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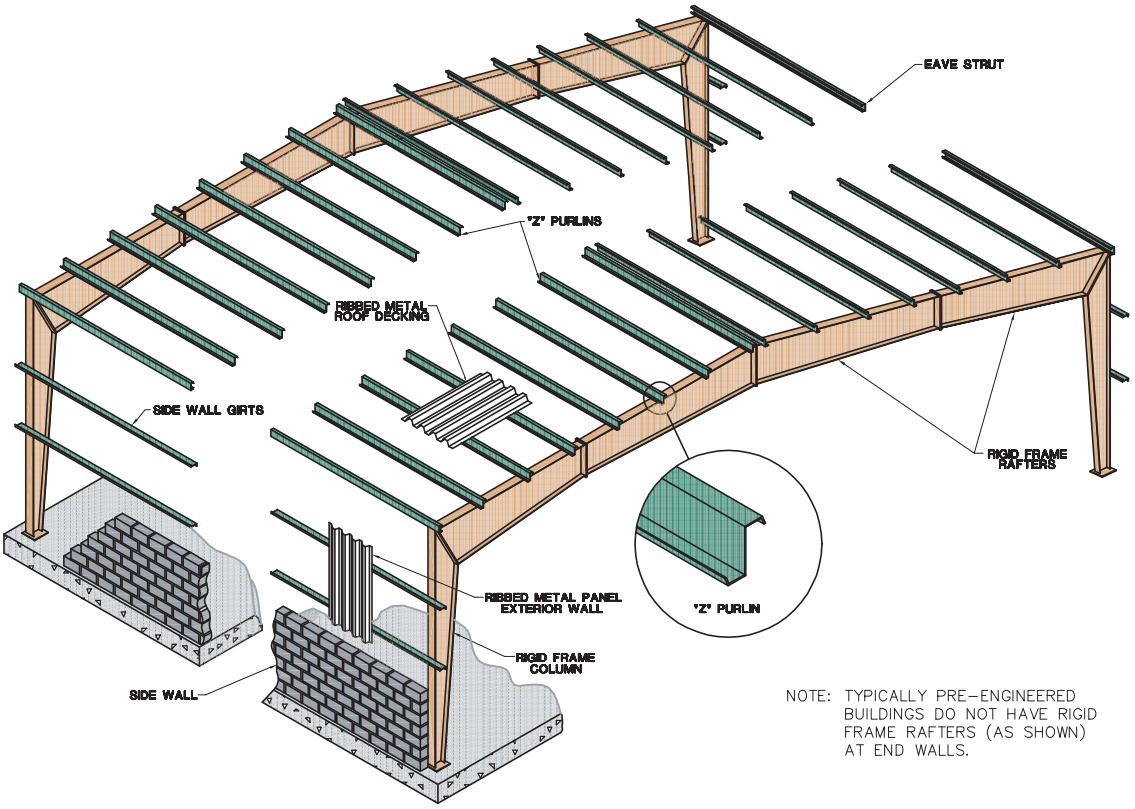
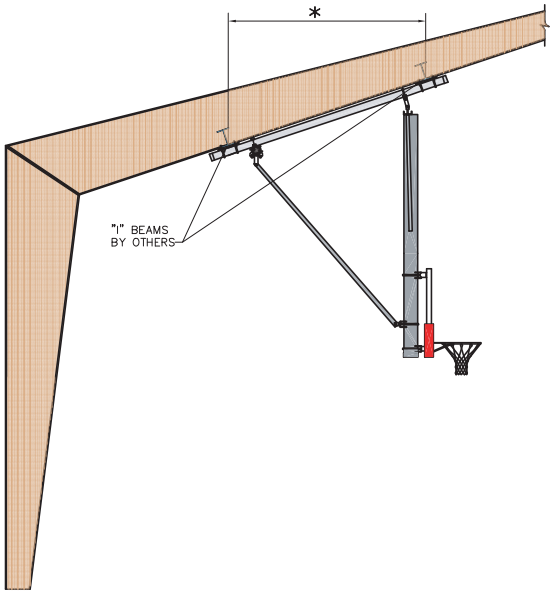
STEEL-IN-PLACE AND SUPERSTRUCTURE GUIDE

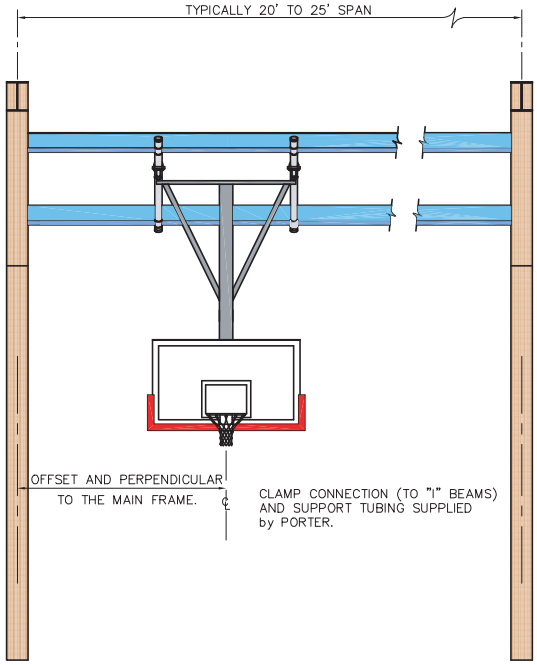
BACKSTOP APPLICATIONS FOR PRE-ENGINEERED BUILDINGS

(First Edition)



NOTE: TYPICALLY PRE-ENGINEERED BUILDINGS DO NOT HAVE RIGID FRAME RAFTERS (AS SHOWN) AT END WALLS.





BACKSTOP APPLICATIONS
FOR PRE-ENGINEERED BUILDINGS

INDEX

BACKSTOP STRUCTURE APPLICATIONS

FOR PRE-ENGINEERED BUILDINGS

This manual has been prepared to assist both the salesperson and structural engineer to better identify the support structure required for an overhead supported backstop, as adapted to a pre-engineered building. Due to the fast-track nature in the erection of pre-engineered buildings, the backstop support must be taken into consideration early in the project. Pricing of the backstop superstructure can vary widely, dependent upon whether the backstop can be attached directly to the purlins, cradled about a rigid frame member, attached to steel-in-place by a general contractor, or span frames with bridged tubing supplied by Porter.

This manual in no way implies the exclusion of the pre-engineered (metal) building fabricator, architect or structural engineer. Building attachments, as detailed in this manual, may not necessarily comply with the design load of the pre-engineered building structure. For example, the structural engineer (and/or metal building fabricator) may not allow any attachments for the backstop superstructure to the secondary ("Z" purlin) framing members. In a case such as this, either additional structural support members ("I" beams), supplied and installed by others, or bridged tubing (supplied by Porter) to span the rigid frames, will be required.

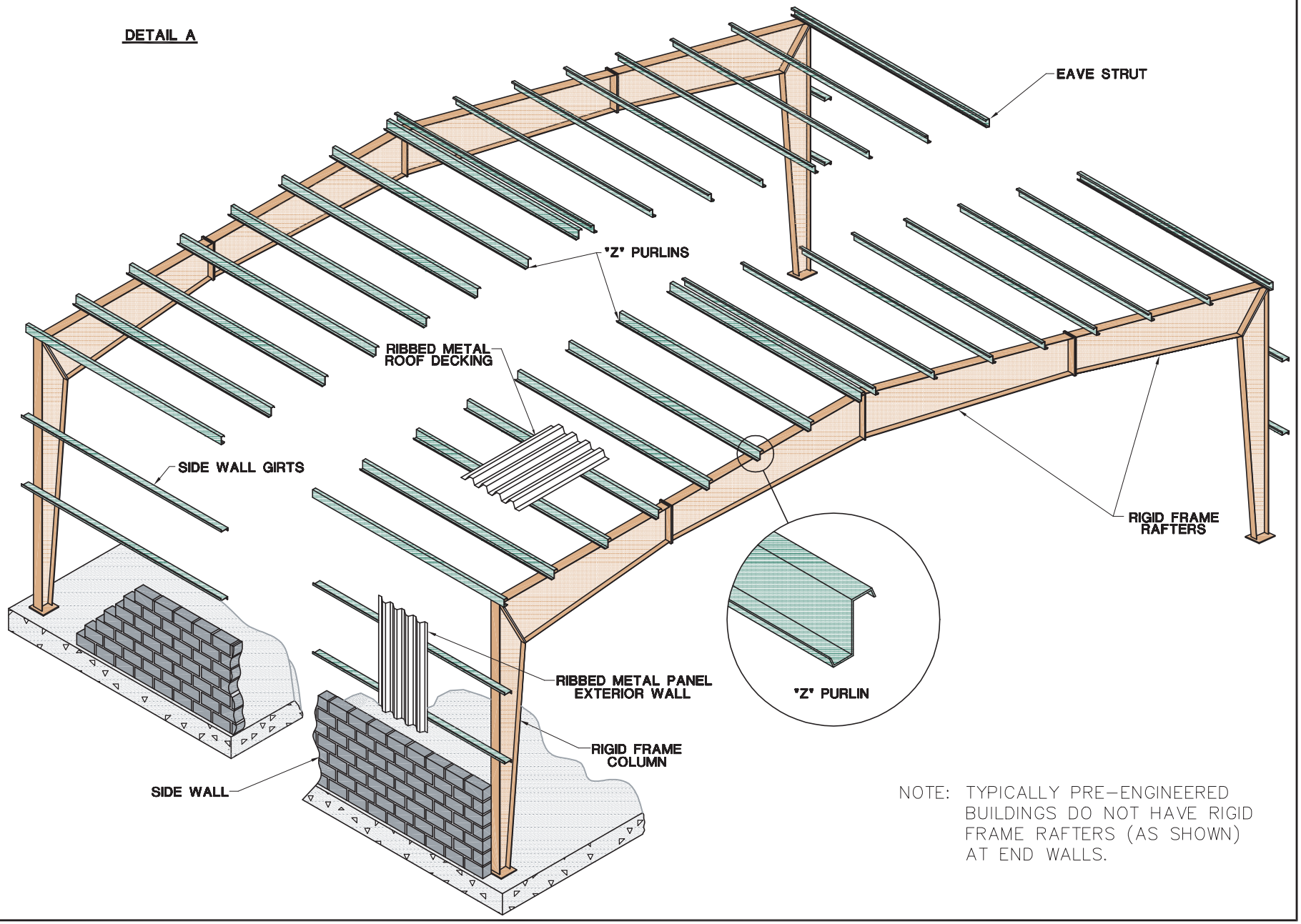
As a point of clarification, the terms "Pre-engineered Building," "Metal Frame Building" and "Rigid Frame Building" are all interchangeable for the sake of discussion in this manual. "Steel-in-place" refers to additional structural members required to support the backstops, which must be designed and designated by the architect or structural engineer, and erected by the general contractor. Please note, however, tube steel is still provided by Porter to span the steel-in-place. It has been Porter's vast experience that when steel is placed in a predetermined location, the backstop may not necessarily align correctly within the basketball court layout. The tube superstructure supplied by Porter provides adjustability during the installation process, and acts as bridging across the steel-framing members.

For simplicity in illustrating the various types of superstructures, all backstop models depicted in this manual are shown as stationary, rear-braced backstops. It is critical to take into consideration which model backstop will be utilized in your particular project. Obviously, the superstructure supports will vary, depending upon the model selected. A brief guide illustrating various backstop models is listed in this section. A comprehensive description, with illustrations, can be found in Porter's "Designer's Technical Manual."

Each building application is unique, with this guide serving only as a reference source. Differences in building material, design, lighting, and HVAC locations will require customization of the standard superstructure designs illustrated. Your Porter representative has the entire Porter engineering team to review your particular design needs. As you have come to expect, the Porter design and product is backed by over 130 years' experience and expertise. Let our team help you with your next project.

Porter Athletic Equipment Company

TYPICAL RIGID FRAME CONSTRUCTION



NOTE: TYPICALLY PRE-ENGINEERED BUILDINGS DO NOT HAVE RIGID FRAME RAFTERS (AS SHOWN) AT END WALLS.

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TYPICAL PRE-ENGINEERED BUILDING COMPONENTS

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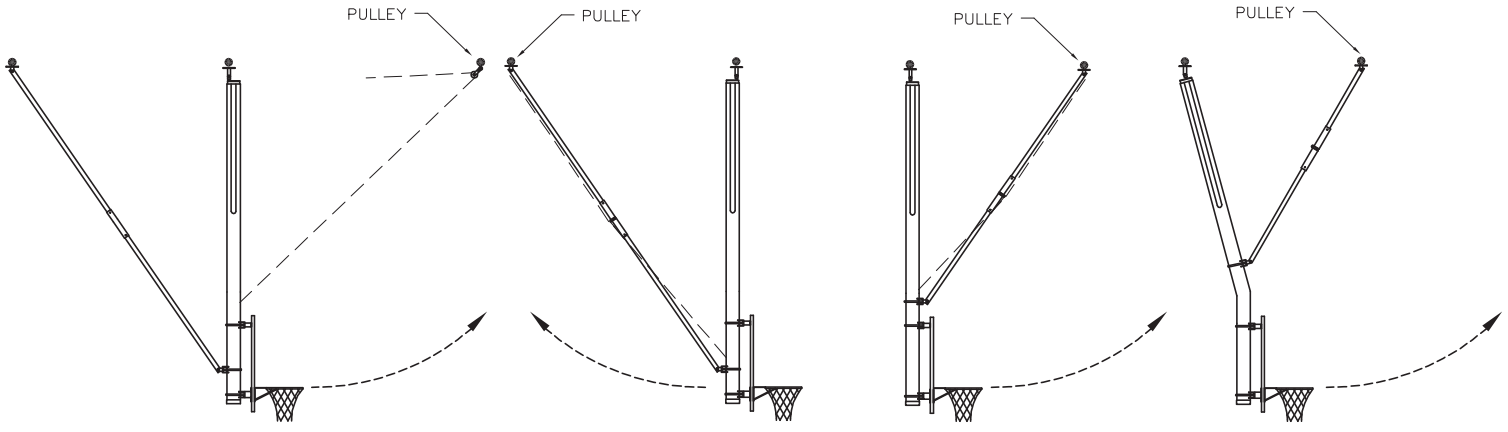
POINTS TO REMEMBER WHEN ADAPTING OVERHEAD SUPPORTED BACKSTOP STRUCTURES TO A PRE-ENGINEERED BUILDING

1. This is a permanent structure.

2. The building structure must withstand the load and lateral force of the backstop, as detailed, for a safe and rigid installation. Porter strongly recommends review of the backstop superstructure by the architect or the building's structural engineer of record.

3. Additional structural support may be added, as required, by the architect/structural engineer. Additional steel members, if required, are to be specified by the architect, located by Porter and installed by the general contractor. This must be specified in the architectural drawings/specifications, as required.

4. On folding units, additional support structure is required on a "17" series backstop for the pulley location, as opposed to the self-contained pulley structure on other folding units (see Detail "A"). The "17" series requires three points of attachment, as opposed to two.



THE "55" SERIES SIDE FOLD BACKSTOP ALSO REQUIRES ADDITIONAL STRUCTURE (NOT SHOWN).

DETAIL A

BACKSTOP FIELD CHECK LIST FOR RIGID FRAME BUILDINGS

Information not verified will be assumed correct. Porter Athletic Equipment Company will not accept responsibility for errors resulting from field checks without complete verification.

Sketch in the following information on the field check sheet and submittal drawings.

❑ 1. Transfer all architects comments/corrections to this set of submittal drawings.

❑ 2. Check distance of wall-to-wall dimensions, length and width of gymnasium.

❑ 3. Check distance from first rigid frame to wall and center-to-center dimensions of all other members.

❑ 4. Check distance of first purlin to wall and center-to-center of all other purlins.

❑ 5. Check size of attachment members. Designate type and size:
   A. Rigid Frame Flange: Width _____ Thickness _____
   B. "Z" Purlin: Height _____ Gauge _____
   C. "C" Purlin: Height _____ Gauge _____

❑ 6. Give description of wall and check with architect to determine if backstop superstructure and/or winch pulley may be attached to wall.

❑ 7. Check height of beams at attachment points of backstop superstructure. (Is finished floor in place? If not, check thickness with G.C. and specify.) Check beam height at wall and at center of room for slope or camber of beams.

❑ 8. Check with general contractor if a ceiling is to be installed. If so, request the following:
   A. Type of ceiling _____
   B. Ceiling height from finished floor _____
   C. Schedule for installation of ceiling _____

❑ 9. If heating ducts and lights have not been installed, check with general contractor on locations, heights and sizes to ensure that there will not be an interference with the installation and folding of the backstops.

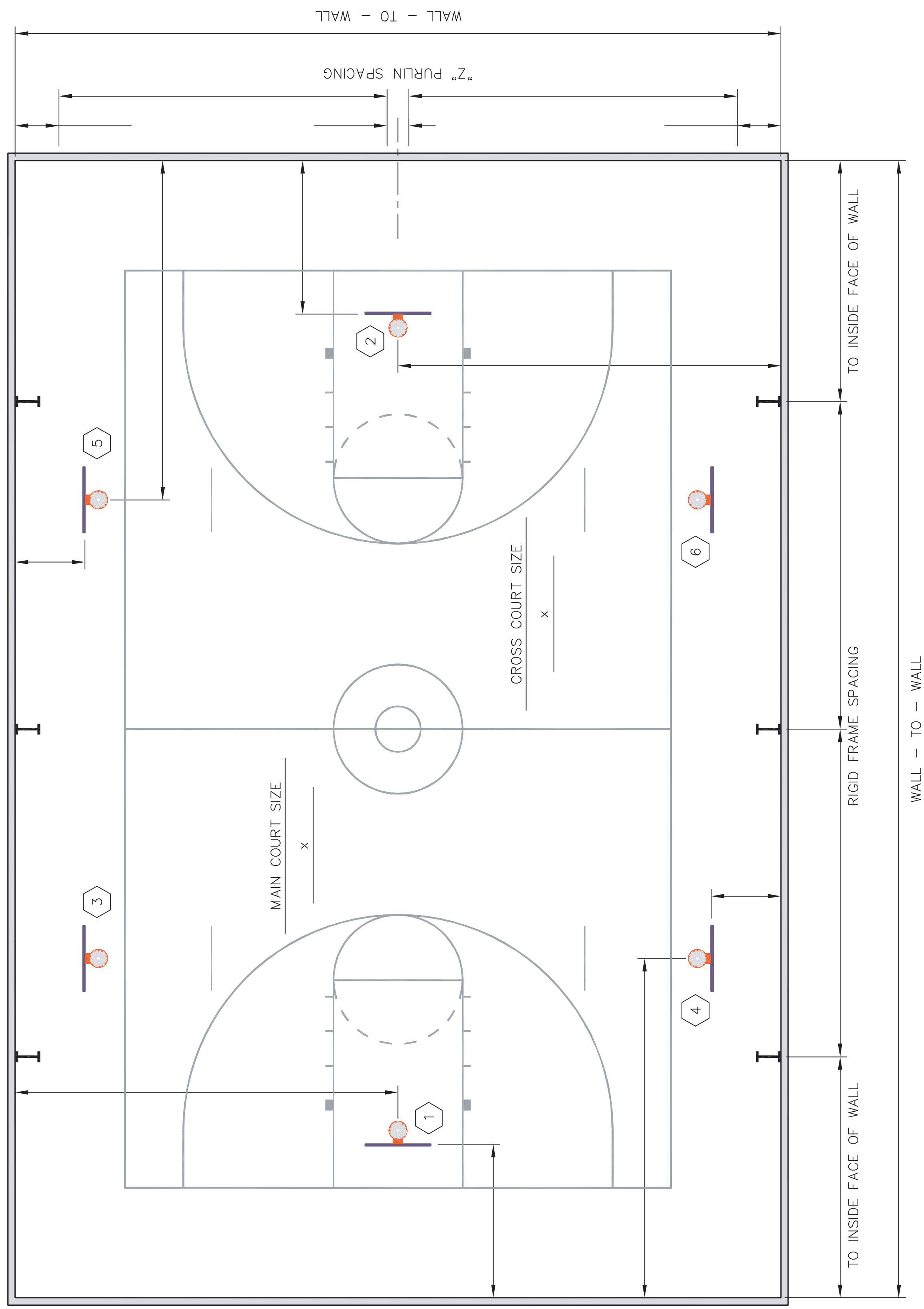
❑ 10. Check with owner or architect to determine the best location for the manual winches. Ideally, winches should be located directly below structural ceiling member so that wall pulley may be affixed to it, thus keeping load of backstop off wall at this point.

❑ 11. If electric operation is specified, give general contractor copy of wiring diagram and specify the location of the electric winch. In most cases the winch will be located directly above the backboard, as located on the floor plan. Check keyswitch box size.

❑ 12. If court markings are not in place, check with field architect on location of backstops as per architect's floor plan. (Note minimum face of bank-to-wall dimensions on backstop drawings.)

❑ 13. Check sight lines from top row of balcony bleachers. (Recommend direct attached forward fold backstops when sight line problem exists.)

❑ 14. Check with contractor on scheduling of shipment and installation of backstops.



FIELD CHECK NOTE: PLEASE NOTE ON THIS DRAWING EXACT LOCATIONS OF ALL LIGHT FIXTURES, AIR DUCTS, AND HEATING UNITS THAT ARE NEAR THE BACKSTOPS. WE CAN NOT FABRICATE WITHOUT THIS INFORMATION.

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FLOOR PLAN
FIELD CHECK GUIDE

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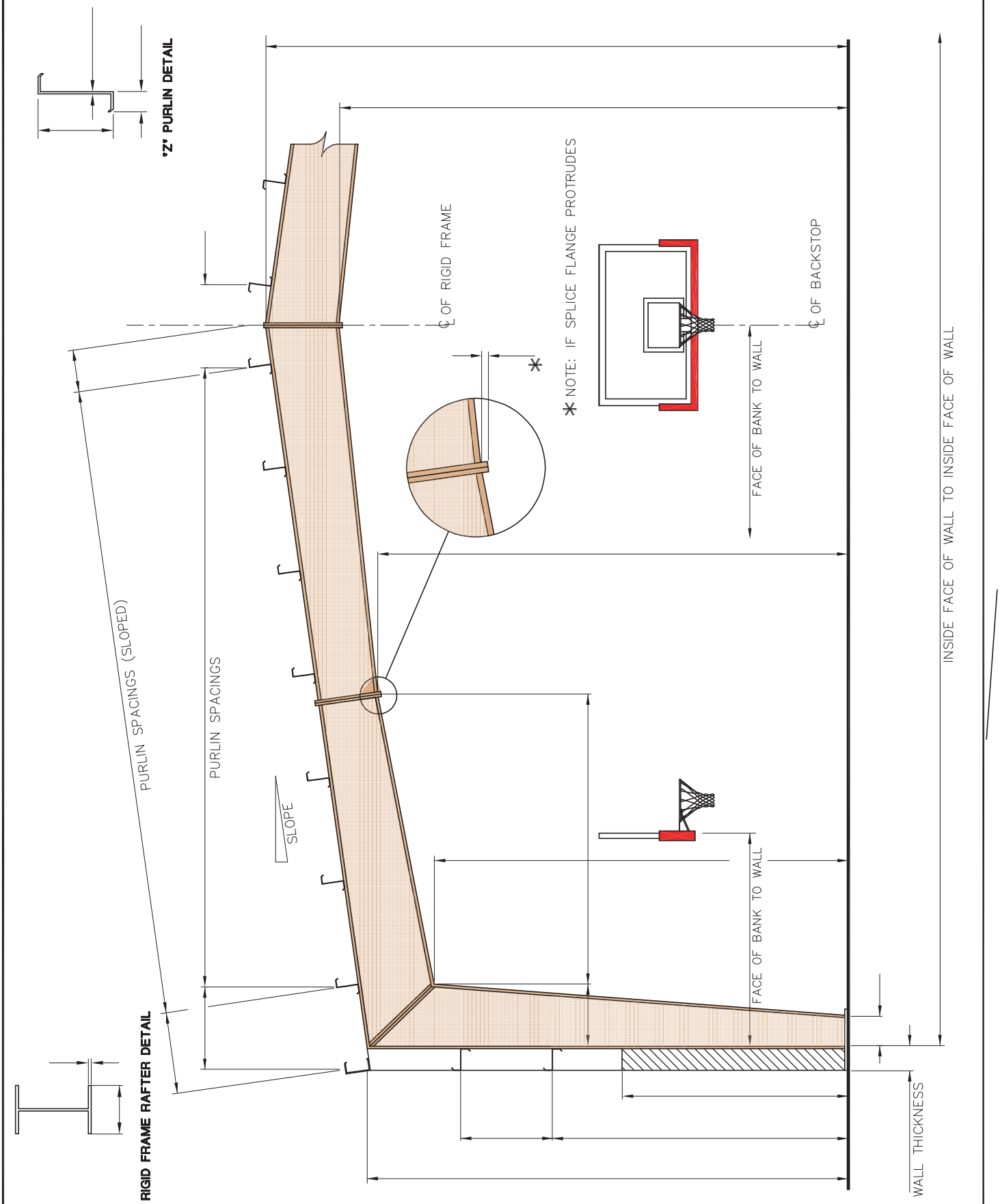

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BUILDING ELEVATION FIELD CHECK GUIDE

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STEEL-IN-PLACE BACKBOARD PARALLEL WITH MAIN FRAME (OPTION A)

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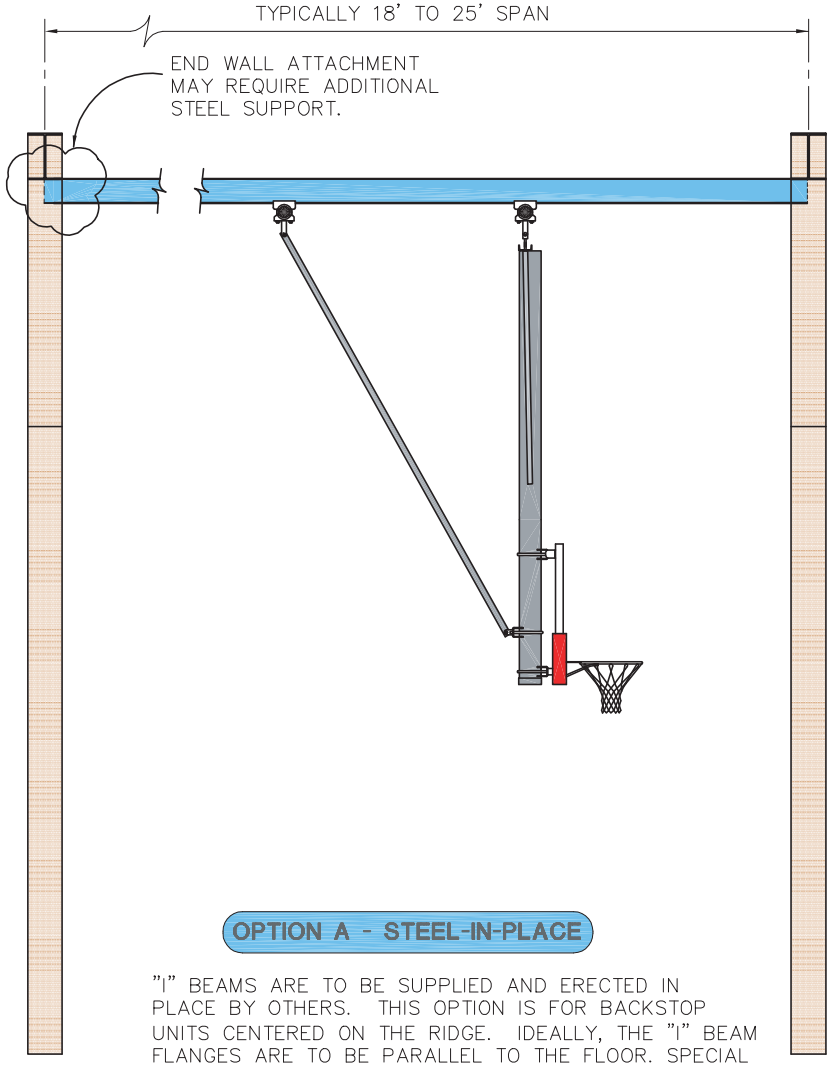
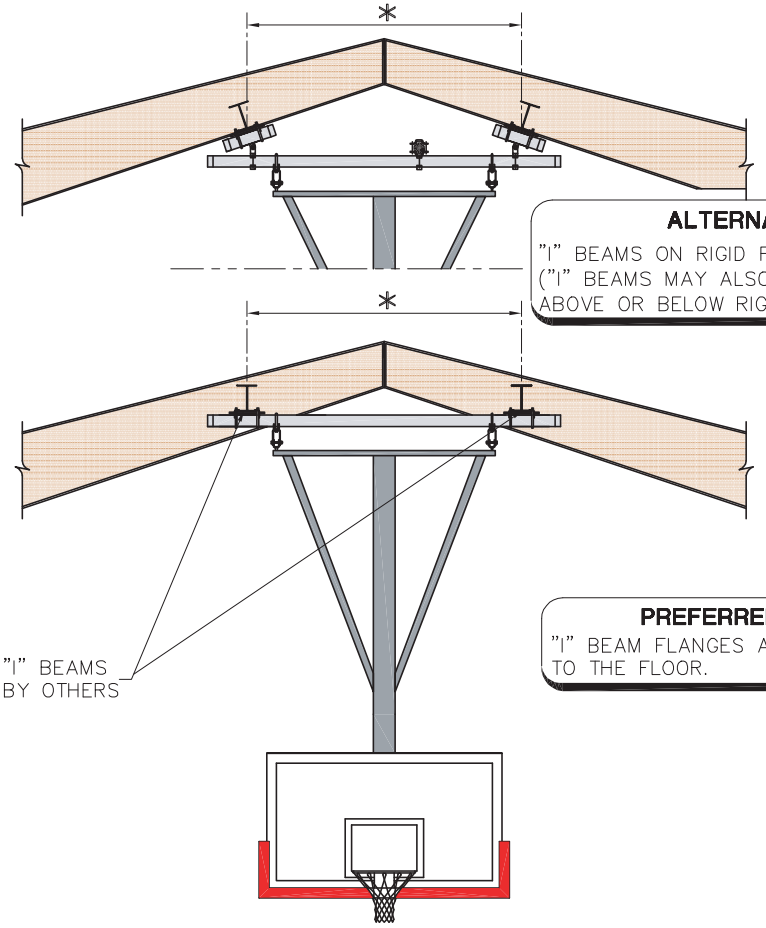
* CONTACT FACTORY REP FOR LOCATION



OPTION A - STEEL-IN-PLACE

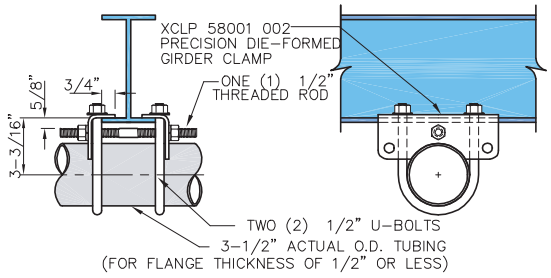
"I" BEAMS ARE TO BE SUPPLIED AND ERECTED IN PLACE BY OTHERS. THIS OPTION IS FOR BACKSTOP UNITS CENTERED ON THE RIDGE. IDEALLY, THE "I" BEAM FLANGES ARE TO BE PARALLEL TO THE FLOOR. SPECIAL PROVISIONS MAY BE REQUIRED FOR THE "I" BEAM AT THE END WALL ATTACHMENT.



ALTERNATE
"I" BEAMS ON RIGID FRAME CAMBER. ("I" BEAMS MAY ALSO BE LOCATED ABOVE OR BELOW RIGID FRAME.)

PREFERRED
"I" BEAM FLANGES ARE PARALLEL TO THE FLOOR.

CLAMP CONNECTION (TO "I" BEAMS) AND SUPPORT TUBING SUPPLIED by PORTER.



DETAIL A
GIRDER CLAMP ASSEMBLY

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STEEL-IN-PLACE
BACKBOARD PARALLEL WITH MAIN FRAME (OPTION B)

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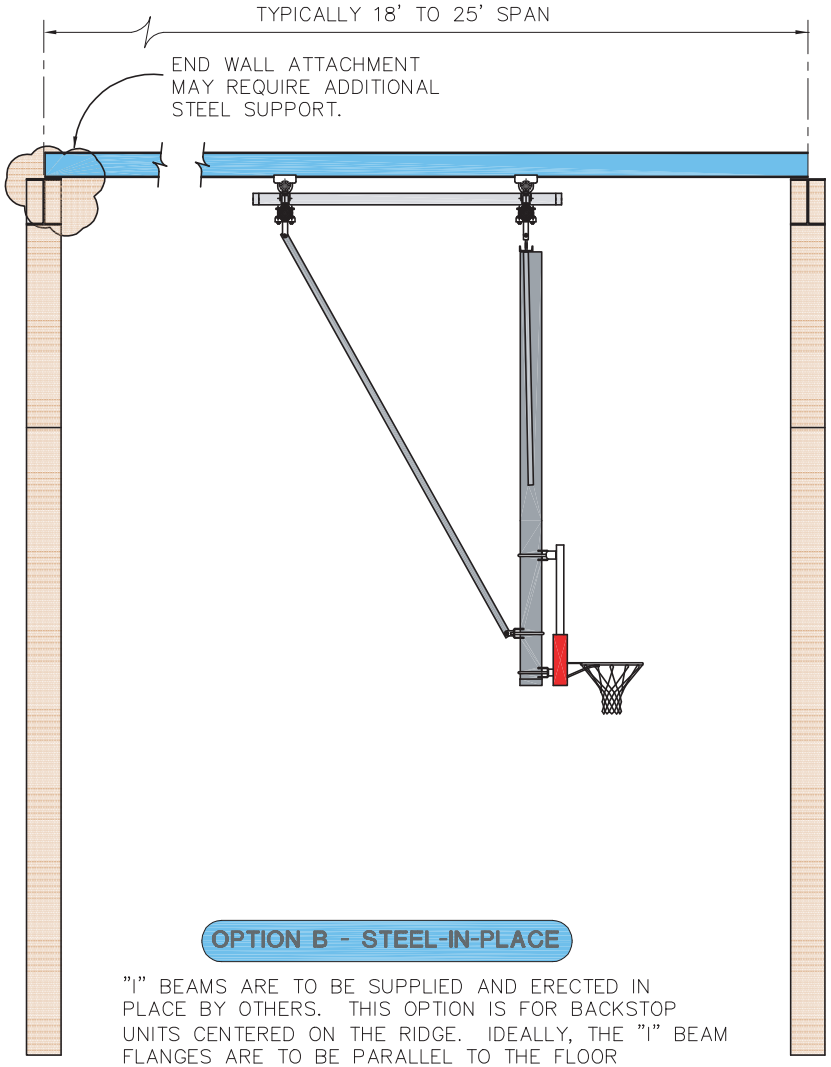
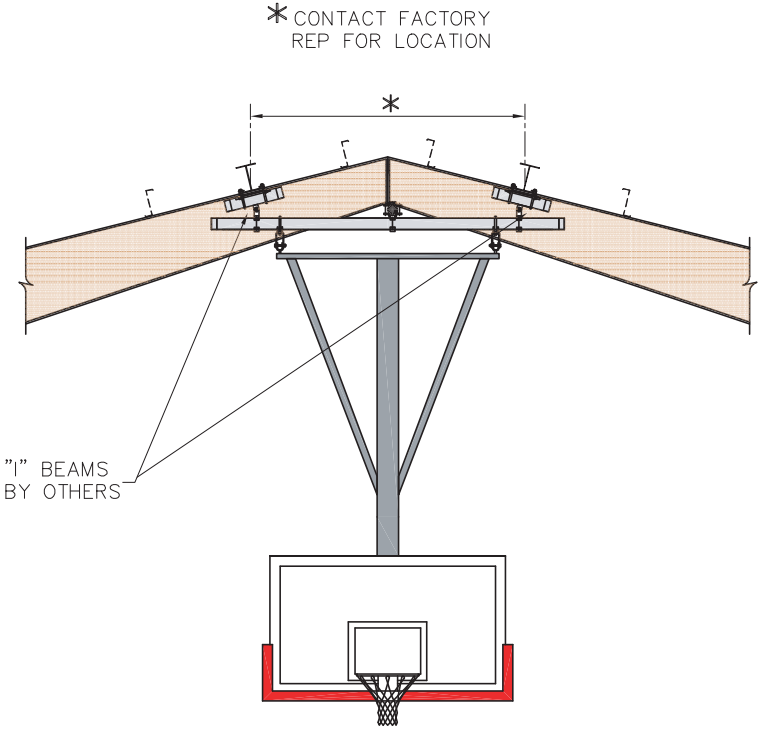


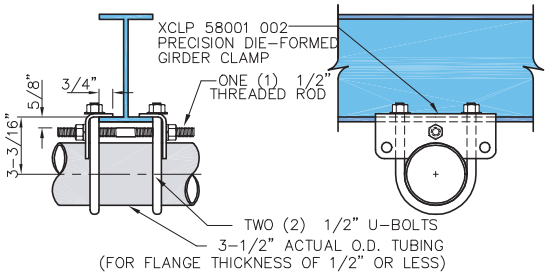
OPTION B - STEEL-IN-PLACE

"I" BEAMS ARE TO BE SUPPLIED AND ERECTED IN PLACE BY OTHERS. THIS OPTION IS FOR BACKSTOP UNITS CENTERED ON THE RIDGE. IDEALLY, THE "I" BEAM FLANGES ARE TO BE PARALLEL TO THE FLOOR (SEE OPTION A). SPECIAL PROVISIONS MAY BE REQUIRED FOR THE "I" BEAM AT THE END WALL ATTACHMENT.

"I" BEAMS ON TOP OF RIGID FRAME, IN THE SAME PLANE AS THE "Z" PURLINS.



CLAMP CONNECTION (TO "I" BEAMS) AND SUPPORT TUBING SUPPLIED by PORTER.



DETAIL A

GIRDER CLAMP ASSEMBLY

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STEEL-IN-PLACE BACKBOARD PERPENDICULAR WITH MAIN FRAME (OPTION C)

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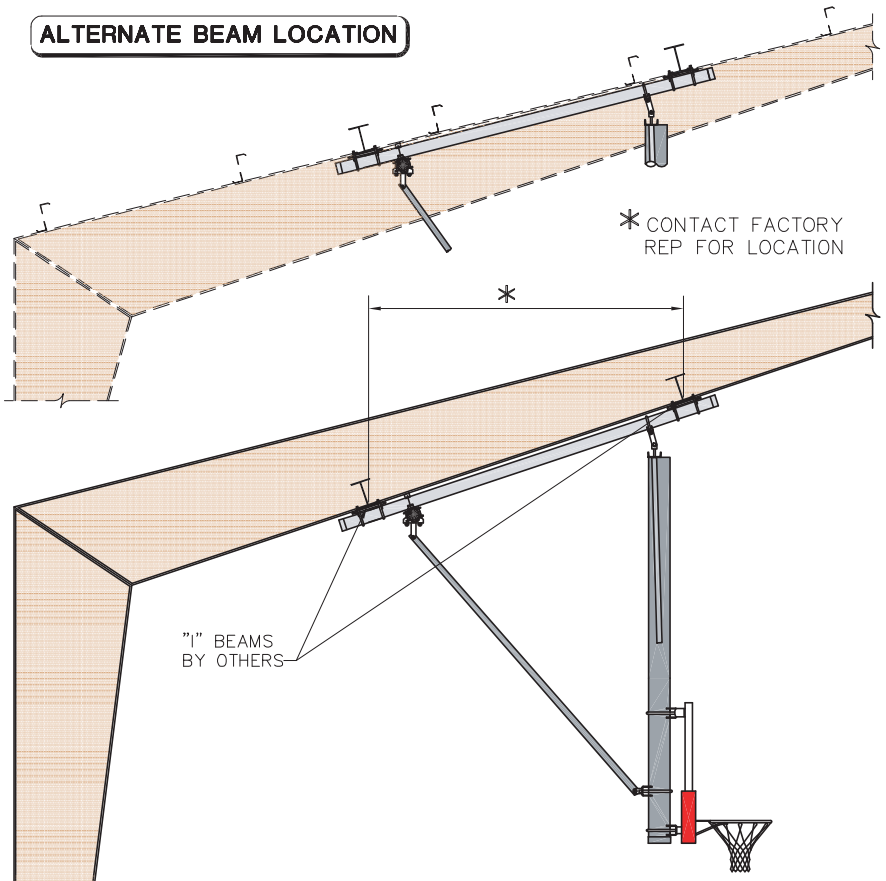
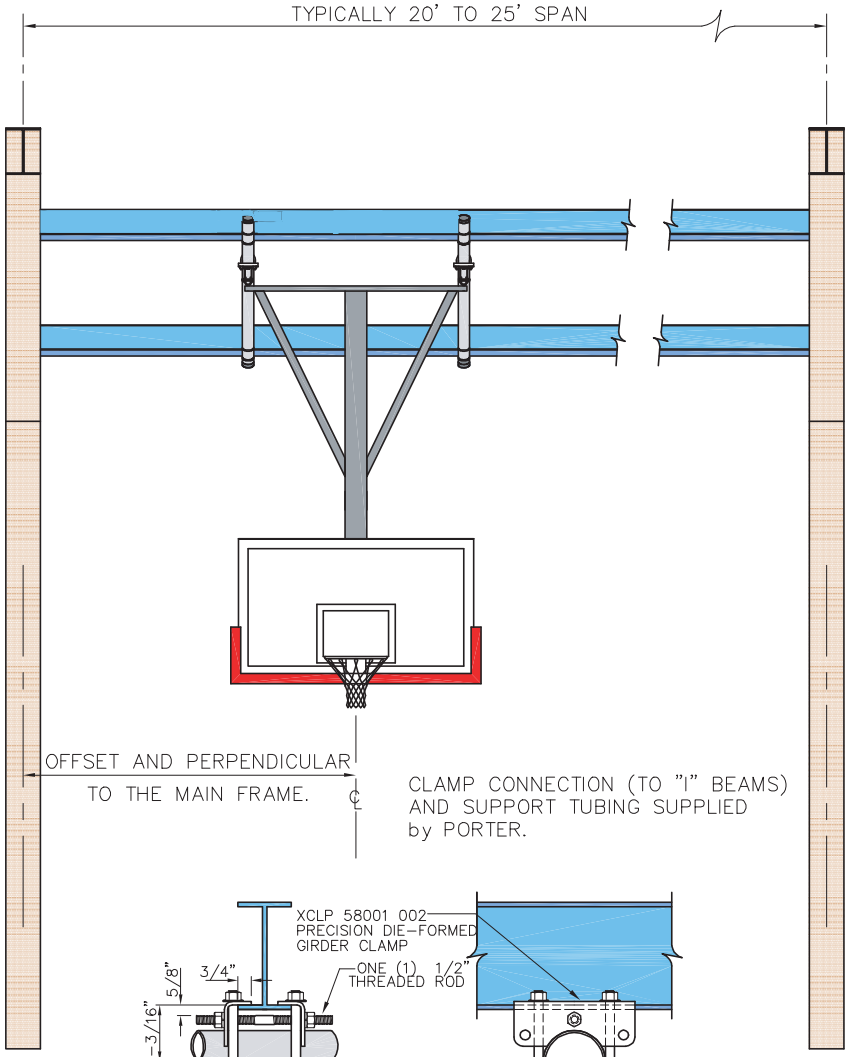
ALTERNATE BEAM LOCATION



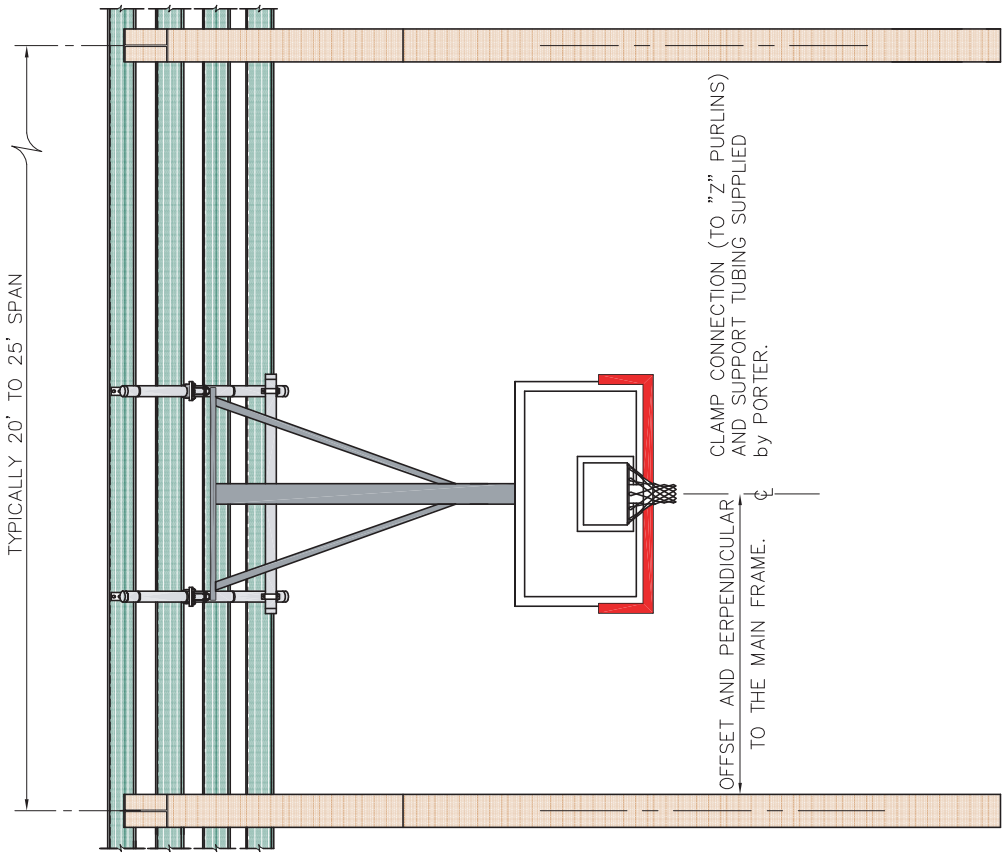
OPTION C - STEEL-IN-PLACE

"I" BEAMS ARE TO BE SUPPLIED AND ERECTED BY OTHERS. THIS OPTION IS FOR BACKSTOP UNITS PERPENDICULAR TO, AND OFFSET FROM THE MAIN FRAMES. THE "I" BEAMS MAY BE INSTALLED WITHIN THE WEB OF THE MAIN FRAME, AS SHOWN, OR EITHER ABOVE OR BELOW THE FRAME AS SHOWN IN THE ALTERNATE LOCATION.



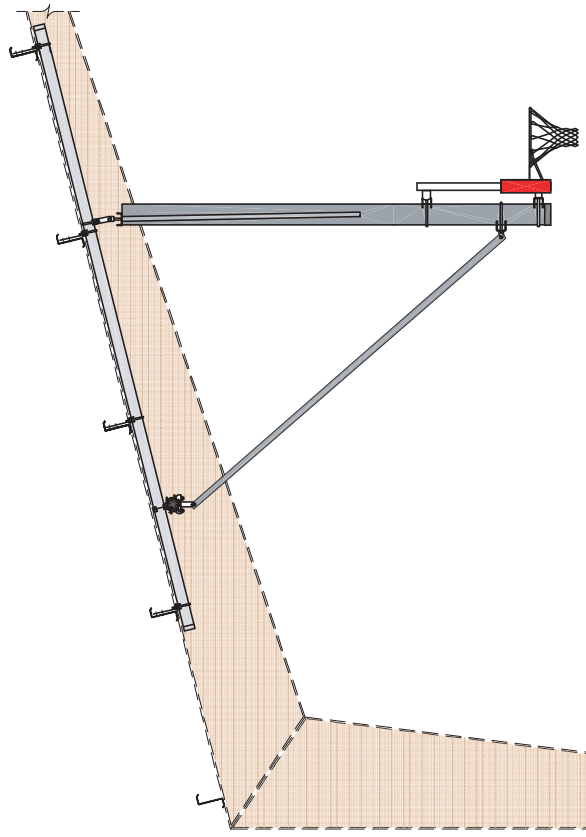
DETAIL A

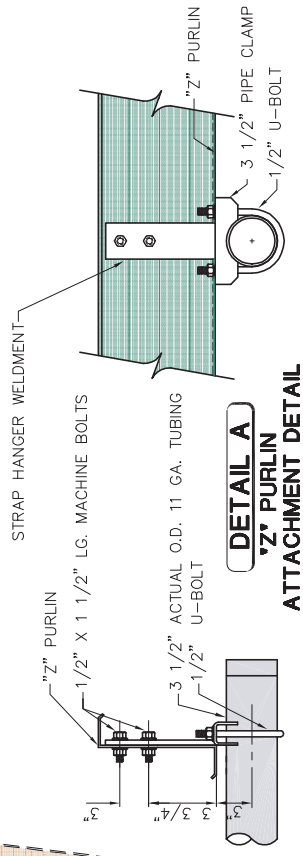
GIRDER CLAMP ASSEMBLY



ATTACHMENT OF SUPERSTRUCTURE DIRECTLY TO PURLINS

BACKBOARD PARALLEL TO PURLINS; BACKSTOP LOCATIONS BETWEEN RIGID FRAME MEMBERS.





DETAIL A
'Z' PURLIN
ATTACHMENT DETAIL

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SUPERSTRUCTURE by PORTER
BACKBOARD PERPENDICULAR TO MAIN FRAME (OPTION D)

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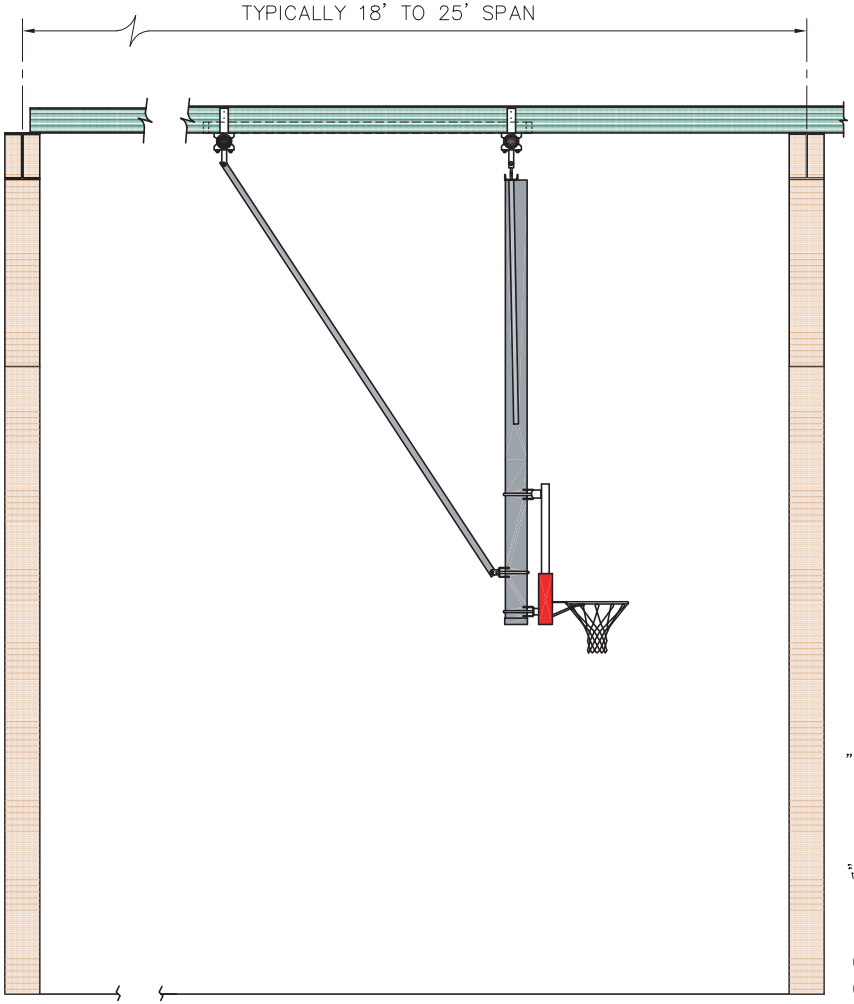
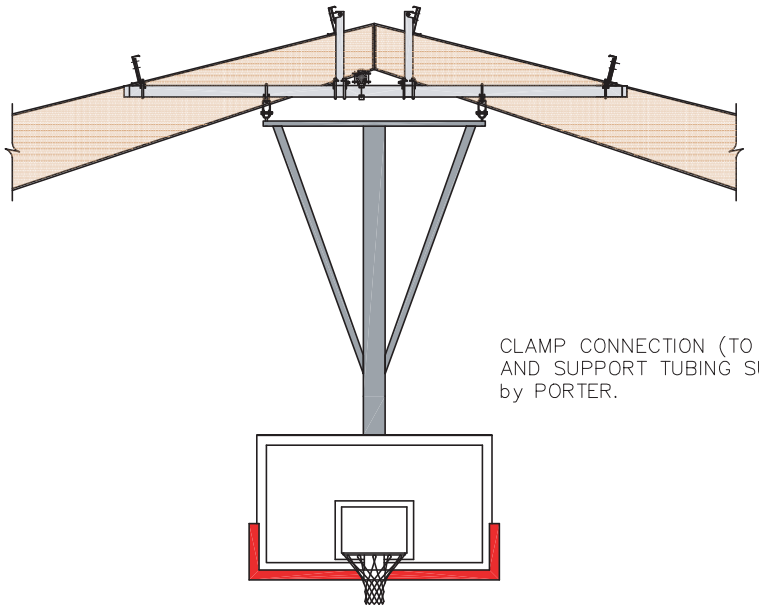
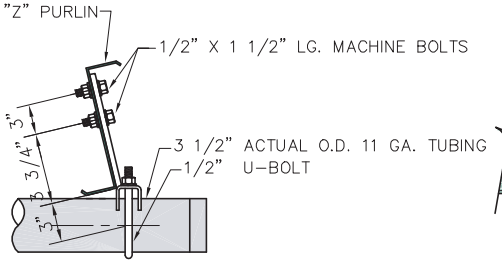
ATTACHMENT OF SUPERSTRUCTURE DIRECTLY TO PURLINS

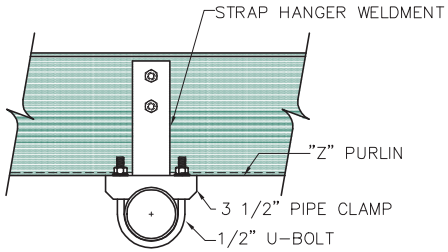
BACKBOARD PERPENDICULAR TO PURLINS; BACKSTOP LOCATION BETWEEN RIGID FRAME MEMBERS AND CENTERED ON RIDGE.





CLAMP CONNECTION (TO "Z" PURLINS) AND SUPPORT TUBING SUPPLIED by PORTER.





DETAIL A
"Z" PURLIN ATTACHMENT DETAIL

SUPERSTRUCTURE by PORTER
BACKBOARD PERPENDICULAR TO PURLINS (OPTION E)

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OPTION E

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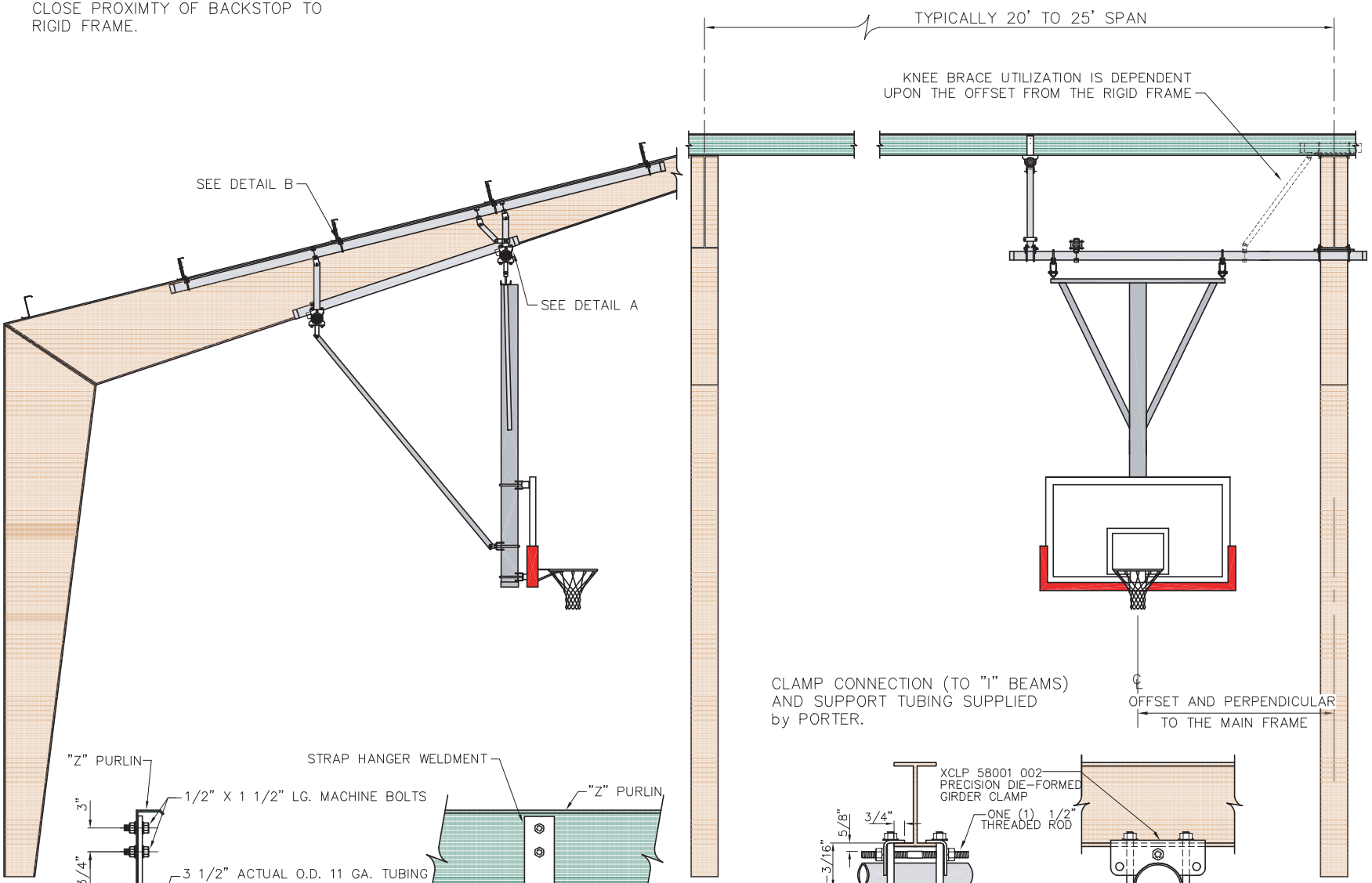
HALF CRADLE TO RIGID FRAME

BACKBOARD PARALLEL TO PURLINS;
CLOSE PROXIMTY OF BACKSTOP TO
RIGID FRAME.



DETAIL B

"Z" PURLIN ATTACHMENT DETAIL

DETAIL A

GIRDER CLAMP ASSEMBLY

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SUPERSTRUCTURE by PORTER
HALF CRADLE TO RIGID FRAME (OPTION F)

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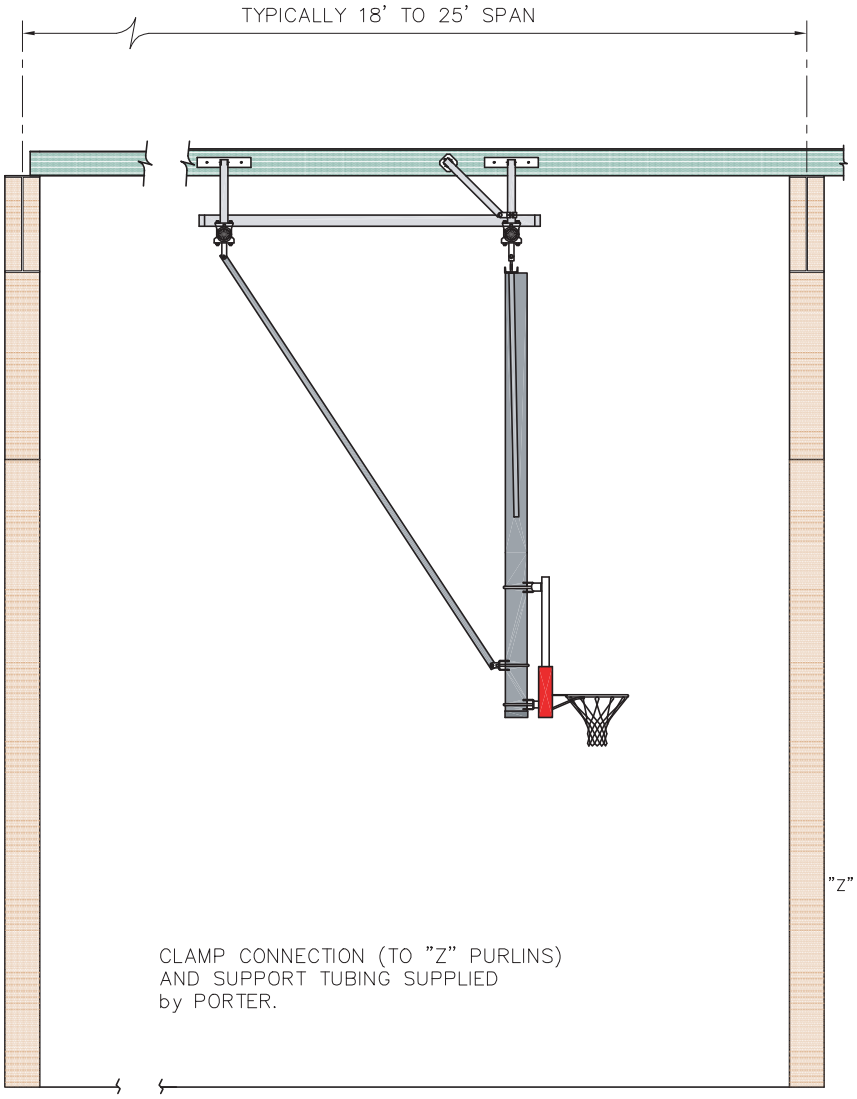
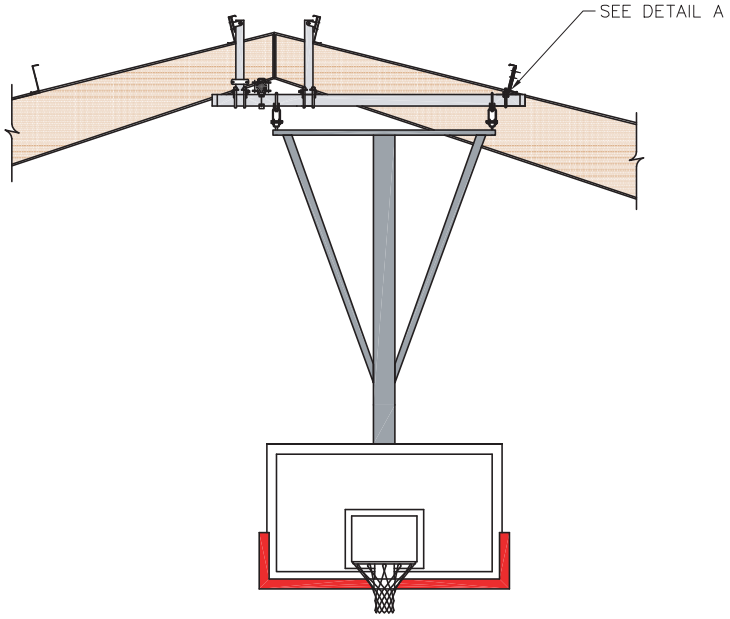
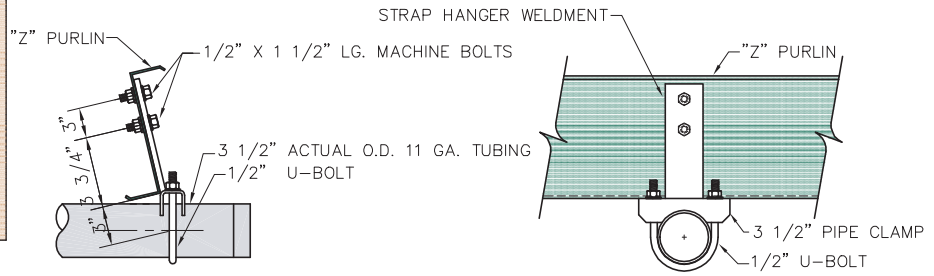
HALF CRADLE FROM PURLINS

BACKBOARD PERPENDICULAR TO PURLINS;
BACKSTOP LOCATION BETWEEN RIGID
FRAME MEMBERS AND OFFSET FROM RIDGE.







DETAIL A
"Z" PURLIN
ATTACHMENT DETAIL

SUPERSTRUCTURE by PORTER
HALF CRADLE FROM PURLINS
(OPTION G)

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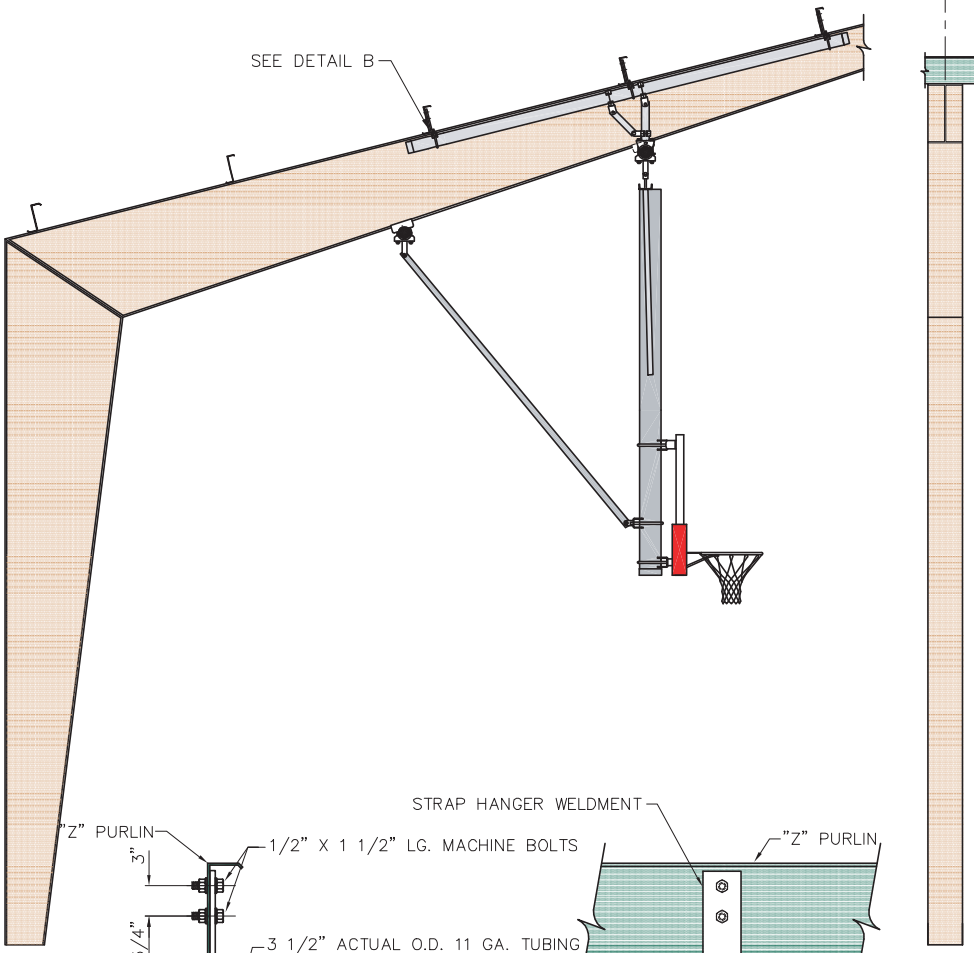
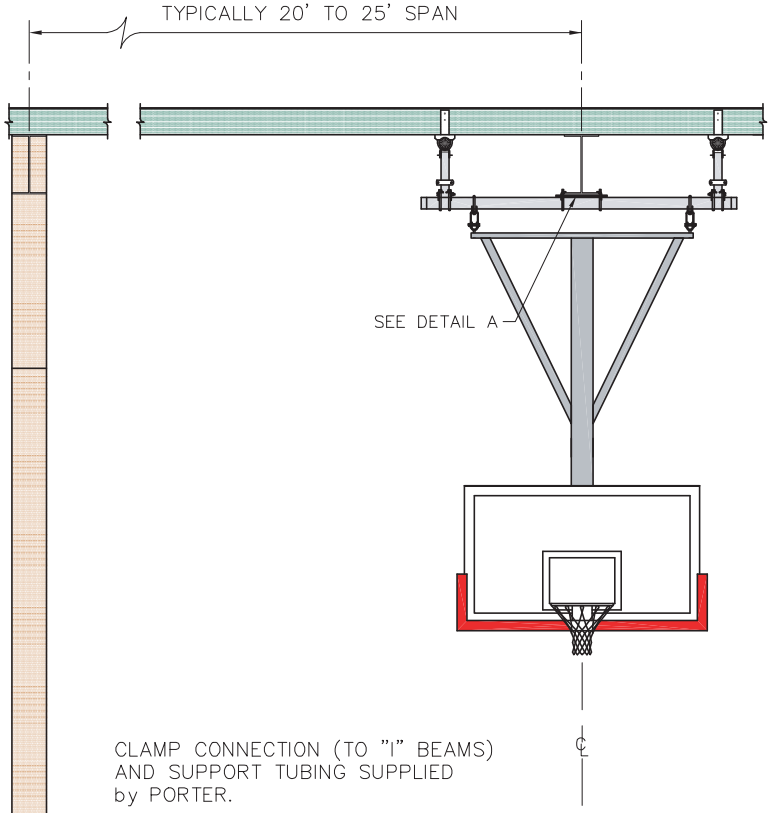
HALF CRADLE TO RIGID FRAME

BACKBOARD PARALLEL TO PURLINS;
BACKSTOP CENTERED UNDER RIGID FRAME.

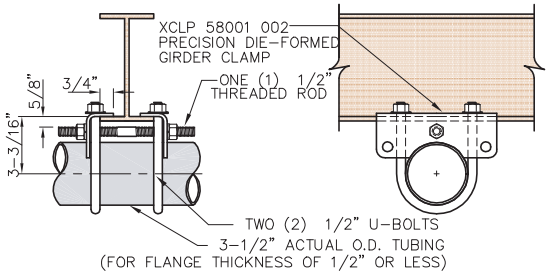




CLAMP CONNECTION (TO "I" BEAMS)
AND SUPPORT TUBING SUPPLIED
by PORTER.

DETAIL B

"Z" PURLIN ATTACHMENT DETAIL



DETAIL A

GIRDER CLAMP ASSEMBLY

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SUPERSTRUCTURE by PORTER
HALF CRADLE TO RIGID FRAME
(OPTION H)

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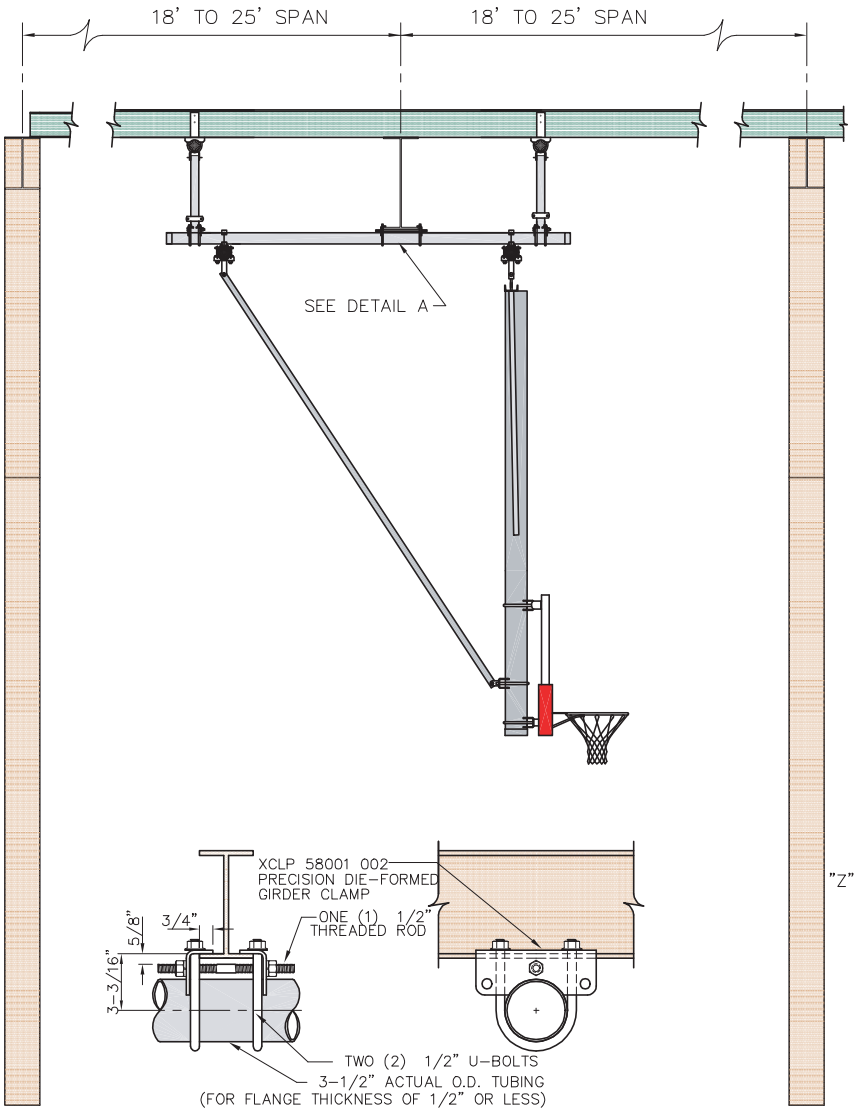
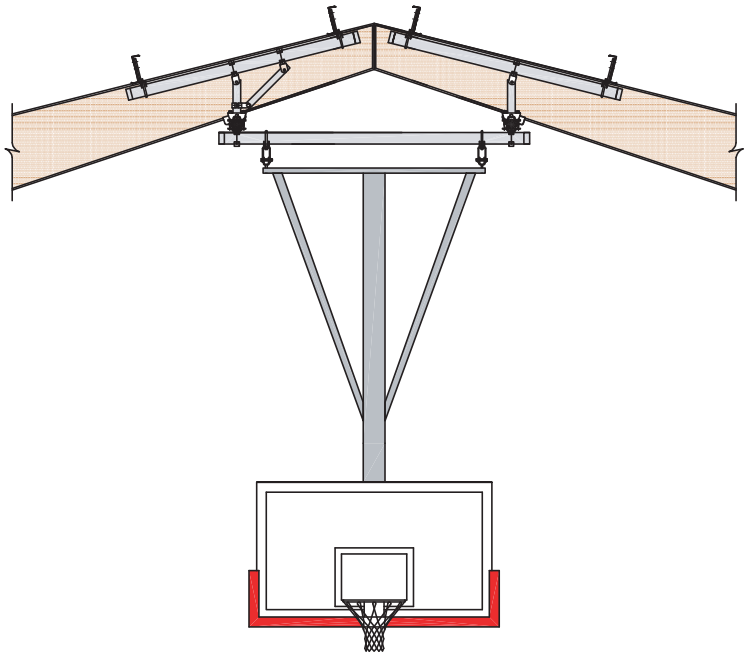
FULL CRADLE FROM RIGID FRAME

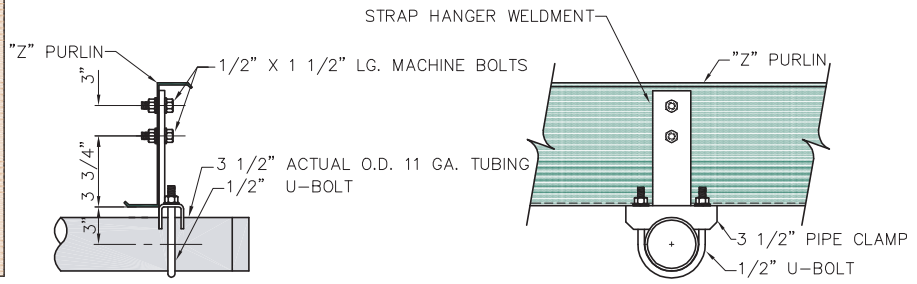
CLAMP CONNECTION (TO "Z" PURLINS & RIGID FRAME) AND SUPPORT TUBING SUPPLIED by PORTER.



DETAIL A

GIRDER CLAMP ASSEMBLY





DETAIL B

"Z" PURLIN ATTACHMENT DETAIL

REVISION	DATE

DATE

PORTER No. OPTION J

CUSTOMER No.

SUPERSTRUCTURE by PORTER

FULL CRADLE TO RIGID FRAME

(OPTION J)

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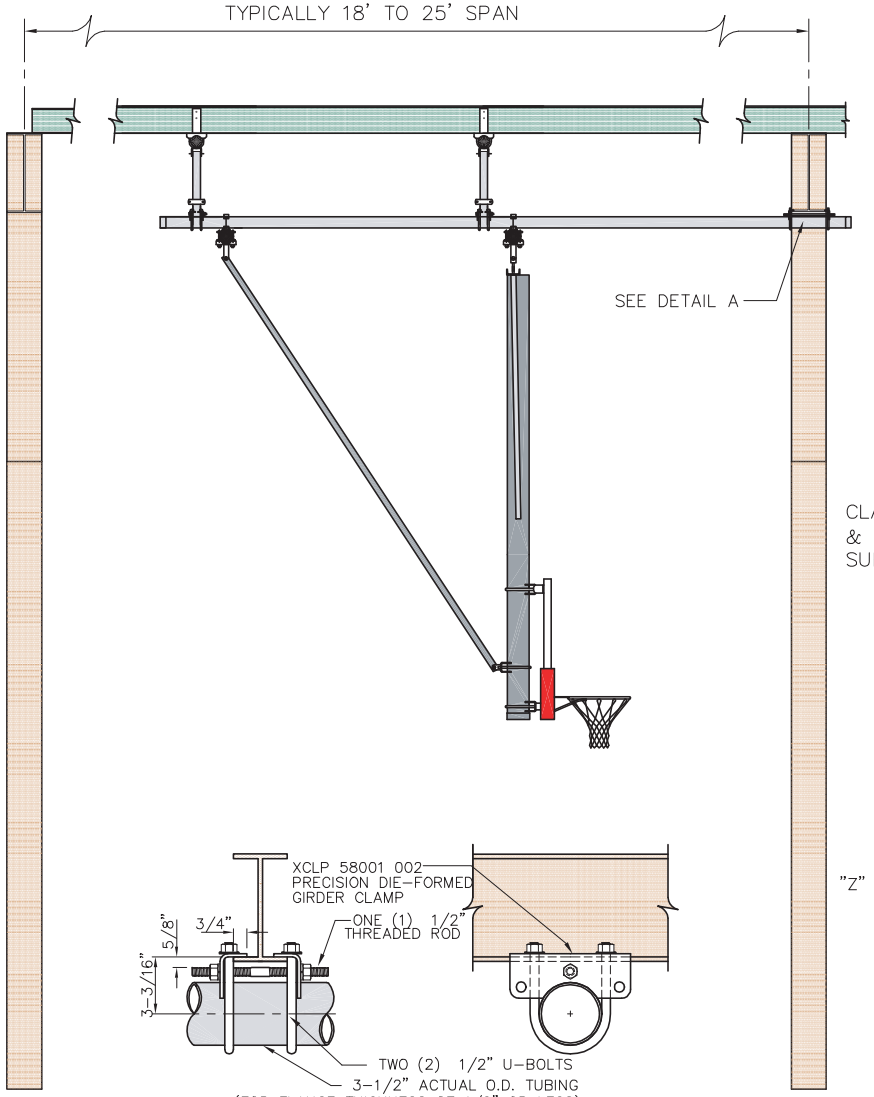
PAGE No. 22

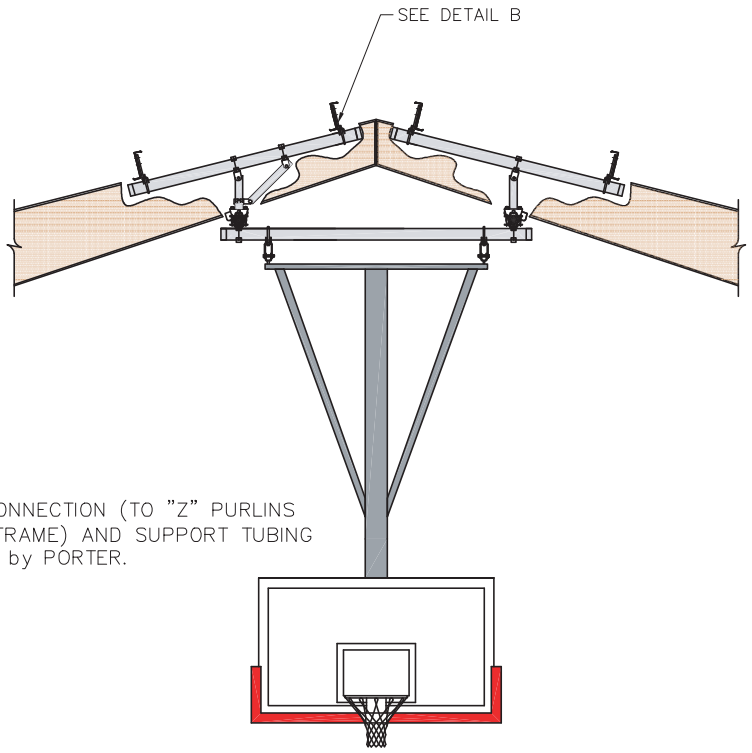
FULL CRADLE TO RIGID FRAME

BACKBOARD PERPENDICULAR TO PURLINS;
BACKSTOP LOCATION BETWEEN RIGID
FRAME MEMBERS.

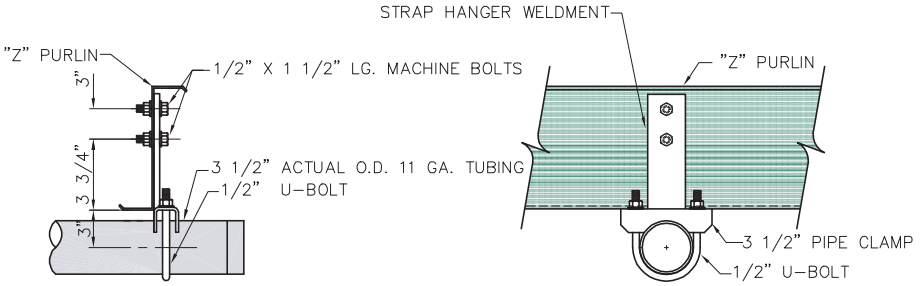


DETAIL A

GIRDER CLAMP ASSEMBLY



CLAMP CONNECTION (TO "Z" PURLINS
& RIGID FRAME) AND SUPPORT TUBING
SUPPLIED by PORTER.



DETAIL B

"Z" PURLIN ATTACHMENT DETAIL

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CUSTOMER No.
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SUPERSTRUCTURE by PORTER
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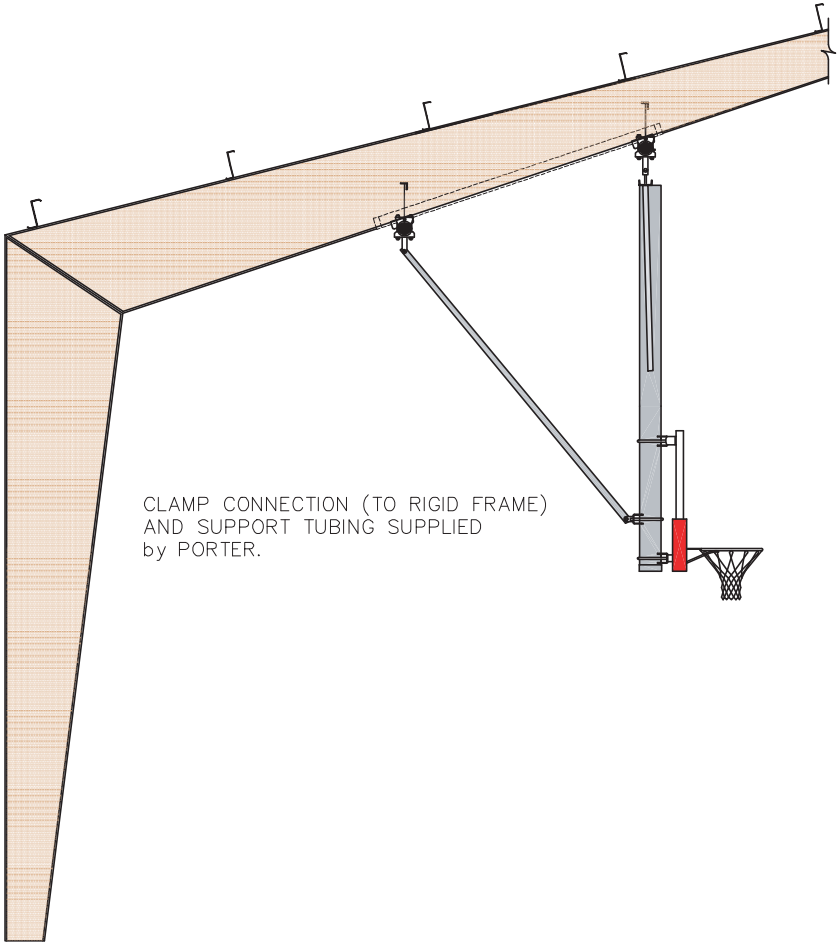
BRIDGED PIPE SPAN TO RIGID FRAMES

BACKBOARD PARALLEL TO PURLINS.
BRIDGED PIPE ONLY



CLAMP CONNECTION (TO RIGID FRAME)
AND SUPPORT TUBING SUPPLIED
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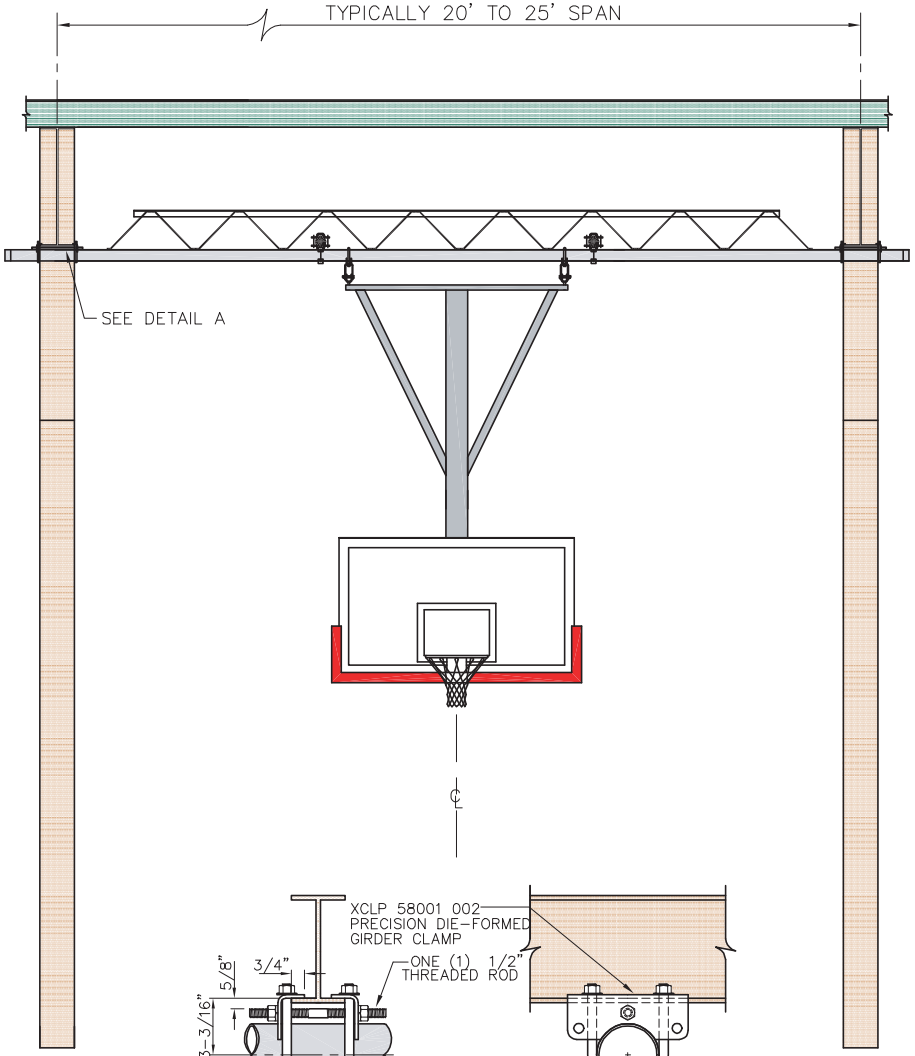

DETAIL A
GIRDER CLAMP ASSEMBLY

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SUPERSTRUCTURE by PORTER
BRIDGED PIPE SPAN
(OPTION L)

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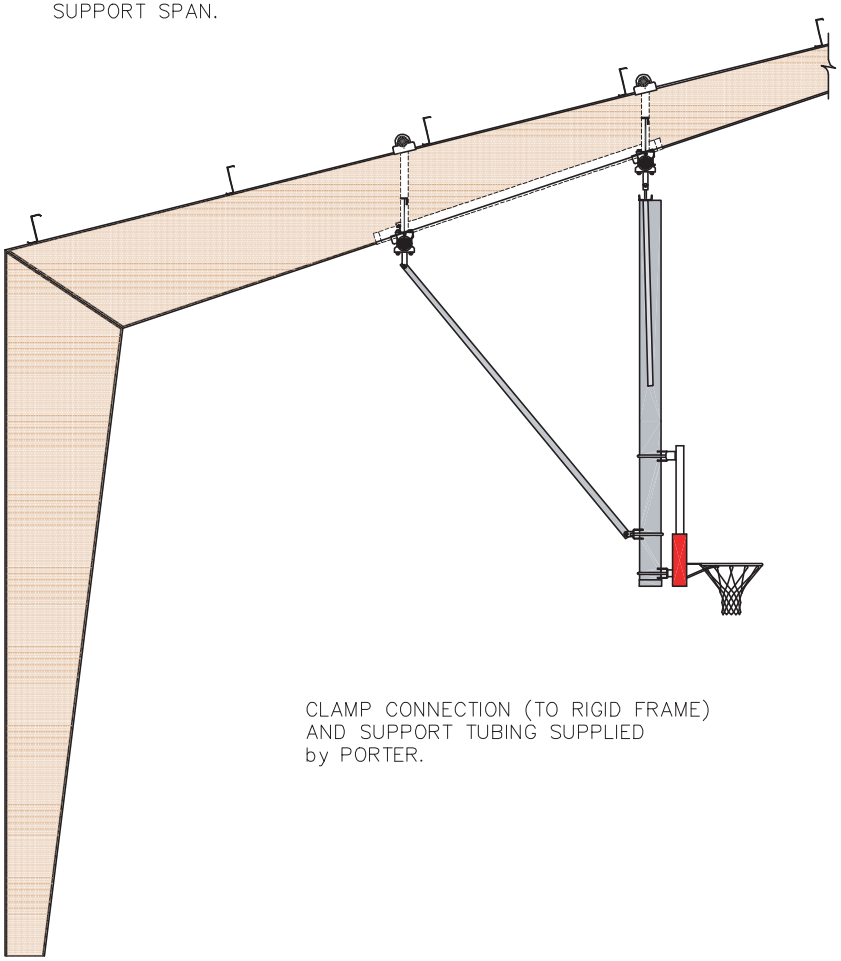
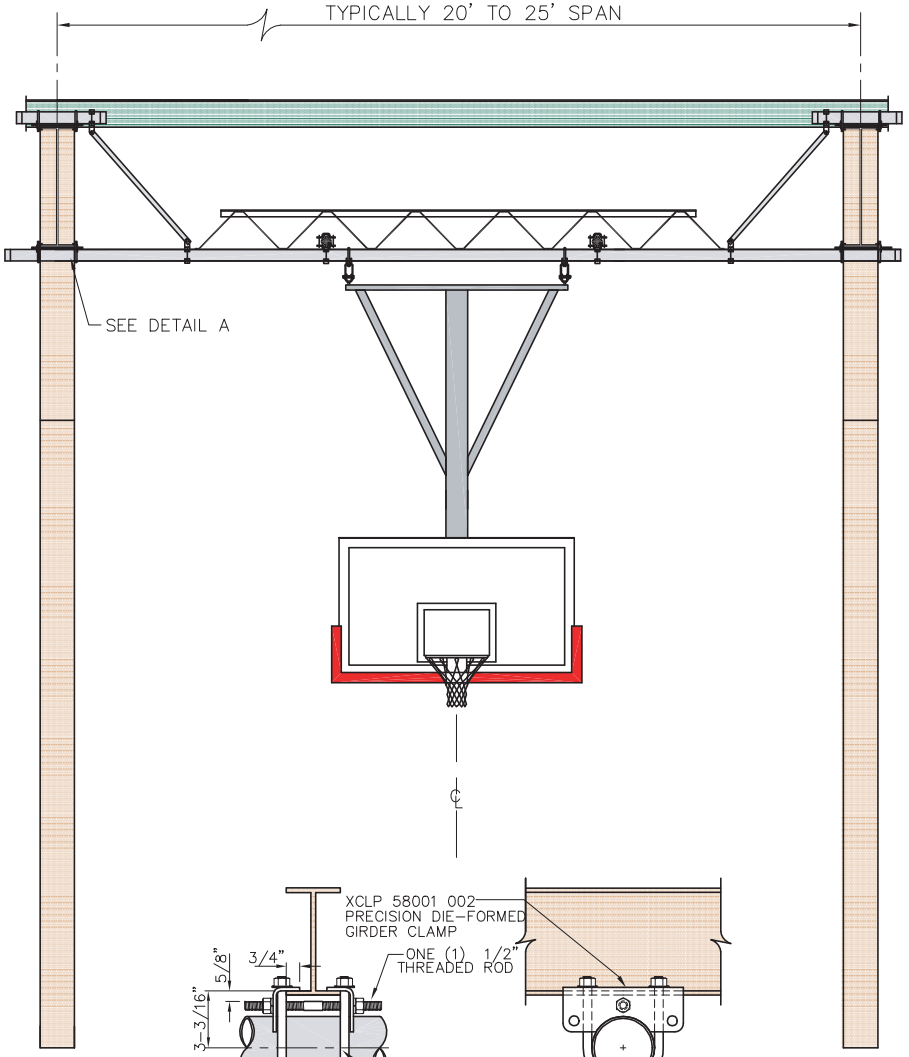
BRIDGED PIPE SPAN WITH KNEE BRACES

BACKBOARD PARALLEL TO PURLINS.

UP TO 25' SPAN WITH KNEE BRACING FROM THE RIGID FRAME. BRIDGING IS ADDED DPENDING UPON SPAN LENGTH, DEPTH OF RIGID FRAME, AND PROXIMITY OF BACKSTOPS TO THE RIGID FRAME. KNEE BRACING WILL INCREASE THE RIGIDITY OF THE SUPPORT SPAN.



CLAMP CONNECTION (TO RIGID FRAME) AND SUPPORT TUBING SUPPLIED by PORTER.



DETAIL A

GIRDER CLAMP ASSEMBLY

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OPTION M

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SUPERSTRUCTURE by PORTER

BRIDGED PIPE WITH KNEE BRACING (OPTION M)

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PAGE No. 25

WALL-MOUNTED BACKSTOP APPLICATIONS FOR PRE-ENGINEERED BUILDINGS

As a precautionary note, only a minority of pre-engineered buildings is suitable for the installation of wall-mounted backstops. A bearing wall, usually of CMU construction, must be available for thru-bolting the backstop attachment (anchor) points above the finished floor. Typically, pre-engineered buildings will have a block wall (CMU) construction to only 10' above the finished floor, or no block wall at all. A wall-mounted backstop is not recommended unless a floor-to-ceiling block wall capable of supporting the load of the backstop unit is available, or the architect designs supports in place. A column-mounted backstop is available and is ideal for the pre-engineered building environment. The column-mounted backstop (Model No. 311) is detailed on page 27.

POINTS TO REMEMBER

1. The wall-mounted backstop is a permanent structure.

2. Backstop must be anchored to a vertical wall capable of supporting the unit at the extension required. Typically, pre-engineered buildings do not have block walls from floor to ceiling.

3. Thru-bolting of at least the top two wall locations and chain supports is required on all installations.

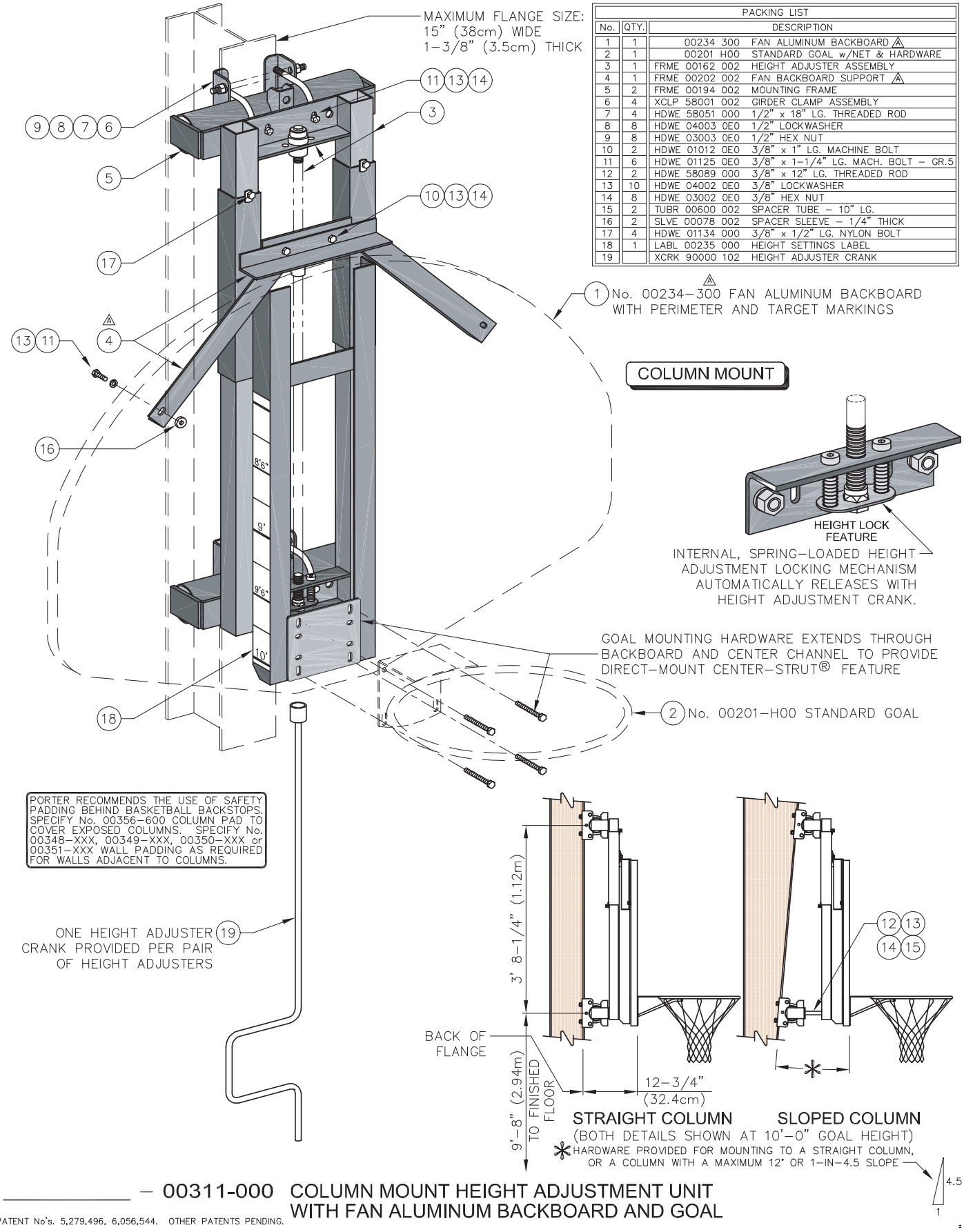
4. On non-folding backstops (Model No. 312), the diagonal support chains may be secured to the roof framing, if necessary, to reduce wall loading. Contact the factory for additional hardware requirements.

5. On stationary backstops (Model No. 312), offsets in the wall construction can be compensated for by length of backstop extension pipes (specify).

6. On folding backstops (Model 219 & Model 220), attachments at wall must be in alignment (no offsets or projections). If offsets exist, blocking and/or additional structure support must be supplied (by others) to compensate for the offset.

7. On stationary backstops (Model 312), attachment can be made to the rigid frame column if a block wall does not exist. Contact the factory for additional hardware requirements. A Model No. 311 column-mount may also be specified where only a minimal extension is required.

8. It is strongly recommended that the architect/building structural engineer approve all building attachments.



PACKING LIST			
No.	QTY.		DESCRIPTION
1	1	00234 300	FAN ALUMINUM BACKBOARD ⚠
2	1	00201 H00	STANDARD GOAL w/NET & HARDWARE
3	1	FRME 00162 002	HEIGHT ADJUSTER ASSEMBLY
4	1	FRME 00202 002	FAN BACKBOARD SUPPORT ⚠
5	2	FRME 00194 002	MOUNTING FRAME
6	4	XCLP 58001 002	GIRDER CLAMP ASSEMBLY
7	4	HDWE 58051 000	1/2" x 18" LG. THREADED ROD
8	8	HDWE 04003 0E0	1/2" LOCKWASHER
9	8	HDWE 03003 0E0	1/2" HEX NUT
10	2	HDWE 01012 0E0	3/8" x 1" LG. MACHINE BOLT
11	6	HDWE 01125 0E0	3/8" x 1-1/4" LG. MACH. BOLT - GR.5
12	2	HDWE 58089 000	3/8" x 12" LG. THREADED ROD
13	10	HDWE 04002 0E0	3/8" LOCKWASHER
14	8	HDWE 03002 0E0	3/8" HEX NUT
15	2	TUBR 00600 002	SPACER TUBE - 10" LG.
16	2	SLVE 00078 002	SPACER SLEEVE - 1/4" THICK
17	4	HDWE 01134 000	3/8" x 1/2" LG. NYLON BOLT
18	1	LABL 00235 000	HEIGHT SETTINGS LABEL
19		XCRK 90000 102	HEIGHT ADJUSTER CRANK

_____ - 00311-000 COLUMN MOUNT HEIGHT ADJUSTMENT UNIT WITH FAN ALUMINUM BACKBOARD AND GOAL

PATENT No's. 5,279,496, 6,056,544. OTHER PATENTS PENDING.

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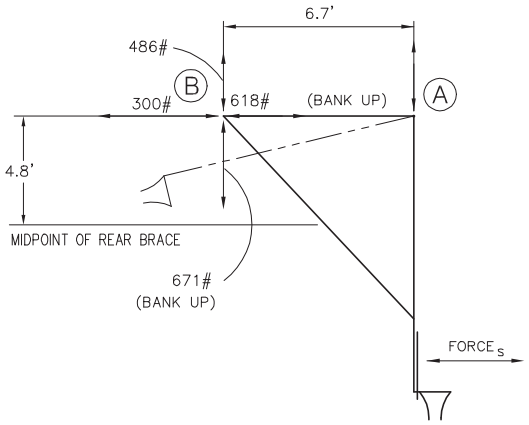
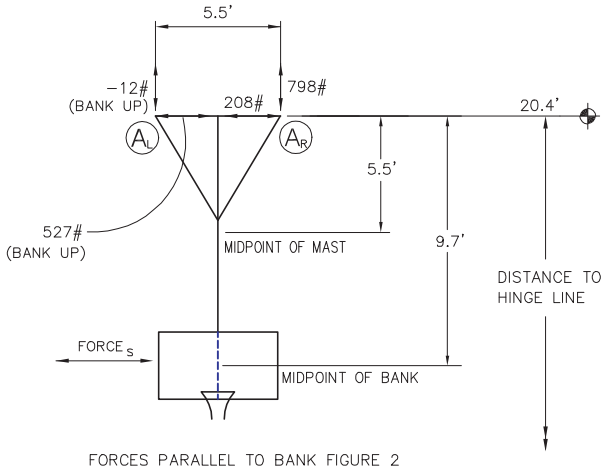
AB	GS	27

BACKSTOP LOADING
ON THE PRE-ENGINEERED BUILDING STRUCTURE

The following two pages provide static equivalent loading of a Model No. 923 backward fold backstop at attachment heights of 21' and 28'. Weight intensive options such as a glass bank and height adjuster are included to provide a "worst case scenario." Superstructure support is not included in the computer-generated loads that typically can add 200 to 300 pounds. The loads are provided for a preliminary "ball park" figure only. Your Porter representative can provide computer generated, job specific loads of the 900 line series backstop ranging from 18' to 32' attachment heights.



FORCES PERPENDICULAR TO BANK FIGURE 1



FORCES PARALLEL TO BANK FIGURE 2

WEIGHT LOAD CALCULATIONS (WITH BANK DOWN)

BACKSTOP'S TOTAL WEIGHT LOAD = 594 lbs (WEIGHT OF REAR BRACE + WEIGHT OF MAST + WEIGHT OF BANK

WEIGHT LOAD AT POINT "A" = $541 \text{ lbs}\left(\frac{\text{WEIGHT OF REAR BRACE}}{2}\right)$ + WEIGHT OF MAST + WEIGHT OF BANK

WEIGHT LOAD AT POINT "B" = $53 \text{ lbs}\left(\frac{\text{WEIGHT OF REAR BRACE}}{2}\right)$ + WEIGHT OF PULLEY

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)	264 lbs X SEISMIC FACTOR X	DISTANCE TO MIDPOINT OF BANK (DB)	=	1788 ft.lbs SEISMIC MOMENT (MB) (FT.LBS.)
WEIGHT OF REAR BRACE (WFB)	34 lbs X SEISMIC FACTOR X	DISTANCE TO MIDPOINT OF FRONT BRACE (DFB)	=	115 ft.lbs SEISMIC MOMENT (MRB) (FT.LBS.)
WEIGHT OF MAST (WM)	260 lbs X SEISMIC FACTOR X	DISTANCE TO MIDPOINT OF MAST (DM)	=	996 ft.lbs SEISMIC MOMENT (MM) (FT.LBS.)

WB + WRB + WM = BACKSTOP'S TOTAL WEIGHT LOAD = 2900 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^{A}_{VER} VERTICAL REACTIONS AT POINT A: $798 \text{ lbs} = \frac{\text{WEIGHT LOAD AT POINT "A"}}{\text{2 SUPPORTS}} \pm \frac{\text{SUM OF THE MOMENTS}}{\text{DISTANCE BETWEEN SUPPORTS } (A_L - A_R)}$

R^{A}_{HOR} HORIZONTAL REACTION AT POINT A: $208 \text{ lbs} = \frac{\text{BACKSTOP'S TOTAL WEIGHT LOAD X SEISMIC FACTOR}}{\text{2 SUPPORTS}}$

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

BANK DOWN

R^{B}_{VER} VERTICAL REACTION AT POINT B: $486 \text{ lbs} = \frac{\text{WEIGHT OF REAR BRACE}}{\text{2 SUPPORTS}} + \text{WEIGHT OF PULLEY} \pm \frac{\text{SUM OF THE MOMENTS}}{\text{DISTANCE BETWEEN SUPPORTS } (A-B)}$

R^{B}_{HOR} HORIZONTAL REACTION AT POINT B: $300 \text{ lbs} = \frac{\text{SUM OF THE MOMENTS}}{\text{DISTANCE TO MIDPOINT OF REAR BRACE X 2}}$

POINT REACTIONS FROM WEIGHT LOADS AND SEISMIC WITH BANK UP

HOIST CABLE TENSION AT POINT B: $618 \text{ lbs} = \frac{\text{SUM OF THE MOMENTS}}{\text{SEISMIC FACTOR X DISTANCE FROM A TO B}}$

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

BANK UP

R^{A-BU}_{VER} VERTICAL REACTION AT POINT A: $-12 \text{ lbs} = \frac{\text{BACKSTOP'S TOTAL WEIGHT LOAD} - \text{HOIST CABLE TENSION}}{\text{2 SUPPORTS}}$

R^{A-BU}_{HOR} HORIZONTAL REACTION AT POINT A: FROM SEISMIC PARALLEL TO BANK $527 \text{ lbs} = \pm \frac{\text{SUM OF THE MOMENTS}}{\text{DISTANCE FROM } A_L \text{ TO } A_R}$

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

BANK UP

R^{B-BU}_{VER} VERTICAL REACTION AT POINT B: $671 \text{ lbs} = \text{HOIST CABLE TENSION} + \frac{\text{WEIGHT OF REAR BRACE}}{\text{2 SUPPORTS}} + \text{WEIGHT OF PULLEY}$

R^{B-BU}_{HOR} HORIZONTAL REACTION AT POINT B: $618 \text{ lbs} = \text{HOIST CABLE TENSION}$

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STATIC EQUIVALENT LOADING FOR:
Sample Load Calculation for a Model 923 Backstop @ 21'-0"

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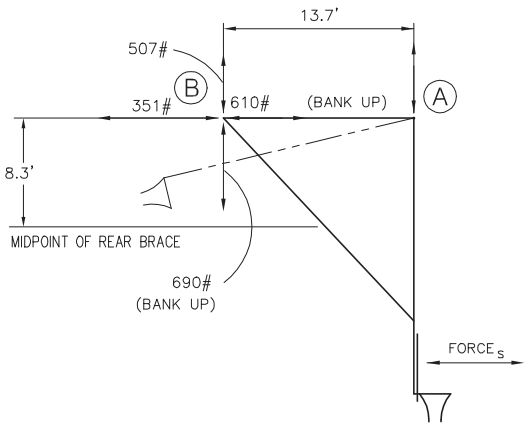
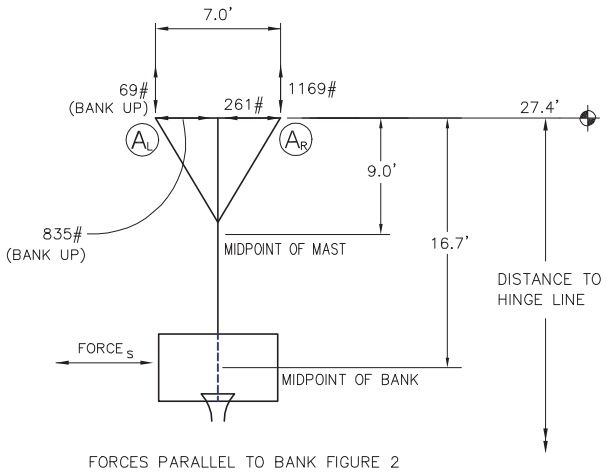


FORCES PERPENDICULAR TO BANK FIGURE 1



FORCES PARALLEL TO BANK FIGURE 2

WEIGHT LOAD CALCULATIONS (WITH BANK DOWN)

BACKSTOP'S TOTAL WEIGHT LOAD = 747 lbs (WEIGHT OF REAR BRACE + WEIGHT OF MAST + WEIGHT OF BANK

WEIGHT LOAD AT POINT "A" = 667 lbs $\left(\frac{\text{WEIGHT OF REAR BRACE}}{2}\right)$ + WEIGHT OF MAST + WEIGHT OF BANK

WEIGHT LOAD AT POINT "B" = 80 lbs $\left(\frac{\text{WEIGHT OF REAR BRACE}}{2}\right)$ + WEIGHT OF PULLEY

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)	264 lbs	X SEISMIC FACTOR X	DISTANCE TO MIDPOINT OF BANK (DB)	=	3082 ft.lbs	SEISMIC MOMENT (MB) (FT.LBS.)
WEIGHT OF REAR BRACE (WFB)	88 lbs	X SEISMIC FACTOR X	DISTANCE TO MIDPOINT OF FRONT BRACE (DFB)	=	514 ft.lbs	SEISMIC MOMENT (MRB) (FT.LBS.)
WEIGHT OF MAST (WM)	359 lbs	X SEISMIC FACTOR X	DISTANCE TO MIDPOINT OF MAST (DM)	=	2253 ft.lbs	SEISMIC MOMENT (MM) (FT.LBS.)
WB + WRB + WM = BACKSTOP'S TOTAL WEIGHT LOAD				=	5848 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^{A}_{VER} VERTICAL REACTIONS AT POINT A: 1169 lbs = $\frac{\text{WEIGHT LOAD AT POINT "A"}}{\text{2 SUPPORTS}} \pm \frac{\text{SUM OF THE MOMENTS}}{\text{DISTANCE BETWEEN SUPPORTS } (A_L - A_R)}$

R^{A}_{HOR} HORIZONTAL REACTION AT POINT A: 261 lbs = $\frac{\text{BACKSTOP'S TOTAL WEIGHT LOAD X SEISMIC FACTOR}}{\text{2 SUPPORTS}}$

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

BANK DOWN

R^{B}_{VER} VERTICAL REACTION AT POINT B: 507 lbs = $\frac{\text{WEIGHT OF REAR BRACE}}{\text{2 SUPPORTS}}$ + WEIGHT OF PULLEY ± $\frac{\text{SUM OF THE MOMENTS}}{\text{DISTANCE BETWEEN SUPPORTS } (A-B)}$

R^{B}_{HOR} HORIZONTAL REACTION AT POINT B: 351 lbs = $\frac{\text{SUM OF THE MOMENTS}}{\text{DISTANCE TO MIDPOINT OF REAR BRACE X 2}}$

POINT REACTIONS FROM WEIGHT LOADS AND SEISMIC WITH BANK UP

HOIST CABLE TENSION AT POINT B: 610 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^{A-BU}_{VER} VERTICAL REACTION AT POINT A: 69 lbs = $\frac{\text{BACKSTOP'S TOTAL WEIGHT LOAD − HOIST CABLE TENSION}}{\text{2 SUPPORTS}}$

R^{A-BU}_{HOR} HORIZONTAL REACTION AT POINT A: FROM SEISMIC PARALLEL TO BANK 835 lbs = ± $\frac{\text{SUM OF THE MOMENTS}}{\text{DISTANCE FROM } A_L \text{ TO } A_R}$

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

BANK UP

R^{B-BU}_{VER} VERTICAL REACTION AT POINT B: 690 lbs = HOIST CABLE TENSION + $\frac{\text{WEIGHT OF REAR BRACE}}{\text{2 SUPPORTS}}$ + WEIGHT OF PULLEY

R^{B-BU}_{HOR} HORIZONTAL REACTION AT POINT B: 610 lbs = HOIST CABLE TENSION

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STATIC EQUIVALENT LOADING FOR:
Sample Load Calculation for a Model 923 Backstop @ 28'-0"

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