

Personnel Safety Net System



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INTRODUCTION

PERSONNEL SAFETY NET SYSTEM



The InCord Personnel Safety Net System is designed with the highest degree of safety in mind, using the highest grade materials within the industry. The shock-absorbing safety netting is made of high tenacity synthetic mesh designed to meet the most rigorous construction demands - and tested to exceed ANSI® A10.11-1989 safety standards for personnel nets. In addition, InCord shock-absorbing, diamond mesh netting is treated with inhibitors that protect it from normal wear and tear as well as ultraviolet degradation.

All InCord personnel netting is bordered with 5,000-pound minimum-test synthetic rope with staggered steel hooks every four feet for attachment to other nets. Color coded sides allow for quick and easy matching to identical adjoining nets.

Net support arms are constructed of high strength four inch tubular aluminum used to support the netting over the fall area, work in conjunction with internal and external wire rope cabling to provide a complete impact absorbing personnel safety system.

Conditions Requiring Nets

Personnel nets are installed at a construction site to protect people working at a height, typically greater than one story, and who are not protected by other fall protection equipment.

Each potential fall situation shall be examined by a competent person¹ capable of determining the height and conditions for which fall protection is required.

No public traffic or workers shall be permitted underneath a personnel safety net unless the net is provided with a debris lining with mesh and strength capable of stopping falling objects such as tools and material used at the site.

Installation

The personnel safety net is designed and constructed to minimize fall-arrest injuries sustained in the course of normal use when installed in accordance to these instructions.

The nets shall be installed below the work area and as close as practical, but not lower than 30 feet.

They shall be hung with sufficient clearance to prevent contact with any surface below the safety net during full impact load, which is typically twice the shortest dimension of the net.

Mounting brackets for the net arms must be secured to an suitable working surface, and installation of all support cabling must follow the instructions outlined in this manual.

No substitute of material is acceptable. Any damaged netting, support arms, cabling or fittings must be reported to the work site supervisor immediately.

Inspection and Testing - See ANSI® A10.11-1989

Personnel nets and hardware shall be inspected by a competent person¹ after each installation.

Additional inspections shall be made after alterations, repair, and impact loading. On-the-job impact testing of the nets shall be conducted in the suspended position immediately following initial installation, relocation, or major repair.

¹ "...capable of identifying existing and predictable hazards in the surroundings or working conditions that are hazardous or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them". ANSI® A10.11-1989

PARTS LIST COMPONENT IDENTIFICATION



Unpack all support components, cabling, fittings and netting. Check all pieces against the packing slip for description, quantity, and lengths. Check the safety netting for any cuts or tears in the net or rope cording. Contact INCORD if anything is missing, not to length, or if any portion of the netting is damaged. Do not substitute any installation hardware or net material.

Match all components to their placement on the design blue print. In some instances, custom lengths of poles and cabling must be matched to a specific work area. Mounting brackets for cast-in-place concrete and steel pillar mounting brackets must also be matched to their designated work area.

Your components may differ in appearance from those pictured on this page. This is for reference and basic identification only.



Read all Instructions carefully before installing the Personnel Safety Net System. Keep in mind that safe practices must always be used during installation, testing, inspection, maintenance, and removal.

Components:

1. Personnel Safety Net, with Snap-Hooks
2. Top Support Arm Section
3. Support Arm Coupler
4. Lower Support Arm Section
5. Terminator Bar, with hardware
6. Mounting Bracket, for concrete slab
7. Concrete Slab-Grabber
8. Column Mounting Bracket with anchor straps
9. Hitch Pin, two per arm, one per mount
10. Wire Rope Cable with one end terminated
 - a. Internal Cable (continuous)
 - b. External Cable (35 ft)
 - c. Cross Cables for terminator bar (35 ft)
 - d. Hanger Cable (18 ft) for column mount and slab-grabber
 - e. Tag Line (20 ft) for support arm
11. Turnbuckle, one or more for internal cabling
12. Cable Wire Clamp, three per cable end
13. Thimble, one per cable end
14. Shackle, one per cable end



PERSONNEL SAFETY NET ASSEMBLY AND INSTALLATION



Concrete Mounting Bracket Installation

The mounting bracket is designed for installation onto a cast-in-place concrete slab. If this is not possible, use a column bracket or slab grabber instead.



Always consult a structural engineer when deviating from a planned installation.

Install the bracket 6 inches from the slab edge. Use 3/4 inch bolts with four bolts per side. Bolt length to be specified by a structural engineer.



Caution: Avoid contact with rebar and prestressed concrete cabling.

Note: The six holes on each side of the mount allow for alternate mounting positions.

Continue this mounting procedure around the building or structure with mounting bracket spacing no more than 30 feet apart.

Column Bracket Installation

Place the mounting bracket at the base of the steel support column. Secure with two anchor straps with edge protecting corners behind the column.



Add a safety hanger cable between the column bracket and the internal cable assembly on the floor above.

Slab Grabber Bracket Installation

For applications where other bracket attachment methods are not practicable. Install the bracket securely over the edge of the concrete slab and tighten the clamping screws.

Add a safety hanger line between the bracket and an overhead structural beam or column.



Note: For use on concrete slab with maximum thickness of 12 inches.

Assembly & Installation of Net Support Arm

The three piece support arm is to be assembled one floor above the mounting brackets, then lowered into place to the floor below.

Assemble the upper and lower support arm sections to the support arm coupler and secure with two hitch pins. The pins must be installed in the same direction.

Attach a tag line to the support arm eye, tie-off the tag line to a column, then lower the arm to the mounting bracket below.



Secure the support arm to the mounting bracket with one hitch pin.

Note: All three hitch pin handles must face up.



Internal Cable Installation

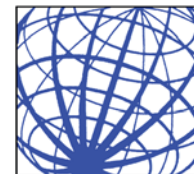
Run the internal cabling from the base of the first support column to the end of the safety net run, wrapping the cabling around each column or to a designated termination point.

Follow the design blue print, and use appropriate hardware and turnbuckles where indicated. Adjust the cabling to remove all slack, and tighten with turnbuckles.

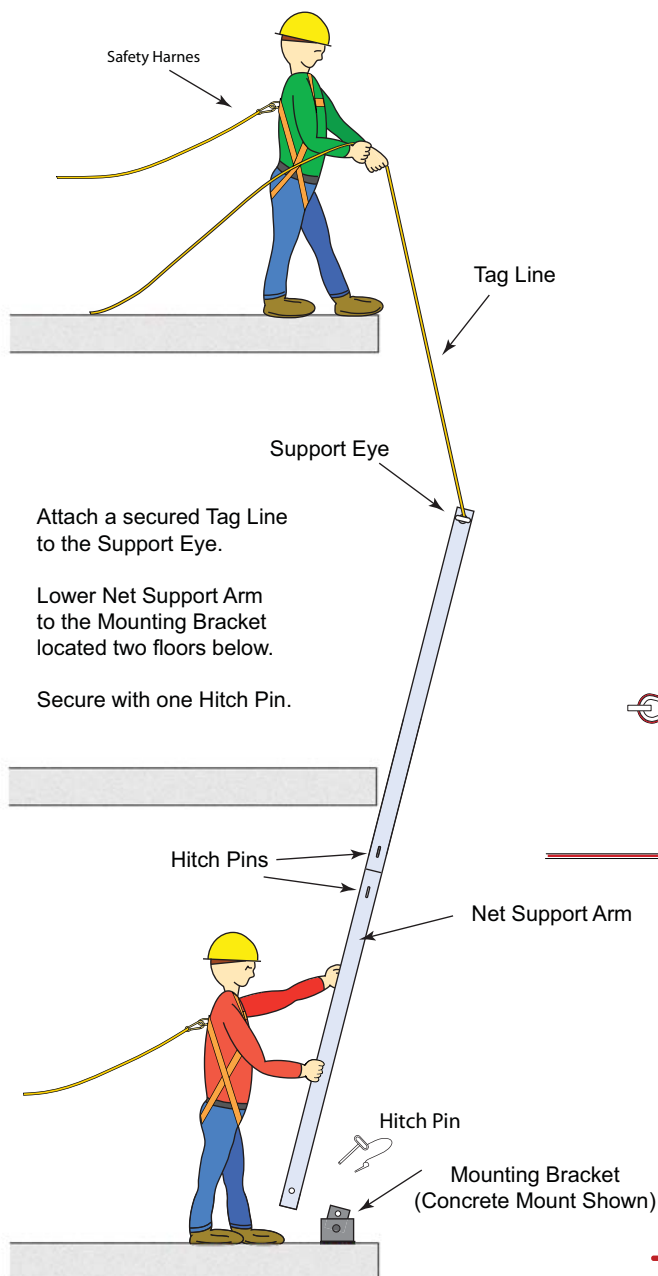
External Cable Installation

Measure between two support arms, then assemble an external cable with a thimble on each end. Attach the cable assembly with shackles to the support arm eyes. If necessary, adjust the cable assembly so that it neither sags or pulls between support arms.

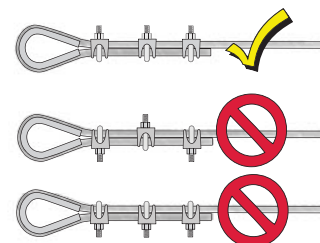
PERSONNEL SAFETY NET ASSEMBLY AND INSTALLATION



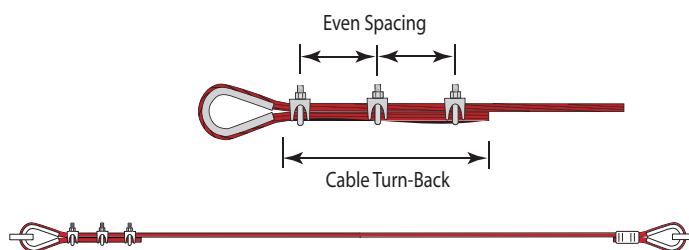
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Note: A properly prepared cable end with thimble uses three cable clamps evenly spaced with the first clamp securing the thimble. Install clamps as shown in the illustration.



Cable Clamp Assembly and Torque Specifications			
Clamp Size (in)	Clamps	Cable Turn-Back (in)	Torque (ft-lb)
1/4	3	4-3/4	30
3/8	3	6-1/2	45

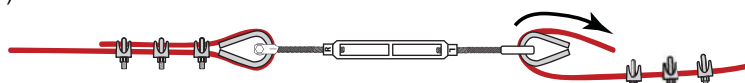
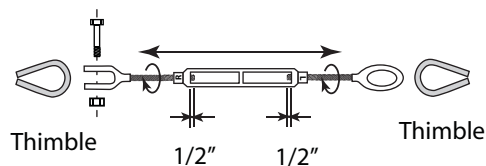


Exterior Cable Assembly



Internal Cable Assembly

Expand Turnbuckle to 1/2" limits before installing



Finished Assembly

Cable Clamps

PERSONNEL SAFETY NET ASSEMBLY AND INSTALLATION



Terminator Bar

The Terminator Bar provides increased side support to a perimeter net system. It is recommended that a terminator bar be installed on each end of a laterally unsupported system. For interconnected systems that wrap around a building, an anchor cable is used on each end. See Installation Examples.

Terminator Bar Installation

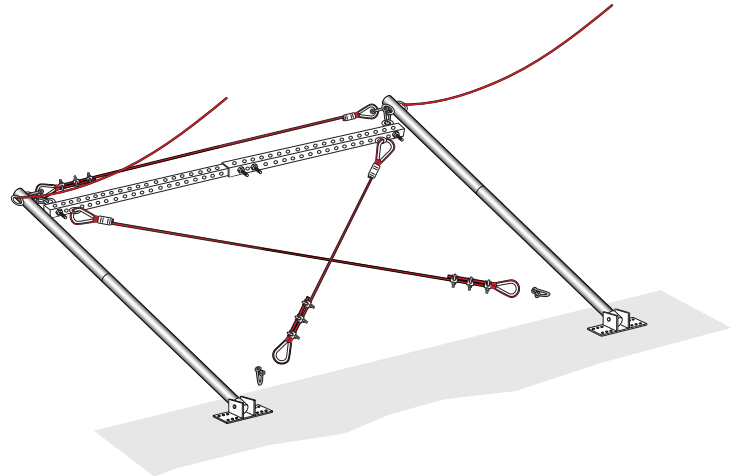
Adjust the two section telescoping terminator bar to the width of the support arm eyes as shown below. Assemble using the hardware provided.

Attach the two cross cable assemblies with eyebolts to the terminator as shown.

Mount the terminator bar between the support arm eyes with two shackles.

Measure and assemble an external cable and attach it with shackles between the two support arm eyes.

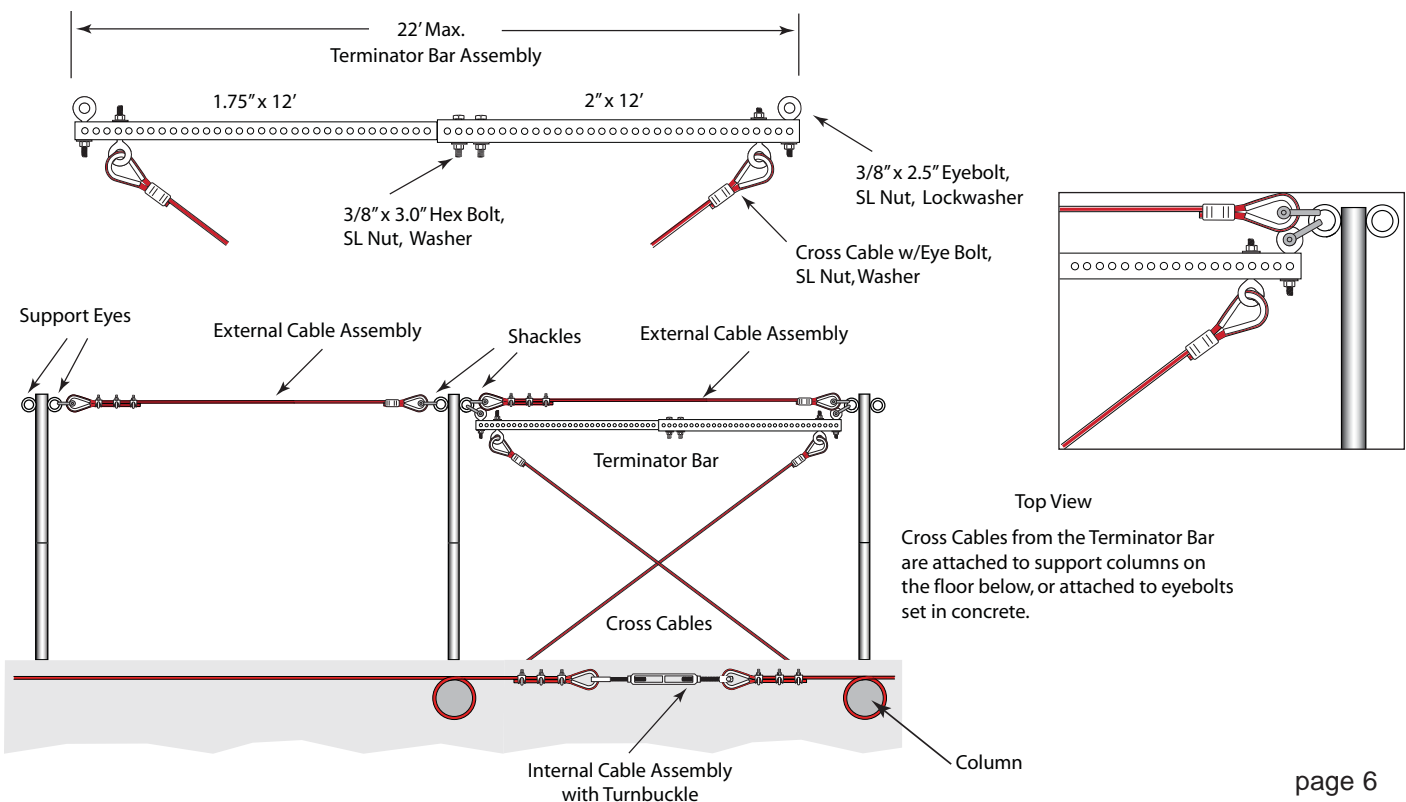
Secure each cross cable to a support column or to an eyebolt set into concrete near the support arm mounting bracket. Use the supplied cable clips and thimble.



Caution: When drilling, avoid contact with rebar and prestressed concrete cabling.

Note: Do not attach the cross cables directly to the mounting bracket. Offset the cable anchoring to avoid cables touching each other at the cross point.

Adjust each cable assembly so that it neither sags or pulls between support arms.



PERSONNEL SAFETY NET ASSEMBLY AND INSTALLATION



Safety Net installation

Secure the net to the external and internal cables with the attached metal net snap hooks. Attach only the outermost corners of the net system to the support eye.

Match each color coded side to the adjoining net. Red to Yellow and Blue to Green. This will provide a series of alternating attachment points every 2 feet.

Safety Net Deployment

Lower the net arms using the attached tag lines to the full extent of the netting, approximately 15 feet. Tie off the tag lines to a support column.

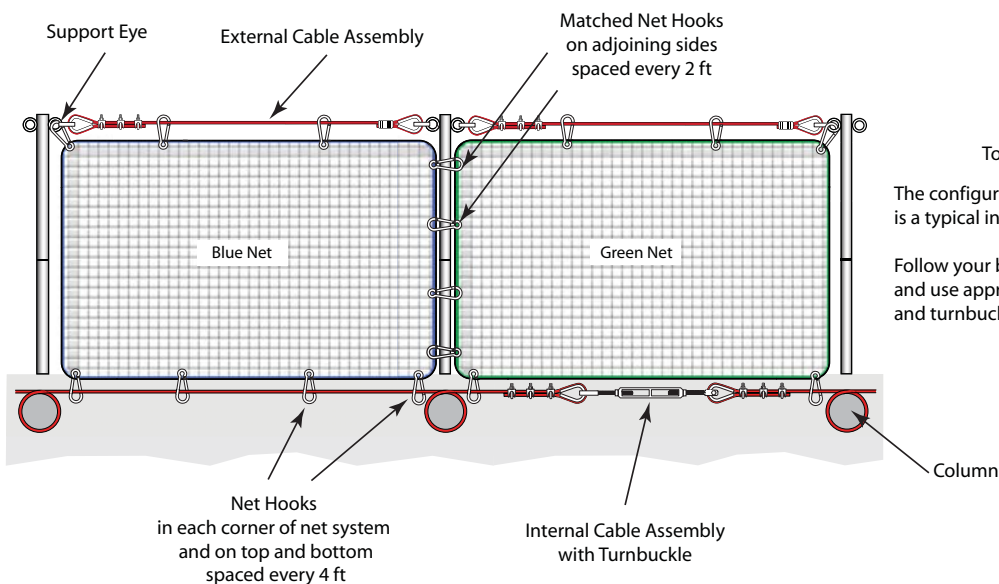
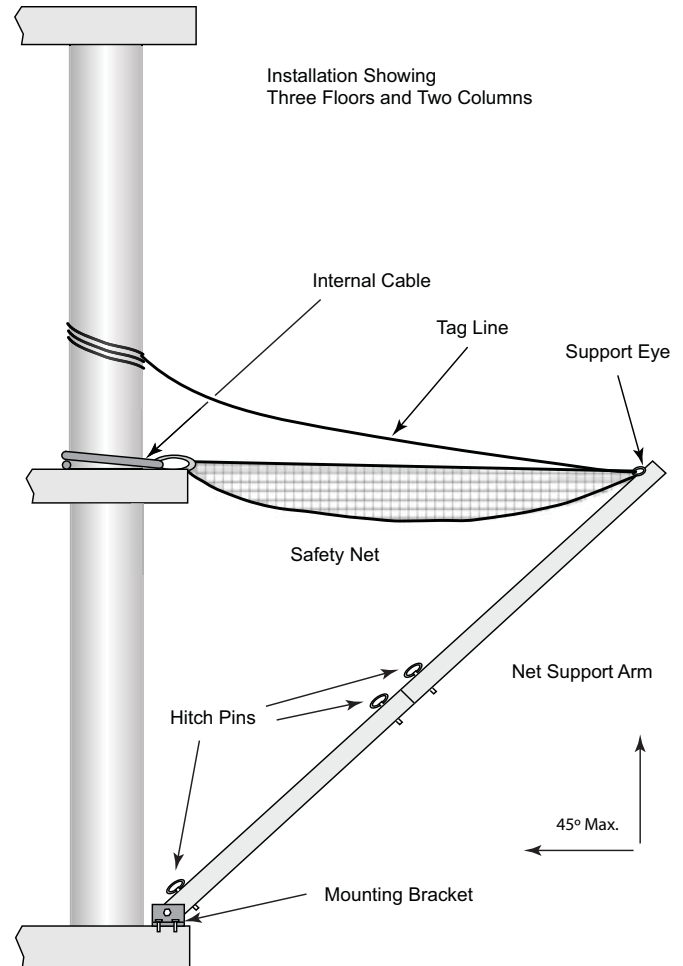
Note: The tag lines are used only to deploy and retrieve the net arms and are not used for system support. Leave slack in tied off tag lines.



Caution: Arms are held at maximum angle of 45 degrees. If the net arms are deployed beyond this point the strength and function of the safety net system will be compromised. Check installation dimensions.

Make all necessary adjustments to the support arms and their placement to assure that the rope border of the safety net is taut and proper support arm angle is maintained. There must be sufficient sag in the center of the net to absorb and arrest a fall without injury.

Always consult a structural engineer when deviating from a planned installation.



Top View

The configuration shown in this example is a typical installation.

Follow your blue print and use appropriate hardware and turnbuckles where indicated.

PERSONNEL SAFETY NET ASSEMBLY AND INSTALLATION



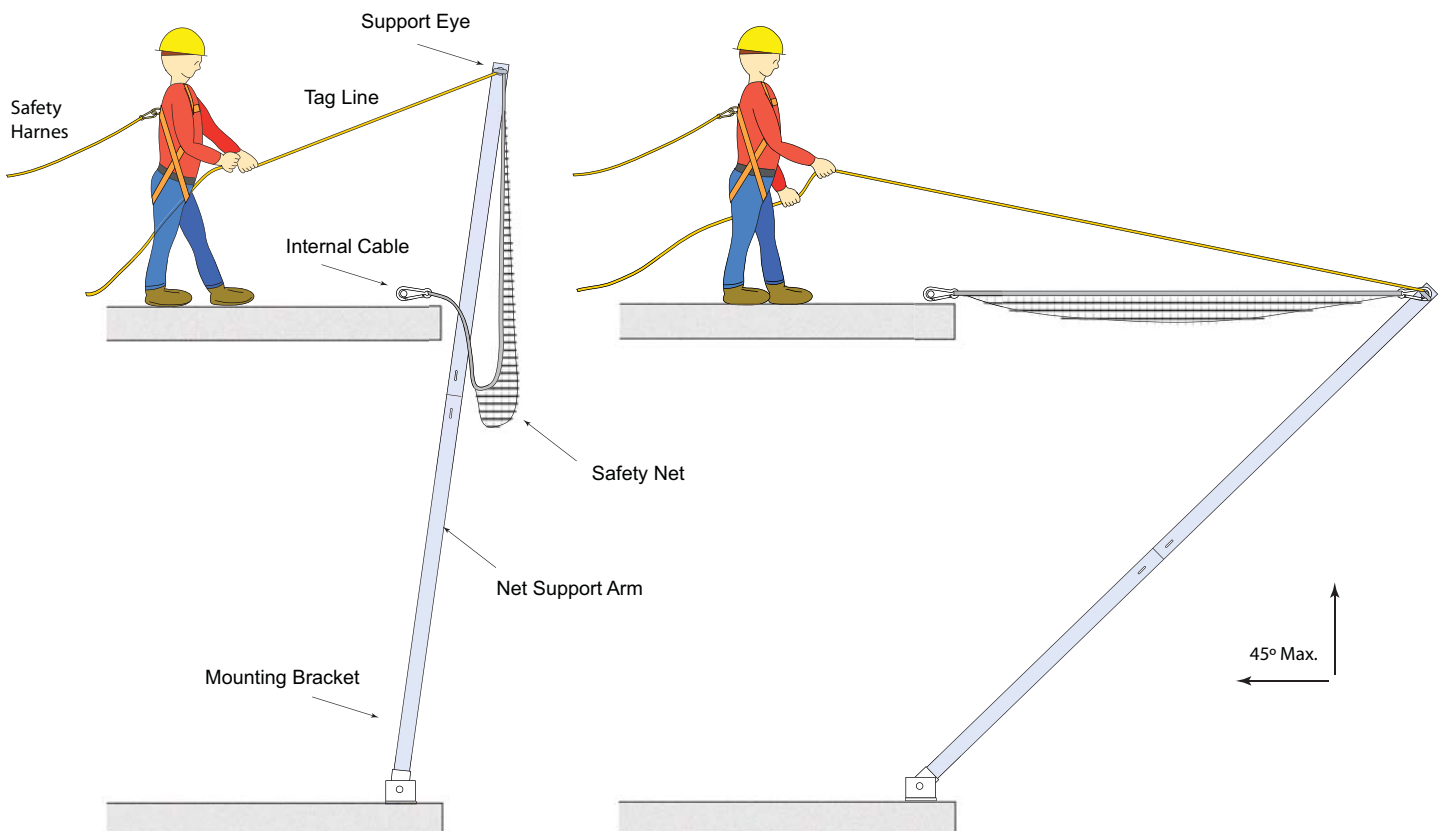
Safety Net Deployment

Note: Safety Nets should be drawn back against the building and tied off during times of excessive ice, snow or wind loading, and only when not in use.

Note: The Tag lines are used only to deploy and retrieve the Net Arms and are not used for system support.

Leave slack in the tied off Net Arm Tag Lines after deploying the Safety Net System.

Caution: Net Arms are held at a maximum of 45°. The strength and function of the system will be compromised beyond this point. Check all system dimensions and make any necessary adjustments.



NET SYSTEM TESTING AND INSPECTION



Net Safety System Testing and Inspection

The personnel safety net is designed and constructed to minimize fall-arrest injuries sustained in the course of normal use when installed in accordance to these instructions.

Individually mounted personnel nets and inter-connected net systems must be tested and inspected on the job in the suspended position immediately following initial installation, relocation, or major repair, and, when left in one location, at six month intervals.

On-Site Testing

The following testing requirements and methods are outlined in ANSI[®] publication A10.11.1989, American National Standard for Construction and Demolition Operations - Personnel and Debris Nets.

Personnel net systems shall be tested with a test weight dropped into the center of the net that is considered to be the weakest point of the system.

The age and condition of each net, and the arrangement of the supports, must be considered when determining the weakest point. In cases where reasonable doubt exists, the drop-test shall be conducted at each point considered to be potentially weak.

The drop test consists of dropping a 400-pound bag of sand into the center of the net, not more than 30 inches \pm 2 inches in diameter and no more than 36 inches wide.

A tag line of sufficient strength is attached to the test weight should it penetrate the net. The tag line must not reduce the impact of the test weight during the drop-test.

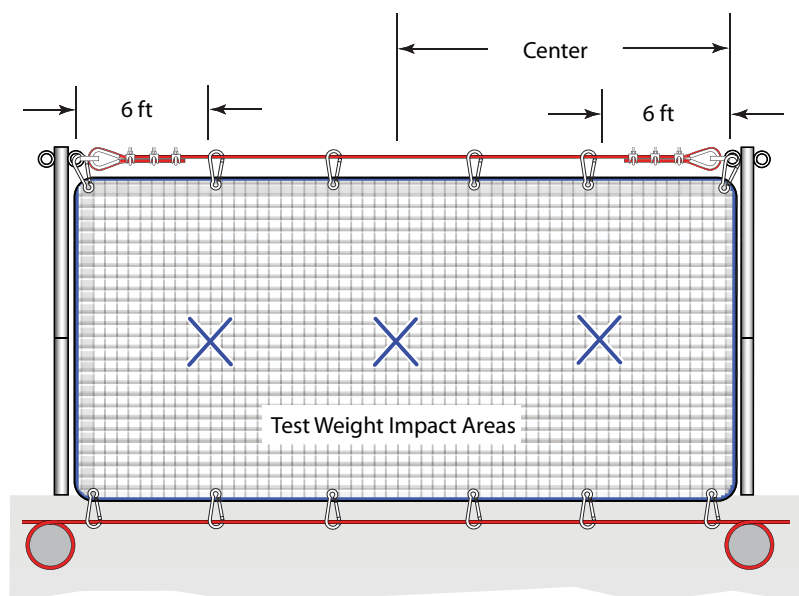
The weight is to be free fall dropped from a height of 25 feet above the net, measured from the bottom of the weight (10,000 foot-pounds).

1. Bag of Sand, 400 lb, 30 x 36 \pm 2 inch.
2. Tag Line to bag of sand.
3. Drop-Test from height of 25 ft above net.
4. Impact Area is center of net or weakest point.

Test Results

There shall be no penetration of the net, and no significant residual distortion of the net pattern or the suspension system. The bag of sand must be arrested within the net and not bounce.

Testing Exception - When the employer can demonstrate that a drop test is not feasible or practical, the net and the net installation shall be certified by a competent person¹ to be in compliance with all other provisions of installation, inspection and maintenance.



NET SYSTEM TESTING AND INSPECTION



Inspection

Personnel safety nets must be inspected by a competent person¹ after each installation and not less than once each week thereafter. Additional inspections must be made after alterations, repair, or following any impact loading.

If any welding or cutting operations occur above the safety net, weld protection must be provided for that area, and more frequent inspections should be conducted in proportion to the level of dangers involved.

√ Inspection must include all netting, mesh ropes, perimeter ropes, installation hardware, and suspension systems.

√ Nets or hardware that show deterioration from mildew, wear, or stress, that may affect their strength, must be immediately removed from service for further inspection, repair or disposal.

√ All cabling and fasteners should be checked to assure they are secure.

√ Nets must be checked for debris at least once a day, and all debris must be removed.

Safety Nets should be drawn back against the building or structure and tied off during times of excessive ice, snow or wind loading, and only when not in use.

It is recommended that an up-to-date, on the job record be maintained for each personnel net. The record should include the following:

- | | |
|------------------------|--------------------------|
| (1) Net serial number | (5) Repairs |
| (2) Date installed | (6) Dates removed |
| (3) Dates inspected | (7) Disposition & reason |
| (4) Inspection results | |

Factors Affecting Net Life

Sun. Ropes of synthetic fibers can lose significant amount of strength after prolonged exposure to direct sunlight. All nets not in use should be protected from direct and indirect sunlight.

Abrasion. The adverse effects of abrasion should be kept in mind. Nets should not be dragged or allowed to chafe over the ground or other rough surfaces.

Sand. Embedded sand cuts into fibers, reducing the strength of the net. Care should be taken to keep nets as clean and free of sand as possible.

Rust. Prolonged contact with rusting iron or steel can cause abrasive degradation and loss of strength.

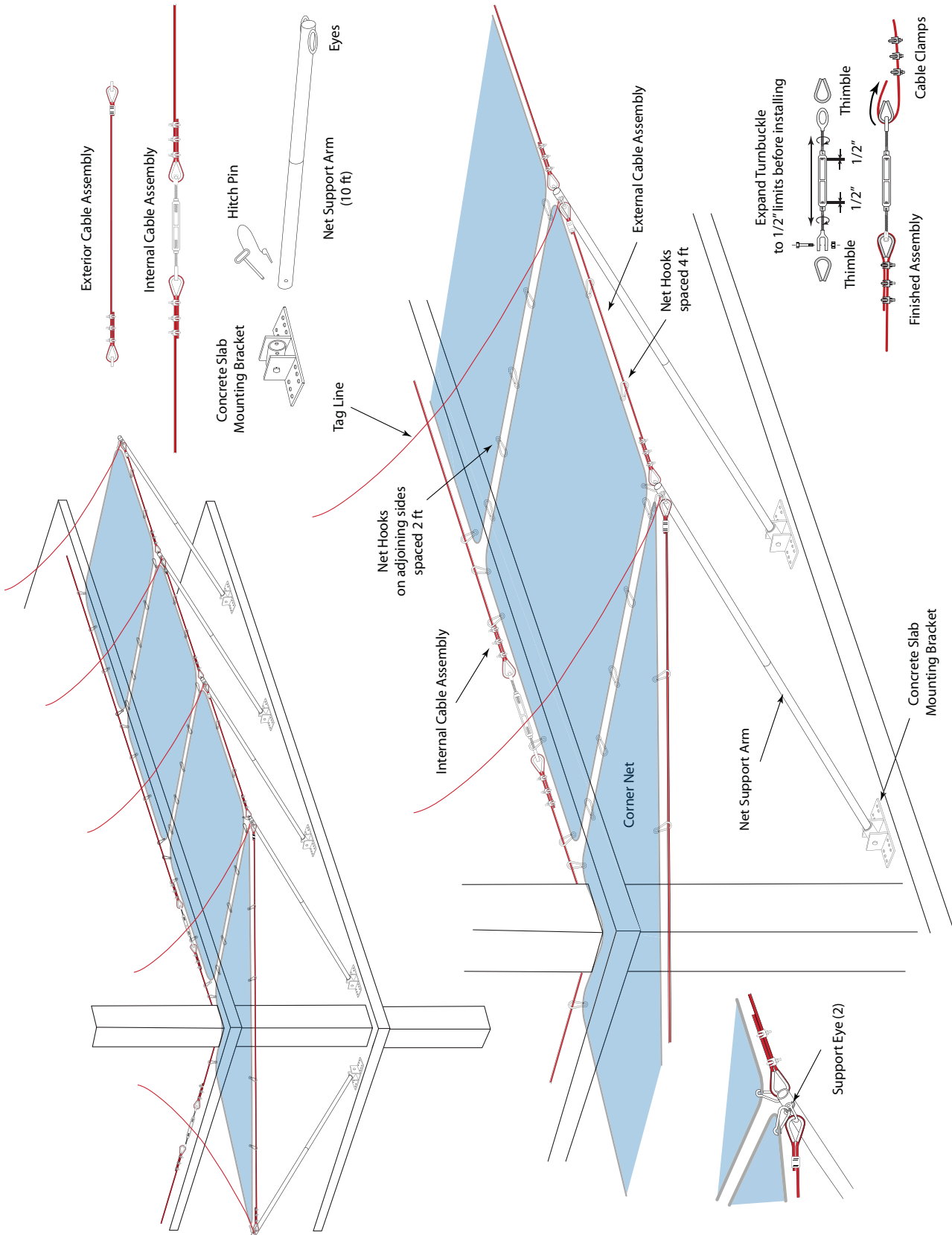
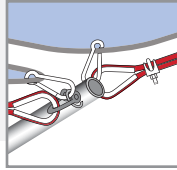
Airborne Contaminants. Many chemicals and airborne contaminants can adversely affect the strength of nets. Where such hazards to nets exist, the chemicals should be identified and the concentrations measured, The effect on the net materials should be determined by test, if not already known.

Identification of Nets

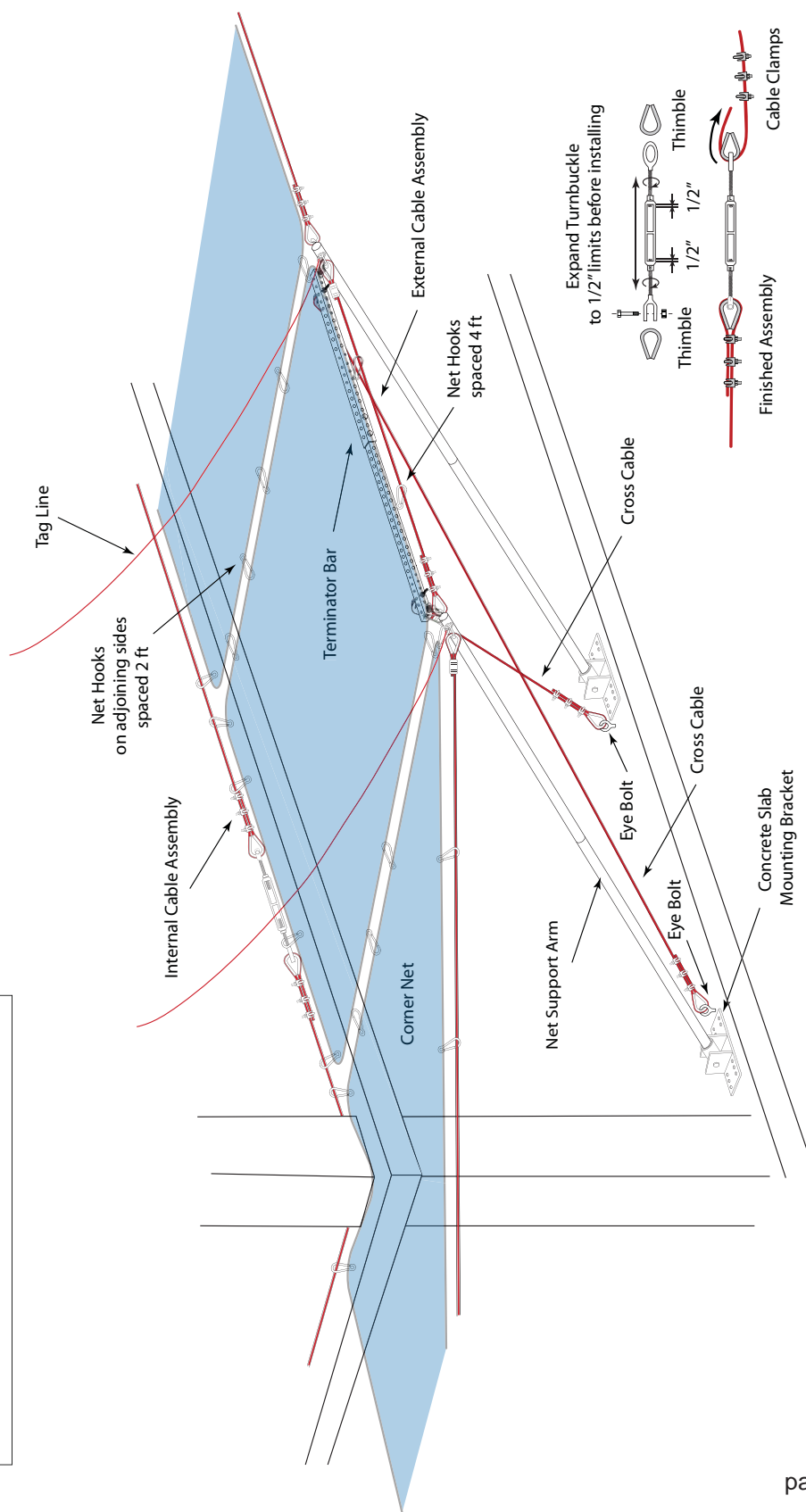
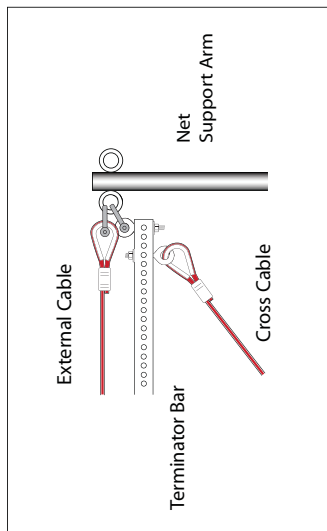
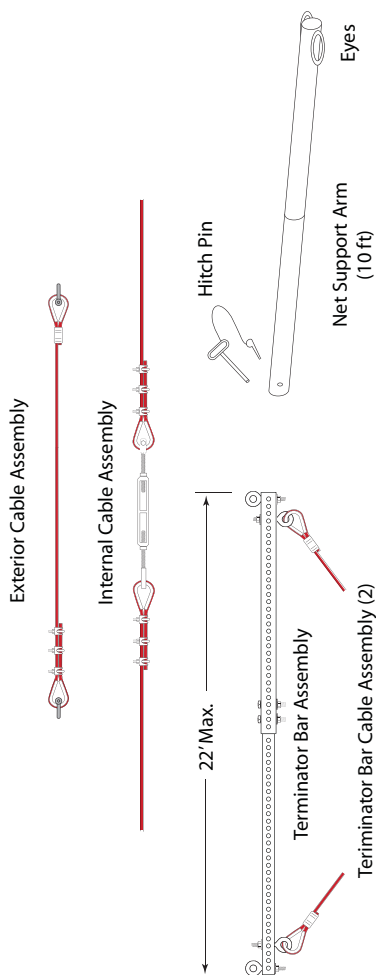
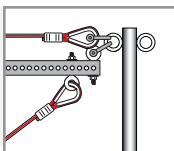
Each personnel net is permanently labeled with the following information:

1. Name of manufacturer (InCord)
2. Identification of net material
3. Date of manufacture
4. Date of testing agency
5. Serial number

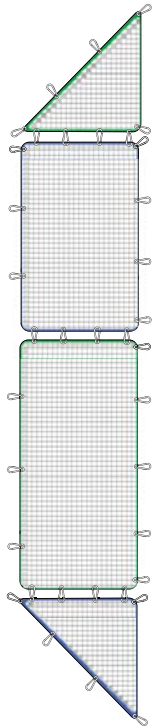
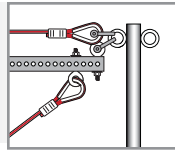
INSTALLATION EXAMPLE USING CONCRETE SLAB BRACKET



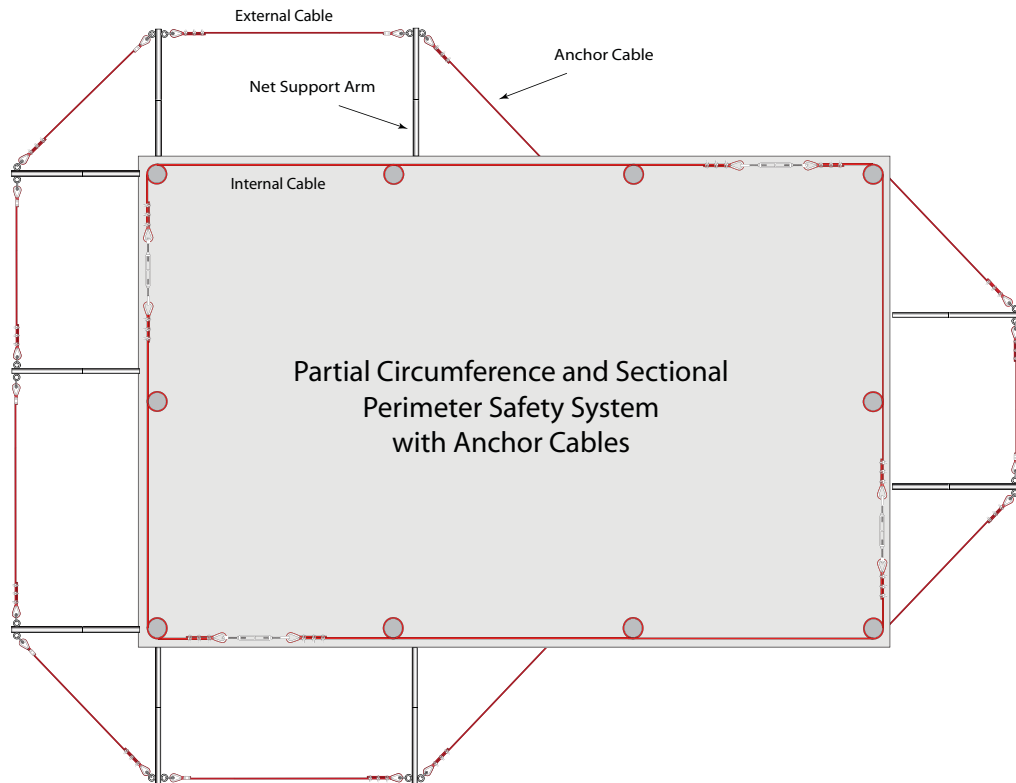
INSTALLATION EXAMPLE USING TERMINATOR BAR



INSTALLATION EXAMPLE USING TERMINATOR BAR



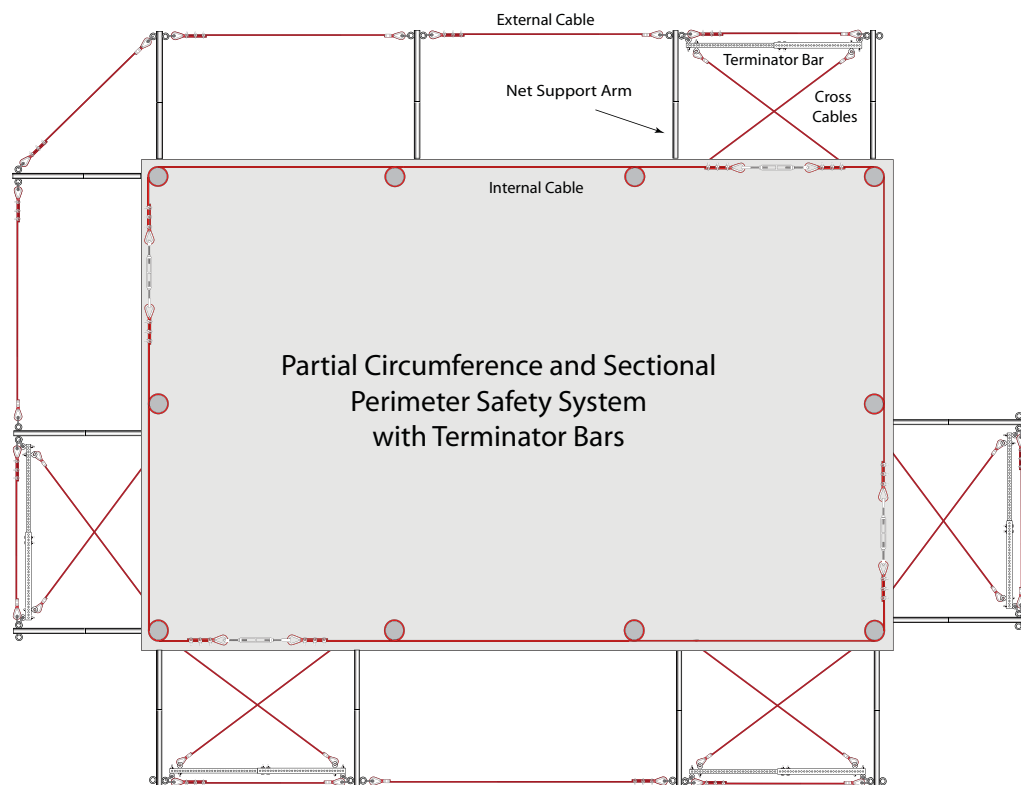
Perimeter Net Sections
with Snap Hooks



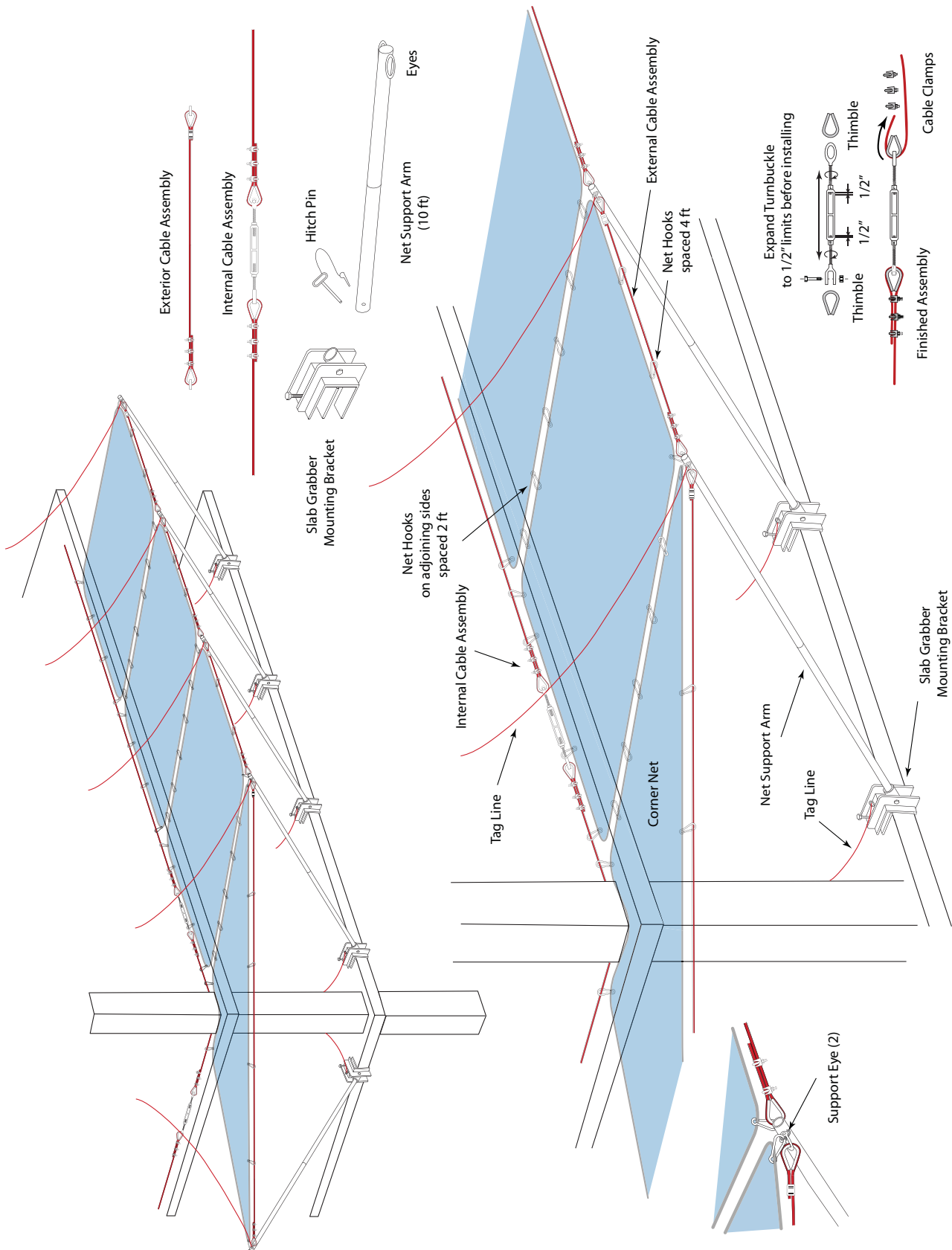
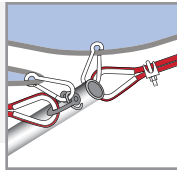
Terminator bars should be installed on each end of a laterally unsupported perimeter system.

For interconnected partial circumference systems that wrap around a building, an anchor cable is used on each end.

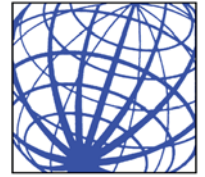
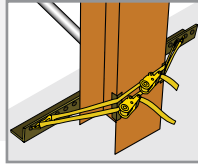
A terminator bar may be used with individual net systems if increased lateral support is required.



INSTALLATION EXAMPLE USING SLAB GRABBER BRACKET



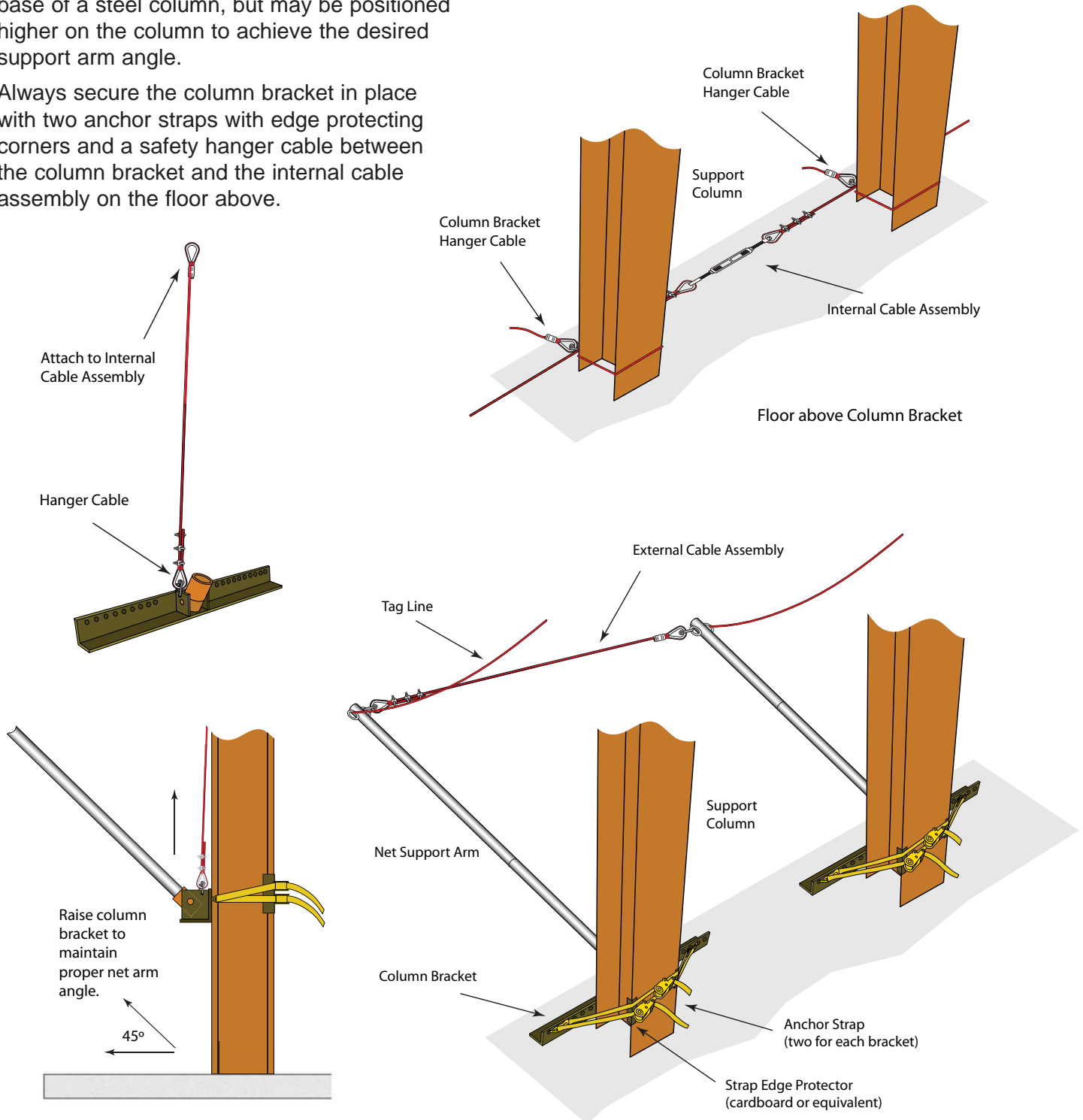
INSTALLATION EXAMPLE USING COLUMN BRACKET



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The column bracket is typically secured at the base of a steel column, but may be positioned higher on the column to achieve the desired support arm angle.

Always secure the column bracket in place with two anchor straps with edge protecting corners and a safety hanger cable between the column bracket and the internal cable assembly on the floor above.



PERSONNEL SAFETY NET SYSTEM INSTALLATION INSTRUCTIONS



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INCORP
226 Upton Road
Colchester, CT 06415

www.incord.com
netting@incord.com

860-537-1414
800-596-1066
Fax 860-537-7393

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