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VOLUME NO. 4

Brass-Geometry User Documentation

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16. Abstract Often, a traditional design procedure is used wherein a designer sketches results which are based on computer applications and transmits this information via hardcopy to a drafter, who re-enters it into a CAD system. The inefficiencies are clear and an obvious opportunity exists for productive gain. Recently, an existing design application, BRASS-GEOMETRY used for the computation of screed elevation and horizontal geometry for straight bridges and curved bridges. The technical aspects of this program were written and are maintained by the Wyoming Department of Transportation (WDT). Using the UWGRAPH library, the University of Wyoming linked the program with additional procedures to automatically produce CAD files. UWGRAPH links to three graphic formats commonly used in engineering DXF (AutoCAD), MICRO-CSL (Intergraph) and GKS (screen graphics) in one application program. The information required to use BRASS-GEOMETRY is described.			
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DISCLAIMER

The contents of this report reflect the views of the authors. This document is disseminated under the sponsorship of the Department of Transportation, University Transportation Centers Program, in the interest of information exchange. The U.S. Government nor the Wyoming Department of Transportation assumes no liability for the contents or use thereof.

PREFACE

The two major objectives for MPC-007 were:

- Development of effective methods for enhancing the user interfaces for existing transportation software.
- Development of effective methods for the direct linkage of design applications to computer-aided-design.

The purpose of this document is to outline the part of results which were obtained in meeting the second objective. This document is the user documentation for a design application written to demonstrate the applicability of the UWGRAPH graphics library. Complete documentation on UWGRAPH is available in a separate document *UWGRAPH Computer-Aided-Design and Drafting Library*. This application is one of several which use UWGRAPH to easily move design computations into CAD.

The authors encourage those using UWGRAPH to develop other documented design procedures and to share these procedures with design professionals.

ABSTRACT

Often, a traditional design procedure is used wherein a designer sketches results which are based on computer applications and transmits this information via hardcopy to a drafter, who reenters it into a CAD system. The inefficiencies are clear and an obvious opportunity exists for productive gain. Recently, an existing design application, BRASS-GEOMETRY used for the computation of screed elevation and horizontal geometry for straight bridges and curved bridges. The technical aspects of this program were written and are maintained by the Wyoming Department of Transportation (WDT). Using the UWGRAPH library, the University of Wyoming linked the program with additional procedures to automatically produce CAD files.

UWGRAPH links to three graphic formats commonly used in engineering DXF (AutoCAD), MICRO-CSL (Intergraph) and GKS (screen graphics) in one application program. The information required to use BRASS-GEOMETRY is described.

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AVAILABILITY

The program described herein is available on Intergraph workstations under CLIX 3.1. The source and executable code is available upon request.

INTRODUCTION

BRASS-geometry is a computer program developed to provide the bridge engineer with screed elevations, vertical corrections, shop web camber and blocking ordinates for various structure configurations. The program computes elevations and horizontal geometry for straight and curved girders.

The program was developed and is maintained by the Wyoming Department of Transportation. The University of Wyoming added the capability to draw the screed elevation tables, the camber and blocking diagram, and the slab thickening diagram. The graphics are produced with the aid of UWGRAPH, a graphics tool developed as part of this MPC project.

The general features and data definitions are presented first. This is followed by specific command descriptions and examples of graphical output. ELEVATIONS are computed on:

- Straight grade
- Vertical curve
- Part on straight grade, part on vertical curve
- Crown section, constant super
- Variable superelevation

GIRDER configurations allowed are:

- Straight parallel girders
- Curved parallel girders
- Chorded parallel girders
- Chorded non-parallel girders

SKEWS allowed are:

- Radial skews (straight and curved bridges)
- Skews to long chord (curved bridges)
- Skews can vary from support to support

PROGRAM LIMITS are:

- 8 Spans
- 12 Girders
- 4 Splices per span

Girders may be chorded from support to support only at the present time. It is planned to incorporate other chorded configurations in the future.

SYSTEM INPUT is free form consisting of commands grouped to define bridge basic geometry, control elevations, and the output desired.

OUTPUT data is logically arranged and self-explanatory. The amount of detail is controlled by the user.

LANGUAGE used is FORTRAN 77.

SYSTEM AIDES: Each subroutine in BRASS-GEOMETRY is assigned a number and placed in a numbered component. Built-in trace of intermediate values may be turned on by subroutine number or by component number. Each subroutine is documented by numerous comments.

GENERAL

BRASS-GEOMETRY is designed to provide a bridge engineer with screed elevations, vertical corrections, shop web camber and blocking ordinates.

Basically, the engineer needs to describe:

1. Horizontal alignment
2. Vertical alignment
3. Girder geometry such as spacing, type of girder (straight, chorded or curved)
4. Support geometry such as stations, skew
5. Type of output required.

To use BRASS-GEOMETRY, the engineer creates a data file with a series of "Commands" each followed by one or more parameters.

"Typical Command Sets" are provided to help the engineer become acquainted with the system. These begin on Page 6.

Numerous defaults are built into BRASS-GEOMETRY. If a Command parameter has a default value listed, the parameter may be left blank and the default value will be used. Be sure to enter zero if it is a valid value. Blank and zero entries are treated differently.

Short descriptions of the Commands and their parameters are summarized in the BRASS-GEOMETRY Command Summary Manual found in Appendix B. If additional information is required each short description of a command has the number reference for the full description contained in Appendix A

Each "Command Set" must begin with one or two TITLE commands. Optional COMMENT commands may be used as often as needed to document the input series of commands.

The Commands should be arranged to describe the following in the order

shown:

1. Horizontal alignment
2. Vertical alignment
3. Intersect stations
4. Girder offsets
5. Other input data
 - . Screed line number
 - . Vertical correction line numbers
 - . Splice data
 - . Deflections

Input Format

Data are entered in a command format. Each line begins with a command which describes up to six data entries hereinafter referred to as parameters. The data may be entered as a real (including a decimal) or integer (excluding a decimal point). Zero is not the same as a blank. Default entries are given with most commands and are employed by a blank field or by omission of the command in those cases where all default values are desired. Each command has a three-character abbreviation which may be used in lieu of the full command name.

Commas are used to delineate parameters. The number of spaces between entries has no meaning. For example, if the third entry of a command is the only entry required, any of the following would be valid.

```

COMMAND-EXAMPLE , , 2.0, , ,
COMMAND-EXAMPLE , , 2
CEX , , 2.0
CEX , , , 2.0000
  
```

List of Commands for:

Job Control			
TITLE	TLE	10	Problem Title
COMMENT	COM	20	Input Comments
SYSTEM-1	SY1	30	System Control No. 1
SYSTEM-2	SY2	40	System Control No. 2 Primarily a debugging aid by component
SYSTEM-3	SY3	50	System Control No. 3 Primarily a debugging aid by subroutine no.
CONTROL	CNL	60	Sets flags for input and output control
Geometry			
HORIZONTAL	HOR	70	Sets Degree of curve and skew angles if constant
VERTICAL	VER	80	Sets elevation data required for elevations
STATION	STN	90	Establishes station intersects at end of spans
SKEW-RADIAL	SKR	100	Sets radial angles at intersects if angles are variable
SKEW-LONGC	SKL	110	Sets long chord angles at intersects if angles are variable
OFFSETS-RADIAL	OFR	120	Sets offset distances to C_L
OFFSETS-PARCARD	OFP	130	Sets offset distances to C_L span #1
ELEVATIONS-SCREEDS	ESC	140	Determines which lines screeds are wanted on
ELEVATIONS-VERTICAL	EVR	150	Determines which line and what vertical correction is to be applied
SPLICE-INDIV	SPI	160	Sets splice data required for camber diagram and blocking diagram on individual girder
SPLICE-ALL	SPA	170	Sets splice data on all girders using information on centerline for camber diagrams and blocking diagrams on all girders
DEFLECTIONS	DFL	180	Inputs dead load deflections for each span

Typical Command Sets

Straight Bridge			
COMMAND	ABBR	COMMAND NUMBER	USAGE
TITLE	TLE	10	Required
COMMENT	COM	20	Optional
CONTROL	CNL	60	Required
HORIZONTAL	HOR	70	Required
VERTICAL	VER	80	Required for screed output
STATION	STN	90	Required
SKEW-RADIAL	SKR	100	Optional (1)
OFFSETS-RADIAL	OFR	120	Required
ELEVATIONS-SCREEDS	ESC	140	Required for screed output
ELEVATIONS-VERTICAL	EVR	150	Optional (2) - 2 cards max
SPLICE-INDIV	SPI	160	Optional - 96 cards max
SPLICE-ALL	SPA	170	Optional (3) - 8 cards max
DEFLECTIONS	DFL	180	Optional - 8 cards max

- (1) Use if variable skew angle.
 (2) For vertical correction. Do not use at present time.
 (3) For determining camber and blocking diagrams for all girders. Do not use at present time.

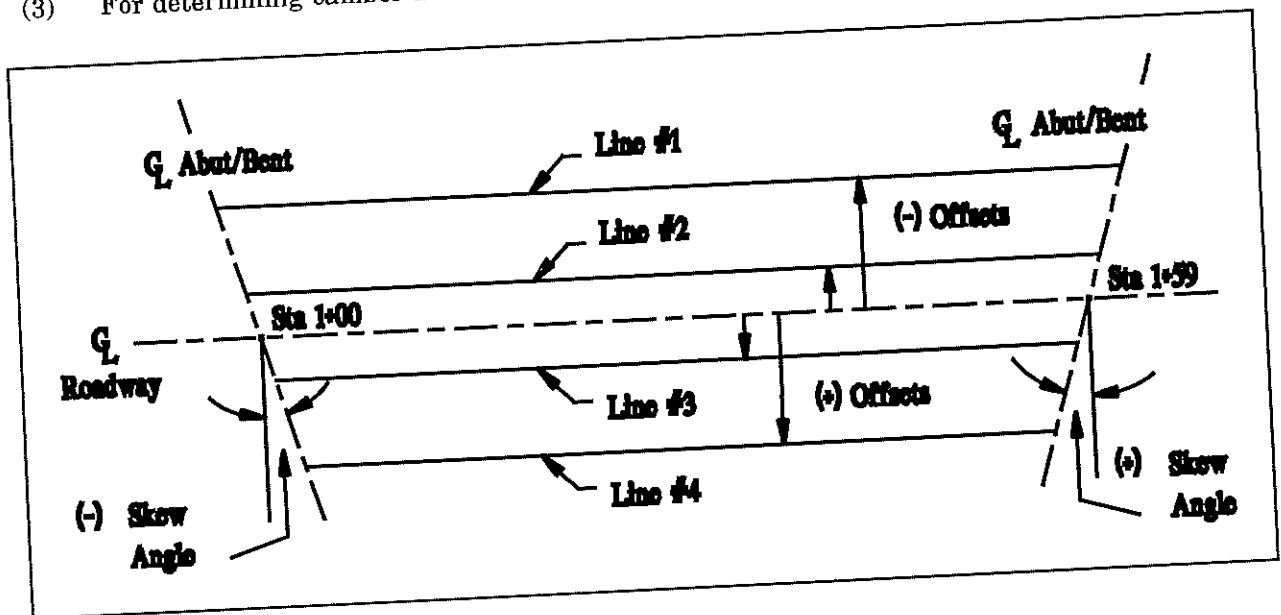


Figure 1. Geometry for Typical Command Sets

Curved Girder Bridge - Radial Skew			
COMMAND	ABBR	COMMAND NUMBER	USAGE
TITLE	TLE	10	Required
COMMENT	COM	20	Optional
CONTROL	CNL	60	Required
HORIZONTAL	HOR	70	Required
VERTICAL	VER	80	Required for screed output
STATION	STN	90	Required
SKEW-RADIAL	SKR	100	Optional (1)
OFFSET-RADIAL	OFR	120	Required
ELEVATIONS-SCREEDS	ESC	140	Required for screed output
ELEVATIONS-VERTICAL	EVR	150	Optional (2) - 2 cards max
SPLICE-INDIV	SPI	160	Optional - 96 cards max
SPLICE-ALL	SPA	170	Optional (3) - 8 cards max
DEFLECTIONS	DFL	180	Optional - 8 cards max

- (1) Use if variable radial skew angle.
 (2) For vertical correction. Do not use at present time.
 (3) For determining camber and blocking diagrams for all girders. Do not use at present time.

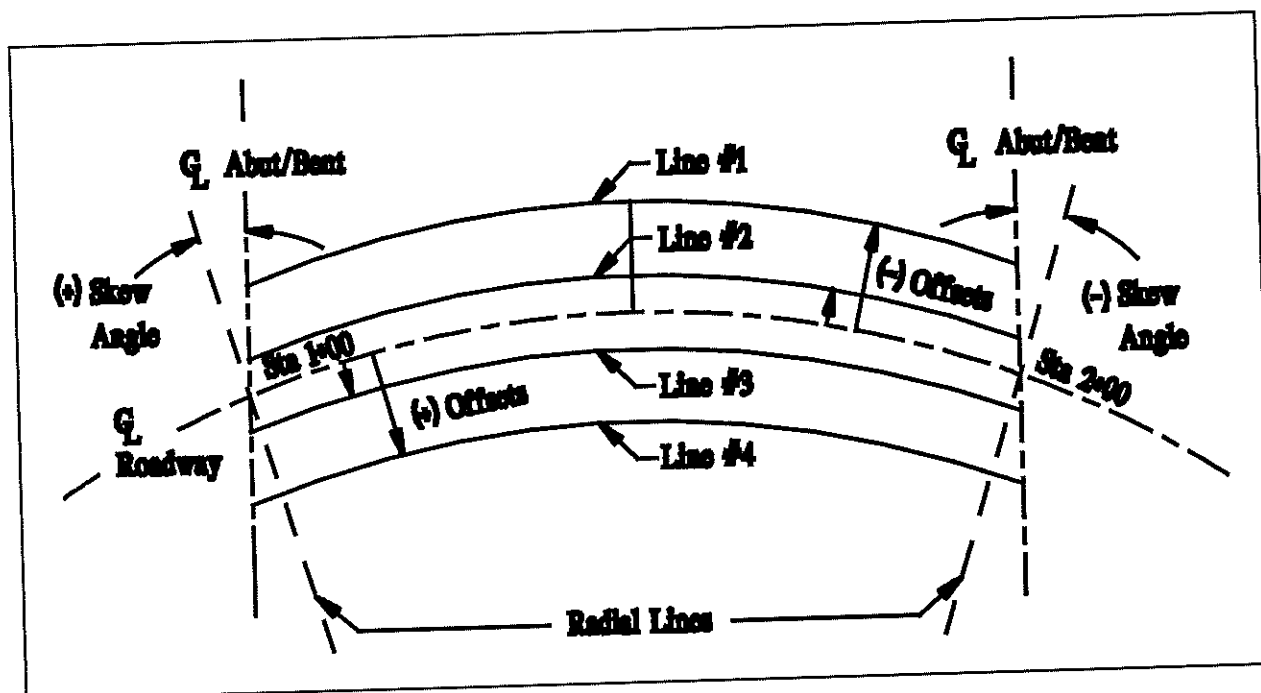


Figure 2. Geometry for Curved Girder Bridge - Radial Skew

Curved Bridge with Non-parallel Chorded Girders- Radial Skew			
COMMAND	ABBR	COMMAND NUMBER	USAGE
TITLE	TLE	10	Required
COMMENT	COM	20	Optional
CONTROL	CNL	60	Required
HORIZONTAL	HOR	70	Required
VERTICAL	VER	80	Required for screed output
STATION	STN	90	Required
SKEW-RADIAL	SKR	100	Optional (1)
OFFSET-RADIAL	OFR	120	Required
ELEVATIONS-SCREEDS	ESC	140	Required for screed output
ELEVATIONS-VERTICAL	EVR	150	Optional (2) - 2 cards max
SPLICE-INDIV	SPI	160	Optional - 96 cards max
SPLICE-ALL	SPA	170	Optional (3) - 8 cards max
DEFLECTIONS	DFL	180	Optional - 8 cards max

- (1) Use if variable radial skew angle.
- (2) For vertical correction. Do not use at present time.
- (3) For determining camber and blocking diagrams for all girders. Do not use at present time.

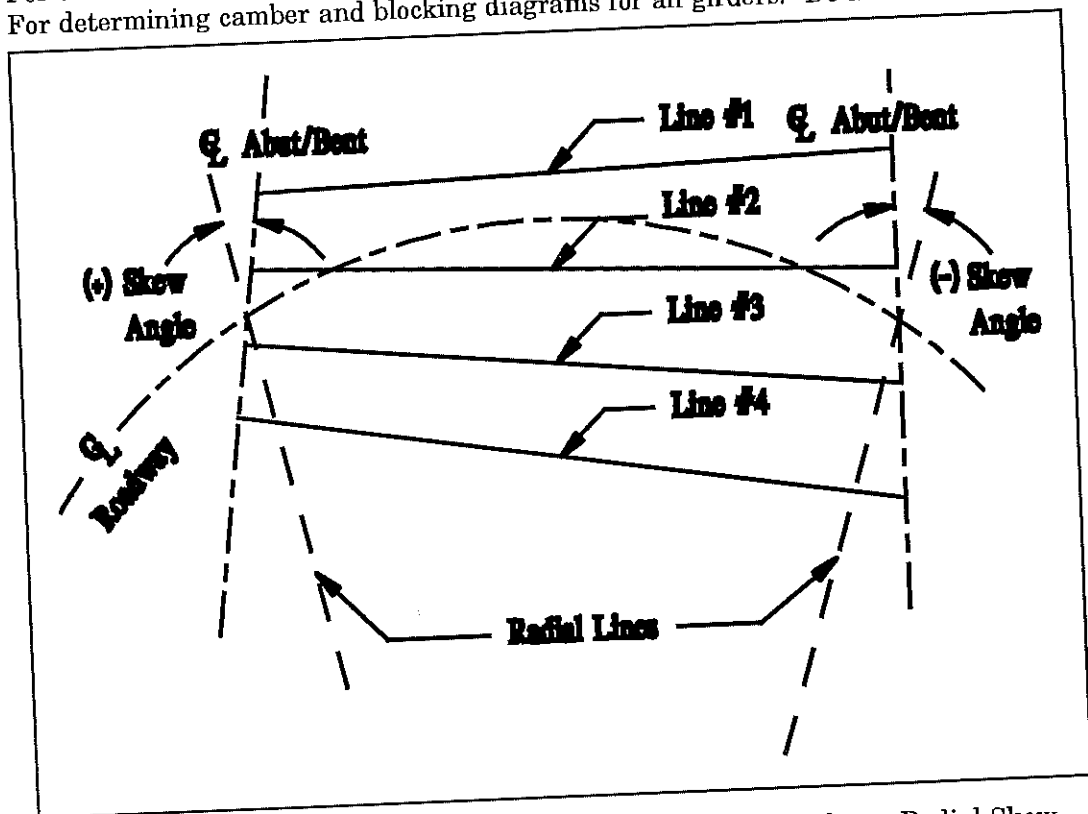


Figure 3. Geometry for Curved Bridge with Non-parallel Chorded Girders - Radial Skew

Curved Bridge with Parallel Chorded Girders- Radial Skew			
COMMAND	ABBR	COMMAND NUMBER	USAGE
TITLE	TLE	10	Required
COMMENT	COM	20	Optional
CONTROL	CNL	60	Required
HORIZONTAL	HOR	70	Required
VERTICAL	VER	80	Required for screed output
STATION	STN	90	Required
SKEW-RADIAL	SKR	100	Optional (1)
OFFSET-PARCORD	OFP	130	Required
ELEVATIONS-SCREEDS	ESC	140	Required for screed output
ELEVATIONS-VERTICAL	EVR	150	Optional (2) - 2 cards max
SPLICE-INDIV	SPI	160	Optional - 96 cards max
SPLICE-ALL	SPA	170	Optional (3) - 8 cards max
DEFLECTIONS	DFL	180	Optional - 8 cards max

- (1) Use if variable radial skew angle.
- (2) For vertical correction. Do not use at present time.
- (3) For determining camber and blocking diagrams for all girders. Do not use at present time.

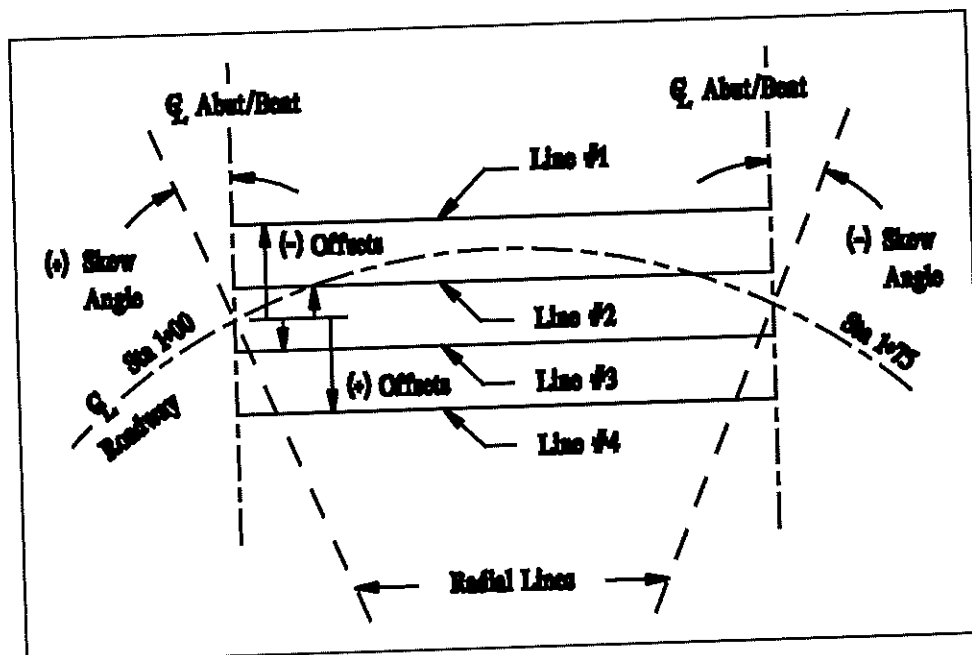


Figure 4. Geometry for Curved Bridge with Parallel Chorded Girders - Radial Skew

Curved Girder Bridge - Skew to Long Chord			
COMMAND	ABBR	COMMAND NUMBER	USAGE
TITLE	TLE	10	Required
COMMENT	COM	20	Optional
CONTROL	CNL	60	Required
HORIZONTAL	HOR	70	Required
VERTICAL	VER	80	Required for screed output
STATION	STN	90	Required
SKEW-LONGC	SKL	110	Optional (1)
OFFSETS-RADIAL	OFR	120	Required
ELEVATIONS-SCREEDS	ESC	140	Required for screed output
ELEVATIONS-VERTICAL	EVR	150	Optional (2) - 2 cards max
SPLICE-INDIV	SPI	160	Optional - 96 cards max
SPLICE-ALL	SPA	170	Optional (3) - 8 cards max
DEFLECTIONS	DFL	180	Optional - 8 cards max

- (1) Use if variable long chords skew angle.
- (2) For vertical correction. Do not use at present time.
- (3) For determining camber and blocking diagrams for all girders. Do not use at present time.

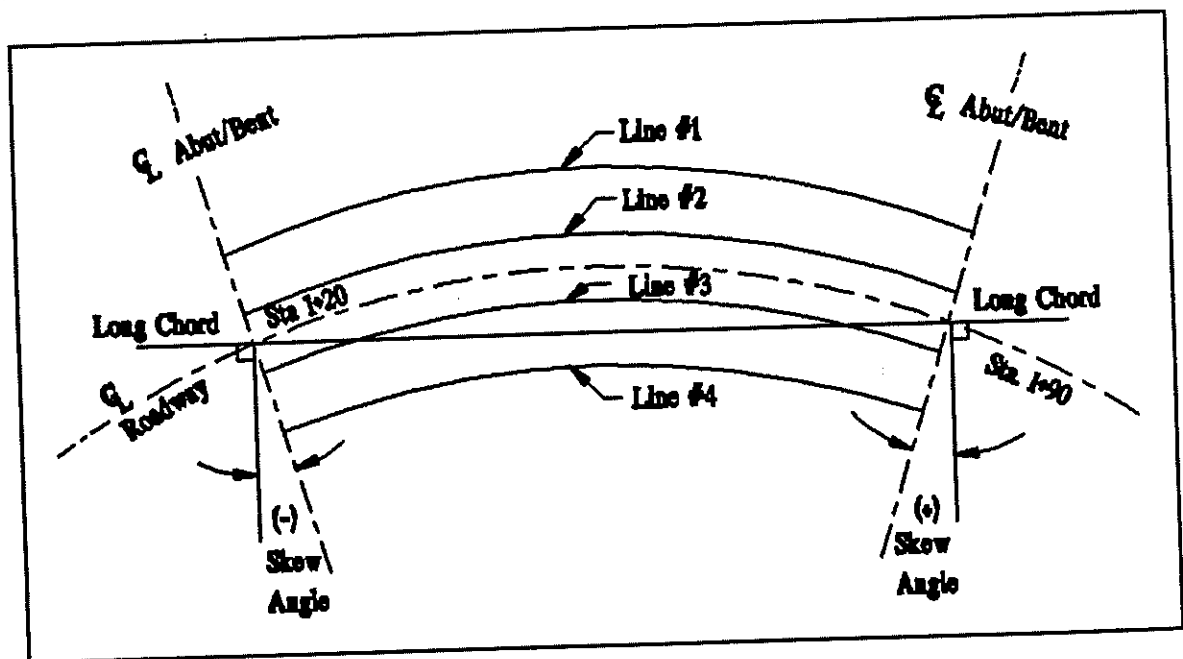


Figure 5. Geometry for Curved Girder Bridge - Skew to Long Chord

Curved Bridge with Non-parallel Chorded Girders - Skew to Long Chord			
COMMAND	ABBR	COMMAND NUMBER	USAGE
TITLE	TLE	10	Required
COMMENT	COM	20	Optional
CONTROL	CNL	60	Required
HORIZONTAL	HOR	70	Required
VERTICAL	VER	80	Required for screed output
STATION	STN	90	Required
SKEW-LONGC	SKL	110	Optional (1)
OFFSETS-RADIAL	OFR	120	Required
ELEVATIONS-SCREEDS	ESC	140	Required for screed output
ELEVATIONS-VERTICAL	EVR	150	Optional (2) - 2 cards max
SPLICE-INDIV	SPI	160	Optional - 96 cards max
SPLICE-ALL	SPA	170	Optional (3) - 8 cards max
DEFLECTIONS	DFL	180	Optional - 8 cards max

- (1) Use if variable long chords skew angle.
 (2) For vertical correction. Do not use at present time.
 (3) For determining camber and blocking diagrams for all girders. Do not use at present time.

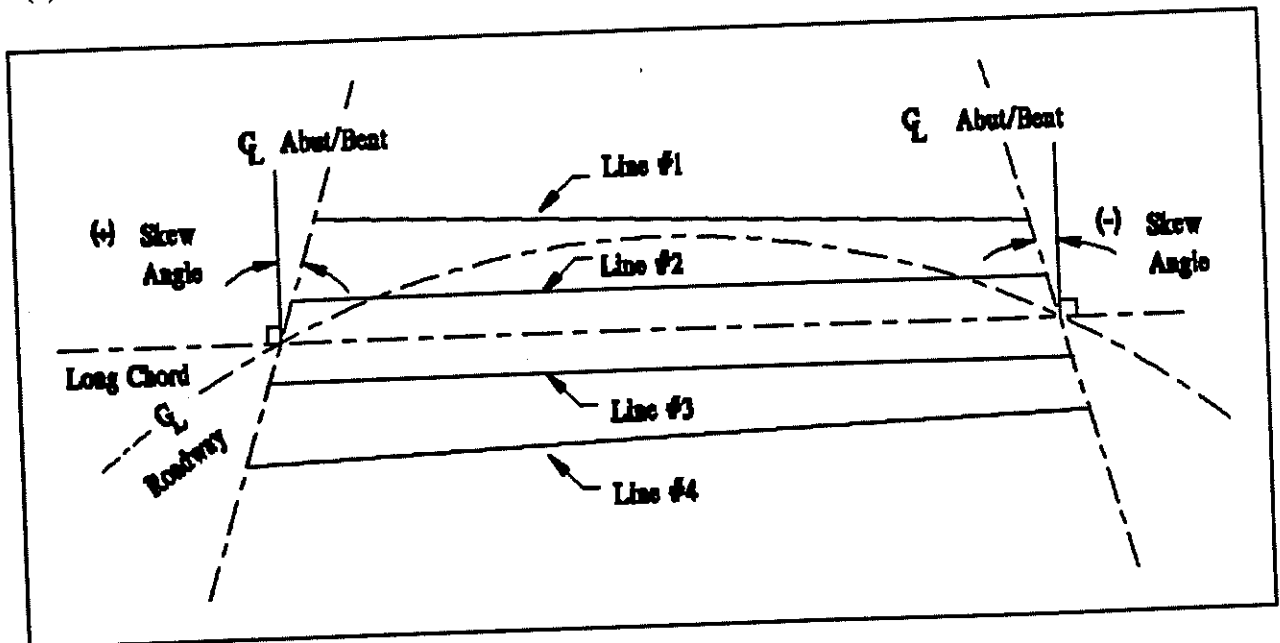


Figure 6. Curved Bridge with Non-parallel Chorded Girders - Skew to Long Chord

Curved Bridge with Parallel Chorded Girders - Skew to Long Chord			
COMMAND	ABBR	COMMAND NUMBER	USAGE
TITLE	TLE	10	Required
COMMENT	COM	20	Optional
CONTROL	CNL	60	Required
HORIZONTAL	HOR	70	Required
VERTICAL	VER	80	Required for screed output
STATION	STN	90	Required
SKEW-LONGC	SKL	110	Optional (1)
OFFSETS-PARCORD	OFP	130	Required
ELEVATIONS-SCREEDS	ESC	140	Required for screed output
ELEVATIONS-VERTICAL	EVR	150	Optional (2) - 2 cards max
SPLICE-INDIV	SPI	160	Optional - 96 cards max
SPLICE-ALL	SPA	170	Optional (3) - 8 cards max
DEFLECTIONS	DFL	180	Optional - 8 cards max

- (1) Use if variable long chords skew angle.
 (2) For vertical correction. Do not use at present time.
 (3) For determining camber and blocking diagrams for all girders. Do not use at present time.

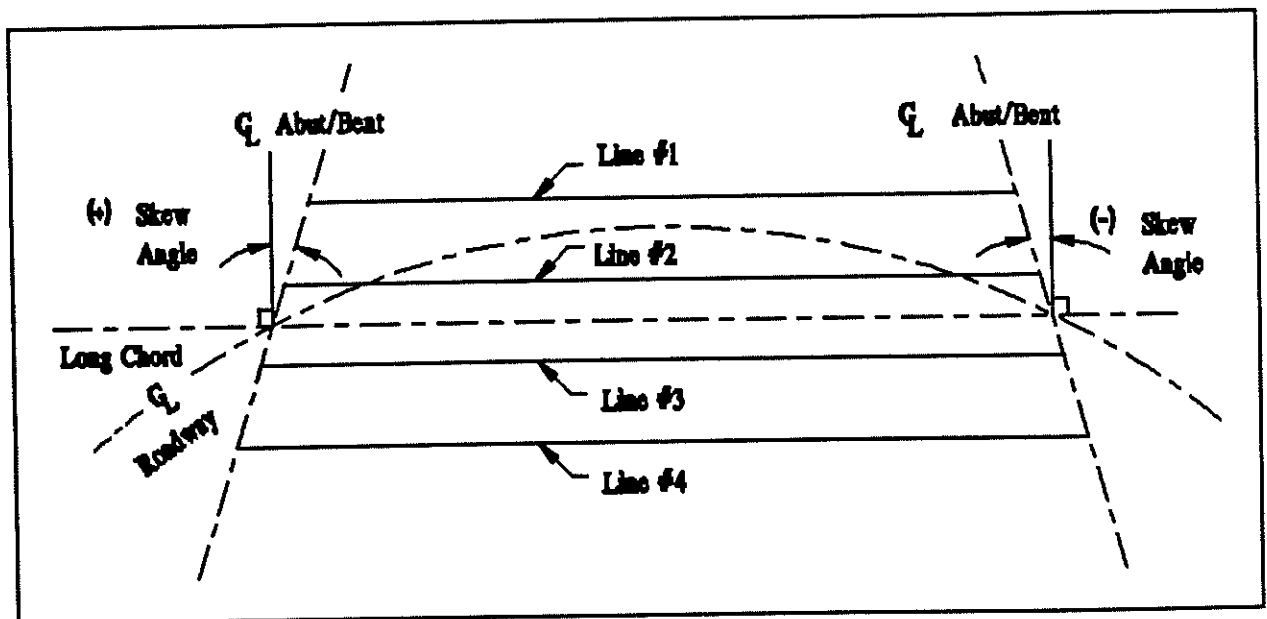


Figure 7. Geometry for Curved Bridge with Parallel Chorded Girders - Skew to Long Chord

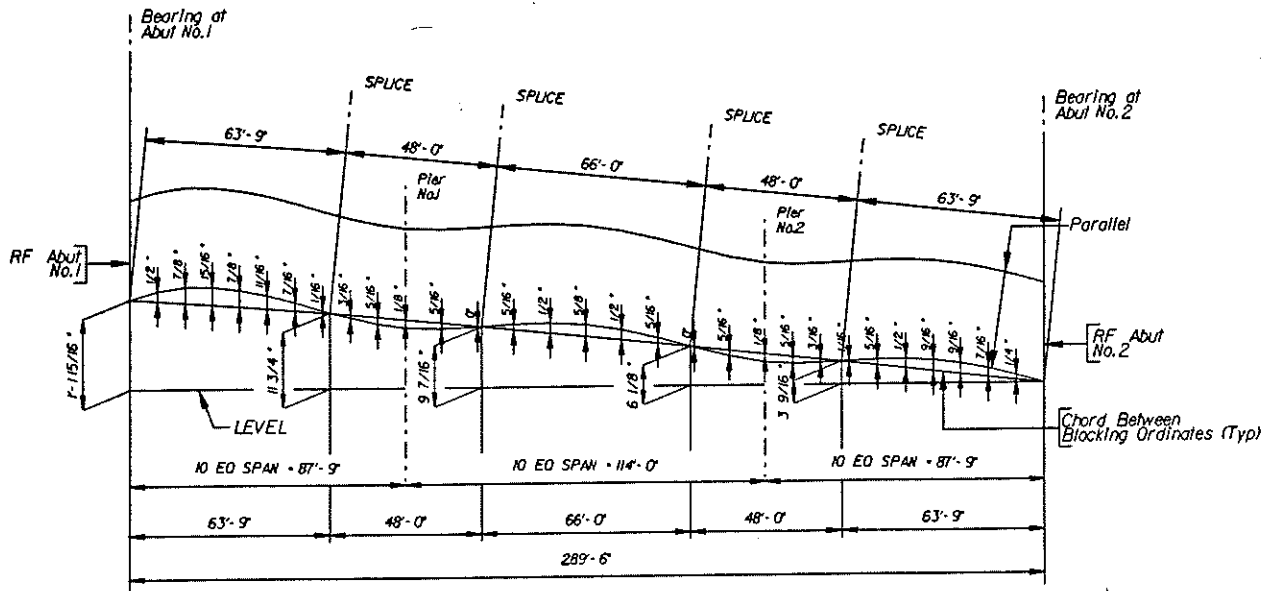
COMMAND DEFINITIONS

The BRASS-GEOMETRY command descriptions are given in Appendix A. Each command is defined and the parameters required are given. Where appropriate, an example is given for illustration. Abbreviated command descriptions are given in Appendix B. This Appendix is useful for the frequent user.

CAD DRAWINGS

Examples of the screed elevation table, camber and blocking diagram, and slab thickening diagram are shown in Figures 1, 2 and 3, respectively. This output may be obtained in either DXF or MicroStation CAD formats, or viewed on the workstation in a GKS window. The output format is defined in an interactive query.

TABLE OF SCREED ELEVATIONS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
Line No.	10 :Abut No.1	11	12	13	14	15	16	17	18	19	20 :Pier No.1	TENTH POINT OF SPANS																		30 :Pier No.2	31	32	33	34	35	36	37	38	39	40 :Abut No.2																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
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1	6012	6014	6013	6011	6008	6004	6000	5995	5989	5985	5981	5977	5974	5972	5969	5964	5959	5953	5946	5939	5933	5929	5927	5924	5922	5919	5916	5912	5907	5902	5895	5889	5885	5881	5877	5874	5872	5869	5864	5859	5853	5846	5839	5833	5829	5827	5824	5822	5819	5816	5812	5807	5802	5795	5789	5785	5781	5777	5774	5772	5769	5764	5759	5753	5746	5739	5733	5729	5727	5724	5722	5719	5716	5712	5707	5702	5695	5689	5685	5681	5677	5674	5672	5669	5664	5659	5653	5646	5639	5633	5629	5627	5624	5622	5619	5616	5612	5607	5602	5595	5589	5585	5581	5577	5574	5572	5569	5564	5559	5553	5546	5539	5533	5529	5527	5524	5522	5519	5516	5512	5507	5502	5495	5489	5485	5481	5477	5474	5472	5469	5464	5459	5453	5446	5439	5433	5429	5427	5424	5422	5419	5416	5412	5407	5402	5395	5389	5385	5381	5377	5374	5372	5369	5364	5359	5353	5346	5339	5333	5329	5327	5324	5322	5319	5316	5312	5307	5302	5295	5289	5285	5281	5277	5274	5272	5269	5264	5259	5253	5246	5239	5233	5229	5227	5224	5222	5219	5216	5212	5207	5202	5195	5189	5185	5181	5177	5174	5172	5169	5164	5159	5153	5146	5139	5133	5129	5127	5124	5122	5119	5116	5112	5107	5102	5095	5089	5085	5081	5077	5074	5072	5069	5064	5059	5053	5046	5039	5033	5029	5027	5024	5022	5019	5016	5012	5007	5002	9995	9989	9985	9981	9977	9974	9972	9969	9964	9959	9953	9946	9939	9933	9929	9927	9924	9922	9919	9916	9912	9907	9902	9895	9889	9885	9881	9877	9874	9872	9869	9864	9859	9853	9846	9839	9833	9829	9827	9824	9822	9819	9816	9812	9807	9802	8795	8789	8785	8781	8777	8774	8772	8769	8764	8759	8753	8746	8739	8733	8729	8727	8724	8722	8719	8716	8712	8707	8702	8695	8689	8685	8681	8677	8674	8672	8669	8664	8659	8653	8646	8639	8633	8629	8627	8624	8622	8619	8616	8612	8607	8602	8595	8589	8585	8581	8577	8574	8572	8569	8564	8559	8553	8546	8539	8533	8529	8527	8524	8522	8519	8516	8512	8507	8502	8495	8489	8485	8481	8477	8474	8472	8469	8464	8459	8453	8446	8439	8433	8429	8427	8424	8422	8419	8416	8412	8407	8402	8395	8389	8385	8381	8377	8374	8372	8369	8364	8359	8353	8346	8339	8333	8329	8327	8324	8322	8319	8316	8312	8307	8302	8295	8289	8285	8281	8277	8274	8272	8269	8264	8259	8253	8246	8239	8233	8229	8227	8224	8222	8219	8216	8212	8207	8202	8195	8189	8185	8181	8177	8174	8172	8169	8164	8159	8153	8146	8139	8133	8129	8127	8124	8122	8119	8116	8112	8107	8102	8095	8089	8085	8081	8077	8074	8072	8069	8064	8059	8053	8046	8039	8033	8029	8027	8024	8022	8019	8016	8012	8007	8002	7995	7989	7985	7981	7977	7974	7972	7969	7964	7959	7953	7946	7939	7933	7929	7927	7924	7922	7919	7916	7912	7907	7902	7895	7889	7885	7881	7877	7874	7872	7869	7864	7859	7853	7846	7839	7833	7829	7827	7824	7822	7819	7816	7812	7807	7802	7795	7789	7785	7781	7777	7774	7772	7769	7764	7759	7753	7746	7739	7733	7729	7727	7724	7722	7719	7716	7712	7707	7702	7695	7689	7685	7681	7677	7674	7672	7669	7664	7659	7653	7646	7639	7633	7629	7627	7624	7622	7619	7616	7612	7607	7602	7595	7589	7585	7581	7577	7574	7572	7569	7564	7559	7553	7546	7539	7533	7529	7527	7524	7522	7519	7516	7512	7507	7502	7495	7489	7485	7481	7477	7474	7472	7469	7464	7459	7453	7446	7439	7433	7429	7427	7424	7422	7419	7416	7412	7407	7402	7395	7389	7385	7381	7377	7374	7372	7369	7364	7359	7353	7346	7339	7333	7329	7327	7324	7322	7319	7316	7312	7307	7302	7295	7289	7285	7281	7277	7274	7272	7269	7264	7259	7253	7246	7239	7233	7229	7227	7224	7222	7219	7216	7212	7207	7202	7195	7189	7185	7181	7177	7174	7172	7169	7164	7159	7153	7146	7139	7133	7129	7127	7124	7122	7119	7116	7112	7107	7102	7095	7089	7085	7081	7077	7074	7072	7069	7064	7059	7053	7046	7039	7033	7029	7027	7024	7022	7019	7016	7012	7007	7002	6995	6989	6985	6981	6977	6974	6972	6969	6964	6959	6953	6946	6939	6933	6929	6927	6924	6922	6919	6916	6912	6907	6902	6895	6889	6885	6881	6877	6874	6872	6869	6864	6859	6853	6846	6839	6833	6829	6827	6824	6822	6819	6816	6812	6807	6802	6795	6789	6785	6781	6777	6774	6772	6769	6764	6759	6753	6746	6739	6733	6729	6727	6724	6722	6719	6716	6712	6707	6702	6695	6689	6685	6681	6677	6674	6672	6669	6664	6659	6653	6646	6639	6633	6629	6627	6624	6622	6619	6616	6612	6607	6602	6595	6589	6585	6581	6577	6574	6572	6569	6564	6559	6553	6546	6539	6533	6529	6527	6524	6522	6519	6516	6512	6507	6502	6495	6489	6485	6481	6477	6474	6472	6469	6464	6459	6453	6446	6439	6433	6429	6427	6424	6422	6419	6416	6412	6407	6402	6395	6389	6385	6381	6377	6374	6372	6369	6364	6359	6353	6346	6339	6333	6329	6327	6324	6322	6319	6316	6312	6307	6302	6295	6289	6285	6281	6277	6274	6272	6269	6264	6259	6253	6246	6239	6233	6229	6227	6224	6222	6219	6216	6212	6207	6202	6195	6189	6185	6181	6177	6174	6172	6169	6164	6159	6153	6146	6139	6133	6129	6127	6124	6122	6119	6116	6112	6107	6102	6095	6089	6085	6081	6077	6074	6072	6069	6064	6059	6053	6046	6039	6033	6029	6027	6024	6022	6019	6016	6012	6007	6002	5995	5989	5985	5981	5977	5974	5972	5969	5964	5959	5953	5946	5939	5933	5929	5927	5924	5922	5919	5916	5912	5907	5902	5895	5889	5885	5881	5877	5874	5872	5869	5864	5859	5853	5846	5839	5833	5829	5827	5824	5822	5819	5816	5812	5807	5802	5795	5789	5785	5781	5777	5774	5772	5769	5764	5759	5753	5746	5739	5733	5729	5727	5724	5722	5719	5716	5712	5707	5702	5695	5689	5685	5681	5677	5674	5672	5669	5664	5659	5653	5646	5639	5633	5629	5627	5624	5622	5619	5616	5612	5607	5602	5595	5589	5585	5581	5577	5574	5572	5569	5564	5559	5553	5546	5539	5533	5529	5527	5524	5522	5519	5516	5512	5507	5502	5495	5489	5485	5481	5477	5474	5472	5469	5464	5459	5453	5446	5439	5433	5429	5427	5424	5422	5419	5416	5412	5407	5402	5395	5389	5385	5381	5377	5374	5372	5369	5364	5359	5353	5346	5339	5333	5329	5327	5324	5322	5319	5316	5312	5307	5302	5295	5289	5285	5281	5277	5274	5272	5269	5264	5259	5253	5246	5239	5233	5229	5227	5224	5222	5219	5216	5212	5207	5202	5195	5189	5185	5181	5177	5174	5172	5169	5164	5159	5153	5146	5139	5133	5129	5127	5124	5122	5119	5116	5112	5107	5102	5095	5089	5085	5081	5077	5074	5072	5069	5064	5059	5053	5046	5039	5033	5029	5027	5024	5022	5019	5016	5012	5007	5002	4995	4989	4985	4981	4977	4974	4972	4969	4964	4959	4953	4946	4939	4933	4929	4927	4924	4922	4919	4916	4912	4907	4902	4895	4889	4885	4881	4877	4874	4872	4869	4864	4859	4853	4846	4839	4833	4829	4827	4824	4822	4819	4816	4812	4807	4802	4795	4789	4785	4781	4777	4774	4772	4769	4764	4759	4753	4746	4739	4733	4729	4727	4724	4722	4719	4716	4712	4707	4702	4695	4689	4685	4681	4677	4674	4672	4669	4664	4659	4653	4646	4639	4633	4629	4627	4624	4622	4619	4616	4612	4607	4602	4595	4589	4585	4581	4577	4574	4572	4569	4564	4559	4553	4546	4539	4533	4529	4527	4524	4522	4519	4516	4512	4507	4502	4495	4489	4485	4481	4477	4474	4472	4469	4464	4459	4453	4446	4439	4433	4429	4427	4424	4422	4419	4416	4412	4407	4402	4395	4389	4385	4381	4377	4374	4372	4369	4364	4359	4353	4346	4339	4333	4329	4327	4324	4322	4319	4316	4312	4307	4302	4295	4289	4285	4281	4277	4274



**Figure 9. Web Cutting Diagram
(includes Dead Deflection, Grade, Vertical Curvature)**

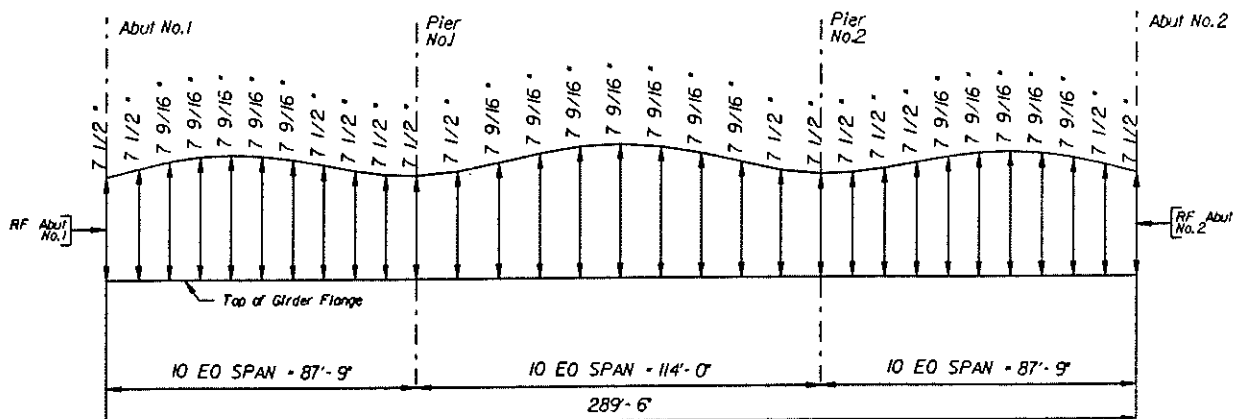


Figure 10. Slab Thickness Diagram
At & Girder (includes correction for dead load deflection)

APPENDIX A

COMMAND DESCRIPTIONS

60	BRASS	COMMAND DESCRIPTION	
COMMAND NAME		CONTROL (CNL)	
PURPOSE	This command controls the input and output for BRASS-GEOMETRY. This command is required.		
COMMAND PARAMETERS			
Elevations 10th Points	Always required Code 1 if elevations are required. Code 0 if elevations are not required.		
Super Type	Always required Code 0 if center crown Code 1 if constant super Code 2 if variable super		
Bridge Type	Always required Code 0 if straight bridge Code 1 if left curve Code 2 if right curve		
Parallel Girders	Code 1 if girders are parallel Code 0 if girders are not parallel.		
Chorded Girders	Code 1 if girders are chorded. Code 0 if girders are curved. Leave blank if straight girders on straight bridge.		
Shop Web Camber	Code 2 if shop web camber is wanted on all girders. This command is not available at present time. Code 1 if shop web camber is wanted on specific girder. Code 0 if shop web camber is not wanted.		

COMMAND PARAMETERS (Cont.)			
<p>% Deflection</p> <p>Output data for CADD</p> <p>Abutment Type (Not required if Output from CADD is not wanted)</p> <p>Intermediate Support Type (Not required if Output from CADD is not wanted)</p> <p>Slab Thickness</p> <p>Top Flange Thickness</p>	<p>No entry assumes 100% Code deflection in percent.</p> <p>Code the Girder Line number for output from CADD. Leave blank if output from CADD is not wanted.</p> <p>Code 1 for cap type abutment Leave blank if other type abutment.</p> <p>Code 0 for Pier Code 1 for Bent.</p> <p>Units in In. (Required for wide flange sections only.) Used for slab thickness diagrams.</p> <p>Units in In. Enter zero for composite construction.</p>		

EXAMPLE

CONTROL 1, 1, 2, 1, 1, 0, 100, 1, 1, 1, 7.5 1

Elevations at tenth points required
 Constant Super
 Right Curve
 Parallel Girders
 Chorded Girders
 No Shop Web Camber
 % Deflection
 Output CADD Data
 Cap Type Abutment
 Bent Support
 Slab Thickness
 Top Flange Thickness

FIGURES**NOTES**

70	BRASS	COMMAND DESCRIPTION	
COMMAND NAME	HORIZONTAL		(HOR)
PURPOSE	This command inputs degree of curve, skew type and skew angles. This command is required.		
COMMAND PARAMETERS			
Degree of Curve	Enter as deg-min-sec 030000 = 3°0'0"		
Skew Type	Code 0 for radial skew (same all supports) (This value is normally used). Code 1 for long chord skew (same all supports)		
	Code 2 for variable radial skew (Varies from support to support)		
	Code 3 for variable long chord skew (Varies from support to support)		
Skew	Code skew angle in deg-min-sec (300000) A negative value indicates a left skew. No entry assumes 000000 (For long chord skew angles with 00 skew use 900000)		
Distance Between End of Girdger and RF Abutment No. 1	Always Required Units in Ft Default = 0.0		
Distance Between End of Girder and RF Abutment No. 2	Always Required Units in Ft Default = Field No. 4 Above		
Girder Length Past The Bearing at Abutment No. 1	Units in Ft Default = 0.0		
Girder Length Past The Bearing at Abutment No. 2	Units in Ft Default = Field No. 6 Above		

EXAMPLE

HORIZONTAL 300000, 1, 900000, .833, .833, .5, .5
 Dist bet girder end and RF Abut
 Girder length past bearing.
 0° skew
 Long chord skew
 30 Horizontal curve

HORIZONTAL , 0, - 300000, 1.5, , 1.042
 Dist bet girder end and RF Abut
 Girder length past bearing.
 30° Left skew
 Radial skew
 Tangent

FIGURES

NOTES

80	BRASS	COMMAND DESCRIPTION	
COMMAND NAME		VERTICAL	(VER)
PURPOSE	This command lists vertical elevation data. Required if elevations at tenth points are requested.		
COMMAND PARAMETERS			
PI Station	Units in Ft (Required)		
PI Elevation	Units in Ft (Required)		
Grade 1	Units in % (Required)		
Grade 2	Units in % (If no entry Grade 2 = Grade 1)		
Length of VC	Units in Ft (Optional)		
Length of VC before PI	Units in Ft (<u>NOT</u> required for symmetrical Vertical Curve)		
Length of VC after PI	Units in Ft (<u>NOT</u> required for symmetrical Vertical Curve)		
Super	Units in % (Required if crown section or constant super) (Crown is input as positive No.) (Positive super is down toward right) (Negative super is down toward left)		
Beginning Super	Units in % (Required if variable super)		
Ending Super	Units in % (Required if variable super)		
Beginning Station	Units in Ft (Required if variable super)		
Ending Station	Units in Ft (Required if variable super)		

EXAMPLE

VERTICAL 24300, 4921, - 0.975, .5588, 300, , , 5.1

Station of PI →
 Elevation of PI →
 Grade #1 →
 Grade #2 →
 Length of VC →
 Not required →
 Not required →
 Super →

FIGURES

NOTES

90	BRASS	COMMAND DESCRIPTION	
COMMAND NAME	STATION (STN)		
PURPOSE	This command lists stations of intersections. This command is required.		
COMMAND PARAMETERS			
Station #1	Units in Ft. (Always required)		
Station #2	Units in Ft. (Always required)		
Station #3	Units in Ft. (Optional)		
Station #4	Units in Ft. (Optional)		
Station #5	Units in Ft. (Optional)		
Station #6	Units in Ft. (Optional)		
Station #7	Units in Ft. (Optional)		
Station #8	Units in Ft. (Optional)		
Station #9	Units in Ft. (Optional)		

EXAMPLE

STATION 23797, 23798.25, 23905.75, 23907

Station of Fourth Intersect
Station of Third Intersect
Station of Second Intersect
Station of First Intersect

FIGURES**NOTES**

100	BRASS	COMMAND DESCRIPTION	
COMMAND NAME	SKEW-RADIAL		(SKR)
PURPOSE	<p>This command lists skew angles to radial line at each intersection.</p> <p>This command is required <u>only</u> when skew type is a variable - radial skew.</p>		
COMMAND PARAMETERS			
Angle of First Intersect	Units in degrees-min-sec i.e., 300000 (Neg = Left Skew)		
Angle of Second Intersect	Units in degrees-min-sec i.e., 300000 (Neg = Left Skew)		
Angle of Third Intersect	Units in degrees-min-sec i.e., 300000 (Neg = Left Skew)		
Angle of Fourth Intersect	Units in degrees-min-sec i.e., 300000 (Neg = Left Skew)		
Angle of Fifth Intersect	Units in degrees-min-sec i.e., 300000 (Neg = Left Skew)		
Angle of Sixth Intersect	Units in degrees-min-sec i.e., 300000 (Neg = Left Skew)		
Angle of Seventh Intersect	Units in degrees-min-sec i.e., 300000 (Neg = Left Skew)		
Angle of Eighth Intersect	Units in degrees-min-sec i.e., 300000 (Neg = Left Skew)		
Angle of Ninth Intersect	Units in degrees-min-sec i.e., 300000 (Neg = Left Skew)		

EXAMPLE

SKEW-RADIAL 300000, 250000, 300000

The diagram shows three lines intersecting at a single point. The lines are labeled with their skew angles and intersection points. The first line is labeled '30° Right skew First Intersect'. The second line is labeled '25° Right skew Second Intersect'. The third line is labeled '30° Right skew Third Intersect'. The lines are also labeled with their respective values: 300000, 250000, and 300000.

30° Right skew
Third Intersect

25° Right skew
Second Intersect

30° Right skew
First Intersect

FIGURES**NOTES**

110	BRASS	COMMAND DESCRIPTION	
COMMAND NAME		SKEW-LONGC	(SKL)
PURPOSE		<p>This command lists skew angles to long chord at each intersection.</p> <p>This command is required <u>only</u> when skew type is a variable - long chord skew.</p>	
COMMAND PARAMETERS			
Angle of First Intersect	Units in degrees-min-sec, i.e., 600000 (Greater than 90° = left skew)		
Angle of Second Intersect	Units in degrees-min-sec, i.e., 600000 (Greater than 90° = left skew)		
Angle of Third Intersect	Units in degrees-min-sec, i.e., 600000 (Greater than 90° = left skew)		
Angle of Fourth Intersect	Units in degrees-min-sec, i.e., 600000 (Greater than 90° = left skew)		
Angle of Fifth Intersect	Units in degrees-min-sec, i.e., 600000 (Greater than 90° = left skew)		
Angle of Sixth Intersect	Units in degrees-min-sec, i.e., 600000 (Greater than 90° = left skew)		
Angle of Seventh Intersect	Units in degrees-min-sec, i.e., 600000 (Greater than 90° = left skew)		
Angle of Eighth Intersect	Units in degrees-min-sec, i.e., 600000 (Greater than 90° = left skew)		
Angle of Ninth Intersect	Units in degrees-min-sec, i.e., 600000 (Greater than 90° = left skew)		

EXAMPLE

SKEW-LONGC 800000, 900000, 1000000

The diagram shows three points labeled 800000, 900000, and 1000000. Arrows point from these points to three intersection points labeled 'First Intersect', 'Second Intersect', and 'Third Intersect'. The angles between the lines are labeled as 80° skew, 90° skew, and 100° skew respectively.

100° skew
Third Intersect

90° skew
Second Intersect

80° skew
First Intersect

FIGURES**NOTES**

120	BRASS	COMMAND DESCRIPTION	
COMMAND NAME	OFFSETS-RADIALS		(OFR)
PURPOSE	This command lists the radial offsets to centerline. Required if girders are not chorded.		
COMMAND PARAMETERS			
Distance to C _L Line #1	Units in Ft. (Neg. if left of C _L)		
Distance to C _L Line #2	Units in Ft. (Neg. if left of C _L)		
Distance to C _L Line #3	Units in Ft. (Neg. if left of C _L)		
Distance to C _L Line #4	Units in Ft. (Neg. if left of C _L)		
Distance to C _L Line #5	Units in Ft. (Neg. if left of C _L)		
Distance to C _L Line #6	Units in Ft. (Neg. if left of C _L)		
Distance to C _L Line #7	Units in Ft. (Neg. if left of C _L)		
Distance to C _L Line #8	Units in Ft. (Neg. if left of C _L)		
Distance to C _L Line #9	Units in Ft. (Neg. if left of C _L)		
Distance to C _L Line #10	Units in Ft. (Neg. if left of C _L)		

COMMAND PARAMETERS (Cont.)			
Distance to C _L Line #11	Units in Ft. (Neg. if left of C _L)		
Distance to C _L Line #12	Units in Ft. (Neg. if left of C _L)		

EXAMPLE

OFFSETS-RADIAL - 9, 0
 ↖ ↗
 First offset = 9' Left Second offset

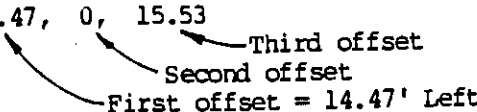
FIGURES**NOTES**

130	BRASS	COMMAND DESCRIPTION	
COMMAND NAME	OFFSETS-PARCORD	(OFF)	
PURPOSE	This command lists the prallel chord offsets for 1st span. Required if girders are parallel and chorded.		
COMMAND PARAMETERS			
Distance to C _L Line #1	Units in Ft. (Neg. if Left of C _L)		
Distance to C _L Line #2	Units in Ft. (Neg. if Left of C _L)		
Distance to C _L Line #3	Units in Ft. (Neg. if Left of C _L)		
Distance to C _L Line #4	Units in Ft. (Neg. if Left of C _L)		
Distance to C _L Line #5	Units in Ft. (Neg. if Left of C _L)		
Distance to C _L Line #6	Units in Ft. (Neg. if Left of C _L)		
Distance to C _L Line #7	Units in Ft. (Neg. if Left of C _L)		
Distance to C _L Line #8	Units in Ft. (Neg. if Left of C _L)		
Distance to C _L Line #9	Units in Ft. (Neg. if Left of C _L)		
Distance to C _L Line #10	Units in Ft. (Neg. if Left of C _L)		

COMMAND PARAMETERS (Cont.)			
Distance to C_L Line #11	Units in Ft. (Neg. if Left of C_L)		
Distance to C_L Line #12	Units in Ft. (Neg. if Left of C_L)		

EXAMPLE

OFFSETS-PARCORD - 14.47, 0, 15.53



Third offset
Second offset
First offset = 14.47' Left

FIGURES**NOTES**

140	BRASS	COMMAND DESCRIPTION	
COMMAND NAME	ELEVATIONS-SCREEDS		(ESC)
PURPOSE	<p>This command lists the line numbers screed elevations are wanted on.</p> <p>Required if 10th point elevations are requested.</p>		
COMMAND PARAMETERS			
Line No.	Up to 12 Line Numbers may be specified.		

EXAMPLE

ELEVATIONS-SCREEDS

1, 2, 3
First Line No.
Second Line No.
Third Line No.

FIGURES**NOTES**

150	BRASS	COMMAND DESCRIPTION	
COMMAND NAME	ELEVATIONS-VERTICAL		(EVR)
PURPOSE	<p>This command lists line numbers and vertical corrections above or below finish grade.</p> <p>This command is optional, 2 commands are allowed for maximum of 12 lines</p> <p>Do <u>not</u> use at present time.</p>		
COMMAND PARAMETERS			
Line No.	Enter the first line a vertical correction is wanted on.		
Vert. Corr.	Enter the vertical correction for first line.		
Line No.	Enter the second line a vertical correction is wanted on.		
Vert. Corr.	Enter the vertical correction for second line.		
Line No.	Enter the third line a vertical correction is wanted on.		
Vert. Corr.	Enter the vertical correction for third line.		
Line No.	Enter the fourth line a vertical correction is wanted on.		
Vert. Corr.	Enter the vertical correction for fourth line.		
Line No.	Enter the fifth line a vertical correction is wanted on.		
Vert. Corr.	Enter the vertical correction for fifth line.		
Line No.	Enter the sixth line a vertical correction is wanted on.		
Vert. Corr.	Enter the vertical correction for sixth line.		
	Repeat command for more than six lines.		

EXAMPLE

ELEVATIONS-VERTICAL 2, .5, 4, -.5

Line number Vert. correction Line number Vert. correction

Line number Vert. correction

The diagram shows the sequence of values 2, .5, 4, -.5. Arrows indicate the following relationships: an arrow from '2' to '.5' is labeled 'Line number'; an arrow from '.5' to '4' is labeled 'Vert. correction'; an arrow from '4' to '-.5' is labeled 'Line number'; and an arrow from '-.5' back to '2' is labeled 'Vert. correction'.

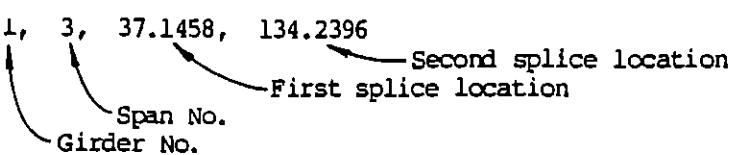
FIGURES**NOTES**

160	BRASS	COMMAND DESCRIPTION
COMMAND NAME	SPLICE-INDIV (SPI)	
PURPOSE	<p>This command lists girder numbers, span numbers and up to four splices per span.</p> <p>A minimum of one command is required with a limit of 96 commands. (12 Girders 8 spans).</p>	
COMMAND PARAMETERS		
Girder No.	Required input	
Span No.	Required input	
Dist from Lt end of span to splice No. 1	Required input	
Dist from Lt end of span to splice No. 2	Optional input	
Dist from Lt end of span to splice No. 3	Optional input	
Dist from Lt end of span to splice No. 4	Optional input	
	<u>Note:</u> If no splice in end span do not use this command for end span.	

EXAMPLE

SPLICE-INDIV 1, 3, 37.1458, 134.2396

Second splice location
First splice location
Span No.
Girder No.

**FIGURES****NOTES**

170	BRASS	COMMAND DESCRIPTION	
COMMAND NAME		SPLICE-ALL	(SPA)
PURPOSE		<p>This command lists span Nos. (8), location of splices (4), angle of splice lines to C_L (4) when shop web camber is to be furnished on all girders.</p> <p>Do <u>not</u> use at present time.</p>	
COMMAND PARAMETERS			
Span No.	Required input		
Dist. along C_L from Lt end of span to Splice No. 1	Required input		
Dist along C_L from Lt end of span to Splice No. 2	Optional input		
Dist along C_L from Lt end of span to Splice No. 3	Optional input		
Dist along C_L from Lt end of span to Splice No. 4	Optional input		
Angle of Splice to C_L of Splice #1	Required input - Angle in Deg-Min-Sec, i.e. 900000		
Angle of Splice to C_L of Splice #2	Optional input		
Angle of Splice to C_L of Splice #3	Optional input		
Angle of Splice to C_L of Splice #4	Optional input		
	Repeat for each span		

EXAMPLE

SPLICE-ALL 2, 25, 75, , , 850000, 850000

Span Dist #1 Dist #2 Angle #1 Angle #2

FIGURES**NOTES**

180	BRASS	COMMAND DESCRIPTION	
COMMAND NAME	DEFLECTIONS (DFL)		
PURPOSE	This command lists span number and deflections. Repeat for each span deflection is being furnished. (8 max)		
COMMAND PARAMETERS			
Span No.	Required		
Deflection @ 0.1	Required		
Deflection @ 0.2	Required		
Deflection @ 0.3	Required		
Deflection @ 0.4	Required		
Deflection @ 0.5	Required		
Deflection @ 0.6	Required		
Deflection @ 0.7	Required		
Deflection @ 0.8	Required		
Deflection @ 0.9	Required		

EXAMPLE			
<p>DEFLECTIONS 2, .0501, .0919, .1194, .1274, .1219, .0994, .0673, .0356, .0074</p> <p> ↑ Span No.</p>			
FIGURES			
NOTES			

APPENDIX B

ABBREVIATED COMMANDS

B R A S S G E O M E T R Y

JOB CONTROL

<u>TITLE</u> (TLE)	[10] xoooooooooooooooooooooooooooooooooooo

Job description up to 60 characters. This will title each page of output. Two are allowed.

COMMENT (COM) [20] xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

Comment up to 60 characters. One or more may be placed between commands to document the input data.

- 1 -

- 2 -

- 3 -

- 4 -

- 5 -

- 6 -

SYSTEM-1 (SY1) [30]
System Control
No. 1
(Optional)

Leave blank

1 - prints name
of subroutine
entered for all
subroutines
2 - prints name
of subroutine
entered for
programs listed
on SYSTEM-2 or
SYSTEM-3 commands

SYSTEM-2 (SY2) [40]
System Control
No. 2
(Optional)

First Component
Number for which
trace is desired

Second Component
Number for which
trace is desired

SYSTEM-3 (SY3) [50]
System Control
No. 3
(Optional)

First Subroutine
Number for which
trace is desired

Second Subroutine
Number for which
trace is desired

Third Subroutine
Number for which
trace is desired

Fourth Subroutine
Number for which
trace is desired

Fifth Subroutine
Number for which
trace is desired

Sixth Subroutine
Number for which
trace is desired

	- 1 -	- 2 -	- 3 -	- 4 -	- 5 -	- 6 -
CONTROL (CNL) [60]						
(Required)	<u>Elevations</u> <u>10th points</u> 1 = Yes 0 = No	<u>Super Type</u> 0 = center crown 1 = constant super 2 = variable super (Always required)	<u>Bridge Type</u> 0 = St. Bridge 1 = Lt. Curve 2 = Rt. Curve (Always required)	<u>Parallel</u> <u>Girders</u> 1 = Yes 0 = No	<u>Chorded</u> <u>Girders</u> 1 = Yes 0 = No	<u>Shop Web</u> <u>Camber</u> 2 = Ea Girder 1 = Specific Girder 0 = No Shop Web Camber - 12 -
	- 7 -	- 8 -	- 9 -	- 10 -	- 11 -	
	<u>% Deflection</u> No entry = 100% Enter % Deflection Used (%) Desired	<u>Output data for</u> <u>CADD</u> 0 = No Any Integer = Girder Line	<----- When Output Data = 1 -----> <u>Abutment type</u> 1 = Cap type leave blank for all other cases		<u>Slab</u> <u>Thickness</u> (In) (Required for wide flange sections only)	<u>Top Flange</u> <u>Thickness</u> (In)
	- 1 -	- 2 -	- 3 -	- 4 -	- 5 -	- 6 -
HORIZONTAL (HOR) [70]						
(Required)	<u>Degree of Curve</u> Required if Bridge Type = 1 or 2	<u>Skew Type</u> 0 = Radial skew (Normally used) 1 = Long chord skew 2 = Variable Radial Skew 3 = Variable Long Chord Skew	<u>Skew</u> Angle in degrees minutes, seconds Use only when Skew Type = 0 or 1 (Neg = Left Skew) Examples: If angle = 30° 00' 00" Code 300000 If angle = 0° Code 000000	<u>Distance Between</u> <u>End of Girder and</u> <u>RF Abutment No. 1</u> (Ft) (Always Required)	<u>Distance Between</u> <u>End of Girder and</u> <u>RF Abutment No. 2</u> (Ft) (Always Required)	<u>Girder Length Past</u> <u>Bearing-Abut No. 1</u> (Ft)
Angle in degrees minutes, seconds	Angle in degrees minutes, seconds Examples: If angle = 30° 00' 00" Code 300000 If angle = 0° Code 000000					
	- 7 -					
	<u>Girder Length Past</u> <u>Bearing-Abut No. 2</u> (Ft)					

VERTICAL (VER) [80]

(Required)

- 1 -	- 2 -	- 3 -	- 4 -	- 5 -	- 6 -
<u>PI Station</u>	<u>PI Elevation</u>	<u>Grade 1</u>	<u>Grade 2</u> Default = Grade 1	<u>Length of VC</u>	<u>Length of vert.</u> before PI NOT required for symmetrical VC
(Ft)	(Ft)	(%)	(%)	(Ft)	(Ft)
- 7 -	- 8 -	- 9 -	- 10 -	- 11 -	- 12 -

Pos super is down
toward right, Input
crown super as
positive number

<u>Length of Vert</u> after PI NOT required for symmetrical VC	<u>Super</u> Required if Super type = 0 or 1	<u>Beginning Super</u> Required if Super type = 2	<u>Ending Super</u> Required if Super type = 2	<u>Beginning Station</u> Required if Super type = 2	<u>Ending Station</u> Required if Super type = 2
(Ft)	(%)	(%)	(%)	(Ft)	(Ft)

STATION (STN) [90](Required)
For double bearing
bents/piers, code
the C_L of the
bent/pier

- 1 -	- 2 -	- 3 -	- 4 -	- 5 -	- 6 -
<u>Station 1</u> First Intersect Station (Always required)	<u>Station 2</u> Second Intersect Station (Always required)	<u>Station 3</u> Third Intersect Station (Optional)	<u>Station 4</u> Fourth Intersect Station (Optional)	<u>Station 5</u> Fifth Intersect Station (Optional)	<u>Station 6</u> Sixth Intersect Station (Optional)
(Ft)	(Ft)	(Ft)	(Ft)	(Ft)	(Ft)
- 7 -	- 8 -	- 9 -			

<u>Station 7</u> Seventh Intersect Station (Optional)	<u>Station 8</u> Eighth Intersect Station (Optional)	<u>Station 9</u> Ninth Intersect Station (Optional)
----------------------------------------------------------------	---------------------------------------------------------------	--------------------------------------------------------------

SKW-RADIAL (SKR)[100]

Required if
Radial Skew
and Skew Type = 2

Angle of First
Intersect
(Deg-Min-Sec)
(i.e. 300000)
(Neg = Left Skew)

Angle of Second
Intersect
(Deg-Min-Sec)

Angle of Third
Intersect
(Deg-Min-Sec)

Angle Fourth
Intersect
(Deg-Min-Sec)

Angle Fifth
Intersect
(Deg-Min-Sec)

Angle Sixth
Intersect
(Deg-Min-Sec)

- 7 -

- 8 -

- 9 -

Angle of Seventh
Intersect
(Deg-Min-Sec)

Angle of Eighth
Intersect
(Deg-Min-Sec)

Angle of Ninth
Intersect
(Deg-Min-Sec)

- 1 -

- 2 -

- 3 -

- 4 -

- 5 -

- 6 -

SKW-LONGC (SKL)[110]

Required if
Long Chord Skew
and Skew Type = 3

Angle of First
Intersect
(Deg-Min-Sec)
(i.e. 300000)
(Angles greater than
90 Degrees = Left Skew)

Angle of Second
Intersect
(Deg-Min-Sec)

Angle of Third
Intersect
(Deg-Min-Sec)

Angle of Fourth
Intersect
(Deg-Min-Sec)

Angle of Fifth
Intersect
(Deg-Min-Sec)

Angle of Sixth
Intersect
(Deg-Min-Sec)

- 7 -

- 8 -

- 9 -

Angle of Seventh
Intersect
(Deg-Min-Sec)

Angle of Eighth
Intersect
(Deg-Min-Sec)

Angle of Ninth
Intersect
(Deg-Min-Sec)

- 1 -

- 2 -

- 3 -

- 4 -

- 5 -

- 6 -

OFFSETS-RADIAL (OFR)[120]

Required if
Parallel curved
or Parallel Straight
Neg if left of C_L

Distance to
C_L #1

(Ft)

- 7 -

Distance to
C_L #2

(Ft)

- 8 -

Distance to
C_L #3

(Ft)

- 9 -

Distance to
C_L #4

(Ft)

- 10 -

Distance to
C_L #5

(Ft)

- 11 -

Distance to
C_L #6

(Ft)

- 12 -

Distance to
C_L #7

(Ft)

Distance to
C_L #8

(Ft)

Distance to
C_L #9

(Ft)

Distance to
C_L #10

(Ft)

Distance to
C_L #11

(Ft)

Distance to
C_L #12

(Ft)

- 1 -

- 2 -

- 3 -

- 4 -

- 5 -

- 6 -

OFFSETS-PARCORD (OPP)[130]

Required if
Parallel Chorded
Offsets shown
for first span only
Neg if left of C_L

Distance to
C_L #1

(Ft)

- 7 -

Distance to
C_L #2

(Ft)

- 8 -

Distance to
C_L #3

(Ft)

- 9 -

Distance to
C_L #4

(Ft)

- 10 -

Distance to
C_L #5

(Ft)

- 11 -

Distance to
C_L #6

(Ft)

- 12 -

Distance to
C_L #7

(Ft)

Distance to
C_L #8

(Ft)

Distance to
C_L #9

(Ft)

Distance to
C_L #10

(Ft)

Distance to
C_L #11

(Ft)

Distance to
C_L #12

(Ft)

- 1 -

- 2 -

- 3 -

- 4 -

- 5 -

- 6 -

ELEVATIONS-SCREDS (ESC)

(Required)

[140]

Line #Desired line #
for SCREDSUp to 12 lines may
be requestedELEVATIONS-VERTICAL (EVR)

[150]

(Not currently
Operational)2 cards maximum
(Optional)Line #Desired line #
for vertical
correctionVertical Correction

(Ft)

Line #Desired line #
for vertical
correctionVertical Correction

(Ft)

Line #Desired line #
for vertical
correctionVertical Correction

(Ft)

- 7 -

- 8 -

- 9 -

- 10 -

- 11 -

- 12 -

Line #Desired line #
for vertical
correctionVertical Correction

(Ft)

Line #Desired line #
for vertical
correctionVertical Correction

(Ft)

Line #Desired line #
for vertical
correctionVertical Correction

(Ft)

- 1 -

- 2 -

- 3 -

- 4 -

- 5 -

- 6 -

SPICE-INDIV (SPI)[160]

Required if
Shop web camber
is required on
individual lines
Up to 96 cards
(12 Girders,
8 Spans)

Girder
No.

Span
No.

Dist from
Lt end of
Span to
Splice No. 1

(Ft)

Dist from
Lt end of
Span to
Splice No. 2

(Ft)

Dist from
Lt end of
Span to
Splice No. 3

(Ft)

Dist from
Lt end of
Span to
Splice No. 4

(Ft)

Note: If no splice in end span do not enter.

SPICE-ALL (SPA)[170]

Required if
Shop web camber
is requested on
all lines.
8 cards maximum
(Not currently
operational)

Span No.

Dist along C_L
from Lt end
of span to
Splice No. 1

(Ft)

Dist along C_L
from Lt end
of span to
Splice No. 2

(Ft)

Dist along C_L
from Lt end
of span to
Splice No. 3

(Ft)

Dist along C_L
from Lt end
of span to
Splice No. 4

(Ft)

Angle of splice
to C_L
Splice No. 1

(Deg-Min-Sec)

- 7 -

- 8 -

- 9 -

Angle of
Splice to C_L
Splice No. 2

(Deg-Min-Sec)

Angle of
Splice to C_L
Splice No. 3

(Deg-Min-Sec)

Angle of
Splice to C_L
Splice No. 4

(Deg-Min-Sec)

DEFLECTIONS (DFL)[180]
 Repeat for each span
 Up to 8 cards
 (Required)

- 1 -	- 2 -	- 3 -	- 4 -	- 5 -	- 6 -
<u>Span No.</u>	<u>Deflection</u> <u>@ 0.1</u>	<u>Deflection</u> <u>@ 0.2</u>	<u>Deflection</u> <u>@ 0.3</u>	<u>Deflection</u> <u>@ 0.4</u>	<u>Deflection</u> <u>@ 0.5</u>
	(Ft)	(Ft)	(Ft)	(Ft)	(Ft)
- 7 -	- 8 -	- 9 -	- 10 -		
<u>Deflection</u> <u>@ 0.6</u>	<u>Deflection</u> <u>@ 0.7</u>	<u>Deflection</u> <u>@ 0.8</u>	<u>Deflection</u> <u>@ 0.9</u>		
(Ft)	(Ft)	(Ft)	(Ft)		