



FORM DQP 2.01-1
LEVEL 1 CHECK PRINT SIGN-OFF SHEET

Client Name: Ohio Department of Transportation
Job Title: Cleveland Innerbelt Design-Build Contract
Job Number: CUY-90-14.90
Document Title: Revised Hanger Connection to Stringer

Check Level (Mark One): 1A 100% Document Check
 1B 100% Input Check

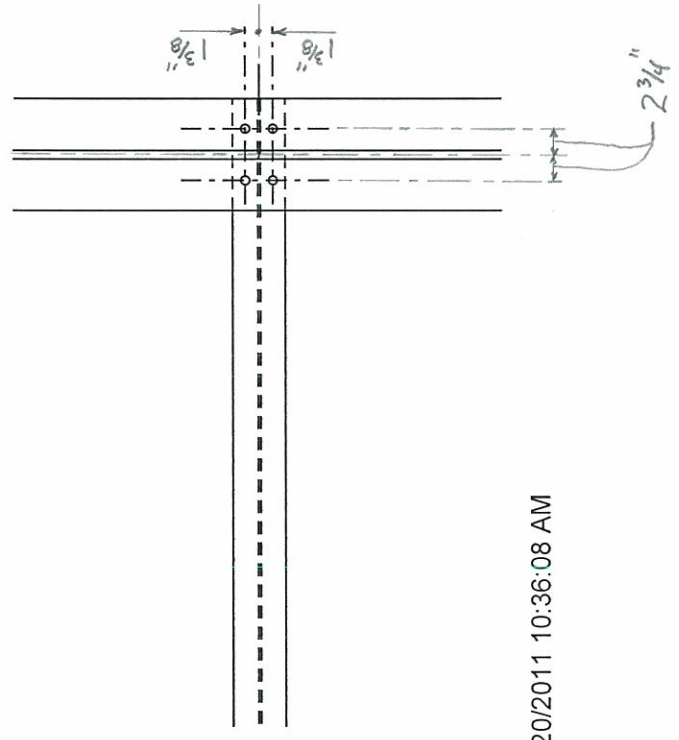
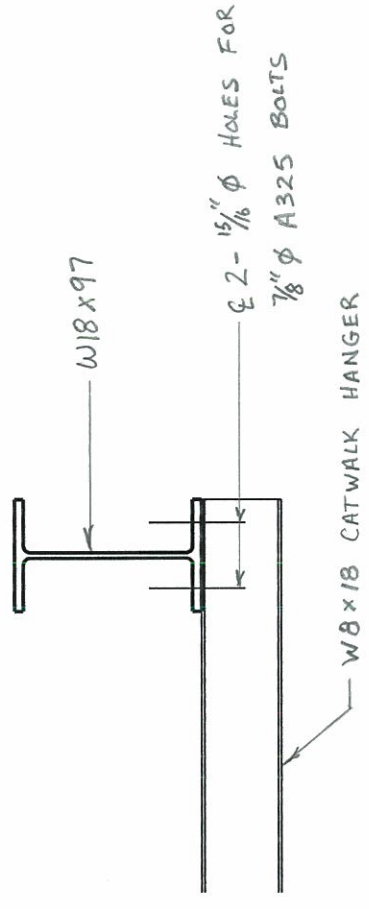
Enter description below:

	Print Name	Signature	Date
<input checked="" type="checkbox"/> Originator	<u>David Glastetter</u>	<u>[Signature]</u>	<u>10/20/11</u>
<input checked="" type="checkbox"/> Checker	<u>SARAH LARSON</u>	<u>Sarah Larson</u>	<u>10-20-11</u>
<input checked="" type="checkbox"/> Backchecker	<u>David Glastetter</u>	<u>[Signature]</u>	<u>10/20/11</u>
<input checked="" type="checkbox"/> Updater	<u>David Glastetter</u>	<u>[Signature]</u>	<u>10/20/11</u>
<input checked="" type="checkbox"/> Validater	<u>SARAH LARSON</u>	<u>Sarah Larson</u>	<u>10-20-11</u>

Insert an "X" in the box to indicate a required QC activity.

Form DQP 2.01-1

DJG 10/20/11
SSL 10-20-11
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Bolted Connection from the catwalk hanger (W8 x 18) to the stringer (W18 x 97)

$$P_t := 28 \text{kip} \quad \text{Minimum Required bolt tension}$$

$$d_b := 0.875 \text{in}$$

$$A_b := \frac{\pi \cdot d_b^2}{4} = 0.601 \cdot \text{in}^2$$

$$F_{ub} := 120 \text{ksi}$$

Use a 4 Bolt Pattern one bolt in each quadrant

$$R_B := 5.108 \text{kip} \quad (\text{From DJG/SJL calcs on 9/16/11})$$

$$P_b := \frac{R_B}{4} = 1.277 \cdot \text{kip}$$

Prying Action (A. 6.13.2.10.4)

$$a := 1.25 \text{in}$$

$$t := 0.33 \text{in}$$

$$b := \frac{5.25 \text{in} - t}{2} - a = 1.21 \cdot \text{in}$$

$$Q_u := \left(\frac{3 \cdot b}{8 \cdot a} - \frac{t^3}{20 \cdot \text{in}^3} \right) \cdot P_b = 0.461 \cdot \text{kip}$$

$$R_T := P_b + Q_u = 1.738 \cdot \text{kip}$$

Allowable Tension (A. 6.13.2.10.2)

$$\phi_t := 0.8$$

$$T_n := \phi_t \cdot 0.76 \cdot A_b \cdot F_{ub} = 43.872 \cdot \text{kip}$$

$$\text{Check}_{\text{Tension}} := \text{if}(R_T \leq T_n, \text{"OK"}, \text{"NG"}) = \text{"OK"}$$

Check Flexure of hanger top flange about the toe of the fillet (assume $b = 11 \text{ in} = \text{W18x97}$ flange width).

$$M_b := 2 \cdot R_T \cdot b = 4.207 \cdot \text{in} \cdot \text{kip}$$

$$I_f := \frac{11 \text{ in} \cdot (0.33 \text{ in})^3}{12} = 0.033 \cdot \text{in}^4$$

$$c := \frac{0.33 \text{ in}}{2}$$

$$\sigma_b := \frac{M_b \cdot c}{I_f} = 21.07 \cdot \text{ksi} \quad \ll F_y = 50 \text{ ksi, OK}$$

Check the Net Section Fracture at the Mid Point of the Stringer

$$F_u := 65 \text{ ksi}$$

$$A_g := 11.1 \text{ in} \cdot 0.87 \text{ in} = 9.657 \cdot \text{in}^2$$

$$A_n := A_g - 2 \cdot (d_b + 0.0625 \text{ in}) \cdot 0.87 \text{ in} = 8.026 \cdot \text{in}^2$$

$$\phi_{fr} := 0.8$$

$$F_{fracture} := \phi_{fr} \cdot 0.84 \cdot \left(\frac{A_n}{A_g} \right) \cdot F_u = 36.302 \cdot \text{ksi} \quad (\text{A. 6.10.1.8})$$

Max Tensile Stress from Stringer Design:

$$F_{design} := 34.5 \text{ ksi}$$

$$\text{Check}_{\text{NetSection}} := \text{if}(F_{design} \leq F_{fracture}, \text{"OK"}, \text{"NG"}) = \text{"OK"}$$

Check force to overcome sliding friction on opposite side from connection

$$\mu_s := 0.3 \quad \text{Steel on Steel max coefficient of sliding friction}$$

$$R_n := \left[0.5 \cdot 15\text{ft} \cdot 18 \frac{\text{lbf}}{\text{ft}} + \left[\left(6\text{lbf} \cdot 2 + 22.4 \frac{\text{lbf}}{\text{ft}} \cdot 4.167\text{ft} \right) \cdot \frac{2.5\text{ft}}{15\text{ft}} \right] \right] \cdot 1.25 = 0.191 \cdot \text{kip}$$

$$F_s := \mu_s \cdot R_n = 0.057 \cdot \text{kip}$$

$$M_{\text{bolts}} := F_s \cdot 15\text{ft} = 10.298 \cdot \text{in} \cdot \text{kip}$$

$$I_{\text{bolts}} := 4 \cdot \left[(2.75\text{in})^2 + (1.375\text{in})^2 \right] = 37.812 \cdot \text{in}^2$$

$$R_x := \frac{M_{\text{bolts}} \cdot 1.375\text{in}}{I_{\text{bolts}}} = 0.374 \cdot \text{kip}$$

$$R_y := \frac{M_{\text{bolts}} \cdot 2.75\text{in}}{I_{\text{bolts}}} = 0.749 \cdot \text{kip}$$

$$R_v := \frac{F_s}{4} = 0.014 \cdot \text{kip}$$

$$R := \sqrt{\left[(R_y + R_v)^2 + R_x^2 \right]} = 0.85 \cdot \text{kip}$$

$$N_s := 1 \quad \phi_b := 0.8$$

$$R_n := \phi_b \cdot 0.48 \cdot A_b \cdot F_{ub} \cdot N_s = 27.709 \cdot \text{kip} \quad > R = 0.85 \text{ kips, OK}$$

$$\frac{R}{R_n} = 0.031 \quad \text{Less than 0.33 use A. 6.13.2.11-1}$$

$$T_n := \phi_b \cdot 0.76 \cdot A_b \cdot F_{ub} = 43.872 \cdot \text{kip} \quad > R_T = 1.738 \text{ kips OK}$$

Bearing Resistance at Bolt Holes for end distance less than $2d$. A. 6.13.2.9-2

$$L_c := 0.067\text{ft} \quad t := 0.33\text{in} \quad F_u := 65\text{ksi}$$

$$R_n := \phi_b \cdot 1.2 \cdot L_c \cdot t \cdot F_u = 16.556 \cdot \text{kip} > 0.85 \text{ kips, OK}$$

Table 6.13.2.8-1—Minimum Required Bolt Tension

Bolt Diameter, in.	Required Tension- P_t (kip)	
	M 164 (A325)	M 253 (A490)
5/8	19	24
3/4	28	35
7/8	39	49
1	51	64
1-1/8	56	80
1-1/4	71	102
1-3/8	85	121
1-1/2	103	148

Table 6.13.2.8-2—Values of K_s

For standard holes	1.00
For oversize and short-slotted holes	0.85
For long-slotted holes with the slot perpendicular to the direction of the force	0.70
For long-slotted holes with the slot parallel to the direction of the force	0.60

Table 6.13.2.8-3—Values of K_f

For Class A surface conditions	0.33
For Class B surface conditions	0.50
For Class C surface conditions	0.33

The following descriptions of surface condition shall apply to Table 6.13.2.8-3:

- Class A Surface: unpainted clean mill scale, and blast-cleaned surfaces with Class A coatings,
- Class B Surface: unpainted blast-cleaned surfaces and blast-cleaned surfaces with Class B coatings, and
- Class C Surface: hot-dip galvanized surfaces roughened by wire brushing after galvanizing.

The contract documents shall specify that in uncoated joints, paint, including any inadvertent overspray, be excluded from areas closer than one bolt diameter but not less than 1.0 in. from the edge of any hole and all areas within the bolt pattern.

The criteria for slip resistance are for the case of connections subject to a coaxial load. For cases in which the load tends to rotate the connection in the plane of the faying surface, a modified formula accounting for the placement of bolts relative to the center of rotation should be used (Kulak et al., 1987).

The required tension specified for AASHTO M 164 (ASTM A325) bolts larger than M24 reflects an update from the ISO specification that lists identical material properties for the size range from M16 to M36. This update has not yet been applied to the customary U.S. Specifications.

The minimum bolt tension values given in Table 6.13.2.8-1 are equal to 70 percent of the minimum tensile strength of the bolts. The same percentage of the tensile strength has been traditionally used for the required tension of the bolts.

The effect of ordinary paint coatings on limited portions of the contact area within joints and the effect of overspray over the total contact area have been investigated experimentally (Polyzois and Frank, 1986). The tests demonstrated that the effective area for transfer of shear by friction between contact surfaces was concentrated in an annular ring around and close to the bolts. Paint on the contact surfaces approximately 1.0 in., but not less than the bolt diameter away from the edge of the hole did not reduce the slip resistance. On the other hand, bolt pretension might not be adequate to completely flatten and pull thick material into tight contact around every bolt. Therefore, these Specifications require that all areas between bolts also be free of paint.

$$R_n = 1.2L_c t F_u \quad (6.13.2.9-2)$$

For long-slotted holes perpendicular to the applied bearing force:

- With bolts spaced at a clear distance between holes not less than $2.0d$ and with a clear end distance not less than $2.0d$:

$$R_n = 2.0dt F_u \quad (6.13.2.9-3)$$

- If either the clear distance between holes is less than $2.0d$, or the clear end distance is less than $2.0d$:

$$R_n = L_c t F_u \quad (6.13.2.9-4)$$

where:

d = nominal diameter of the bolt (in.)

t = thickness of the connected material (in.)

F_u = tensile strength of the connected material specified in Table 6.4.1-1 (ksi)

L_c = clear distance between holes or between the hole and the end of the member in the direction of the applied bearing force (in.)

6.13.2.10—Tensile Resistance

6.13.2.10.1—General

High-strength bolts subjected to axial tension shall be tensioned to the force specified in Table 6.13.2.8-1. The applied tensile force shall be taken as the force due to the external factored loadings, plus any tension resulting from prying action produced by deformation of the connected parts, as specified in Article 6.13.2.10.4.

6.13.2.10.2—Nominal Tensile Resistance

The nominal tensile resistance of a bolt, T_n , independent of any initial tightening force shall be taken as:

$$T_n = 0.76A_b F_{ub} \quad (6.13.2.10.2-1)$$

where:

A_b = area of bolt corresponding to the nominal diameter (in.²)

F_{ub} = specified minimum tensile strength of the bolt specified in Article 6.4.3 (ksi)

where:

r_n = nominal bearing pressure (ksi)

F_u = specified minimum tensile strength of the connected part (ksi)

In these Specifications, the nominal bearing resistance of an interior hole is based on the clear distance between the hole and the adjacent hole in the direction of the bearing force. The nominal bearing resistance of an end hole is based on the clear distance between the hole and the end of the member. The nominal bearing resistance of the connected member may be taken as the sum of the resistances of the individual holes. The clear distance is used to simplify the computations for oversize and slotted holes.

Holes may be spaced at clear distances less than the specified values, as long as the lower value specified by Eq. 6.13.2.9-2 or Eq. 6.13.2.9-4, as applicable, is used for the nominal bearing resistance.

C6.13.2.10.2

The recommended design strength is approximately equal to the initial tightening force; thus, when loaded to the service load, high-strength bolts will experience little, if any, actual change in stress. For this reason, bolts in connections, in which the applied loads subject the bolts to axial tension, are required to be fully tensioned.

6.13.2.10.3—Fatigue Resistance

Where high-strength bolts in axial tension are subject to fatigue, the stress range, Δf , in the bolt, due to the fatigue design live load, plus the dynamic load allowance for fatigue loading specified in Article 3.6.1.4, plus the prying force resulting from cyclic application of the fatigue load, shall satisfy Eq. 6.6.1.2.2-1.

The nominal diameter of the bolt shall be used in calculating the bolt stress range. In no case shall the calculated prying force exceed 30 percent of the externally applied load.

Low carbon ASTM A307 bolts shall not be used in connections subjected to fatigue.

6.13.2.10.4—Prying Action

The tensile force due to prying action shall be taken as:

$$Q_u = \left[\frac{3b}{8a} - \frac{t^3}{20} \right] P_u \quad (6.13.2.10.4-1)$$

where:

Q_u = prying tension per bolt due to the factored loadings taken as 0 when negative (kip)

P_u = direct tension per bolt due to the factored loadings (kip)

a = distance from center of bolt to edge of plate (in.)

b = distance from center of bolt to the toe of fillet of connected part (in.)

t = thickness of thinnest connected part (in.)

6.13.2.11—Combined Tension and Shear

The nominal tensile resistance of a bolt subjected to combined shear and axial tension, T_n , shall be taken as:

- If $\frac{P_u}{R_n} \leq 0.33$, then:

$$T_n = 0.76 A_b F_{ub} \quad (6.13.2.11-1)$$

- Otherwise:

$$T_n = 0.76 A_b F_{ub} \sqrt{1 - \left(\frac{P_u}{\phi_s R_n} \right)^2} \quad (6.13.2.11-2)$$

where:

A_b = area of the bolt corresponding to the nominal diameter (in.²)

C6.13.2.10.3

Properly tightened A325 and A490 bolts are not adversely affected by repeated application of the recommended service load tensile stress, provided that the fitting material is sufficiently stiff that the prying force is a relatively small part of the applied tension. The provisions covering bolt tensile fatigue are based upon study of test reports of bolts that were subjected to repeated tensile load to failure (Kulak et al., 1987).

C6.13.2.10.4

Eq. 6.13.2.10.4-1 for estimating the magnitude of the force due to prying is a simplification given in ASCE (1971) of a semiempirical expression (Douty and McGuire, 1965). This simplified formula tends to overestimate the prying force and provides conservative design results (Nair et al., 1974).

C6.13.2.11

The nominal tensile resistance of bolts subject to combined axial tension and shear is provided by elliptical interaction curves, which account for the connection length effect on bolts loaded in shear, the ratio of shear strength to tension strength of threaded bolts, and the ratios of root area to nominal body area and tensile stress area to nominal body area (Chesson et al., 1965). Eqs. 6.13.2.11-1 and 6.13.2.11-2 are conservative simplifications of the set of elliptical curves. The equations representing the set of elliptical curves for various cases may be found in AISC (1988). No reduction in the nominal tensile resistance is required when the applied shear force on the bolt due to the factored loads is less than or equal to 33 percent of the nominal shear resistance of the bolt.



Made: TRG 8/8/11
 Checked: KDG 8/8/11
 BkChkd: TRG 8/8/11

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VERSION 2.9.1.0										
RUN TIME: 08/07/2011 19:48:37.651										
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----- GIRDER 2 FLANGE PLATE AREA REQUIRED FOR STRENGTH/CONSTRUCTIBILITY (* = DIFFERENT THAN INPUT) -----										
SPAN/LOC	INP AREA	REQ AREA	WIDTH	THICK	RATIO	INP AREA	REQ AREA	WIDTH	THICK	STRESS
(ft)	(sq ft)	(sq ft)	(in)	(in)	(%)	(sq ft)	(sq ft)	(in)	(in)	(ksi)
10.725	9.7	9.7	11.1000	0.8700	0.21	9.7	9.7	11.1000	0.8700	0.33
10.750	9.7	9.7	11.1000	0.8700	0.24	9.7	9.7	11.1000	0.8700	0.28
10.800	9.7	9.7	11.1000	0.8700	0.20	9.7	9.7	11.1000	0.8700	0.32
10.850	9.7	9.7	11.1000	0.8700	0.33	9.7	9.7	11.1000	0.8700	0.25
10.880	9.7	9.7	11.1000	0.8700	0.06	9.7	9.7	11.1000	0.8700	0.18
10.892	9.7	9.7	11.1000	0.8700	0.02	9.7	9.7	11.1000	0.8700	0.24
10.900	9.7	9.7	11.1000	0.8700	0.06	9.7	9.7	11.1000	0.8700	0.35
10.908	9.7	9.7	11.1000	0.8700	0.12	9.7	9.7	11.1000	0.8700	0.29
10.926	9.7	9.7	11.1000	0.8700	0.16	9.7	9.7	11.1000	0.8700	0.39
10.936	9.7	9.7	11.1000	0.8700	0.17	9.7	9.7	11.1000	0.8700	0.42
10.946	9.7	9.7	11.1000	0.8700	0.19	9.7	9.7	11.1000	0.8700	0.45
10.956	9.7	9.7	11.1000	0.8700	0.20	9.7	9.7	11.1000	0.8700	0.47
10.966	9.7	9.7	11.1000	0.8700	0.20	9.7	9.7	11.1000	0.8700	0.47
11.000	9.7	9.7	11.1000	0.8700	0.28	9.7	9.7	11.1000	0.8700	0.61

----- GIRDER 2 FLANGE PLATE AREA REQUIRED FOR STRENGTH/CONSTRUCTIBILITY (* = DIFFERENT THAN INPUT) -----

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VERSION 2.9.1.0										
RUN TIME: 08/07/2011 19:48:37.651										
Filename: C:\DOCUME~1\Gregory\LOCALS~1\Temp\BGS_StIden\Stringer A.OUT										
----- GIRDER 2 FLANGE PLATE AREA REQUIRED FOR STRENGTH/CONSTRUCTIBILITY (* = DIFFERENT THAN INPUT) -----										
SPAN/LOC	INP AREA	REQ AREA	WIDTH	THICK	RATIO	INP AREA	REQ AREA	WIDTH	THICK	STRESS
(ft)	(sq ft)	(sq ft)	(in)	(in)	(%)	(sq ft)	(sq ft)	(in)	(in)	(ksi)
11.050	9.7	9.7	11.1000	0.8700	0.20	9.7	9.7	11.1000	0.8700	0.48
11.100	9.7	9.7	11.1000	0.8700	0.14	9.7	9.7	11.1000	0.8700	0.37
11.150	9.7	9.7	11.1000	0.8700	0.09	9.7	9.7	11.1000	0.8700	0.25
11.200	9.7	9.7	11.1000	0.8700	0.04	9.7	9.7	11.1000	0.8700	0.21
11.239	9.7	9.7	11.1000	0.8700	0.03	9.7	9.7	11.1000	0.8700	0.22
11.239	9.7	9.7	11.1000	0.8700	0.33	9.7	9.7	11.1000	0.8700	0.31
11.239	9.7	9.7	11.1000	0.8700	0.21	9.7	9.7	11.1000	0.8700	0.32
11.250	9.7	9.7	11.1000	0.8700	0.21	9.7	9.7	11.1000	0.8700	0.32
11.359	9.7	9.7	11.1000	0.8700	0.20	9.7	9.7	11.1000	0.8700	0.39
11.400	9.7	9.7	11.1000	0.8700	0.19	9.7	9.7	11.1000	0.8700	0.39
11.400	9.7	9.7	11.1000	0.8700	0.16	9.7	9.7	11.1000	0.8700	0.45
11.474	9.7	9.7	11.1000	0.8700	0.11	9.7	9.7	11.1000	0.8700	0.46
11.500	9.7	9.7	11.1000	0.8700	0.11	9.7	9.7	11.1000	0.8700	0.46
11.510	9.7	9.7	11.1000	0.8700	0.11	9.7	9.7	11.1000	0.8700	0.46
11.560	9.7	9.7	11.1000	0.8700	0.10	9.7	9.7	11.1000	0.8700	0.43
11.650	9.7	9.7	11.1000	0.8700	0.12	9.7	9.7	11.1000	0.8700	0.38
11.700	9.7	9.7	11.1000	0.8700	0.15	9.7	9.7	11.1000	0.8700	0.32
11.750	9.7	9.7	11.1000	0.8700	0.22	9.7	9.7	11.1000	0.8700	0.22
11.750	9.7	9.7	11.1000	0.8700	0.02	9.7	9.7	11.1000	0.8700	0.15
11.800	9.7	9.7	11.1000	0.8700	0.03	9.7	9.7	11.1000	0.8700	0.18
11.850	9.7	9.7	11.1000	0.8700	0.06	9.7	9.7	11.1000	0.8700	0.28
11.900	9.7	9.7	11.1000	0.8700	0.12	9.7	9.7	11.1000	0.8700	0.28
11.950	9.7	9.7	11.1000	0.8700	0.18	9.7	9.7	11.1000	0.8700	0.41
12.000	9.7	9.7	11.1000	0.8700	0.26	9.7	9.7	11.1000	0.8700	0.58
12.000	9.7	9.7	11.1000	0.8700	0.26	9.7	9.7	11.1000	0.8700	0.69
12.050	9.7	9.7	11.1000	0.8700	0.18	9.7	9.7	11.1000	0.8700	0.54
12.100	9.7	9.7	11.1000	0.8700	0.11	9.7	9.7	11.1000	0.8700	0.44
12.150	9.7	9.7	11.1000	0.8700	0.05	9.7	9.7	11.1000	0.8700	0.44
12.195	9.7	9.7	11.1000	0.8700	0.42	9.7	9.7	11.1000	0.8700	0.27
12.200	9.7	9.7	11.1000	0.8700	0.42	9.7	9.7	11.1000	0.8700	0.47
12.250	9.7	9.7	11.1000	0.8700	0.41	9.7	9.7	11.1000	0.8700	0.46
12.250	9.7	9.7	11.1000	0.8700	0.33	9.7	9.7	11.1000	0.8700	0.29
12.300	9.7	9.7	11.1000	0.8700	0.26	9.7	9.7	11.1000	0.8700	0.34
12.400	9.7	9.7	11.1000	0.8700	0.20	9.7	9.7	11.1000	0.8700	0.38
12.450	9.7	9.7	11.1000	0.8700	0.21	9.7	9.7	11.1000	0.8700	0.40
12.482	9.7	9.7	11.1000	0.8700	0.22	9.7	9.7	11.1000	0.8700	0.40
12.500	9.7	9.7	11.1000	0.8700	0.21	9.7	9.7	11.1000	0.8700	0.39
12.600	9.7	9.7	11.1000	0.8700	0.19	9.7	9.7	11.1000	0.8700	0.37
12.650	9.7	9.7	11.1000	0.8700	0.16	9.7	9.7	11.1000	0.8700	0.33
12.650	9.7	9.7	11.1000	0.8700	0.15	9.7	9.7	11.1000	0.8700	0.31
12.687	9.7	9.7	11.1000	0.8700	0.16	9.7	9.7	11.1000	0.8700	0.29
12.700	9.7	9.7	11.1000	0.8700	0.17	9.7	9.7	11.1000	0.8700	0.27
12.745	9.7	9.7	11.1000	0.8700	0.29	9.7	9.7	11.1000	0.8700	0.26
12.788	9.7	9.7	11.1000	0.8700	0.27	9.7	9.7	11.1000	0.8700	0.30
12.888	9.7	9.7	11.1000	0.8700	0.02	9.7	9.7	11.1000	0.8700	0.18
12.900	9.7	9.7	11.1000	0.8700	0.03	9.7	9.7	11.1000	0.8700	0.18
12.900	9.7	9.7	11.1000	0.8700	0.13	9.7	9.7	11.1000	0.8700	0.28
12.950	9.7	9.7	11.1000	0.8700	0.13	9.7	9.7	11.1000	0.8700	0.37
13.000	9.7	9.7	11.1000	0.8700	0.20	9.7	9.7	11.1000	0.8700	0.51
13.000	9.7	9.7	11.1000	0.8700	0.29	9.7	9.7	11.1000	0.8700	0.71
13.000	9.7	9.7	11.1000	0.8700	0.21	9.7	9.7	11.1000	0.8700	0.49
13.050	9.7	9.7	11.1000	0.8700	0.13	9.7	9.7	11.1000	0.8700	0.38
13.150	9.7	9.7	11.1000	0.8700	0.08	9.7	9.7	11.1000	0.8700	0.28

----- GIRDER 2 FLANGE PLATE AREA REQUIRED FOR STRENGTH/CONSTRUCTIBILITY (* = DIFFERENT THAN INPUT) -----

HNPS BRIDGE DESIGN PROGRAM BGS										
VERSION 2.9.1.0										
RUN TIME: 08/07/2011 19:48:37.651										
Filename: C:\DOCUME~1\Gregory\LOCALS~1\Temp\BGS_StIden\Stringer A.OUT										
----- GIRDER 2 FLANGE PLATE AREA REQUIRED FOR STRENGTH/CONSTRUCTIBILITY (* = DIFFERENT THAN INPUT) -----										
SPAN/LOC	INP AREA	REQ AREA	WIDTH	THICK	RATIO	INP AREA	REQ AREA	WIDTH	THICK	STRESS
(ft)	(sq ft)	(sq ft)	(in)	(in)	(%)	(sq ft)	(sq ft)	(in)	(in)	(ksi)
13.000	9.7	9.7	11.1000	0.8700	0.56	9.7	9.7	11.1000	0.8700	0.44
13.050	9.7	9.7	11.1000	0.8700	0.38	9.7	9.7	11.1000	0.8700	0.44
13.100	9.7	9.7	11.1000	0.8700	0.21	9.7	9.7	11.1000	0.8700	0.52
13.150	9.7	9.7	11.1000	0.8700	0.14	9.7	9.7	11.1000	0.8700	0.51
13.188	9.7	9.7	11.1000	0.8700	0.21	9.7	9.7	11.1000	0.8700	0.48
13.288	9.7	9.7	11.1000	0.8700	0.19	9.7	9.7	11.1000	0.8700	0.44
13.300	9.7	9.7	11.1000	0.8700	0.29	9.7	9.7	11.1000	0.8700	0.44
13.350	9.7	9.7	11.1000	0.8700	0.31	9.7	9.7	11.1000	0.8700	0.44
13.400	9.7	9.7	11.1000	0.8700	0.41	9.7	9.7	11.1000	0.8700	0.44
13.450	9.7	9.7	11.1000	0.8700	0.37	9.7	9.7	11.1000	0.8700	0.44
13.500	9.7	9.7	11.1000	0.8700	0.41	9.7	9.7	11.1000	0.8700	0.44
13.550	9.7	9.7	11.1000	0.8700	0.48	9.7	9.7	11.1000	0.8700	0.44
13.600	9.7	9.7	11.1000	0.8700	0.56	9.7	9.7	11.1000	0.8700	0.44
13.650	9.7	9.7	11.1000	0.8700	0.41	9.7	9.7	11.1000	0.8700	0.44
13.700	9.7	9.7	11.1000	0.8700	0.38	9.7	9.7	11.1000	0.8700	0.44
13.750	9.7	9.7	11.1000	0.8700	0.21	9.7	9.7	11.1000	0.8700	0.44
13.800	9.7	9.7	11.1000	0.8700	0.07	9.7	9.7	11.1000	0.8700	0.44
13.850	9.7	9.7	11.1000	0.8700	0.03	9.7	9.7	11.1000	0.8700	0.44
13.900	9.7	9.7	11.1000	0.8700	0.21	9.7	9.7	11.1000	0.8700	0.44
13.950	9.7	9.7	11.1000	0.8700	0.17	9.7	9.7	11.1000	0.8700	0.44
14.000	9.7	9.7	11.1000	0.8700	0.12	9.7	9.7	11.1000	0.8700	0.44
14.050	9.7	9.7	11.1000	0.8700	0.11	9.7	9.7	11.1000	0.8700	0.44
14.100	9.7	9.7	11.1000	0.8700	0.12	9.7	9.7	11.1000	0.8700	0.44
14.150	9.7	9.7	11.1000	0.8700	0.13	9.7	9.7	11.1000	0.8700	0.44
14.200	9.7	9.7	11.1000	0.8700	0.16	9.7	9.7	11.1000	0.8700	0.44
14.250	9.7	9.7	11.1000	0.8700	0.16	9.7	9.7	11.1000	0.8700	0.44
14.300	9.7	9.7	11.1000	0.8700	0.16	9.7	9.7	11.1000	0.8700	0.44
14.350	9.7	9.7	11.1000	0.8700	0.16	9.7	9.7	11.1000	0.8700	0.44
14.400	9.7	9.7	11.1000	0.8700	0.16	9.7	9.7	11.1000	0.8700	0.44
14.450	9.7									

Made: TRG 8/11
Checked: KDG 8/11
BkChkd: TRG 8/11

HNBS BRIDGE DESIGN PROGRAM BGDS
RUN TIME: 08/07/2011 19:48:37.651
Filename: C:\DOCUME~1\jregory\LOCALS~1\Temp\BGDS_StIdem\Stringer A.OUT

----- GIRDER 2 FLEXURAL FATIGUE STRESS SUMMARY -----
VERSION 2.9.1.0 OUTPUT

NOTES:
- MOMENTS AND STRESSES ARE FACTORED
- DEAD LOAD STRESSES INCLUDE LATERAL FLANGE BENDING (IF APPLICABLE)
- STRESSES ARE BASED ON INPUT PLATE SIZES
- TENSION IS POSITIVE

SPAN/LOC	DEAD LOAD		MAX FATIGUE I		MIN FATIGUE I		TOP FLANGE		BOTTOM FLANGE	
	TOP FL (ksi)	BOT FL (ksi)	MZ (ft-k)	TOP BOT (ft-k)	MZ (ft-k)	TOP BOT (ft-k)	MAX (ksi)	MIN (ksi)	MAX (ksi)	MIN (ksi)
19.100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19.200	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19.300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19.400	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19.500	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19.600	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19.700	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19.800	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19.900	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

MAX STRESS RATIO 0.61

HNBS BRIDGE DESIGN PROGRAM BGDS
RUN TIME: 08/07/2011 19:48:37.651
Filename: C:\DOCUME~1\jregory\LOCALS~1\Temp\BGDS_StIdem\Stringer A.OUT

----- GIRDER 2 FLANGE PLATE AREA REQUIRED FOR STRENGTH/CONSTRUCTIBILITY (* = DIFFERENT THAN INPUT) -----
VERSION 2.9.1.0 OUTPUT

NOTES:
- MOMENTS AND STRESSES ARE FACTORED
- DEAD LOAD STRESSES INCLUDE LATERAL FLANGE BENDING (IF APPLICABLE)
- STRESSES ARE BASED ON INPUT PLATE SIZES
- TENSION IS POSITIVE

SPAN/LOC	DEAD LOAD		MAX FATIGUE I		MIN FATIGUE I		TOP FLANGE		BOTTOM FLANGE	
	TOP FL (ksi)	BOT FL (ksi)	MZ (ft-k)	TOP BOT (ft-k)	MZ (ft-k)	TOP BOT (ft-k)	MAX (ksi)	MIN (ksi)	MAX (ksi)	MIN (ksi)
19.100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19.200	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19.300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19.400	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19.500	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19.600	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19.700	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19.800	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19.900	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

HNBS BRIDGE DESIGN PROGRAM BGDS
RUN TIME: 08/07/2011 19:48:37.651
Filename: C:\DOCUME~1\jregory\LOCALS~1\Temp\BGDS_StIdem\Stringer A.OUT

----- GIRDER 2 FLEXURAL FATIGUE STRESS SUMMARY -----
VERSION 2.9.1.0 OUTPUT

NOTES:
- MOMENTS AND STRESSES ARE FACTORED
- DEAD LOAD STRESSES INCLUDE LATERAL FLANGE BENDING (IF APPLICABLE)
- STRESSES ARE BASED ON INPUT PLATE SIZES
- TENSION IS POSITIVE

SPAN/LOC	DEAD LOAD		MAX FATIGUE I		MIN FATIGUE I		TOP FLANGE		BOTTOM FLANGE	
	TOP FL (ksi)	BOT FL (ksi)	MZ (ft-k)	TOP BOT (ft-k)	MZ (ft-k)	TOP BOT (ft-k)	MAX (ksi)	MIN (ksi)	MAX (ksi)	MIN (ksi)
19.100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19.200	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19.300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19.400	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19.500	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19.600	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19.700	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19.800	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19.900	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

HNBS BRIDGE DESIGN PROGRAM BGDS
RUN TIME: 08/07/2011 19:48:37.651
Filename: C:\DOCUME~1\jregory\LOCALS~1\Temp\BGDS_StIdem\Stringer A.OUT

----- GIRDER 2 FLEXURAL FATIGUE STRESS SUMMARY -----
VERSION 2.9.1.0 OUTPUT

NOTES:
- MOMENTS AND STRESSES ARE FACTORED
- DEAD LOAD STRESSES INCLUDE LATERAL FLANGE BENDING (IF APPLICABLE)
- STRESSES ARE BASED ON INPUT PLATE SIZES
- TENSION IS POSITIVE

SPAN/LOC	DEAD LOAD		MAX FATIGUE I		MIN FATIGUE I		TOP FLANGE		BOTTOM FLANGE	
	TOP FL (ksi)	BOT FL (ksi)	MZ (ft-k)	TOP BOT (ft-k)	MZ (ft-k)	TOP BOT (ft-k)	MAX (ksi)	MIN (ksi)	MAX (ksi)	MIN (ksi)
19.100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19.200	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19.300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19.400	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19.500	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19.600	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19.700	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19.800	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19.900	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00



STR A w/FORMS

File: N:\1933\Design\Design\Main Unit 2\Stringers\Stringer A v forms backsheet.rpt 8/7/2011, 2:24:12PM

20.000 0.0182471 -0.0317901 0.0007661 0.00180142 8.11832718 -70.34324556 0.00000000 0.00000000 -71.00482129
20.000 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000
----- GIRDER 2 FLANGE PLATE AREA REQUIRED FOR STRENGTH/CONSTRUCTIBILITY (* = DIFFERENT THAN INPUT) -----
HINTS BRIDGE DESIGN PROGRAM B003
RUN TIME: 08/07/2011 14:11:35.546
FILENAME: C:\LOCUME-1\Gregory\LOCALS-1\Temp\Ase\Ibm_wforms\Stringer A.OUT
VERSION 2.9.1.0 OUTPUT

Table with columns: SPAN, LOC, INP AREA, REQ AREA, TOP FLANGE, THICK, STRESS, RATIO, BOTTOM FLANGE, THICK, STRESS, RATIO. Contains multiple rows of data for girder 2 flange plate area requirements.

----- GIRDER 2 FLANGE PLATE AREA REQUIRED FOR STRENGTH/CONSTRUCTIBILITY (* = DIFFERENT THAN INPUT) -----
HINTS BRIDGE DESIGN PROGRAM B003
RUN TIME: 08/07/2011 14:11:35.546
FILENAME: C:\LOCUME-1\Gregory\LOCALS-1\Temp\Ase\Ibm_wforms\Stringer A.OUT
VERSION 2.9.1.0 OUTPUT

Table with columns: SPAN, LOC, INP AREA, REQ AREA, TOP FLANGE, THICK, STRESS, RATIO, BOTTOM FLANGE, THICK, STRESS, RATIO. Contains multiple rows of data for girder 2 flange plate area requirements.



File: N:\1933\Design\Design\Main Unit 2\Stringers\Stringer A v forms backsheet.rpt 8/7/2011, 2:24:12PM

20.000 0.0182471 -0.0317901 0.0007661 0.00180142 8.11832718 -70.34324556 0.00000000 0.00000000 -71.00482129
20.000 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000 0.00000000
----- GIRDER 2 FLANGE PLATE AREA REQUIRED FOR STRENGTH/CONSTRUCTIBILITY (* = DIFFERENT THAN INPUT) -----
HINTS BRIDGE DESIGN PROGRAM B003
RUN TIME: 08/07/2011 14:11:35.546
FILENAME: C:\LOCUME-1\Gregory\LOCALS-1\Temp\Ase\Ibm_wforms\Stringer A.OUT
VERSION 2.9.1.0 OUTPUT

Table with columns: SPAN, LOC, INP AREA, REQ AREA, TOP FLANGE, THICK, STRESS, RATIO, BOTTOM FLANGE, THICK, STRESS, RATIO. Contains multiple rows of data for girder 2 flange plate area requirements.

----- GIRDER 2 FLANGE PLATE AREA REQUIRED FOR STRENGTH/CONSTRUCTIBILITY (* = DIFFERENT THAN INPUT) -----
HINTS BRIDGE DESIGN PROGRAM B003
RUN TIME: 08/07/2011 14:11:35.546
FILENAME: C:\LOCUME-1\Gregory\LOCALS-1\Temp\Ase\Ibm_wforms\Stringer A.OUT
VERSION 2.9.1.0 OUTPUT

Table with columns: SPAN, LOC, INP AREA, REQ AREA, TOP FLANGE, THICK, STRESS, RATIO, BOTTOM FLANGE, THICK, STRESS, RATIO. Contains multiple rows of data for girder 2 flange plate area requirements.

NHTS BRIDGE DESIGN PROGRAM BGCS												
VERSION 2.9.1.0												
RUN TIME: 08/07/2011 14:17:35.546												
Filename: C:\DOCS\N\9593\LOCALS\Temp\Section_of\Comm\Stringer A.OUT												
----- GIRDER 2 FLANGE PLATE AREA REQUIRED FOR STRENGTH/CONSTRUCTIBILITY (*) - DIFFERENT THAN INPUT -----												
SPAN/LAC	INF AREA	REQ AREA	TOP FLANGE	THICK	STRESS	INF AREA	REQ AREA	THICK	STRESS	INF AREA	REQ AREA	RATIO
(in)	(in)	(in)	(in)	(in)	(ksi)	(in)	(in)	(in)	(ksi)	(in)	(in)	(in)
6.000	9.7	9.7	11.1000	0.8700	0.14	9.7	9.7	11.1000	0.8700	0.14	9.7	9.7
6.050	9.7	9.7	11.1000	0.8700	0.17	9.7	9.7	11.1000	0.8700	0.17	9.7	9.7
6.100	9.7	9.7	11.1000	0.8700	0.20	9.7	9.7	11.1000	0.8700	0.20	9.7	9.7
6.150	9.7	9.7	11.1000	0.8700	0.23	9.7	9.7	11.1000	0.8700	0.23	9.7	9.7
6.200	9.7	9.7	11.1000	0.8700	0.26	9.7	9.7	11.1000	0.8700	0.26	9.7	9.7
6.250	9.7	9.7	11.1000	0.8700	0.29	9.7	9.7	11.1000	0.8700	0.29	9.7	9.7
6.300	9.7	9.7	11.1000	0.8700	0.32	9.7	9.7	11.1000	0.8700	0.32	9.7	9.7
6.350	9.7	9.7	11.1000	0.8700	0.35	9.7	9.7	11.1000	0.8700	0.35	9.7	9.7
6.400	9.7	9.7	11.1000	0.8700	0.38	9.7	9.7	11.1000	0.8700	0.38	9.7	9.7
6.450	9.7	9.7	11.1000	0.8700	0.41	9.7	9.7	11.1000	0.8700	0.41	9.7	9.7
6.500	9.7	9.7	11.1000	0.8700	0.44	9.7	9.7	11.1000	0.8700	0.44	9.7	9.7
6.550	9.7	9.7	11.1000	0.8700	0.47	9.7	9.7	11.1000	0.8700	0.47	9.7	9.7
6.600	9.7	9.7	11.1000	0.8700	0.50	9.7	9.7	11.1000	0.8700	0.50	9.7	9.7
6.650	9.7	9.7	11.1000	0.8700	0.53	9.7	9.7	11.1000	0.8700	0.53	9.7	9.7
6.700	9.7	9.7	11.1000	0.8700	0.56	9.7	9.7	11.1000	0.8700	0.56	9.7	9.7
6.750	9.7	9.7	11.1000	0.8700	0.59	9.7	9.7	11.1000	0.8700	0.59	9.7	9.7
6.800	9.7	9.7	11.1000	0.8700	0.62	9.7	9.7	11.1000	0.8700	0.62	9.7	9.7
6.850	9.7	9.7	11.1000	0.8700	0.65	9.7	9.7	11.1000	0.8700	0.65	9.7	9.7
6.900	9.7	9.7	11.1000	0.8700	0.68	9.7	9.7	11.1000	0.8700	0.68	9.7	9.7
6.950	9.7	9.7	11.1000	0.8700	0.71	9.7	9.7	11.1000	0.8700	0.71	9.7	9.7
7.000	9.7	9.7	11.1000	0.8700	0.74	9.7	9.7	11.1000	0.8700	0.74	9.7	9.7
7.050	9.7	9.7	11.1000	0.8700	0.77	9.7	9.7	11.1000	0.8700	0.77	9.7	9.7
7.100	9.7	9.7	11.1000	0.8700	0.80	9.7	9.7	11.1000	0.8700	0.80	9.7	9.7
7.150	9.7	9.7	11.1000	0.8700	0.83	9.7	9.7	11.1000	0.8700	0.83	9.7	9.7
7.200	9.7	9.7	11.1000	0.8700	0.86	9.7	9.7	11.1000	0.8700	0.86	9.7	9.7
7.250	9.7	9.7	11.1000	0.8700	0.89	9.7	9.7	11.1000	0.8700	0.89	9.7	9.7
7.300	9.7	9.7	11.1000	0.8700	0.92	9.7	9.7	11.1000	0.8700	0.92	9.7	9.7
7.350	9.7	9.7	11.1000	0.8700	0.95	9.7	9.7	11.1000	0.8700	0.95	9.7	9.7
7.400	9.7	9.7	11.1000	0.8700	0.98	9.7	9.7	11.1000	0.8700	0.98	9.7	9.7
7.450	9.7	9.7	11.1000	0.8700	1.01	9.7	9.7	11.1000	0.8700	1.01	9.7	9.7
7.500	9.7	9.7	11.1000	0.8700	1.04	9.7	9.7	11.1000	0.8700	1.04	9.7	9.7
7.550	9.7	9.7	11.1000	0.8700	1.07	9.7	9.7	11.1000	0.8700	1.07	9.7	9.7
7.600	9.7	9.7	11.1000	0.8700	1.10	9.7	9.7	11.1000	0.8700	1.10	9.7	9.7
7.650	9.7	9.7	11.1000	0.8700	1.13	9.7	9.7	11.1000	0.8700	1.13	9.7	9.7
7.700	9.7	9.7	11.1000	0.8700	1.16	9.7	9.7	11.1000	0.8700	1.16	9.7	9.7
7.750	9.7	9.7	11.1000	0.8700	1.19	9.7	9.7	11.1000	0.8700	1.19	9.7	9.7
7.800	9.7	9.7	11.1000	0.8700	1.22	9.7	9.7	11.1000	0.8700	1.22	9.7	9.7
7.850	9.7	9.7	11.1000	0.8700	1.25	9.7	9.7	11.1000	0.8700	1.25	9.7	9.7
7.900	9.7	9.7	11.1000	0.8700	1.28	9.7	9.7	11.1000	0.8700	1.28	9.7	9.7
7.950	9.7	9.7	11.1000	0.8700	1.31	9.7	9.7	11.1000	0.8700	1.31	9.7	9.7
8.000	9.7	9.7	11.1000	0.8700	1.34	9.7	9.7	11.1000	0.8700	1.34	9.7	9.7
8.050	9.7	9.7	11.1000	0.8700	1.37	9.7	9.7	11.1000	0.8700	1.37	9.7	9.7
8.100	9.7	9.7	11.1000	0.8700	1.40	9.7	9.7	11.1000	0.8700	1.40	9.7	9.7
8.150	9.7	9.7	11.1000	0.8700	1.43	9.7	9.7	11.1000	0.8700	1.43	9.7	9.7
8.200	9.7	9.7	11.1000	0.8700	1.46	9.7	9.7	11.1000	0.8700	1.46	9.7	9.7
8.250	9.7	9.7	11.1000	0.8700	1.49	9.7	9.7	11.1000	0.8700	1.49	9.7	9.7
8.300	9.7	9.7	11.1000	0.8700	1.52	9.7	9.7	11.1000	0.8700	1.52	9.7	9.7
8.350	9.7	9.7	11.1000	0.8700	1.55	9.7	9.7	11.1000	0.8700	1.55	9.7	9.7
8.400	9.7	9.7	11.1000	0.8700	1.58	9.7	9.7	11.1000	0.8700	1.58	9.7	9.7
8.450	9.7	9.7	11.1000	0.8700	1.61	9.7	9.7	11.1000	0.8700	1.61	9.7	9.7
8.500	9.7	9.7	11.1000	0.8700	1.64	9.7	9.7	11.1000	0.8700	1.64	9.7	9.7
8.550	9.7	9.7	11.1000	0.8700	1.67	9.7	9.7	11.1000	0.8700	1.67	9.7	9.7
8.600	9.7	9.7	11.1000	0.8700	1.70	9.7	9.7	11.1000	0.8700	1.70	9.7	9.7
8.650	9.7	9.7	11.1000	0.8700	1.73	9.7	9.7	11.1000	0.8700	1.73	9.7	9.7
8.700	9.7	9.7	11.1000	0.8700	1.76	9.7	9.7	11.1000	0.8700	1.76	9.7	9.7
8.750	9.7	9.7	11.1000	0.8700	1.79	9.7	9.7	11.1000	0.8700	1.79	9.7	9.7
8.800	9.7	9.7	11.1000	0.8700	1.82	9.7	9.7	11.1000	0.8700	1.82	9.7	9.7
8.850	9.7	9.7	11.1000	0.8700	1.85	9.7	9.7	11.1000	0.8700	1.85	9.7	9.7
8.900	9.7	9.7	11.1000	0.8700	1.88	9.7	9.7	11.1000	0.8700	1.88	9.7	9.7
8.950	9.7	9.7	11.1000	0.8700	1.91	9.7	9.7	11.1000	0.8700	1.91	9.7	9.7
9.000	9.7	9.7	11.1000	0.8700	1.94	9.7	9.7	11.1000	0.8700	1.94	9.7	9.7
9.050	9.7	9.7	11.1000	0.8700	1.97	9.7	9.7	11.1000	0.8700	1.97	9.7	9.7
9.100	9.7	9.7	11.1000	0.8700	2.00	9.7	9.7	11.1000	0.8700	2.00	9.7	9.7
9.150	9.7	9.7	11.1000	0.8700	2.03	9.7	9.7	11.1000	0.8700	2.03	9.7	9.7
9.200	9.7	9.7	11.1000	0.8700	2.06	9.7	9.7	11.1000	0.8700	2.06	9.7	9.7
9.250	9.7	9.7	11.1000	0.8700	2.09	9.7	9.7	11.1000	0.8700	2.09	9.7	9.7
9.300	9.7	9.7	11.1000	0.8700	2.12	9.7	9.7	11.1000	0.8700	2.12	9.7	9.7
9.350	9.7	9.7	11.1000	0.8700	2.15	9.7	9.7	11.1000	0.8700	2.15	9.7	9.7
9.400	9.7	9.7	11.1000	0.8700	2.18	9.7	9.7	11.1000	0.8700	2.18	9.7	9.7
9.450	9.7	9.7	11.1000	0.8700	2.21	9.7	9.7	11.1000	0.8700	2.21	9.7	9.7
9.500	9.7	9.7	11.1000	0.8700	2.24	9.7	9.7	11.1000	0.8700	2.24	9.7	9.7
9.550	9.7	9.7	11.1000	0.8700	2.27	9.7	9.7	11.1000	0.8700	2.27	9.7	9.7
9.600	9.7	9.7	11.1000	0.8700	2.30	9.7	9.7	11.1000	0.8700	2.30	9.7	9.7
9.650	9.7	9.7	11.1000	0.8700	2.33	9.7	9.7	11.1000	0.8700	2.33	9.7	9.7
9.700	9.7	9.7	11.1000	0.8700	2.36	9.7	9.7	11.1000	0.8700	2.36	9.7	9.7
9.750	9.7	9.7	11.1000	0.8700	2.39	9.7	9.7	11.1000	0.8700	2.39	9.7	9.7
9.800	9.7	9.7	11.1000	0.8700	2.42	9.7	9.7	11.1000	0.8700	2.42	9.7	9.7
9.850	9.7	9.7	11.1000	0.8700	2.45	9.7	9.7	11.1000	0.8700	2.45	9.7	9.7
9.900	9.7	9.7	11.1000	0.8700	2.48	9.7	9.7	11.1000	0.8700	2.48	9.7	9.7
9.950	9.7	9.7	11.1000	0.8700	2.51	9.7	9.7	11.1000	0.8700	2.51	9.7	9.7
10.000	9.7	9.7	11.1000	0.8700	2.54	9.7	9.7	11.1000	0.8700	2.54	9.7	9.7

NHTS BRIDGE DESIGN PROGRAM BGCS												
VERSION 2.9.1.0												
RUN TIME: 08/07/2011 14:17:35.546												
Filename: C:\DOCS\N\9593\LOCALS\Temp\Section_of\Comm\Stringer A.OUT												
----- GIRDER 2 FLANGE PLATE AREA REQUIRED FOR STRENGTH/CONSTRUCTIBILITY (*) - DIFFERENT THAN INPUT -----												
SPAN/LAC	INF AREA	REQ AREA	TOP FLANGE	THICK	STRESS	INF AREA	REQ AREA	THICK	STRESS	INF AREA	REQ AREA	RATIO
(in)	(in)	(in)	(in)	(in)	(ksi)	(in)	(in)	(in)	(ksi)	(in)	(in)	(in)
6.000	9.7	9.7	11.1000	0.8700	0.14	9.7	9.7	11.1000	0.8700	0.14	9.7	9.7
6.050	9.7	9.7	11.1000	0.8700	0.17	9.7	9.7	11.1000	0.8700	0.17	9.7	9.7
6.100	9.7	9.7	11.1000	0.8700	0.20	9.7	9.7	11.1000	0.8700	0.20	9.7	9.7
6.150	9.7	9.7	11.1000	0.8700	0.23	9.7	9.7	11.1000	0.8700	0.23	9.7	9.7
6.200	9.7	9.7	11.1000	0.8700	0.26	9.7	9.7	11.1000	0.8700	0.26	9.7	9.7
6.250	9.7	9.7	11.1000	0.8700	0.29	9.7	9.7	11.1000	0.8700	0.29	9.7	9.7
6.300	9.7	9.7	11.1000	0.8700	0.32	9.7	9.7	11.1000	0.8700	0.32	9.7	9.7
6.350	9.7	9.7	11.1000	0.8700	0.35	9.7	9.7	11.1000	0.870			



SPAN,LOC	TOP FLANGE	THICK	STRESS	IMP AREA	REQ AREA	BOTTOM FLANGE	THICK	STRESS	THICK	RATIO
9.476	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
9.483	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
9.490	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
9.497	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
9.504	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
9.511	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
9.518	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
9.525	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
9.532	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
9.539	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
9.546	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
9.553	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
9.560	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
9.567	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
9.574	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
9.581	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
9.588	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
9.595	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
9.602	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
9.609	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
9.616	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
9.623	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
9.630	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
9.637	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
9.644	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
9.651	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
9.658	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
9.665	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
9.672	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
9.679	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
9.686	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
9.693	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
9.700	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49

NOTE: BRIDGE DESIGN PROGRAM BIDS
 RUN TIME: 08/07/2011 14:17:35.546
 FILENAME: C:\DOCS\1\Gregory\ALOCALS\1\Temp\SteelDen_Misc\Stringer A.OUT

VERSION 2.9.1.0 OUTPUT
 ***** GIRDER 2 FLANGE PLATE AREA REQUIRED FOR STRENGTH/CONSTRUCTIBILITY (* = DIFFERENT THAN INPUT) *****

SPAN,LOC	TOP FLANGE	THICK	STRESS	IMP AREA	REQ AREA	BOTTOM FLANGE	THICK	STRESS	THICK	RATIO
10.085	9.7	11.1000	0.8700	0.25	9.7	11.1000	0.8700	0.82	9.7	0.82
10.092	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.47	9.7	0.47
10.099	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.46	9.7	0.46
10.106	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.46	9.7	0.46
10.113	9.7	11.1000	0.8700	0.06	9.7	11.1000	0.8700	0.33	9.7	0.33
10.120	9.7	11.1000	0.8700	0.06	9.7	11.1000	0.8700	0.30	9.7	0.30
10.250	9.7	11.1000	0.8700	0.03	9.7	11.1000	0.8700	0.25	9.7	0.25
10.257	9.7	11.1000	0.8700	0.03	9.7	11.1000	0.8700	0.25	9.7	0.25
10.264	9.7	11.1000	0.8700	0.03	9.7	11.1000	0.8700	0.25	9.7	0.25
10.271	9.7	11.1000	0.8700	0.03	9.7	11.1000	0.8700	0.25	9.7	0.25
10.278	9.7	11.1000	0.8700	0.25	9.7	11.1000	0.8700	0.31	9.7	0.31
10.380	9.7	11.1000	0.8700	0.21	9.7	11.1000	0.8700	0.35	9.7	0.35
10.387	9.7	11.1000	0.8700	0.18	9.7	11.1000	0.8700	0.32	9.7	0.32
10.394	9.7	11.1000	0.8700	0.20	9.7	11.1000	0.8700	0.32	9.7	0.32
10.401	9.7	11.1000	0.8700	0.18	9.7	11.1000	0.8700	0.38	9.7	0.38
10.408	9.7	11.1000	0.8700	0.15	9.7	11.1000	0.8700	0.40	9.7	0.40
10.415	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.41	9.7	0.41
10.422	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.41	9.7	0.41
10.550	9.7	11.1000	0.8700	0.16	9.7	11.1000	0.8700	0.40	9.7	0.40
10.557	9.7	11.1000	0.8700	0.16	9.7	11.1000	0.8700	0.40	9.7	0.40
10.564	9.7	11.1000	0.8700	0.18	9.7	11.1000	0.8700	0.39	9.7	0.39
10.571	9.7	11.1000	0.8700	0.18	9.7	11.1000	0.8700	0.34	9.7	0.34
10.578	9.7	11.1000	0.8700	0.28	9.7	11.1000	0.8700	0.34	9.7	0.34
10.585	9.7	11.1000	0.8700	0.28	9.7	11.1000	0.8700	0.34	9.7	0.34
10.592	9.7	11.1000	0.8700	0.34	9.7	11.1000	0.8700	0.34	9.7	0.34
10.599	9.7	11.1000	0.8700	0.34	9.7	11.1000	0.8700	0.34	9.7	0.34
10.606	9.7	11.1000	0.8700	0.34	9.7	11.1000	0.8700	0.34	9.7	0.34
10.613	9.7	11.1000	0.8700	0.34	9.7	11.1000	0.8700	0.34	9.7	0.34
10.620	9.7	11.1000	0.8700	0.34	9.7	11.1000	0.8700	0.34	9.7	0.34
10.627	9.7	11.1000	0.8700	0.34	9.7	11.1000	0.8700	0.34	9.7	0.34
10.634	9.7	11.1000	0.8700	0.34	9.7	11.1000	0.8700	0.34	9.7	0.34
10.641	9.7	11.1000	0.8700	0.34	9.7	11.1000	0.8700	0.34	9.7	0.34
10.648	9.7	11.1000	0.8700	0.34	9.7	11.1000	0.8700	0.34	9.7	0.34
10.655	9.7	11.1000	0.8700	0.34	9.7	11.1000	0.8700	0.34	9.7	0.34
10.662	9.7	11.1000	0.8700	0.34	9.7	11.1000	0.8700	0.34	9.7	0.34
10.669	9.7	11.1000	0.8700	0.34	9.7	11.1000	0.8700	0.34	9.7	0.34
10.676	9.7	11.1000	0.8700	0.34	9.7	11.1000	0.8700	0.34	9.7	0.34
10.683	9.7	11.1000	0.8700	0.34	9.7	11.1000	0.8700	0.34	9.7	0.34
10.690	9.7	11.1000	0.8700	0.34	9.7	11.1000	0.8700	0.34	9.7	0.34
10.697	9.7	11.1000	0.8700	0.34	9.7	11.1000	0.8700	0.34	9.7	0.34
10.704	9.7	11.1000	0.8700	0.34	9.7	11.1000	0.8700	0.34	9.7	0.34
10.711	9.7	11.1000	0.8700	0.34	9.7	11.1000	0.8700	0.34	9.7	0.34
10.718	9.7	11.1000	0.8700	0.34	9.7	11.1000	0.8700	0.34	9.7	0.34
10.725	9.7	11.1000	0.8700	0.34	9.7	11.1000	0.8700	0.34	9.7	0.34
10.800	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
10.807	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
10.814	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
10.821	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
10.828	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
10.835	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
10.842	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
10.849	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
10.856	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
10.863	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
10.870	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
10.877	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
10.884	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
10.891	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
10.898	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
10.905	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
10.912	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
10.919	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
10.926	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
10.933	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
10.940	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
10.947	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
10.954	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
10.961	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
10.968	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
10.975	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
10.982	9.7	11.1000	0.8700	0.14	9.7	11.1000	0.8700	0.49	9.7	0.49
10.989	9.7	11.1000	0.8700							

