the straps in inches. If none exist, enter 0. (Maximum = 4 inches, Minimum = 0.25 inches or 0)

EXAMPLE

1234567 HINGE DETAILS 7.00 0 0 13.0 4.0

FIGURES



HINGE DETAILS

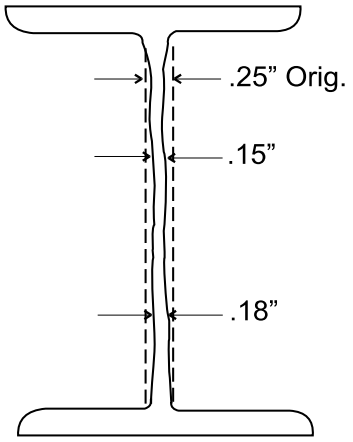
NOTES

13. DETERIORATION INFORMATION

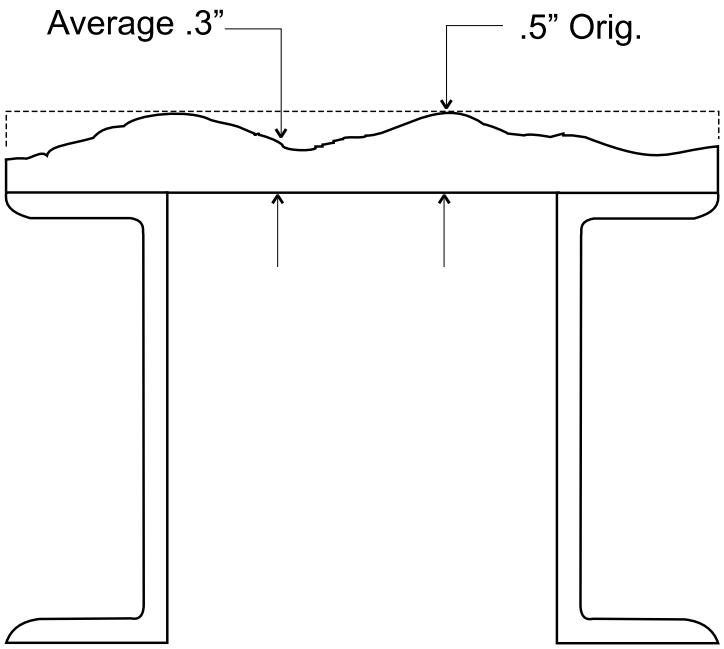
When deterioration of sleepers, stringers or floorbeams occur, two commands are required to provide the information needed. The first command of the set contains the dimensions of an original unrusted or non-deteriorated section. The command "STEEL SLEEPERS", "TIMBER SLEEPERS", "CHANNEL STRINGER", "ROLLED STRINGER", "TIMBER STRINGER", "CHANNEL FLOORBEAM", "ROLLED FLOORBEAM", or "ISEC FLOORBEAM" is repeated and the word "RUST" (or "ROT" for timber members) is entered for the "Span" or "Location" parameter. The remaining parameters contain the percentage of area loss for a particular element, or the percentage of dimension loss for the appropriate element as described below.

There are two procedures that can be used to identify deterioration for the requirements of this program. If, by an eyeball inspection of the section the percentage of area loss is recognized, then this percentage, adjusted for the number of pieces of the element affected, can be input under one of the field headings for that element and the other fields for that element input as zero. If the percentage of area loss is not apparent in an element, then the percentage of dimension loss, either width, depth or thickness is input under the appropriate field. The only exceptions to the statement made above are for sections where the full dimensions of the elements are not required for input. The channel web and flange thickness and the rolled beam web thickness are not required for identification of the section, so the deterioration value input under the channel or rolled beam depth field or the channel flange width field are percentages of area loss, rather than dimension loss. The Figures and comments on the following pages illustrate the procedures used to generate the deterioration values.

General Information for
WEBS and PLATES

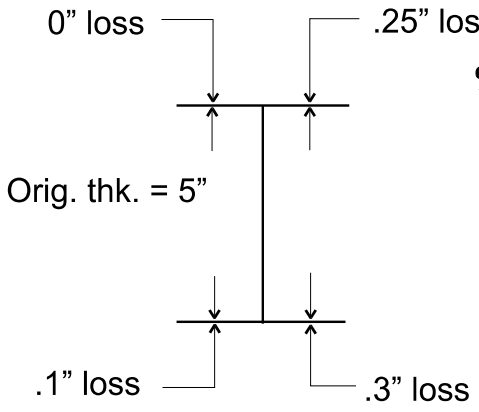


Sometimes deterioration is so irregular that an exact measurement for loss cannot be made. Make an estimate either by averaging a few measurements or by eye.



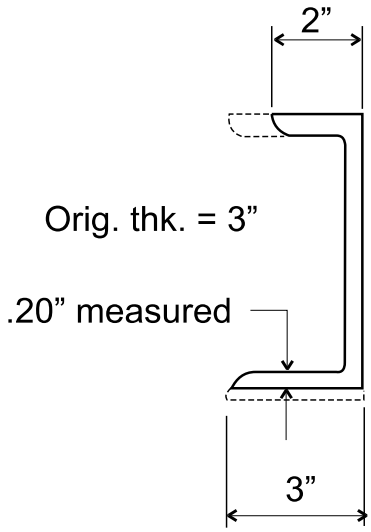
Channels and Rolled Beams

FLANGE THICKNESS



$$\% \text{ loss} = \frac{\left(0 + \frac{.25}{.5} + \frac{.1}{.5} + \frac{.3}{.5}\right)}{2 \text{ Average flanges}} \times 100 = 32\%$$

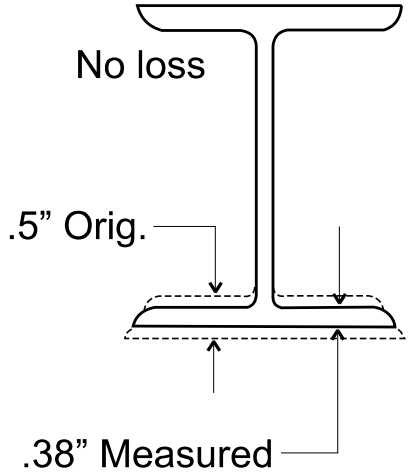
Enter 32% under flange thickness
(Dimension loss)



$$\% \text{ loss} = \frac{\frac{1}{3} \text{ Width} + \frac{.1}{.3} \text{ Thickness}}{2 \text{ flanges}} \times 100 = 33\%$$

Enter 33% under flange width
(Area loss)

Enter 12% under flange

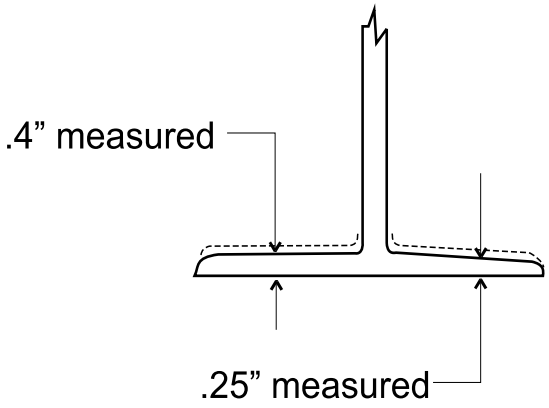


$$\% \text{ loss} = \frac{.12}{.50} \times \frac{1}{2 \text{ flanges}} \times 100 = 12\%$$

thickness
(Dimension loss)

Deterioration Information (Cont.)
Channels and Rolled Beams
FLANGE THICKNESS (Cont.)

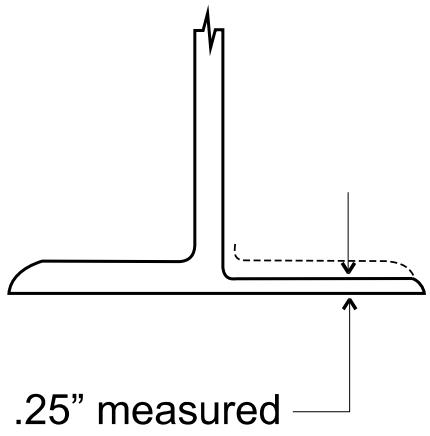
Original thickness = .5"



$$\text{Average thickness} = \frac{.4 + .25}{2} = .325''$$

$$\%\ \text{loss} = \frac{(.5 - .325)}{.5} \times \frac{1}{2\ \text{flanges}} \times 100 = 17\%$$

Enter 17% under flange thickness.
(Dimension loss)

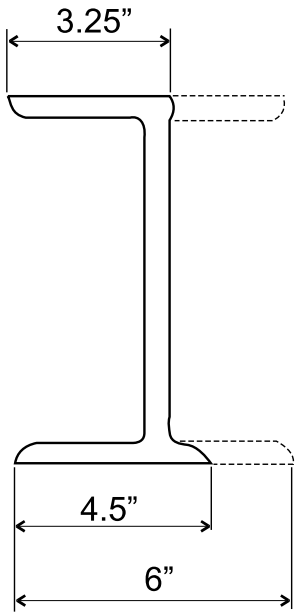


Original thickness = .5"

$$\%\ \text{loss} = \frac{.25}{.5} \times \frac{1}{2} \times \frac{1}{2} \times 100 = 12\%$$

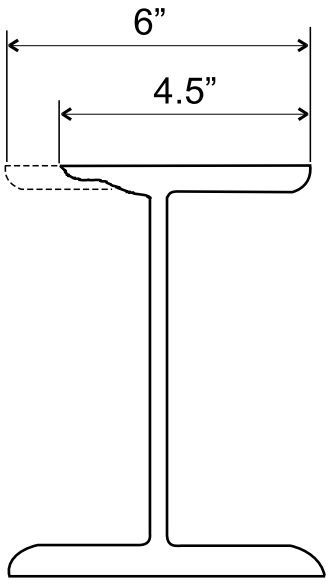
Enter 12% under flange thickness.
(Dimension loss)

Deterioration Information (Cont.)
Channels and Rolled Beams
FLANGE WIDTH



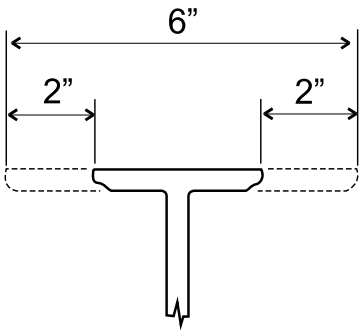
$$\% \text{ loss} = \frac{(\frac{2.75}{6} + \frac{1.5}{6})}{2 \text{ flanges}} \times 100 = 35\%$$

Enter 35% under flange width.
(Dimension loss)



$$\% \text{ loss} = \frac{1.5}{6} \times \frac{1}{2 \text{ flanges}} \times 100 = 12\%$$

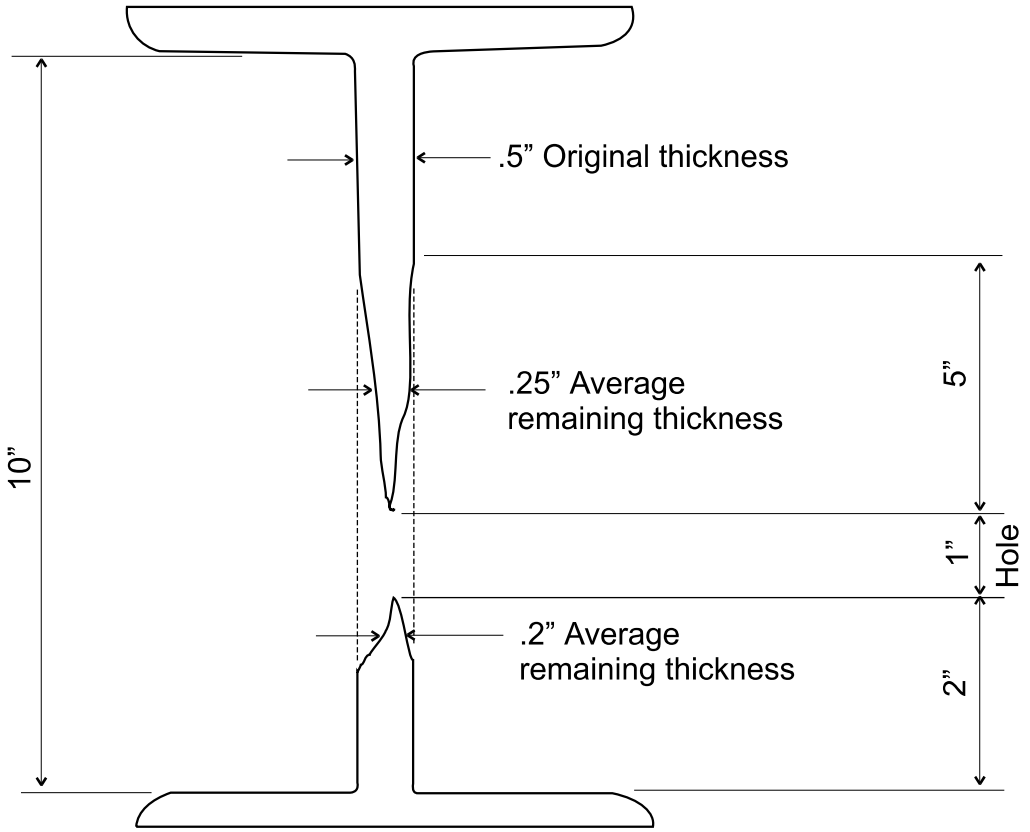
Enter 12% under flange width.
(Dimension loss)



$$\% \text{ loss} = \frac{4}{6} \times \frac{1}{2 \text{ flanges}} \times 100 = 33\%$$

Enter 33% under flange width.
(Dimension loss)

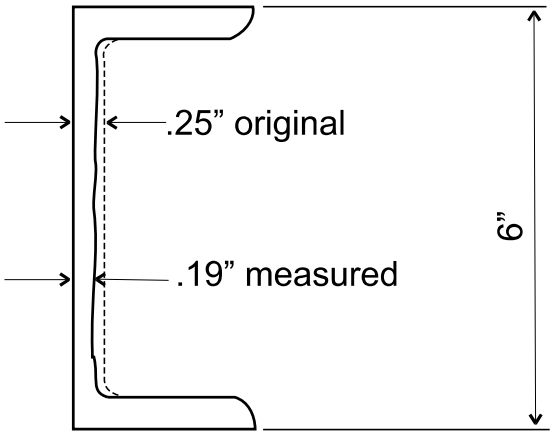
Deterioration Information (Cont.)
Channels and Rolled Beams
WEBS



$$\% \text{ loss} = \left(\frac{.25}{.5} \; x \; \frac{5}{10} + \frac{.3}{.5} \; x \; \frac{2}{10} + \frac{1}{10} \right) \; x \; 100 = 47\%$$

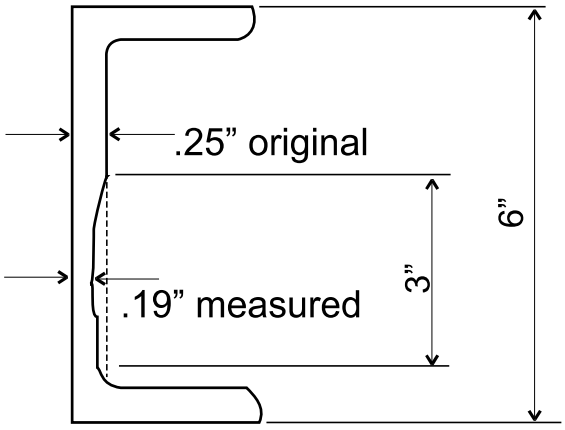
Enter 47% under depth. (Area loss)

Deterioration Information (Cont.)
Channels and Rolled Beams
WEBS (Cont.)



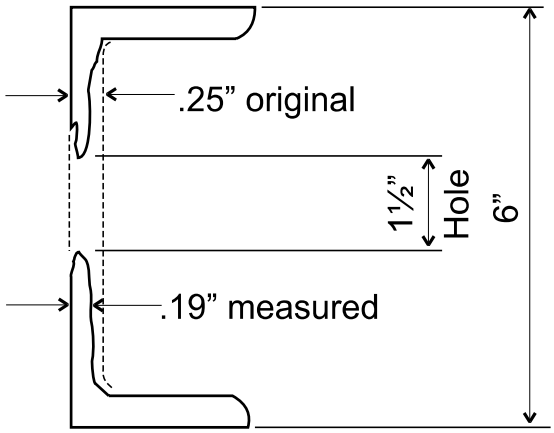
$$\% \text{ loss} = \frac{.06}{.25} \times 100 = 24\%$$

Enter 24% under depth. (Area loss)



$$\% \text{ loss} = \frac{3}{6} \times \frac{.06}{.25} \times 100 = 12\%$$

Enter 12% under depth. (Area loss)

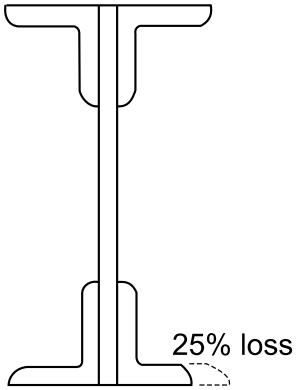


$$\% \text{ loss} = \left(\frac{.06}{.25} + \frac{1.5}{6} \times \frac{.19}{.25} \right) \times 100 = 43\%$$

Enter 43% under depth. (Area loss)

Deterioration Information (Cont.)

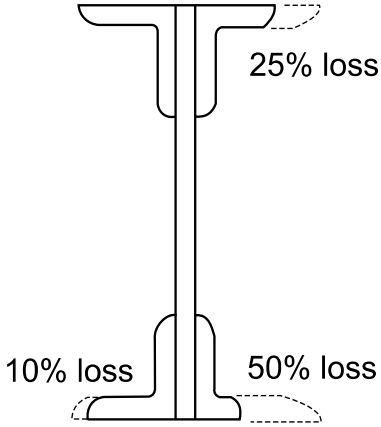
ANGLES



Top ∠ s ~ No loss, enter 0.

Bottom ∠ s = $\frac{25}{2 \text{ Angles}}$ = 12% Enter under width of horizontal leg. (Dimension loss)

Other values 0.

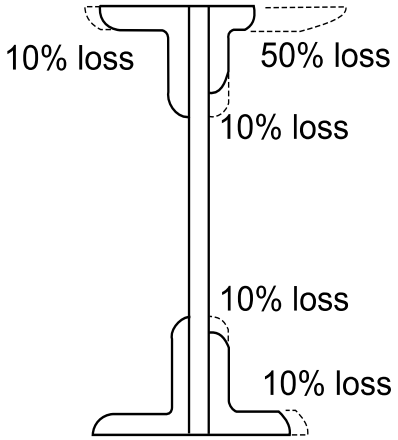


Top ∠ s = $\frac{25}{2 \text{ Angles}}$ = 12% Enter under width of horizontal leg. (Dimension loss)

Bottom ∠ s = $\frac{(50 + 10)}{2 \text{ Angles}}$ = 30% Enter under width of horizontal leg. (Dimension loss)

Other values 0.

Note: For Floorbeams Only



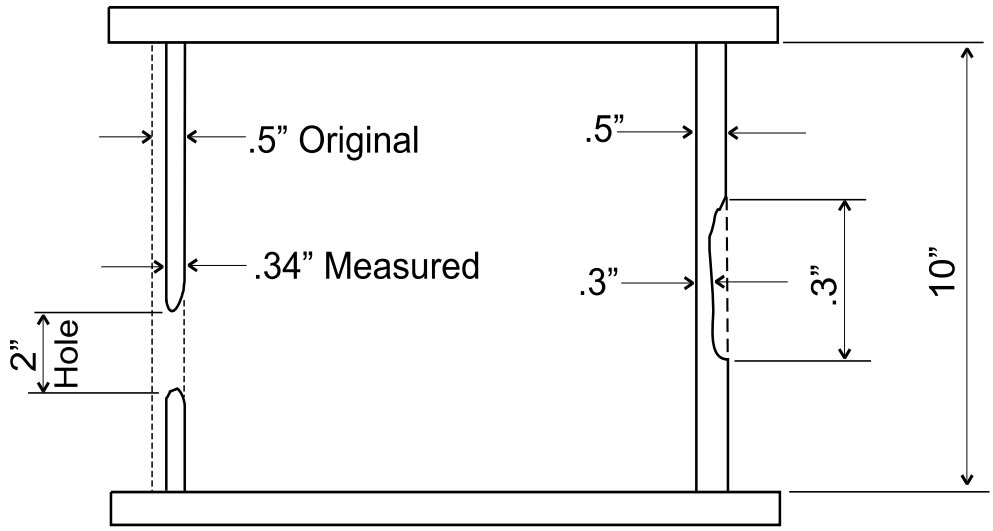
Top ∠ s = $\frac{(50 + 10 + 10)}{2 \text{ Angles}}$ = 35%

Bottom ∠ s = $\frac{(10 + 10)}{2 \text{ Angles}}$ = 10%

% loss = $\frac{(35 + 10)}{2}$ = 22.5% Enter under width (Area loss)

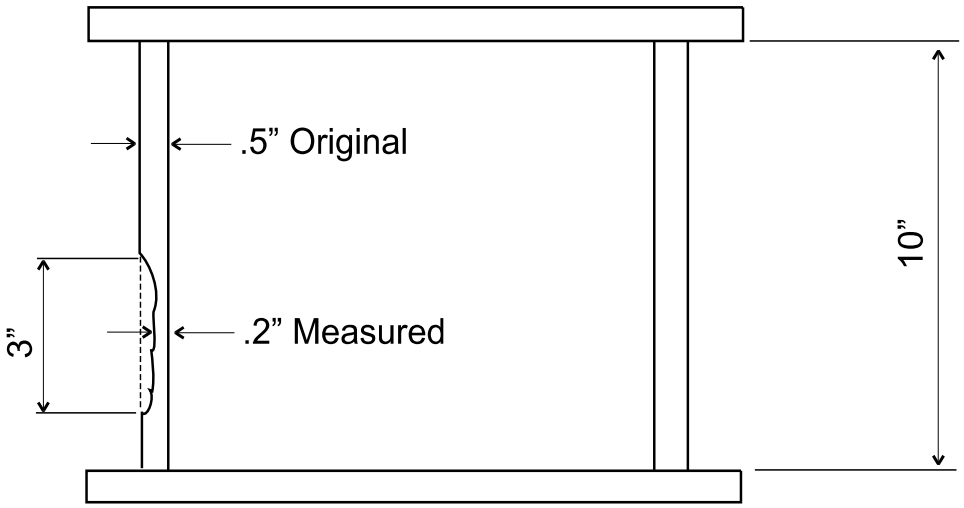
Other values 0.

Deterioration Information (Cont.)
Box Section
WEBS



$$\% \text{ loss} = \left(\frac{2}{10} \times \frac{1}{2 \text{ Webs}}\right) \times 100 = 10\%$$ Enter under depth (Dimension loss)

$$\% \text{ loss} = \left(\frac{.16}{.5} \times \frac{8}{10} \times \frac{.2}{.5} \times \frac{3}{10}\right) \times \frac{1}{2 \text{ Webs}} \times 100 = 19\%$$ Enter under depth (Dimension loss)



$$\% \text{ loss} = \left(\frac{.3}{.5} \times \frac{3}{10} \times \frac{1}{2}\right) \times 100 = 9\%$$ Enter under thickness (Dimension loss)

Depth loss = 0

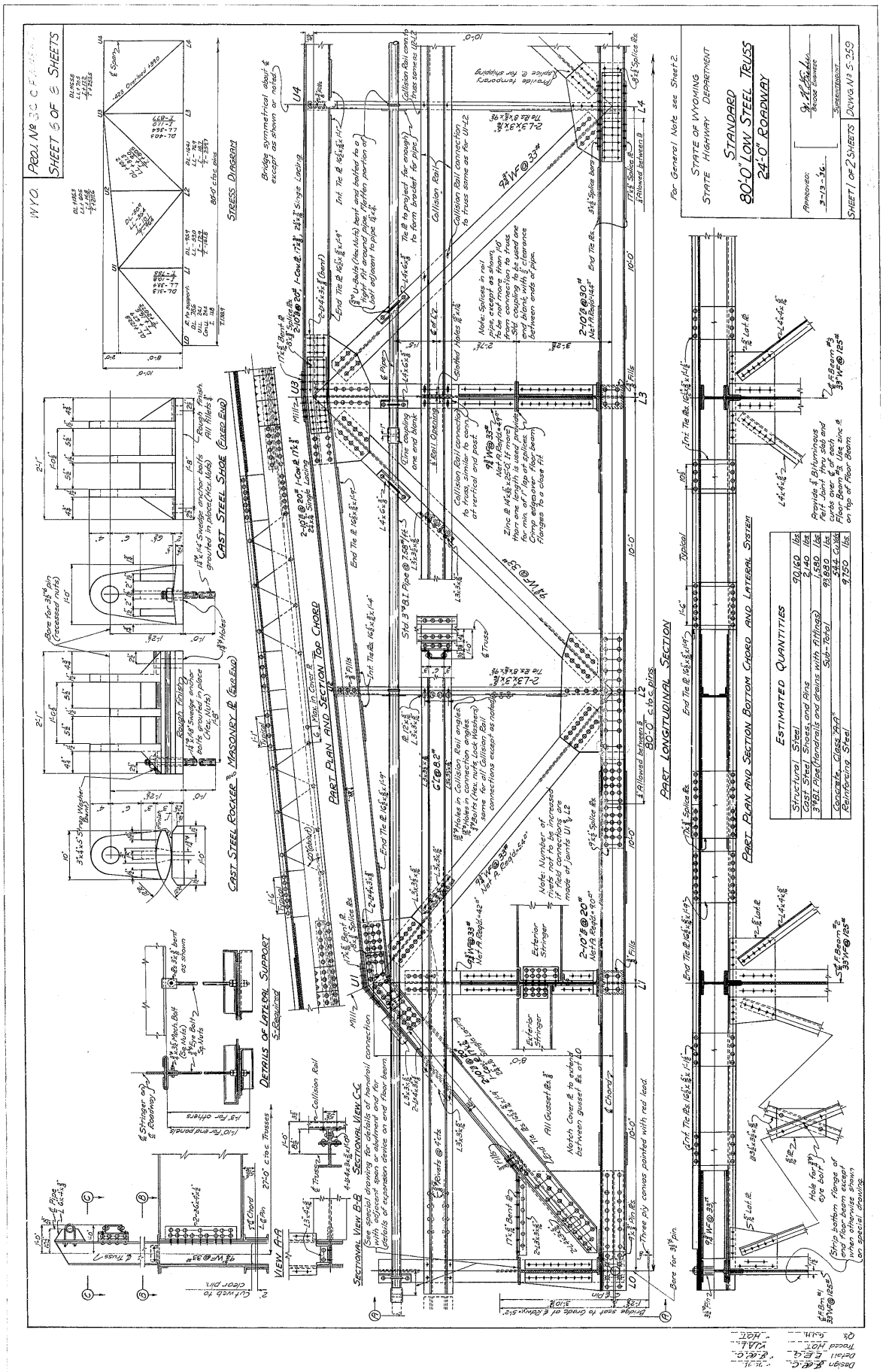
14. SAMPLE PROBLEM

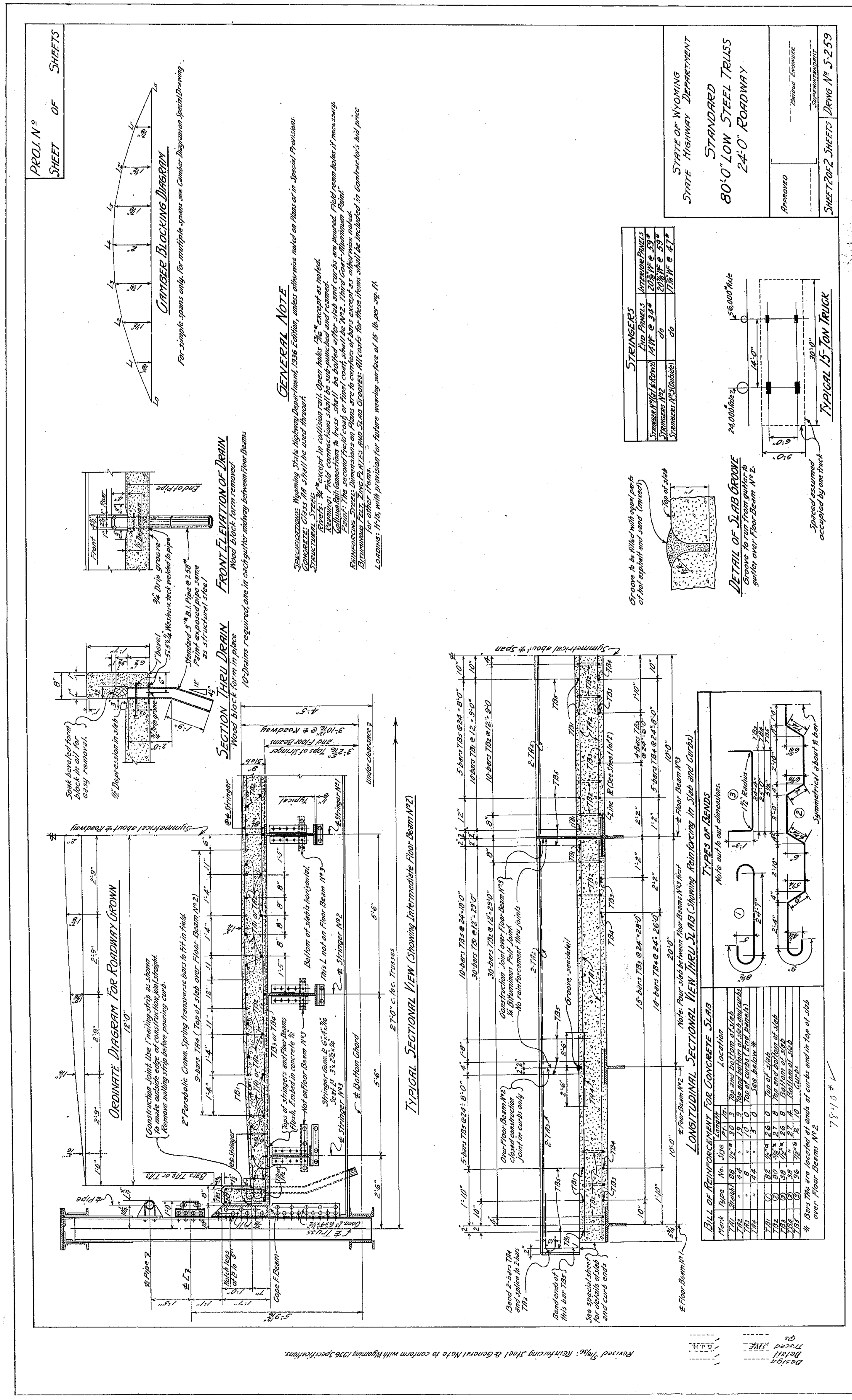
RATING A TYPICAL SIMPLE SPAN PONY TRUSS

The sample problem is for rating an 80 foot simple span pony truss (See Bridge Plans on Pages 14.2 and 14.3). This example shows the pertinent information from the plans that is needed to code the data. The live loads applied are HS20 truck and lane, H20 truck and lane, Type 3, Type 3S3, and Type 3-3 as described in AASHTO Manual for Maintenance Inspection of Bridges 1983, Page 50.

The following data set would be created:

```
3374000 SPANS 0 0 1
3374000 BRIDGE 1 1 0 0 TRUSS S 2 1 1 1 1 UNKN
3374000 LOCATION 1 0 0 46 0 R04
3374000 YEARS 1936 0 0 0
3374000 STRESSES 33.0 33.0 2.70 0
3374000 COMMENTS BRIDGE OVER LITTLE WIND RIVER SAMPLE PROBLEM #1
3374000 WEARING SURFACE 1.25 ASPHALT
3374000 PAVEMENT 24.0 0
3374000 LEFT SIDEWALK 0 0 NONE NONE 0 0
3374000 RIGHT SIDEWALK 0 0 NONE NONE 0 0
3374000 CONCRETE DECK 5.5 8 FLAT 2.4 4 2.4 4
3374000 SECONDARY MEMBER LONGITUDINAL STRINGER 20 0 0 5 YES
3374000 ROLLED STRINGER FASCIA 17.90 7.492 0.520
3374000 ROLLED STRINGER INTERIOR 20.91 8.230 0.575
3374000 SECONDARY MEMBER TRANSVERSE FLOORBEAM 27.0 0 0 0 0 N
3374000 ROLLED FLOORBEAM END 33.0 11.50 0.805
3374000 ROLLED FLOORBEAM INTERMEDIATE 33.0 11.50 0.805
3374000 MAIN MEMBER PONY TRUSS RIVETED EITHER RIVETED 10.0 10.0
3374000 L00U01 CBXO 0 17.0 0.44 10.00 2.74 0 0 16.5 0
3374000 U01U02 CBXO 0 17.0 0.38 10.00 2.74 0 0 16.5 0
3374000 U02U03 CBXO 0 17.0 0.38 10.00 2.74 0 0 16.5 0
3374000 U03U04 CBXO 0 17.0 0.38 10.00 2.74 0 0 16.5 0
3374000 U04U05 CBXO 0 17.0 0.38 10.00 2.74 0 0 16.5 0
3374000 U05U06 CBXO 0 17.0 0.38 10.00 2.74 0 0 16.5 0
3374000 U06U07 CBXO 0 17.0 0.38 10.00 2.74 0 0 16.5 0
3374000 U07L08 CBXO 0 17.0 0.44 10.00 2.74 0 0 16.5 0
3374000 L00L01 CBXO 0 16.5 0 10.00 2.74 0 0 16.5 0
3374000 L01L02 CBXO 0 16.5 0 10.00 2.74 0 0 16.5 0
3374000 L06L07 CBXO 0 16.5 0 10.00 2.74 0 0 16.5 0
3374000 L07L08 CBXO 0 16.5 0 10.00 2.74 0 0 16.5 0
3374000 L02L03 CBXO 0 16.5 0 10.00 3.03 0 0 16.5 0
3374000 L03L04 CBXO 0 16.5 0 10.00 3.03 0 0 16.5 0
3374000 L04L05 CBXO 0 16.5 0 10.00 3.03 0 0 16.5 0
3374000 L05L06 CBXO 0 16.5 0 10.00 3.03 0 0 16.5 0
3374000 L02U02 ABXI 9.0 8.0 0 3.0 3.0 0.31 0 0 0 0 0 0 0
3374000 L04U04 ABXI 10.0 8.0 0 3.0 3.0 0.31 0 0 0 0 0 0 0
3374000 L06U06 ABXI 9.0 8.0 0 3.0 3.0 0.31 0 0 0 0 0 0 0
3374000 L01U01 ROLLED 8.0 0 0 9.750 7.964 .433 0 0
3374000 U01L02 ROLLED 0 0 0 9.750 7.964 .433 0 0
3374000 L02U03 ROLLED 0 0 0 9.750 7.964 .433 0 0
3374000 L03U03 ROLLED 0 0 0 9.750 7.964 .433 0 0
3374000 U03L04 ROLLED 0 0 0 9.750 7.964 .433 0 0
3374000 L04U05 ROLLED 0 0 0 9.750 7.964 .433 0 0
3374000 L05U05 ROLLED 0 0 0 9.750 7.964 .433 0 0
3374000 U05L06 ROLLED 0 0 0 9.750 7.964 .433 0 0
3374000 L06U07 ROLLED 0 0 0 9.750 7.964 .433 0 0
3374000 L07U07 ROLLED 8.0 0 0 9.750 7.964 .433 0 0
3374000 FRAMED CONNECTION INTERIOR STRINGER TO INTERMEDIATE FLOORBEAM
3374000 FRAMED DETAILS 2.0 4.0 6.0 0.44 5.0 2.0 0.75 5.0 2.0 0.75 3.0 2.5 0.25
3374000 FRAMED CONNECTION INTERMEDIATE FLOORBEAM TO EITHER TRUSS
3374000 FRAMED DETAILS 2.0 4.0 8.0 0.50 9.0 2.0 0.75 9.0 2.0 0.75 0 0 0
```


WYO.
PROJ. Nº 30 C FOR
SHEET 5 OF 5 SHEETS
STATE OF WYOMING
STATE HIGHWAY DEPARTMENT
STANDARD
80'-0" LOW STEEL TRUSS
24'-0" ROADWAY
APPROVED:
3-13-56
BRIDGE ENGINEER
SUPERINTENDENT
SHEET 1 OF 2 SHEETS
DWNG Nº S-259
PART PLAN AND SECTION TOP CHORD
PART PLAN AND SECTION BOTTOM CHORD AND LATERAL SYSTEM
PART LONGITUDINAL SECTION
STRESS DIAGRAM
CAST STEEL ROCKER & MASONRY @ (EXP. END)
CAST STEEL SHOE (FIXED END)
DETAILS OF LATERAL SUPPORT
ESTIMATED QUANTITIES
Structural Steel 90,160 lbs
Cast Steel Shoes and Pins 2,140 lbs
3"ø Pipe(Handrails and drains with fittings) 1,580 lbs
Sub-Total 93,880 lbs
Concrete Class "A" 544 C.Y.
Reinforcing Steel 9750 lbs


STATE OF WYOMING
STATE HIGHWAY DEPARTMENT
STANDARD
80'-0" LOW STEEL TRUSS
24'-0" ROADWAY
SHEET 2 OF 2 SHEETS
DRWG Nº S-259
PROJ. Nº
SHEET OF SHEETS
CAMBER BLOCKING DIAGRAM
GENERAL NOTE
ORDINATE DIAGRAM FOR ROADWAY CROWN
SECTION THRU DRAIN
FRONT ELEVATION OF DRAIN
TYPICAL SECTIONAL VIEW (Showing Intermediate Floor Beam Nº2)
LONGITUDINAL SECTIONAL VIEW THRU SLAB (Showing Reinforcing in Slab and Curbs)
BILL OF REINFORCEMENT FOR CONCRETE SLAB
TYPES OF BENDS
STRINGERS
DETAIL OF SLAB GROOVE
TYPICAL 15-TON TRUCK