PERIMETER 20

Edge Protection System

Installation and Inspection Manual

HIGHLAND
safety systems

Patent Pending
#63/247,383

TABLE OF CONTENTS

notes

For questions or clarification regarding this or any other Highland Safety Systems engineered product, please don't hesitate to contact us at info@highlandsystems.com or 1.855.591.7272.

The various attachment methods and accessories described in this manual were designed exclusively for attaching the PERIMETER20 system. No other products or systems shall be used.

The Highland PERIMETER20 System and all of its components must be installed according to these instructions.

The connection systems have been designed exclusively for use with the PERIMETER20 system. No other systems shall be used with them.

access to the slab edge

PERIMETER20 panels can be easily removed for access to the slab edge - no messy ties or wires to deal with.

Workers must be tied off before removing an PERIMETER20 system panel. Workers must remain tied off until the panel has been replaced.

An area with a removed PERIMETER20 panel must not be left unattended.

The PERIMETER20 panel must be properly reinstalled as immediately as possible after removal.

Refer to the regulations specific to the region of installation for complete requirements.

For layout purposes posts supporting PERIMETER20 panels should be spaced at 8 ft on center.

An edge protection plan should be made. Space is provided in the inspection section of this manual to create a sketch of the plan.

the worker

The PERIMETER20 system and all its attachment accessories must be installed by a properly trained installer.

Workers installing and/or using the PERIMETER20 system must first read this manual in its entirety.

Workers must be tied off to a compliant fall arrest anchor or to an existing travel restraint system at all times when installing the PERIMETER20 system and all of its component. Follow the health and safety requirements applicable in your jurisdiction.

Workers shall not lean against the PERIMETER20 system.

Construction material or other object shall not be leaned or placed on the PERIMETER20 system.

the job site

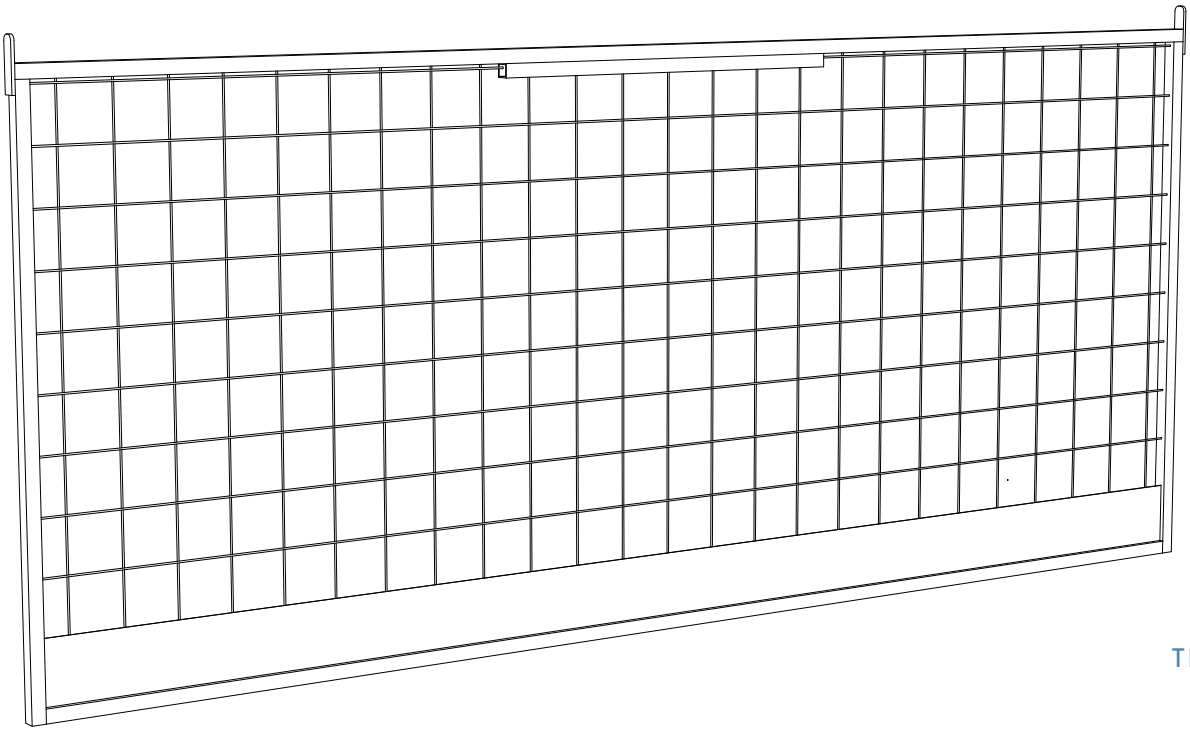
All deviations from prescribed arrangements of the PERIMETER20 system and its components must be designed and reviewed by an individual qualified to practice in the location of installation.

Workers shall be familiar with all applicable site restrictions.

Workers should be familiar with and follow all labour and safety regulations that apply in the location of installation.

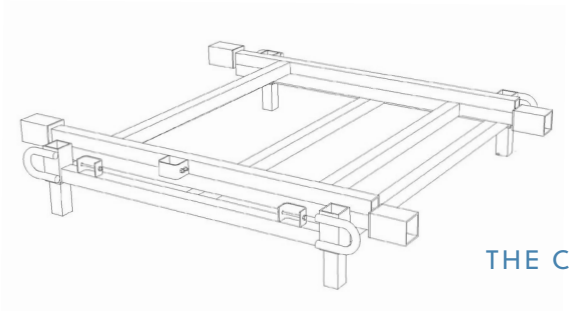
Any unsafe or hazardous conditions at the site of the installation should be identified and immediately reported to the appropriate person.

THE SYSTEM: components

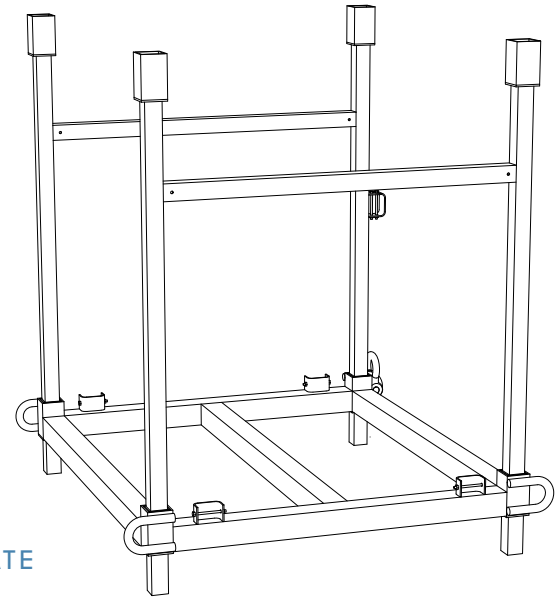


THE PANEL

THE POST



THE CRATE



PLEASE SEE PAGES 15-17 FOR DIMENSIONAL DETAILS ON ALL OF THESE COMPONENTS

the PERIMETER20 system information

Handling and installation of the PERIMETER20 system components requires the use of power tools and lift equipment. The instructions and safety guidelines set out by the manufacturers of the tools and equipment should be followed.

The PERIMETER20 panels weigh approximately 36 lbs (16.3 kg). Proper lifting techniques should be used, and workers should never lift more than they can safely handle.

Lifting, movement and placement of the PERIMETER20 system components must be done in a way that does not create a falling object hazard.

The PERIMETER20 system components must not be modified in any manner.

Objects or items should not be painted, welded or otherwise attached to any component of the PERIMETER20 system in a way that compromises the integrity of the steel or the strength of its attachment to the structure.

inspection and repair

All of the PERIMETER20 system components must be inspected prior to each installation. A complete inspection must be conducted at least once per year.

Components which are damaged or defective must be removed from service. Consult the Inspection section of this manual on pages 18-21 for reference.

Damaged or defective PERIMETER20 components should only be returned to service once a qualified engineer has inspected them and certified that their capacity to perform to their documented standards has not been compromised in any way.

Forms regarding the inspection and repair of the PERIMETER20 system and all of it's attachment components are available in the Inspection section of this manual.

Components must be inspected prior to installation.

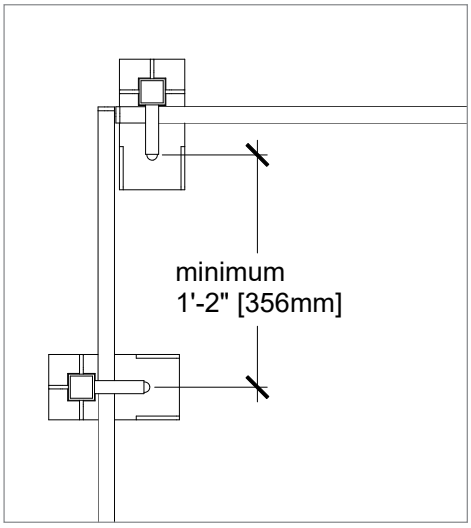
Damaged items must be removed from service and assessed for usability. Repair/remove criteria are outlined for each component.

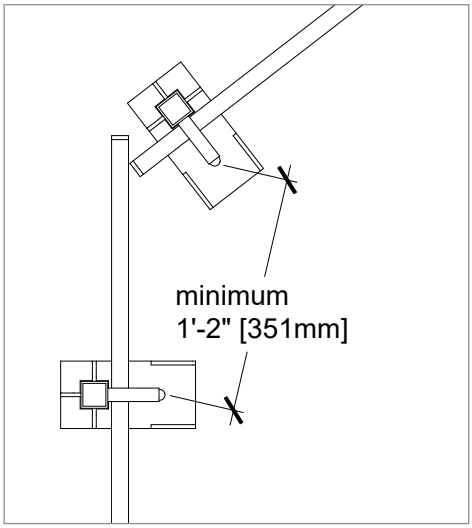
system positioning

Standards regarding the positioning of the guardrail relative to the slab edge vary from region to region. These standards may include maximum and minimum edge distances. Local regulations must be followed.

Corners

The PERIMETER20 system can accommodate corners and angles without any gaps. Two posts must be installed at a corner.

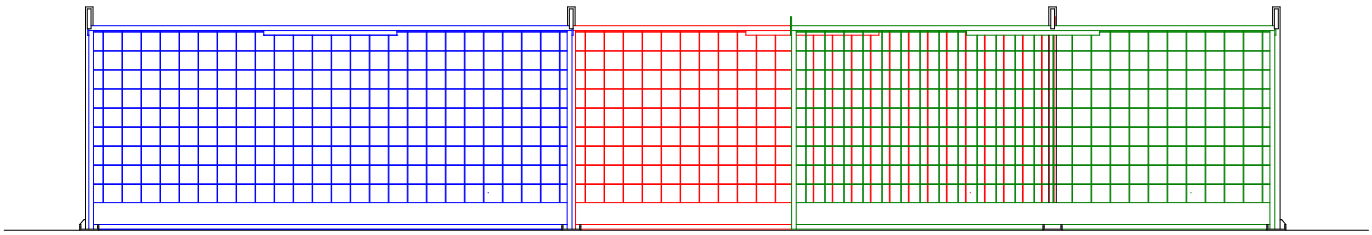




Straight runs

The PERIMETER20 panel is 8'4" long. The panels overlap the post by a minimum of 1 ¼" on each side. Thus the posts should be spaced at a maximum of 8' apart.

Panels can overlap each other to accommodate smaller openings.

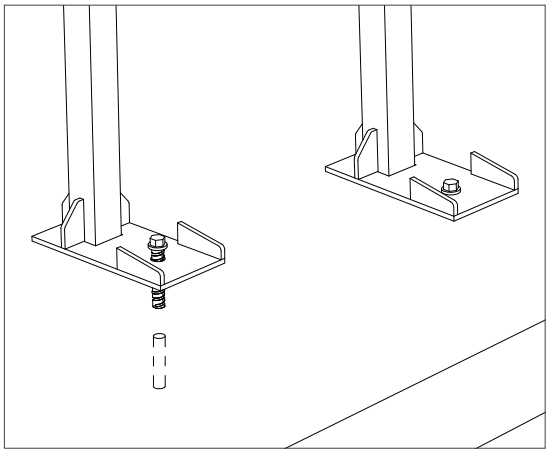


overview

Various methods of attaching the PERIMETER20 system to the building structure are available. These methods are outlined here. The choice of method is based primarily on the type of construction. Instructions specific to each method are outlined subsequently. Please contact Highland Safety Systems if you are unsure about which method is best for your specific situation.

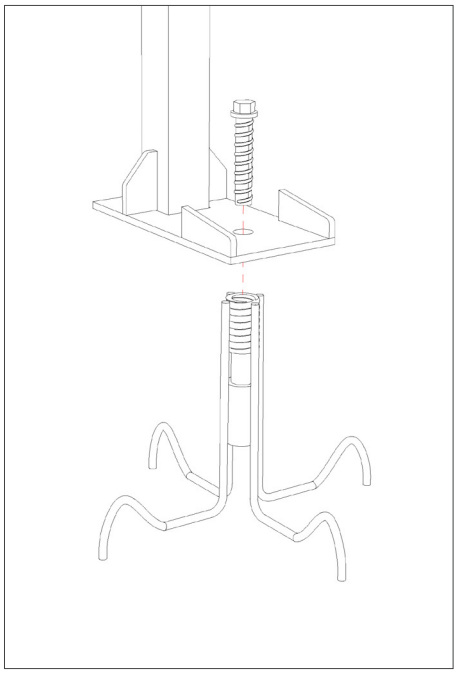
method 1
concrete screw ANCHORS

This is an excellent and robust method of attaching to poured concrete slabs. Only a single approved anchor is required. This method requires drilling into concrete. Where drilling is not a suitable option, our other attachment method will serve your needs.



method 2
the SINGLE COIL INSERT

The Single Coil Insert is an ideal solution for post-tensioned slabs. It is cast into the concrete. Once the concrete is cured the plug is pulled out and the post attached with a coil anchor.



CONCRETE ANCHOR details

Post-installed concrete screw anchors must be snug against the post base plate surface but not over-tightened.

System must be anchored to uncracked concrete that has been cured to a strength of at least 20 MPa (3000 psi).

System capacity has been engineered for the use of the following anchors:

Hilti KWIK HUS concrete anchor
1/2" diameter
4 1/2" long

Concrete anchors must be spaced a minimum of 14" apart on center.

The capacities of the concrete anchors have been engineered in accordance with the requirements of ACI 318-11 and CSA A23.3.

Installation guidelines provided by the manufacturers of these anchors must be followed, including specifications regarding drill bit requirements, embedment depths and wrench torque settings. These specifications are available from the manufacturers' respective websites or from Highland Safety Systems upon request. Use of alternative anchors must be approved by Highland Safety Systems.

The Hilti KWIK HUS anchor is now reusable with the PERIMETER20 system. Please refer to the guidance provided by Hilti before reusing these anchors.

The post must be positioned with the outer extremity of the base plate at a minimum of 10" from the edge of the concrete slab. Some local regulations allow the posts to be positioned at other distances from the edge. Please refer to your local regulations for more details.

Anchors longer than those specified must be authorized for use in the slab thickness in question as outlined by the anchor manufacturer.

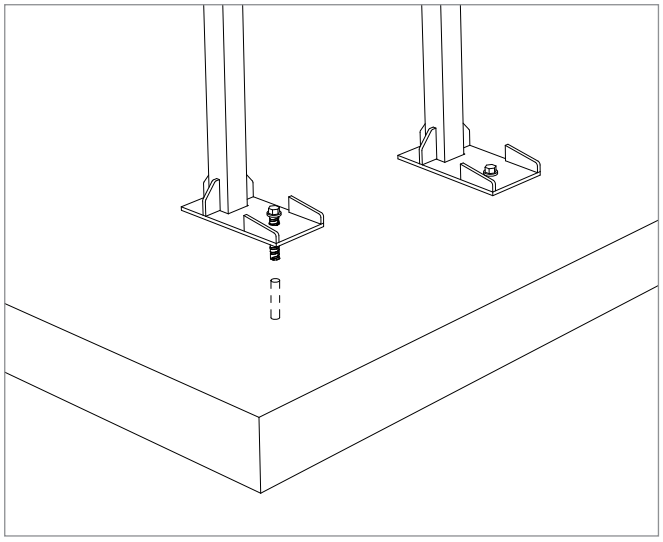
Anchors provide documented strength for single-use only, unless otherwise specified. Anchors must not be reused unless explicitly permitted by the manufacturer.

step by step

1. Plan layout of guardrail posts. For ease of installation, snap a chalk line across the back of the first installed post parallel to the slab edge, and install the subsequent posts square to this line.

2. Scan the slab surface to avoid steel reinforcement. Following manufacturer's directions, drill required holes in the concrete. Remove dust and debris from drilled holes using hand pump, compressed air or vacuum.

3. Install anchor. Anchor must be installed with a powered impact wrench or torque wrench.



anchorage details

Approved single coil inserts include:
- Dayton Superior T6A Brace Anchor

The use of other coil inserts must be approved by Highland Safety Systems.

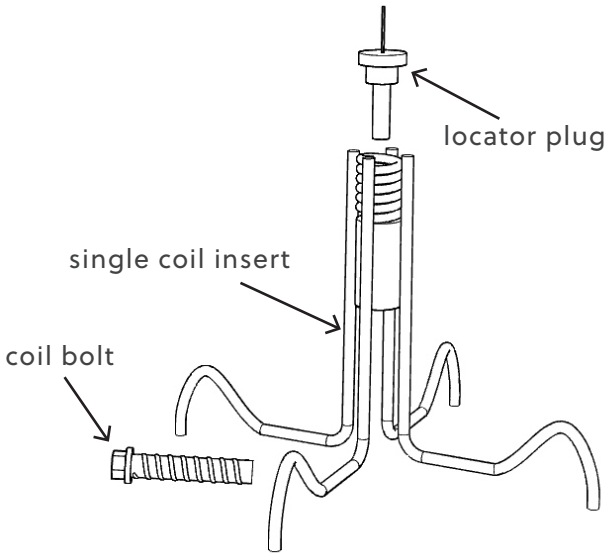
All Dayton Superior directions and specifications regarding use of the T6A Brace Anchor must be followed. These specifications are available from the manufacturer's website or from Highland Safety Systems upon request.

The capacity of the single coil insert has been engineered in accordance with the requirements of ACI 318.

The specifications outlined in this section require the posts to be positioned with the outer extremity of the base plate at a minimum of 15" from the edge of the concrete slab. Some local regulations allow the posts to be positioned at other distances from the edge. Please refer to your local regulations for more details.

Coil bolts provide documented strength for single-use only, unless otherwise specified. Coil bolts must not be reused unless explicitly permitted by the manufacturer and bolt condition has been properly evaluated.

SINGLE coil insert components



step by step

1. Plan layout of guardrail posts. For ease of installation, snap a chalk line across the back of the first installed post parallel to the slab edge, and install the subsequent posts square to this line.

2. Choose the size of your cast in anchor (coil insert) based on your slab depth – once installed, the top of the plug should be level with the eventual surface of the concrete

3. Properly secure the cast-in coil insert legs to the formwork, ensuring that they remain upright and vertical. Make sure the locator plug is installed.

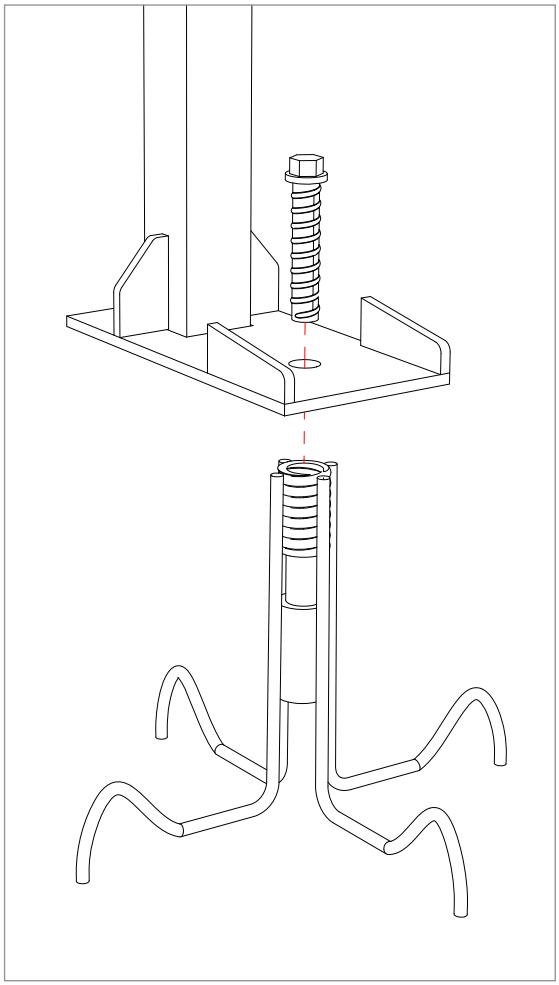
4. Pour the concrete, ensuring that the cast-in coil inserts remain vertical and upright.

5. Once the concrete has cured, locate the cast-in anchors using the protruding plastic stub on the plastic plugs. Remove the plugs.

6. Secure the PERIMETER20 post to the concrete by inserting a coil bolt through the hole in the post base plate and threading it securely into the embedded anchor.

7. Repeat steps 5 and 6 with subsequent posts, spacing them at a maximum of 8' on center.

8. Hang the PERIMETER20 panels.



panel installation notes

The panels are inserted into the channel in the post.
SEE DIAGRAM 1

Because the panels overlap each other at the post (SEE DIAGRAM 2), they must be staggered to the front and back of the channel. Every other panel must be installed in the run before the panels in between them can be installed. That is, install panels 1, 3, 5, 7, 9 etc. of the run before installing panels 2, 4, 6, 8, 10. As the diagram shows, panels 2 and 4 must be installed before panel 3 is installed.
SEE DIAGRAM 3

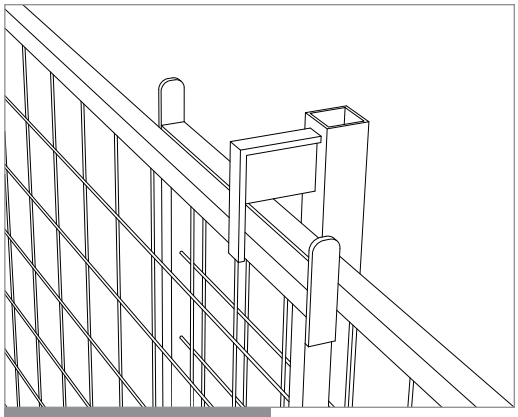


DIAGRAM 2

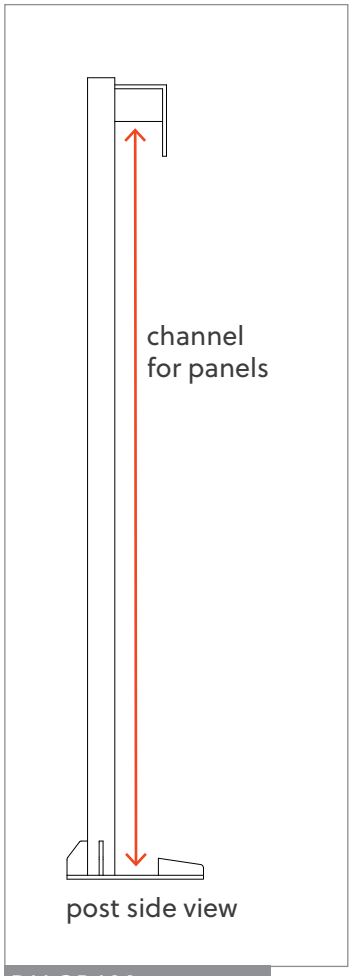
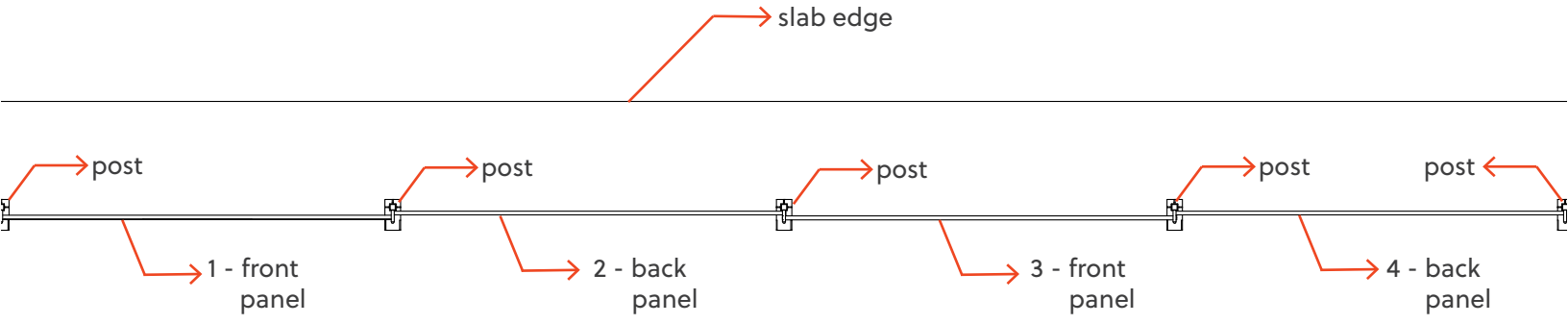


DIAGRAM 1

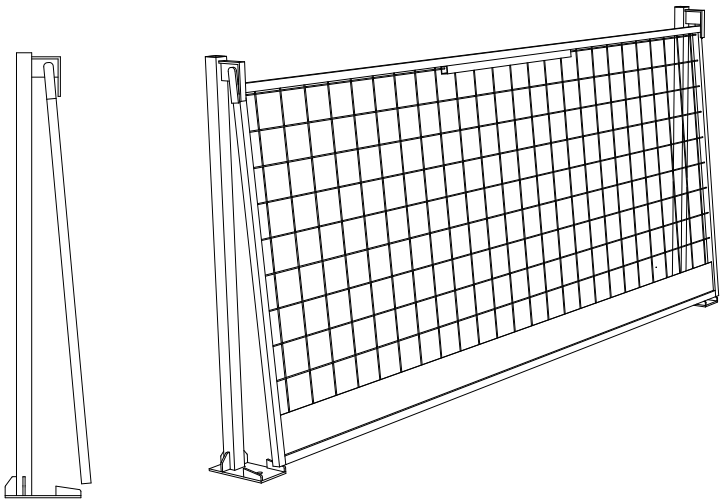
DIAGRAM 3



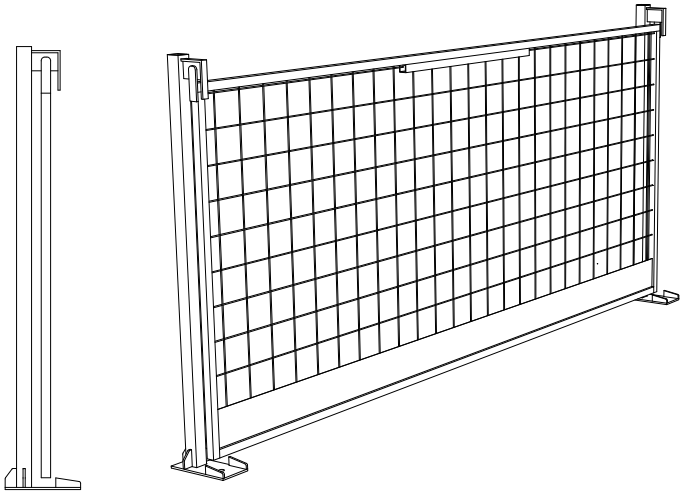
INSTALLATION: panel insertion

step by step

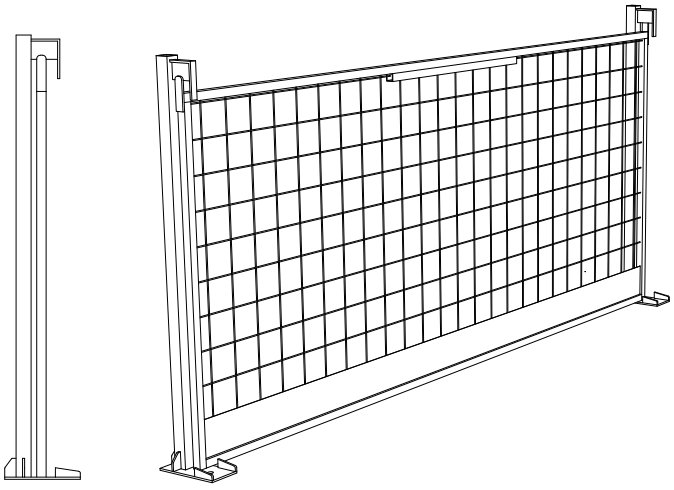
1. Angle the top of the panel away from you and insert the top rail of the panel into the top channels in the posts.



2. Swing the bottom of the panel inwards.



3. Lower the panel into the bottom post channels.



the crate

PERIMETER20 panels and post have engineered crates to allow for easy storage and transport of the PERIMETER20 system.

Panels and post must be strapped in according to the directions on page 14 before moving the crates.

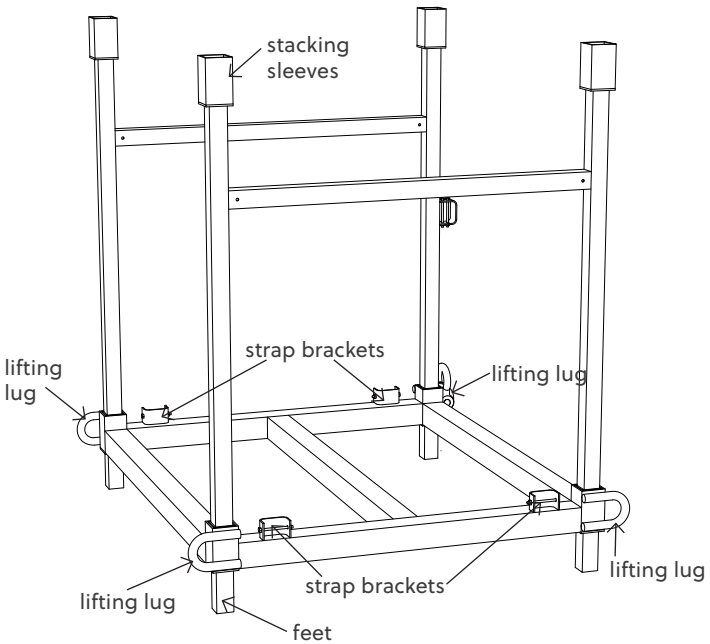
Crates can be moved using either a fork lift/pallet jack or the lifting lugs.

Lifting lugs shall be inspected by a qualified Professional Engineer. Inspection intervals depends on usage and storage location of units. Conduct inspections at a minimum twice a year. Log all inspections and keep records of examinations, repairs and inspections. Actual inspection requirements such a NDT (Non-Destructive Testing: magnetic particle and liquid penetrant) are up to the Professional Engineer's discretion.

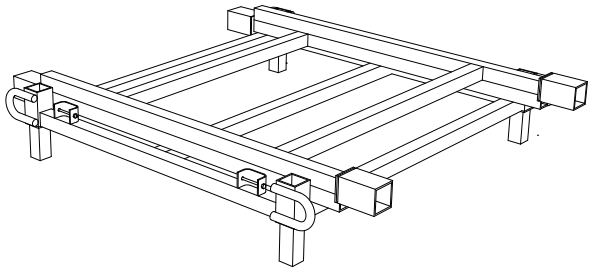
Altered or repaired lugs shall be inspected by a qualified Professional Engineer.

Repairs must follow established standards.

the crate components

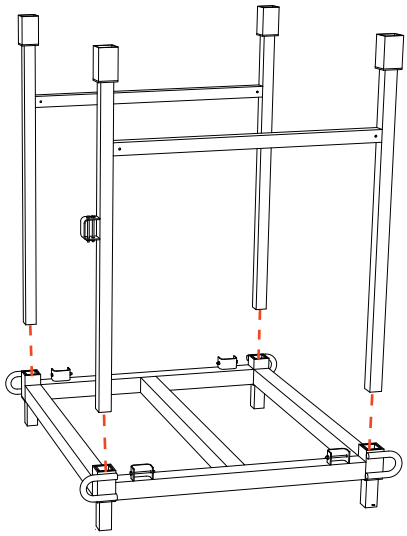


the crate collapsed for storage



assembling the crate

PERIMETER20 crates are collapsible for easy storage. To assemble, insert the vertical posts into the base with the top horizontal bar parallel to the lifting lugs.



storing full crates

PERIMETER20 crates may be stacked to save on storage space. A maximum of 2 crates may be stacked. Double stacked crates must be stored on level ground.

The feet on the top crate fits into the stacking sleeves on the bottom crate.

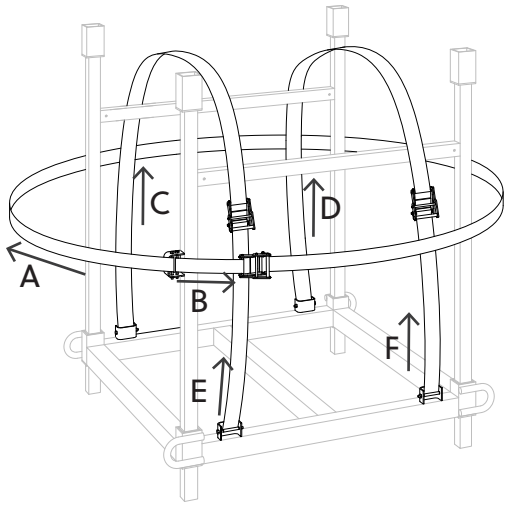
Crates must be placed on a solid surface prevent the feet from sinking into the ground.

Do not stack crates under heavy wind loads. Do not stack crates on floors above the ground floor

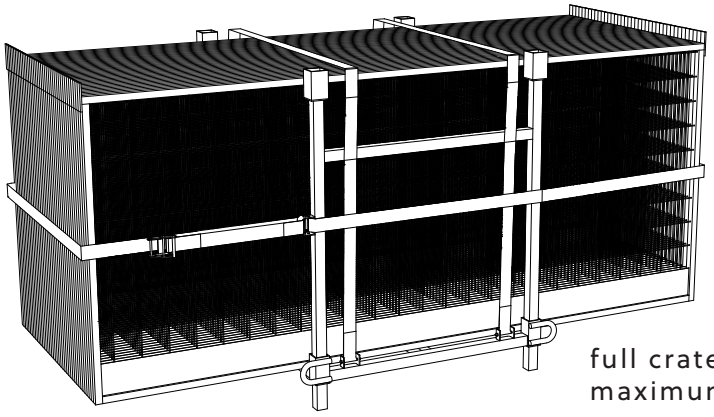
strapping in the posts and panels

Prior to moving a crate that contains posts or panels, they must be strapped into place.

The long horizontal strap (A) coming from the post strap bracket must go around the posts or panels horizontally and be attached to the horizontal ratchet strap (B) going the other way. The ratchet must be firmly tightened. Tuck any excess strap length behind the tightened strap.



The vertical straps coming from the crate base must be attached and firmly tightened. Pass the long straps (C and D) over the panels or posts and attach to the ratchet straps (E and F) on the other side. The ratchets must be firmly tightened. Tuck any excess strap length behind the tightened strap.



full crate of panels
maximum capacity 35

lifting the crate

Lifting a crate containing posts is not recommended without the posts being securely contained with the crate to prevent them from sliding out the side.

The contents of the crate must be centered with the crate before lifting.

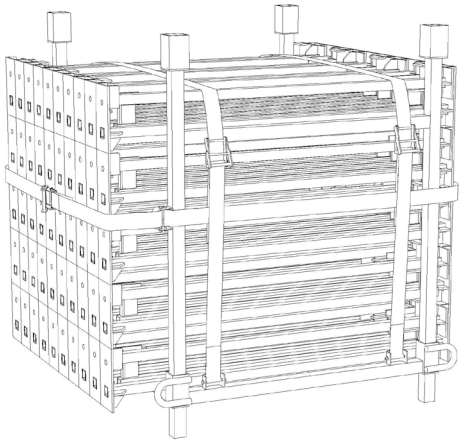
When using the lifting lugs, all four lugs must be used.

When using the lifting lugs, local rigging and hoisting specifications and regulations must be followed.

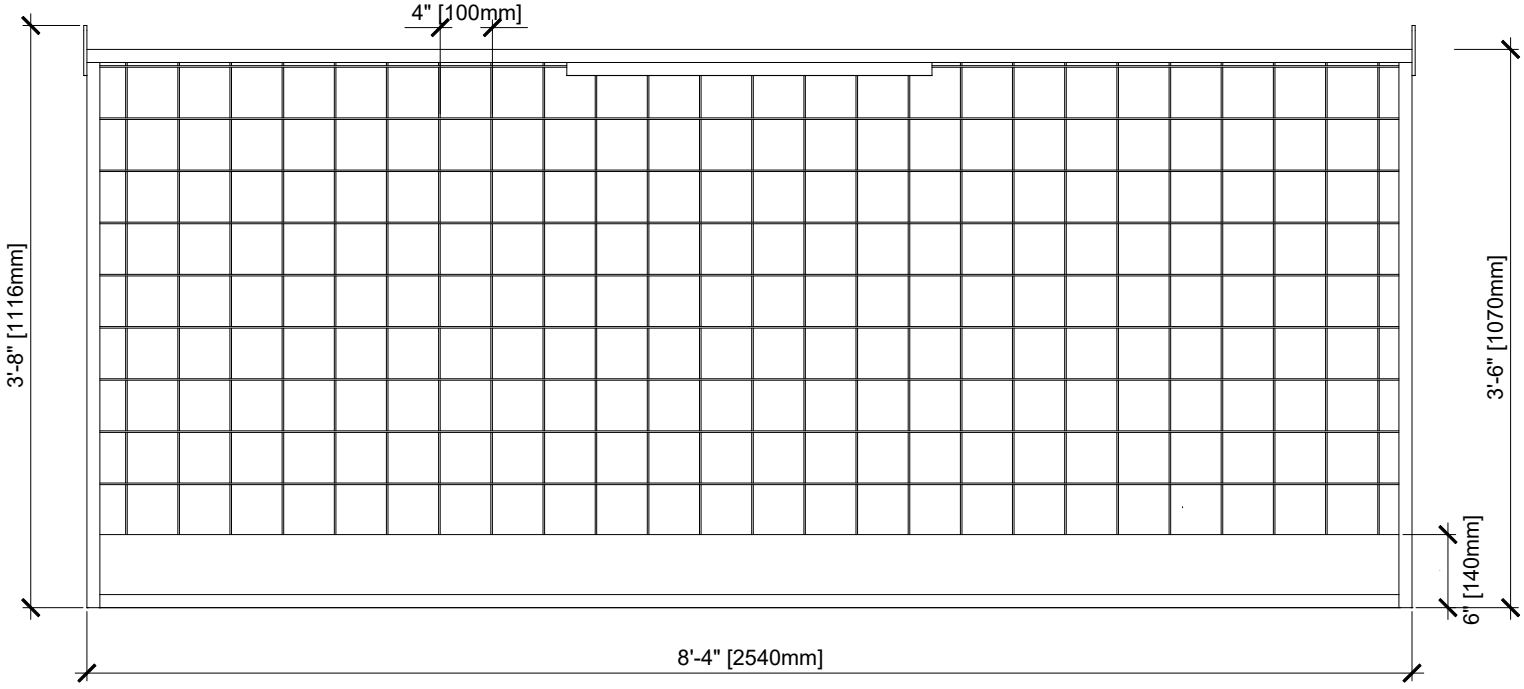
Lifting lugs shall be inspected before every lift. Lugs shall not be used if they show evidence of: cracks, distortion, bends, fissures, deformations, excessive wear, etc.

Straps and ratchets must be inspected before every lift. Straps that show wear cannot be used and must be replaced before commencing lifting. Log all inspections.

Make sure slings are properly installed so the angle of action does not exceed 45 degrees against the vertical.

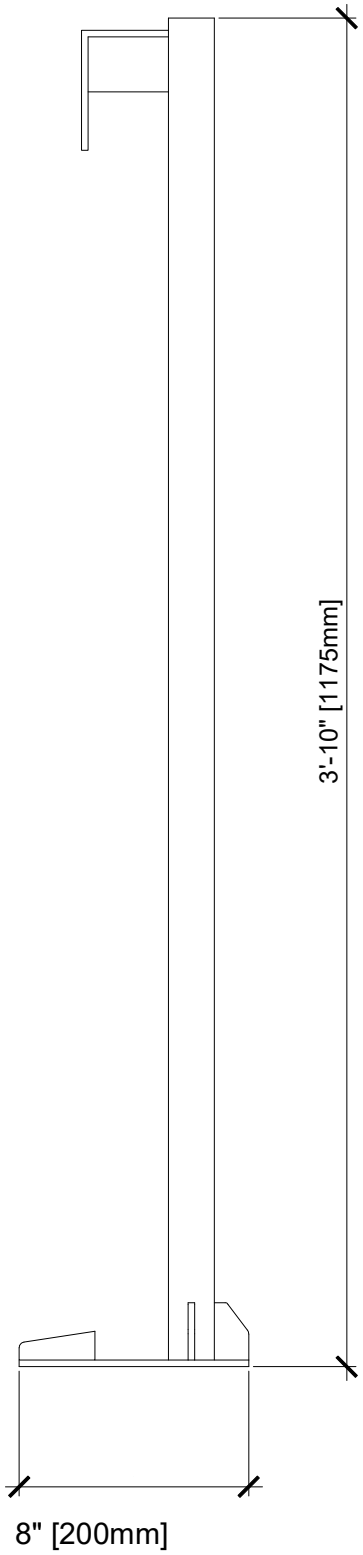


full crates of posts
maximum capacity 125

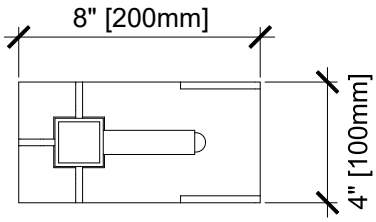


weight : 31 lbs (14 kg)

ELEVATION VIEW:

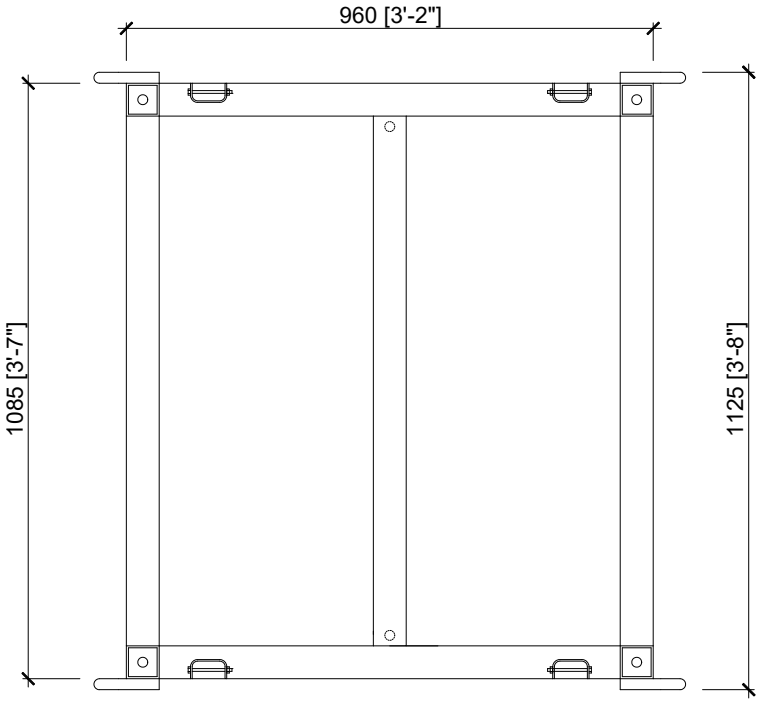


PLAN VIEW:

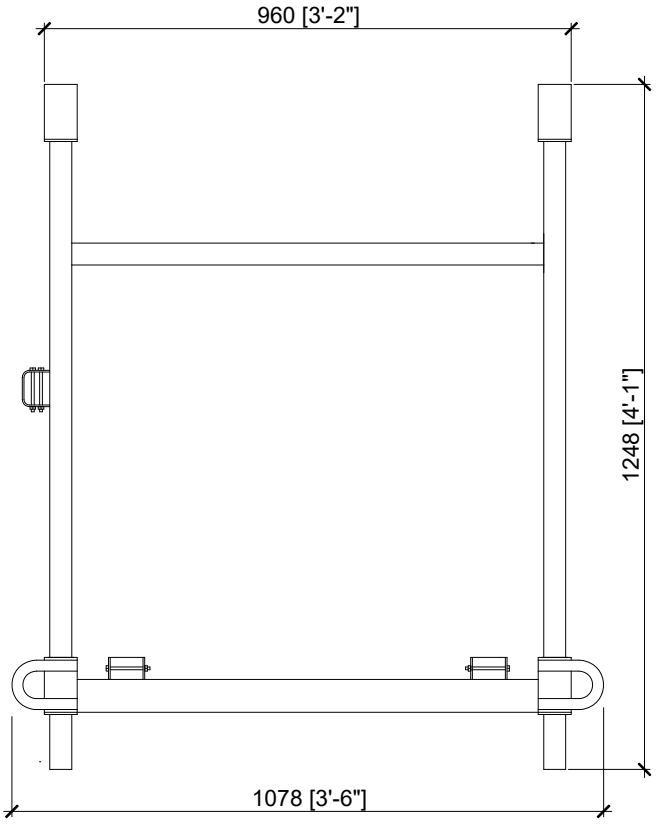


weight : 12 lbs (5.5 kg)

PLAN VIEW:



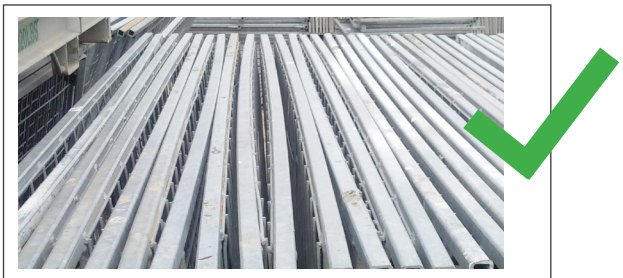
ELEVATION VIEW:



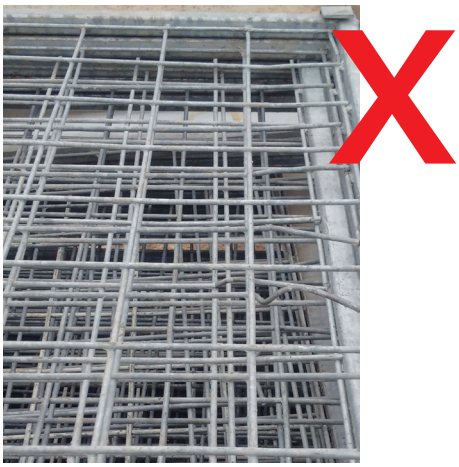
weight : 69 lbs (31.5 kg)

inspection information

- a separate inspection form must be filled out for each continuous run of fencing
- use the grid on page 22 to sketch the layout of the system
- each run of fencing requires an inspection form for the posts and panels and any attachment accessory being used
- inspections must be carried out immediately prior to installation as well as a minimum of once per year while in use
- for attachment accessories that are installed pre-pour, inspection must be carried out before and after the pour
- each item must meet all of the inspection points in order to pass inspection
- for all other items
  - damage to structural members will result in inspection failure and item must be disposed
  - damage to fence panel mesh must be analyzed on a case by case basis to determine repairability
- items that fail inspection must have a repair/ dispose form filled out
- use the inspection diagrams on pages 19-21 to indicate location of failure



Maximum smooth deflection: ½" horizontal - panel acceptable



Maximum number of continuously broken mesh: 2

Not adequate - dispose of panel

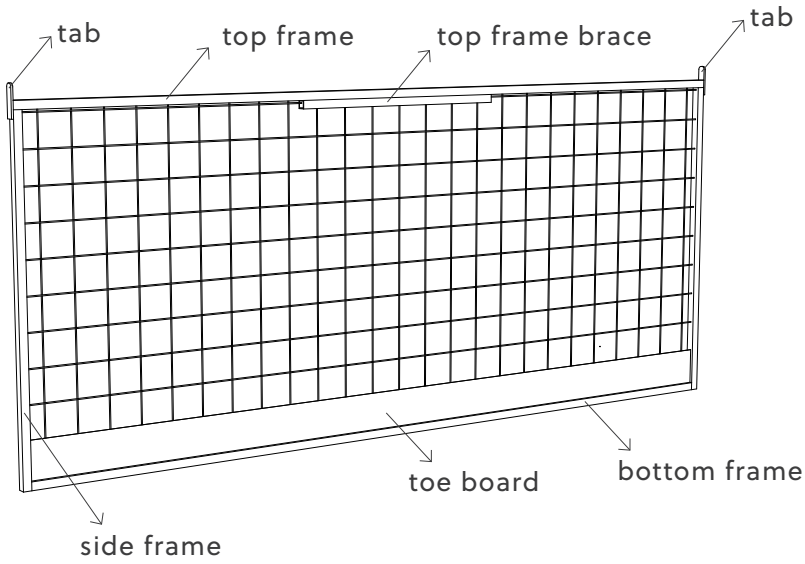
Not adequate - dispose of panel

INSPECTION: panel traceability inspection form

DATE OF PURCHASE _____

LOCATION OF RUN _____

DATE	QUANTITY INSPECTED	QUANTITY PASSED	APPROVED BY



REQUIRED INSPECTION POINTS:

SYSTEM:
- length of slab edge fully protected
- guardrail correct distance from edge

COMPONENT
- no damage to steel
  - hairline cracks
  - section member loss due to rust
  - broken pieces
  - bent pieces
  - missing pieces
  - cracked welds
- nothing attached to system without approval

INSPECTION INSTRUCTIONS:

Inspect the panel thoroughly, including but not limited to:

top frame
top frame brace
side frames
bottom frame
toe board
tabs

Panel must be taken out of commission if any of the following events happen:

1. Any abnormality/damage to the above components, including but not limited to the tabs and the vertical, horizontal or side frames.
   Maximum panel deflection*:
   vertical: ⅛"
   horizontal: ½"
   *Bowing deflection. No sharp angles on maximum curvature.
2. Broken mesh: maximum allowable - 2 adjacent welds. Maximum distance between broken mesh to be assessed by and engineer.

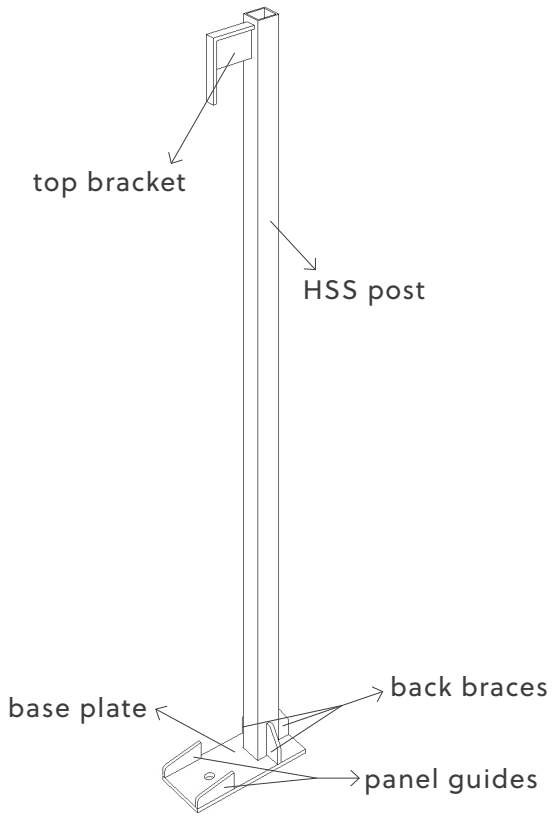
THERE IS ZERO TOLERANCE

INSPECTION: post traceability inspection form

DATE OF PURCHASE _____

LOCATION OF RUN _____

DATE	QUANTITY INSPECTED	QUANTITY PASSED	APPROVED BY



REQUIRED INSPECTION POINTS:

SYSTEM:
- length of slab edge fully protected
- guardrail correct distance from edge
- nothing attached to system without approval

COMPONENT
- no damage to steel
  - hairline cracks
  - section member loss due to rust
  - broken pieces
  - bent pieces
  - missing pieces
  - cracked welds
- post base flush with concrete surface
- concrete anchor attachment:
  - correct concrete cure strength
  - anchors flush with post plate surface
  - approved brand of anchors

INSPECTION INSTRUCTIONS:

Inspect the post thoroughly, including but not limited to:

HSS post
top bracket
base plate
back braces
panel guides

Post must be taken out of commission if any of the following events happen:
1. Any abnormality/damage to the above components.
2. Deflection of greater than ⅛" on post

THERE IS ZERO TOLERANCE.

REPAIR/DISPOSE FORM

A SEPARATE REPAIR/DISCARD FORM MUST BE FILLED OUT FOR EACH ITEM THAT DOES NOT PASS INSPECTION

USE THE DIAGRAMS ON PAGES 19-20 TO INDICATE LOCATION OF DAMAGE

DATE _____

ITEM DESCRIPTION _____

_____

REASON FOR INSPECTION FAILURE - LIST ALL REASONS

_____

_____

_____

_____

ITEM TO BE: ☐ REPAIRED

☐ REMOVED AND DISPOSED

DESCRIPTION OF REPAIR WORK

_____

_____

_____

_____

APPROVED FOR REUSE BY _____

NOTES

safe productivity at the leading edge

HIGHLAND safety systems

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