

MANUAL OF THE STRUCTURE AND BRIDGE DIVISION

PART 7

STEEL PLATE GIRDER STANDARDS



**VIRGINIA DEPARTMENT OF
TRANSPORTATION**

VDOT GOVERNANCE DOCUMENT

**VDOT Manual of the Structure and Bridge Division: Part 07: Steel Plate
Girder Standards**

OWNING DIVISION: Structure and Bridge

DATE OF ISSUANCE: 10/31/2018



COMMONWEALTH of VIRGINIA

DEPARTMENT OF TRANSPORTATION
1401 EAST BROAD STREET
RICHMOND, 23219-2000

Stephen Brich
COMMISSIONER

October 31, 2018

SUBJECT: Manual of the Structure and Bridge Division – Part 7
Steel Plate Girder Standards

MEMORANDUM

TO: Holders of Manual

VOIDED:

None

NEW ISSUES:

None

REVISIONS:

| <u>File Number</u> | <u>Description of change(s)</u> |
|---|---|
| TOC-1 thru -4 | Revised dates. |
| SGDET2-1, SGDET2C-1, SGDET3-1, SGDET3C-1, SGDET4A-1, SGDET4AC-1, SGDET4B-1 and SGDET4BC-1 | Aligned second top flange plate transition with the bolted field splice centerline on each side of the pier centerline(s). Made miscellaneous drafting updates. |

RETAIN THIS MEMO IN FRONT OF INDEX TO PART 7

/original signed/
Junyi Meng, P.E.
Assistant State Structure and Bridge Engineer

For: Kendal R. Walus, P.E.
State Structure and Bridge Engineer



COMMONWEALTH of VIRGINIA

DEPARTMENT OF TRANSPORTATION
1401 EAST BROAD STREET
RICHMOND, 23219-2000

Charles A. Kilpatrick, P.E.
COMMISSIONER

May 18, 2016

SUBJECT: Manual of the Structure and Bridge Division – Part 7
Steel Plate Girder Standards

MEMORANDUM

TO: Holders of Manual

VOIDED:

None

NEW ISSUES:

None

REVISIONS:

| <u>File Number</u> | <u>Description of change(s)</u> |
|-----------------------|--|
| TOC-1 – TOC-4 | Removed “Volume V” from headers and footers. Removed “Vol. V” from footer File No. blocks. Revised dates. |
| INSTR-1 to -3 | Removed “Volume V” from headers. Removed “Vol. V” from footer File No. blocks; no revision of dates. |
| All Notes to Designer | Removed “VOL. V” from footer File No. blocks. Changed last revised dates only on sheets where other content was changed. |
| SGBSPL-2 | Updated manual reference. |

REVISIONS:(cont'd)

| <u>File Number</u> | <u>Description of change(s)</u> |
|--|--|
| SGDET1A-1, SGDET1AC-1 SGDET2-1, SGDET2C-1 SGDET4A-1 and SGDET4AC-1 | Added TYPICAL BEAM END DETAIL. In GIRDER ELEVATION, added Scale for horizontal only, removed Face of backwall at . . . , added Bearing stiffeners, changed label “permissible bolted field splice” to “bolted field splice” and relocated splice to where there is change in plate thickness, revised stud shear connectors spacing and left weld size open. Added blank lines for dimensions and plate size in BEARING STIFFENERS, CROSS FRAME CONNECTOR PLATE AND TRANSVERSE INTERMEDIATE STIFFENER details. In GIRDER DIMENSION TABLE, removed columns unused for stud shear connectors spacing. In Notes, edited “For spacing of stiffeners and connector plates . . . ” and added note on shipping and erection when Contractor chooses eliminating bolted field splice(s). |
| SGDET1A-2 and -3, SGDET1AC-2 and -3, SGDET2-2 and -3, SGDET2C-2 and -3, SGDET4A-2 and -3, and SGDET4AC-2 and-3 | Added GIRDER ELEVATION note. In PLATE DIMENSION TABLE and GIRDER DIMENSION TABLE, added “Removed unused columns”. Updated manual reference in CROSS FRAME CONNECTOR PLATE, TRANSVERSE INTERMEDIATE STIFFENER and FLANGE CLIP DETAIL notes. Added TYPICAL BEAM END DETAIL note. |
| SGDET3-1, SGDET3C-1 SGDET4B-1 and SGDET4BC-1 | ELEVATION, added Scale for horizontal only, removed Face of backwall . . . , added Bearing stiffeners, changed label “permissible bolted field splice” to “bolted field splice” and relocated splice to where there is change in plate thickness, revised stud shear connectors spacing and left weld size open. In GIRDER DIMENSION TABLE, removed columns unused for stud shear connectors spacing. |
| SGDET3-2, SGDET3C-2 SGDET4B-2 and SGDET4BC-2 | Added GIRDER ELEVATION note and added “Removed. unused columns” in PLATE DIMENSION TABLE and GIRDER DIMENSION TABLE. |
| SGDET1B-1, SGDET1BC-1 | Removed Face of backwall at . . . and replaced label “CL Bearing” to “Line Thru Centers of bearings at . . . ” |
| SGDET1B-2, SGDET1BC-2 SGCAM2-2, SGCAM2C-2, | In NOTES TO DESIGNER, added to see SGCELLS for modification with other cells. |
| SGCAM2-1, SGCAM2C-1, SGCAM4-1, SGCAM4C-1, SGDLD2-1, SGDLD2C-1, SGDLD3-1, SGDLD3C-1, SGDLD4A-1, SGDLD4AC-1, SGDLD4B-1 and SGDLD4BC-1 | Replaced label “CL Bearing” to “Line Thru Centers of bearings at . . . ”. |

REVISIONS:(cont'd)

| <u>File Number</u> | <u>Description of change(s)</u> |
|----------------------------|--|
| SGCAM3-1, and SGCAM3C-1 | Added TYPICAL BEAM END DETAIL. Added blank lines for dimensions and plate size in BEARING STIFFENERS, CROSS FRAME CONNECTOR PLATE AND TRANSVERSE INTERMEDIATE STIFFENER details. In Notes, edited “For spacing of stiffeners and connector plates . . .” and added note on shipping and erection when Contractor chooses eliminating bolted field splice(s). |
| SGCAM3-2, and SGCAM3C-2 | Removed “Volume V” in CROSS FRAME CONNECTOR PLATE, TRANSVERSE INTERMEDIATE, STIFFENER and FLANGE CLIP DETAIL notes. Added TYPICAL BEAM END DETAIL note. |
| SGCELLIND-1 | Revised dates. |
| SGCELLS-2 THRU -14 | Revised cells in which the changes were reflected on the standards. |

RETAIN THIS MEMO IN FRONT OF INDEX TO PART 7

/original signed/
Prasad Nallapaneni, P.E.
Assistant State Structure and Bridge Engineer

For: Kendal R. Walus, P.E.
State Structure and Bridge Engineer

RELEASE LETTERS

PART 7

STEEL PLATE GIRDER STANDARDS

A complete set of all release (revision) letters is located at the following link:

http://www.virginiadot.org/business/bridge_manual_archives_part_7.asp

**PART 7
STEEL PLATE GIRDER STANDARDS**

TABLE OF CONTENTS

| FILE NO. | TITLE | DATE |
|---|---|-----------|
| TABLE OF CONTENTS & GENERAL INSTRUCTIONS | | |
| TOC-1 | Table of Contents..... | 31Oct2018 |
| TOC-2 | Table of Contents – cont'd | 31Oct2018 |
| TOC-3 | Table of Contents – cont'd | 31Oct2018 |
| TOC-4 | Table of Contents – cont'd | 31Oct2018 |
| INSTR-1 | General Instructions..... | 10Mar2015 |
| INSTR-2 | External Users: File Access Instructions..... | 11Jul2008 |
| INSTR-3 | External Users: File Access Instructions..... | 11Jul2008 |

BOLTED SPLICE DETAILS

| | | |
|---------|--------------------------------|-----------|
| *SGBSPL | -1 Bolted Splice Details | 14Jun2010 |
| | -2 Notes to Designer | 18May2016 |
| | -DGN MicroStation Drawing File | |

SIMPLE SPAN(S) - STRAIGHT

| | | |
|----------|--------------------------------|-----------|
| *SGDET1A | -1 Girder Details | 18May2016 |
| | -2 Notes to Designer | 18May2016 |
| | -3 Notes to Designer | 18May2016 |
| | -DGN MicroStation Drawing File | |
| *SGDET1B | -1 Girder Details | 18May2016 |
| | -2 Notes to Designer | 18May2016 |
| | -DGN MicroStation Drawing File | |

SIMPLE SPAN(S) – TRAPEZOIDAL OR CURVED

| | | |
|-------------|--------------------------------|-----------|
| *SGDET1AC-1 | Girder Details | 18May2016 |
| | -2 Notes to Designer | 18May2016 |
| | -3 Notes to Designer | 18May2016 |
| | -DGN MicroStation Drawing File | |
| *SGDET1BC-1 | Girder Details | 18May2016 |
| | -2 Notes to Designer | 18May2016 |
| | -DGN MicroStation Drawing File | |

*Indicates 11 x 17 sheet; all others are 8½ x 11.

**PART 7
STEEL PLATE GIRDER STANDARDS**

TABLE OF CONTENTS (cont'd)

| FILE NO. | TITLE | DATE |
|--|--------------------------------------|-----------|
| 2 – SPAN CONTINUOUS - STRAIGHT | | |
| *SGDET2 | -1 Girder Details | 31Oct2018 |
| | -2 Notes to Designer | 18May2016 |
| | -3 Notes to Designer | 18May2016 |
| | -DGN MicroStation Drawing File | |
| *SGCAM2 | -1 Camber Diagram..... | 18May2016 |
| | -2 Notes to Designer | 18May2016 |
| | -DGN MicroStation Drawing File | |
| *SGDLD2 | -1 Dead Load Deflection Diagram..... | 18May2016 |
| | -2 Notes to Designer | 29May2009 |
| | -DGN MicroStation Drawing File | |
| 2 – SPAN CONTINUOUS – TRAPEZOIDAL OR CURVED | | |
| *SGDET2C | -1 Girder Details | 31Oct2018 |
| | -2 Notes to Designer | 18May2016 |
| | -3 Notes to Designer | 18May2016 |
| | -DGN MicroStation Drawing File | |
| *SGCAM2C | -1 Camber Diagram..... | 18May2016 |
| | -2 Notes to Designer | 18May2016 |
| | -DGN MicroStation Drawing File | |
| *SGDLD2C | -1 Dead Load Deflection Diagram..... | 18May2016 |
| | -2 Notes to Designer | 29May2009 |
| | -DGN MicroStation Drawing File | |
| 3 – SPAN CONTINUOUS - STRAIGHT | | |
| *SGDET3 | -1 Girder Details | 31Oct2018 |
| | -2 Notes to Designer | 18May2016 |
| | -DGN MicroStation Drawing File | |
| *SGCAM3 | -1 Camber Diagram..... | 18May2016 |
| | -2 Notes to Designer | 18May2016 |
| | -DGN MicroStation Drawing File | |
| *SGDLD3 | -1 Dead Load Deflection Diagram..... | 18May2016 |
| | -2 Notes to Designer | 29May2009 |
| | -DGN MicroStation Drawing File | |

*Indicates 11 x 17 sheet; all others are 8½ x 11.

**PART 7
STEEL PLATE GIRDER STANDARDS**

TABLE OF CONTENTS (cont'd)

| FILE NO. | TITLE | DATE |
|--|---|-----------|
| 3 – SPAN CONTINUOUS - TRAPEZOIDAL OR CURVED | | |
| *SGDET3C -1 | Girder Details | 31Oct2018 |
| -2 | Notes to Designer | 18May2016 |
| -DGN | MicroStation Drawing File | |
| *SGCAM3C -1 | Camber Diagram..... | 18May2016 |
| -2 | Notes to Designer | 18May2016 |
| -DGN | MicroStation Drawing File | |
| *SGDLD3C -1 | Dead Load Deflection Diagram..... | 18May2016 |
| -2 | Notes to Designer | 29May2009 |
| -DGN | MicroStation Drawing File | |
| 4 – SPAN CONTINUOUS – STRAIGHT | | |
| *SGDET4A -1 | Girder Details, sheet 1 of 2 | 31Oct2018 |
| -2 | Notes to Designer | 18May2016 |
| -3 | Notes to Designer | 18May2016 |
| -DGN | MicroStation Drawing File | |
| *SGDET4B -1 | Girder Details, sheet 2 of 2 | 31Oct2018 |
| -2 | Notes to Designer | 18May2016 |
| -DGN | MicroStation Drawing File | |
| *SGCAM4 -1 | Camber Diagram..... | 18May2016 |
| -2 | Notes to Designer | 29May2009 |
| -DGN | MicroStation Drawing File..... | |
| *SGDLD4A -1 | Dead Load Deflection Diagram, sheet 1 of 2..... | 18May2016 |
| -2 | Notes to Designer | 29May2009 |
| -DGN | MicroStation Drawing File | |
| *SGDLD4B -1 | Dead Load Deflection Diagram, sheet 2 of 2..... | 18May2016 |
| -2 | Notes to Designer | 31Aug2007 |
| -DGN | MicroStation Drawing File | |

*Indicates 11 x 17 sheet; all others are 8½ x 11.

**PART 7
STEEL PLATE GIRDER STANDARDS**

TABLE OF CONTENTS (cont'd)

| FILE NO. | TITLE | DATE |
|--|---|-----------|
| 4 – SPAN CONTINUOUS - TRAPEZOIDAL OR CURVED | | |
| *SGDET4AC-1 | Girder Details, sheet 1 of 2 | 31Oct2018 |
| -2 | Notes to Designer | 18May2016 |
| -3 | Notes to Designer | 18May2016 |
| -DGN | MicroStation Drawing File | |
| *SGDET4BC-1 | Girder Details, sheet 2 of 2 | 31Oct2018 |
| -2 | Notes to Designer | 18May2016 |
| -DGN | MicroStation Drawing File | |
| *SGCAM4C-1 | Camber Diagram..... | 18May2016 |
| -2 | Notes to Designer | 29May2009 |
| -DGN | MicroStation Drawing File | |
| *SGDLD4AC-1 | Dead Load Deflection Diagram, sheet 1 of 2..... | 18May2016 |
| -2 | Notes to Designer | 29May2009 |
| -DGN | MicroStation Drawing File | |
| *SGDLD4BC-1 | Dead Load Deflection Diagram, sheet 2 of 2..... | 18May2016 |
| -2 | Notes to Designer | 31Aug2007 |
| -DGN | MicroStation Drawing File | |

CELLS FOR STEEL PLATE GIRDER STANDARDS

| | | |
|-------------|---------------------------|-----------|
| SGCELLIND-1 | Index of Cells | 18May2016 |
| SGCELLS -1 | Cells | 31Aug2007 |
| -2 | Cells | 18May2016 |
| -3 | Cells | 18May2016 |
| -4 | Cells | 18May2016 |
| -5 | Cells | 18May2016 |
| -6 | Cells | 18May2016 |
| -7 | Cells | 18May2016 |
| -8 | Cells | 18May2016 |
| -9 | Cells | 18May2016 |
| -10 | Cells | 18May2016 |
| -11 | Cells | 18May2016 |
| -12 | Cells | 18May2016 |
| -13 | Cells | 18May2016 |
| -14 | Cells | 18May2016 |
| -CEL | MicroStation Cell Library | |

*Indicates 11 x 17 sheet; all others are 8½ x 11.

MANUAL OF THE STRUCTURE AND BRIDGE DIVISION

PART 7 STEEL PLATE GIRDER STANDARDS

The steel plate girder standards (SG-series) include standard sheets for girder details, camber diagram and dead load deflection diagram for straight and curved girders for simple and continuous spans (2, 3 and 4 spans). Also included are miscellaneous details and bolted splice details with uniform and staggered bolt patterns.

By filling in the sizes of plates (flanges and webs), lengths, stud shear connector spacings, weld size(s), ranges for tension flanges, deflections, etc. the designer can complete the basic plate girder details for inclusion into a set of bridge plans. Active points have been provided to help fill in the tables with the user command "btbl" (fill-in table). Use center top justification.

The tables found on the standards provide for a number of design data. If any of the data is not used, the designer should enter a long dash to indicate that particular piece of data was not left blank by error. For straight girders, there is room only for data for a single girder --- each separate span should have a separate sheet --- the title block can then be modified for example to indicate "GIRDER DETAILS – SPAN a". For straight, trapezoidal spans and curved girder spans, there is room for up to six girders of data. If more girders are used the table can be easily expanded. Remember that the bottom line is of a different weight.

Completion of the project block, title block and lower left corner shall be in accordance with the requirements of File Nos. 04.04-1 thru -2 of Part 2 of this manual and as specified herein.

If a standard sheet is modified by the designer, the letters "MOD." (without quotes) shall be added behind the standard designation in the lower left portion of the border, e.g., SGBSPL-1 MOD. Completing items on the standard that are indicated in the NOTES TO DESIGNER are not considered to be modifications. Minor modifications do not require approval (except for those proposed by Concessionaire/Design-Builder where emailed approval by the District Structure and Bridge Engineer documented to the project design file is required for any modification). See Part 1 of this manual, File No. Pre.02-6 for definition of minor modification.

Modifications not considered minor as defined in File No. Pre.02-6 require email approval by the District Structure and Bridge Engineer documented to the project design file unless a design exception is required.

The CADD standard beam detail sheets are located in Falcon [..\PROJECTS\br-stand\sbr\sg] directory (central office environment). The drawing file name for the standard sheet corresponds with the file number (name of standard sheet) as listed in the Table of Contents (minus the dash). For example, standard SGDET1A is drawing sgdet1a.dgn.

A cell library (sg.cel) is included with the standards to allow the designer to modify/replace details on the standard sheets. The SGCELLS-series sheets included herein depict the cells found in the cell library along with the name of the cell, an image of the cell, a description of the cell and the origin of cell. The origin of cell is indicated by a star ★. To attach the cell library, use the pull down menu in MicroStation under ELEMENT – CELLS and select FILE to get a drop-down listing of available cell libraries.

STEEL PLATE GIRDER STANDARDS GENERAL INSTRUCTIONS

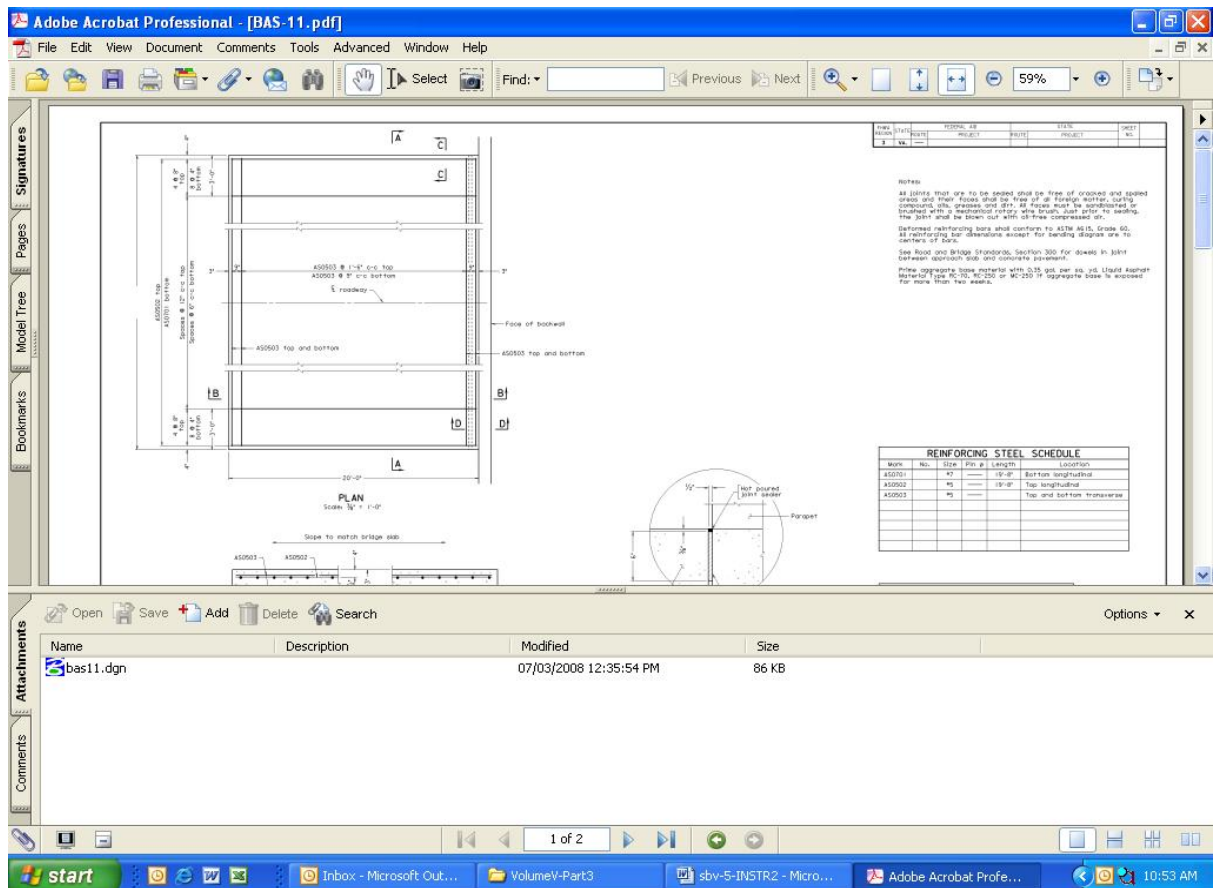
PART 7
DATE: 10Mar2015
SHEET 1 of 3
FILE NO. INSTR-1

MANUAL OF THE STRUCTURE AND BRIDGE DIVISION

PART 7 STEEL PLATE GIRDER STANDARDS

For external users, the CADD standard detail sheets are attached to the PDF files for each drawing located on VDOT's Structure and Bridge Division website. The user will need Adobe Reader version 7.0 or higher to be able to access the files. Either click on the DGN link in the table of contents or click on the attachment tab in the PDF file for each standard sheet.

Using either method, the screen will appear similar to that shown below.



By left clicking on the icon, the following menu will appear:



Users may then save the file to their computer.

STEEL PLATE GIRDER STANDARDS EXTERNAL DGN FILE ACCESS INSTRUCTIONS

PART 7
DATE: 11Jul2008
SHEET 2 of 3
FILE NO. INSTR-2

MANUAL OF THE STRUCTURE AND BRIDGE DIVISION

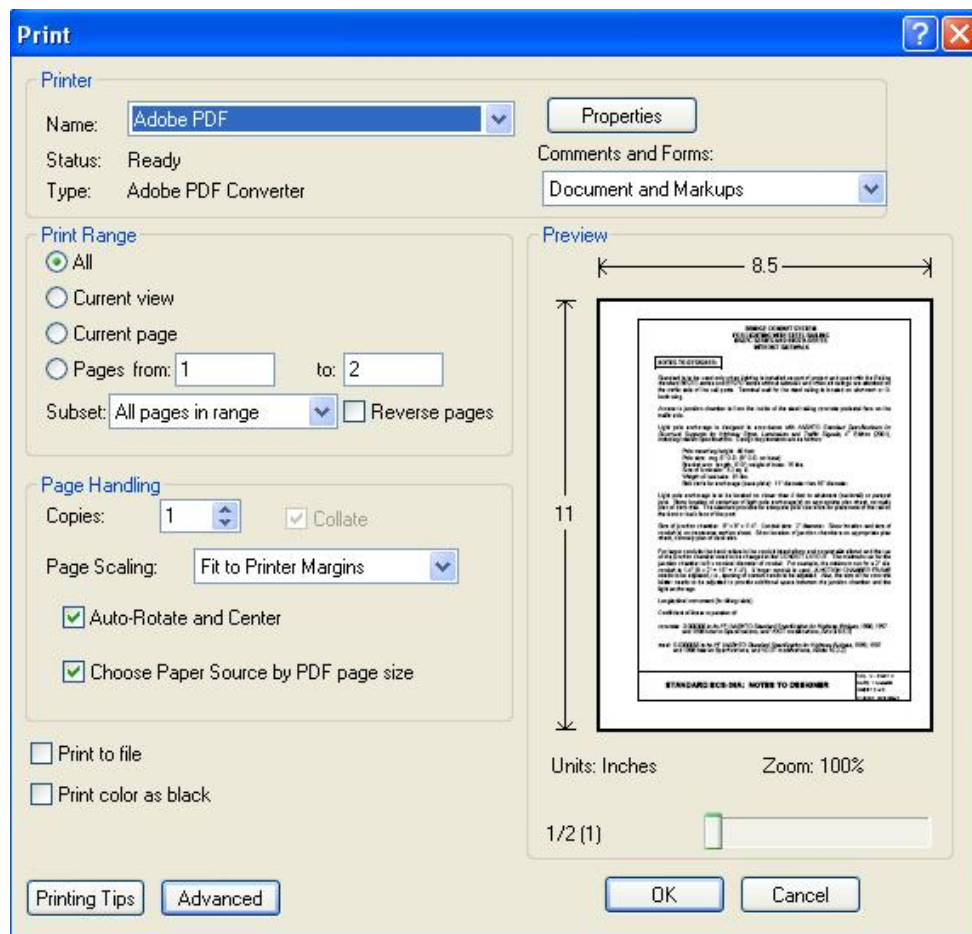
PART 7 STEEL PLATE GIRDER STANDARDS

For accessing the cell library, click on CEL link in the table of contents.

To simplify printing of this manual, a PDF of the complete manual in one PDF file with no links may be accessed by clicking on the link below.

[Full manual no links](#)

If the printer has both 8 ½ x 11 and 11 x 17 paper sizes available, the drawings and notes to designer may be printed on the correct paper size by placing a check next to the item “Choose Paper Source by PDF page size” as shown in the dialog below:



If the printer only has 8 ½ x 11 paper, the drawings will default to the reduced paper size.

Depending on the printer margins, the 11 x 17 drawing(s) may not be true half-size drawing(s).