

ProStak Storage System Rack Installation Manual



Storage Rack Assembly

Site Preparations

Prior to Delivery

The site preparation should be done prior to delivery of the ProStak Storage System. The area in which the ProStak Storage System will be erected must be clear and free of all obstructions. Check to make certain overhead clearance is sufficient to provide the overall height of the system and to allow 3" minimum clearance to any overhead obstructions.

Floor Elevation

The highest elevation point and the lowest elevation point on the floor where the ProStak System will be erected must also be determined. This may be done using a transit level and measuring rod or a laser level and tape measure. Once you have determined the highest level place a mark on the floor for future reference. The difference between the highest and lowest elevations will determine the thickness of shimming material required to level the ProStak System. A nominal amount of shims are included, if additional shims are needed this information should be communicated to the Rapistak Storage Systems ProStak Sales Engineer. Also, if height difference is greater than 1/2", it may be necessary to obtain anchor bolts longer than those normally supplied.

At Delivery

Before assembling your new ProStak Storage System, unpack the entire system. Separate the Storage Rack components from the Stacker Crane components. Inspect all components to familiarize yourself with the system. Should any parts be missing, notify Rapistak Corporation immediately. Should any parts be damaged, notify the freight carrier immediately. When referring to your ProStak System, always use the serial number on the capacity sticker located on the bridge girder.

After Delivery

Step 1:

First prepare the area , make sure the floor is swept and clear of debris so that the floor markings can be seen clearly.

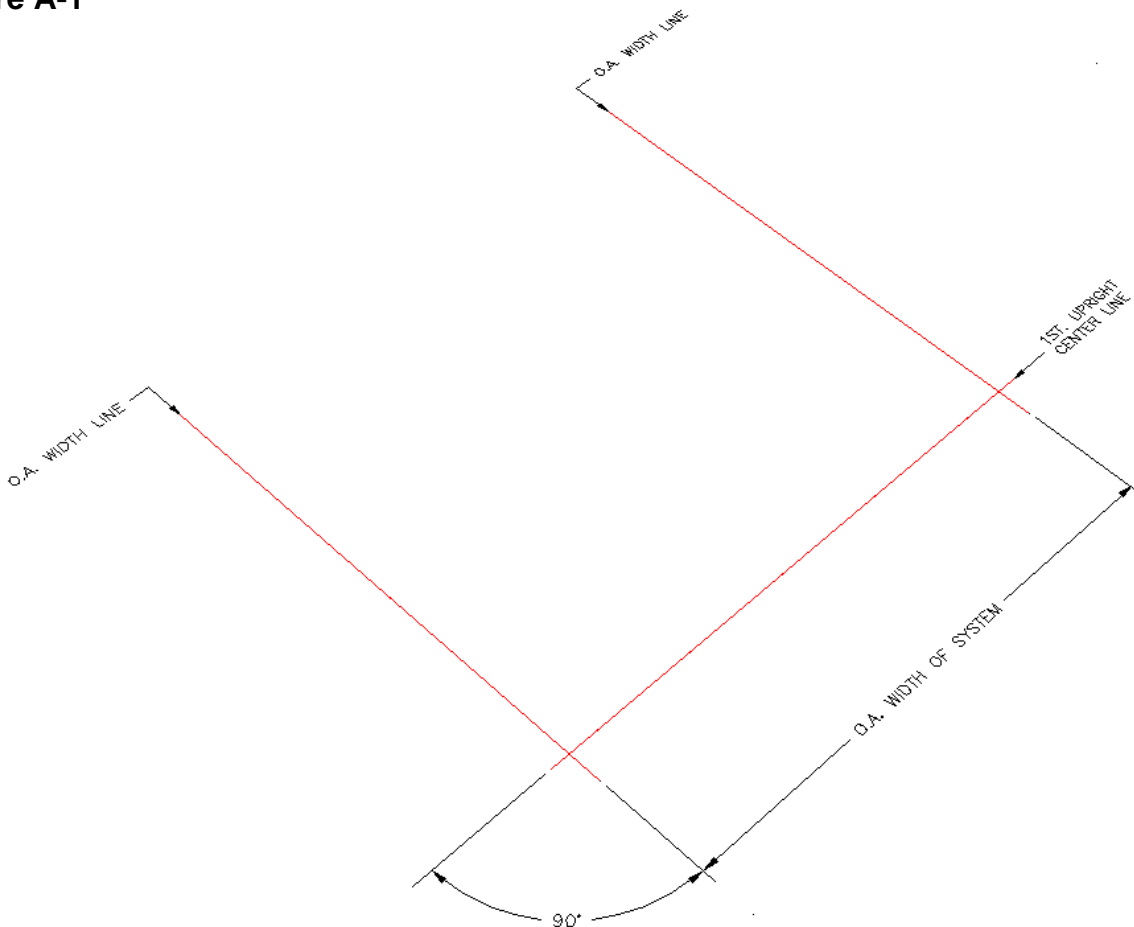
Step 2:

The “General Arrangement Drawing” provided by Rapistak Corporation is located inside the Stacker Crane components box. You will need this drawing to layout the chalk lines to establish the storage system. Placement of the system will be established either by the customer or the drawings supplied by the customer or distributor.

Step 3:

Once placement of the system has been established locate the “1st. Upright Center Line” and snap a chalk line on the floor. Than locate the “O.A. Width Lines” and snap chalk lines perpendicular to the “1st. Upright Center Line” as shown in “Figure A-1”. Using the “1st. Upright Center Line” as a base line place a tape measure along the right side “O.A. Width Line”.

Figure A-1



Step 3 (Continued):

Locate the “Bay 1 Upright Center” dimension on the General Arrangement Drawing and place a mark on the floor at that dimension. Locate the “Bay 2 Upright Center” dimension on the General Arrangement Drawing and add the “Bay 1 Upright Center” dimension to the “Bay 2 Upright Center” dimension and place a mark on the floor at that dimension. Continue to do this until you have reached the last upright center line in the system.

Example:

Bay 1 = 41” place a mark at this dimension.

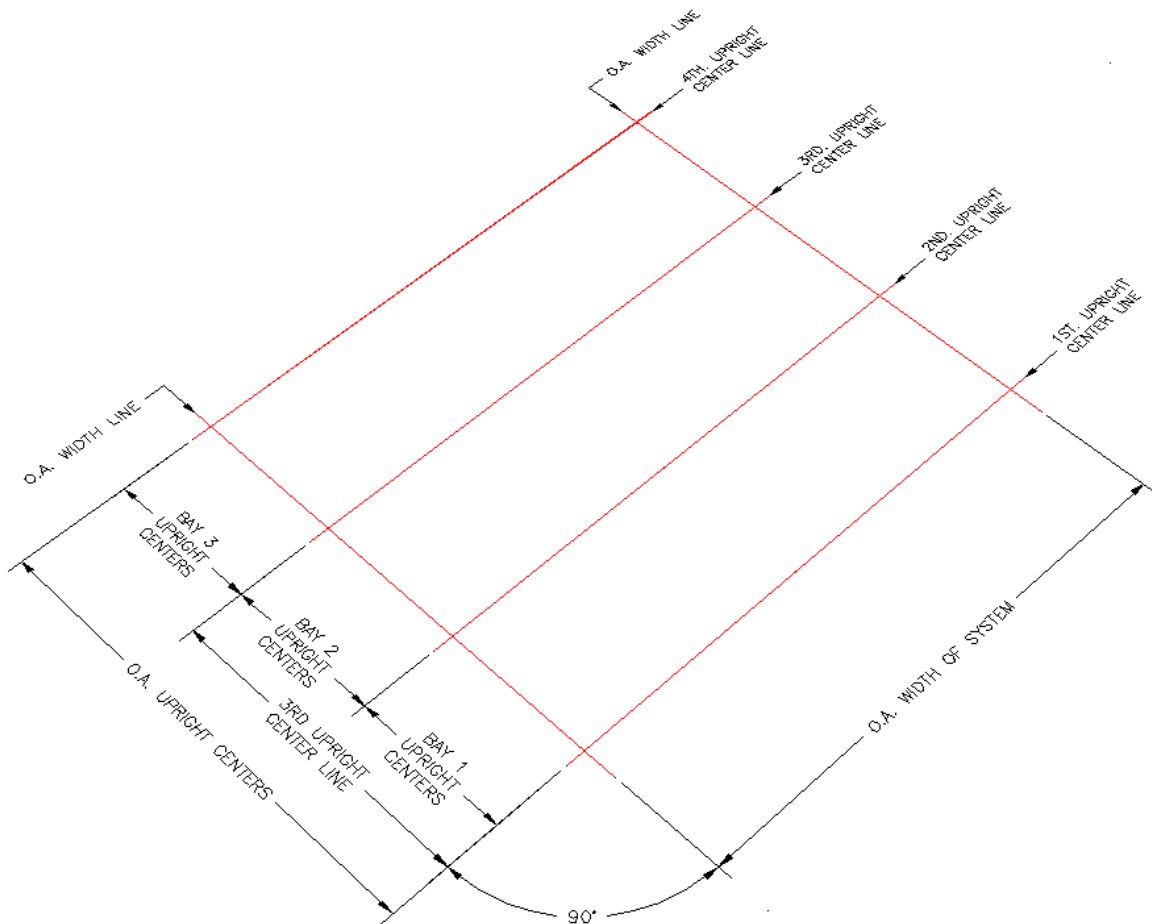
Using the last “mark” dimension add the next bay dimension (41” + 41” = 82”) place a mark 82” from the 1st. Upright Center Line.

Using the last “mark” dimension add the next bay dimension (82” + 41” = 123”) place a mark 123” from the 1st. Upright Center Line.

Continue this until you reach the last upright center line in the system.

Repeat the above steps on the left side “O.A. Width Line”, then snap your chalk lines as shown in “Figure A-2”.

Figure A-2

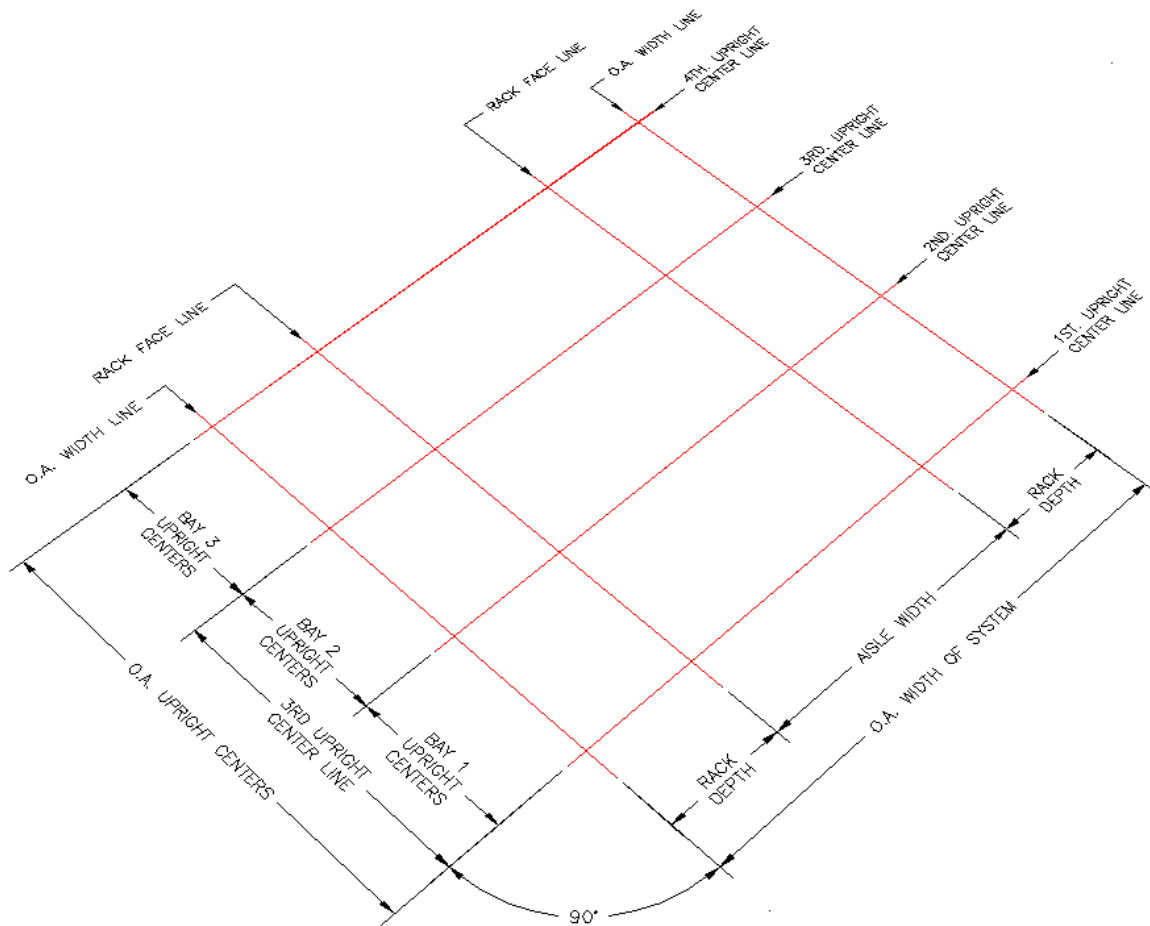


Step 4:

To locate the “Rack Face Lines” locate the “Rack Depth” dimensions on the General Arrangement Drawing. At the “1st. Upright Center Line” measure from the “O.A. Width Line” the “Rack Depth” dimension and place a mark. Repeat this at all four corners of the layout. Then snap a chalk line on these marks as shown in “Figure A-3”.

Verify that the “Aisle Width” dimension matches the dimension shown on the General Arrangement Drawing. You should also verify that the “O.A. Upright Centers” dimension matches the dimension shown on the General Arrangement Drawing.

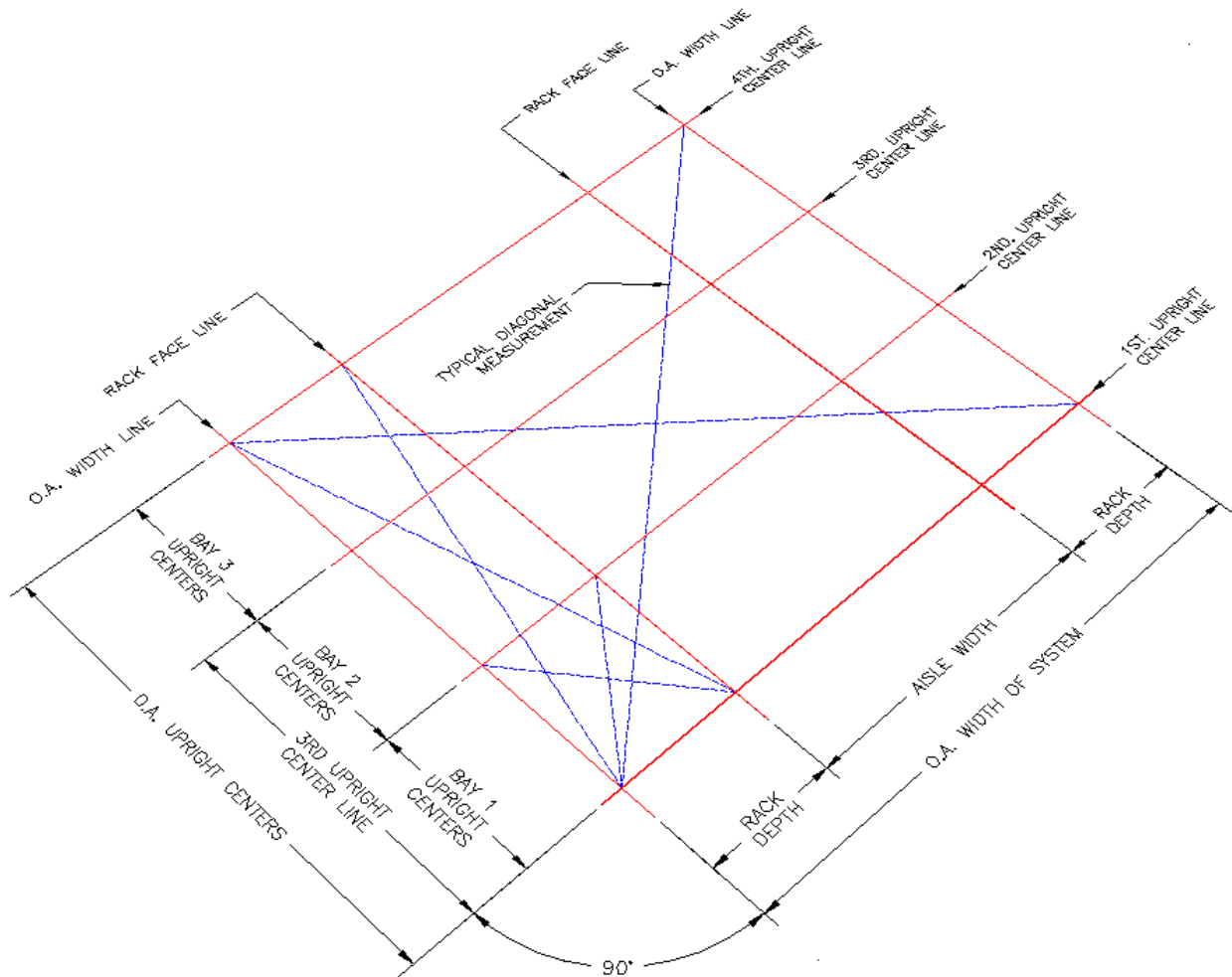
Figure A-3



Step 5:

To verify that the layout is square you will need to take diagonal measurements of the boxes you drew on the floor. The diagonal measurements must be equal within plus or minus 1/16". If your measurements are not equal you must erase your lines and do the layout again.

Figure A-4



Step 6:

Note: Because the base plates may not be welded symmetrical to the uprights you must mark the true center of the upright as follows.

Mark the base plates of the Uprights. In “Figure A-5” on the Front Upright Column measure the width of the column, not the base plate, and place the “center mark” of the column on the base plate. Then place a straight edge across the face of the column and mark the “aisle lines” on the base plate.

In “Figure A-6” on the Rear Upright Column measure the width of the column, not the base plate, and place the “center mark” of the column on the base plate.

Repeat this process for each Upright.

Figure A-5

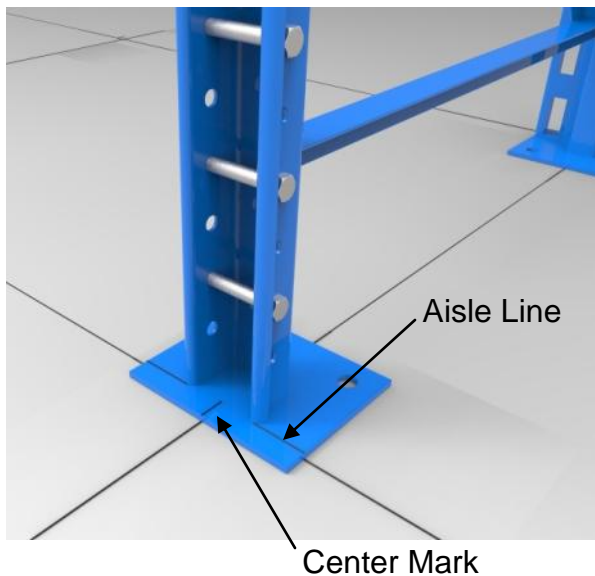
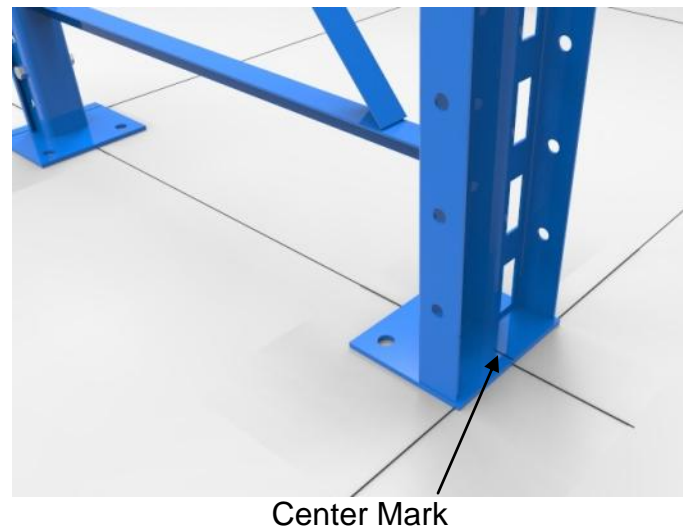


Figure A-6



Step 7:

After marking the 1st Upright base plates, stand the 1st Upright in the vertical position as shown in “Figure A-7” and secure the upright to prevent it from falling over.

Step 8:

Place the 2nd Upright in the same relative position parallel to the 1st Upright and using a rear horizontal brace and a front horizontal brace bolt the 1st and 2nd Uprights together at the top of the uprights. See “Figures A-8, A-9 and A10”.

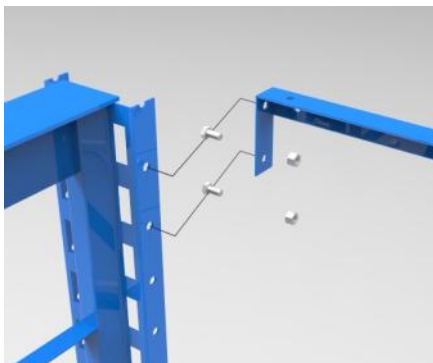
Figure A-7



Figure A-8

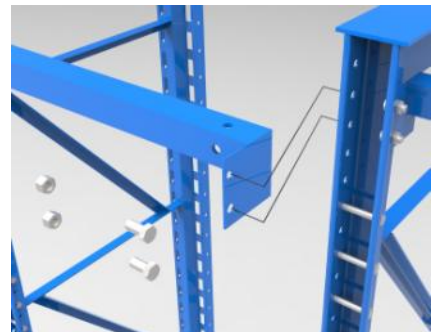


Figure A-9



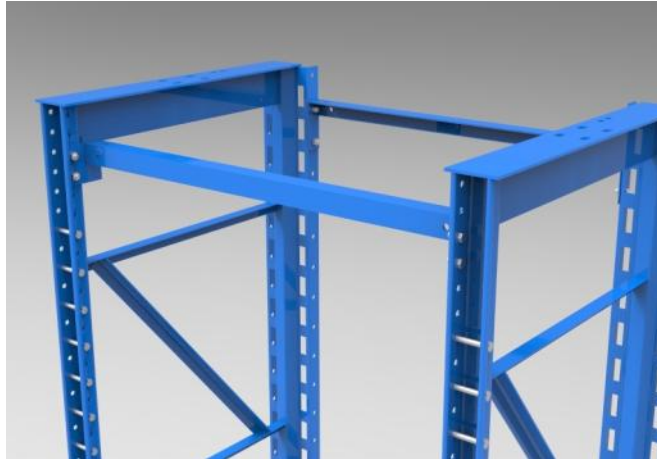
Use 1/2”-13 x 1” long hex head bolts and 1/2”-13 serrated flange hex lock nuts

Figure A-10



Note: The front and rear horizontal braces should be at the same elevation front to back as shown in “Figure A-11”.

Figure A-11



Step 9:

Place the 3rd Upright in the same relative position parallel to the 2nd Upright and using the rear horizontal brace and the front horizontal brace bolt the 3rd and 2nd Uprights together at the top of the uprights as shown in “Figure A-12”. Continue this process until all of the Uprights have been raised and placed in their approximate positions as shown by the markings on the floor.

Figure A-12



Step 10:

When you have completed erecting all of the uprights in that row you can now begin installing all of the rear horizontal braces and rear X-braces.

Start with the bottom rear horizontal brace and install the brace in the bottom two holes as shown in “Figure A-13” using 1/2”-13 x 1” long hex head bolts and 1/2”-13 serrated flange hex lock nuts. **Do not tighten the bolts at this time.**

Figure A-13



Step 11:

To locate the next rear horizontal brace measure the over all height of the rack Upright. Locate that dimension on the charts on **pages 10 and 11**. The dimensions that are shown in the chart are the space required between each rear horizontal brace as shown in “Figures A-14 and A-15”. Install the rear horizontal braces to the dimensions shown in the charts, using 1/2”-13 x 1” long hex head bolts and 1/2”-13 serrated flange hex lock nuts. **Do not tighten the bolts at this time.**

Step 12:

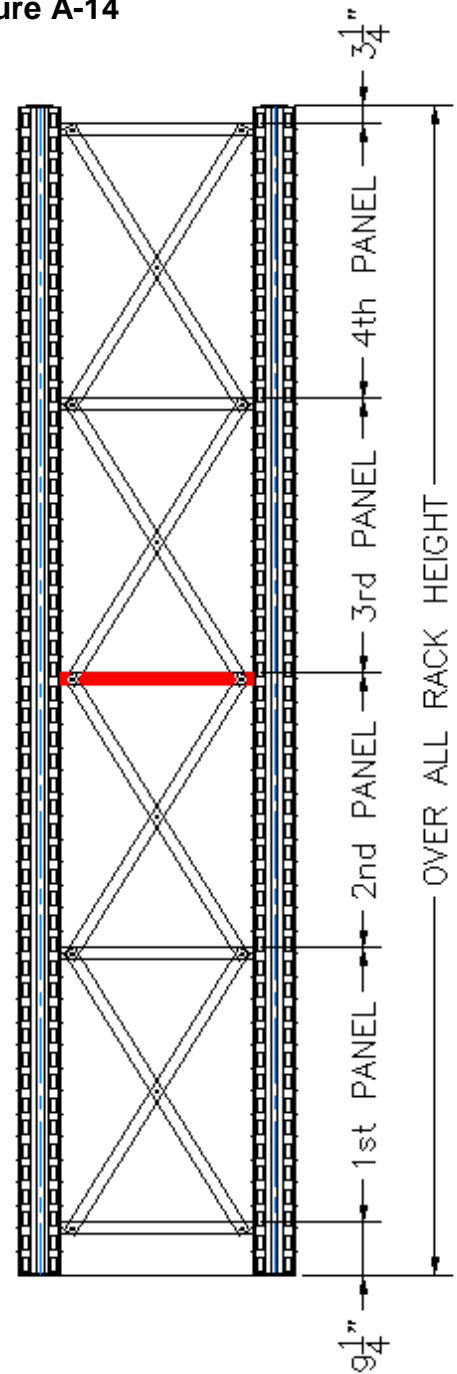
Locate the proper rear X-braces and install the rear X-braces as shown in “Figure A-13”, using 1/2”-13 x 1” long hex head bolts and 1/2”-13 serrated flange hex lock nuts. **Do not tighten the bolts at this time.**

Rear Horizontal Brace Chart

HEIGHT	PANELS	1st	2nd	X	3rd	4th	5th	6th
10'-0" (120")	2	52"	56"	-	-	-	-	-
10'-4" (124")	2	56"	56"	-	-	-	-	-
10'-8" (128")	3	36"	40"	-	40"	-	-	-
11'-0" (132")	3	40"	40"	-	40"	-	-	-
11'-4" (136")	3	40"	40"	-	44"	-	-	-
11'-8" (140")	3	40"	44"	-	44"	-	-	-
12'-0" (144")	3	44"	44"	-	44"	-	-	-
12'-4" (148")	3	44"	44"	-	48"	-	-	-
12'-8" (152")	3	44"	48"	-	48"	-	-	-
13'-0" (156")	3	48"	48"	-	48"	-	-	-
13'-4" (160")	3	48"	48"	-	52"	-	-	-
13'-8" (164")	3	48"	52"	-	52"	-	-	-
14'-0" (168")	3	52"	52"	-	52"	-	-	-
14'-4" (172")	3	52"	52"	-	56"	-	-	-
14'-8" (176")	3	52"	56"	-	56"	-	-	-
15'-0" (180")	3	56"	56"	-	56"	-	-	-
15'-4" (184")	4	40"	44"	-	44"	44"	-	-
15'-8" (188")	4	44"	44"	-	44"	44"	-	-
16'-0" (192")	4	44"	44"	-	44"	48"	-	-
16'-4" (196")	4	44"	44"	-	48"	48"	-	-
16'-8" (200")	4	44"	48"	-	48"	48"	-	-
17'-0" (204")	4	48"	48"	-	48"	48"	-	-
17'-4" (208")	4	48"	48"	X	48"	52"	-	-

X = Mid Panel X-Brace Location

Figure A-14



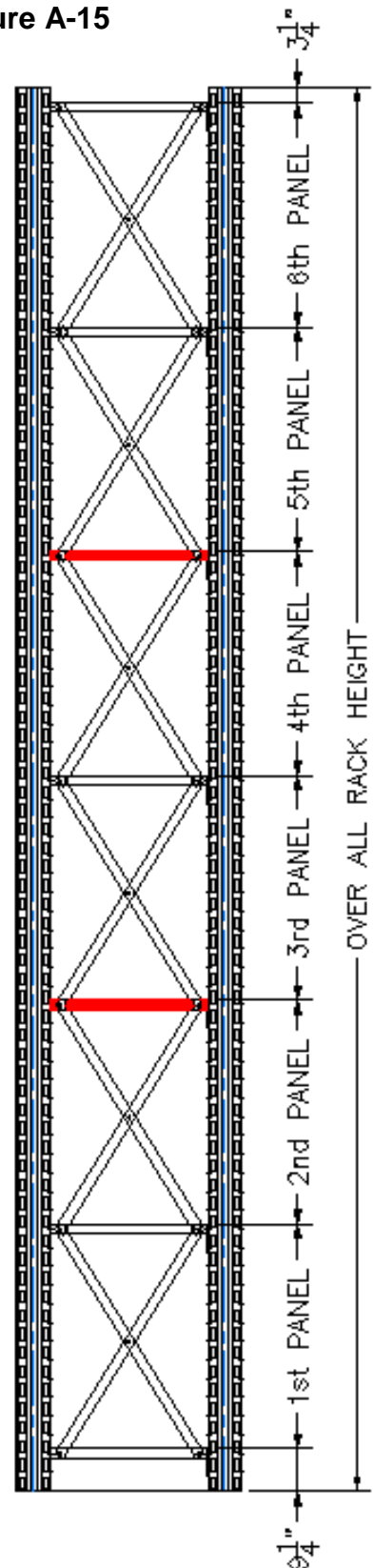
Red bar indicates Mid Panel X-Brace location.

Rear Horizontal Brace Chart (Continued)

HEIGHT	PANELS	1st	2nd	X	3rd	4th	X	5th	6th
17'-8" (212")	4	48"	48"	X	52"	52"	-	-	-
18'-0" (216")	4	48"	52"	X	52"	52"	-	-	-
18'-4" (220")	4	52"	52"	X	52"	52"	-	-	-
18'-8" (224")	4	52"	52"	X	52"	56"	-	-	-
19'-0" (228")	4	52"	52"	X	56"	56"	-	-	-
19'-4" (232")	4	52"	56"	X	56"	56"	-	-	-
19'-8" (236")	4	56"	56"	X	56"	56"	-	-	-
20'-0" (240")	5	44"	44"	X	44"	48"	-	48"	-
20'-4" (244")	5	44"	44"	X	48"	48"	-	48"	-
20'-8" (248")	5	44"	48"	X	48"	48"	-	48"	-
21'-0" (252")	5	48"	48"	X	48"	48"	-	48"	-
21'-4" (256")	5	48"	48"	X	48"	48"	-	52"	-
21'-8" (260")	5	48"	48"	X	48"	52"	-	52"	-
22'-0" (264")	5	48"	48"	X	52"	52"	-	52"	-
22'-4" (268")	5	48"	52"	X	52"	52"	X	52"	-
22'-8" (272")	5	52"	52"	X	52"	52"	X	52"	-
23'-0" (276")	5	52"	52"	X	52"	52"	X	56"	-
23'-4" (280")	5	52"	52"	X	52"	56"	X	56"	-
23'-8" (284")	5	52"	52"	X	56"	56"	X	56"	-
24'-0" (288")	5	52"	56"	X	56"	56"	X	56"	-
24'-4" (292")	5	56"	56"	X	56"	56"	X	56"	-
24'-8" (296")	6	44"	48"	X	48"	48"	X	48"	48"
25'-0" (300")	6	48"	48"	X	48"	48"	X	48"	48"

X = Mid Panel X-Brace Location

Figure A-15

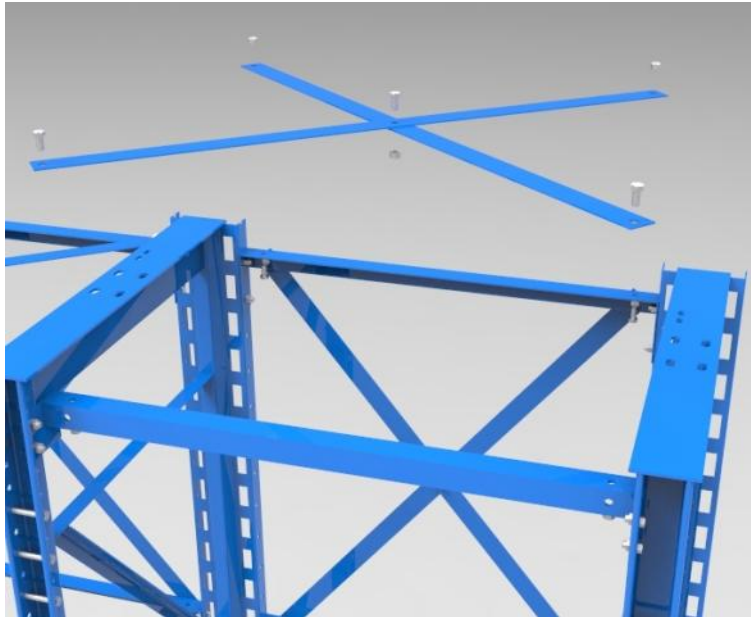


Red bar indicates Mid Panel X-Brace location.

Step 13:

Install the top frame X-braces as shown in “Figure A-16”, using 1/2”-13 x 1” long hex head bolts and 1/2”-13 serrated flange hex lock nuts. **Do not tighten the bolts at this time.**

Continue installing the top frame X-braces until you complete the entire row. **Do not tighten the bolts at this time.**

Figure A-16

Note: If the over all rack height is 17’-4” (208”) or taller you will need to install Mid Panel X-Bracing. If the over all rack height is less than 17’-4” (208”) skip step 14.

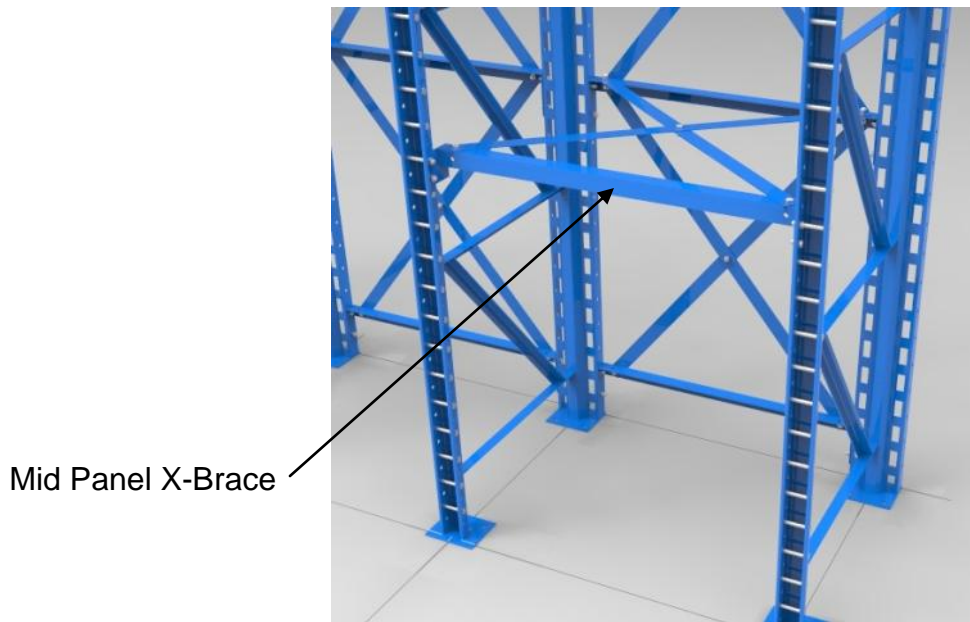
Step 14:

To install the Mid Panel X-Bracing as shown in “Figure A-17”, measure the over all height of the rack and locate that height in the charts on **pages 10 and 11**. Read across the chart if there is one “X” in the chart you will need to install one Mid Panel X-Brace per section. If there are two “X”s in the chart you will need to install two Mid Panel X-Braces per section. The red bars shown in “Figures A-14 and A-15” indicate the locations of the Mid Panel X-braces.

Note: Refer to the “General Arrangement Drawing” for the exact location of the Mid Panel X-Braces.

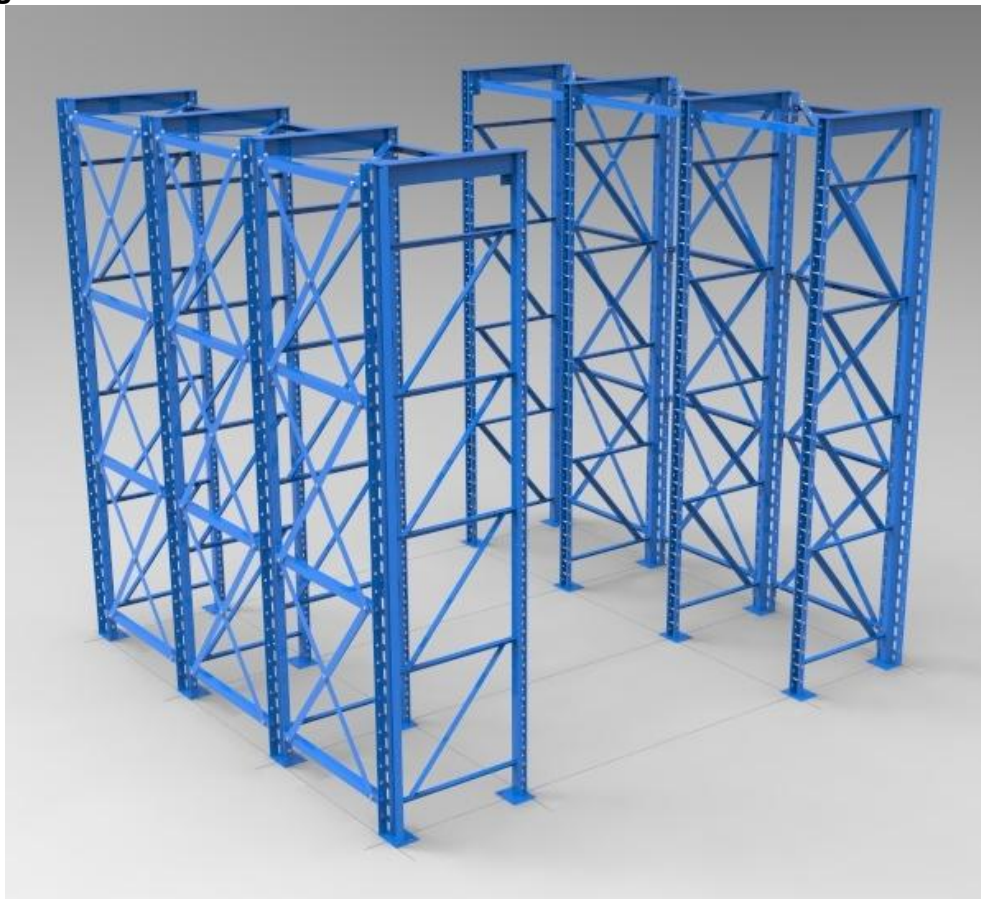
Install the Mid Panel X-Bracing using 1/2”-13 x 1” long hex head bolts and 1/2”-13 serrated flange hex lock nuts. **Do not tighten the bolts at this time.**

Figure A-17



Note: Repeat Steps 6 through 14 on the opposite side of the aisle.

Figure A-18



Step 15:

Optional Cross Aisle Tie Installation

Install the “Cross Aisle Ties” as shown in “Figures A-19 and A-20”, using 1/2”-13 x 1” long hex head bolts and 1/2”-13 serrated flange hex lock nuts. **Do not tighten the bolts at this time.**

You will need to repeat this process at the other end of the aisle.

Figure A-19

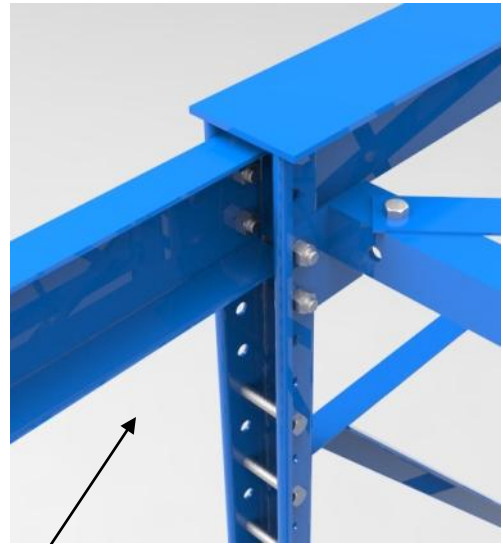
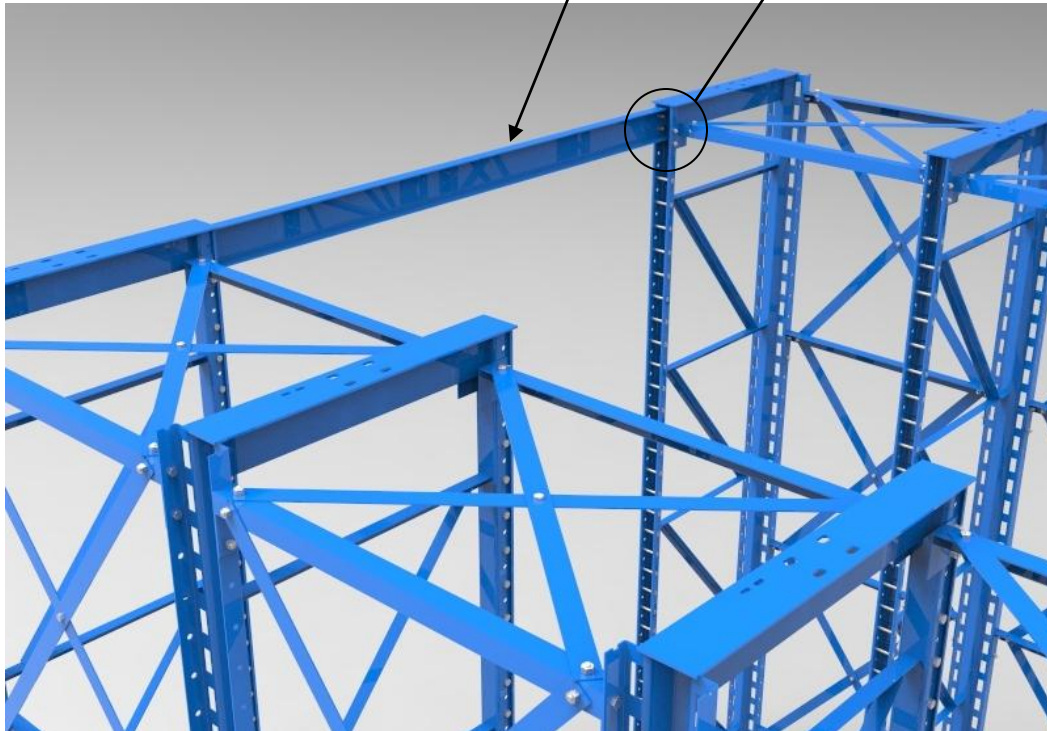


Figure A-20



Preliminary Leveling Operation

Step 16:

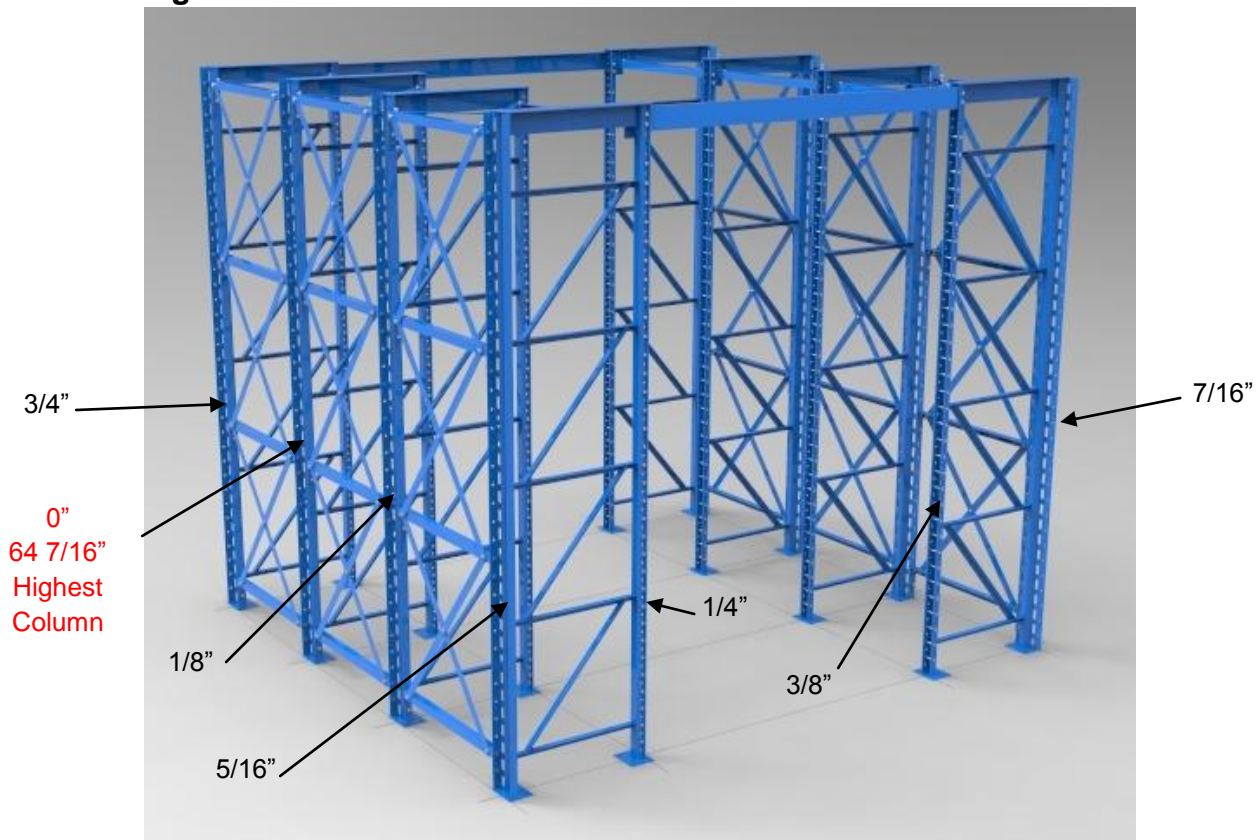
Using a transit level or laser level, verify that the highest column is at the point where the floor is marked. (See page 1: "Floor Elevation".) A folding rule or a tape measure can serve as a measuring stick.

Mark the column that rests on the highest point on the floor with a zero "0", denoting that it is the highest column. Place the measuring stick on the top of the column base plate and mark the elevation reading from the measuring stick, as viewed through the transit or laser level, on the column in inches to the nearest fraction of 1/16".

Move the folding rule or tape measure to each column (**both front and rear**) and rest it on the top of the column base plate. Note the elevation reading in inches and subtract it from the elevation reading of the highest column. Mark this difference figure on each column as you move along the system as shown in "Figure A-21". This dimension is the thickness of the shims required to bring the column bases to the same elevation as the highest column.

The columns will be raised to their proper heights after the anchor bolts are installed. The anchor bolts supplied will handle approximately 1/2" difference in column base elevations. If the elevation difference is greater than 1/2", it will be necessary to obtain longer anchor bolts than those normally supplied.

Figure A-21



Anchoring the System

IMPORTANT: Position each vertical column before drilling any anchor holes.

Step 17:

Each vertical column (**both front and back**) **MUST** be located in their correct positions before drilling for anchoring. Each vertical column must be at its marked position on the “Rack Face Line” and the “Upright Center Line”. Refer to “Figure A-3” on page 4.

Starting with the front column of the “1st Upright”, align the center mark on the base plate with the “1st Upright Center Line” making sure the face of the front column is aligned with the “Rack Face Line”, as shown in “Figure A-22”. Using the base plate as a template, drill two 5/8” diameter holes 4” deep.

Insert the two anchor bolts and draw them down leaving about 1” of space to allow for shimming, as shown in “Figure A-23”.

Figure A-22

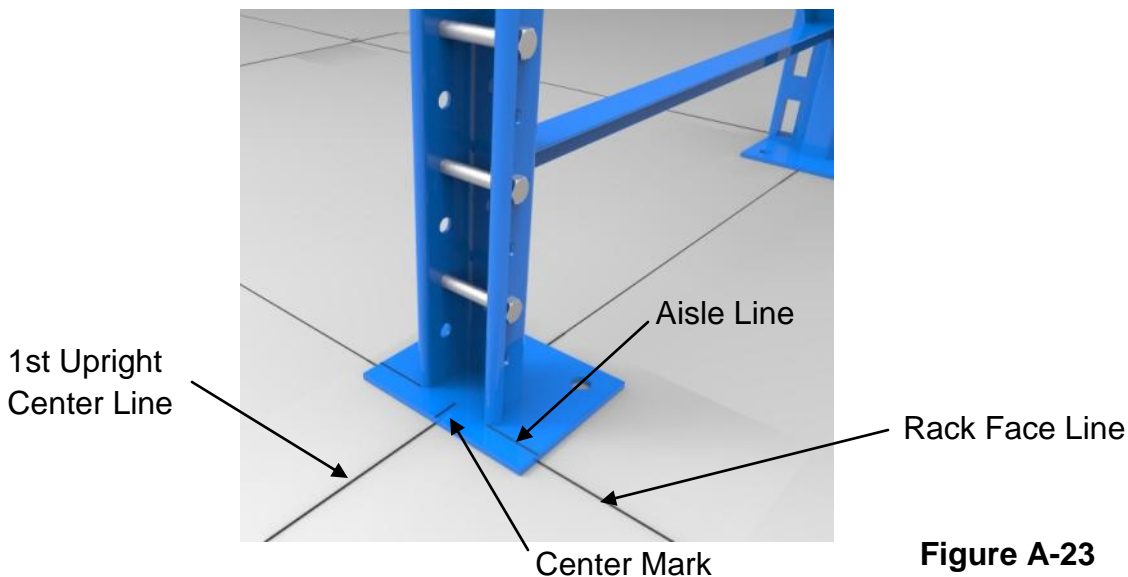
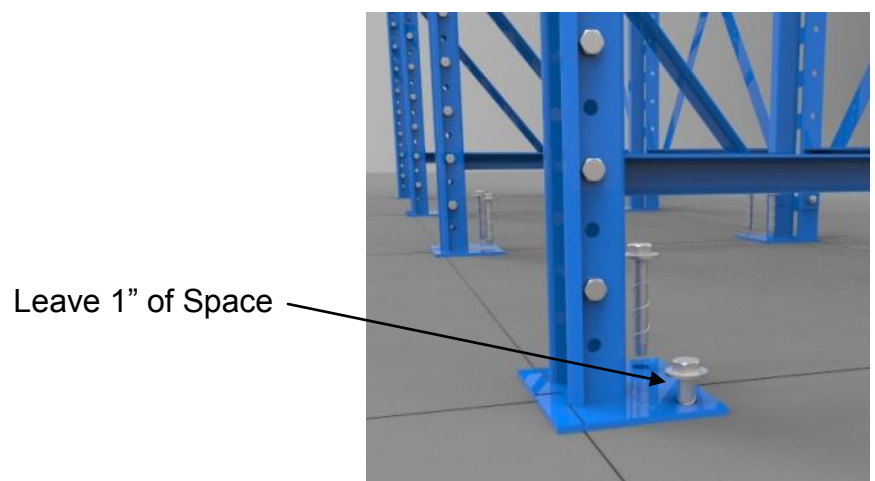


Figure A-23



Step 17 (Continued):

Using the appropriate “Bay Upright Center” dimension located on the “General Arrangement Drawing”, position the next “Front Upright Column” along the “Rack Face Line” and align the “Front Upright Column” center mark with the “2nd Upright Center Line”.

After the “Front Upright Column” is in the correct position, using the base plate as a template, drill the two 5/8” diameter holes 4” deep.

Insert the two anchor bolts and draw them down leaving about 1” of space to allow for shimming. Continue this process for each successive “Front Upright Column”.

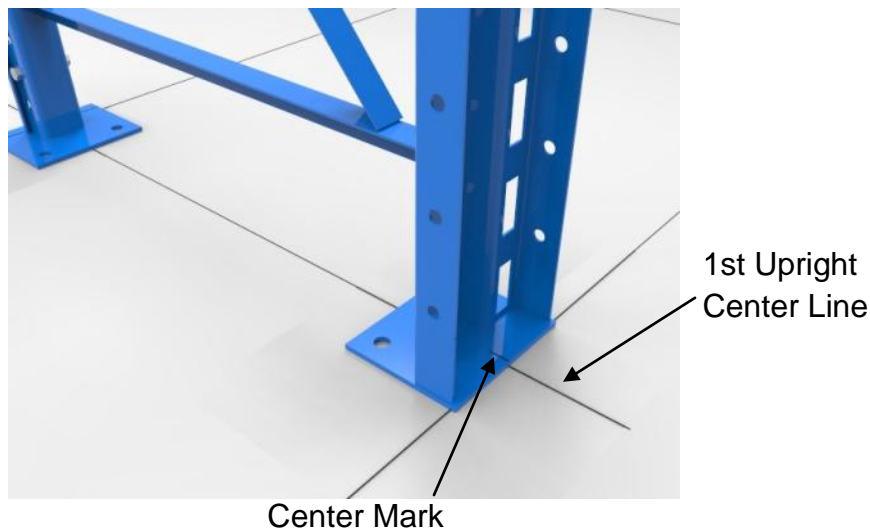
Step 18:

Starting with the rear column of the “1st Upright”, align the center mark on the base plate with the “1st Upright Center Line”, as shown in “Figure A-24”.

After the “Rear Upright Column” is in the correct position, using the base plate as a template, drill the two 5/8” diameter holes 4” deep.

Insert the two anchor bolts and draw them down leaving about 1” of space to allow for shimming.

Figure A-24



Using the appropriate “Bay Upright Center” dimension located on the “General Arrangement Drawing”, position the next “Rear Upright Column” center mark along the “2nd Upright Center Line”.

IMPORTANT: Before drilling the anchor bolt holes you MUST check if the rack section is square, see “Figure A-25”.

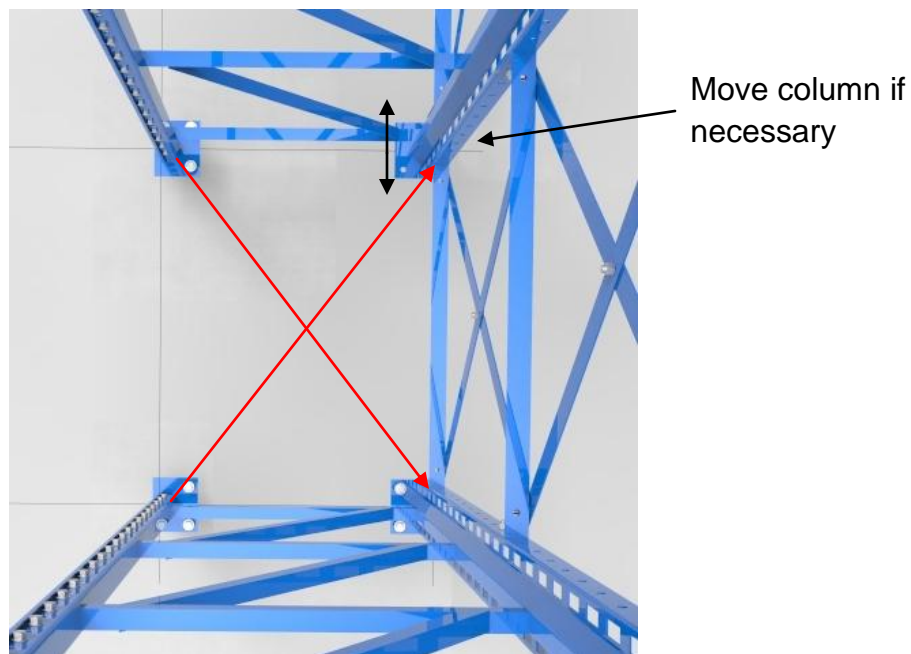
Step 18 (Continued):

Squaring the Rack Section

To square the rack section measure the distance between the “Front Upright Column” to the “Rear Upright Column” in a diagonal direction near the bottom of the rack, as shown in “Figure A-25”. These two dimensions should be equal to within 1/16”.

If the diagonal dimensions are not equal to within 1/16”, you must adjust the 2nd rear upright column until they are equal to within 1/16”.

Figure A-25



After the “Rear Upright Column” is in the correct position, using the base plate as a template, drill the two 5/8” diameter holes 4” deep.

Insert the two anchor bolts and draw them down leaving about 1” of space to allow for shimming. Continue this process for each successive “Rear Upright Column”.

NOTE: Do not allow tolerance build-up to create a problem as the rear columns are anchored.

Step 19:

Repeat steps 17 and 18 for the “Uprights” on the opposite side of the aisle.

Step 20:

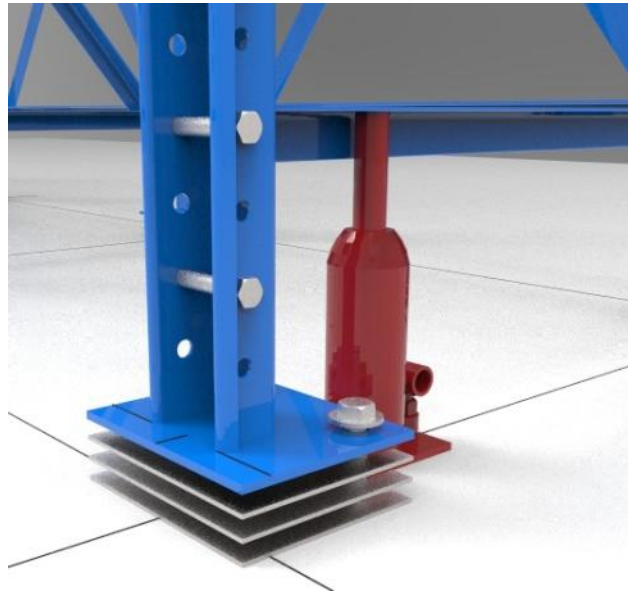
Shimming

Using the shim thickness measurements taken earlier in “Step 16” on page 15, make shim packs where required. Use both 1/16” and 1/8” thick shims to create the shim packs so you will have enough of each size to use through-out the system. Position each shim pack in front of the column where it is to be used.

Using a bottle jack, no taller than 8”, position the bottle jack next to the column you plan to shim, than jack the column off the floor slightly higher than the required shim pack. Slide the shim pack under the column base plate, than lower the column onto the shim pack. See “Figure A-26”.

Using an impact gun snug the anchor bolts to the top of the base plate. **Do not torque the anchor bolts at this time.** Complete this operation for all columns in the system.

Figure A-26



Using the transit or laser level check the zero “0” column that is designated the highest column for the elevation reading. Place the measuring stick on the top of the column base plate and verify the reading, with the mark on the column. Move the measuring stick to each column and place the measuring stick on the top of the column base plate and check to see that each reading is approximately the same, within +/- 1/16”. Further adjustment may be made by adding or removing shims if necessary.

Step 21:

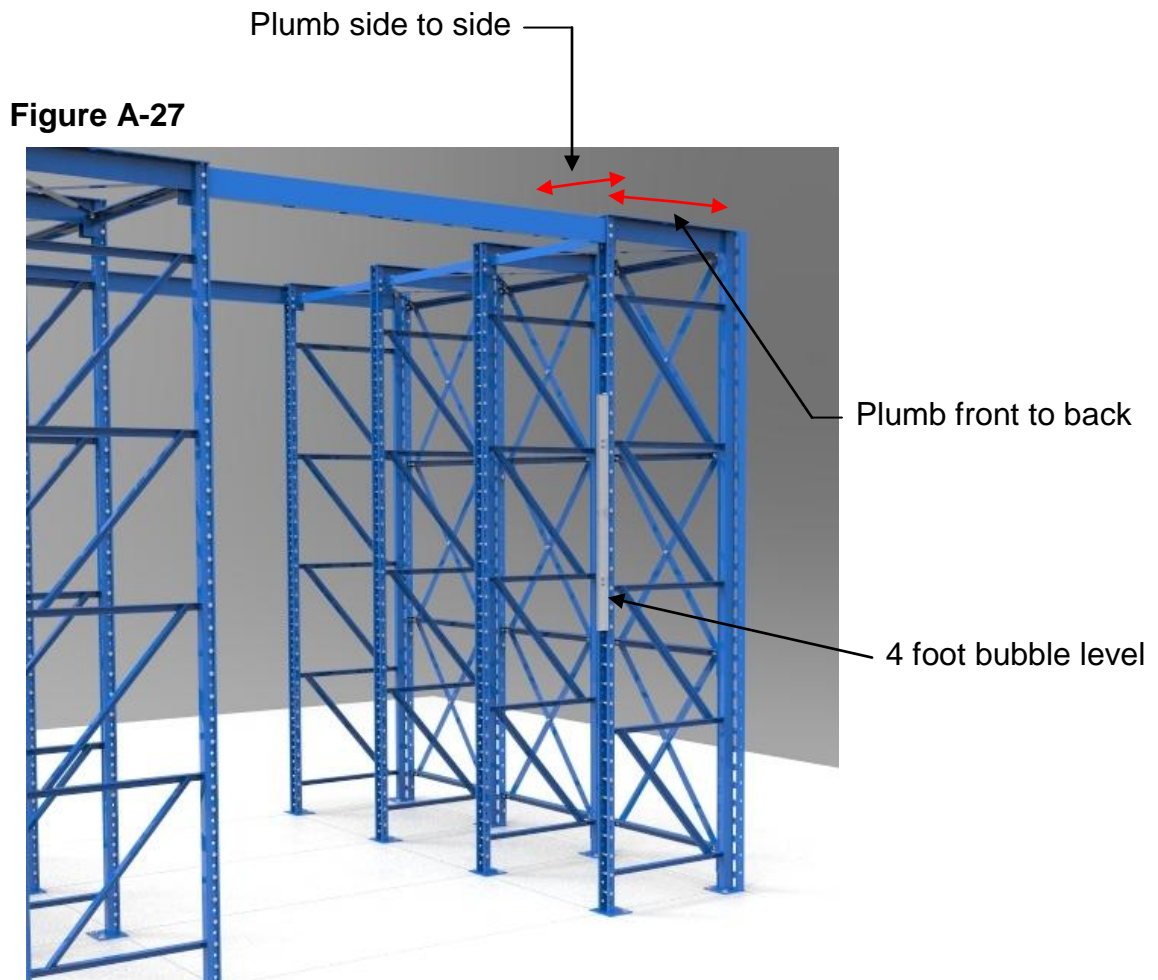
Checking Plumb

After shimming the Uprights it is time to check that the Uprights are plumb side to side and front to back, as shown in "Figure A-27".

To check plumb front to back place a 4 foot bubble level approximately half way up on the face of the "1st Front Upright Column" and check the bubble for level. Adjustments can be made by shimming the rear upright column.

To check plumb side to side place a 4 foot bubble level approximately half way up on the side of the "1st Front Upright Column" and check the bubble for level. Adjustments can be made by pulling or pushing the Upright than tightening the bolts that hold the diagonal X-braces.

Note: When tightening the anchor bolts the Uprights may move out of plumb, double check plumb after tightening the anchor bolts. You may need to make adjustments to correct this issue.



Step 21 (Continued):**Checking Plumb**

While checking plumb use the chart below to be within acceptable tolerance.

Rack Frame Height (Ft.)	Max Out Of Plumb of Uprights In Any Direction (Unloaded Rack) (in.)
8 ft	1/8"
9 ft.	1/8"
10 ft.	3/16"
11 ft.	3/16"
12 ft.	3/16"
13 ft.	3/16"
14 ft.	1/4"
15 ft.	1/4"
16 ft.	1/4"
17 ft.	5/16"
18 ft.	5/16"
19 ft.	5/16"
20 ft.	5/16"
21 ft.	3/8"
22 ft.	3/8"
23 ft.	3/8"
24 ft.	3/8"
25 ft.	3/8"

Step 22:

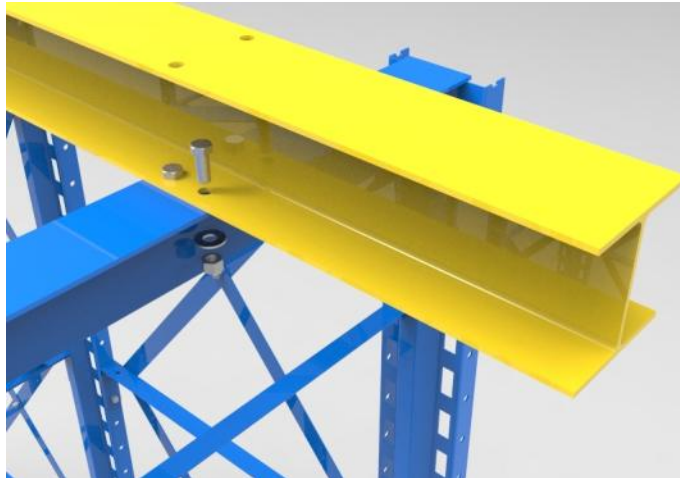
After leveling and checking for plumb completely tighten all hardware, previously left loose, starting with the anchor bolts. After the anchor bolts have been tightened, completely tighten the attachment hardware for the Rear Horizontal Braces, Rear X-Braces, Top Frame X-Braces and the Cross Aisle Ties.

Runway Rail Support Beam Installation

Some applications require runway rail support beams to be mounted to the top of the storage rack. Using the General Arrangement Drawing locate the beams on the drawing, each beam will be marked with a letter-number combination and the length of the beam will be shown on the General Arrangement Drawing.

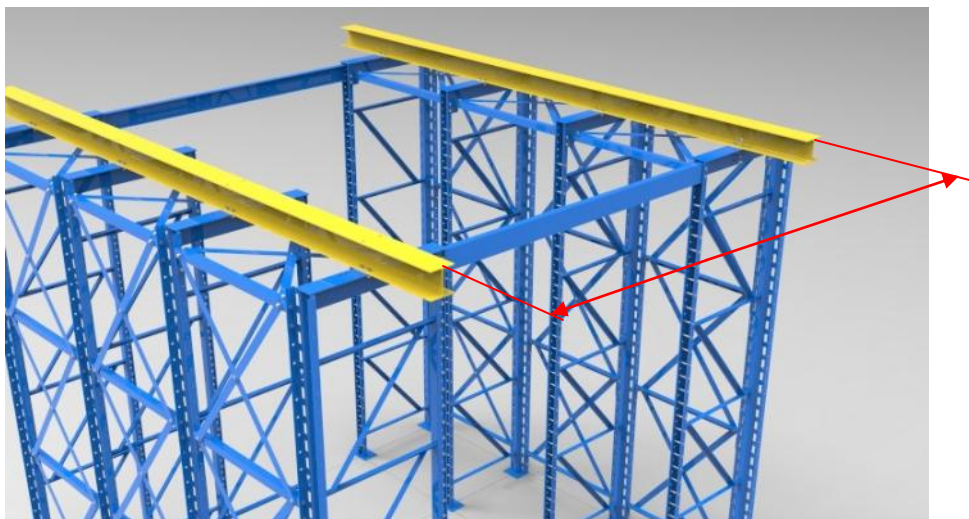
Using these match marks place the beams on top of the rack uprights and align the holes in the runway rail support beams with the holes in the top of the upright frames, as shown in “Figure B-1”. Using 5/8”-11 x 2” long hex head bolts, 5/8” flat washers and 5/8”-11 hex nylon lock nuts bolt the beams to the top of the rack system. **Do not tighten the bolts at this time.**

Figure B-1



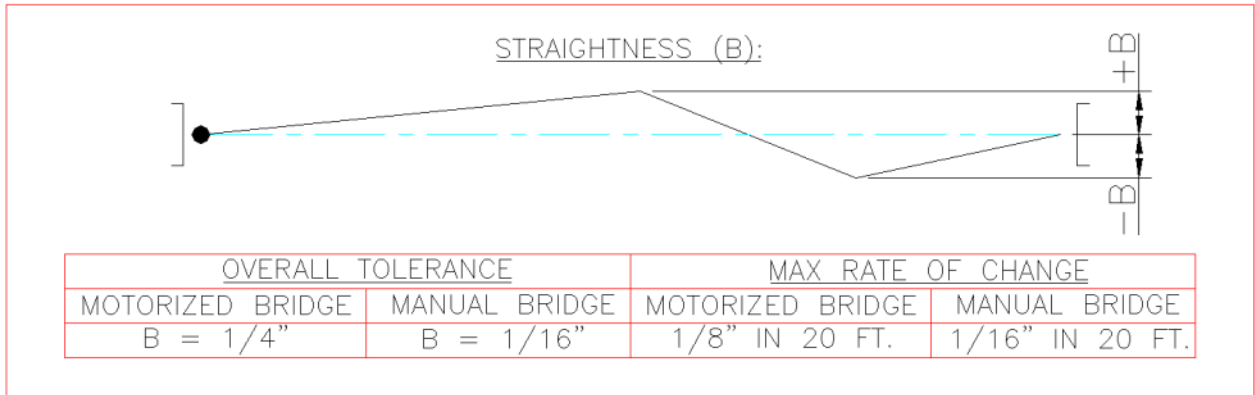
After installing the runway rail support beams you will need to align the beams. Using the Crane Span dimension shown of the General Arrangement Drawing, align the runway rail support beams to the Straightness Chart shown on the next page. After making the alignment tighten all the hardware. See “Figure B-2”.

Figure B-2



Using the chart below align the runway rail support beams as shown in “Figure B-2” to these acceptable tolerances.

Figure B-3



Optional 4 ft. Run-out Installation

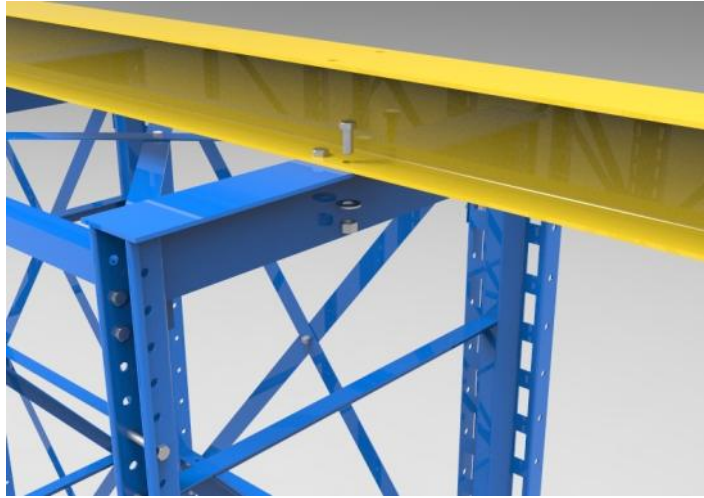
When the optional 4 ft. Run-Out is supplied three Uprights per side are 8" shorter than the remaining Uprights in the system. Follow Steps 1 through 22 to install the ProStak Rack System as normal, paying attention to which end of the system will get the 4 ft. Run-Out. This information will be provided on the General Arrangement Drawing.

Figure B-4



Locate the Run-Out beams and place them on top of the 8" shorter Uprights, making sure that the gusset plates welded to the web of the beams are pointed toward the center of the system. Using 5/8"-11 x 2" long hex head bolts, 5/8" flat washers and 5/8"-11 hex nylon lock nuts bolt the beams to the top of the rack system, as shown in "Figure B-5". **Do not tighten the bolts at this time.**

Figure B-5



Once the beams are in place attach the Cross Aisle Tie to the end of the Run-Out beams. Using 1/2"-13 x 1" long hex head bolts and 1/2"-13 serrated flange hex lock nuts, bolt the Cross Aisle Tie to the angle clips at the end of each Run-Out beam, as shown in "Figure B-6". **Do not tighten the bolts at this time.**

Figure B-6



After installing the Run-Out beams you will need to align the beams. Using the Crane Span dimension shown of the General Arrangement Drawing, align the Run-Out beams to the Straightness Chart shown on page 23. After making the alignment, tighten all the hardware, as shown in “Figure B-5”.

Figure B-5

