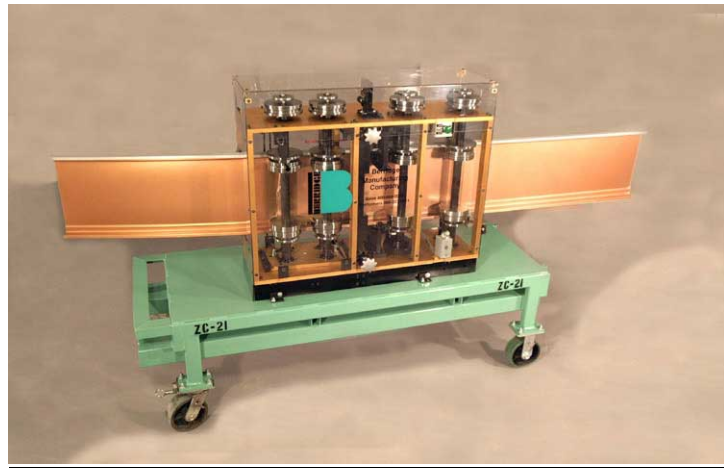


OPERATIONS  
MANUAL

BERRIDGE  
ZEE LOCK  
ZC-21 CURVING MACHINE

---

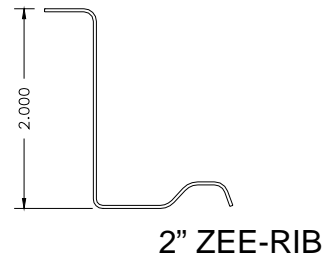
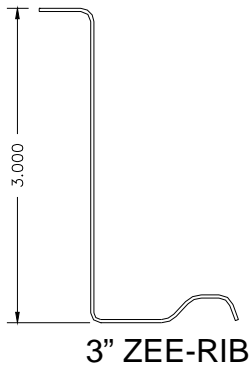


Berridge  
Manufacturing  
Company  
**Roll Former Operations**  
**Seguin, TX**  
**800-303-0811**

# BERRIDGE ZEE LOCK ZC-21 CURVING MACHINE

## OVERVIEW

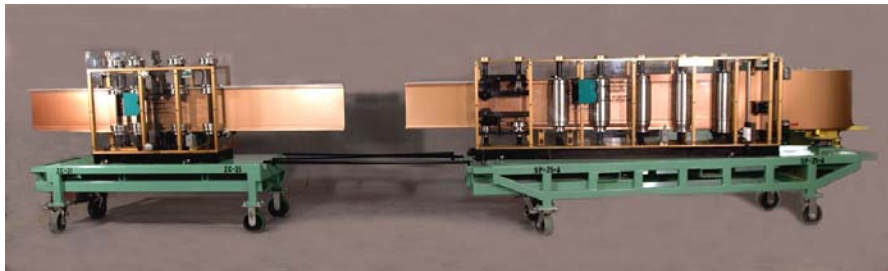
The Berridge Zee-Lock Curving Machine produces convex curved Zee-Lock panels plain, rigid profile texture (striated), or ribbed, as well as curved 2-INCH AND 3-INCH Zee-Ribs with and without Vinyl Weatherseal.



WITH AND WITHOUT VINYL



ZEE-LOCK PANEL



The machine is used in tandem with the Berridge SP-21 or SP-21-X portable rollformer to simultaneously produce and curve, or independently, to curve previously produced panels. Used in tandem, the curver is mechanically linked, and electrically interconnected with the rollformer. Wiring on customer-owned SP-21 and SP-21-X portable rollformers must be modified to provide for the interconnection. Call Berridge Manufacturing Co. for information at 1-800-303-0811.

## **PERFORMANCE –**

The curving radius is continuously adjustable down to a documented minimum of 20 feet.

The machine is capable of curving 24 gauge Zee-Lock panels through a full range of radii. 22 gauge steel or Galvalume can be curved at larger radii.

Production speed matches the SP-21 rollformer at forty-five (45) feet per minute.

## **POWER REQUIREMENTS –**

SP-21 individually requires a 20A, 1P, 208-240VAC single-phase power source.

The Zee-Lock Curver individually requires a 30A, 1P, 120VAC, single-phase power source.

With the two machines used in tandem, the requirements are the same, but power sources must be individually connected directly to the power distribution panel. Combining on a single extension cord is prohibited.

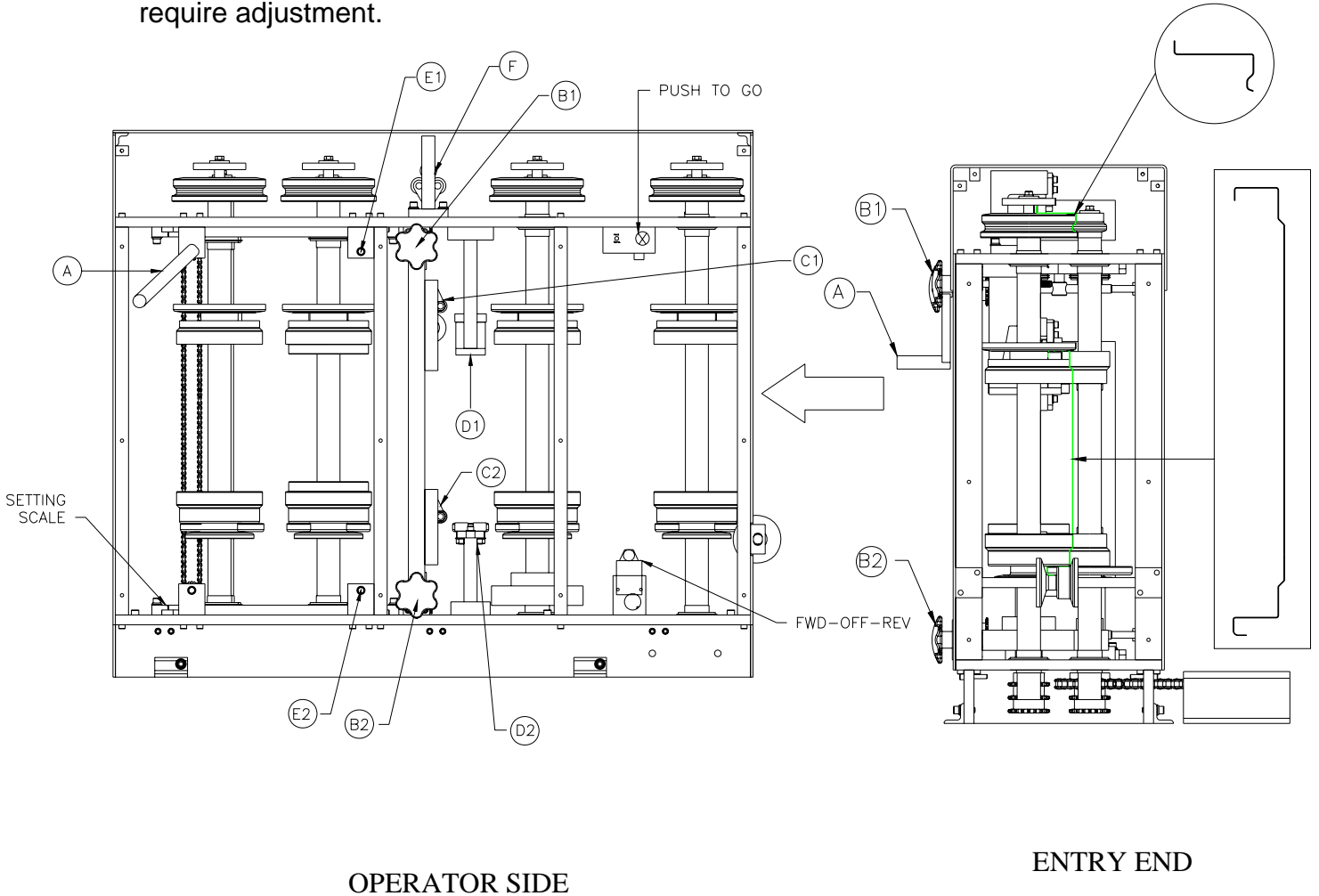
Power cord sizes for *each* machine are as follows:

<u>Length</u>	<u>Wire Size</u>	<u>SP-21</u>	<u>Curver</u>
0-50 ft.	No. 10 AWG	4-Wire	3-Wire
50 to 100 ft.	No. 8 AWG	4-Wire	3-Wire
100 to 150 ft.	No. 6 AWG	4-Wire	3-Wire

## MACHINE SETUP

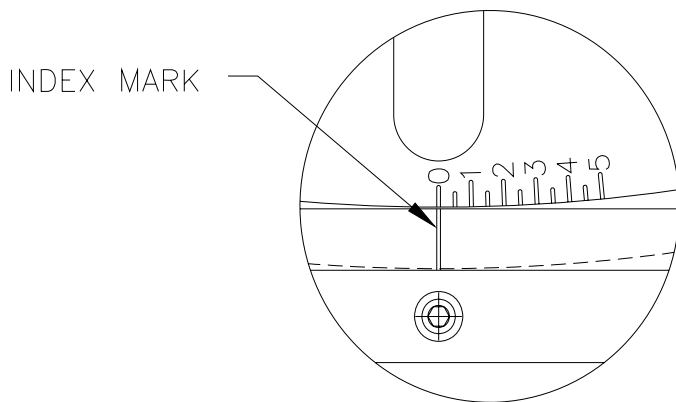
### CURVING PANELS – OVERVIEW

Curving panels with the Berridge Zee-Lock Curver utilizes longitudinal stretching of the legs to allow curving through the final two passes of the machine. For all except the smallest radii, a single crank handle (A) adjusts the offset of the final passes in an ideal path to form the radius. In some cases B1 and B2 may require adjustment.

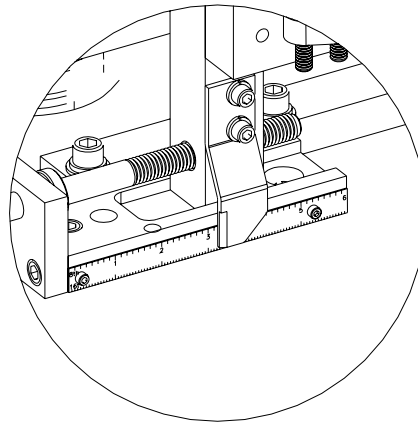


OPERATOR SIDE

ENTRY END



**RADIUS  
SETTING SCALE**



**FEMALE  
STRETCH SETTING**

## **SETTING THE RADIUS**

Note: Berridge Manufacturing Co. policy is to set up and test a leased machine for the first radius before shipping to the lessee. Subsequent changes, if required are the responsibility of the lessee. Prior to making any adjustment to the curver, consult Berridge Manufacturing Company Roll Former Department at 1-800-303-0811.

In general, the curving radius is set with the RADIUS setting crank (A) at the top left corner of the machine. Clockwise turns increase radius while counter-clockwise turns decrease the radius. The practical adjustment range is 0 to 4.0 allowing radii from approximately 20 feet to 170 feet. Beyond 170 feet radius, the standard 24 gauge Zee-Lock panels will conform to the substrate without curving in the machine.

**STRETCHER ROLLERS** – There are four sets of stretcher rollers on the machine. Two sets, C1 and C2, stretch the vertical legs. D1 and D2 stretch the top horizontal portions of the legs. These are all set at the factory. For reference, the settings are specified in the grayed area of the CURVING PERFORMANCE CHART (Figure 3). E1, E2 and the adjustment scale located just before pass 3 pertain to machine alignment and are not to be moved.

The OFFSET SETTING, or the placement of C1 and C2 rollers is readily adjustable using knobs B1 and B2. These are used to equalize the radius of the male and female legs. Moving the rollers toward the top of the vertical leg (turning B1 or B2 clockwise) decreases the radius of that leg. B1 adjusts the radius of the male leg and B2, the female leg. Typically, the machine is adjusted for the correct radius on the female leg. B1 is then adjusted, as required to match the male leg radius to the female leg radius.

The D1 rollers (Figure 1) are adjusted with a 31/64" round gage inserted into the three-roller pyramid. This is a factory setting, but should be checked if performance does not correspond to the Chart.

C1, C2, and D2, roller clearances are set with a feeler gauge to clearances as specified in the Curving Chart.



Figure 1



Figure 2

## **DETERMINING SETTINGS**

Refer to the ZEE-LOCK CURVING PERFORMANCE CHART (figure 3) to determine settings. This chart provides initial values for settings. Fine-tuning may be necessary due to variations in steel coils, ambient temperature, etc.

**RADIUS SETTING** - Begin by following the numbers down the Radius (left) column to find the listed radius (feet) that is nearest to your required radius. Follow horizontally to the right to the number listed. This is the Radius Setting for final pass to be set with Crank A.

The **STRETCH SETTING** is fine-tuned with knobs B1 and B2 provided between the second and third passes. Read the setting on the ruler scales at the pointers. Adjustments for each side of the panel are separate to allow equalizing the radius of male and female legs of the panel. Turning the knob clockwise reduces the radius to make a tighter bend.

## **RUNNING THE PANEL**

The machine operator turns the Forward/Reverse switch to the left for Forward. The motor will start and run freely. To run a panel, insert into right hand end of the machine (facing the control switches) with the female side to the bottom.

At the top of the machine push the Green jog button to run the panel through the machine. This engages the electric clutch. The Green button must be held down to run the panel. Rest panel on lower roller. Maintain the panel level as it enters the machine and exits the machine. **Panel must be well supported during entry and exit procedures. One person every ten feet of panel length is recommended.**

Always remove any build-up of strippable vinyl from the rolls, the females in particular. A small amount of spray lubricant such as WD-40 is helpful in preventing a build-up. Excess oil can make the machine slip.

Should there be a jam, immediately stop the machine by releasing the Green button. Let motor coast to a full stop. Move Forward/Reverse switch to the right to reverse machine. In most cases the panel can be backed out without cutting.

## **CHECKING THE PANEL**

Form a Curved Zee-Lock panel with a chord length at least eight (8) feet long (figures 4 & 5). Placing the panel on edge (its side) on a flat surface, measure the height of the arch from the center of an eight-foot straight edge. Compare this height with the "H" dimension given for your desired radius in the CURVING CHART BASED ON 96" CHORD LENGTH (figure 6).

Turn the panel over and measure the height along the opposite side of the panel. Check for equality with the first side to insure that both legs are curved to the same radius.

## CURVING PERFORMANCE CHART FOR THE BERRIDGE ZEE-LOCK CURVING MACHINE

RADIUS (FT)	RADIUS SETTING	OFFSET SETTING		INFORMATION ONLY (FACTORY SETTINGS)			
	CRANK (A) RANGE -1 TO 3.6	B-1	B-2	STRETCH SETTINGS			
				C-1	C-2 (DIA)	D-1 (DIA)	D-2
180	-0.3	2.63	3.03	0.100	0.129	31/64	0.100
128	0.3	2.63	3.03	0.100	0.129	31/64	0.100
77	0.7	2.63	3.03	0.100	0.129	31/64	0.100
64	1.1	2.63	3.03	0.100	0.129	31/64	0.100
59	1.5	2.63	3.03	0.100	0.129	31/64	0.100
42	1.8	2.63	3.03	0.100	0.129	31/64	0.100
39	2.2	2.63	3.03	0.080	0.129	31/64	0.100
34	2.5	2.75	3.03	0.080	0.129	31/64	0.100
28	2.9	2.75	3.03	0.080	0.129	31/64	0.100
24	3.3	2.5	3.28	0.080	0.129	31/64	0.100
20	3.6	2.5	3.28	0.080	0.129	31/64	0.100

NOTE: SETTINGS FOR CRANK A, B-1, B-2 ARE GOOD STARTING POINTS.  
MAKE CORRECTIONS AFTER RUNNING A SAMPLE.

Figure 3



EXAMPLE: Referring to the CURVING CHART BASED ON 96" CHORD LENGTH (figure 6) , for a 25.34-foot radius (nearest to our 25 foot radius), the arch height will be 3.8125 or 3-13/16 inches at the center of the eight-foot straight edge. Should the measured height "H" be more than 3-13/16 inches, the radius is too small. Should the measured height "H" be less than 3-13/16 inches, the radius is too large. Adjust the RADIUS SETTING (Crank A) to correct. Normal variations between lots of steel coil, ambient temperatures, and other factors will cause differences from the CURVING PERFORMANCE CHART.

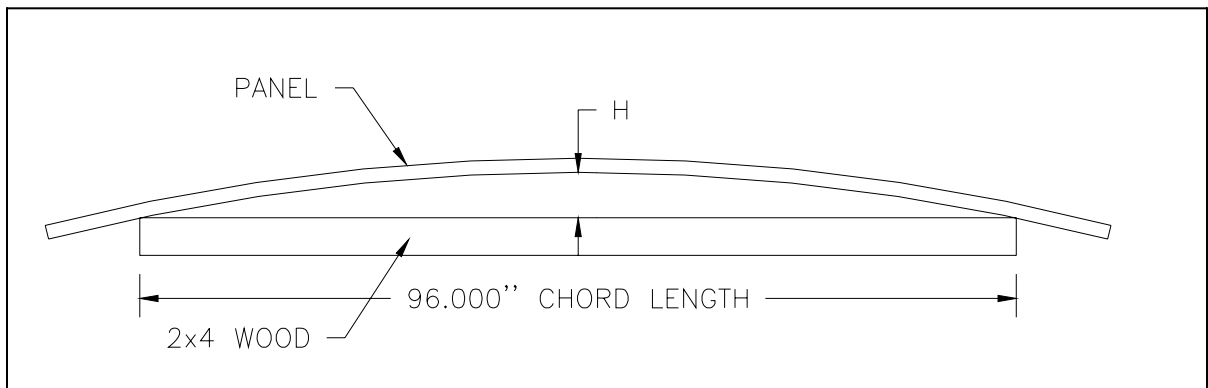
Should the radii of the opposite sides not be equal, adjust the STRETCH SETTING (B1, B2) of the side that is out of dimension. Increasing the STRETCH SETTING will increase (flatten) the radius and decrease the arch height (H). Decreasing will decrease (tighten) the panel radius and increase the arch height (H).

EXAMPLE: Moving the STRETCH SETTING from 2.5 to 2.75 inches increases the panel radius. The arch height (Dimension "H") will be less.

Note: Our tests have shown that up to a plus or minus ten (10) percent difference between the formed radius and the structure radius is tolerable. For example, if the target is a fifty-foot radius and the panel radius measures between forty-five (45) and fifty-five (55) feet, the panel will work satisfactorily. With stiffer 22-gauge and Galvalume panels, the tolerance should be reduced to approximately five (5) percent.



Figure 4



(Figure 5) Measuring panel radius using a tape and 96-inch long straight edge.

### QUALITY EXAMINATION

Examine the panel for waviness in the legs caused by too much stretching relative to the radius.

Too little stretch relative to the radius results in the pan being arched or bowed upward. The pan should be flat within approximately a 1/8 inch with the tightest of radii. Additionally, too little stretch can cause the legs to flare outwards. A small degree of flare of the legs along mid-portion of the panel is normal.

Kinking along the shoulders of the panel indicates too little stretch for the radius attempted. Generally, while the panel is being curved, loud “popping” or “snapping” sounds indicate that kinking is occurring.

## **CURVING ZEE-RIBS**

Zee-Ribs are curved with dies at the top of the machine. In general, the radius setting must be increased from that used for the panel. Start with one counter-clockwise turn of Crank (A) from the setting used for the panel.

The stretcher, located between passes 2 and 3, is adjusted with loosening the retaining bolts and moving the assembly in slots. Re-tighten bolts after moving. Move toward the operator for a smaller radius, away for a larger radius. The stretcher rollers must stretch the upper part of the rib.

The machine accommodates 2-inch ribs with and without vinyl Weatherseal and 3-inch ribs with and without vinyl, without die changes.

Zee-Ribs are inserted at the top, right hand of the machine with the bottom (foot) leg down.

## CURVING CHART BASED ON 96" CHORD LENGTH

DIMENSION "H" IS THE HEIGHT IN INCHES AT CENTER OF 96" CHORD  
RADIUS IS IN FEET.

RADIUS	DIM "H"	RADIUS	DIM "H"	RADIUS	DIM "H"
170.69	0.5625	48.08	2	28.07	3.4375
153.63	0.625	46.63	2.0625	27.57	3.5
139.67	0.6875	45.27	2.125	27.10	3.5625
128.03	0.75	43.98	2.1875	26.63	3.625
118.19	0.8125	42.76	2.25	25.76	3.75
109.75	0.875	41.61	2.3125	26.19	3.6875
102.44	0.9375	40.52	2.375	25.76	3.75
96.04	1	39.49	2.4375	25.34	3.8125
90.40	1.0625	38.50	2.5	24.55	3.9375
85.38	1.125	37.57	2.5625	24.17	4
80.89	1.1875	36.68	2.625	23.80	4.0625
76.85	1.25	35.83	2.6875	23.44	4.125
73.20	1.3125	35.02	2.75	23.10	4.1875
69.88	1.375	34.25	2.8125	22.77	4.25
66.84	1.4375	33.51	2.875	22.44	4.3125
64.06	1.5	32.80	2.9375	22.13	4.375
61.51	1.5625	32.13	3	21.82	4.4375
59.14	1.625	31.47	3.0625	21.52	4.5
56.96	1.6875	30.85	3.125	21.23	4.5625
54.93	1.75	30.25	3.1875	20.95	4.625
53.04	1.8125	29.67	3.25	20.68	4.6875
51.28	1.875	29.12	3.3125	20.41	4.75
49.63	1.9375	28.59	3.375	20.15	4.8125
				19.90	4.875

Figure 6

## TANDEM SETUP AND OPERATION

**OVERVIEW** - Operating the Zee-Lock Curver in tandem with an SP-21 is a simple and effective way of reducing the labor of handling panels twice. The SP-21 and the Curver are roughly aligned on a level floor so that the panel flows directly from the rollformer into the curver.

**COUPLING AND ALIGNMENT** – Pin-on links are provided to connect the machines. Two links are parallel and the third, shorter link (No. 2 see figure 7) is a diagonal brace between them. After visually aligning the machines on a level floor, the links are pinned in place to hold the alignment. Do not force the installation of the links. Their purpose is only to assure that the machines are aligned and maintain that alignment as the panel passes from the rollformer to the curver.

Minimum length of panels with the pin-on bars is about eleven (11) feet. Shorter panels must be roll formed and curved in separate operations. Do not attempt to relocate the machines with the links connected. ELECTRICAL HOOKUP – Provide individual power sources for each machine as previously described in the POWER REQUIREMENTS section of this manual.

An interlock cable to connect the two machines synchronizes the start-stop functions of the rollformer and the curver. It plugs into both the SP-21 and the Zee-lock Curver at the drive motor junction box.

**SAFETY WARNING - Both machines must be disconnected from the power source when connecting the interlock cable to prevent exposure to potentially fatal electrical shock.**

Forward-Reverse switches are operated manually on each machine. They must be set in the same position (both forward, or both reverse) when operated in tandem. For example, they must both be in Forward position to advance the panel through the machines.

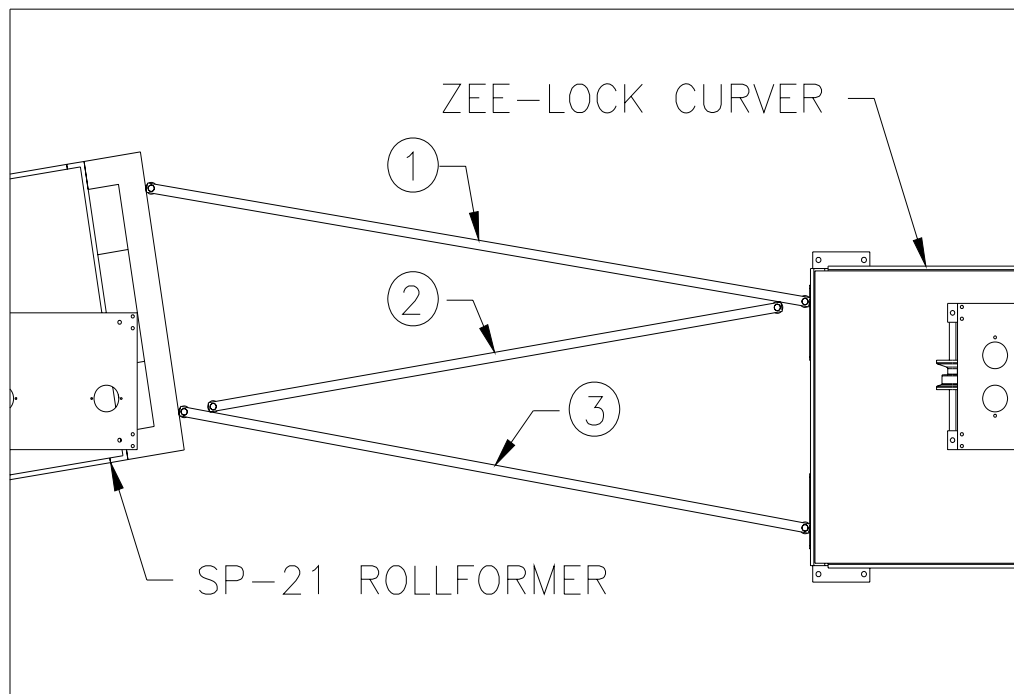


Figure 7

### SPECIAL NOTE ON SEAMING PANELS

Follow Berridge Manufacturing instructions on installation and seaming of standard Zee-Lock panels except that prior to power seaming, hand crimp the seam every five (5) feet. Follow with a standard Berridge Manufacturing Company single-lock seamer. Seamer wheels must be set to the higher of the two axle holes provided. This procedure will insure a good, fully-engaged locking seam.