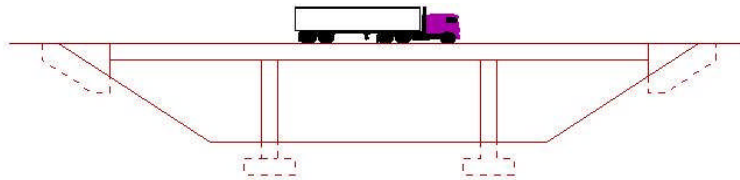


**STRUCTWARE<sup>®</sup>**  
←—————→  
**Program Documentation**

for

# **BDSPOST**

**BDS Post-Processing Program**



# STRUCTWARE

SHEET A-1 OF \_\_\_\_\_

JOB TITLE BDSPOST DOCUMENTATION ORIGINATOR Bob Matthews DATE 12/31/2005

JOB No. \_\_\_\_\_ CALCULATION No. \_\_\_\_\_ REVIEWER \_\_\_\_\_ DATE \_\_\_\_\_

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Introduction.....	A-1
Program information	
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Verification problems.....	C-1

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# STRUCTWARE

SHEET A-1 OF \_\_\_\_\_

JOB TITLE BDSPOST DOCUMENTATION ORIGINATOR Bob Matthews DATE 12/31/2005

JOB No. \_\_\_\_\_ CALCULATION No. \_\_\_\_\_ REVIEWER \_\_\_\_\_ DATE \_\_\_\_\_

## INTRODUCTION

BDSPOST is a collection of routines used to perform post-processing tasks on BDS output files. The Shear Modification of Skewed Girders routine magnifies the shear for skewed concrete box girders using the method outlined in Caltrans Bridge Design Aids 5-31. The Plastic Hinging on Superstructure routine checks shear and bending moment for column plastic hinging on the superstructure. The Load Combinations routine combines shear and bending moment from BDS output files according to user-specified criteria.

The online help file and graphical interface is shown in Section B. Verification problems are included in Section C. Additional information is contained in the following files installed in the program directory.

*License.txt* - The license agreement contains the terms and conditions for use of this program and documentation.

*Readme.txt* – The installation instructions, copyright notices and version history is contained in this file.

The following steps are recommended for users new to the program or specific features.

1. To learn how to use the program, view the Flash Demonstration Movie that is installed along with the program and read the "Instructions" section of the help file.

To apply this program to a specific problem, find a similar case in the Verification Problems section of this document. Run the program to see if you can reproduce the results. If your problem varies significantly from the Verification Problem, you should perform manual calculations for verification.

# STRUCTWARE

SHEET B1-1 OF \_\_\_\_\_

JOB TITLE BDSPOST DOCUMENTATION ORIGINATOR Bob Matthews DATE 12/31/2005

JOB No. \_\_\_\_\_ CALCULATION No. \_\_\_\_\_ REVIEWER \_\_\_\_\_ DATE \_\_\_\_\_

## ONLINE HELP FILE

[Bdspost help](#)

## GRAPHICAL INTERFACE

**BDS Post-Processing Program**

File View Reset Help

**POST-PROCESSING OPTIONS**

- Shear modification of skewed girders
- BDS load combinations
- Column plastic hinging on superstructure

Magnifies the shear from BDS output files for skewed concrete box girders using the method outlined in Caltrans Bridge Design Aids 5 - 31.

**UNITS**

- English
- Metric

Build Database Continue

No input file specified No database file specified No output file specified

**Shear Modification**

File View Help

**SHEAR STIRRUP SIZE**

Typical Interior Girder: #5

Obtuse Exterior Girder: #5

**SKEW ANGLE**

Abut/Bent Number: 1 Skew angle: 0

← →

Calculate

**BDS Load Combinations**

File View Help

2 Number of load combinations

**LOAD COMBINATION NO 1**

Factor	Load Description
0	Dead load shear and moment
0	Trial 1 shear and moment
0	Total PE moment
0	Secondary prestress shear and moment

← →

Calculate

# STRUCTWARE

SHEET B2-2 OF \_\_\_\_\_

JOB TITLE BDSPOST DOCUMENTATION ORIGINATOR Bob Matthews DATE 12/31/2005

JOB No. \_\_\_\_\_ CALCULATION No. \_\_\_\_\_ REVIEWER \_\_\_\_\_ DATE \_\_\_\_\_

Factor	Load Description
<input type="text" value="1"/>	Dead load shear and moment
<input type="text" value="0"/>	Trial 1 shear and moment
<input type="text" value="0"/>	Total PE moment
<input type="text" value="1"/>	Secondary prestress shear and moment
<input type="text" value="1"/>	Column Plastic Hinging

Bent Number:  Plastic Moment:

← →

Calculate

**Program BDSPOST Version 1.10**

A collection of routines used to perform post-processing tasks on BDS output files. Formatted to support version 4.2.0 of Imbsen's BDS program.

**Credit**

Program BDSPOST written by Robert Matthews

OK

# STRUCTWARE

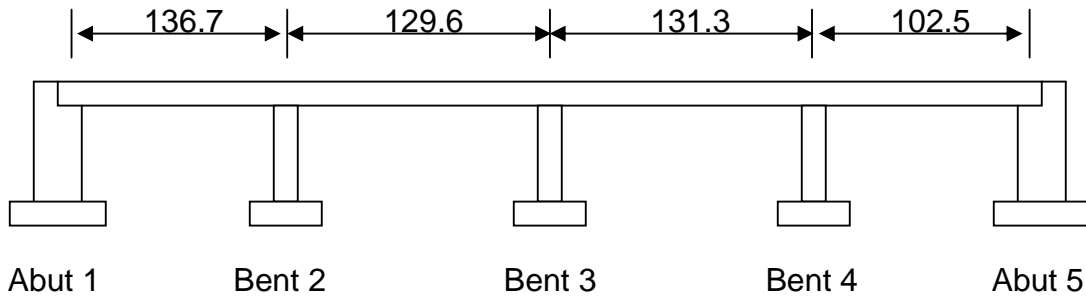
SHEET C-1 OF \_\_\_\_\_

JOB TITLE BDSPOST DOCUMENTATION ORIGINATOR Bob Matthews DATE 12/31/2005

JOB No. \_\_\_\_\_ CALCULATION No. \_\_\_\_\_ REVIEWER \_\_\_\_\_ DATE \_\_\_\_\_

## VERIFICATION PROBLEMS

BDSPOST will be verified using a BDS output file from the Terminal Way Overhead. The Terminal Way Overhead is a 4 span CIP/PS box girder bridge with supports oriented at varying skew angles. The BDS model configuration is shown below.



<i>Location</i>	<i>Skew (Degrees)</i>
Abutment 1	20.00
Bent 2	38.98
Bent 3	30.00
Bent 4	20.81
Abutment 5	13.69

## Shear Modification of Skewed Girders

The shear modification of skewed girders will be calculated with the BDSPOST program. First a BDS run of the Terminal Way Overhead is completed and stored in the BDSENG.OUT file (not shown). Next, BDSPOST is used to create the BDSENG.DAT database file (See sheets C-7 and C-8) from the BDSENG.OUT file. In the same BDSPOST run, the next step is to select the post-processing option for shear modification and proceed to the appropriate input form. The shear reinforcement is specified as #6 U stirrups and the skew angles at the supports are entered. The BDSPOST program is then used to calculate the required stirrup spacing. The BDSPOST output file, BDSPOST1.OUT, is shown on sheets C-4 thru C-6. Hand calculations are shown below to verify the BDSPOST calculations.

- Check skew factors per BDA 5-31 (See sheet C-3)

Member	End	Girder	Corner	Factor
1	i	Exterior	Obtuse	$1.0 + 0.02 \times 20 = 1.400$
	i	1st Int	Obtuse	$1.0 + 0.00333 \times 20 = 1.067$
	i	Exterior	Acute	$1.0 - 0.0143 \times 20 = 0.714$

- Calculate required stirrup area

$$\frac{A_v}{s} = \frac{(\text{skew factor}) \left( \frac{V_u}{\phi} \right) - V_c}{60d(\text{no of girders})}$$

$$A_{vmin} = 50 \times b_w / f_y$$

$$s = A_{st} / A_v$$

$$b_{min} = 625 \times (A_v / s) \times 12 / (f'_c)^{1/2} > 12 \text{ in}$$

$$f'_c = 4000 \text{ psi}$$

$$\phi = 0.9$$

$$d = 0.8 \times 72 = 57.6 \text{ in}$$

$$\text{no of girders} = 6$$

$$A_{st} = 0.44 \times 2 = 0.88 \text{ in}^2$$

$$A_v / s (\text{min}) = 50 \times 12 / 60000 = 0.01$$

$$s (\text{max}) = 24 \text{ in}$$

$$\text{Member 1, End 1} \Rightarrow V_u = 2955 \text{ kips, } V_c = 2436 \text{ kips}$$

Member	End	Girder	Corner	$A_v / s$	s	$b_{min}$
1	i	Exterior	Obtuse	0.104	8.4	12.4
	i	1st Int	Obtuse	0.051	17.1	12.0
	i	Exterior	Acute	0.010	24.0	12.0

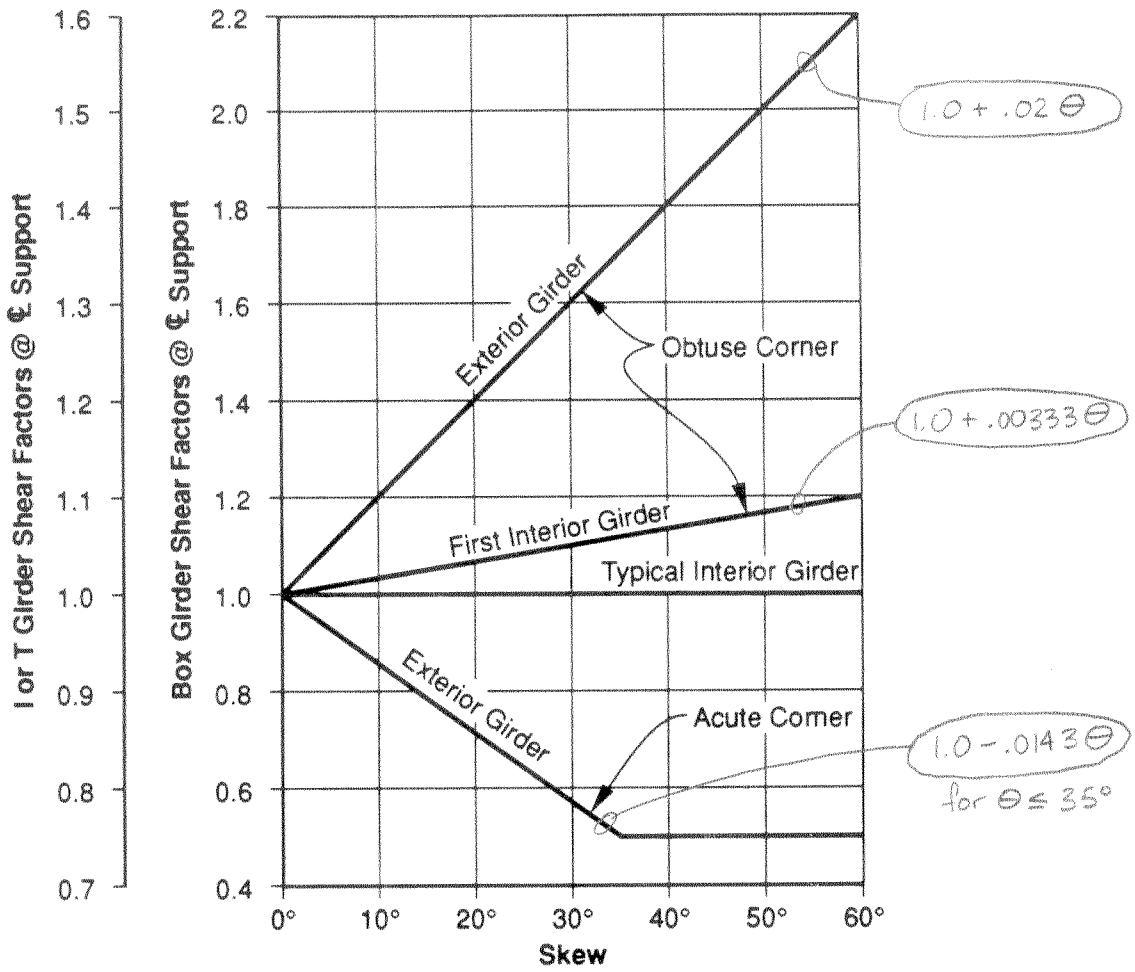
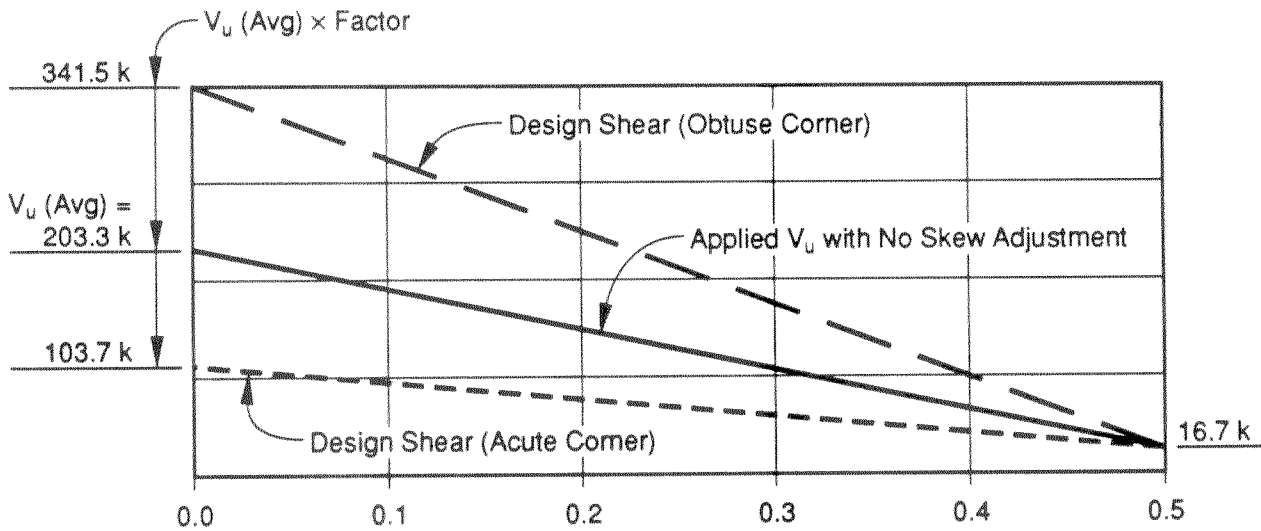


Chart No. 1



Note: Adjustment for interior girder not shown  
**34° Skew Adjustment Sketch for Example Problem No. 1**







## FILE = BDESENG.DAT

MODEL INFORMATION											
72.00	6	4000.	4	3605.							
1	136.7	0.2423E+07	0.0	3605.							
2	129.6	0.2423E+07	0.0	3605.							
3	131.3	0.2649E+07	0.0	3605.							
4	102.5	0.2797E+07	0.0	3605.							
DEAD LOAD MOMENTS											
1	0.	13148.	22420.	27816.	29335.	26978.	20745.	10636.	-3350.	-21213.	-43065.
2	-37713.	-20846.	-7573.	2215.	8519.	11339.	10675.	6526.	-1106.	-12224.	-26936.
3	-31205.	-13786.	-272.	9375.	15155.	17067.	15095.	9211.	-615.	-14412.	-32208.
4	-33392.	-18617.	-6320.	3474.	10742.	15462.	17608.	17159.	14090.	8378.	0.
DEAD LOAD SHEARS											
1	1103.6	820.1	536.5	252.9	-30.6	-314.2	-597.8	-881.3	-1164.9	-1449.1	-1752.7
2	1447.9	1159.3	889.7	620.8	352.0	83.2	-185.7	-454.5	-723.3	-993.0	-1281.6
3	1478.0	1176.8	882.0	587.5	293.0	-1.9	-298.8	-597.9	-899.2	-1202.7	-1508.5
4	1561.7	1321.0	1078.0	832.7	585.2	335.3	83.2	-171.2	-427.9	-686.9	-948.2
TRIAL 1 MOMENTS											
1	0.	1263.	2154.	2672.	2817.	2589.	1988.	1015.	-332.	-2051.	-4142.
2	-3647.	-2025.	-737.	216.	833.	1116.	1063.	675.	-48.	-1106.	-2499.
3	-2840.	-1285.	-74.	793.	1316.	1495.	1327.	810.	-61.	-1290.	-2881.
4	-3041.	-1685.	-554.	348.	1018.	1453.	1650.	1607.	1319.	785.	0.
TRIAL 1 SHEARS											
1	106.1	78.8	51.5	24.2	-3.0	-30.3	-57.6	-84.8	-112.1	-139.4	-166.7
2	138.1	112.3	86.4	60.6	34.7	8.9	-17.0	-42.8	-68.7	-94.6	-120.4
3	131.5	105.3	79.1	52.9	26.7	0.5	-26.0	-52.8	-79.9	-107.3	-135.0
4	143.3	121.4	99.2	76.7	54.0	30.9	7.5	-16.1	-40.1	-64.3	-88.8
TOTAL PE MOMENTS											
1	-5766.	-13158.	-18064.	-20455.	-20303.	-17746.	-12947.	-5887.	3455.	15659.	26083.
2	29133.	18355.	5209.	-3833.	-9537.	-11949.	-11118.	-7091.	85.	11051.	19266.
3	19401.	11519.	849.	-6240.	-10234.	-11168.	-9090.	-4048.	3915.	14754.	21008.
4	17879.	11926.	2362.	-5253.	-10944.	-14735.	-16649.	-16551.	-14334.	-10031.	-3671.
SECONDARY P/S SHEARS											
1	126.	126.	126.	126.	126.	126.	126.	126.	126.	126.	126.
2	-40.	-40.	-40.	-40.	-40.	-40.	-40.	-40.	-40.	-40.	-40.
3	8.	8.	8.	8.	8.	8.	8.	8.	8.	8.	8.
4	-128.	-128.	-128.	-128.	-128.	-128.	-128.	-128.	-128.	-128.	-128.
ULTIMATE APPLIED SHEARS											
1	2955.	2295.	1658.	1060.	526.	941.	1493.	2123.	2767.	3413.	4057.
2	3449.	2800.	2174.	1573.	1052.	530.	907.	1429.	2035.	2662.	3309.
3	3561.	2895.	2234.	1590.	1029.	471.	1035.	1607.	2271.	2956.	3643.
4	3602.	3036.	2480.	1958.	1488.	1000.	515.	1027.	1553.	2094.	2695.
CONCRETE SHEAR CAPACITIES											
1	2436.	1556.	897.	497.	446.	549.	1482.	2138.	2489.	2065.	2065.
2	1773.	2645.	1470.	1240.	706.	446.	2048.	1396.	2578.	1651.	1651.
3	1798.	2460.	1603.	1091.	588.	446.	1927.	1640.	2381.	1766.	1766.
4	1786.	2373.	1706.	2052.	1025.	632.	1107.	1878.	2073.	2241.	2241.

REQUIRED WEB THICKNESSES											
1	72.	72.	72.	72.	72.	72.	72.	72.	72.	86.	
2	72.	72.	72.	72.	72.	72.	72.	72.	72.	72.	
3	76.	72.	72.	72.	72.	72.	72.	72.	72.	80.	
4	78.	72.	72.	72.	72.	72.	72.	72.	72.	72.	
REQUIRED SHEAR REINFORCING AREAS											
1	2.94	3.45	3.28	2.36	0.72	1.72	2.55	3.05	3.25	4.53	8.48
2	7.15	1.62	3.28	1.77	1.61	0.72	1.73	0.72	3.00	1.32	7.04
3	7.49	2.63	3.05	2.35	1.93	0.72	1.94	0.72	3.07	3.14	7.92
4	7.70	3.47	3.64	0.72	2.18	1.66	0.72	0.72	0.72	0.88	2.61
SECONDARY P/S MOMENTS											
1	0.	1723.	3447.	5170.	6894.	8617.	10340.	12064.	13787.	15511.	17234.
2	15680.	15167.	14654.	14141.	13628.	13115.	12602.	12089.	11576.	11063.	10550.
3	10659.	10762.	10864.	10967.	11069.	11172.	11274.	11377.	11480.	11582.	11685.
4	13110.	11799.	10488.	9177.	7866.	6555.	5244.	3933.	2622.	1311.	0.
ULTIMATE APPLIED MOMENTS											
1	0.	34131.	58512.	73275.	79422.	76313.	64034.	42582.	16958.	30740.	66122.
2	55996.	29915.	12473.	31131.	44508.	49445.	46294.	34850.	18191.	19013.	43468.
3	48664.	21497.	19262.	38652.	52149.	56546.	52164.	38614.	19330.	21335.	49012.
4	47637.	27966.	9049.	27343.	41144.	49506.	52156.	48645.	39403.	23361.	0.
ULTIMATE P/S STEEL MOMENT CAPACITIES											
1	0.	57951.	67519.	73013.	74483.	72982.	68580.	60306.	48900.	53638.	61101.
2	61679.	52040.	52950.	65258.	72473.	74965.	72473.	65258.	52950.	52040.	61679.
3	61679.	52040.	52950.	65258.	72473.	75012.	72598.	65454.	53178.	52423.	62196.
4	62196.	54216.	49385.	60966.	69127.	74243.	76024.	74166.	68419.	59079.	0.

# STRUCTWARE

SHEET C-9 OF \_\_\_\_\_

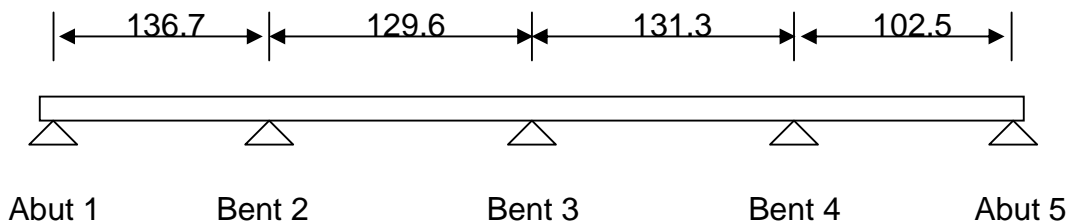
JOB TITLE BDSPOST DOCUMENTATION ORIGINATOR Bob Matthews DATE 12/31/2005

JOB No. \_\_\_\_\_ CALCULATION No. \_\_\_\_\_ REVIEWER \_\_\_\_\_ DATE \_\_\_\_\_

## Plastic Hinging on Superstructure

The plastic hinging on superstructure will be determined with the BDSPOST program. First a BDS run of the Terminal Way Overhead with pinned supports at the top of columns is completed and stored in the BDSPIN.OUT file (not shown). Next, BDSPOST is used to create the BDSPIN.DAT database file (See sheets C-15 and C-16) from the BDSPIN.OUT file. In the same BDSPOST run, the next step is to select the post-processing option for plastic hinging and proceed to the appropriate input form. The load factors and column plastic hinging moments are entered. The BDSPOST program is then used to perform moment distribution using the FRAME2D routine. Finally, the internal loads are combined in accordance with the load combination factors. The BDSPOST output file, BDSPOST3.OUT, is shown on sheets C-11 thru C-14. The SAP2000 program is used to verify the moment distribution calculations performed by the FRAME2D routine.

- SAP2000 model (file = bdspost2.sdb)



<i>Location</i>	<i>Moment (k-ft)</i>
Bent 2	63342
Bent 3	63288
Bent 4	63753







#####  
 M A X I M U M M O M E N T  
 #####

MEMBER	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.0	2297.9	4595.7	6893.6	9191.4	11489.3	13787.1	16085.0	18382.9	20680.7	22978.6
2	40363.4	33101.9	25840.3	18578.8	11317.2	4055.7	3205.8	10467.4	17728.9	24990.5	32252.0
3	31036.0	24330.2	17624.5	10918.8	4213.0	2492.7	9198.4	15904.1	22609.9	29315.6	36021.3
4	27731.7	24958.5	22185.3	19412.2	16639.0	13865.8	11092.7	8319.5	5546.3	2773.2	0.0

#####  
 M I N I M U M M O M E N T  
 #####

MEMBER	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.0	-2297.9	-4595.7	-6893.6	-9191.4	-11489.3	-13787.1	-16085.0	-18382.9	-20680.7	-22978.6
2	-40363.4	-33101.9	-25840.3	-18578.8	-11317.2	-4055.7	-3205.8	-10467.4	-17728.9	-24990.5	-32252.0
3	-31036.0	-24330.2	-17624.5	-10918.8	-4213.0	-2492.7	-9198.4	-15904.1	-22609.9	-29315.6	-36021.3
4	-27731.7	-24958.5	-22185.3	-19412.2	-16639.0	-13865.8	-11092.7	-8319.5	-5546.3	-2773.2	0.0

LOAD COMBINATION RESULTS

- 1.00 \* 1. DEAD LOAD SHEAR & MOMENT
- 0.00 \* 2. TRIAL 1 SHEAR & MOMENT
- 0.00 \* 3. TOTAL PE MOMENT
- 1.00 \* 4. SECONDARY PRESTRESS SHEAR & MOMENT
- 1.00 \* 5. PLASTIC HINGING

#####  
 M A X I M U M S H E A R  
 #####

MEMBER	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	1413.7	1130.1	846.6	563.0	279.4	-4.1	-287.7	-571.2	-854.8	-1139.0	-1442.6
2	1970.1	1681.5	1411.9	1143.1	874.3	605.4	336.6	67.8	-201.1	-470.7	-759.3
3	1970.3	1669.1	1374.3	1079.8	785.3	490.4	193.5	-105.6	-406.9	-710.4	-1016.2
4	1713.8	1473.1	1230.1	984.8	737.3	487.4	235.3	-19.1	-275.8	-534.8	-796.1

#####  
 M I N I M U M S H E A R  
 #####

MEMBER	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT	
1	1077.5	793.9	510.4	226.8	-56.8	-340.3	-623.9	-907.4	-1191.0	-1475.2	-1778.8
2	849.5	560.9	291.3	22.5	-246.3	-515.2	-784.0	-1052.8	-1321.7	-1591.3	-1879.9
3	948.9	647.7	352.9	58.4	-236.1	-531.0	-827.9	-1127.0	-1428.3	-1731.8	-2037.6
4	1172.6	931.9	688.9	443.6	196.1	-53.8	-305.9	-560.3	-817.0	-1076.0	-1337.3

#####  
 M A X I M U M M O M E N T  
 #####

MEMBER	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT	
1	0.0	17387.9	30899.7	40535.6	46294.4	48177.3	46184.1	40314.0	30568.9	16944.7	-667.4
2	16717.4	25827.9	31345.3	33375.8	31923.2	26986.7	24976.8	27594.4	26728.9	22377.5	14433.0
3	13217.0	23688.2	30255.5	32956.8	31789.0	31739.7	36233.4	36814.1	33451.9	26120.6	14789.3
4	6499.7	17285.5	25592.3	31398.2	34677.0	35406.8	33564.7	29126.5	22067.3	12367.2	0.0

#####  
 M I N I M U M M O M E N T  
 #####

MEMBER	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT	
1	0.0	12792.1	21708.3	26748.4	27911.6	25198.7	18609.9	8144.0	-6196.9	-24416.7	-46624.6
2	-64009.4	-40375.9	-20335.3	-3781.8	9288.8	18875.3	18565.2	6659.6	-8728.9	-27603.5	-50071.0
3	-48855.0	-24972.2	-4993.5	11119.2	23363.0	26754.3	17836.6	5005.9	-11767.9	-32510.6	-57253.3
4	-48963.7	-32631.5	-18778.3	-7426.2	1399.0	7675.2	11379.3	12487.5	10974.7	6820.8	0.0

FILE = BDSPIN.DAT

MODEL INFORMATION		6	4000.	4	3605.
72.00		0.2423E+07	0.0	3605.	3605.
1	136.7	0.2423E+07	0.0	3605.	3605.
2	129.6	0.2423E+07	0.0	3605.	3605.
3	131.3	0.2649E+07	0.0	3605.	3605.
4	102.5	0.2797E+07	0.0	3605.	3605.
DEAD LOAD MOMENTS					
1	0.	13435.	22994.	28676.	30482.
2	-40198.	-23189.	-9773.	157.	6603.
3	-27999.	-11045.	2004.	11187.	16502.
4	-33649.	-18848.	-6526.	3294.	10588.
DEAD LOAD SHEARS					
1	1124.6	841.0	557.5	273.9	-9.7
2	1458.8	1170.2	900.6	631.8	363.0
3	1442.6	1141.4	846.6	552.1	257.6
4	1564.2	1323.5	1080.5	835.2	587.7
TRIAL 1 MOMENTS					
1	0.	1289.	2205.	2749.	2920.
2	-3885.	-2245.	-940.	29.	664.
3	-2565.	-1053.	116.	940.	1421.
4	-3029.	-1674.	-544.	356.	1025.
TRIAL 1 SHEARS					
1	107.9	80.7	53.4	26.1	-1.1
2	139.5	113.6	87.7	61.9	36.0
3	128.3	102.1	75.9	49.7	23.5
4	143.2	121.3	99.1	76.6	53.8
TOTAL PE MOMENTS					
1	-5761.	-13020.	-17796.	-20060.	-19783.
2	27314.	16817.	3954.	-4810.	-10237.
3	20162.	12054.	1160.	-6156.	-10380.
4	19431.	13327.	3615.	-4150.	-9992.
SECONDARY P/S SHEARS					
1	121.	121.	121.	121.	121.
2	-49.	-49.	-49.	-49.	-49.
3	17.	17.	17.	17.	17.
4	-121.	-121.	-121.	-121.	-121.
ULTIMATE APPLIED SHEARS					
1	3028.	2373.	1737.	1126.	584.
2	3440.	2792.	2170.	1582.	1067.
3	3505.	2841.	2184.	1545.	978.
4	3570.	3009.	2446.	1930.	1460.
CONCRETE SHEAR CAPACITIES					
1	2434.	1565.	912.	446.	505.
2	1772.	1593.	1340.	696.	446.
3	1753.	1671.	2297.	519.	446.
4	1785.	1791.	1585.	2050.	971.

REQUIRED WEB THICKNESSES												
1	72.	72.	72.	72.	72.	72.	72.	72.	72.	72.	72.	84.
2	72.	72.	72.	72.	72.	72.	72.	72.	72.	72.	72.	72.
3	74.	72.	72.	72.	72.	72.	72.	72.	72.	72.	72.	82.
4	78.	72.	72.	72.	72.	72.	72.	72.	72.	72.	72.	72.
REQUIRED SHEAR REINFORCING AREAS												
1	3.23	3.72	3.54	2.56	0.72	1.66	2.55	3.41	3.87	4.22	8.35	
2	7.12	5.24	3.72	1.99	1.70	0.72	1.83	2.28	3.68	5.15	7.05	
3	7.44	5.16	0.72	2.64	1.97	0.72	2.04	2.66	3.48	3.34	7.96	
4	7.57	5.39	3.93	0.72	2.26	1.65	0.72	2.42	0.72	2.61	2.77	
SECONDARY P/S MOMENTS												
1	0.	1655.	3310.	4966.	6621.	8276.	9931.	11586.	13242.	14897.	16552.	
2	16552.	15915.	15278.	14640.	14003.	13366.	12729.	12091.	11454.	10817.	10180.	
3	10180.	10403.	10627.	10851.	11074.	11298.	11522.	11746.	11969.	12193.	12417.	
4	12417.	11175.	9933.	8692.	7450.	6208.	4967.	3725.	2483.	1242.	0.	
ULTIMATE APPLIED MOMENTS												
1	0.	35203.	60624.	76496.	83753.	81686.	70550.	50156.	22764.	27758.	59596.	
2	60974.	39163.	17422.	33212.	46540.	51373.	48155.	36462.	18533.	23298.	46958.	
3	46303.	21769.	24860.	45174.	58006.	61687.	56639.	42338.	21207.	22900.	51096.	
4	50893.	33684.	15418.	29347.	43520.	51442.	53743.	49654.	39770.	23465.	0.	
ULTIMATE P/S STEEL MOMENT CAPACITIES												
1	0.	57903.	67464.	72605.	73968.	72367.	68055.	60257.	48860.	53595.	61629.	
2	61629.	51999.	35444.	65205.	72414.	74903.	72414.	65205.	52907.	51999.	61629.	
3	61629.	51999.	52906.	65205.	72414.	74950.	72538.	65401.	53135.	52380.	62145.	
4	62145.	54172.	39930.	60916.	69070.	74181.	75961.	74105.	68362.	59031.	0.	