

Curved Girder Ratings with DESCUS

For each bridge, a separate run will be required for Single Vehicle legal trucks and for TTST legal trucks.

See S:\Load Ratings for supplementary documents.

The following is a sample SV legal truck rating with commentary which may be used as a guide for future ratings.

D:\snoke's\Curved_Gdr_Rating\BR679\guilford679SV.dat - [Project]

File Edit Input Screen Go To Graphic Auto-Mesh Auto-DF Help

Project Data Option Shear Connector General Control

DATA TYPE: 0101, 0102 and 0103

DESCRIPTION	Guilford 679 Single Vehicle Trucks	
	Guilford 679	
OUTPUT LEVEL	2	2=Secondary
UNIT	0	0=English
SPAN INTERVAL	20	
PROGRAM OPTIONS	2	2=DL+LL
DESIGN OPTIONS	2	2=Rating
PLOT SCALE	10.	
COMPOSITE/NOCOMP	1	1=Composite
SHEAR CONNECTORS	0	0=No

- Provide adequate description (indicate SV or TTST)
- Include secondary output
- Appropriate units
- DL+LL
- Rating
- May leave plot scale blank
- Span interval based on length of spans
- Composite
- Shear Connectors → No (check this each time file is opened)

D:\snoke's\Curved_Gdr_Rating\BR679\guilford679SV.dat - [Project]

File Edit Input Screen Go To Graphic Auto-Mesh Auto-DF Help

Project Data Option Shear Connector General Control

DATA TYPE: 0105

A. DESIGN OPTIONS 1 1=LFD

B. POST-PROCESSING 1 1=Yes

C. ANALYSIS

NON-AASHTO + AASHTO OPTION 1 1=Separate NON-AASHTO

LOAD AMP. FACTOR FOR TRUCK

LANE LOADING OPTION 0 0=NON-AASHTO TRUCK without concurrent lane loading

Note: For rating with NON-AASHTO truck, Separate NON-AASHTO analysis ('1') is required.

D. LOAD FACTOR AND LOAD AND RESISTANCE FACTOR DESIGN

AASHTO DEAD LOAD FACTOR AASHTO LIVE LOAD FACTOR

NON-AASHTO DEAD LOAD FACTOR NON-AASHTO LIVE LOAD FACTOR

E. WORKING STRESS DESIGN

NON-AASHTO TRUCK AMP. FACTOR

INVENTORY RATING FACTOR OPERATING RATING FACTOR

- Rate with code type used for design
- Post processing, YES
- Separate NON-AASHTO truck
- Without concurrent lane loading

Now click on “Auto-DF” at top of screen to create Distribution Factors.

D:\snoke's\Curved_Gdr_Rating\DF679.df

File Edit Help

Girder Lane

DATA TYPE : 0601, 0602

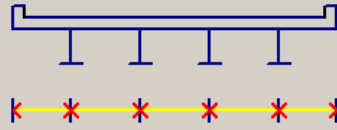
NO. GIRDER SPACINGS

SPAN NO. FROM TO

LOAD PATTERN ID

END TO GIRDER/GIRDER TO GIRDER SPACINGS (Ft. or m)

1.	<input type="text" value="3.875"/>	9.	<input type="text"/>
2.	<input type="text" value="9.333"/>	10.	<input type="text"/>
3.	<input type="text" value="9.333"/>	11.	<input type="text"/>
4.	<input type="text" value="9.333"/>	12.	<input type="text"/>
5.	<input type="text" value="9.333"/>	13.	<input type="text"/>
6.	<input type="text" value="3.875"/>	14.	<input type="text"/>
7.	<input type="text"/>	15.	<input type="text"/>
8.	<input type="text"/>	16.	<input type="text"/>



Spacing

D:\snoke's\Curved_Gdr_Rating\DF679.df

File Edit Help

Girder Lane

DATA TYPE : 0701, 0703

NUMBER OF DESIGN LANES: 3

DESIGN LANE WIDTH: 12. (Ft. or m)

TRUCK WHEEL BASE WIDTH: 6. (Ft. or m) (default = 6 feet or 1.8m)

LEFT WHEEL FRACTION: .32 (Default=0.5, assume no superelevation and centrifugal force; if other than 0.5, Truck DF of DESCUS Data Type 0303 will be generated.)

RIGHT WHEEL FRACTION: .68

LOADED LANE OPTION: 0 0-Multi Lane Loaded

2ND TRUCK WHEEL BASE WIDTH: (Default as the 1st truck)

DISTANCE OF RIGHT EDGE OF EACH DESIGN LANE TO RIGHT EDGE OF CROSS SECTION. (Ft. or m.)

Diagram labels: Distance, Lane Width, lane2, lane1, G4, G3, G2, G1

ID					
1.	3.5417	0	0-AASHTO Vehicle	7.	0-AASHTO Vehicle
2.	16.5417	0	0-AASHTO Vehicle	8.	0-AASHTO Vehicle
3.	28.5417	0	0-AASHTO Vehicle	9.	0-AASHTO Vehicle
4.			0-AASHTO Vehicle	10.	0-AASHTO Vehicle
5.			0-AASHTO Vehicle	11.	0-AASHTO Vehicle
6.			0-AASHTO Vehicle	12.	0-AASHTO Vehicle

Note: If ID is other than 0, 2nd vehicle DF of DESCUS Data Type 0302 will be generated for truck loading and Data Type 0301 will be generated for lane loading.

- (Clear width /Lane width) then round down
- Typically 12' or 3.6m
- Multi-Lane Loaded
- Be sure the number of inputs at the bottom matches # of design lanes
- **Save this file on your D drive. It will not work if saved on the server.

Run this file, and the following DF input screens will be filled in.

D:\snoke's\Curved_Gdr_Rating\BR679\guilford6795V.dat - [Factor]

File Edit Input Screen Go To Graphic Auto-Mesh Auto-DF Help

Live Load Distribution Factors (truck only) Impact Factors

Live Load Distribution Factors

Excel Work Sheet

DATA TYPE : 0301

Primary Girder No.	Girder No.	Distribution Factor	Span No. From	Span No. To	Primary Girder No.	Girder No.	Distribution Factor	Span No. From	Span No. To	Primary Girder No.	Girder No.	Distribution Factor	Span No. From	Span No. To
1	1	.611	1	2	1	2	.643	1	2	1	3	.739	1	2
1	4	.611	1	2	1	5	.096	1	2					
2	1	.289	1	2	2	2	.771	1	2	2	3	.643	1	2
2	4	.739	1	2	2	5	.257	1	2					
3	1	.129	1	2	3	2	.611	1	2	3	3	.771	1	2
3	4	.643	1	2	3	5	.546	1	2					
4	1	.257	1	2	4	2	.739	1	2	4	3	.643	1	2
4	4	.771	1	2	4	5	.289	1	2					
5	1	.096	1	2	5	2	.611	1	2	5	3	.739	1	2
5	4	.643	1	2	5	5	.611	1	2					

These were
Auto-generated
By Auto-DF

D:\snoke's\Curved_Gdr_Rating\BR679\guilford6795V.dat - [Factor]

File Edit Input Screen Go To Graphic Auto-Mesh Auto-DF Help

Live Load Distribution Factors (truck only) Impact Factors

Live Load Distribution Factors (2nd vehicle)

Excel Work Sheet

DATA TYPE : 0303

Primary Girder No.	Girder No.	Distribution Factor	Span No. From	Span No. To	Primary Girder No.	Girder No.	Distribution Factor	Span No. From	Span No. To	Primary Girder No.	Girder No.	Distribution Factor	Span No. From	Span No. To
1	1	.715	1	2	1	2	.643	1	2	1	3	.705	1	2
1	4	.576	1	2	1	5	.062	1	2					
2	1	.393	1	2	2	2	.725	1	2	2	3	.643	1	2
2	4	.774	1	2	2	5	.165	1	2					
3	1	.175	1	2	3	2	.622	1	2	3	3	.818	1	2
3	4	.643	1	2	3	5	.442	1	2					
4	1	.350	1	2	4	2	.705	1	2	4	3	.643	1	2
4	4	.818	1	2	4	5	.185	1	2					
5	1	.131	1	2	5	2	.645	1	2	5	3	.774	1	2
5	4	.643	1	2	5	5	.507	1	2					

S:\Load Ratings\Bridges\BR400679\guilford6795V.dat - [Structure]

File Edit Input Screen Go To Graphic Auto-Mesh Auto-DF Help

Details (1) Details (2) Concrete

DATA TYPE: 0401

NUMBER OF GIRDERS	<input type="text" value="5"/>	
SLAB DEPTH	<input type="text" value="8.5"/>	(In. or mm.)
INTEGRAL WEAR SURFACE DEPTH	<input type="text" value=".25"/>	(In. or mm.)
HAUNCH DEPTH	<input type="text" value="3.25"/>	(In. or mm.)
WIDTH	<input type="text" value="18."/>	(In. or mm.)
FUTURE WEAR SURFACE	<input type="text" value="0"/>	(Lbs/Sq. Ft.) or (N/Sq. m)
STRUCTURAL DETAIL FACTOR	<input type="text" value="1.2"/>	
CONCRETE SIDEWALK AREA	<input type="text" value=""/>	(Sq. Ft. or Sq. m)

- Slab depth → slab depth on plans minus 1/4" (6mm)
- Integral wear surface depth → 1/4" (6mm)
- FWS → 0
- Structural Detail Factor → 1.2



Details (1)

Details (2)

Concrete

DATA TYPE: 0402

TOTAL UTILITY WEIGHT (Lb./Ft. or N/m)

TOTAL RAILING WEIGHT (Lb./Ft. or N/m)

WIDTH BETWEEN CURB BARRIERS (Ft. or m)

OVERHANG WIDTH

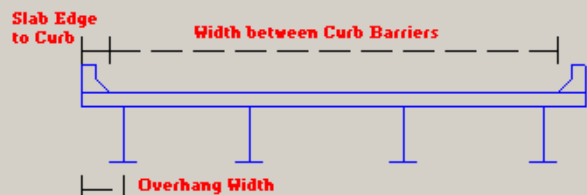
LEFT (Ft. or m)

RIGHT (Ft. or m)

SLAB EDGE TO CURB

LEFT (Ft. or m)

RIGHT (Ft. or m)



Details (1)

Details (2)

Concrete

DATA TYPE: 0402

MODULAR RATIOS

N1 (=3*N2)

N2

ALLOWABLE COMPRESSIVE STRESS (Ksi or MPa)

UNIT WEIGHT (Lb./Cu. Ft. or Kg/m³)

D:\snoko's\Curved_Gdr_Rating\BR679\guilford679SV.dat - [Load]

File Edit Input Screen Go To Graphic Auto-Mesh Auto-DF Help

Concentrated Loads Support Displacement

Live Loads Non-AASHTO Trucks Distributed Loads

DATA TYPE: 0403

GENERAL

AASHTO LIVE LOAD **HS** — 20 **HS-20**

INTERSTATE **0** **0=No**

TYPE OF ROAD **1** **1=Type 1**

SIDEWALK LIVE LOAD

LEFT SIDEWALK

WIDTH (Ft or m)

ECCENTRICITY RATIO

GIRDER NO.

RIGHT SIDEWALK

WIDTH (Ft or m)

ECCENTRICITY RATIO

GIRDER NO.

- Appropriate Live Load to match design
- Interstate-YES if on interstate or ramp to/from interstate,
NO if otherwise

D:\snoke's\Curved_Gdr_Rating\BR679\guilford679SV.dat - [Load]

File Edit Input Screen Go To Graphic Auto-Mesh Auto-DF Help

Concentrated Loads Support Displacement
Live Loads Non-AASHTO Trucks Distributed Loads

DATA TYPE: 0404

Truck No.	Axle			Axle		
	No	Weight (KIPs or KN)	Distance (Ft. or m)	No	Weight (KIPs or KN)	Distance (Ft. or m)
1	1	5.	14.	2	20.	
2	1	7.5	9.	2	19.	4.
2	3	19.				
3	1	5.	11.	2	19.	4.
3	3	19.				
4	1	11.5	9.	2	4.	4.
4	3	19.	4.	4	19.	
5	1	11.	9.	2	6.	4.
5	3	19.	4.	4	19.	4.
5	5	6.				
6	1	11.	9.	2	6.66	4.
6	3	6.67	4.	4	19.	4.
6	5	19.	4.	6	6.67	
7	1	11.	9.	2	6.66	4.
7	3	6.67	4.	4	19.	4.
7	5	19.	4.	6	6.67	9.
7	7	11.				
8	1	11.	9.	2	7.	4.

REF. #	SINGLE VEHICLE (SV)	TRUCK	TRACTOR	SEMI-TRAILER	TTST
NSH	5K 22K 27K 13.5 TON 14'	NT4A	12.1K 12.05K 21K 21K 9' 9' 4' 22'	66.15K 33.075 TON	
NGARB S2	23.5K 16.5K 40K 20 TON 14'	NAGRI T4	16K 18K 21K 21K 16' 28' 4' 48'	76K 38 TON	
NS3A	12.05K 21K 21K 27.025 TON 9' 4' 13'	NT5B	7.15K 21K 21K 12.625K 12.625K 9' 4' 9' 4' 26'	74.4K 37.2 TON	
NCOTT S3	7K 22K 22K 25.5 TON 11' 4' 15'	NAGRI T5A	22K 21K 21K 13K 13K 15' 4' 28' 4' 51'	90K 45 TON	
NAGGR S4	16K 15.85K 19K 19K 34.925 TON 9' 4' 4' 17'	NAGRI T5B	6K 21K 21K 21K 21K 15' 4' 26' 4' 51'	90K 45 TON	
NS5A	12.1K 8.5K 21K 21K 8.5K 35.55 TON 9' 4' 4' 4' 21'	NT6A	12.1K 8.2K 21K 21K 10.45K 10.45K 9' 4' 4' 9' 4' 30'	83.2K 41.6 TON	
NS6A	12.1K 8.6K 8.6K 21K 21K 8.6K 39.95 TON 9' 4' 4' 4' 4' 25'	NT7A	4.1K 4K 21K 11.3K 11.3K 11.3K 9' 4' 4' 9' 4' 4' 34'	84K 42 TON	
NS7B	7.6K 8.6K 8.6K 21K 21K 8.6K 8.6K 84K 42 TON 9' 4' 4' 4' 4' 4' 29'	NT7B	4.1K 10.5K 10.5K 8.45K 8.45K 21K 21K 9' 4' 9' 4' 4' 4' 4' 34'	84K 42 TON	

To input these trucks, a text file will be provided with SV and TTST trucks (Interstate and Non-Interstate). Save input file, close Descus, open file in a text editor. Then cut and paste trucks into input file at appropriate place. You may wish to first input some place holders in this screen so that the appropriate location of this information is easily recognizable in the editor. Re-open file in Descus, and trucks will appear as shown above.

Non-Interstate SV trucks → text file

0404					
0404	1	15.	14.	222.	
0404	2	123.5	14.	216.5	
0404	3	112.05	9.	221.	4.
0404	3	321.			
0404	4	17.	11.	222.	4.
0404	4	322.			
0404	5	116.	9.	215.85	4.
0404	5	319.	4.	419.	
0404	6	112.1	9.	28.5	4.
0404	6	321.	4.	421.	4.
0404	6	58.5			
0404	7	112.1	9.	28.6	4.
0404	7	38.6	4.	421.	4.
0404	7	521.	4.	68.6	4.
0404	8	17.6	9.	28.6	4.
0404	8	38.6	4.	421.	4.
0404	8	521.	4.	68.6	4.
0404	8	78.6			



I-Girder

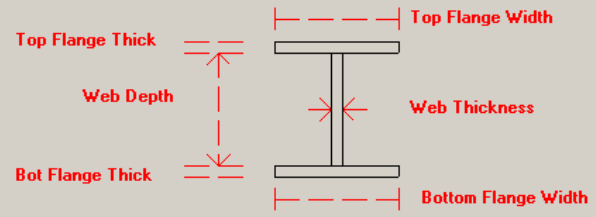
Trusses

Computed Section

DATA TYPE: 0501A

Excel Work Sheet

Sect. No.	Fy (Ksi or MPa)	Web Depth (in or mm)	Web Thick. (in or mm)	Flange				Member Type	* Hybrid Option	
				Top Width (in or mm)	Top Thick. (in or mm)	Bottom Width (in or mm)	Bottom Thick. (in or mm)		Fy (Top FL.) Ksi/MPa	Fy (Bot FL.) Ksi/MPa
1	50.	52.	.5625	16.	.875	16.	.875			
2	50.	52.	.5625	18.	1.	18.	1.			
3	50.	52.	.5625	18.	1.6875	18.	1.6875			
4	50.	52.	.5625	18.	1.3125	18.	1.3125			



* If blank, homogeneous section is assumed



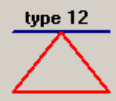
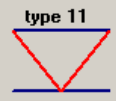
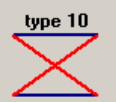
I-Girder

Trusses

Computed Section

DATA TYPE: 0501B

Sect. No.	Fy (Ksi or MPa)	Member Type	Top (in ² or cm ²)	Areas Bottom (in ² or cm ²)	Areas Diagonal (in ² or cm ²)	Distance between Chords (in or mm)
10	50.	12	9.69	2.63	2.63	52.
11	50.	12	9.69	4.12	4.12	52.
12	50.	10	6.63	6.63	4.12	52.



D:\snoko's\Curved_Gdr_Rating\BR679\guilford6795V.dat - [Connectivity]

File Edit Input Screen Go To Graphic Auto-Mesh Auto-DF Help

Bifurcation Diaphragms Kink Def.

Supports Girder

DATA TYPE: 0601

Girder No.	Skew Angle (Degree)	Girder Spc. at Left End (Ft or m)	Joint Numbers of Supports														
			1	2	3	4	5	6	7	8	9	10	11				
1	0	0	1	31	66												
2	0	9.333	2	32	67												
3	0	9.333	3	33	68												
4	0	9.333	4	34	69												
5	0	9.333	5	35	70												



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File Edit Input Screen Go To Graphic Auto-Mesh Auto-DF Help

Supports Diaphragms Kink Def.

Bifurcation Girder

DATA TYPE: 0801

Excel Work Sheet

Diap. No.	Mem. Conn. Fm	Mem. Conn. To	Diap. No.	Mem. Conn. Fm	Mem. Conn. To	Se No	Diap. No.	Mem. Conn. Fm	Mem. Conn. To	Se No	Diap. No.	Mem. Conn. Fm	Mem. Conn. To	Se No	Diap. No.	Mem. Conn. Fm	Mem. Conn. To
1	1	2															
2	2	3															
3	3	4															
4	4	5															
5	6	7															
6	7	8															
7	8	9															
8	9	10															
9	11	12															
10	12	13															
11	13	14															
12	14	15															
13	16	17															
14	17	18															
15	18	19															
16	19	20															
17	21	22															
18	22	23															
19	23	24															
20	24	25															
21	26	27															
22	27	28															

D:\snoko's\Curved_Gdr_Rating\BR679\guilford6795V.dat - [Connectivity]

File Edit Input Screen Go To Graphic Auto-Mesh Auto-DF Help

Bifurcation Diaphragms

Supports Girder

DATA TYPE: 0701

Excel Work Sheet

Kink Opt. 1	Kink Opt. 2	Girder No.	Member Connectivity From	Member Connectivity To	Distance along Arc (Ft or m)	Sec. No.	Distance Radius (Ft or m)	Member Connectivity From
1		1	1	6	17.625	1	-536.537	
		1	6	11	17.625	1	-536.537	
		1	11	16	17.625	1	-536.537	
		1	16	71	12.125	1	-536.537	
		1	71	21	5.50	2	-536.537	
		1	21	72	14.795	2	-536.537	
		1	72	26	3.604	2	-536.537	
		1	26	31	16.396	3	-536.537	
		1	31	73	14.00	3	-536.537	
		1	73	36	.891	2	-536.537	
		1	36	41	14.891	2	-536.537	
		1	41	74	2.181	2	-536.537	
		1	74	46	14.314	1	-536.537	
		1	46	51	16.495	1	-536.537	
		1	51	56	16.495	1	-536.537	
		1	56	61	16.495	1	-536.537	
		1	61	66	16.495	1	-536.537	
		2	2	7	17.318	1	-527.203	
		2	7	12	17.318	1	-527.203	
		2	12	17	17.318	1	-527.203	
		2	17	75	11.916	1	-527.203	

May cut and paste input from Excel sheet for Diaphragms and Girder

Output:

d:\snoko's\Curved_Gdr_Rating\Load Ratings\Bridges\BR400679\guilford679SV.res

Open File | View/Print File | View Tables | Print Tables | Exit

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20.6 MAXIMUM STRESSES GIRDER NO. 5
20.7 MAXIMUM AND ALLOWABLE STRESSES AND DESIGN LL TYPES GIRDER NO. 5
20.7 MAXIMUM AND ALLOWABLE STRESSES AND DESIGN LL TYPES GIRDER NO. 5
20.7A OVERLOAD AND ALLOWABLE STRESSES AND DESIGN LL TYPES GIRDER NO. 5
20.7B OVERLOAD AND WEB ALLOWABLE STRESSES GIRDER NO. 5
20.10 RATING FACTOR (TRUCK) GIRDER NO. 5
20.10 RATING FACTOR (TRUCK) GIRDER NO. 5
20.10 RATING FACTOR (TRUCK) GIRDER NO. 5
20.13 BRIDGE RATING SUMMARY INFORMATION
  
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TABLE 20.13 BRIDGE RATING SUMMARY INFORMATION

BRIDGE RATING INFORMATION FOR AASHTO TRUCK

	GIRDER NO	SPAN NO	INC. NO	LOCATION (FT)	RATING FACTOR	GOV CASE	
INVENTORY	1	1	8	105.29	.70	2	L
OPERATING	1	1	8	105.29	1.17	2	L

BRIDGE RATING INFORMATION FOR SPECIAL TRUCKS

	GIRDER NO	SPAN NO	INC. NO	LOCATION (FT)	RATING FACTOR	GOV CASE
TRUCK NO. 1	1	2	6	62.77	3.47	1
TRUCK NO. 2	1	2	6	62.77	1.92	1
TRUCK NO. 3	1	2	6	62.77	2.03	1
TRUCK NO. 4	1	2	6	62.77	1.68	1
TRUCK NO. 5	1	2	6	62.77	1.48	1
TRUCK NO. 6	1	2	6	62.77	1.34	1
TRUCK NO. 7	1	2	6	62.77	1.20	1
TRUCK NO. 8	1	2	6	62.77	1.22	1

NOTE: SPECIAL TRUCK RATING IS BASED ON OPERATING RATING.
GOV. CASE 1 IS GOVERNED BY MAXIMUM STRESS; 2 IS BY OVERLOAD STRESS.
0 END OF JOB, OPTIMIZATION FILE HAS BEEN PRODUCED

Print relevant input pages and the Bridge Rating Summary for checking.

Microsoft Excel - Rating Summary.xls

File Edit View Insert Format Tools Data Window Help

C10 fx

	A	B	C	D	E	F	G
1	Rating Summary For Curved Steel Girder Bridge						
2	(using North Carolina Legal Loads for bridges carrying interstate traffic)						
3							
4		Bridge No.					
5		County					
6		Spans					
7							
8							
9		Design Truck	Rating Factor	Truck Rating			
10		HS-20 Inventory					
11		HS-20 Operating					
12							
13							
14		Descus Truck No.	Bridge Management Truck Designation	Truck Weight (tons)	Rating Factor	Inventory Truck Rating	Operating Truck Rating
15	Single Vehicle Run	1	ISH	12.5			
16		2	IS3A	22.75			
17		3	IS3C	21.5			
18		4	IS4A	26.75			
19		5	IS5A	30.5			
20		6	IS6A	34.5			
21		7	IS7A	40			
22		8	IS7B	38.5			
23	TTST Run	1	IT4A	28.25			
24		2	IT5B	32			
25		3	IT6A	36			
26		4	IT7A	40			
27		5	IT7B	40			
28							

Use the provided RatingSummary.xls and fill in the rating table.