

# STATIC EQUIVALENT LOADING: 955 STYLE BACKSTOP

CEILING SUSPENDED, SIDE FOLD, SIDE BRACED

## INTRODUCTION

The following pages show the estimated reaction forces of a backstop- up to the point of structure that is custom designed for each individual project. Custom-designed structure may add overall weight to the assembly, but normally distributes these reaction forces to the building attachment points.

Final reaction magnitude and locations cannot be determined until the backstop is engineered, but this document is meant to serve as a worst-case guide for your project. The reaction forces are based on the weight of the backstop (including the heaviest backboard, height adjuster, etc) and a 0.7 Seismic Factor.

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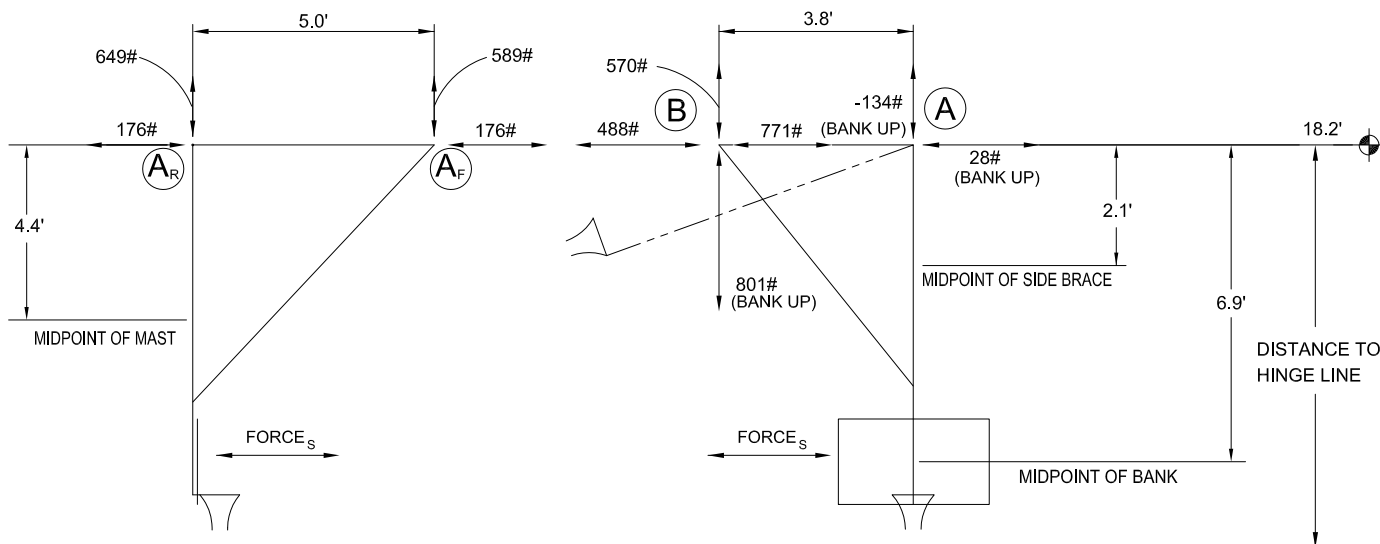
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### WEIGHT LOAD CALCULATIONS (WITH BANK DOWN)

$$\begin{aligned} \text{BACKSTOP'S TOTAL WEIGHT LOAD} &= 504 \text{ lbs (WEIGHT OF FRONT BRACE + WEIGHT OF MAST + WEIGHT OF BANK)} \\ \text{WEIGHT LOAD AT POINT "A"} &= 480 \text{ lbs } \left( \frac{\text{WEIGHT OF SIDE BRACE}}{2} \right) + \text{WEIGHT OF MAST + WEIGHT OF BANK} \\ \text{WEIGHT LOAD AT POINT "B"} &= 30 \text{ lbs } \left( \frac{\text{WEIGHT OF SIDE BRACE}}{2} \right) + \text{WEIGHT OF PULLEY} \end{aligned}$$

+PLEASE NOTE THESE ARE ESTIMATED WEIGHT LOADS FROM THE BACKSTOP MAST HANGERS TO THE FLOOR. THESE ESTIMATES DO NOT INCLUDE ANY SUPERSTRUCTURE WEIGHTS.

### SEISMIC FACTORED MOMENTS AND SUM OF MOMENTS FOR BACKSTOP ELEMENTS

SEISMIC FACTOR = 0.7 (VARIES WITH SEISMIC ZONE, RIGIDITY OF SUPPORT & ROOM USE)

$$\begin{aligned} \text{WEIGHT OF BANK (WB)} &= 329 \text{ lbs} \times \text{SEISMIC FACTOR} \times \text{DISTANCE TO MIDPOINT OF BANK (DB)} = 1589 \text{ ft.lbs SEISMIC MOMENT (MB) (FT.LBS.)} \\ \text{WEIGHT OF SIDE BRACE (WSB)} &= 48 \text{ lbs} \times \text{SEISMIC FACTOR} \times \text{DISTANCE TO MIDPOINT OF SIDE BRACE (DSB)} = 71 \text{ ft.lbs SEISMIC MOMENT (MFB) (FT.LBS.)} \\ \text{WEIGHT OF MAST (WM)} &= 127 \text{ lbs} \times \text{SEISMIC FACTOR} \times \text{DISTANCE TO MIDPOINT OF MAST (DM)} = 391 \text{ ft.lbs SEISMIC MOMENT (MM) (FT.LBS.)} \end{aligned}$$

$$\text{WB} + \text{WFB} + \text{WM} = \text{BACKSTOP'S TOTAL WEIGHT LOAD} = 2051 \text{ ft.lbs SUM OF THE MOMENTS} = \text{MB} + \text{MFB} + \text{MM}$$

### POINT REACTIONS FROM WEIGHT LOADS AND SEISMIC WITH BANK DOWN

#### REACTIONS AT HINGE LINE AT POINT A FROM WEIGHT LOADS AND SEISMIC PARALLEL TO BANK (FIG. 2)

**BANK DOWN**

$$\begin{aligned} R_{\text{VER}}^{\text{AR}} \text{ VERTICAL REACTIONS AT POINT AR: } 649 \text{ lbs} &= \frac{\text{WEIGHT OF MAST} + \text{WEIGHT OF BANK} + \frac{\text{WEIGHT OF THE BANK}}{2 \text{ SUPPORTS}}}{\text{DISTANCE FROM A}_F \text{ TO A}_R / 2} \pm \frac{\text{MOMENT OF THE BRACE}}{\text{DISTANCE FROM A}_F \text{ TO A}_R / 2} \\ R_{\text{VER}}^{\text{AF}} \text{ VERTICAL REACTIONS AT POINT AF: } 598 \text{ lbs} &= \frac{\text{WEIGHT OF BANK}}{2 \text{ SUPPORTS}} + \frac{\text{MOMENT AT MAST} + \text{MOMENT AT BANK}}{\text{DISTANCE BETWEEN SUPPORTS (A}_F - \text{A}_R)} \pm \frac{\text{MOMENT OF THE BRACE}}{\text{DISTANCE FROM A}_F \text{ TO A}_R / 2} \\ R_{\text{HOR}} \text{ HORIZONTAL REACTION FOR BOTH: } 176 \text{ lbs} &= \frac{\text{BACKSTOP'S TOTAL WEIGHT LOAD} \times \text{SEISMIC FACTOR}}{2 \text{ SUPPORTS}} \end{aligned}$$

#### REACTIONS AT HINGE LINE AT POINT B FROM WEIGHT LOADS AND SEISMIC PERPENDICULAR TO BANK (FIG. 1)

**BANK DOWN**

$$\begin{aligned} R_{\text{VER}}^{\text{B}} \text{ VERTICAL REACTION AT POINT B: } 570 \text{ lbs} &= \frac{\text{WEIGHT OF SIDE BRACE}}{2 \text{ SUPPORTS}} + \text{WEIGHT OF PULLEY} \pm \frac{\text{SUM OF THE MOMENTS}}{\text{DISTANCE BETWEEN SUPPORTS (A-B)}} \\ R_{\text{HOR}}^{\text{B}} \text{ HORIZONTAL REACTION AT POINT B: } 488 \text{ lbs} &= \frac{\text{SUM OF THE MOMENTS}}{\text{DISTANCE TO MIDPOINT OF SIDE BRACE} \times 2} \end{aligned}$$

### POINT REACTIONS FROM WEIGHT LOADS AND SEISMIC WITH BANK UP

$$\text{HOIST CABLE TENSION AT POINT C: } 771 \text{ lbs} = \frac{\text{SUM OF THE MOMENTS}}{\text{SEISMIC FACTOR} \times \text{DISTANCE FROM A TO B}}$$

#### REACTIONS AT HINGE LINE AT POINT A FROM WEIGHT LOADS AND SEISMIC PARALLEL TO BANK (FIG. 2)

**BANK UP**

$$\begin{aligned} R_{\text{VER}}^{\text{A-BU}} \text{ VERTICAL REACTION AT POINT A: } -134 \text{ lbs} &= \frac{\text{BACKSTOP'S TOTAL WEIGHT LOAD} - \text{HOIST CABLE TENSION}}{2 \text{ SUPPORTS}} \\ R_{\text{HOR}}^{\text{AF}} \text{ HORIZONTAL REACTION AT POINT A: } 28 \text{ lbs} &= \pm \frac{\text{MOMENT AT BRACE}}{\text{DISTANCE FROM A}_F \text{ TO A}_R / 2} \end{aligned}$$

#### REACTIONS AT HINGE LINE AT POINT B FROM WEIGHT LOADS AND SEISMIC PARALLEL TO BANK (FIG. 2)

**BANK UP**

$$\begin{aligned} R_{\text{VER}}^{\text{B-BU}} \text{ VERTICAL REACTION AT POINT B: } 801 \text{ lbs} &= \text{HOIST CABLE TENSION} + \frac{\text{WEIGHT OF SIDE BRACE}}{2 \text{ SUPPORTS}} + \text{WEIGHT OF PULLEY} \\ R_{\text{HOR}}^{\text{B-BU}} \text{ HORIZONTAL REACTION AT POINT B: } 771 \text{ lbs} &= \text{HOIST CABLE TENSION} \end{aligned}$$



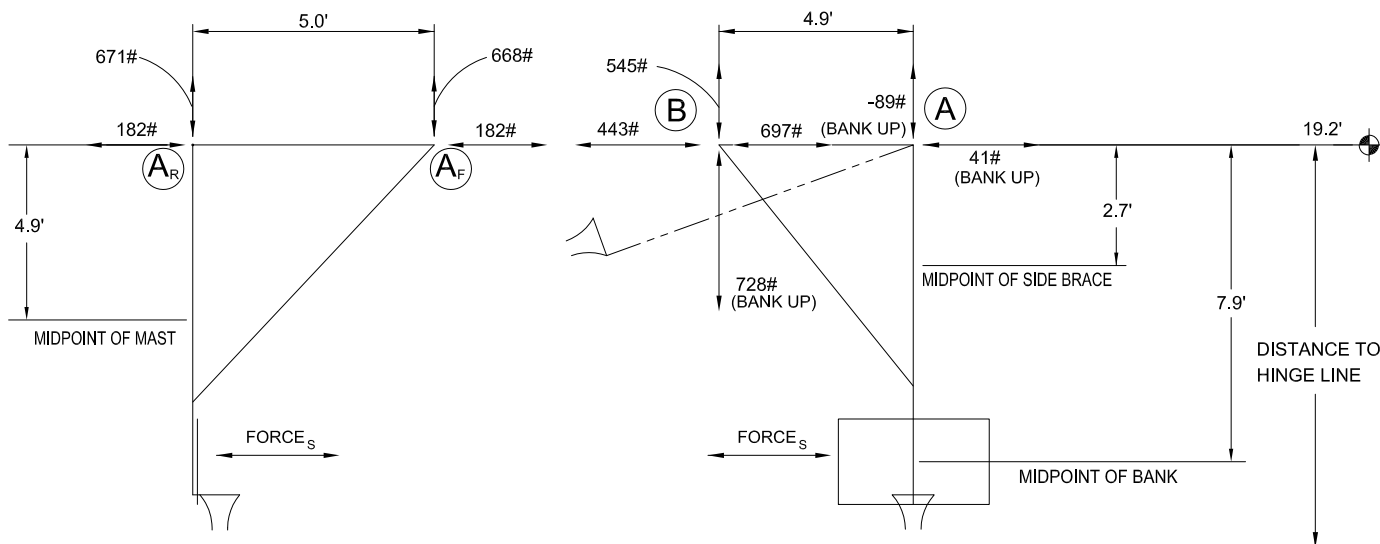
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STATIC EQUIVALENT LOADING FOR:  
955 Style backstop  
19' Attachment Height

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FORCES PERPENDICULAR TO BANK FIGURE 1

FORCES PARALLEL TO BANK FIGURE 2

### WEIGHT LOAD CALCULATIONS (WITH BANK DOWN)

$$\begin{aligned} \text{BACKSTOP'S TOTAL WEIGHT LOAD} &= 520 \text{ lbs (WEIGHT OF FRONT BRACE + WEIGHT OF MAST + WEIGHT OF BANK)} \\ \text{WEIGHT LOAD AT POINT "A"} &= 493 \text{ lbs} \left( \frac{\text{WEIGHT OF SIDE BRACE}}{2} \right) + \text{WEIGHT OF MAST} + \text{WEIGHT OF BANK} \\ \text{WEIGHT LOAD AT POINT "B"} &= 33 \text{ lbs} \left( \frac{\text{WEIGHT OF SIDE BRACE}}{2} \right) + \text{WEIGHT OF PULLEY} \end{aligned}$$

+PLEASE NOTE THESE ARE ESTIMATED WEIGHT LOADS FROM THE BACKSTOP MAST HANGERS TO THE FLOOR. THESE ESTIMATES DO NOT INCLUDE ANY SUPERSTRUCTURE WEIGHTS.

### SEISMIC FACTORED MOMENTS AND SUM OF MOMENTS FOR BACKSTOP ELEMENTS

SEISMIC FACTOR = 0.7 (VARIES WITH SEISMIC ZONE, RIGIDITY OF SUPPORT & ROOM USE)

$$\begin{aligned} \text{WEIGHT OF BANK (WB)} &= 329 \text{ lbs} \times \text{SEISMIC FACTOR} \times \text{DISTANCE TO MIDPOINT OF BANK (DB)} = 1819 \text{ ft.lbs SEISMIC MOMENT (MB) (FT.LBS.)} \\ \text{WEIGHT OF SIDE BRACE (WSB)} &= 54 \text{ lbs} \times \text{SEISMIC FACTOR} \times \text{DISTANCE TO MIDPOINT OF SIDE BRACE (DSB)} = 102 \text{ ft.lbs SEISMIC MOMENT (MFB) (FT.LBS.)} \\ \text{WEIGHT OF MAST (WM)} &= 137 \text{ lbs} \times \text{SEISMIC FACTOR} \times \text{DISTANCE TO MIDPOINT OF MAST (DM)} = 470 \text{ ft.lbs SEISMIC MOMENT (MM) (FT.LBS.)} \\ \text{WB} + \text{WFB} + \text{WM} &= \text{BACKSTOP'S TOTAL WEIGHT LOAD} = 2391 \text{ ft.lbs SUM OF THE MOMENTS} = \text{MB} + \text{MFB} + \text{MM} \end{aligned}$$

### POINT REACTIONS FROM WEIGHT LOADS AND SEISMIC WITH BANK DOWN

#### REACTIONS AT HINGE LINE AT POINT A FROM WEIGHT LOADS AND SEISMIC PARALLEL TO BANK (FIG. 2)

$$\begin{aligned} \text{BANK DOWN} \quad R_{\text{VER}}^{\text{AR}} \quad \text{VERTICAL REACTIONS AT POINT AR:} \quad 671 \text{ lbs} &= \frac{\text{WEIGHT OF MAST} + \text{WEIGHT OF BANK} + \frac{\text{WEIGHT OF THE BANK}}{2 \text{ SUPPORTS}} \pm \frac{\text{MOMENT OF THE BRACE}}{\text{DISTANCE FROM A}_F \text{ TO A}_R / 2} \\ R_{\text{VER}}^{\text{AF}} \quad \text{VERTICAL REACTIONS AT POINT AF:} \quad 668 \text{ lbs} &= \frac{\text{WEIGHT OF BANK}}{2 \text{ SUPPORTS}} + \frac{\text{MOMENT AT MAST} + \text{MOMENT AT BANK}}{\text{DISTANCE BETWEEN SUPPORTS (A}_F - \text{A}_R)} \pm \frac{\text{MOMENT OF THE BRACE}}{\text{DISTANCE FROM A}_F \text{ TO A}_R / 2} \\ R_{\text{HOR}} \quad \text{HORIZONTAL REACTION FOR BOTH:} \quad 182 \text{ lbs} &= \frac{\text{BACKSTOP'S TOTAL WEIGHT LOAD} \times \text{SEISMIC FACTOR}}{2 \text{ SUPPORTS}} \end{aligned}$$

#### REACTIONS AT HINGE LINE AT POINT B FROM WEIGHT LOADS AND SEISMIC PERPENDICULAR TO BANK (FIG. 1)

$$\begin{aligned} \text{BANK DOWN} \quad R_{\text{VER}}^{\text{B}} \quad \text{VERTICAL REACTION AT POINT B:} \quad 545 \text{ lbs} &= \frac{\text{WEIGHT OF SIDE BRACE}}{2 \text{ SUPPORTS}} + \text{WEIGHT OF PULLEY} \pm \frac{\text{SUM OF THE MOMENTS}}{\text{DISTANCE BETWEEN SUPPORTS (A-B)}} \\ R_{\text{HOR}}^{\text{B}} \quad \text{HORIZONTAL REACTION AT POINT B:} \quad 443 \text{ lbs} &= \frac{\text{SUM OF THE MOMENTS}}{\text{DISTANCE TO MIDPOINT OF SIDE BRACE} \times 2} \end{aligned}$$

### POINT REACTIONS FROM WEIGHT LOADS AND SEISMIC WITH BANK UP

$$\text{HOIST CABLE TENSION AT POINT C:} \quad 697 \text{ lbs} = \frac{\text{SUM OF THE MOMENTS}}{\text{SEISMIC FACTOR} \times \text{DISTANCE FROM A TO B}}$$

#### REACTIONS AT HINGE LINE AT POINT A FROM WEIGHT LOADS AND SEISMIC PARALLEL TO BANK (FIG. 2)

$$\begin{aligned} \text{BANK UP} \quad R_{\text{VER}}^{\text{A-BU}} \quad \text{VERTICAL REACTION AT POINT A:} \quad -89 \text{ lbs} &= \frac{\text{BACKSTOP'S TOTAL WEIGHT LOAD} - \text{HOIST CABLE TENSION}}{2 \text{ SUPPORTS}} \\ R_{\text{HOR}}^{\text{AF}} \quad \text{HORIZONTAL REACTION AT POINT A: FROM SEISMIC PARALLEL TO BANK} \quad 41 \text{ lbs} &= \pm \frac{\text{MOMENT AT BRACE}}{\text{DISTANCE FROM A}_F \text{ TO A}_R / 2} \end{aligned}$$

#### REACTIONS AT HINGE LINE AT POINT B FROM WEIGHT LOADS AND SEISMIC PARALLEL TO BANK (FIG. 2)

$$\begin{aligned} \text{BANK UP} \quad R_{\text{VER}}^{\text{B-BU}} \quad \text{VERTICAL REACTION AT POINT B:} \quad 728 \text{ lbs} &= \text{HOIST CABLE TENSION} + \frac{\text{WEIGHT OF SIDE BRACE}}{2 \text{ SUPPORTS}} + \text{WEIGHT OF PULLEY} \\ R_{\text{HOR}}^{\text{B-BU}} \quad \text{HORIZONTAL REACTION AT POINT B:} \quad 697 \text{ lbs} &= \text{HOIST CABLE TENSION} \end{aligned}$$



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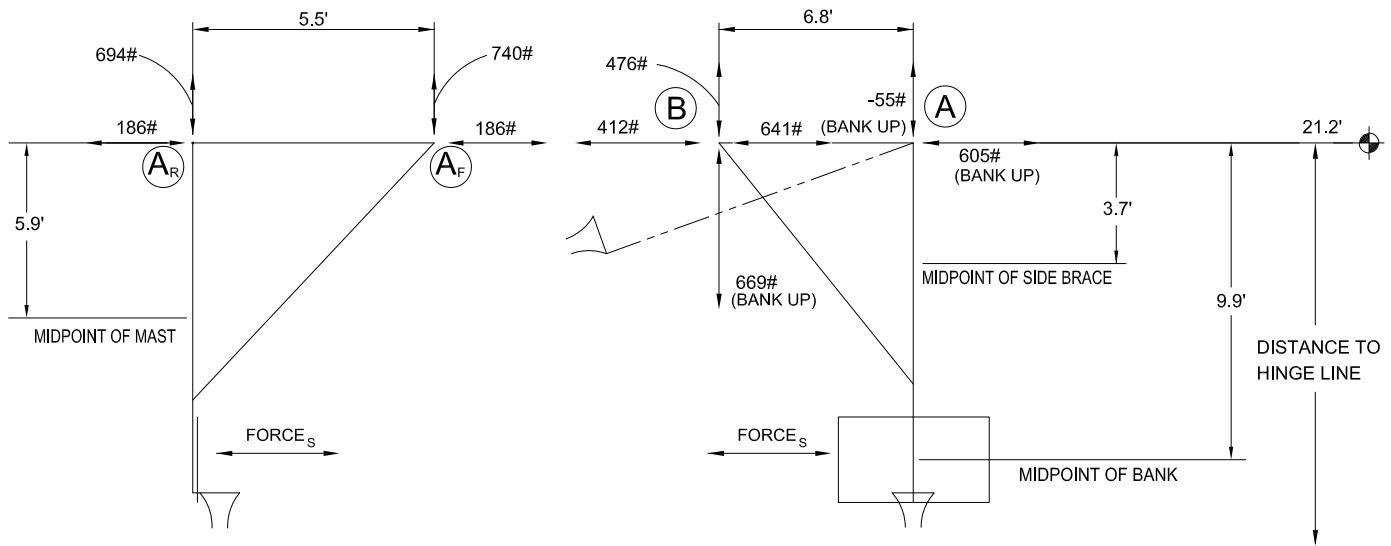
STATIC EQUIVALENT LOADING FOR:  
955 Style backstop  
20' Attachment Height

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FORCES PERPENDICULAR TO BANK FIGURE 1

FORCES PARALLEL TO BANK FIGURE 2

### WEIGHT LOAD CALCULATIONS (WITH BANK DOWN)

$$\begin{aligned} \text{BACKSTOP'S TOTAL WEIGHT LOAD} &= 532 \text{ lbs (WEIGHT OF FRONT BRACE + WEIGHT OF MAST + WEIGHT OF BANK)} \\ \text{WEIGHT LOAD AT POINT "A"} &= 511 \text{ lbs } \left( \frac{\text{WEIGHT OF SIDE BRACE}}{2} \right) + \text{WEIGHT OF MAST + WEIGHT OF BANK} \\ \text{WEIGHT LOAD AT POINT "B"} &= 28 \text{ lbs } \left( \frac{\text{WEIGHT OF SIDE BRACE}}{2} \right) + \text{WEIGHT OF PULLEY} \end{aligned}$$

+PLEASE NOTE THESE ARE ESTIMATED WEIGHT LOADS FROM THE BACKSTOP MAST HANGERS TO THE FLOOR. THESE ESTIMATES DO NOT INCLUDE ANY SUPERSTRUCTURE WEIGHTS.

### SEISMIC FACTORED MOMENTS AND SUM OF MOMENTS FOR BACKSTOP ELEMENTS

SEISMIC FACTOR = 0.7 (VARIES WITH SEISMIC ZONE, RIGIDITY OF SUPPORT & ROOM USE)

$$\begin{aligned} \text{WEIGHT OF BANK (WB)} & 329 \text{ lbs} \times \text{SEISMIC FACTOR} \times \text{DISTANCE TO MIDPOINT OF BANK (DB)} &= 2280 \text{ ft.lbs} & \text{SEISMIC MOMENT (MB) (FT.LBS.)} \\ \text{WEIGHT OF SIDE BRACE (WSB)} & 43 \text{ lbs} \times \text{SEISMIC FACTOR} \times \text{DISTANCE TO MIDPOINT OF SIDE BRACE (DSB)} &= 111 \text{ ft.lbs} & \text{SEISMIC MOMENT (MFB) (FT.LBS.)} \\ \text{WEIGHT OF MAST (WM)} & 160 \text{ lbs} \times \text{SEISMIC FACTOR} \times \text{DISTANCE TO MIDPOINT OF MAST (DM)} &= 661 \text{ ft.lbs} & \text{SEISMIC MOMENT (MM) (FT.LBS.)} \end{aligned}$$

$$\text{WB} + \text{WFB} + \text{WM} = \text{BACKSTOP'S TOTAL WEIGHT LOAD} = 3052 \text{ ft.lbs} \quad \text{SUM OF THE MOMENTS} = \text{MB} + \text{MFB} + \text{MM}$$

### POINT REACTIONS FROM WEIGHT LOADS AND SEISMIC WITH BANK DOWN

#### REACTIONS AT HINGE LINE AT POINT A FROM WEIGHT LOADS AND SEISMIC PARALLEL TO BANK (FIG. 2)

$$\begin{aligned} \text{BANK DOWN} \quad R_{\text{VER}}^{\text{AR}} \quad \text{VERTICAL REACTIONS AT POINT AR:} \quad 694 \text{ lbs} &= \frac{\text{WEIGHT OF MAST} + \text{WEIGHT OF BANK} + \frac{\text{WEIGHT OF THE BANK}}{2 \text{ SUPPORTS}}}{\text{DISTANCE FROM A}_F \text{ TO A}_R / 2} \pm \frac{\text{MOMENT OF THE BRACE}}{\text{DISTANCE FROM A}_F \text{ TO A}_R / 2} \\ R_{\text{VER}}^{\text{AF}} \quad \text{VERTICAL REACTIONS AT POINT AF:} \quad 740 \text{ lbs} &= \frac{\text{WEIGHT OF BANK}}{2 \text{ SUPPORTS}} + \frac{\text{MOMENT AT MAST} + \text{MOMENT AT BANK}}{\text{DISTANCE BETWEEN SUPPORTS (A}_F - \text{A}_R)} \pm \frac{\text{MOMENT OF THE BRACE}}{\text{DISTANCE FROM A}_F \text{ TO A}_R / 2} \\ R_{\text{HOR}} \quad \text{HORIZONTAL REACTION FOR BOTH:} \quad 186 \text{ lbs} &= \frac{\text{BACKSTOP'S TOTAL WEIGHT LOAD} \times \text{SEISMIC FACTOR}}{2 \text{ SUPPORTS}} \end{aligned}$$

#### REACTIONS AT HINGE LINE AT POINT B FROM WEIGHT LOADS AND SEISMIC PERPENDICULAR TO BANK (FIG. 1)

$$\begin{aligned} \text{BANK DOWN} \quad R_{\text{VER}}^{\text{B}} \quad \text{VERTICAL REACTION AT POINT B:} \quad 476 \text{ lbs} &= \frac{\text{WEIGHT OF SIDE BRACE}}{2 \text{ SUPPORTS}} + \text{WEIGHT OF PULLEY} \pm \frac{\text{SUM OF THE MOMENTS}}{\text{DISTANCE BETWEEN SUPPORTS (A-B)}} \\ R_{\text{HOR}}^{\text{B}} \quad \text{HORIZONTAL REACTION AT POINT B:} \quad 412 \text{ lbs} &= \frac{\text{SUM OF THE MOMENTS}}{\text{DISTANCE TO MIDPOINT OF SIDE BRACE} \times 2} \end{aligned}$$

### POINT REACTIONS FROM WEIGHT LOADS AND SEISMIC WITH BANK UP

$$\text{HOIST CABLE TENSION AT POINT C:} \quad 641 \text{ lbs} = \frac{\text{SUM OF THE MOMENTS}}{\text{SEISMIC FACTOR} \times \text{DISTANCE FROM A TO B}}$$

#### REACTIONS AT HINGE LINE AT POINT A FROM WEIGHT LOADS AND SEISMIC PARALLEL TO BANK (FIG. 2)

$$\begin{aligned} \text{BANK UP} \quad R_{\text{VER}}^{\text{A-BU}} \quad \text{VERTICAL REACTION AT POINT A:} \quad -55 \text{ lbs} &= \frac{\text{BACKSTOP'S TOTAL WEIGHT LOAD} - \text{HOIST CABLE TENSION}}{2 \text{ SUPPORTS}} \\ R_{\text{HOR}}^{\text{AF}} \quad \text{HORIZONTAL REACTION AT POINT A: FROM SEISMIC PARALLEL TO BANK} \quad 40 \text{ lbs} &= \pm \frac{\text{MOMENT AT BRACE}}{\text{DISTANCE FROM A}_F \text{ TO A}_R / 2} \end{aligned}$$

#### REACTIONS AT HINGE LINE AT POINT B FROM WEIGHT LOADS AND SEISMIC PARALLEL TO BANK (FIG. 2)

$$\begin{aligned} \text{BANK UP} \quad R_{\text{VER}}^{\text{B-BU}} \quad \text{VERTICAL REACTION AT POINT B:} \quad 669 \text{ lbs} &= \text{HOIST CABLE TENSION} + \frac{\text{WEIGHT OF SIDE BRACE}}{2 \text{ SUPPORTS}} + \text{WEIGHT OF PULLEY} \\ R_{\text{HOR}}^{\text{B-BU}} \quad \text{HORIZONTAL REACTION AT POINT B:} \quad 641 \text{ lbs} &= \text{HOIST CABLE TENSION} \end{aligned}$$



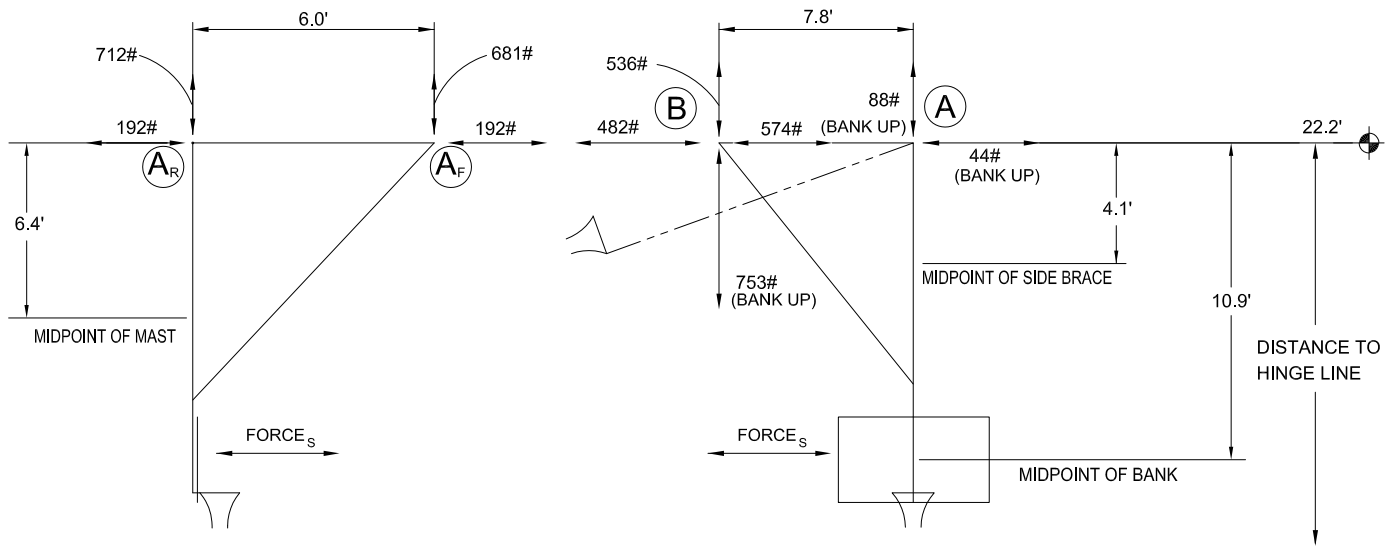
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STATIC EQUIVALENT LOADING FOR:  
955 Style backstop  
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FORCES PERPENDICULAR TO BANK FIGURE 1

FORCES PARALLEL TO BANK FIGURE 2

### WEIGHT LOAD CALCULATIONS (WITH BANK DOWN)

$$\begin{aligned} \text{BACKSTOP'S TOTAL WEIGHT LOAD} &= 549 \text{ lbs (WEIGHT OF FRONT BRACE + WEIGHT OF MAST + WEIGHT OF BANK)} \\ \text{WEIGHT LOAD AT POINT "A"} &= 526 \text{ lbs} \left( \frac{\text{WEIGHT OF SIDE BRACE}}{2} \right) + \text{WEIGHT OF MAST} + \text{WEIGHT OF BANK} \\ \text{WEIGHT LOAD AT POINT "B"} &= 29 \text{ lbs} \left( \frac{\text{WEIGHT OF SIDE BRACE}}{2} \right) + \text{WEIGHT OF PULLEY} \end{aligned}$$

+PLEASE NOTE THESE ARE ESTIMATED WEIGHT LOADS FROM THE BACKSTOP MAST HANGERS TO THE FLOOR. THESE ESTIMATES DO NOT INCLUDE ANY SUPERSTRUCTURE WEIGHTS.

### SEISMIC FACTORED MOMENTS AND SUM OF MOMENTS FOR BACKSTOP ELEMENTS

SEISMIC FACTOR = 0.7 (VARIES WITH SEISMIC ZONE, RIGIDITY OF SUPPORT & ROOM USE)

WEIGHT OF BANK (WB)	329 lbs	X SEISMIC FACTOR X	DISTANCE TO MIDPOINT OF BANK (DB)	=	2510 ft.lbs	SEISMIC MOMENT (MB) (FT.LBS.)
WEIGHT OF SIDE BRACE (WSB)	46 lbs	X SEISMIC FACTOR X	DISTANCE TO MIDPOINT OF SIDE BRACE (DSB)	=	132 ft.lbs	SEISMIC MOMENT (MFB) (FT.LBS.)
WEIGHT OF MAST (WM)	174 lbs	X SEISMIC FACTOR X	DISTANCE TO MIDPOINT OF MAST (DM)	=	1309 ft.lbs	SEISMIC MOMENT (MM) (FT.LBS.)
WB + WFB + WM = BACKSTOP'S TOTAL WEIGHT LOAD				=	3951 ft.lbs	SUM OF THE MOMENTS = MB + MFB + MM

### POINT REACTIONS FROM WEIGHT LOADS AND SEISMIC WITH BANK DOWN

#### REACTIONS AT HINGE LINE AT POINT A FROM WEIGHT LOADS AND SEISMIC PARALLEL TO BANK (FIG. 2)

BANK DOWN	$R_{VER}^{AR}$	VERTICAL REACTIONS AT POINT AR:	$712 \text{ lbs} = \frac{\text{WEIGHT OF MAST} + \text{WEIGHT OF BANK} + \frac{\text{WEIGHT OF THE BANK}}{2 \text{ SUPPORTS}}}{\text{DISTANCE FROM } A_F \text{ TO } A_R / 2} \pm \frac{\text{MOMENT OF THE BRACE}}{\text{DISTANCE FROM } A_F \text{ TO } A_R / 2}$
	$R_{VER}^{AF}$	VERTICAL REACTIONS AT POINT AF:	$681 \text{ lbs} = \frac{\text{WEIGHT OF BANK}}{2 \text{ SUPPORTS}} + \frac{\text{MOMENT AT MAST} + \text{MOMENT AT BANK}}{\text{DISTANCE BETWEEN SUPPORTS (} A_F - A_R \text{)}} \pm \frac{\text{MOMENT OF THE BRACE}}{\text{DISTANCE FROM } A_F \text{ TO } A_R / 2}$
	$R_{HOR}$	HORIZONTAL REACTION FOR BOTH:	$192 \text{ lbs} = \frac{\text{BACKSTOP'S TOTAL WEIGHT LOAD X SEISMIC FACTOR}}{2 \text{ SUPPORTS}}$

#### REACTIONS AT HINGE LINE AT POINT B FROM WEIGHT LOADS AND SEISMIC PERPENDICULAR TO BANK (FIG. 1)

BANK DOWN	$R_{VER}^B$	VERTICAL REACTION AT POINT B:	$536 \text{ lbs} = \frac{\text{WEIGHT OF SIDE BRACE}}{2 \text{ SUPPORTS}} + \text{WEIGHT OF PULLEY} \pm \frac{\text{SUM OF THE MOMENTS}}{\text{DISTANCE BETWEEN SUPPORTS (A-B)}}$
	$R_{HOR}^B$	HORIZONTAL REACTION AT POINT B:	$482 \text{ lbs} = \frac{\text{SUM OF THE MOMENTS}}{\text{DISTANCE TO MIDPOINT OF SIDE BRACE X 2}}$

### POINT REACTIONS FROM WEIGHT LOADS AND SEISMIC WITH BANK UP

HOIST CABLE TENSION AT POINT C:  $724 \text{ lbs} = \frac{\text{SUM OF THE MOMENTS}}{\text{SEISMIC FACTOR X DISTANCE FROM A TO B}}$

#### REACTIONS AT HINGE LINE AT POINT A FROM WEIGHT LOADS AND SEISMIC PARALLEL TO BANK (FIG. 2)

BANK UP	$R_{VER}^{A-BU}$	VERTICAL REACTION AT POINT A:	$88 \text{ lbs} = \frac{\text{BACKSTOP'S TOTAL WEIGHT LOAD} - \text{HOIST CABLE TENSION}}{2 \text{ SUPPORTS}}$
	$R_{HOR}^{AF}$	HORIZONTAL REACTION AT POINT A: FROM SEISMIC PARALLEL TO BANK	$44 \text{ lbs} = \pm \frac{\text{MOMENT AT BRACE}}{\text{DISTANCE FROM } A_F \text{ TO } A_R / 2}$

#### REACTIONS AT HINGE LINE AT POINT B FROM WEIGHT LOADS AND SEISMIC PARALLEL TO BANK (FIG. 2)

BANK UP	$R_{VER}^{B-BU}$	VERTICAL REACTION AT POINT B:	$753 \text{ lbs} = \text{HOIST CABLE TENSION} + \frac{\text{WEIGHT OF SIDE BRACE}}{2 \text{ SUPPORTS}} + \text{WEIGHT OF PULLEY}$
	$R_{HOR}^{B-BU}$	HORIZONTAL REACTION AT POINT B:	$724 \text{ lbs} = \text{HOIST CABLE TENSION}$



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STATIC EQUIVALENT LOADING FOR:  
955 Style backstop  
23' Attachment Height

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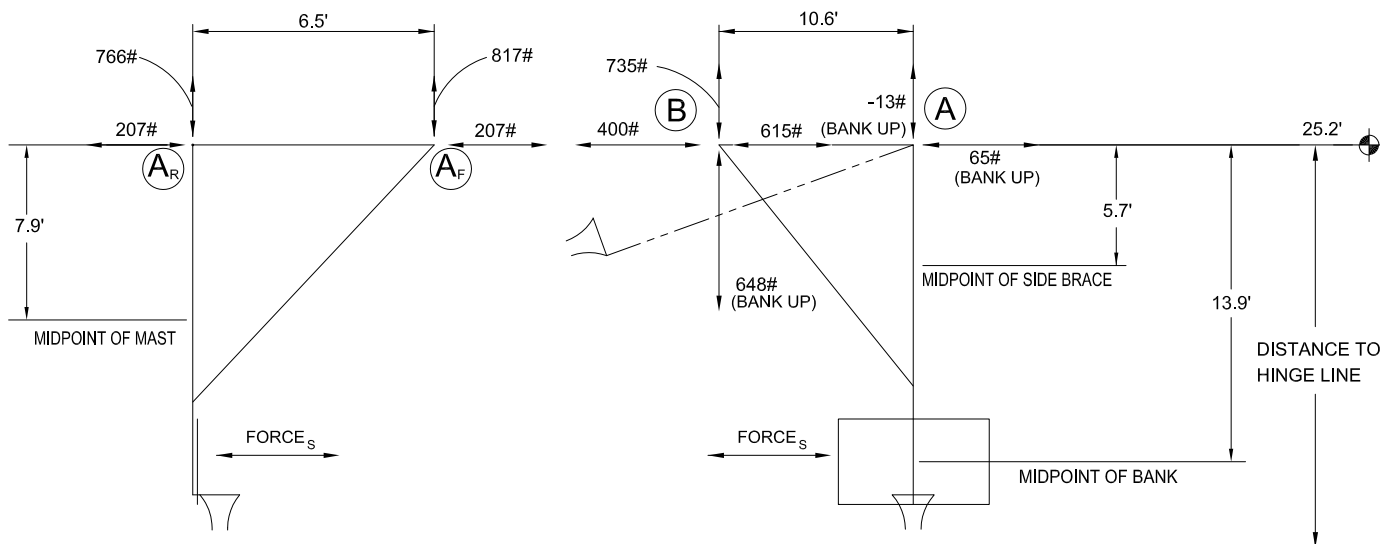
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FORCES PERPENDICULAR TO BANK FIGURE 1

FORCES PARALLEL TO BANK FIGURE 2

### WEIGHT LOAD CALCULATIONS (WITH BANK DOWN)

$$\begin{aligned} \text{BACKSTOP'S TOTAL WEIGHT LOAD} &= 590 \text{ lbs (WEIGHT OF FRONT BRACE + WEIGHT OF MAST + WEIGHT OF BANK)} \\ \text{WEIGHT LOAD AT POINT "A"} &= 564 \text{ lbs} \left( \frac{\text{WEIGHT OF SIDE BRACE}}{2} \right) + \text{WEIGHT OF MAST + WEIGHT OF BANK} \\ \text{WEIGHT LOAD AT POINT "B"} &= 33 \text{ lbs} \left( \frac{\text{WEIGHT OF SIDE BRACE}}{2} \right) + \text{WEIGHT OF PULLEY} \end{aligned}$$

+PLEASE NOTE THESE ARE ESTIMATED WEIGHT LOADS FROM THE BACKSTOP MAST HANGERS TO THE FLOOR. THESE ESTIMATES DO NOT INCLUDE ANY SUPERSTRUCTURE WEIGHTS.

### SEISMIC FACTORED MOMENTS AND SUM OF MOMENTS FOR BACKSTOP ELEMENTS

SEISMIC FACTOR = 0.7 (VARIES WITH SEISMIC ZONE, RIGIDITY OF SUPPORT & ROOM USE)

$$\begin{aligned} \text{WEIGHT OF BANK (WB)} & 329 \text{ lbs} \times \text{SEISMIC FACTOR} \times \text{DISTANCE TO MIDPOINT OF BANK (DB)} &= 3201 \text{ ft.lbs} & \text{SEISMIC MOMENT (MB) (FT.LBS.)} \\ \text{WEIGHT OF SIDE BRACE (WSB)} & 53 \text{ lbs} \times \text{SEISMIC FACTOR} \times \text{DISTANCE TO MIDPOINT OF SIDE BRACE (DSB)} &= 211 \text{ ft.lbs} & \text{SEISMIC MOMENT (MFB) (FT.LBS.)} \\ \text{WEIGHT OF MAST (WM)} & 208 \text{ lbs} \times \text{SEISMIC FACTOR} \times \text{DISTANCE TO MIDPOINT OF MAST (DM)} &= 1150 \text{ ft.lbs} & \text{SEISMIC MOMENT (MM) (FT.LBS.)} \end{aligned}$$

$$\text{WB} + \text{WFB} + \text{WM} = \text{BACKSTOP'S TOTAL WEIGHT LOAD} = 4563 \text{ ft.lbs} \quad \text{SUM OF THE MOMENTS} = \text{MB} + \text{MFB} + \text{MM}$$

### POINT REACTIONS FROM WEIGHT LOADS AND SEISMIC WITH BANK DOWN

#### REACTIONS AT HINGE LINE AT POINT A FROM WEIGHT LOADS AND SEISMIC PARALLEL TO BANK (FIG. 2)

**BANK DOWN**

$$\begin{aligned} R_{\text{VER}}^{\text{AR}} & \text{ VERTICAL REACTIONS AT POINT AR: } 766 \text{ lbs} = \frac{\text{WEIGHT OF MAST} + \text{WEIGHT OF BANK} + \frac{\text{WEIGHT OF THE BANK}}{2 \text{ SUPPORTS}}}{\text{DISTANCE FROM A}_F \text{ TO A}_R / 2} \pm \frac{\text{MOMENT OF THE BRACE}}{\text{DISTANCE FROM A}_F \text{ TO A}_R / 2} \\ R_{\text{VER}}^{\text{AF}} & \text{ VERTICAL REACTIONS AT POINT AF: } 817 \text{ lbs} = \frac{\text{WEIGHT OF BANK}}{2 \text{ SUPPORTS}} + \frac{\text{MOMENT AT MAST} + \text{MOMENT AT BANK}}{\text{DISTANCE BETWEEN SUPPORTS (A}_F - \text{A}_R)} \pm \frac{\text{MOMENT OF THE BRACE}}{\text{DISTANCE FROM A}_F \text{ TO A}_R / 2} \\ R_{\text{HOR}} & \text{ HORIZONTAL REACTION FOR BOTH: } 207 \text{ lbs} = \frac{\text{BACKSTOP'S TOTAL WEIGHT LOAD} \times \text{SEISMIC FACTOR}}{2 \text{ SUPPORTS}} \end{aligned}$$

#### REACTIONS AT HINGE LINE AT POINT B FROM WEIGHT LOADS AND SEISMIC PERPENDICULAR TO BANK (FIG. 1)

**BANK DOWN**

$$\begin{aligned} R_{\text{VER}}^{\text{B}} & \text{ VERTICAL REACTION AT POINT B: } 735 \text{ lbs} = \frac{\text{WEIGHT OF SIDE BRACE}}{2 \text{ SUPPORTS}} + \text{WEIGHT OF PULLEY} \pm \frac{\text{SUM OF THE MOMENTS}}{\text{DISTANCE BETWEEN SUPPORTS (A-B)}} \\ R_{\text{HOR}}^{\text{B}} & \text{ HORIZONTAL REACTION AT POINT B: } 400 \text{ lbs} = \frac{\text{SUM OF THE MOMENTS}}{\text{DISTANCE TO MIDPOINT OF SIDE BRACE} \times 2} \end{aligned}$$

### POINT REACTIONS FROM WEIGHT LOADS AND SEISMIC WITH BANK UP

$$\text{HOIST CABLE TENSION AT POINT C: } 615 \text{ lbs} = \frac{\text{SUM OF THE MOMENTS}}{\text{SEISMIC FACTOR} \times \text{DISTANCE FROM A TO B}}$$

#### REACTIONS AT HINGE LINE AT POINT A FROM WEIGHT LOADS AND SEISMIC PARALLEL TO BANK (FIG. 2)

**BANK UP**

$$\begin{aligned} R_{\text{VER}}^{\text{A-BU}} & \text{ VERTICAL REACTION AT POINT A: } -13 \text{ lbs} = \frac{\text{BACKSTOP'S TOTAL WEIGHT LOAD} - \text{HOIST CABLE TENSION}}{2 \text{ SUPPORTS}} \\ R_{\text{HOR}}^{\text{AF}} & \text{ HORIZONTAL REACTION AT POINT A: } 65 \text{ lbs} = \pm \frac{\text{MOMENT AT BRACE}}{\text{DISTANCE FROM A}_F \text{ TO A}_R / 2} \end{aligned}$$

#### REACTIONS AT HINGE LINE AT POINT B FROM WEIGHT LOADS AND SEISMIC PARALLEL TO BANK (FIG. 2)

**BANK UP**

$$\begin{aligned} R_{\text{VER}}^{\text{B-BU}} & \text{ VERTICAL REACTION AT POINT B: } 648 \text{ lbs} = \text{HOIST CABLE TENSION} + \frac{\text{WEIGHT OF SIDE BRACE}}{2 \text{ SUPPORTS}} + \text{WEIGHT OF PULLEY} \\ R_{\text{HOR}}^{\text{B-BU}} & \text{ HORIZONTAL REACTION AT POINT B: } 615 \text{ lbs} = \text{HOIST CABLE TENSION} \end{aligned}$$



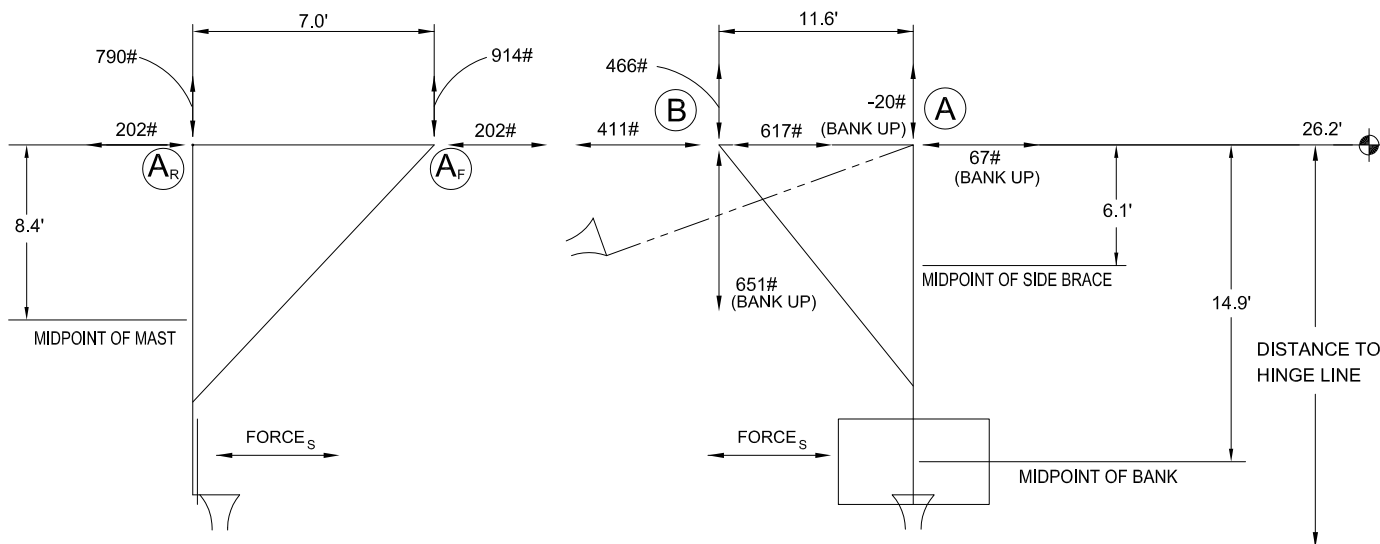
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FORCES PERPENDICULAR TO BANK FIGURE 1

FORCES PARALLEL TO BANK FIGURE 2

### WEIGHT LOAD CALCULATIONS (WITH BANK DOWN)

$$\begin{aligned} \text{BACKSTOP'S TOTAL WEIGHT LOAD} &= 577 \text{ lbs (WEIGHT OF FRONT BRACE + WEIGHT OF MAST + WEIGHT OF BANK)} \\ \text{WEIGHT LOAD AT POINT "A"} &= 552 \text{ lbs} \left( \frac{\text{WEIGHT OF SIDE BRACE}}{2} \right) + \text{WEIGHT OF MAST + WEIGHT OF BANK} \\ \text{WEIGHT LOAD AT POINT "B"} &= 31 \text{ lbs} \left( \frac{\text{WEIGHT OF SIDE BRACE}}{2} \right) + \text{WEIGHT OF PULLEY} \end{aligned}$$

+PLEASE NOTE THESE ARE ESTIMATED WEIGHT LOADS FROM THE BACKSTOP MAST HANGERS TO THE FLOOR. THESE ESTIMATES DO NOT INCLUDE ANY SUPERSTRUCTURE WEIGHTS.

### SEISMIC FACTORED MOMENTS AND SUM OF MOMENTS FOR BACKSTOP ELEMENTS

SEISMIC FACTOR = 0.7 (VARIES WITH SEISMIC ZONE, RIGIDITY OF SUPPORT & ROOM USE)

$$\begin{aligned} \text{WEIGHT OF BANK (WB)} &= 329 \text{ lbs} \times \text{SEISMIC FACTOR} \times \text{DISTANCE TO MIDPOINT OF BANK (DB)} = 3431 \text{ ft.lbs SEISMIC MOMENT (MB) (FT.LBS.)} \\ \text{WEIGHT OF SIDE BRACE (WSB)} &= 55 \text{ lbs} \times \text{SEISMIC FACTOR} \times \text{DISTANCE TO MIDPOINT OF SIDE BRACE (DSB)} = 235 \text{ ft.lbs SEISMIC MOMENT (MFB) (FT.LBS.)} \\ \text{WEIGHT OF MAST (WM)} &= 229 \text{ lbs} \times \text{SEISMIC FACTOR} \times \text{DISTANCE TO MIDPOINT OF MAST (DM)} = 1347 \text{ ft.lbs SEISMIC MOMENT (MM) (FT.LBS.)} \end{aligned}$$

$$\text{WB} + \text{WFB} + \text{WM} = \text{BACKSTOP'S TOTAL WEIGHT LOAD} = 5013 \text{ ft.lbs SUM OF THE MOMENTS} = \text{MB} + \text{MFB} + \text{MM}$$

### POINT REACTIONS FROM WEIGHT LOADS AND SEISMIC WITH BANK DOWN

#### REACTIONS AT HINGE LINE AT POINT A FROM WEIGHT LOADS AND SEISMIC PARALLEL TO BANK (FIG. 2)

$$\begin{aligned} \text{BANK DOWN} \quad R_{\text{VER}}^{\text{AR}} \quad \text{VERTICAL REACTIONS AT POINT AR:} \quad 790 \text{ lbs} &= \frac{\text{WEIGHT OF MAST} + \text{WEIGHT OF BANK} + \frac{\text{WEIGHT OF THE BANK}}{2 \text{ SUPPORTS}} \pm \frac{\text{MOMENT OF THE BRACE}}{\text{DISTANCE FROM A}_F \text{ TO A}_R / 2} \\ R_{\text{VER}}^{\text{AF}} \quad \text{VERTICAL REACTIONS AT POINT AF:} \quad 914 \text{ lbs} &= \frac{\text{WEIGHT OF BANK}}{2 \text{ SUPPORTS}} + \frac{\text{MOMENT AT MAST} + \text{MOMENT AT BANK}}{\text{DISTANCE BETWEEN SUPPORTS (A}_F - \text{A}_R)} \pm \frac{\text{MOMENT OF THE BRACE}}{\text{DISTANCE FROM A}_F \text{ TO A}_R / 2} \\ R_{\text{HOR}} \quad \text{HORIZONTAL REACTION FOR BOTH:} \quad 202 \text{ lbs} &= \frac{\text{BACKSTOP'S TOTAL WEIGHT LOAD} \times \text{SEISMIC FACTOR}}{2 \text{ SUPPORTS}} \end{aligned}$$

#### REACTIONS AT HINGE LINE AT POINT B FROM WEIGHT LOADS AND SEISMIC PERPENDICULAR TO BANK (FIG. 1)

$$\begin{aligned} \text{BANK DOWN} \quad R_{\text{VER}}^{\text{B}} \quad \text{VERTICAL REACTION AT POINT B:} \quad 466 \text{ lbs} &= \frac{\text{WEIGHT OF SIDE BRACE}}{2 \text{ SUPPORTS}} + \text{WEIGHT OF PULLEY} \pm \frac{\text{SUM OF THE MOMENTS}}{\text{DISTANCE BETWEEN SUPPORTS (A-B)}} \\ R_{\text{HOR}}^{\text{B}} \quad \text{HORIZONTAL REACTION AT POINT B:} \quad 411 \text{ lbs} &= \frac{\text{SUM OF THE MOMENTS}}{\text{DISTANCE TO MIDPOINT OF SIDE BRACE} \times 2} \end{aligned}$$

### POINT REACTIONS FROM WEIGHT LOADS AND SEISMIC WITH BANK UP

$$\text{HOIST CABLE TENSION AT POINT C:} \quad 617 \text{ lbs} = \frac{\text{SUM OF THE MOMENTS}}{\text{SEISMIC FACTOR} \times \text{DISTANCE FROM A TO B}}$$

#### REACTIONS AT HINGE LINE AT POINT A FROM WEIGHT LOADS AND SEISMIC PARALLEL TO BANK (FIG. 2)

$$\begin{aligned} \text{BANK UP} \quad R_{\text{VER}}^{\text{A-BU}} \quad \text{VERTICAL REACTION AT POINT A:} \quad -20 \text{ lbs} &= \frac{\text{BACKSTOP'S TOTAL WEIGHT LOAD} - \text{HOIST CABLE TENSION}}{2 \text{ SUPPORTS}} \\ R_{\text{HOR}}^{\text{AF}} \quad \text{HORIZONTAL REACTION AT POINT A: FROM SEISMIC PARALLEL TO BANK} \quad 67 \text{ lbs} &= \pm \frac{\text{MOMENT AT BRACE}}{\text{DISTANCE FROM A}_F \text{ TO A}_R / 2} \end{aligned}$$

#### REACTIONS AT HINGE LINE AT POINT B FROM WEIGHT LOADS AND SEISMIC PARALLEL TO BANK (FIG. 2)

$$\begin{aligned} \text{BANK UP} \quad R_{\text{VER}}^{\text{B-BU}} \quad \text{VERTICAL REACTION AT POINT B:} \quad 651 \text{ lbs} &= \text{HOIST CABLE TENSION} + \frac{\text{WEIGHT OF SIDE BRACE}}{2 \text{ SUPPORTS}} + \text{WEIGHT OF PULLEY} \\ R_{\text{HOR}}^{\text{B-BU}} \quad \text{HORIZONTAL REACTION AT POINT B:} \quad 617 \text{ lbs} &= \text{HOIST CABLE TENSION} \end{aligned}$$



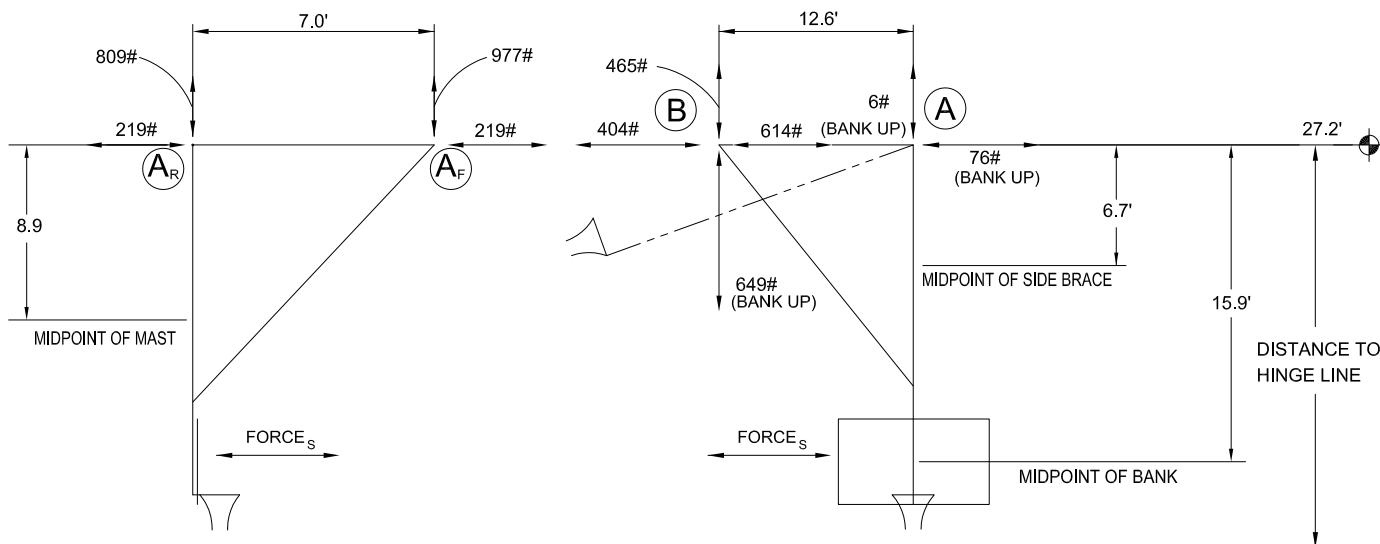
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FORCES PERPENDICULAR TO BANK FIGURE 1

FORCES PARALLEL TO BANK FIGURE 2

### WEIGHT LOAD CALCULATIONS (WITH BANK DOWN)

$$\begin{aligned} \text{BACKSTOP'S TOTAL WEIGHT LOAD} &= 625 \text{ lbs (WEIGHT OF FRONT BRACE + WEIGHT OF MAST + WEIGHT OF BANK)} \\ \text{WEIGHT LOAD AT POINT "A"} &= 597 \text{ lbs} \left( \frac{\text{WEIGHT OF SIDE BRACE}}{2} \right) + \text{WEIGHT OF MAST + WEIGHT OF BANK} \\ \text{WEIGHT LOAD AT POINT "B"} &= 35 \text{ lbs} \left( \frac{\text{WEIGHT OF SIDE BRACE}}{2} \right) + \text{WEIGHT OF PULLEY} \end{aligned}$$

+PLEASE NOTE THESE ARE ESTIMATED WEIGHT LOADS FROM THE BACKSTOP MAST HANGERS TO THE FLOOR. THESE ESTIMATES DO NOT INCLUDE ANY SUPERSTRUCTURE WEIGHTS.

### SEISMIC FACTORED MOMENTS AND SUM OF MOMENTS FOR BACKSTOP ELEMENTS

SEISMIC FACTOR = 0.7 (VARIES WITH SEISMIC ZONE, RIGIDITY OF SUPPORT & ROOM USE)

$$\begin{aligned} \text{WEIGHT OF BANK (WB)} & 329 \text{ lbs} \times \text{SEISMIC FACTOR} \times \text{DISTANCE TO MIDPOINT OF BANK (DB)} &= 3662 \text{ ft.lbs} & \text{SEISMIC MOMENT (MB) (FT.LBS.)} \\ \text{WEIGHT OF SIDE BRACE (WSB)} & 57 \text{ lbs} \times \text{SEISMIC FACTOR} \times \text{DISTANCE TO MIDPOINT OF SIDE BRACE (DSB)} &= 267 \text{ ft.lbs} & \text{SEISMIC MOMENT (MFB) (FT.LBS.)} \\ \text{WEIGHT OF MAST (WM)} & 239 \text{ lbs} \times \text{SEISMIC FACTOR} \times \text{DISTANCE TO MIDPOINT OF MAST (DM)} &= 1489 \text{ ft.lbs} & \text{SEISMIC MOMENT (MM) (FT.LBS.)} \end{aligned}$$

$$\text{WB} + \text{WFB} + \text{WM} = \text{BACKSTOP'S TOTAL WEIGHT LOAD} = 5418 \text{ ft.lbs} \quad \text{SUM OF THE MOMENTS} = \text{MB} + \text{MFB} + \text{MM}$$

### POINT REACTIONS FROM WEIGHT LOADS AND SEISMIC WITH BANK DOWN

#### REACTIONS AT HINGE LINE AT POINT A FROM WEIGHT LOADS AND SEISMIC PARALLEL TO BANK (FIG. 2)

**BANK DOWN**

$$\begin{aligned} R_{\text{VER}}^{\text{AR}} & \text{ VERTICAL REACTIONS AT POINT AR: } 809 \text{ lbs} = \frac{\text{WEIGHT OF MAST} + \text{WEIGHT OF BANK} + \frac{\text{WEIGHT OF THE BANK}}{2 \text{ SUPPORTS}}}{\text{DISTANCE FROM A}_F \text{ TO A}_R / 2} \pm \frac{\text{MOMENT OF THE BRACE}}{\text{DISTANCE FROM A}_F \text{ TO A}_R / 2} \\ R_{\text{VER}}^{\text{AF}} & \text{ VERTICAL REACTIONS AT POINT AF: } 977 \text{ lbs} = \frac{\text{WEIGHT OF BANK}}{2 \text{ SUPPORTS}} + \frac{\text{MOMENT AT MAST} + \text{MOMENT AT BANK}}{\text{DISTANCE BETWEEN SUPPORTS (A}_F - \text{A}_R)} \pm \frac{\text{MOMENT OF THE BRACE}}{\text{DISTANCE FROM A}_F \text{ TO A}_R / 2} \\ R_{\text{HOR}} & \text{ HORIZONTAL REACTION FOR BOTH: } 219 \text{ lbs} = \frac{\text{BACKSTOP'S TOTAL WEIGHT LOAD} \times \text{SEISMIC FACTOR}}{2 \text{ SUPPORTS}} \end{aligned}$$

#### REACTIONS AT HINGE LINE AT POINT B FROM WEIGHT LOADS AND SEISMIC PERPENDICULAR TO BANK (FIG. 1)

**BANK DOWN**

$$\begin{aligned} R_{\text{VER}}^{\text{B}} & \text{ VERTICAL REACTION AT POINT B: } 465 \text{ lbs} = \frac{\text{WEIGHT OF SIDE BRACE}}{2 \text{ SUPPORTS}} + \text{WEIGHT OF PULLEY} \pm \frac{\text{SUM OF THE MOMENTS}}{\text{DISTANCE BETWEEN SUPPORTS (A-B)}} \\ R_{\text{HOR}}^{\text{B}} & \text{ HORIZONTAL REACTION AT POINT B: } 404 \text{ lbs} = \frac{\text{SUM OF THE MOMENTS}}{\text{DISTANCE TO MIDPOINT OF SIDE BRACE} \times 2} \end{aligned}$$

### POINT REACTIONS FROM WEIGHT LOADS AND SEISMIC WITH BANK UP

$$\text{HOIST CABLE TENSION AT POINT C: } 614 \text{ lbs} = \frac{\text{SUM OF THE MOMENTS}}{\text{SEISMIC FACTOR} \times \text{DISTANCE FROM A TO B}}$$

#### REACTIONS AT HINGE LINE AT POINT A FROM WEIGHT LOADS AND SEISMIC PARALLEL TO BANK (FIG. 2)

**BANK UP**

$$\begin{aligned} R_{\text{VER}}^{\text{A-BU}} & \text{ VERTICAL REACTION AT POINT A: } 6 \text{ lbs} = \frac{\text{BACKSTOP'S TOTAL WEIGHT LOAD} - \text{HOIST CABLE TENSION}}{2 \text{ SUPPORTS}} \\ R_{\text{HOR}}^{\text{AF}} & \text{ HORIZONTAL REACTION AT POINT A: FROM SEISMIC PARALLEL TO BANK } 76 \text{ lbs} = \pm \frac{\text{MOMENT AT BRACE}}{\text{DISTANCE FROM A}_F \text{ TO A}_R / 2} \end{aligned}$$

#### REACTIONS AT HINGE LINE AT POINT B FROM WEIGHT LOADS AND SEISMIC PARALLEL TO BANK (FIG. 2)

**BANK UP**

$$\begin{aligned} R_{\text{VER}}^{\text{B-BU}} & \text{ VERTICAL REACTION AT POINT B: } 649 \text{ lbs} = \text{HOIST CABLE TENSION} + \frac{\text{WEIGHT OF SIDE BRACE}}{2 \text{ SUPPORTS}} + \text{WEIGHT OF PULLEY} \\ R_{\text{HOR}}^{\text{B-BU}} & \text{ HORIZONTAL REACTION AT POINT B: } 614 \text{ lbs} = \text{HOIST CABLE TENSION} \end{aligned}$$



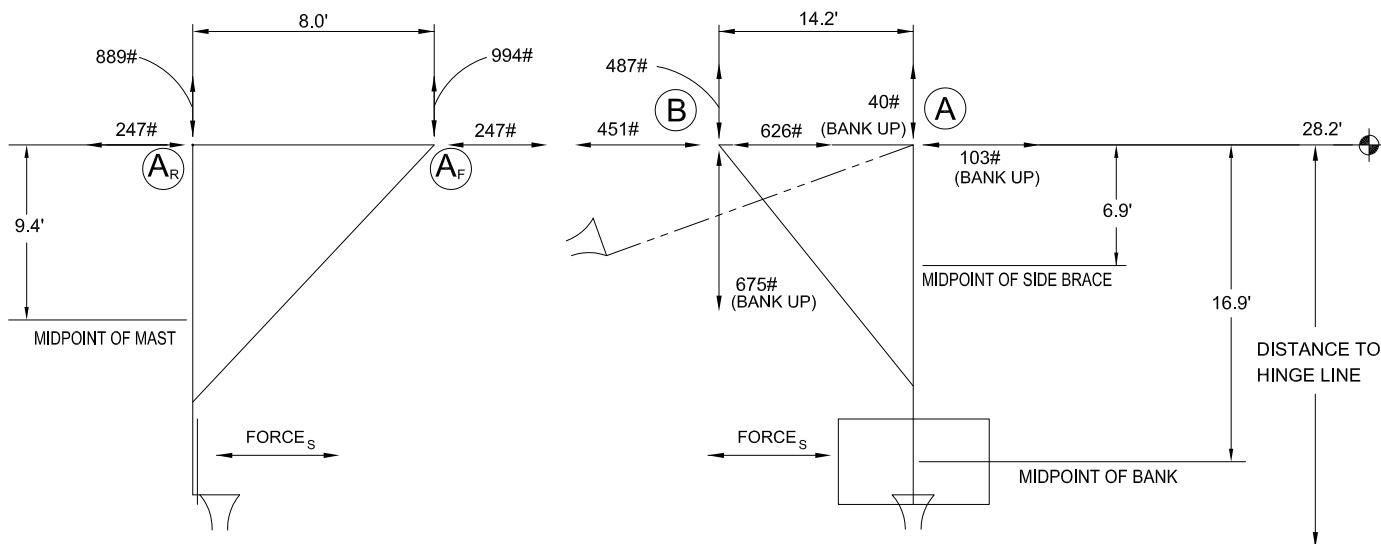
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FORCES PERPENDICULAR TO BANK FIGURE 1

FORCES PARALLEL TO BANK FIGURE 2

### WEIGHT LOAD CALCULATIONS (WITH BANK DOWN)

$$\begin{aligned} \text{BACKSTOP'S TOTAL WEIGHT LOAD} &= 706 \text{ lbs (WEIGHT OF FRONT BRACE + WEIGHT OF MAST + WEIGHT OF BANK)} \\ \text{WEIGHT LOAD AT POINT "A"} &= 664 \text{ lbs} \left( \frac{\text{WEIGHT OF SIDE BRACE}}{2} \right) + \text{WEIGHT OF MAST + WEIGHT OF BANK} \\ \text{WEIGHT LOAD AT POINT "B"} &= 49 \text{ lbs} \left( \frac{\text{WEIGHT OF SIDE BRACE}}{2} \right) + \text{WEIGHT OF PULLEY} \end{aligned}$$

+PLEASE NOTE THESE ARE ESTIMATED WEIGHT LOADS FROM THE BACKSTOP MAST HANGERS TO THE FLOOR. THESE ESTIMATES DO NOT INCLUDE ANY SUPERSTRUCTURE WEIGHTS.

### SEISMIC FACTORED MOMENTS AND SUM OF MOMENTS FOR BACKSTOP ELEMENTS

SEISMIC FACTOR = 0.7 (VARIES WITH SEISMIC ZONE, RIGIDITY OF SUPPORT & ROOM USE)

$$\begin{aligned} \text{WEIGHT OF BANK (WB)} &= 329 \text{ lbs} \times \text{SEISMIC FACTOR} \times \text{DISTANCE TO MIDPOINT OF BANK (DB)} = 3892 \text{ ft.lbs SEISMIC MOMENT (MB) (FT.LBS.)} \\ \text{WEIGHT OF SIDE BRACE (WSB)} &= 85 \text{ lbs} \times \text{SEISMIC FACTOR} \times \text{DISTANCE TO MIDPOINT OF SIDE BRACE (DSB)} = 411 \text{ ft.lbs SEISMIC MOMENT (MFB) (FT.LBS.)} \\ \text{WEIGHT OF MAST (WM)} &= 292 \text{ lbs} \times \text{SEISMIC FACTOR} \times \text{DISTANCE TO MIDPOINT OF MAST (DM)} = 1921 \text{ ft.lbs SEISMIC MOMENT (MM) (FT.LBS.)} \end{aligned}$$

$$\text{WB} + \text{WFB} + \text{WM} = \text{BACKSTOP'S TOTAL WEIGHT LOAD} = 6224 \text{ ft.lbs SUM OF THE MOMENTS} = \text{MB} + \text{MFB} + \text{MM}$$

### POINT REACTIONS FROM WEIGHT LOADS AND SEISMIC WITH BANK DOWN

#### REACTIONS AT HINGE LINE AT POINT A FROM WEIGHT LOADS AND SEISMIC PARALLEL TO BANK (FIG. 2)

$$\begin{aligned} \text{BANK DOWN} \quad R_{\text{VER}}^{\text{AR}} \quad \text{VERTICAL REACTIONS AT POINT AR:} \quad 889 \text{ lbs} &= \frac{\text{WEIGHT OF MAST} + \text{WEIGHT OF BANK} + \frac{\text{WEIGHT OF THE BANK}}{2 \text{ SUPPORTS}}}{\text{DISTANCE FROM A}_F \text{ TO A}_R / 2} \pm \frac{\text{MOMENT OF THE BRACE}}{\text{DISTANCE FROM A}_F \text{ TO A}_R / 2} \\ R_{\text{VER}}^{\text{AF}} \quad \text{VERTICAL REACTIONS AT POINT AF:} \quad 994 \text{ lbs} &= \frac{\text{WEIGHT OF BANK}}{2 \text{ SUPPORTS}} + \frac{\text{MOMENT AT MAST} + \text{MOMENT AT BANK}}{\text{DISTANCE BETWEEN SUPPORTS (A}_F - \text{A}_R)} \pm \frac{\text{MOMENT OF THE BRACE}}{\text{DISTANCE FROM A}_F \text{ TO A}_R / 2} \\ R_{\text{HOR}} \quad \text{HORIZONTAL REACTION FOR BOTH:} \quad 247 \text{ lbs} &= \frac{\text{BACKSTOP'S TOTAL WEIGHT LOAD} \times \text{SEISMIC FACTOR}}{2 \text{ SUPPORTS}} \end{aligned}$$

#### REACTIONS AT HINGE LINE AT POINT B FROM WEIGHT LOADS AND SEISMIC PERPENDICULAR TO BANK (FIG. 1)

$$\begin{aligned} \text{BANK DOWN} \quad R_{\text{VER}}^{\text{B}} \quad \text{VERTICAL REACTION AT POINT B:} \quad 487 \text{ lbs} &= \frac{\text{WEIGHT OF SIDE BRACE}}{2 \text{ SUPPORTS}} + \text{WEIGHT OF PULLEY} \pm \frac{\text{SUM OF THE MOMENTS}}{\text{DISTANCE BETWEEN SUPPORTS (A-B)}} \\ R_{\text{HOR}}^{\text{B}} \quad \text{HORIZONTAL REACTION AT POINT B:} \quad 451 \text{ lbs} &= \frac{\text{SUM OF THE MOMENTS}}{\text{DISTANCE TO MIDPOINT OF SIDE BRACE} \times 2} \end{aligned}$$

### POINT REACTIONS FROM WEIGHT LOADS AND SEISMIC WITH BANK UP

$$\text{HOIST CABLE TENSION AT POINT C:} \quad 626 \text{ lbs} = \frac{\text{SUM OF THE MOMENTS}}{\text{SEISMIC FACTOR} \times \text{DISTANCE FROM A TO B}}$$

#### REACTIONS AT HINGE LINE AT POINT A FROM WEIGHT LOADS AND SEISMIC PARALLEL TO BANK (FIG. 2)

$$\begin{aligned} \text{BANK UP} \quad R_{\text{VER}}^{\text{A-BU}} \quad \text{VERTICAL REACTION AT POINT A:} \quad 40 \text{ lbs} &= \frac{\text{BACKSTOP'S TOTAL WEIGHT LOAD} - \text{HOIST CABLE TENSION}}{2 \text{ SUPPORTS}} \\ R_{\text{HOR}}^{\text{AF}} \quad \text{HORIZONTAL REACTION AT POINT A: FROM SEISMIC PARALLEL TO BANK} \quad 103 \text{ lbs} &= \pm \frac{\text{MOMENT AT BRACE}}{\text{DISTANCE FROM A}_F \text{ TO A}_R / 2} \end{aligned}$$

#### REACTIONS AT HINGE LINE AT POINT B FROM WEIGHT LOADS AND SEISMIC PARALLEL TO BANK (FIG. 2)

$$\begin{aligned} \text{BANK UP} \quad R_{\text{VER}}^{\text{B-BU}} \quad \text{VERTICAL REACTION AT POINT B:} \quad 675 \text{ lbs} &= \text{HOIST CABLE TENSION} + \frac{\text{WEIGHT OF SIDE BRACE}}{2 \text{ SUPPORTS}} + \text{WEIGHT OF PULLEY} \\ R_{\text{HOR}}^{\text{B-BU}} \quad \text{HORIZONTAL REACTION AT POINT B:} \quad 626 \text{ lbs} &= \text{HOIST CABLE TENSION} \end{aligned}$$



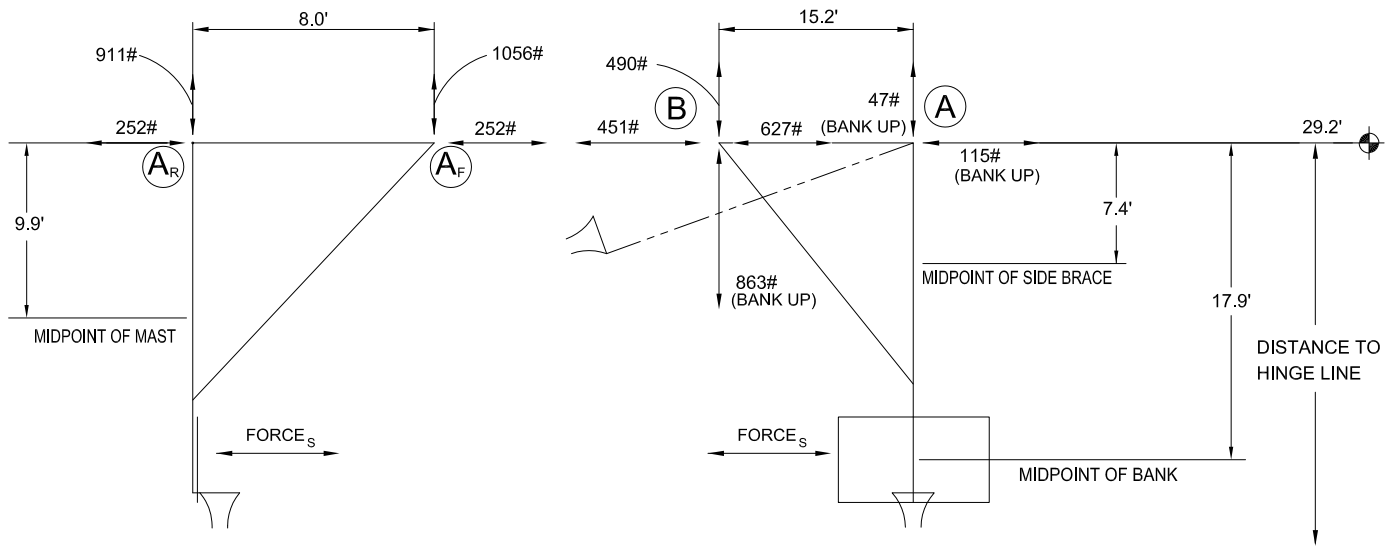
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FORCES PERPENDICULAR TO BANK FIGURE 1

FORCES PARALLEL TO BANK FIGURE 2

### WEIGHT LOAD CALCULATIONS (WITH BANK DOWN)

$$\begin{aligned} \text{BACKSTOP'S TOTAL WEIGHT LOAD} &= 720 \text{ lbs (WEIGHT OF FRONT BRACE + WEIGHT OF MAST + WEIGHT OF BANK)} \\ \text{WEIGHT LOAD AT POINT "A"} &= 676 \text{ lbs} \left( \frac{\text{WEIGHT OF SIDE BRACE}}{2} \right) + \text{WEIGHT OF MAST + WEIGHT OF BANK} \\ \text{WEIGHT LOAD AT POINT "B"} &= 51 \text{ lbs} \left( \frac{\text{WEIGHT OF SIDE BRACE}}{2} \right) + \text{WEIGHT OF PULLEY} \end{aligned}$$

+PLEASE NOTE THESE ARE ESTIMATED WEIGHT LOADS FROM THE BACKSTOP MAST HANGERS TO THE FLOOR. THESE ESTIMATES DO NOT INCLUDE ANY SUPERSTRUCTURE WEIGHTS.

### SEISMIC FACTORED MOMENTS AND SUM OF MOMENTS FOR BACKSTOP ELEMENTS

$$\text{SEISMIC FACTOR} = 0.7 \quad (\text{VARIES WITH SEISMIC ZONE, RIGIDITY OF SUPPORT \& ROOM USE})$$

$$\begin{aligned} \text{WEIGHT OF BANK (WB)} & 329 \text{ lbs} \times \text{SEISMIC FACTOR} \times \text{DISTANCE TO MIDPOINT OF BANK (DB)} &= 4122 \text{ ft.lbs} & \text{SEISMIC MOMENT (MB) (FT.LBS.)} \\ \text{WEIGHT OF SIDE BRACE (WSB)} & 89 \text{ lbs} \times \text{SEISMIC FACTOR} \times \text{DISTANCE TO MIDPOINT OF SIDE BRACE (DSB)} &= 461 \text{ ft.lbs} & \text{SEISMIC MOMENT (MFB) (FT.LBS.)} \\ \text{WEIGHT OF MAST (WM)} & 302 \text{ lbs} \times \text{SEISMIC FACTOR} \times \text{DISTANCE TO MIDPOINT OF MAST (DM)} &= 2093 \text{ ft.lbs} & \text{SEISMIC MOMENT (MM) (FT.LBS.)} \end{aligned}$$

$$\text{WB} + \text{WFB} + \text{WM} = \text{BACKSTOP'S TOTAL WEIGHT LOAD} = 6676 \text{ ft.lbs} \quad \text{SUM OF THE MOMENTS} = \text{MB} + \text{MFB} + \text{MM}$$

### POINT REACTIONS FROM WEIGHT LOADS AND SEISMIC WITH BANK DOWN

#### REACTIONS AT HINGE LINE AT POINT A FROM WEIGHT LOADS AND SEISMIC PARALLEL TO BANK (FIG. 2)

$$\begin{aligned} \text{BANK DOWN} \quad R_{\text{VER}}^{\text{AR}} \quad \text{VERTICAL REACTIONS AT POINT AR:} \quad 911 \text{ lbs} &= \frac{\text{WEIGHT OF MAST} + \text{WEIGHT OF BANK} + \frac{\text{WEIGHT OF THE BANK}}{2 \text{ SUPPORTS}}}{\text{DISTANCE FROM A}_F \text{ TO A}_R / 2} \pm \frac{\text{MOMENT OF THE BRACE}}{\text{DISTANCE FROM A}_F \text{ TO A}_R / 2} \\ R_{\text{VER}}^{\text{AF}} \quad \text{VERTICAL REACTIONS AT POINT AF:} \quad 1056 \text{ lbs} &= \frac{\text{WEIGHT OF BANK}}{2 \text{ SUPPORTS}} + \frac{\text{MOMENT AT MAST} + \text{MOMENT AT BANK}}{\text{DISTANCE BETWEEN SUPPORTS (A}_F - \text{A}_R)} \pm \frac{\text{MOMENT OF THE BRACE}}{\text{DISTANCE FROM A}_F \text{ TO A}_R / 2} \\ R_{\text{HOR}} \quad \text{HORIZONTAL REACTION FOR BOTH:} \quad 252 \text{ lbs} &= \frac{\text{BACKSTOP'S TOTAL WEIGHT LOAD} \times \text{SEISMIC FACTOR}}{2 \text{ SUPPORTS}} \end{aligned}$$

#### REACTIONS AT HINGE LINE AT POINT B FROM WEIGHT LOADS AND SEISMIC PERPENDICULAR TO BANK (FIG. 1)

$$\begin{aligned} \text{BANK DOWN} \quad R_{\text{VER}}^{\text{B}} \quad \text{VERTICAL REACTION AT POINT B:} \quad 490 \text{ lbs} &= \frac{\text{WEIGHT OF SIDE BRACE}}{2 \text{ SUPPORTS}} + \text{WEIGHT OF PULLEY} \pm \frac{\text{SUM OF THE MOMENTS}}{\text{DISTANCE BETWEEN SUPPORTS (A-B)}} \\ R_{\text{HOR}}^{\text{B}} \quad \text{HORIZONTAL REACTION AT POINT B:} \quad 451 \text{ lbs} &= \frac{\text{SUM OF THE MOMENTS}}{\text{DISTANCE TO MIDPOINT OF SIDE BRACE} \times 2} \end{aligned}$$

### POINT REACTIONS FROM WEIGHT LOADS AND SEISMIC WITH BANK UP

$$\text{HOIST CABLE TENSION AT POINT C:} \quad 627 \text{ lbs} = \frac{\text{SUM OF THE MOMENTS}}{\text{SEISMIC FACTOR} \times \text{DISTANCE FROM A TO B}}$$

#### REACTIONS AT HINGE LINE AT POINT A FROM WEIGHT LOADS AND SEISMIC PARALLEL TO BANK (FIG. 2)

$$\begin{aligned} \text{BANK UP} \quad R_{\text{VER}}^{\text{A-BU}} \quad \text{VERTICAL REACTION AT POINT A:} \quad 47 \text{ lbs} &= \frac{\text{BACKSTOP'S TOTAL WEIGHT LOAD} - \text{HOIST CABLE TENSION}}{2 \text{ SUPPORTS}} \\ R_{\text{HOR}}^{\text{AF}} \quad \text{HORIZONTAL REACTION AT POINT A: FROM SEISMIC PARALLEL TO BANK} \quad 115 \text{ lbs} &= \pm \frac{\text{MOMENT AT BRACE}}{\text{DISTANCE FROM A}_F \text{ TO A}_R / 2} \end{aligned}$$

#### REACTIONS AT HINGE LINE AT POINT B FROM WEIGHT LOADS AND SEISMIC PARALLEL TO BANK (FIG. 2)

$$\begin{aligned} \text{BANK UP} \quad R_{\text{VER}}^{\text{B-BU}} \quad \text{VERTICAL REACTION AT POINT B:} \quad 863 \text{ lbs} &= \text{HOIST CABLE TENSION} + \frac{\text{WEIGHT OF SIDE BRACE}}{2 \text{ SUPPORTS}} + \text{WEIGHT OF PULLEY} \\ R_{\text{HOR}}^{\text{B-BU}} \quad \text{HORIZONTAL REACTION AT POINT B:} \quad 627 \text{ lbs} &= \text{HOIST CABLE TENSION} \end{aligned}$$



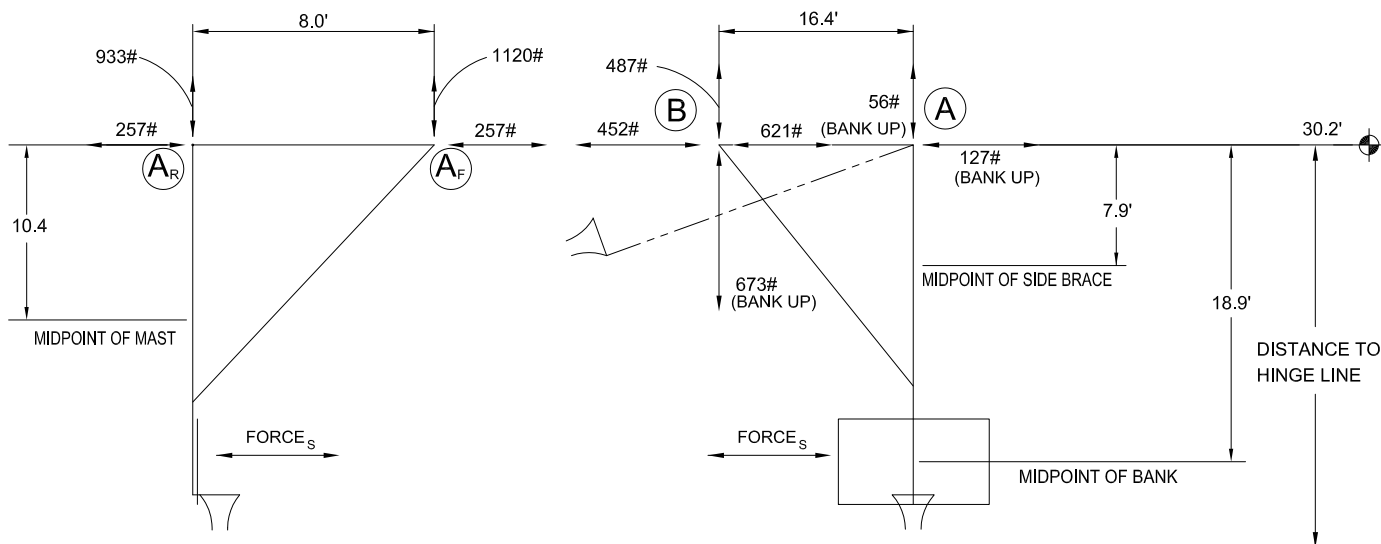
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### WEIGHT LOAD CALCULATIONS (WITH BANK DOWN)

$$\begin{aligned} \text{BACKSTOP'S TOTAL WEIGHT LOAD} &= 733 \text{ lbs (WEIGHT OF FRONT BRACE + WEIGHT OF MAST + WEIGHT OF BANK)} \\ \text{WEIGHT LOAD AT POINT "A"} &= 687 \text{ lbs} \left( \frac{\text{WEIGHT OF SIDE BRACE}}{2} \right) + \text{WEIGHT OF MAST} + \text{WEIGHT OF BANK} \\ \text{WEIGHT LOAD AT POINT "B"} &= 52 \text{ lbs} \left( \frac{\text{WEIGHT OF SIDE BRACE}}{2} \right) + \text{WEIGHT OF PULLEY} \end{aligned}$$

+PLEASE NOTE THESE ARE ESTIMATED WEIGHT LOADS FROM THE BACKSTOP MAST HANGERS TO THE FLOOR. THESE ESTIMATES DO NOT INCLUDE ANY SUPERSTRUCTURE WEIGHTS.

### SEISMIC FACTORED MOMENTS AND SUM OF MOMENTS FOR BACKSTOP ELEMENTS

SEISMIC FACTOR = 0.7 (VARIES WITH SEISMIC ZONE, RIGIDITY OF SUPPORT & ROOM USE)

WEIGHT OF BANK (WB)	329 lbs	X SEISMIC FACTOR X	DISTANCE TO MIDPOINT OF BANK (DB)	=	4353 ft.lbs	SEISMIC MOMENT (MB) (FT.LBS.)
WEIGHT OF SIDE BRACE (WSB)	92 lbs	X SEISMIC FACTOR X	DISTANCE TO MIDPOINT OF SIDE BRACE (DSB)	=	509 ft.lbs	SEISMIC MOMENT (MFB) (FT.LBS.)
WEIGHT OF MAST (WM)	312 lbs	X SEISMIC FACTOR X	DISTANCE TO MIDPOINT OF MAST (DM)	=	2271 ft.lbs	SEISMIC MOMENT (MM) (FT.LBS.)
WB + WFB + WM = BACKSTOP'S TOTAL WEIGHT LOAD				=	7133 ft.lbs	SUM OF THE MOMENTS = MB + MFB + MM

### POINT REACTIONS FROM WEIGHT LOADS AND SEISMIC WITH BANK DOWN

#### REACTIONS AT HINGE LINE AT POINT A FROM WEIGHT LOADS AND SEISMIC PARALLEL TO BANK (FIG. 2)

<b>BANK DOWN</b>	$R_{VER}^{AR}$	VERTICAL REACTIONS AT POINT AR:	$933 \text{ lbs} = \frac{\text{WEIGHT OF MAST} + \text{WEIGHT OF BANK} + \frac{\text{WEIGHT OF THE BANK}}{2 \text{ SUPPORTS}}}{\text{DISTANCE FROM } A_F \text{ TO } A_R / 2} \pm \frac{\text{MOMENT OF THE BRACE}}{\text{DISTANCE FROM } A_F \text{ TO } A_R / 2}$
	$R_{VER}^{AF}$	VERTICAL REACTIONS AT POINT AF:	$1120 \text{ lbs} = \frac{\text{WEIGHT OF BANK}}{2 \text{ SUPPORTS}} + \frac{\text{MOMENT AT MAST} + \text{MOMENT AT BANK}}{\text{DISTANCE BETWEEN SUPPORTS } (A_F - A_R)} \pm \frac{\text{MOMENT OF THE BRACE}}{\text{DISTANCE FROM } A_F \text{ TO } A_R / 2}$
	$R_{HOR}$	HORIZONTAL REACTION FOR BOTH:	$257 \text{ lbs} = \frac{\text{BACKSTOP'S TOTAL WEIGHT LOAD} \times \text{SEISMIC FACTOR}}{2 \text{ SUPPORTS}}$

#### REACTIONS AT HINGE LINE AT POINT B FROM WEIGHT LOADS AND SEISMIC PERPENDICULAR TO BANK (FIG. 1)

<b>BANK DOWN</b>	$R_{VER}^B$	VERTICAL REACTION AT POINT B:	$487 \text{ lbs} = \frac{\text{WEIGHT OF SIDE BRACE}}{2 \text{ SUPPORTS}} + \text{WEIGHT OF PULLEY} \pm \frac{\text{SUM OF THE MOMENTS}}{\text{DISTANCE BETWEEN SUPPORTS } (A-B)}$
	$R_{HOR}^B$	HORIZONTAL REACTION AT POINT B:	$452 \text{ lbs} = \frac{\text{SUM OF THE MOMENTS}}{\text{DISTANCE TO MIDPOINT OF SIDE BRACE} \times 2}$

### POINT REACTIONS FROM WEIGHT LOADS AND SEISMIC WITH BANK UP

HOIST CABLE TENSION AT POINT C:  $621 \text{ lbs} = \frac{\text{SUM OF THE MOMENTS}}{\text{SEISMIC FACTOR} \times \text{DISTANCE FROM A TO B}}$

#### REACTIONS AT HINGE LINE AT POINT A FROM WEIGHT LOADS AND SEISMIC PARALLEL TO BANK (FIG. 2)

<b>BANK UP</b>	$R_{VER}^{A-BU}$	VERTICAL REACTION AT POINT A:	$56 \text{ lbs} = \frac{\text{BACKSTOP'S TOTAL WEIGHT LOAD} - \text{HOIST CABLE TENSION}}{2 \text{ SUPPORTS}}$
	$R_{HOR}^{AF}$	HORIZONTAL REACTION AT POINT A: FROM SEISMIC PARALLEL TO BANK	$127 \text{ lbs} = \pm \frac{\text{MOMENT AT BRACE}}{\text{DISTANCE FROM } A_F \text{ TO } A_R / 2}$

#### REACTIONS AT HINGE LINE AT POINT B FROM WEIGHT LOADS AND SEISMIC PARALLEL TO BANK (FIG. 2)

<b>BANK UP</b>	$R_{VER}^{B-BU}$	VERTICAL REACTION AT POINT B:	$673 \text{ lbs} = \text{HOIST CABLE TENSION} + \frac{\text{WEIGHT OF SIDE BRACE}}{2 \text{ SUPPORTS}} + \text{WEIGHT OF PULLEY}$
	$R_{HOR}^{B-BU}$	HORIZONTAL REACTION AT POINT B:	$621 \text{ lbs} = \text{HOIST CABLE TENSION}$



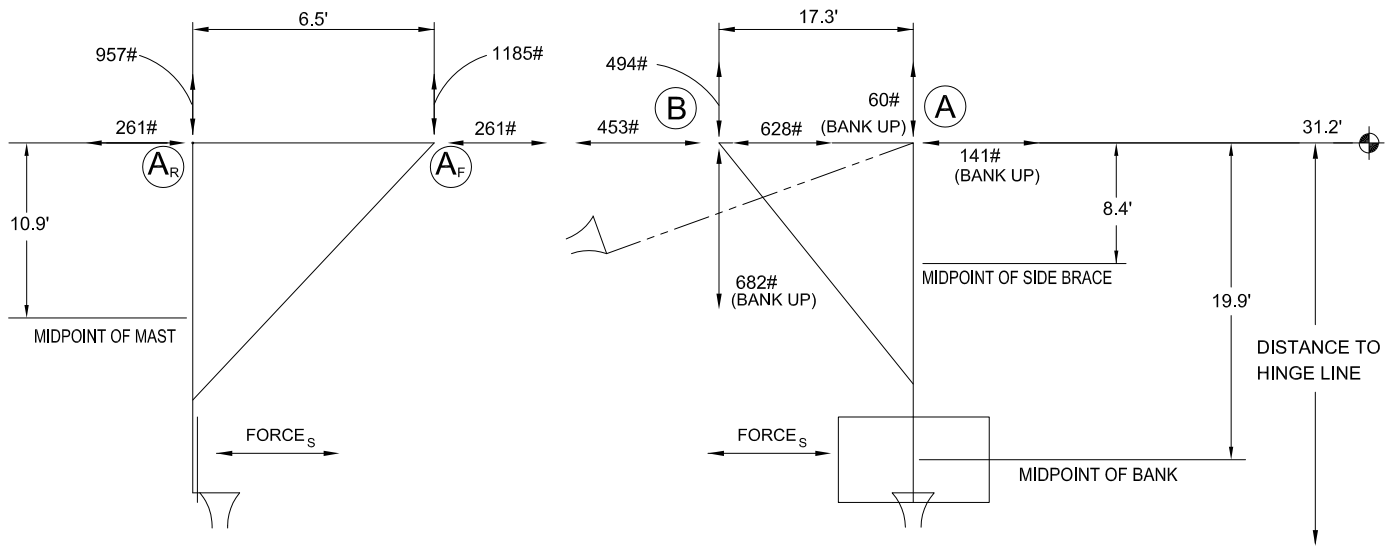
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FORCES PERPENDICULAR TO BANK FIGURE 1

FORCES PARALLEL TO BANK FIGURE 2

### WEIGHT LOAD CALCULATIONS (WITH BANK DOWN)

$$\begin{aligned} \text{BACKSTOP'S TOTAL WEIGHT LOAD} &= 747 \text{ lbs (WEIGHT OF FRONT BRACE + WEIGHT OF MAST + WEIGHT OF BANK)} \\ \text{WEIGHT LOAD AT POINT "A"} &= 699 \text{ lbs} \left( \frac{\text{WEIGHT OF SIDE BRACE}}{2} \right) + \text{WEIGHT OF MAST + WEIGHT OF BANK} \\ \text{WEIGHT LOAD AT POINT "B"} &= 54 \text{ lbs} \left( \frac{\text{WEIGHT OF SIDE BRACE}}{2} \right) + \text{WEIGHT OF PULLEY} \end{aligned}$$

+PLEASE NOTE THESE ARE ESTIMATED WEIGHT LOADS FROM THE BACKSTOP MAST HANGERS TO THE FLOOR. THESE ESTIMATES DO NOT INCLUDE ANY SUPERSTRUCTURE WEIGHTS.

### SEISMIC FACTORED MOMENTS AND SUM OF MOMENTS FOR BACKSTOP ELEMENTS

SEISMIC FACTOR = 0.7 (VARIES WITH SEISMIC ZONE, RIGIDITY OF SUPPORT & ROOM USE)

$$\begin{aligned} \text{WEIGHT OF BANK (WB)} & 329 \text{ lbs} \times \text{SEISMIC FACTOR} \times \text{DISTANCE TO MIDPOINT OF BANK (DB)} &= 4583 \text{ ft.lbs} & \text{SEISMIC MOMENT (MB) (FT.LBS.)} \\ \text{WEIGHT OF SIDE BRACE (WSB)} & 96 \text{ lbs} \times \text{SEISMIC FACTOR} \times \text{DISTANCE TO MIDPOINT OF SIDE BRACE (DSB)} &= 564 \text{ ft.lbs} & \text{SEISMIC MOMENT (MFB) (FT.LBS.)} \\ \text{WEIGHT OF MAST (WM)} & 322 \text{ lbs} \times \text{SEISMIC FACTOR} \times \text{DISTANCE TO MIDPOINT OF MAST (DM)} &= 2457 \text{ ft.lbs} & \text{SEISMIC MOMENT (MM) (FT.LBS.)} \end{aligned}$$

$$\text{WB} + \text{WFB} + \text{WM} = \text{BACKSTOP'S TOTAL WEIGHT LOAD} = 7604 \text{ ft.lbs} \quad \text{SUM OF THE MOMENTS} = \text{MB} + \text{MFB} + \text{MM}$$

### POINT REACTIONS FROM WEIGHT LOADS AND SEISMIC WITH BANK DOWN

#### REACTIONS AT HINGE LINE AT POINT A FROM WEIGHT LOADS AND SEISMIC PARALLEL TO BANK (FIG. 2)

$$\begin{aligned} \text{BANK DOWN} \quad R_{\text{VER}}^{\text{AR}} \quad \text{VERTICAL REACTIONS AT POINT AR:} \quad 957 \text{ lbs} &= \frac{\text{WEIGHT OF MAST} + \text{WEIGHT OF BANK} + \frac{\text{WEIGHT OF THE BANK}}{2 \text{ SUPPORTS}}}{\text{DISTANCE FROM A}_F \text{ TO A}_R / 2} \pm \frac{\text{MOMENT OF THE BRACE}}{\text{DISTANCE FROM A}_F \text{ TO A}_R / 2} \\ R_{\text{VER}}^{\text{AF}} \quad \text{VERTICAL REACTIONS AT POINT AF:} \quad 1185 \text{ lbs} &= \frac{\text{WEIGHT OF BANK}}{2 \text{ SUPPORTS}} + \frac{\text{MOMENT AT MAST} + \text{MOMENT AT BANK}}{\text{DISTANCE BETWEEN SUPPORTS (A}_F - \text{A}_R)} \pm \frac{\text{MOMENT OF THE BRACE}}{\text{DISTANCE FROM A}_F \text{ TO A}_R / 2} \\ R_{\text{HOR}} \quad \text{HORIZONTAL REACTION FOR BOTH:} \quad 261 \text{ lbs} &= \frac{\text{BACKSTOP'S TOTAL WEIGHT LOAD} \times \text{SEISMIC FACTOR}}{2 \text{ SUPPORTS}} \end{aligned}$$

#### REACTIONS AT HINGE LINE AT POINT B FROM WEIGHT LOADS AND SEISMIC PERPENDICULAR TO BANK (FIG. 1)

$$\begin{aligned} \text{BANK DOWN} \quad R_{\text{VER}}^{\text{B}} \quad \text{VERTICAL REACTION AT POINT B:} \quad 494 \text{ lbs} &= \frac{\text{WEIGHT OF SIDE BRACE}}{2 \text{ SUPPORTS}} + \text{WEIGHT OF PULLEY} \pm \frac{\text{SUM OF THE MOMENTS}}{\text{DISTANCE BETWEEN SUPPORTS (A-B)}} \\ R_{\text{HOR}}^{\text{B}} \quad \text{HORIZONTAL REACTION AT POINT B:} \quad 453 \text{ lbs} &= \frac{\text{SUM OF THE MOMENTS}}{\text{DISTANCE TO MIDPOINT OF SIDE BRACE} \times 2} \end{aligned}$$

### POINT REACTIONS FROM WEIGHT LOADS AND SEISMIC WITH BANK UP

$$\text{HOIST CABLE TENSION AT POINT C:} \quad 628 \text{ lbs} = \frac{\text{SUM OF THE MOMENTS}}{\text{SEISMIC FACTOR} \times \text{DISTANCE FROM A TO B}}$$

#### REACTIONS AT HINGE LINE AT POINT A FROM WEIGHT LOADS AND SEISMIC PARALLEL TO BANK (FIG. 2)

$$\begin{aligned} \text{BANK UP} \quad R_{\text{VER}}^{\text{A-BU}} \quad \text{VERTICAL REACTION AT POINT A:} \quad 60 \text{ lbs} &= \frac{\text{BACKSTOP'S TOTAL WEIGHT LOAD} - \text{HOIST CABLE TENSION}}{2 \text{ SUPPORTS}} \\ R_{\text{HOR}}^{\text{AF}} \quad \text{HORIZONTAL REACTION AT POINT A: FROM SEISMIC PARALLEL TO BANK} \quad 141 \text{ lbs} &= \pm \frac{\text{MOMENT AT BRACE}}{\text{DISTANCE FROM A}_F \text{ TO A}_R / 2} \end{aligned}$$

#### REACTIONS AT HINGE LINE AT POINT B FROM WEIGHT LOADS AND SEISMIC PARALLEL TO BANK (FIG. 2)

$$\begin{aligned} \text{BANK UP} \quad R_{\text{VER}}^{\text{B-BU}} \quad \text{VERTICAL REACTION AT POINT B:} \quad 682 \text{ lbs} &= \text{HOIST CABLE TENSION} + \frac{\text{WEIGHT OF SIDE BRACE}}{2 \text{ SUPPORTS}} + \text{WEIGHT OF PULLEY} \\ R_{\text{HOR}}^{\text{B-BU}} \quad \text{HORIZONTAL REACTION AT POINT B:} \quad 628 \text{ lbs} &= \text{HOIST CABLE TENSION} \end{aligned}$$



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