Erection Plan Support Calculations
STP 5600 (12)

Colchester, Vermont

CEE 38-mi-15

Prepared for:
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By:
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Colchester, Vermont

Erection Plan

TH 27 (Mill Pond Road) Bridge 12
Colchester Bridge 12 - STP 5600(12)

Location:
Town of Colchester in Chittenden County on TH 27 over the Indian Brook adjacent to the Mill Pond Dam. Approximately 0.24 miles south of the intersection of VT 2A and TH 27

References:
-Use AISC 9th ASD to check stresses in girders during erection
-AASHTO 7th Ed.

Calculate Section Properties of 1G1A/2G2A:

Component	H(in)	W(in)	A(in^2)	y(in)	Ay(in^3)	I(in^4)	d(in)	Ad^2*I(in^4)
(1)Flange	0.875	18.000	15.750	0.438	6.891	1.005	23.438	8652.738
(2)Web	46.000	0.500	23.000	23.875	549.125	4055.667	0.000	4055.667
(3)Flange	0.875	18.000	15.750	47.313	745.172	1.005	23.438	8652.738
SUM	47.750		54.500		1301.188			21361.143
Ybar(in)	23.875							
Yt(in)	Yb(in)		A(in^2)	Sbot(in^3)	Stop(in^3)	I(in^4)		wt/ft
23.875	23.875		54.500	894.708	894.708	21361.143		185.451

$S_b = 894.708\ in^3$ $\quad S_t = 894.708\ in^3$ $\quad w_{self} = 185.451\ plf$

$d = 47.75\ in$ $\quad b_f = 18\ in$ $\quad t_f = 0.875\ in$ $\quad A_f := b_f \cdot t_f = 15.75\ in^2$

$d_{web} := d - 2 \cdot t_f = 46\ in$ $\quad t_w = 0.5\ in$ $\quad F_y := 50\ ksi$

$L_{1G1A} := 69.1\ ft$ $\quad L_{2G2A} := 71.12\ ft$

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$$L_c := min\left(\frac{\frac{76 \cdot b_f}{in}}{\sqrt{\frac{F_y}{ksi}}}, \frac{20000}{\left(\frac{\frac{d}{in}}{\frac{A_f}{in^2}}\right) \cdot \frac{F_y}{ksi}}\right) \cdot in = 131.937\ in$$ F1-2, ASD

$d_{compweb} := \frac{d_{web}}{2} \cdot \frac{1}{3} = 7.667\ in$ $A_{compweb} := d_{compweb} \cdot t_w = 3.833\ in^2$

$A_t := A_{compweb} + A_f = 19.583\ in^2$ $I_t := \frac{\left(t_f \cdot b_f^{\ 3}\right)}{12} + \frac{\left(d_{compweb} \cdot t_w^{\ 3}\right)}{12} = 425.33\ in^4$

$r_T := \sqrt{\frac{I_t}{A_t}} = 4.66\ in$

Check stress during lift on 1G1A:

$W_a := L_{1G1A} \cdot 1.15 \cdot w_{self} = 14.737\ kip$

$w_{beam} := w_{self} \cdot 1.15 = 213.269\ plf$ increase by 15% for connections, welds, etc.

$M_u := 23300\ lbf \cdot ft = 279.6\ kip \cdot in$ Moment induced by vertical loads (dead load)

$f_{bv} := \frac{M_u}{S_b} = 0.313\ ksi$ Stress induced by dead load

Calculate Stress Induced by Curvature of Girders:

$l := L_{1G1A} = 69.1\ ft$ $R := 332.542\ ft$ $N := 10$ $D := 3.833\ ft$

$M_{lat} := \frac{M_u \cdot l^2}{N \cdot R \cdot D} = 104.739\ kip \cdot in$ C4.6.1.2.4b-1, AASHTO

$S_{flange} := \frac{t_f \cdot b_f^{\ 2}}{6} = 47.25\ in^3$

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$f_{bh} := \frac{M_{lat}}{S_{flange}} = 2.217\ ksi$ Conservatively, resist moment with (1) flange only

$f_b := f_{bv} + \frac{1}{3} \cdot f_{bh} = 1.051\ ksi$

$L_b := L_{1G1A} = 69.1\ ft$ conservative

$Check_{Fb} :=$ if $L_b < L_c$
"Fb=0.66Fy"
else
"Check Equation F1−6, F1−7, & F1−8"

$Check_{Fb} =$ "Check Equation F1−6, F1−7, & F1−8"

$l := L_b = 829.2\ in$ $\frac{l}{r_T} = 177.926$ Assume $C_b := 1.0$

$Limit_1 := \sqrt{\frac{\left(102 \cdot 10^3 \cdot C_b\right)}{\frac{F_y}{ksi}}} = 45.166$ $Limit_2 := \sqrt{\frac{\left(510 \cdot 10^3 \cdot C_b\right)}{\frac{F_y}{ksi}}} = 100.995$

$F_{b1} := \left(\frac{2}{3} - \frac{\left(\frac{F_y}{ksi} \cdot \left(\frac{l}{r_T}\right)^2\right)}{1530 \cdot 10^3 \cdot C_b}\right) \cdot F_y = -18.395\ ksi$ (F1-6)

$F_{b2} := \frac{\left(170 \cdot 10^3 \cdot C_b\right)}{\left(\frac{l}{r_T}\right)^2} \cdot ksi = 5.37\ ksi$ (F1-7)

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$$F_{b3} := \frac{\left(12 \cdot 10^3 \cdot C_b\right)}{\left(l \cdot \frac{d}{A_f}\right)} \cdot ksi = 4.773\ ksi$$ (F1-8)

$$F_b := \begin{cases} \max\left(F_{b1}, F_{b3}\right) & \text{if } \frac{l}{r_T} < Limit_2 \\ \max\left(F_{b2}, F_{b3}\right) & \text{else} \end{cases}$$

$F_b = 5.37\ ksi$

$f_b = 1.051\ ksi$

$$Check_1 := \begin{cases} \text{“OK”} & \text{if } f_b < F_b \\ \text{“No Good”} & \text{else} \end{cases} = \text{“OK”}$$

<u>Check stress on 1G1A when set on Abutments:</u>

$L_{1G1A} = 69.1\ ft$

$w_{beam} := w_{self} \cdot 1.15 = 213.269\ plf$ increase by 15% for connections, welds, etc.

$M_u := 39400\ lbf \cdot ft = 472.8\ kip \cdot in$ Moment induced by vertical loads (dead load)

$f_{bv} := \frac{M_u}{S_t} = 0.528\ ksi$ Stress induced by dead load

Calculate Stress Induced by Curvature of Girders:

$l := L_{1G1A} = 69.1\ ft$ $R := 332.542\ ft$ $N := 10$ $D := 3.833\ ft$

$M_{lat} := \frac{M_u \cdot l^2}{N \cdot R \cdot D} = 177.112\ kip \cdot in$ C4.6.1.2.4b-1, AASHTO

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$$S_{flange} := \frac{t_f \cdot b_f^{\,2}}{6} = 47.25\ in^3$$

$$f_{bh} := \frac{M_{lat}}{S_{flange}} = 3.748\ ksi$$

Conservatively, resist moment with (1) flange only

$$f_b := f_{bv} + \frac{1}{3} \cdot f_{bh} = 1.778\ ksi$$

$$L_b := L_{1G1A} = 69.1\ ft$$

conservative

$Check_{Fb} :=$ if $L_b < L_c$
  "Fb=0.66Fy"
else
  "Check Equation F1−6, F1−7, & F1−8"

$Check_{Fb} =$ "Check Equation F1−6, F1−7, & F1−8"

$$l := L_b = 829.2\ in \qquad \frac{l}{r_T} = 177.926$$

Assume $C_b := 1.0$

$$Limit_1 := \sqrt{\frac{\left(102 \cdot 10^3 \cdot C_b\right)}{\frac{F_y}{ksi}}} = 45.166 \qquad Limit_2 := \sqrt{\frac{\left(510 \cdot 10^3 \cdot C_b\right)}{\frac{F_y}{ksi}}} = 100.995$$

$$F_{b1} := \left(\frac{2}{3} - \frac{\left(\frac{F_y}{ksi} \cdot \left(\frac{l}{r_T}\right)^2\right)}{1530 \cdot 10^3 \cdot C_b}\right) \cdot F_y = -18.395\ ksi$$

(F1-6)

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$$F_{b2} := \frac{\left(170 \cdot 10^3 \cdot C_b\right)}{\left(\frac{l}{r_T}\right)^2} \cdot ksi = 5.37\ ksi$$ (F1-7)

$$F_{b3} := \frac{\left(12 \cdot 10^3 \cdot C_b\right)}{\left(l \cdot \frac{d}{A_f}\right)} \cdot ksi = 4.773\ ksi$$ (F1-8)

$$F_b := \begin{cases} \max\left(F_{b1}, F_{b3}\right) & \text{if } \frac{l}{r_T} < Limit_2 \\ \max\left(F_{b2}, F_{b3}\right) & \text{else} \end{cases}$$

$F_b = 5.37\ ksi$

$f_b = 1.778\ ksi$

$$Check_1 := \begin{cases} \text{“OK”} & \text{if } f_b < F_b \\ \text{“No Good”} & \text{else} \end{cases} = \text{“OK”}$$

Check stress during lift on 2G2A:

$L_{2G2A} = 71.12\ ft$

$L_{2G2A} \cdot w_{self} = 13.189\ kip$

$$w_{beam} := w_{self} \cdot 1.15 + \frac{9560\ lbf}{L_{2G2A}} = 347.69\ plf$$

increase by 15% for connections, welds, etc. Add load for intermediate diaphragms

$M_u := 38900\ lbf \cdot ft = 466.8\ kip \cdot in$ Moment induced by vertical loads (dead load)

$$f_{bv} := \frac{M_u}{S_b} = 0.522\ ksi$$ Stress induced by dead load

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Calculate Stress Induced by Curvature of Girders:

$l := L_{2G2A} = 71.12\ ft$ $\quad R := 332.208\ ft$ $\quad N := 10$ $\quad D := 3.833\ ft$

$M_{lat} := \frac{M_u \cdot l^2}{N \cdot R \cdot D} = 185.424\ kip \cdot in$ C4.6.1.2.4b-1, AASHTO

$S_{flange} := \frac{t_f \cdot b_f^2}{6} = 47.25\ in^3$

$f_{bh} := \frac{M_{lat}}{S_{flange}} = 3.924\ ksi$ Conservatively, resist moment with (1) flange only

$f_b := f_{bv} + \frac{1}{3} \cdot f_{bh} = 1.83\ ksi$

$L_b := L_{2G2A} = 71.12\ ft$ conservative

$Check_{Fb} :=$ if $L_b < L_c$
"Fb=0.66Fy"
else
"Check Equation F1−6, F1−7, & F1−8"

$Check_{Fb} =$ "Check Equation F1−6, F1−7, & F1−8"

$l := L_b = 853.44\ in$ $\quad \frac{l}{r_T} = 183.127$ Assume $C_b := 1.0$

$Limit_1 := \sqrt{\frac{(102 \cdot 10^3 \cdot C_b)}{\frac{F_y}{ksi}}} = 45.166$ $\quad Limit_2 := \sqrt{\frac{(510 \cdot 10^3 \cdot C_b)}{\frac{F_y}{ksi}}} = 100.995$

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$$F_{b1} := \left(\frac{2}{3} - \frac{\left(\frac{F_y}{ksi} \cdot \left(\frac{l}{r_T} \right)^2 \right)}{1530 \cdot 10^3 \cdot C_b} \right) \cdot F_y = -21.463\ ksi \qquad \text{(F1-6)}$$

$$F_{b2} := \frac{\left(170 \cdot 10^3 \cdot C_b\right)}{\left(\frac{l}{r_T} \right)^2} \cdot ksi = 5.069\ ksi \qquad \text{(F1-7)}$$

$$F_{b3} := \frac{\left(12 \cdot 10^3 \cdot C_b\right)}{\left(l \cdot \frac{d}{A_f} \right)} \cdot ksi = 4.638\ ksi \qquad \text{(F1-8)}$$

$$F_b := \begin{cases} \max\left(F_{b1}, F_{b3}\right) & \text{if } \frac{l}{r_T} < Limit_2 \\ \max\left(F_{b2}, F_{b3}\right) & \text{else} \end{cases}$$

$F_b = 5.069\ ksi$

$f_b = 1.83\ ksi$

$$Check_1 := \begin{cases} \text{“OK”} & \text{if } f_b < F_b \\ \text{“No Good”} & \text{else} \end{cases} = \text{“OK”}$$

Girder will be connected to 1G1A with intermediate diaphragms before disconnecting crane. Disconnect crane, then connect abutment diaphragms.

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Calculate Section Properties of 3G3A/4G4A:

Component	H(in)	W(in)	A(in^2)	y(in)	Ay(in^3)	I(in^4)	d(in)	Ad^2*I(in^4)
(1)Flange	1.250	18.000	22.500	0.625	14.063	2.930	20.973	9900.133
(2)Web	46.000	0.500	23.000	24.250	557.750	4055.667	2.652	4217.402
(3)Flange	0.875	18.000	15.750	47.688	751.078	1.005	26.089	10721.255
SUM	48.125		61.250		1322.891			24838.791
Ybar(in)	21.598							
Yt(in)	Yb(in)		A(in^2)	Sbot(in^3)	Stop(in^3)	I(in^4)		wt/ft
26.527	21.598		61.250	1150.039	936.366	24838.791		208.420

$S_b = (1.15 \cdot 10^3)\ in^3$ $\quad S_t = 936.366\ in^3$ $\quad w_{self} = 208.42\ plf$

$d = 48.125\ in$ $\quad b_f = 18\ in$ $\quad t_f = 0.875\ in$ $\quad A_f := b_f \cdot t_f = 15.75\ in^2$

$d_{web} := 46\ in$ $\quad t_w = 0.5\ in$ $\quad F_y := 50\ ksi$

$L_{3G3A} := 73.1\ ft$ $\quad L_{4G4A} := 75.12\ ft$

$$L_c := min\left(\frac{\frac{76 \cdot b_f}{in}}{\sqrt{\frac{F_y}{ksi}}}, \frac{20000}{\left(\frac{\frac{d}{in}}{\frac{A_f}{in^2}}\right) \cdot \frac{F_y}{ksi}}\right) \cdot in = 130.909\ in$$

F1-2, ASD

$d_{compweb} := \frac{d_{web}}{2} \cdot \frac{1}{3} = 7.667\ in$ $\quad A_{compweb} := d_{compweb} \cdot t_w = 3.833\ in^2$

$A_t := A_{compweb} + A_f = 19.583\ in^2$ $\quad I_t := \frac{(t_f \cdot b_f^3)}{12} + \frac{(d_{compweb} \cdot t_w^3)}{12} = 425.33\ in^4$

$r_T := \sqrt{\frac{I_t}{A_t}} = 4.66\ in$

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Check stress during lift on 3G3A:

$w_{beam} := w_{self} \cdot 1.15 = 239.683\ plf$ increase by 15% for connections, welds, etc.

$M_u := 27600\ lbf \cdot ft = 331.2\ kip \cdot in$ Moment induced by vertical loads (dead load)

$f_{bv} := \frac{M_u}{S_b} = 0.288\ ksi$ Stress induced by dead load

Calculate Stress Induced by Curvature of Girders:

$l := L_{3G3A} = 73.1\ ft$ $R := 341.875\ ft$ $N := 10$ $D := 3.833\ ft$

$M_{lat} := \frac{M_u \cdot l^2}{N \cdot R \cdot D} = 135.058\ kip \cdot in$ C4.6.1.2.4b-1, AASHTO

$S_{flange} := \frac{t_f \cdot b_f^2}{6} = 47.25\ in^3$

$f_{bh} := \frac{M_{lat}}{S_{flange}} = 2.858\ ksi$ Conservatively, resist moment with (1) flange only, smaller flange

$f_b := f_{bv} + \frac{1}{3} \cdot f_{bh} = 1.241\ ksi$

$L_b := L_{3G3A} = 73.1\ ft$ conservative

$Check_{Fb} :=$ if $L_b < L_c$
  "Fb=0.66Fy"
else
  "Check Equation F1−6, F1−7, & F1−8"

$Check_{Fb} =$ "Check Equation F1−6, F1−7, & F1−8"

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$l := L_b = 877.2\ in$ $\qquad \dfrac{l}{r_T} = 188.226$ $\qquad$ Assume $\quad C_b := 1.0$

$$Limit_1 := \sqrt{\frac{\left(102 \cdot 10^3 \cdot C_b\right)}{\dfrac{F_y}{ksi}}} = 45.166 \qquad Limit_2 := \sqrt{\frac{\left(510 \cdot 10^3 \cdot C_b\right)}{\dfrac{F_y}{ksi}}} = 100.995$$

$$F_{b1} := \left(\frac{2}{3} - \frac{\left(\dfrac{F_y}{ksi} \cdot \left(\dfrac{l}{r_T}\right)^2\right)}{1530 \cdot 10^3 \cdot C_b}\right) \cdot F_y = -24.557\ ksi \qquad \text{(F1-6)}$$

$$F_{b2} := \frac{\left(170 \cdot 10^3 \cdot C_b\right)}{\left(\dfrac{l}{r_T}\right)^2} \cdot ksi = 4.798\ ksi \qquad \text{(F1-7)}$$

$$F_{b3} := \frac{\left(12 \cdot 10^3 \cdot C_b\right)}{\left(l \cdot \dfrac{d}{A_f}\right)} \cdot ksi = 4.477\ ksi \qquad \text{(F1-8)}$$

$$F_b := \begin{cases} \max\left(F_{b1}, F_{b3}\right) & \text{if } \dfrac{l}{r_T} < Limit_2 \\ \max\left(F_{b2}, F_{b3}\right) & \text{else} \end{cases}$$

$F_b = 4.798\ ksi$

$f_b = 1.241\ ksi$

$$Check_1 := \begin{cases} \text{“OK”} & \text{if } f_b < F_b \\ \text{“No Good”} & \text{else} \end{cases} = \text{“OK”}$$

Girder will be connected to 2G2A with intermediate diaphragms before disconnecting crane. Disconnect crane, then connect abutment diaphragms.

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Check stress during lift on 4G4A:

$w_{beam} := w_{self} \cdot 1.15 = 239.683\ plf$ increase by 15% for connections, welds, etc.

$M_u := 29600\ lbf \cdot ft = 355.2\ kip \cdot in$ Moment induced by vertical loads (dead load)

$f_{bv} := \frac{M_u}{S_b} = 0.309\ ksi$ Stress induced by dead load

Calculate Stress Induced by Curvature of Girders:

$l := L_{4G4A} = 75.12\ ft$ $R := 351.542\ ft$ $N := 10$ $D := 3.833\ ft$

$M_{lat} := \frac{M_u \cdot l^2}{N \cdot R \cdot D} = 148.754\ kip \cdot in$ C4.6.1.2.4b-1, AASHTO

$S_{flange} := \frac{t_f \cdot b_f^2}{6} = 47.25\ in^3$

$f_{bh} := \frac{M_{lat}}{S_{flange}} = 3.148\ ksi$ Conservatively, resist moment with (1) flange only, smaller flange

$f_b := f_{bv} + \frac{1}{3} \cdot f_{bh} = 1.358\ ksi$

$L_b := L_{4G4A} = 75.12\ ft$ conservative

$Check_{Fb} :=$ if $L_b < L_c$
  "Fb=0.66Fy"
else
  "Check Equation F1−6, F1−7, & F1−8"

$Check_{Fb} =$ "Check Equation F1−6, F1−7, & F1−8"

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$l := L_b = 901.44\ in$ $\qquad \dfrac{l}{r_T} = 193.427$ $\qquad$ Assume $\quad C_b := 1.0$

$$Limit_1 := \sqrt{\frac{\left(102 \cdot 10^3 \cdot C_b\right)}{\dfrac{F_y}{ksi}}} = 45.166 \qquad Limit_2 := \sqrt{\frac{\left(510 \cdot 10^3 \cdot C_b\right)}{\dfrac{F_y}{ksi}}} = 100.995$$

$$F_{b1} := \left(\frac{2}{3} - \frac{\left(\dfrac{F_y}{ksi} \cdot \left(\dfrac{l}{r_T}\right)^2\right)}{1530 \cdot 10^3 \cdot C_b}\right) \cdot F_y = -27.801\ ksi \qquad \text{(F1-6)}$$

$$F_{b2} := \frac{\left(170 \cdot 10^3 \cdot C_b\right)}{\left(\dfrac{l}{r_T}\right)^2} \cdot ksi = 4.544\ ksi \qquad \text{(F1-7)}$$

$$F_{b3} := \frac{\left(12 \cdot 10^3 \cdot C_b\right)}{\left(l \cdot \dfrac{d}{A_f}\right)} \cdot ksi = 4.357\ ksi \qquad \text{(F1-8)}$$

$$F_b := \begin{array}{l} \text{if } \dfrac{l}{r_T} < Limit_2 \\ \quad \max\left(F_{b1}, F_{b3}\right) \\ \text{else} \\ \quad \max\left(F_{b2}, F_{b3}\right) \end{array} \qquad F_b = 4.544\ ksi \qquad f_b = 1.358\ ksi$$

$$Check_1 := \begin{array}{l} \text{if } f_b < F_b \\ \quad \text{“OK”} \\ \text{else} \\ \quad \text{“No Good”} \end{array} = \text{“OK”}$$

Girder will be connected to 3G3A with intermediate diaphragms before disconnecting crane. Disconnect crane, then connect abutment diaphragms.

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Check crane mat capacity for HL150 loaded at max radius

Use concrete waste blocks to distribute load-5'x12'
Place crane mats on fill
Stack (2) mats on top of each other

Heaviest Beam: 2G2A with intermediate diaphgrams attached. $Beam_{2G2A} := 13646\ lbf + 8 \cdot (1195\ lbf) = 23.206\ kip$

Most Loaded outrigger: $P := 110\ kip$ from BeamBoy, conservative

Panel:

$D_p := 8\ in$

$B_p := 5\ ft$

$L_p := 12\ ft$

$\gamma_{conc} := 150\ pcf$

$P_{dead} := 2 \cdot D_p \cdot B_p \cdot L_p \cdot \gamma_{conc} = 12\ kip$

$w := \frac{(P + P_{dead})}{(L_p \cdot B_p)} = 2.033\ ksf$ say load is (0) at ends of panel, linearly increasing to center of panel

$w_{max} := w \cdot 2 = 4.067\ ksf$ @ center

$w_{min} := 0\ ksf$ @ ends

$w_{allow} := 6\ ksf$ from Table C10.6.2.6.1-1, AASHTO

Gravel, gravel-sand fill, loose.

$FS := \frac{w_{allow}}{w_{max}} = 1.475$ okay for construction loading

Now check panel moment capacity:

-Model as a canteliever support @ center of concrete panel
-Analyze on a per foot basis

$$M_{max} := \frac{\left(\frac{(w_{max} + w_{min})}{2} \cdot 1\ ft\right) \cdot (6\ ft)^2}{3} = 292.8\ kip \cdot in$$

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Calculate capacity:
-Say #5 bars @ 6" spacing, 2" c.c

$f_y := 60\ ksi$ $\quad f'_c := 3\ ksi$ $\quad A_s := 0.31\ in^2 \cdot 2$ $\quad b_w := 1\ ft$

$$d := 8\ in - 2\ in - \left(\frac{1}{2} \cdot 0.625\ in\right) = 5.688\ in$$

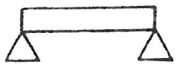
$$a := \frac{(A_s \cdot f_y)}{(0.85 \cdot f'_c \cdot b_w)} = 1.216\ in$$

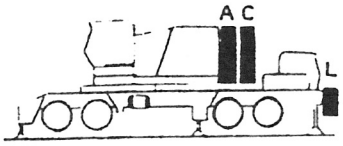
$$M_n := A_s \cdot f_y \cdot \left(d - \frac{a}{2}\right) = 188.963\ kip \cdot in$$

$$FS := \frac{2 \cdot M_n}{M_{max}} = 1.291$$

(2) mats stacked, okay for construction loading.

68A BOOM – ON OUTRIGGERS 360°
85% STABILITY





CAPACITY IN POUNDS
WITH A C + L COUNTERWEIGHTS

COUNTERWEIGHT CONFIGURATION

	BOOM LGTH	LOAD RAD	BOOM ANG	SHEAVE HGT	RATED LOAD
	50	12	81.9	57.1	300,000
	50	13	80.7	57.0	294,900
	50	14	79.6	56.8	273,400
	50	15	78.4	56.5	254,800
	50	16	77.2	56.3	238,400
	50	17	76.0	56.0	224,100
	50	18	74.8	55.7	211,300
†002	50	19	73.6	55.4	199,900
	50	20	72.4	55.1	189,500
	50	25	66.2	53.1	150,400
	50	30	59.7	50.4	124,300
	50	35	52.7	46.8	100,500
	50	40	44.9	42.2	82,300
	50	45	35.8	36.0	69,300
	50	50	23.7	26.8	59,600
	60	14	81.3	66.9	273,100
	60	15	80.3	66.8	254,500
	60	16	79.4	66.6	238,200
	60	17	78.4	66.3	223,800
	60	18	77.4	66.1	211,000
	60	19	76.4	65.8	199,600
	60	20	75.4	65.6	189,300
†003	60	25	70.4	63.9	150,100
	60	30	65.2	61.8	124,100
	60	35	59.8	59.0	100,700
	60	40	54.0	55.6	82,400
	60	45	47.7	51.4	69,400
	60	50	40.7	46.0	59,800
	60	60	21.5	28.6	46,300
	70	16	80.9	76.7	237,900
	70	17	80.1	76.6	223,600
	70	18	79.2	76.3	210,800
	70	19	78.4	76.1	199,400
	70	20	77.6	75.9	189,100
	70	25	73.3	74.5	149,900
†004	70	30	69.0	72.7	123,900
	70	35	64.5	70.4	100,800
	70	40	59.8	67.7	82,500
	70	45	54.9	64.4	69,500
	70	50	49.6	60.3	59,800
	70	60	37.5	49.4	46,400
	70	70	19.8	30.3	37,500
	80	17	81.3	86.7	223,200
	80	18	80.6	86.5	210,400
	80	19	79.9	86.3	199,000
	80	20	79.1	86.1	188,700
	80	25	75.5	84.9	149,500
	80	30	71.7	83.4	123,500
	80	35	67.9	81.4	100,800
†005	80	40	63.9	79.1	82,500
	80	45	59.8	76.3	69,400

	BOOM LGTH	LOAD RAD	BOOM ANG	SHEAVE HGT	RATED LOAD
	80	50	55.5	73.1	59,700
	80	60	46.2	64.7	46,300
	80	70	34.9	52.6	37,400
	80	80	18.4	31.9	31,000
	90	19	81.0	96.5	198,700
	90	20	80.4	96.3	188,400
	90	25	77.1	95.3	149,300
	90	30	73.8	93.9	123,300
	90	35	70.5	92.2	100,800
	90	40	67.0	90.2	82,400
†006	90	45	63.5	87.8	69
	90	50	59.8	85.0	59
	90	60	52.1	78.0	46
	90	70	43.4	68.7	37,400
	90	80	32.8	55.6	31,100
	90	90	17.3	33.4	26,300
	100	20	81.3	106.5	188,000
	100	25	78.4	105.5	148,900
	100	30	75.5	104.3	122,900
	100	35	72.5	102.8	100,700
	100	40	69.4	101.0	82,300
	100	45	66.3	98.9	69,300
†007	100	50	63.1	96.5	59,500
	100	60	56.5	90.5	46,200
	100	70	49.2	82.7	37,200
	100	80	41.0	72.5	30,900
	100	90	31.1	58.4	26,200
	100	100	16.4	34.8	22,400
	110	22	81.1	116.3	169,900
	110	25	79.5	115.7	148,500
	110	30	76.8	114.6	122,500
	110	35	74.1	113.3	100,600
	110	40	71.4	111.7	82,200
	110	45	68.6	109.8	69,100
	110	50	65.8	107.6	59,300
†008	110	60	59.9	102.3	46,000
	110	70	53.6	95.6	37,000
	110	80	46.7	87.1	30,700
	110	90	39.0	76.0	26,000
	110	100	29.6	61.0	22,300
	110	110	15.6	36.2	19,300
	120	24	80.9	126.1	154,600
	120	25	80.4	125.9	148,000
	120	30	77.9	124.9	122,000
	120	35	75.5	123.7	100,500
	120	40	73.0	122.2	82,000
	120	45	70.5	120.5	68,900
	120	50	67.9	118.5	59,100
†009	120	60	62.6	113.8	45,700
	120	70	57.1	107.8	36,800

	BOOM LGTH	LOAD RAD	BOOM ANG	SHEAVE HGT	RATED LOAD
	120	80	51.1	100.4	30,400
	120	90	44.6	91.2	25,800
	120	100	37.2	79.4	22,100
	120	110	28.3	63.5	19,100
	120	120	14.9	37.4	16,600
	130	25	81.1	136.1	147,600
	130	30	78.9	135.1	121,700
	130	35	76.6	134.0	100,200
	130	40	74.3	132.7	81,800
	130	45	72.0	131.1	68,700
	130	50	69.7	129.3	58,900
	130	80	54.6	113.1	30,200
	130	90	49.0	105.1	25,600
	130	100	42.8	95.2	21,900
	130	110	35.7	82.7	19,000
	130	120	27.1	65.9	16,500
	130	130	14.3	38.7	14,500
	140	27	80.9	145.9	135,800
	140	30	79.7	145.3	121,200
	140	35	77.6	144.3	100,100
	140	40	75.5	143.0	81,700
	140	45	73.4	141.6	68,500
	140	50	71.2	139.9	58,700
	140	60	66.8	136.0	45,300
†011	140	70	62.3	131.1	36,300
	140	80	57.5	125.2	29,900
	140	90	52.5	118.1	25,400
	140	100	47.1	109.4	21,700
	140	110	41.1	98.9	18,700
	140	120	34.3	85.8	16,300
	140	130	26.1	68.2	14,200
	140	140	15.7	35.8	12,500
	150	28	81.2	155.8	130,200
	150	30	80.4	155.5	120,800
	150	35	78.4	154.5	99,900
	150	40	76.5	153.4	81,500
	150	45	74.5	152.0	68,300
	150	50	72.5	150.5	58,500
	150	60	68.4	146.9	45,100
	150	70	64.3	142.4	36,100
†012	150	80	59.9	137.0	29,700
	150	90	55.4	130.5	25,100
	150	100	50.5	122.8	21,400
	150	110	45.4	113.7	18,400
	150	120	39.6	102.6	16,000
	150	130	33.1	88.8	14,000
	150	140	25.2	70.5	12,300
	150	150	13.3	41.0	10,800

Use this configuration for all picks

RATED LOADS APPEARING IN SHADED AREAS ARE BASED ON STRUCTURAL OR OTHER FACTORS RATHER THAN STABILITY.

READ AND UNDERSTAND LIFTING CAPACITY NOTES ON A6-829-800021 LOCATED IN THE FRONT OF THIS MANUAL BEFORE OPERATING THIS MACHINE.

†LMI OPERATING CODE. REFER TO LMI MANUAL FOR OPERATING INSTRUCTIONS.

SERIAL NUMBER

HL150T
IDENTIFICATION

BEAMBOY V2.2 REPORT

1G1A in place

BEAM PROPERTIES

Beam Length = 69.1 ft.

LOAD CONFIGURATION

Point Loads

Distributed Loads

Start=231 lb./ft., x=0 ft.; End=231 lb./ft., x=69.1 ft.

Moments

Supports

Simple support; 0 ft., Reaction=1660 lb.
Simple support; 69.1 ft., Reaction=3930 lb.
Simple support; 27 ft., Reaction=10400 lb.

MAXIMUM VALUES

Maximum Bending Moment = -39400 lb.-ft. at x=27 ft.

8/4/2015

BEAMBOY V2.2 REPORT

1G1A Pick

BEAM PROPERTIES

Beam Length = 69.1 ft.

LOAD CONFIGURATION

Point Loads

Distributed Loads

Start=213 lb./ft., x=0 ft.; End=213 lb./ft., x=69.1 ft.

Moments

Supports

Simple support; 14.4 ft., Reaction=7300 lb.
Simple support; 54.3 ft., Reaction=7440 lb.

MAXIMUM VALUES

Maximum Bending Moment = -23300 lb.-ft. at x=54.3 ft.

8/4/2015

BEAMBOY V2.2 REPORT

2G2A Pick

BEAM PROPERTIES

Beam Length = 71.1 ft.

LOAD CONFIGURATION

Point Loads

Distributed Loads

Start=348 lb./ft., x=0 ft.; End=348 lb./ft., x=71.1 ft.

Moments

Supports

Simple support; 14.8 ft., Reaction=12500 lb.
Simple support; 56.7 ft., Reaction=12200 lb.

MAXIMUM VALUES

Maximum Bending Moment = 38900 lb.-ft. at x=35.9 ft.

8/5/2015

BEAMBOY V2.2 REPORT

3G3A Pick

BEAM PROPERTIES

Beam Length = 73.1 ft.

LOAD CONFIGURATION

Point Loads

Distributed Loads

Start=240 lb./ft., x=0 ft.; End=240 lb./ft., x=73.1 ft.

Moments

Supports

Simple support; 15.2 ft., Reaction=8760 lb.
Simple support; 57.9 ft., Reaction=8760 lb.

MAXIMUM VALUES

Maximum Bending Moment = -27600 lb.-ft. at x=15.2 ft.

8/4/2015

BEAMBOY V2.2 REPORT

4G4A Pick

BEAM PROPERTIES

Beam Length = 75.2 ft.

LOAD CONFIGURATION

Point Loads

Distributed Loads

Start=240 lb./ft., x=0 ft.; End=240 lb./ft., x=75.2 ft.

Moments

Supports

Simple support; 15.7 ft., Reaction=9020 lb.
Simple support; 59.5 ft., Reaction=9010 lb.

MAXIMUM VALUES

Maximum Bending Moment = -29600 lb.-ft. at x=15.7 ft.

8/4/2015

BEAMBOY V2.2 REPORT

HL150 Loaded

BEAM PROPERTIES

Beam Length = 89 ft.

LOAD CONFIGURATION

Point Loads

6000 lb., x=0 ft.
20800 lb., x=9.42 ft.
8750 lb., x=11.5 ft.
23200 lb., x=89 ft.

Distributed Loads

Start=1410 lb./ft., x=0 ft.; End=1410 lb./ft., x=29.5 ft.
Start=75 lb./ft., x=29.5 ft.; End=75 lb./ft., x=89 ft.

Moments

Supports

Simple support; 0 ft., Reaction=-4980 lb.
Simple support; 29.5 ft., Reaction=110000 lb.