KNIGHT GLOBAL

Cantilevered Floor Mounted Overhead Structure

Operation, Installation, and Maintenance Manual

For Models: CFMRS1000

ORIGINAL INSTRUCTIONS

THIS MANUAL CONTAINS IMPORTANT INFORMATION REGARDING, SAFETY, INSTALLATION, MAINTENANCE, AND OPERATION OF KNIGHT GLOBAL FLOOR MOUNTED STRUCTURE AND SHOULD BE AVAILABLE TO ALL PERSONNEL RESPONSIBLE FOR USING AND INSTALLING STRUCTURE.

REV: KCFS20180316

This manual provides important information for all personnel involved in the installation, operation and maintenance of Knight Global Aluminum Floor Mounted Rail Structure. All personnel must read this document before operating equipment.

Every effort has been made to provide complete and accurate product information in this manual. However, due to product improvements and changes, discrepancies and omissions may be present. Visit our website at www.knightglobal.com for updated information on all our products.

It is the responsibility of the end user to exercise common sense and judgment when performing the tasks described in this manual. If any procedure seems inaccurate, incomplete or unsafe please put the equipment in a safe condition and contact Knight Global service department for assistance.

Throughout this manual there are steps and procedures that if not performed correctly can result in personal injury or equipment damage. The following signals and words are used to identify the level of potential hazard.

⚠ WARNING

Indicates a hazard which will cause severe injury, death or substantial equipment damage.

⚠ CAUTION

Indicates a hazard which can or will cause injury or equipment damage.

⚠ NOTE

Notifies personnel of assembly, installation, operation or maintenance information which is important but not hazard related.

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1. SAFETY

⚠ CAUTION

Prior to placing this unit into service owners and user are advised to examine specific local and/or other regulations, including ANSI and OSHA regulations that may apply to the use of this product..

Knight Global recognizes that most companies have a safety program in place at their facility. The Safety Section, Notes, Cautions and Warnings in this manual are intended to supplement and not supersede any existing plant or company safety guidelines or regulations.

Knight Global cannot be aware of or provide for all the procedures by which the rail operations or repairs may be conducted and the hazards which may result from each method. If operation or maintenance not specifically recommended by Knight Global is conducted, it must be ensured that product or personnel safety is not endangered by these actions. Personnel should place the rail products in a safe condition and contact a supervisor and/or Knight Global service department for technical support if they are not sure of an operation, maintenance procedure, or step.

Lifting and handling equipment is subject to different regulations in each country. These regulations may or may not be specified in this manual. Check local regulations for specific information.

The National Safety Council, Accident Prevention Manual for Industrial Operations and other recognized safety sources make a common point: Employees who work near suspended loads or assist in hooking on or arranging a load should be instructed to keep out from under the load. From a safety standpoint, one factor is paramount: conduct all lifting operations in such a manner that if there were an equipment failure, no one would be injured. Keep out from under a raised load and keep out of the line of force of any load.

The Occupational Safety and Health Act (OSHA) generally passes the burden of compliance with the owner/employer, not the manufacturer. Many OSHA requirements are not concerned or connected with the manufactured product but are associated with the final installation. It is the owners and users responsibility to determine the suitability of a product for any particular use. It is recommended that all applicable industry, trade association, federal, state, and local regulations be checked. Please read all instructions, notes, cautions and warnings before operation.

Rigging: It is the responsibility of the operator to exercise caution, use common sense and be familiar with proper rigging techniques. Refer to ASME B309 for rigging information, American National Standards Institute, 1430 Broadway, New York, NY 10018.

This manual has been written to provide personnel with information required to install, operate, maintain, repair and decommission Knight Global cantilevered floor mounted rail structure.

It is extremely important that installers and operators be familiar with servicing procedures of these products and are physically capable of conducting procedures. These personnel should have a general working knowledge that includes the following:

- Proper and safe use and application of mechanics common hand tools as well as recommended tools.
- Safety procedures, precautions and work habits established by accepted industry standards

SAFETY (CONTINUED)

Knight Global cannot know or provide all of the procedures in which product operations or repairs might be conducted and the hazards/results of each method. If operation or maintenance procedures not specifically recommended by the manufacturer are performed, it must be ensured that product safety is not endangered. If unsure of any operation or maintenance procedure, personnel should place the product in a safe condition and contact supervisors and/or the Knight Global service department for assistance.

At least two people are required for the installation or maintenance of a floor mounted structure and rail system. Many parts are too large and heavy for one person to handle.

All ladders and scaffolding used by the installer must be reliable and capable of supporting the weight of the installer and equipment.

All hoists, handling devices, brackets, hooks, etc. need to be included in the total weight of the suspended load. The suspended load cannot exceed the rated capacity shown on the rail.

A separate lifting device may be needed during installation for runways exceeding 96 in (2438 mm) in length. Attach a safety cable from load to lifting device in case of accidental release from lifting device. Follow all safety precautions when working with overhead rail systems.

To avoid unsafe operating practices which could lead to injury or property damage follow all operating instructions and warnings.

A majority of companies who use enclosed track aluminum rail systems have a safety program implemented. If there is a conflict between guidelines in the manual and similar individual company rules, the more stringent of the two should take precedence.

Load capacities are marked on floor post(s) and should not be exceeded. Extensive testing has been conducted to establish capacity ratings.

The following list provides the operator with potentially dangerous situations to avoid:

- Only personnel trained in safe operation and maintenance of this system should be allowed to operate and maintain the system.
- Visually inspect the floor mounted structure and rail system before each shift; never use a rail system that appears to be damaged.
- The suspended load cannot exceed the rated capacity shown on the structure and/or the rail.
- When a load is on the rail system, be alert to the load at all times.
- Make sure the load path is clear of all personnel.
- Do not use this system for supporting, lifting, or transporting people unless specifically designed for transporting people (e.g. Knight Ergo Seat).
- Do not swing a suspended load.
- Never leave a load unattended.
- Never cut or weld a suspended load.
- If binding, jamming or overloading occurs do not operate system.
- Any collision or bumping of suspended components should be avoided.

2. INTRODUCTION

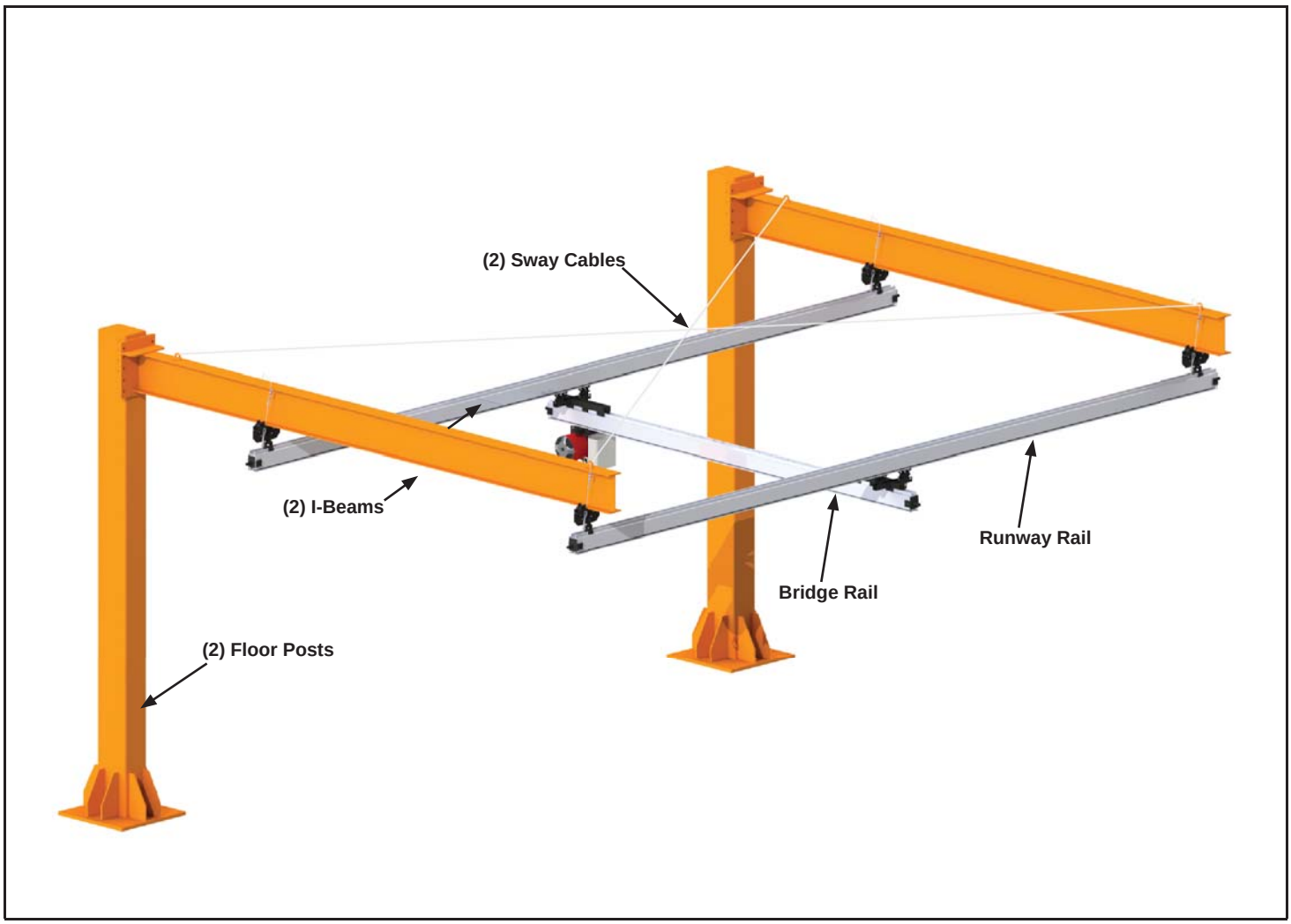


Figure 2-1

Knight Global's Cantilevered Rail Systems are designed to eliminate the need for a four post floor structure system. It provides an alternative to workstations with minimal floor space.

⚠ NOTE

The installation instructions that follow are for a 2 post floor system. Additional posts may be required depending on the application. Please contact your Knight Representative or the Knight Customer Service Department at (248) 377-4950, Extension 162 for further information.

General Tool List

	Metric and Imperial Hex Head Set	Metric and Imperial Impact Socket Set
	Bubble Level	Lift Truck
	Metric and Imperial Combination Wrench Set	Heavy Polyurethane Mallet
	Hammer Drill	Ladder, Scaffolding, or Man Lift
	Drill Bits	Tape Measure
	Impact Wrench	Safety Wire Pliers
	Metric and Imperial Drive Socket Set	Epoxy Kit
	Hole Cleaner Kit	Vacuum
	System Layout Prints	HIT-Z 3/4" x 9 3/4" Rod Diameter (in): 3/4" Hole Size (in): 7/8" - (16) anchors per plate
	HIT-HY 200 Adhesive Anchoring System - (8) anchors per plate	Hilti Anchor Installation Instructions (Included with anchor sets)

Fasteners

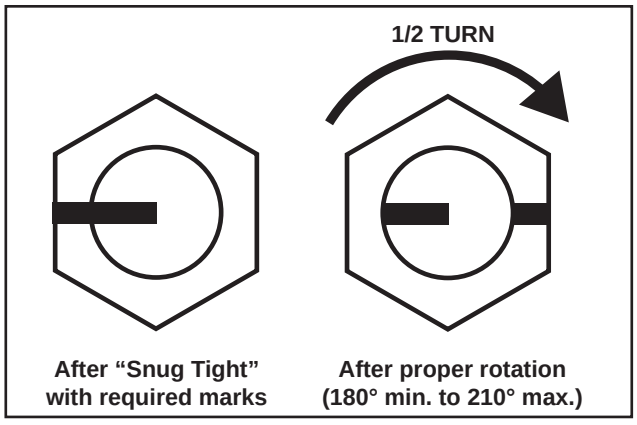
All fasteners must meet ASTM A490 Type 1 Structural Bolt Requirements

DO NOT over-tighten fasteners, this may cause either bolt fracture or stripping of the bolt or nut threads.

Recommended Bolt Torques for Floor Structures

Bolts to be tightened using the Turn-of-Nut Pretensioning Method:

- Snug tighten all fasteners to bring assembly into "firm contact".
- Match mark the nut and bolt end with a single straight line.
- Using an appropriate alternating tightening pattern, apply a 1/2 turn to all fasteners.



Final Tightening of Anchor Bolts

Refer to manufacturer's or engineer's prescribed torque values of anchor bolts.

3. INSTALLATION

Review all supplied installation and layout drawings prior to installation.

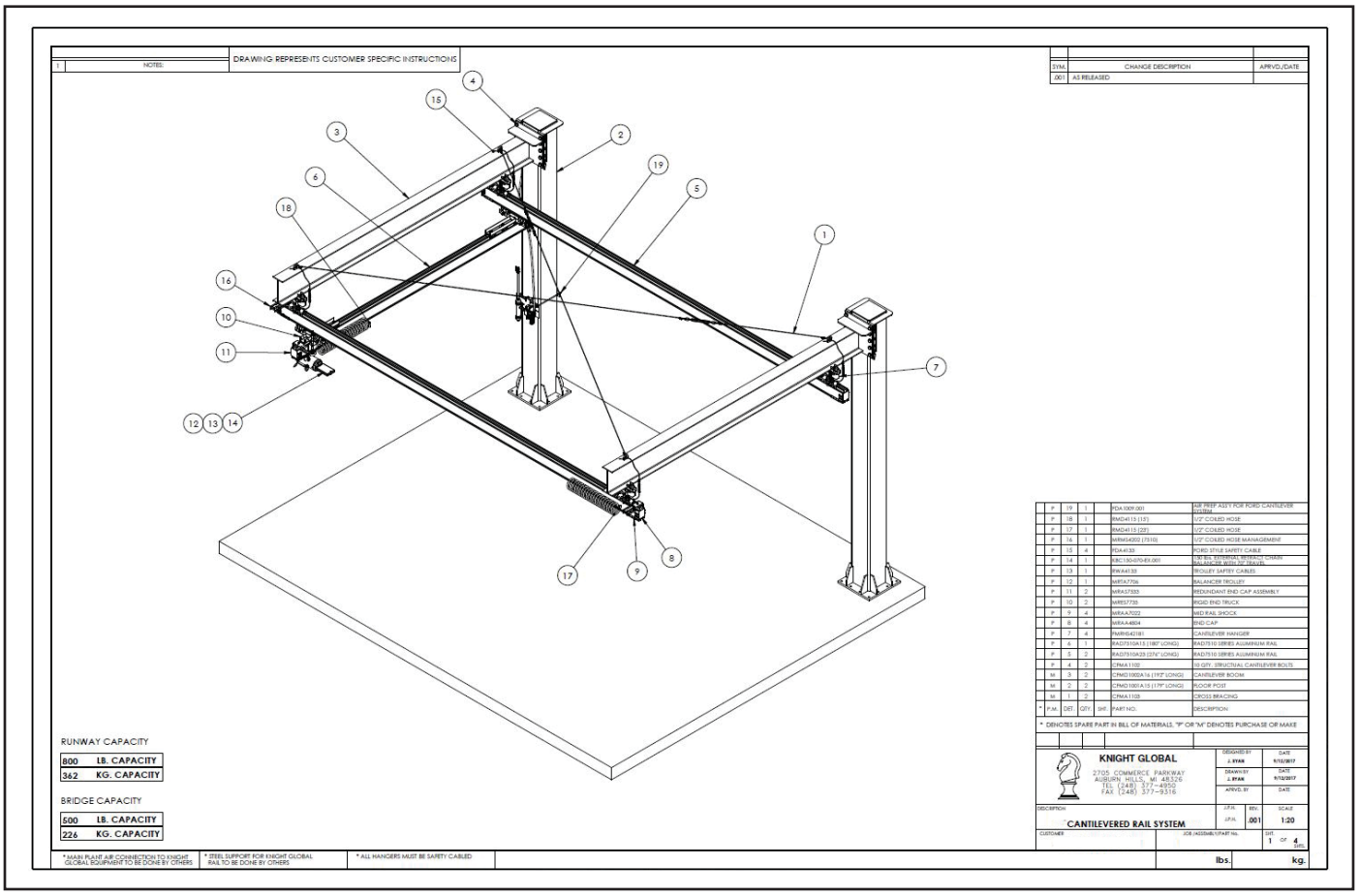
3.1 Uncrating

This is a general sequence of instructions. Refer to specific hanger component sections for detailed instructions.

Step 1. Place floor posts, runway rails, bridge rails, cross beams, and mounting hardware in general area to be installed via fork truck.

Step 2. Cut shipping bands and remove bands and packaging material.

Step 3. Review supplied prints for installation and layout information.



Installation Layout Example

3.2 Anchoring The Floor Posts

Foundation requirements for anchoring floor structures are based on data such as soil pressure, structural concrete floor slab thickness, 28-day compressive strength, post base plate location relative to existing floor cracks or pre-formed joints, etc. ***should be determined by a registered professional engineer.*** This is required to ensure local building codes and laws, possible seismic loading considerations and variance in concrete and soil conditions are addressed.

Minimum Concrete Recommendations for Cantilevered Floor Post Installation

- HILTI #HIT-HY 200-A: Chemical Floor Anchor (Adhesive Anchoring System)
- Anchor Rods: HIT-Z: Ø ¾”x 9 ¾” LG.
- Embedded Depth of Anchors in Concrete Must be 6 ½” – 6 ¾” (Depth of Holes Must Not Exceed 6 ¾”)
- Minimum 8” Concrete Thickness
- Minimum 3000 PSI Concrete
- Follow HILTI Anchor Installation Guide Provided With Each Set Of Anchors
- Capacity Is Based On Installation Of Anchors In Un-Cracked And Joint Free Concrete.
- Check With Plant Facilities Engineers For Concrete Conformance
- For Areas With Seismic Zone Requirements, Other Analysis May Be Required.

⚠ NOTE

Drilled Hole Cleaning is required. (Follow all Hilti Installation Guidelines).

	(16 per floor post) HIT-Z Ø ¾”x 9 ¾” LG. : 3/4” Hole Size (in): 7/8”.
	(1 per floor post) HIT-HY 200-A Adhesive Anchoring System.
	Optional Dispenser. For first time installers, it is likely that a Manual Dispenser will be needed to inject adhesive.
	Hilti installation guide(s) included with each kit or view installation guide and installation videos online at: https://www.hilti.com/anchor-fasteners/injectable-adhesive-anchors/r4803

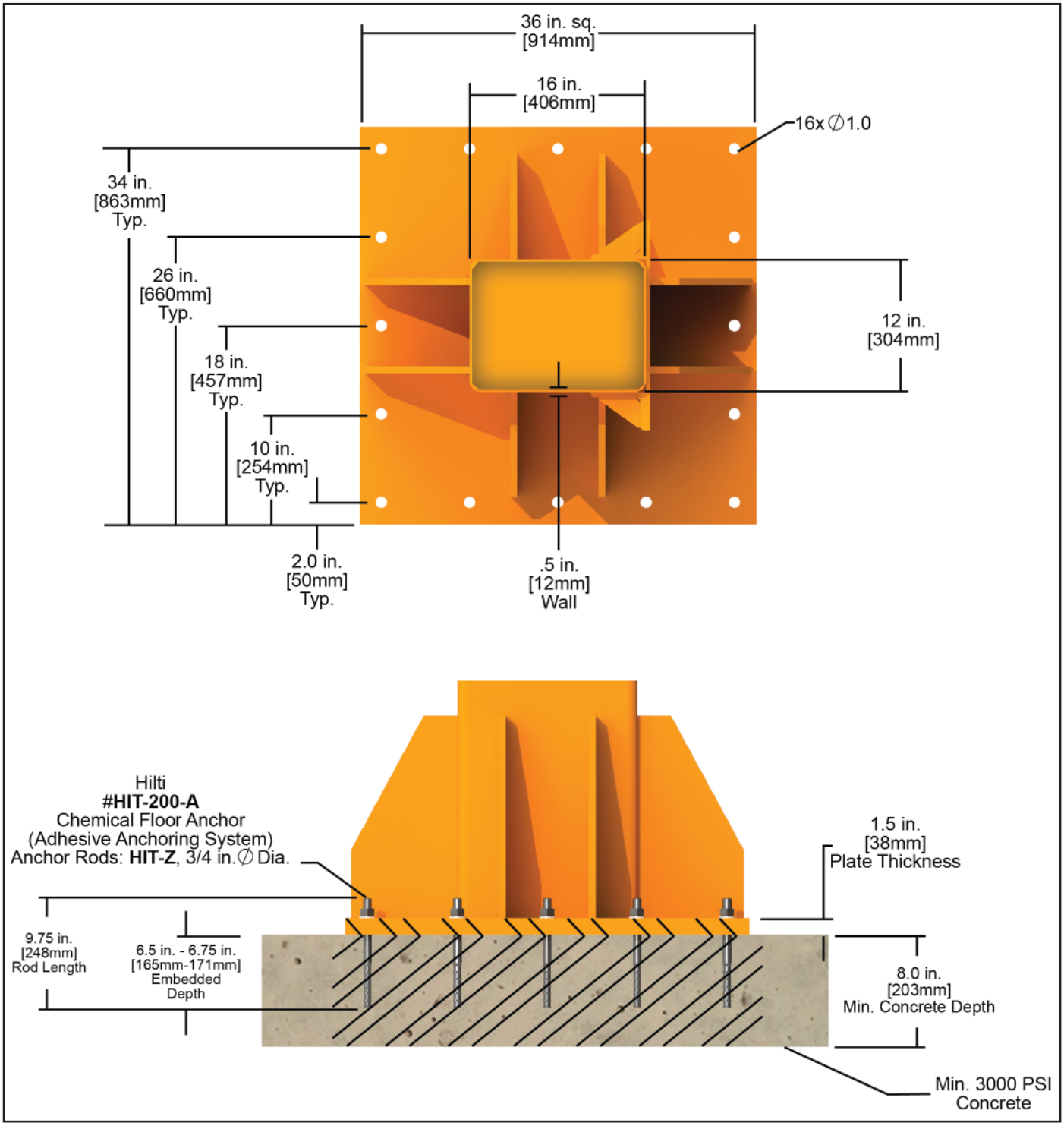

36 in. sq.
[914mm]
16 in.
[406mm]
16x ∅1.0
34 in.
[863mm]
Typ.
26 in.
[660mm]
Typ.
18 in.
[457mm]
Typ.
10 in.
[254mm]
Typ.
12 in.
[304mm]
2.0 in.
[50mm]
Typ.
.5 in.
[12mm]
Wall
Hilti
#HIT-200-A
Chemical Floor Anchor
(Adhesive Anchoring System)
Anchor Rods: HIT-Z, 3/4 in.∅ Dia.
1.5 in.
[38mm]
Plate Thickness
9.75 in.
[248mm]
Rod Length
6.5 in. - 6.75 in.
[165mm-171mm]
Embedded
Depth
8.0 in.
[203mm]
Min. Concrete Depth
Min. 3000 PSI
Concrete

Figure 3-1

3.3 INSTALLATION OF FLOOR STRUCTURE

⚠ NOTE

Install all washers and nuts on anchors to a “snug-tight” condition prior to final installation, aligning and squaring of all beams. Refer to anchor bolt manufacturer’s torque values for final tightening method.

Step 1. Locate first floor post into position per installation drawings. Level and anchor post into floor. Refer to anchoring instructions on page 3-2.

Figure 3-2

Step 2. Level and anchor remaining posts per installation drawings.

Figure 3-3

⚠ WARNING

DO NOT PROCEED UNTIL EPOXY IS CURED FOR FLOOR POSTS ANCHORS

Prior to installing Cross Beams to posts, allow for the epoxy to cure for the anchors. Refer to recommended cure time according to HILTI.

Step 3. Locate Support I-Beam and position to mounting plate of floor post. Use the I-Beam Pad Eyes to assist in lifting I-Beam. Align pre-drilled holes on Support I-Beam mounting plate with floor posts mounting plate. Insert (10) HHSB-T1 1" bolts, (20) Flat Washers, and (10) 1" Hex Nuts through the mounting plates. Level I-Beam and tighten fasteners per instructions on pg. 2-2.

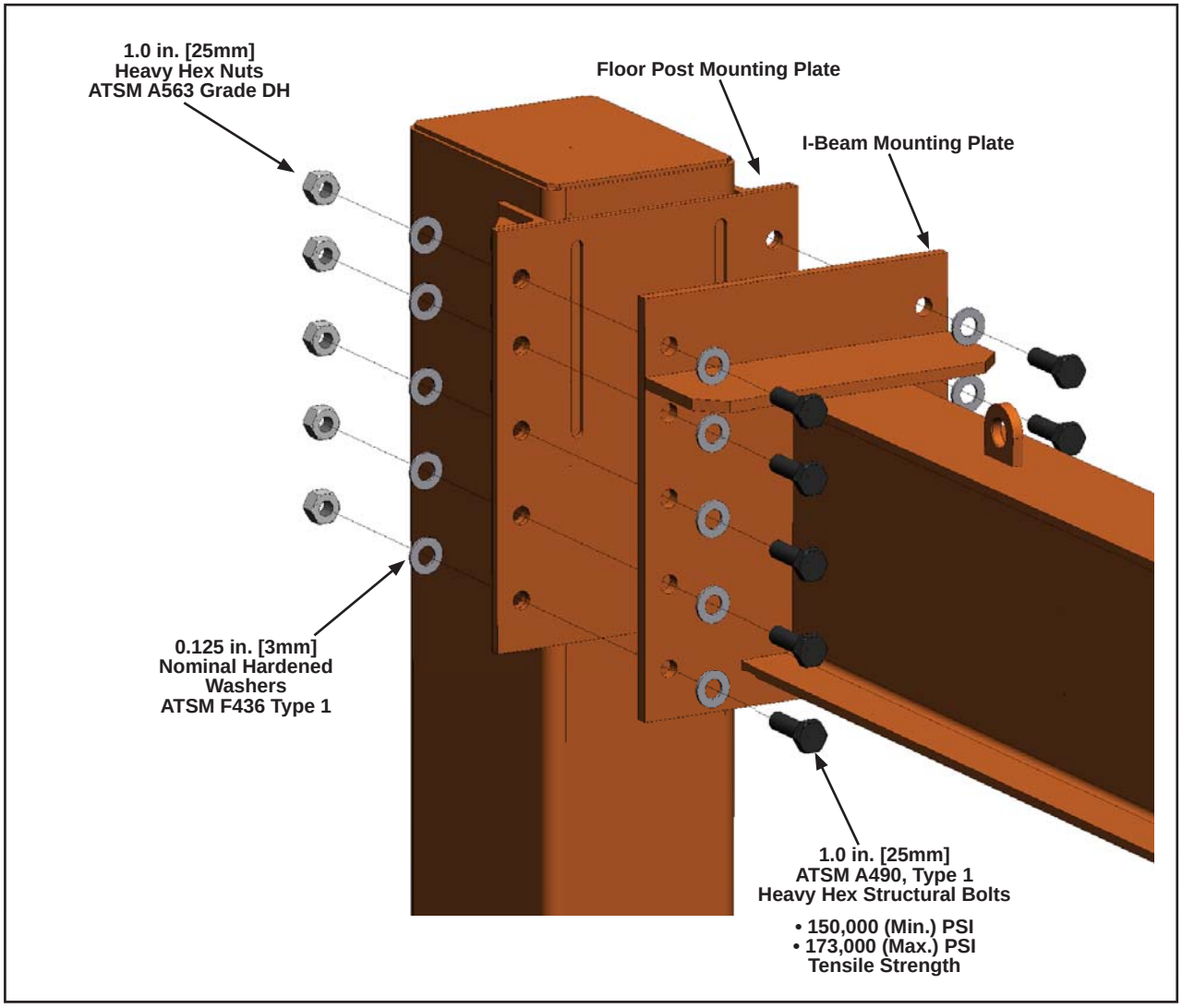


Figure 3-4

Step 4. Locate remaining Support I-Beam(s) and position to mounting plate(s) of remaining floor post(s). Align pre-drilled holes on Support I-Beam mounting plate with floor posts mounting plate. Insert (10) HHSB-T1 3.25” bolts, (20) Flat Washers, and (10) 1” Hex Nuts through the mounting plates. Level I-Beam and tighten fasteners per instructions on pg. 2-2.

Figure 3-5

Step 5. Ensure that I-Beams are parallel to each other.

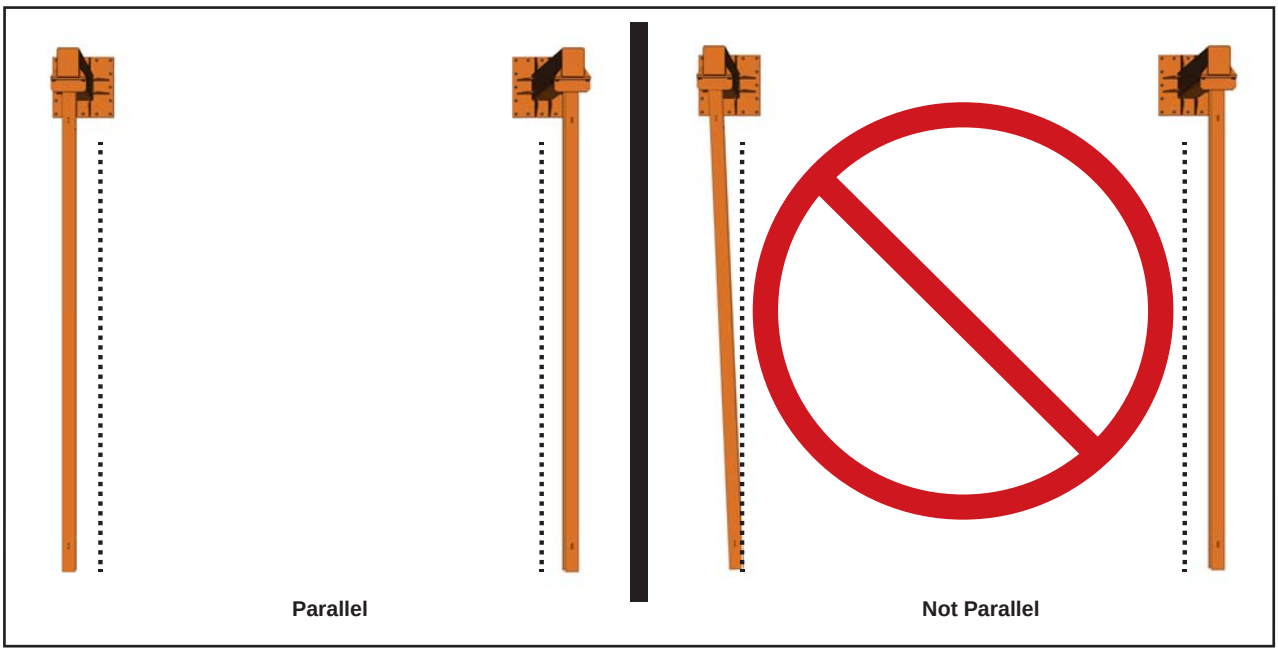


Figure 3-6

Step 6. Install rail system per installation drawings. Refer to the Knight Global Rail Installation manual for instructions on installing overhead enclosed aluminum rail systems.

Figure 3-7

Step 7. Install sway cables in an X formation. Connect each end of the sway cables to the pad eyes located on top of the I-Beams. Tighten tension between the two I-Beams by adjusting the turnbuckle to reduce sway of I-Beams. Refer to page 3-10 for recommended sway cable installation method.

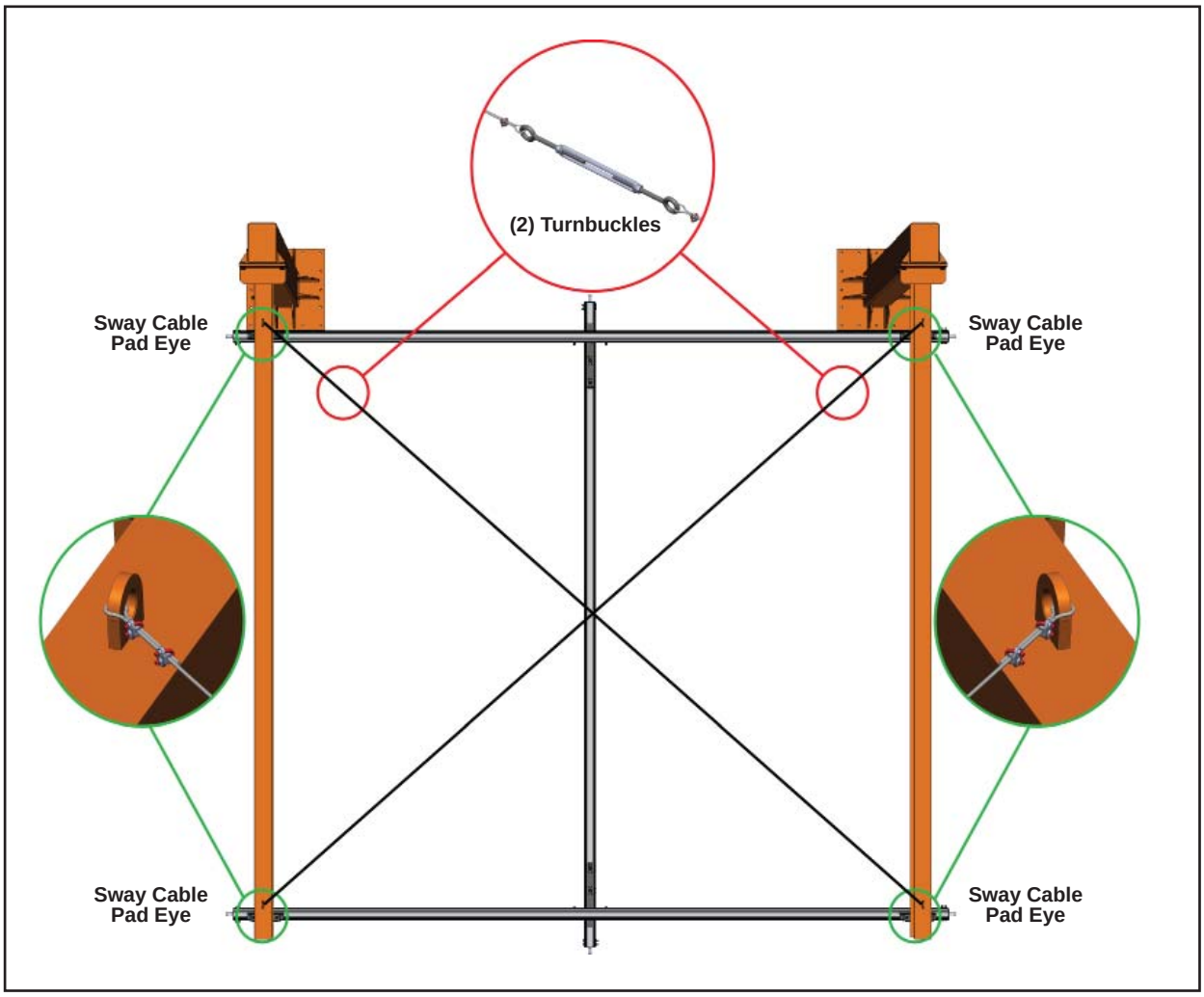


Figure 3-8

Step 8. Ensure floor system is square. Ensure that all fasteners are installed and tightened per instructions on pg. 2-2.

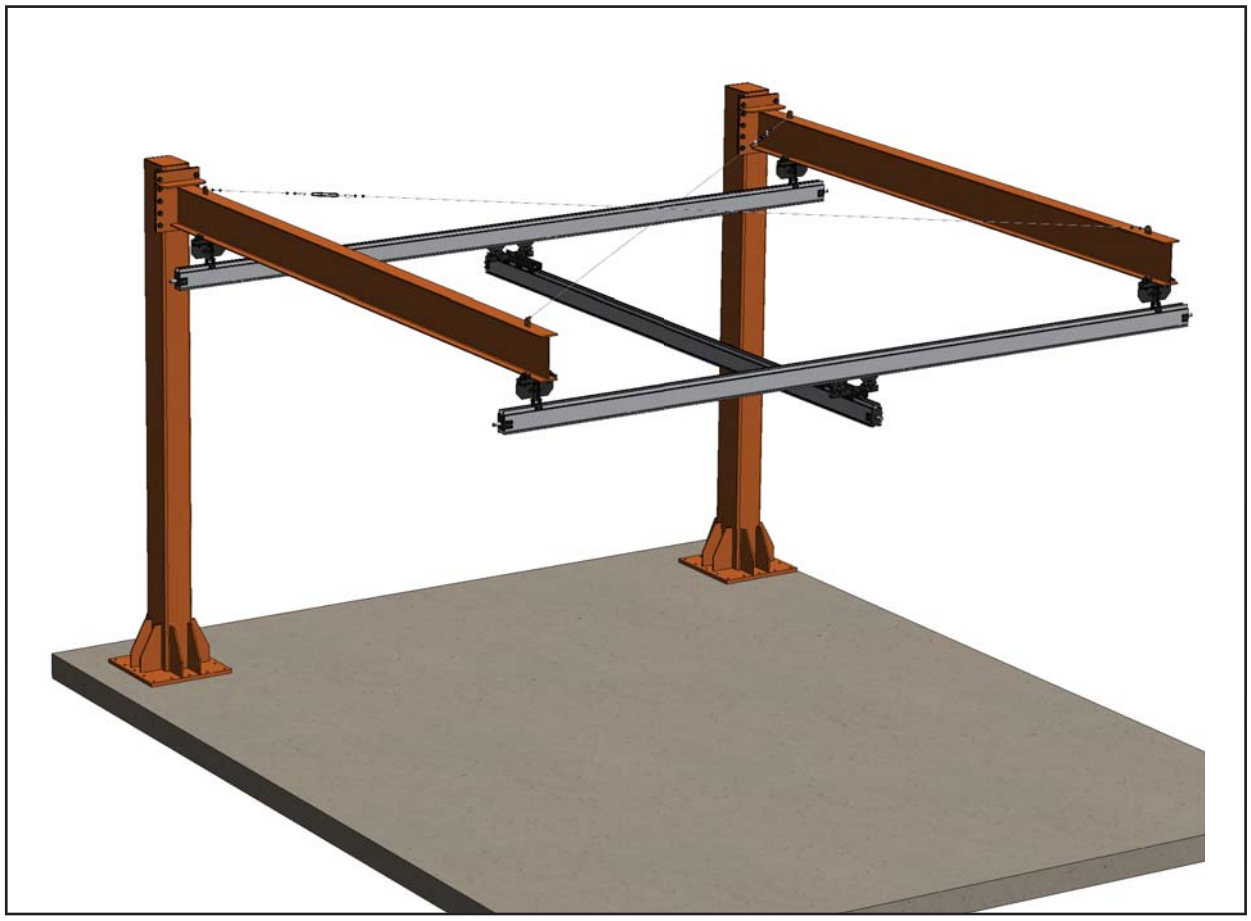


Figure 3-9

⚠ NOTE

For additional installation instructions or troubleshooting, contact the Knight Customer Service Department at (248) 377-4950, Extension 162.

3.4 Sway Cabling Installation

The required method of splicing two (2) wire ropes together is to use inter-locking turn-back eyes with thimbles, using recommended number of clips on each eye.

⚠ NOTE

Do not overlap cable ends. Use eye method with thimbles shown below.

Step 1. Slide thimbles together. See Figure below.

Step 2. Turn back a minimum of 4 .00” (100 mm) of the ¼” cable rope on the thimble or loop as shown in Figure below.

Step 3. Apply first Crosby clip 1.00” (25 mm) from “dead” end of rope. Apply U-bolt over “dead” end of wire rope - “live” end rests in Crosby Clip saddle. Tighten nuts evenly, alternating from one nut to the other until reaching a maximum torque achievable using a hand held wrench. (Torque to 15 ft./lbs.).

Step 4. Apply the second Crosby clip as near the thimble or loop as possible. Apply U-bolt over dead” end of wire rope - “live” end rests in Crosby Clip saddle. Tighten nuts evenly, alternating from one nut to the other until reaching a maximum torque achievable using a hand held wrench. (Torque to 15 ft./lbs.)

⚠ NOTE

Distance between the two Crosby Clips should not exceed one Crosby Clip width. If both the Crosby Clips are assembled next to each other, it does not affect the strength of the fastening system..

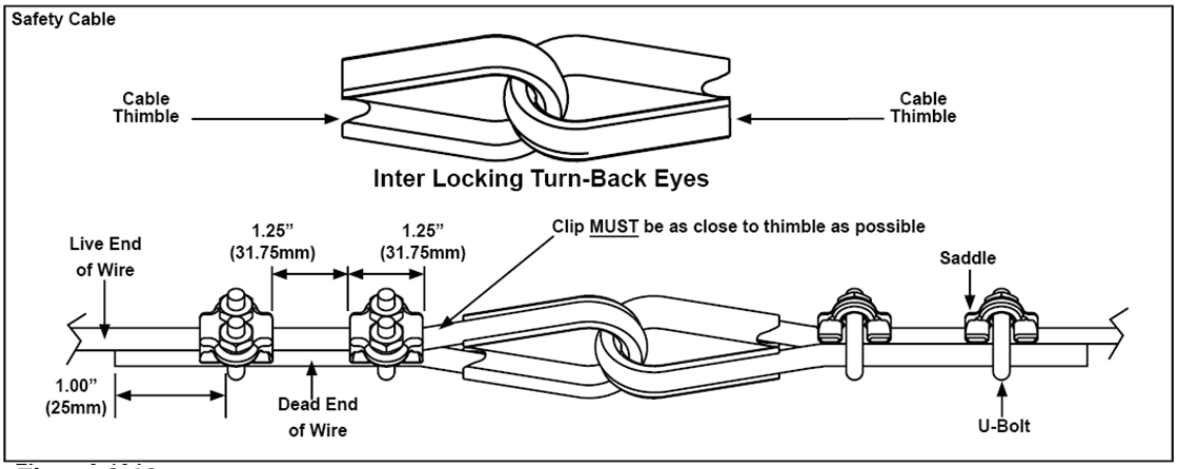


Figure 3-10

4. MAINTENANCE

Inspection Record Requirements

Duty Rating

Inspection frequency should be determined by a qualified person and is based upon duty service as defined below. Each rail system should be rated individually and inspections performed in accordance with rating. Inspections can be performed by qualified personnel.

Duty Service

Normal - Operation with uniform loads less than 65% of rated load for not more than 25% of time.

Heavy - Operation within rated load limit, which exceeds normal service.

Severe - Service that involves normal or heavy service with abnormal conditions.

Frequency of Documentation

Frequent Inspection (Non-Documented):

- Normal Service - quarterly
- Heavy Service – monthly.
- Severe Service - daily

"Rail Inspection Checklist"

"Rail Inspection Checklist" can be used as documentation sheet for new installations as well as to schedule routine maintenance. Use one sheet for each system inspected, additional forms can be copied from this booklet. Periodic maintenance should be performed every six months or more frequently depending on usage and environment. Inspect each system from "Item to be Checked" column. Fill in "Date Checked and "Checked by" columns to indicate that an inspection has been done and record any discrepancies that may appear. If any instructions or criteria are not clear, refer to applicable product page in this manual to help clarify.

Turn in a copy of completed checklist to supervisor for recording maintenance schedule and record keeping purposes.

Use one sheet for each system inspected, additional forms can be copied from this booklet, or download from our website. Periodic maintenance should be performed every six months or more frequently depending on usage and environment.

RAIL INSPECTION CHECKLIST							**DATE:**
Work Cell Identification/Location:							
Rail-Type/Size:	Aluminum			2”	4”	6”	8”
What type of hangers?			How many hangers?				
Bridge?	Yes / No	Single / Dual	Notes:				
Application:							Cycle Time:

Item to be Checked	Date Checked	Checked by	Notes/Discrepancies/Comments
GENERAL			
Ensure all safety devices e.g., safety wire, safety cables, clips, pins, lock-nuts, etc. are properly installed.			
Safety cables installed at all hanger locations per rail section, ¼ in (.25 mm) cable with four (4) clips per cable. Cable clip saddles must be on “live” cable.			
Check all rail splices. Bolts should only be tightened “***snugly***”; over-tightening may cause bolts to strip out of splice plate.			
Ensure that each rail splice bracket is installed on top of rail at splice area with safety bolt holes drilled and bolts installed.			
For all types of rail, ensure that hanger / splice guidelines are followed.			
Visually check all fasteners for indications of over-torquing, especially on hanger pivot points and any other points where movement is required.			
Visually check all structural fasteners on floor posts and I-Beam connection points. Ensure match marks are still visible and have not moved.			
Ensure hanger clamp alignment is perpendicular to beam and that bolts are not over torqued.			
Verify that hanger span is within guidelines for system capacity rating.			
Check floor support base mounting bolts for presence and tightness.			

RAIL INSPECTION CHECKLIST (CONTINUED)

Item to be Checked	Date Checked	Checked by	Notes/Discrepancies/Comments
Mid-Rail Stop			
Rubber Bumper – Wear not to exceed .250 in (6.35 mm); safety cable properly attached.			
End Caps (polyurethane)			
Wear not to exceed - 7510 & 6110 =.325 in (8.25 mm); 4110 & 2000 =.125 in (3.175 mm)			
Trolley Wheels			
Inspect wheels, side rollers, axles, nut and hardware for security and damage, replace as needed. Inspect cable on end truck for wear or breakage.			
Load Eyes (Crane Eyes), Load Hooks			
Bent or distorted components; more than 5% wear in hook throat, wear greater than 5% of original diameter on bolts or pins, loose or damaged locking gates, any visible twisting of hook or eye.			
Hangers (Rod and Ball type)			
Wear resulting in ≥.125 in (3.175 mm) reduction of ball diameter; ≥.125 in (3.175 mm) increase in socket diameter or , ≥.125 in (3.175 mm) combined ball and socket wear.			
Hangers (Rigid/Semi-Rigid)			
Visible distortion, cracks; ≥ .250 in (6.35 mm) increase in bolt hole diameter(s).			
Rail			
Gouges on running surface; twisting of more than ≥.125 in (3.175 mm) bend in excess of ≥.125 in (3.175 mm) in any span of any plane.			
Installation			
Straightness-Must be straight within ¼ in (6.4 mm) in any span length.			
Splice Gap-Must not exceed 1/16 in (1.6 mm) at load carrying flange.			
Runway Elevation-Should not vary ± ¼ in (6.4 mm) in any span length.			
Runway Parallelism-Must not exceed ± 3/16 in (4.8 mm).			

5. TROUBLESHOOTING

Rails Troubleshooting Chart

Refer to previous sections in this manual for specific installation instructions.

Problem	Cause	Solution
Load does not roll well along entire length of runway.	Runways	Ensure runways are parallel and level along length and across width of span. Install hangers that will pivot between structures and runway track. Loosen over-tightened bolts if binding at end caps.
	Splice sections	Ensure splices are installed per OEM instructions.
	Trolleys	Ensure trolley guide rollers and load wheels are in good condition and clean.
	Splice sections	Ensure splice sections are tight. Loosen over-tightened bolts if binding at end caps, hangers or trolleys.
	Bridges	Free up resistance from attached components.
	Rails	Ensure rail is damage free.
Bridge skews or rotates on horizontal axis (changes from a rectangle to a parallelogram) and binds up or is difficult to push or pull.	Runways	Ensure both runway rails are free to pivot along axis at hanger attachment points.
	Trolleys	Ensure trolleys are damage free. Ensure trolleys are free to pivot between trolley and hoist or carriage frames.
	Rails	Ensure rail is damage free.
Load settles in center span of a bridge or runway and does not remain parked at intervals along bridge length.	Fixture Carriage	Ensure attached components such as coiled tubing, electrical cables, or hoses move freely.
	Bridges	
	Rails	Ensure support spans are correct per system layout. Ensure that load does not exceed system rated capacity. (Refer to: http://www.knightglobal.com/rails for rated capacity charts.)
Fixture, hoist, arm, bridge trolleys continually wear out.	Runways	Ensure both runways are free to pivot along axis at hanger attachment points. Loosen over-tightened bolts if binding at end caps, hangers or trolleys.
	Trolleys	Ensure trolley is correct model for rail. Ensure trolleys are not rigidly mounted.
	Spliced Sections	Ensure splices are installed per OEM instructions.
	Hangers	Ensure correct hangers have been used on the proper system.
	Rails	Ensure rail is damage free.
		Wipe rolling surfaces of rail with a clean dry rag.

Rail Performance may be affected by various factors. If your rail system is not performing as well as expected, contact Knight Global at: 248-377-4950 or visit our website at www.knightglobal.com .

6. SPARE PARTS

For Spare Parts or Replacement parts visit Knight Global at: http://www.knightglobal.com/rails. Or contact Knight Global direct.

DECOMMISSIONING OF A RAIL SYSTEM AND FLOOR STRUCTURE

Knight Global Enclosed Track Rail System contain various materials which, at end of service life, should be disposed of or recycled, in accordance with local regulations

⚠ WARNING

Knight Global Enclosed Track Rail Systems and Floor Structures must only be decommissioned by qualified personnel.

7. PERFORMANCE WARRANTY

Knight warrants that its products and parts shall meet all applicable specifications, performance requirements, and be free from defects in material and workmanship for one year, (Servo Systems for two years), from the date of invoice, unless otherwise noted. One exclusion would include any purchased components not manufactured by Knight and their specific individual warranties. Paint defects, scratches and marring from shipping are also excluded.

This warranty shall not cover failure or defective operation caused by inadequate training provided by customer regarding the operation and **/** or maintenance of the tool, misuse, negligence, mis-adjustment, or alteration not approved by Knight. Knight's obligation is limited to the replacement or repair of Knight's products at a location designated by Knight. Buyer is responsible for all associated internal removal and re-installation costs as well as freight charges to and from Knight Industries. Knight's maximum liability shall not in any case exceed the contract price for the products claimed to be defective.

Knight warranties servo hoists, servo arms, and servo tractors to be free from defects in material or workmanship for a period of two years or 6000 hours use from date of shipment.

Knight distributors/agents are not authorized to circumvent any of the terms and conditions of this warranty unless approved in writing by Knight Management. Statements made by Knight distributors/ agents do not constitute warranties.

On a design and build job, the customer is the owner of the equipment once they authorize shipment. The equipment cannot be returned for reimbursement or credit. Unauthorized changes to any of Knights products voids our performance warranty and any potential liabilities. If changes are necessary, please contact Knight for authorization to proceed.

Disclaimers: OTHER THAN AS SET FORTH HEREIN, NO OTHER EXPRESS WARRANTIES, AND NO IMPLIED WARRANTIES, ORAL AND WRITTEN, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ARE MADE BY KNIGHT WITH RESPECT TO ITS PRODUCTS AND ALL SUCH WARRANTIES ARE HEREBY SPECIFICALLY DISCLAIMED. KNIGHT SHALL NOT BE LIABLE UNDER ANY CIRCUMSTANCES FOR ANY INCIDENTAL, SPECIAL AND / OR CONSEQUENTIAL DAMAGES WHATSOEVER, WHETHER OR NOT FORESEEABLE, INCLUDING BUT NOT LIMITED TO DAMAGES FOR LOST PROFITS AND ALL SUCH INCIDENTAL, SPECIAL AND / OR CONSEQUENTIAL DAMAGES ARE HEREBY ALSO SPECIFICALLY DISCLAIMED.

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