

**USER INSTRUCTION  
AND MAINTENANCE MANUAL  
BRIDGE & FORM GUARD SAFETY POST™**

**-WARNINGS - SAFETY FIRST !**

**READ THESE  
WARNINGS (pages 1 - 6) and INSTRUCTIONS (pages 7 - 14)  
BEFORE USING the  
BRIDGE & FORM GUARD SAFETY POST™**

1. Before use of this system, read and understand all instructions, warnings, cautions and notes marked on the equipment and contained in these instructions and warnings.
2. Although we use standard safety equipment and standard values for our engineering, the Bridge & Form Guard Safety Post™ and components are designed and tested as a system using modern shock absorber type lanyards, retractables, rope grabs, and approved harnesses. Use of components that have not been designed and/or tested for use with this system can be dangerous and lead to injury or death. Contact Guardian Fall Protection if you are unsure about using an equivalent product.
3. Do not attach anything other than a complete personal fall arrest system directly to the Bridge & Form Guard Safety Post™ system without additional testing. At this point the Bridge & Form Guard Safety Post™ is only for anchorage of fall protection equipment, and not more than two persons between any two posts at one time. No suspension (such as - but not limited to - bosun's chairs or scaffolds) should be attempted using the Bridge & Form Guard Safety Post™ as an attachment or support point.
4. There may be an application for use of the system as a positioning system, but that has not been evaluated by PSP at this time. Consult with PSP before using this system in a manner that is not covered by these instructions.

5. Treat the Bridge & Form Guard Safety Post™ and its components with respect. Your life is on the line! Use care when moving, shipping or storing them. Do not hammer or weld on the device. Although they are durable, they must withstand tremendous force during a fall. Kinks, bends, or dents in the aluminum or steel or cracks or breaks in the welds can affect the way the system works. Kinked or damaged cable may be less strong than when new. If damaged from rough handling, an impact force, material movement or other accident, or a fall arrest - remove from service and replace it with another new unit. Return the unit to Guardian Fall Protection for inspection or replacement.
6. Any fall protection equipment that is involved in a personnel fall incident or is struck by a weight shall be removed from service immediately and discarded or returned to Guardian Fall Protection for inspection or a qualified person shall inspect and re-certify the unit for continued use. Document such inspections.
7. Failure to install, use, and/or remove the Bridge & Form Guard Safety Post™ equipment in a safe manner by skilled and trained craftsmen can result in serious injury or death. Until the Bridge & Form Guard Safety Post™ is properly installed, use alternate fall protection means. Ask your supervisor for proper training.
8. The Bridge & Form Guard Safety Post™ allows for a worker to wear a personal fall arrest system that limits free fall to less than 6 feet and fall forces to less than 900 lbs. Users must preferably wear a Guardian Fall Protection full body harness and shock absorbing lanyard designed to reduce fall forces to 900 lbs. or less, or an equivalent. Retractable lanyards, rope and rope grabs and cable and cable grabs are also potentially useful, and should meet the lanyard and free fall criteria above as well.
9. It is critical to install the Bridge & Form Guard Safety Post™ properly. The Bridge & Form Guard Safety Post™ is mounted directly into a core hole (>3.5" i.d) drilled 9-12" deep into concrete, or into a PVC pipe embed (> 3.5" i.d.) set 9" to 12" deep in the concrete.
10. The units are designed to work in minimum 4000 lb. concrete. In higher grade concrete the strength increases. However, do not reduce the embedment depth beyond 8" without new engineering.
11. In bulb T's the concrete should cover (at base of embed or core hole) should be ½" to 1" or more.
12. The edge of the core hole or embed should be a minimum of 1'3" from any edge.
13. Avoid any embedded rebar, tensioning strands, conduit, or other embedments/obstructions in the structural concrete. If the concrete in the area of the penetration is weak, honeycombed, spalling, rotten, or showing signs of weakness or aging, do not use this concrete area to secure a Bridge & Form Guard Safety Post™.
14. Once the Bridge & Form Guard Safety Post™ is attached, the user is responsible to repair or replace surface coating or waterproofing material that was on the surface of the concrete and which may have been removed or penetrated to mount the Bridge & Form Guard Safety Post™

Generally, the contractor and lifeline installer should be or should become familiar with the proper method to insure a waterproof installation. Failure to do so will possibly result in water infiltration. Water infiltration into the temporary holes will not readily affect the Bridge & Form Guard Safety Post™ but may affect your concrete. Guardian Fall Protection does not supply materials or specifications related to the nearly infinite types of waterproofing and surfacing systems that may be affected by penetrating the concrete structural substrate, (if applicable).

15. The Bridge & Form Guard Safety Post™ is a single use item. If involved in arresting a fall or the system is struck with a weight (or a load), the unit(s) involved should be taken out of service and replaced and returned for inspection. They may be reusable after inspection depending on the load arrested. Contact Guardian Fall Protection @ 1-800-466-6385 for assistance. .
16. The Bridge & Form Guard Safety Post™ system stops a fall by elastically and inelastically deforming, absorbing fall forces and arresting the fall, incorporating and including flexion, expansion and constructively bending the patented\* PSP Shock Absorbing (Steel) Topper™ Plates and the PSP Bridge and Form Guard Safety (Aluminum) Safety Post™, through deflection and bending of the shock absorbing post , sag and stretch of the wire rope, and extension of the personal shock absorbing lanyard or retracting lanyard. Consider the stretch, sag, bending, and lanyard extension when determining the best location to install the Bridge & Form Guard Safety Post™ in order to minimize the total free fall and any impact potential to items below. Use of a shorter lanyard, a retracting lanyard or closer spacing of the Bridge & Form Guard Safety Post™ to the work area greatly reduces the fall distance.
17. The Bridge & Form Guard Safety Post™ , when used as directed, and when subjected to a substantial fall arrest event, will result in deformation of the parts, and may result in some deformation or stress to the structure. The consequential repairs necessary to remove and replace Bridge & Form Guard Safety Post™ is an expected part of owning a fall protection system that is used to arrest a fall or take a load impact. Guardian Fall Protection is not responsible for the stability or quality of the structure that the Guardian Fall Protection Bridge & Form Guard Safety Post™ is mounted on or in, or for the quality of the workmanship of the placement of the embeds, or the concrete structure.
18. This device does not guarantee your safety, Guardian Fall Protection does not guarantee that no injury will occur if a person falls while working with this unit. Use of this device is only expected to reduce the likelihood of serious injury and limit the total fall distance if a fall occurs. Other means to limit the likelihood of a fall should be considered as well, such as work positioning, clean surfaces, weather considerations, proper footing, guarding, positioning, etc.
19. Once a worker has fallen, the employer must have a plan and a method to rescue him, and give treatment for any injury he may have sustained in the fall.
20. Do not use Guardian Fall Protection equipment until you have been trained and fully understand the device and these instructions. If you have any questions regarding the safe installation, use, or removal of Guardian Fall Protection safety equipment, or need additional instructions, call Guardian Fall Protection at 800/466-6385. Call Guardian Fall Protection for Spanish translation or assistance with other languages. Additional costs may apply.

21. Guardian Fall Protection is staffed with professional safety consultants, experienced in establishing and implementing fall protection programs, determining applications and applicability for fall protection equipment, and conducting training for field employees and supervisors. If you can benefit from these additional services, please call.
  
22. **DANGER** - Horizontal lifeline position is important to the operation of the post. A turnbuckle will be provided upon request and may be used to aid in final adjustment of the cable. But, it is never intended to be used to fully tighten the cable. **DO NOT JUDGE TENSION BY EYE!** Measure the sag in the cable at the mid point of the largest bay with a rule! **DO NOT** tighten the cable too much! Pre-sag (as designated herein), in the cable allows the cable to stretch, and the falling weight produces a better “sling angle” when the cable tightens, and reduces the forces on the safety posts.
  
23. **DANGER** - Do not over tighten the cable. The cable must be 3/8" 7 x 19 Galvanized Air Craft Cable, as supplied by Guardian Fall Protection or equal. Original systems are supplied with cable. Use of 3 (three) forged conventional wire rope clips, or equivalent - such as a drop forged fist grip clip, is recommended to develop the termination/connections. Use of thimbles in eye loops is recommended to reduce cable wear. Cables must have sag. Tightening the cable increases the force during a fall! The following table gives minimum sag for various spacing of posts. Increased sag in cable will result in increased total fall distance. In all cases the sag is set where we have experienced no discernable flexion of the Post or the Topper™ during final tightening of the cable. It is permissible to use more sag, and the total fall distance should be adjusted accordingly.
  
24. Note we have used a 6' conventional lanyard with a 900 lb. max. force shock pack, as sold by Preferred Safety for testing . Use of retractable lanyards should decrease your total fall distance by approximately 4'. (Assumes lock up in 2' and similar travel (braking mechanism inside the retractors) during deceleration on the retractor as compared to a shock absorbing lanyard.
  
25. If a distance between posts is in between the steps on the chart enclosed, use the higher sag distance. (For instance if the posts are spaced at 24 feet use the sag distance for 30' post spacing).

**MINIMUM SAG REQUIRED AND ANTICIPATED TOTAL FALL DISTANCE  
BASED ON 2 WORKERS BETWEEN POSTS THAT COULD FALL AT ONE TIME.**

BRIDGE & FORM GUARD SAFETY POST™ SPACING	MINIMUM INITIAL SAG <sup>1</sup>	MAXIMUM TOTAL ADDITIONAL SAG (below the top flange) of center point of cable at rest after fall.*	SHOCK ABSORBER OPENED	MIN. TOP FLANGE/ WALKING SURFACE DISTANCE FROM GROUND** with 6' Lanyard <sup>A</sup>	MIN. TOP FLANGE/ WALKING SURFACE DISTANCE FROM GROUND*** with Retractable
50'	4"	22"	<30"	14.33'	8.5'-10.3'****
40'	3"	22"	<30"	14.33'	8.5'-10.3'
30'	3"	16"	<35"	13.83'	8.0'-9.7'
20'	2"	8"	<35"	13.18'	7.3'-9.0'
10'	2"	6"	<38"	13.00'	7.0'-8.7'

<sup>1</sup> Note that this is the sag during erection and tightening the cable without any load on the cable. Once retractors, lanyards, or rope grab systems are hung on the cable, the cable will flex downward a small distance depending on the weight of the objects being hung.

**DO NOT READJUST THE CABLES, EVER, AFTER THE FALL ARREST EQUIPMENT IS ATTACHED.**

\* 220 lb. steel weight representing a 310 lb. human falling, and 310 lb dead weight - maximum test performance test per OSHA Subpart M Appendix C and Subpart R Appendix G. (Lighter persons will sag the cable less.)

\*\* Note: in no case did a PSP shock absorbing lanyard open fully nor did a retractor open more than its prescribed maximum stopping distance. In our opinion it is reasonable to assume that in an actual fall, no elongation of a shock absorber or a retractor greater than the distance shown would be expected.

\*\*\* Early in the fall arrest, a falling person is turned upright, and decelerating the entire time - once the lanyard (whether a locked retractor or a conventional shock absorbing lanyard) becomes taught. The probability of injury reduces remarkably when falling speed is decelerated and the body is falling in an upright posture.

\*\*\*\* Retractors tested lock up in 1” to 3” when a fall occurs (PSP 500 Series SRLs), although the allowable locking distance is 2’ (by ANSI/OSHA Standards). Because there is little or no shock in this application, there is no true freefall except the few inches until lock up. As a result, forces are quite small and the retractor brakes or shock absorber rarely are utilized, since our unique shock absorber toppers and special flexion poles are part of the system. That shock absorbency is shown in the stopping distance charts as the distance the cable sags (during a fall arrest) below its original position (shown as below top of steel walking surface). Therefore, our chart for retractors shows probable best case with PSP retractors as tested, and worst case (other compliant retractors). Review note above (\*\*\*) as competent persons

should see the benefit of using a system that decelerates and is substantially safer than any other form of fall arrest even during the first few feet of a fall, and therefore is a lesser hazard as required by OSHA.

<sup>A</sup> We Encourage the use of retractors.

End of Warnings -  
Instructions begin on the next page (7).

# INSTRUCTIONS for INSTALLING the Bridge & Form Guard Safety Post™ System

## Instruction for Installation Bridge & Form Guard Safety Post™ System

1. Insure that you and all other workers have completely read and thoroughly understand the warnings contained herein and on the equipment. Ask questions of your supervisor or your safety department or call toll free to Guardian Fall Protection at 800/466-6385 for help. Your supervisor is required to teach you to properly work in a safe manner, and to train you on the proper methods of installation of this device, the warnings and these instructions.
2. The Bridge & Form Guard Safety Post™ may be spaced up to 50" between posts. Any spacing over 50' must be cleared with the manufacturer and Back Stay Auxiliary Supports are required. See supplemental instructions.
3. It is safest to install the Bridge & Form Guard Safety Post™ while concrete beams for bridges are on the ground – and then fly the beam up with cranes or other hoists, so the system is in place and ready to use immediately after the beam is landed and secured. In the case of piers and concrete columns, it is obvious that the install must be done from the top of the pier/column once the concrete is poured and cured.
4. If required to climb on a column, pier, or bridge beam that is in the air, you must use properly applied fall arrest equipment using a safety system other than the Bridge & Form Guard Safety Post™ System until the Bridge & Form Guard Safety Post™ System is fully installed, and reviewed and approved for use by the on site competent person.
5. Someone in authority should have already laid out the placement and spacing of the system. Installers should be advised of the proper locations for the Bridge & Form Guard Safety Post™, preferably in writing and with a graphic representation if possible. Make sure installers understand. Information on the concrete strength, the location of cables, electrical conduit/boxes, reinforcing bars and strands, other embeds, and an understanding of when and where employees will be assigned to work, and number of employees that will be needed to work on a fall arrest system, are all considerations that should have been made when laying out the system. (See also 12 (a) through 12 (f) for some considerations planners should consider when determining layout of Bridge & Form Guard Safety Post™ Systems.
6. Each wire rope section between 2 posts is a tie off point for up to two persons weighing up to 310 lbs per person, per OSHA standards, and each person must use individual safety equipment that is rated for one person with maximum fall arrest forces developed of less than 900 lbs (using shock absorbers, rope grabs, or retractors for example that are rated at 900 lbs or less). The system is rated for two persons that may fall together at one time

between any two posts. So, more persons can be on the total length of the system, but only two can be between any two posts at one time!

7. The individual fall protection equipment should be limited in length to limit free fall and should contain a fall arrest shock absorber in the system to limit forces on the body to 900 lbs., or less.
8. REMINDER – USE ALTERNATE FALL PROTECTION AT ALL TIMES YOU ARE EXPOSED TO A FALL, INCLUDING IF YOU ARE EXPOSED WHILE INSTALLING THIS FALL PROTECTION SYSTEM!
9. Note: These instructions are not intended to be used by persons that are placing PVC or other pipe embeds in wet concrete forms. Concrete workers at precast and cast in place concrete operations should be skilled at placing embeds to insure they are plumb and level, proper depth, properly closed/sealed to prevent concrete infiltration, and to avoid any hazards associated with working on form work, at heights, or with wet concrete and concrete pumping and placing equipment, as well as hazards associated with strand tensioning operations that are beyond the scope of these instructions. If additional help is needed to place the embeds, call PSP for training. Project structural engineers of record should be consulted before placing embeds to insure they allow for changes in locations of rebar, drains, lifting eyes, strands, or other features or embedded construction materials.
10. If installation is by PVC pipe embed, that was placed during the concrete pour, the location of the posts has been predetermined by your qualified person. The PVC pipe embed (>3.5" i.d. and <= 4.0" i.d.) may be covered with tape or filled with foam which was used to prevent concrete infiltration. Remove tape or foam before beginning to install Bridge & Form Guard Safety Post™. Check the depth of the PVC embed to insure that no concrete has infiltrated the pipe from below. Depth must be at least 9" and not more than 12". If the top of the PVC tube is sticking up above the top of the concrete, measure from the top of the concrete, not the top of the tube - it is the embedment depth of the concrete that regulates depth required for supporting the Bridge & Form Guard Safety Post™.
  - a. Note: Bridge & Form Guard Safety Posts™ are nominally 75" tall, (w/Topper™ nominally 89" tall) and the hole depth varies the ultimate height of the end post (with the Topper™ ) the cable, and the intermediate posts. Slight elevations changes due to fluctuations in hole depth (between 9" and 12") do not affect the performance of the system.
  - b. Note: If concrete has infiltrated the PVC embed tube, resulting in less than 9" of depth in the concrete, it must be removed by drilling, coring, chipping or other method that does not break the concrete around the PVC embed. Otherwise, it will be necessary to abandon this embed and core a hole for the Bridge & Form Guard Safety Post™ or for another PVC embed.
  - c. See below for coring instructions if drilling or coring is necessary to fix a problem with a PVC embed.
11. Check the distance between PVC pipes to insure that they are not further apart than 50'. If the embeds are placed further than 50', your supervisor should be notified. Supplemental Instructions from Preferred Safety on Installation of Auxiliary Tie Backs must be followed.



Auxiliary Tie Backs are to be installed at the end posts of all cable runs that have any section between any two Bridge & Form Guard Safety Posts™ with spacing that is greater than 50'.

12. If installation is to be by coring of concrete,
  - a. clear the areas on the concrete where a qualified and competent person has determined is the best location for the Bridge & Form Guard Safety Post™.
  - b. Determine that the concrete is a minimum 4,000 lb. It is likely that most structural concrete is 4,000 to 6,000 lb. If the area is some other material, a composite, or some other configuration identified in these instructions and warnings, do not install the Bridge & Form Guard Safety Post™ – call Guardian Fall Protection at 800/466-6385 and ask for additional engineering and technical assistance. Additional costs will apply.
  - c. Determine that the concrete is solid and in good condition and not rotted, broken/cracked, or spalling to a degree that the material is substantially weakened. If concrete is not solid and in good condition, do not use the Bridge & Form Guard Safety Post™ in this area.
  - d. Determine location of rebar or reinforcing strands in precast and pre/post tensioned concrete, as well as any other embedded objects such as embeds, conduits, wires, heating coils, or any other objects. Avoid hitting these.
  - e. The edge of the core hole or embed should be a minimum of 1'3" from any edge.
  - f. In a bulb-tee type bridge beam, which tapers inwardly, the concrete cover (at base of embed or core hole) should be ½" to 1" or more or as specified by the bridge or structural engineer.
  - g. Once determined where the Bridge & Form Guard Safety Post™ will go, drill the core hole 9" to 12" deep in the concrete. The units are designed to work in minimum 4000 lb. concrete. In higher grade concrete the strength increases. However, do not reduce the embedment depth without new engineering. (Note: Bridge & Form Guard Safety Post™ are nominally 75" tall, and the hole depth varies the ultimate height of the end post (with the Topper™) the cable, and the intermediate posts. Slight elevations changes due to fluctuations in hole depth (between 9" and 12") do not affect the performance of the system.
  - h. Competent craftsman should be familiar with and trained in concrete coring hazards. This may include, but is not limited to, exercising caution and wear protective equipment customary for use when drilling/coring concrete, cleaning concrete, and/or working with electric drills (if applicable) around wet environments. This includes but is not limited to eye, ear, face, respiratory (silica/nuisance dust), hand, and head protection. It is recommended to use water spray on drilling so dust is minimized.
  - i. Use a safety air chuck (30 psi or less), a vacuum, and/or a brush to clean the hole of loose concrete and dust.
13. In the event that drilling fractures the concrete or otherwise does not work well, based on the criteria given, it is necessary to abandon that hole, and move at least 1'3" away to start over. If this is not practicable, do not use this hole. Guardian Fall Protection, at 800/466-6385 for technical assistance. Damage to the concrete structure may also have to be reported to your structural engineer of record. Additional nominal cost for engineering services may be incurred to make it a useable installation point.
14. Receiver holes – cored or embeds – are now ready to receive the Bridge & Form Guard Safety Post™.

15. Slip the patented Shock Attenuating Topper™ over the end of the 75" Bridge & Form Guard Safety Post™ (75" nominal aluminum end post) that has a 5/8" hole drilled through. Align the holes in the base of the Topper™ with the holes in the end of the aluminum end post. Slide one washer onto the bolt. Insert the bolt into the Topper™ through the holes in the aluminum end post to and out the other side of the Topper™. Slide a washer over the end of the bolt, and then thread on the Nylock™ (or equal) nut that was supplied with your Topper™. It is not necessary to tighten the nut fully – only to engage the nut so that at least two threads of the bolt are showing beyond the end of the nylon nut.
16. Slip the post into the receiver/PVC embed hole, and insure it drops down the full intended depth, and then rotate the post to allow the side of the Topper™ that will have the cable attached to align flat towards the direction of the of the safety cable.
17. The furthest point of the system (including any intermediate post s) and the final end post that will receive the cable from the first end post installed in item 16 above, should be determined and a safety cable at least that length plus about 5 to 8 feet extra (for easiest installation) should be on hand. (If sized and supplied by PSP, use the appropriate pre-made cable) If to be cut on site to size, use the bulk spooled 3/8" 7x19 GAC supplied by PSP with your system and cut it to size as indicated, using standard cable cutters. (Do not torch cut safety cable.)
  - a. In the simplest systems there will be no intermediate posts and only two end post s spaced 10' to 50' apart.
18. In a continuance system, where the cable run is longer than between only two end posts an intermediate post must be placed within 50' of the end post, and every 50' or less thereafter, until reaching the desired end point. PSP recommends runs of 150' to 200' or less, and does not recommend using longer runs than 250' to 300' as it is quite difficult to handle, install, and take down that much cable, and tensioning may be difficult. Insert any intermediate posts in this line by inserting the bottom end of the post (that does not have the hole drilled through) into the receiver hole/PVC embed and insure that it drops down the full intended depth. Turn the intermediate post so the holes face the direction the cable is to be installed and route the cable through the holes during rigging.

Note: DANGER – DO NOT ATTEMPT TO MOUNT A TOPPER TO A TALL (90") INTERMEDIATE POLE AND ATTEMPT TO USE IT AS AN END POLE. INTERMEDIATE POLES MAY ONLY BE USED AS INTERMEDIATES.

19. Insert the final end post similar to instructions instruction 15 and 16 above. Recheck the total distance as pointed out in instruction 17 above.
20. Attach the full length of cable as follows. Install one end on the inboard plate of the Topper™, as shown in the diagrams attached, using standard rigging practices for a termination eye in wire rope, in accordance with the wire rope and wire rope clip manufacturer's instructions. Install the required amount of wire rope clips (3 are recommended by PSP) and turn back the required amount of 'tail' on the wire rope, and tighten the wire clips – properly spaced and torqued as noted in the instructions. If using a safety shackle at the end of the cables, it can be attached to the cable and then attached to the Topper™ or it can be attached to the Topper™ first, and then the cable attached to it as noted above.

- a. If using a pre-made swaged-eye cable end, attach cable to the eye of the Topper™ plate that is flat-faced nearest the direction of the cable run using a safety shackle supplied by PSP, and tighten the shackle nut. Pin the shackle nut using a cotter pin, spring pin, or hitch key.
21. Insert the loose end of the wire rope into/through both of the two holes in the first intermediate post (if any) and sequentially through the two holes in the other intermediate posts in line (if any). The cable will droop between each post segment.
  22. Pulling the rope somewhat taught at all the other segments, adjust the length of the cable for the run to be within 6" of the distance\* between the two end post s. (1' if using a turnbuckle.)  
\*NOTE: Any "extra" cable can be coiled and secured at one end or field cut after connections are made, leaving at least a 3" tail beyond the last wire rope clip. However, it is more convenient to have a long tail during installation and tightening.
  23. If using a turnbuckle, open the turnbuckle fully leaving at least three threads showing inside the barrel.  
NOTE: DO NOT open the turnbuckle too far; threads must show on both sides of the barrel at all times. If using a safety shackle, see instruction above for the first end post.
  24. If using wire rope clips only, thread wire rope through the eye of the Topper™ plate that is flat-faced nearest the direction of the cable run. Otherwise thread the wire rope through the eye/or jaw of the turnbuckle, or the safety shackle, using standard rigging practice. Use a minimum of three clips to secure the cable. Following the wire rope clip manufacturer's guidelines included in this delivery for installation of wire rope clips for spacing and length of turn back (tail), install the final wire rope clips (3 recommended). Do not fully tighten the wire rope clips at this point.
  25. Now that the wire is attached at both ends, there is likely to be substantial sag between all posts - especially on longer runs. Using two men, one man should loosen the wire rope clips installed in Instruction 24 above, while the other man holds the tail of the wire rope. The first man should pull on the safety cable and guide it through the eye loop (around the shackle, turnbuckle, or Topper™) and through the wire rope clips that are loosened, and the second man should assist by pulling on the tail. This is a common maneuver for qualified riggers to tighten a cable that is to be terminated with wire rope clips. Riggers should wear gloves when handling wire rope to avoid pinching and cuts. Once the cable is quite snug. One or more of the wire rope clips can be tightened temporarily to hold the safety line.
  26. Check the sag in the cable at the center point between the two posts it should be at least as much as is shown in the charts in these instructions.
    - a. In between any set of posts with the longest spacing, or 50 feet, press down gently on the cable using only moderate hand pressure. The adjoining bays between other posts should tighten up to nearly horizontal, at which time a measurement should be taken to insure that the sag in the bay being measured is at least the amount shown in the charts included herein.
    - A. If using a turnbuckle, have worker measure the sag in the cable with a rule while holding it down with slight pressure as described above, (see chart in instructions) while another worker turns the turnbuckle until the sag is the amount specified in the chart or more.

- B. Using a turnbuckle is optional. We suggest that the potential for a worker over tightening the cable, plus the added cost and maintenance of the turnbuckles, outweigh any benefit gained in having the turnbuckle, such as in making the final sag adjustments, and most customers surveyed to date agree. We offer turnbuckles for those that prefer them.

**!!!! DO NOT OVER TIGHTEN THE CABLE !!!!**

The cable sag is important to allow stretch of the cable and to reduce the force on the safety posts!

**!!!! DO NOT OVER TIGHTEN THE CABLE !!!!**

The posts will rock or shift inside their receiver holes (PVC embed), and the Toppers™ will rock on top of the Bridge & Form Guard Safety Post™ in the direction of the pull due to allowable over sizing of these connections, and the system will be tensioned during the cable tightening process. However, do not tension beyond the amount shown in the tables, and DO NOT TENSION TO A POINT THAT THE UPPER Topper™ PLATES BEND UNDER THE TENSION OF THE CABLE.

NOTE: If using 90" Intermediate posts in this Bridge & Form Guard Safety Post™ system, see "Additional Information" attached herein.

27. Once the system is finally tensioned, all bolts on wire rope clips and all turnbuckles and shackles should be tightened securely with torques as shown on the literature. Turnbuckles should be moused with galvanized wire to avoid having any person change the setting. All bolts, nuts, and wire rope clips should be inspected along with all other safety equipment each shift.
28. You are now ready to hook a safety lanyard or a retractor to the horizontal cable and use it for fall arrest. Each user should be fully trained in the use of the system its limitations, and the procedures for safely performing each of their work tasks. At a minimum this included properly wearing an approved safety harness and a safety lanyard not greater than 6' long with shock absorbing features that reduce inline forces to less than 900 pounds and limiting free fall to 6' or less.

## ADDITIONAL INFORMATION

1. When installing a continuance system (for example 4 poles over 145' with the 2 end poles with Toppers™ and 2 center poles as intermediates), a 90" Intermediate Post must be used in between two of the 75" End Posts. See Instruction 18 above for installation of a standard intermediate post.

NOTE: INTERMEDIATE POSTS CAN NEVER BE CONVERTED TO AN END POST!

2. End poles, (75" overall and 90" nominal with a topper attached) may be used as intermediates. This may occur when you don't have enough intermediates to cover your planned continuation system. Or, more commonly when an end pole is used temporarily on a bridge beam, as an example, and then an adjacent bridge beam is installed, and it is desirable to have a continuous cable running from end of one beam, across a pier/diaphragm top, to the end of the second beam. This also may occur when laying forms, and the leading edge continues out past another column where an end post may be mounted.
  - a. To use an end post as an intermediate, disconnect the termination of the previous cable, and feed the end of the longer continuation cable through the eyes of both plates of the Topper™ and continue until reaching the desired end post, and connect as before. Note, the end post (with a Topper™ can be used as an intermediate post ***BUT THE INTERMEDIATE POST CAN NEVER BE CONVERTED TO AN END POST.***
3. If using a Guardian Fall Protection Bridge & Form Guard Pass-Thru™ attachment on the top of the 90" Intermediate Posts, see Bridge & Form Guard Safety Post™ Pass-Thru Addendum for more information.
4. Whenever readjusting cables or adding posts or continuation systems, always recheck the minimum sag, by testing for sag in the largest bay, as instructed in Instruction 25 and 26 above. It is allowable to have more sag throughout the system, but not less. Increased sag will increase your fall distances slightly, but also reduces forces on the end posts.
5. See chart enclosed for torque values of wire rope nuts as specified by the wire rope clamp manufacturer.
6. See enclosed drawings which portray a post system fully assembled and other installation and parts graphics.
7. When using a longer cable than is necessary, reduce the length of the cable by loosening the wire rope nuts and sliding the cable through the facing eye of the Topper plate and through the wire rope clips. Store spare cable by coiling it and hanging it on the end, out of the way, near the Bridge & Form Guard Safety Post™. Always check the torque of the wire rope nuts and ensure that the clamps are tight.
8. In the event that circumstances require that a system cannot be installed per these instructions, special permission must be obtained from PSP, for your situation. Call PSP for additional engineering assistance. Additional charges will apply.

Enclosures: -Drawings/Sketches (I-1, I-2, I-3, I-4)  
-Saddle-style Wire Rope Guide (Crosby - Applies to Crosby or equal as supplied by PSP)

\*Patents: 6,439,344; 6,688,427B2; 6,763,910; 6,173,809 may apply. Other Pats. Pending (Applies to all references to “patented” herein.)

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**Note and Warning: Preferred Safety reserves the right to change and improve specifications design configurations, components and details at any time without notice. Check with Preferred Safety for any newer versions of products or instructions or warnings during the life of your product. The product is developed in accordance with OSHA standards in effect at the time of manufacturing. Users should remain aware of any changes in Safety and Health Laws or Standards in the Jurisdiction in which the user is operating and using the PSP products.**

– END –

# CROSBY CLIPS WARNINGS AND APPLICATION INSTRUCTIONS



**G -450  
(Red-U-Bolt)**

## !! WARNING !!

- Failure to read, understand, and follow these instructions may cause death or serious injury.
- Read and understand these instructions before using clips.
- Match the same size clip to the same size wire rope.
- Prepare wire rope end termination only as instructed.
- Do not use with plastic coated wire rope.
- Apply first load to test the assembly. This load should be of equal or greater weight than loads expected in use. Next, check and retighten nuts to recommended torques (see Table 1, this page).

Efficiency ratings for wire rope end terminations are based upon the catalog breaking strength of wire rope. The efficiency rating of a properly prepared loop or thimble - eye termination for clip sizes 1/8" through 7/8" is 80%, and for sizes 1" through 3-1/2" is 90%.

The number of clips shown (see Table 1) is based upon using RRL or RLL wire rope, 6x19 or 6x37 Class, FC or IWRC; IPS or XIP. If Seale construction or similar large outer wire type construction in the 6 x 19 Class is to be used for sizes 1 inch and larger, add one additional clip. If a pulley (sheave) is used for turning back the wire rope, add one additional clip.

The number of clips shown also applies to rotation-resistant RRL wire rope, 8x19 Class, IPS, XIP, sizes 1-1/2 inch and smaller; and to rotation-resistant RRL wire rope, 19x7 Class, IPS, XIP, sizes 1-3/4 inch and smaller.

For other classes of wire rope not mentioned above, we recommend contacting Crosby Engineering at the address or telephone number on the back cover to ensure the desired efficiency rating.

For elevator, personnel hoist, and scaffold applications, refer to ANSI a17.1 and ANSI A10.4. These standards do not recommend U-Bolt style wire rope clip terminations. The style wire rope termination used for any application is the obligation of the user.

For OSHA (Construction) applications, see OSHA 1926.251.

**1.** Refer to Table I in following these instructions. Turn back specified amount of rope from thimble or loop. Apply first clip one base width from dead end of rope. Apply U-Bolt over dead end of wire rope - live end rests in saddle (Never saddle a dead horse!). Tighten nuts evenly, alternate from one nut to the other until reaching the recommended torque.



**2.** When two clips are required, apply the second clip as near the loop or thimble as possible. Tighten nuts evenly, alternating until reaching the recommended torque. When more than two clips are required, apply the second clip as near the loop or thimble as possible, turn nuts on second clip firmly, but do not tighten. Proceed to Step 3.



**3.** When three or more clips are required, space additional clips equally between first two - take up rope slack - tighten nuts on each U-Bolt evenly, alternating from one nut to the other until reaching recommended torque.



### **4. IMPORTANT**

Apply first load to test the assembly. This load should be of equal or greater weight than loads expected in use. Next, check and retighten nuts to recommended torque. In accordance with good rigging and maintenance practices, the wire rope end termination should be inspected periodically for wear, abuse, and general adequacy.

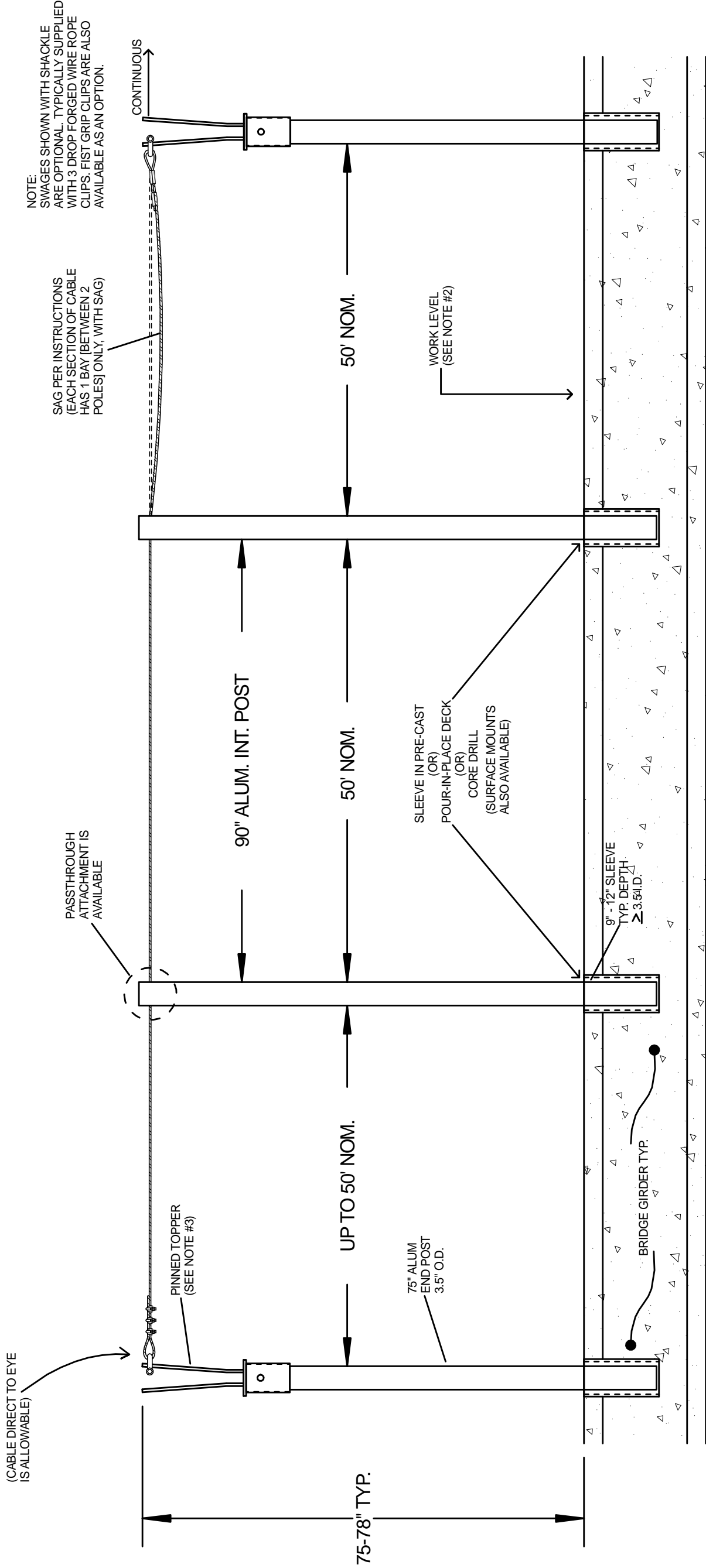
**Table 1**

Clip Size (Inches)	Rope Size (Inches)	Minimum No. Of Clips	Amount of Rope to Turn Back in inches	*Torque in Ft. Lbs.
1/8	1/8	2	3-1/4	4.5
3/16	3/16	2	3-3/4	7.5
1/4	1/4	2	4-3/4	15
5/16	5/16	2	5-1/4	30
3/8	3/8	2	6-1/2	45
7/16	7/16	2	7	65
1/2	1/2	3	11-1/2	65
9/16	9/16	3	12	95
5/8	5/8	3	12	95
3/4	3/4	4	18	130
7/8	7/8	4	19	225
1	1	5	26	225
1-1/8	1-1/8	6	34	225
1-1/4	1-1/4	7	44	360
1-3/8	1-3/8	7	44	360
1-1/2	1-1/2	8	54	360
1-5/8	1-5/8	8	58	430
1-3/4	1-3/4	8	61	590
2	2	8	71	750
2-1/4	2-1/4	8	73	750
2-1/2	2-1/2	9	84	750
2-3/4	2-3/4	10	100	750
3	3	10	106	1200
3-1/2	3-1/2	12	149	1200

**If a pulley (sheave) is used for turning back the wire rope, add one additional clip.**

If a greater number of clips are used than shown in the table, the amount of turnback should be increased proportionately

\*The tightening torque values shown are based upon the threads being clean, dry, and free of lubrication.



(CABLE DIRECT TO EYE IS ALLOWABLE)

NOTE:  
SWAGES SHOWN WITH SHACKLE ARE OPTIONAL. TYPICALLY SUPPLIED WITH 3 DROP FORGED WIRE ROPE CLIPS. FIST GRIP CLIPS ARE ALSO AVAILABLE AS AN OPTION.

SAG PER INSTRUCTIONS (EACH SECTION OF CABLE HAS 1 BAY (BETWEEN 2 POLES) ONLY, WITH SAG)

PASSTHROUGH ATTACHMENT IS AVAILABLE

PINNED TOPPER (SEE NOTE #3)

75-78" TYP.

UP TO 50' NOM.

75" ALUM END POST 3.5" O.D.

90" ALUM. INT. POST

50' NOM.

50' NOM.

SLEEVE IN PRE-CAST (OR) POUR-IN-PLACE DECK (OR) CORE DRILL (SURFACE MOUNTS ALSO AVAILABLE)

WORK LEVEL (SEE NOTE #2)

BRIDGE GIRDER TYP.

9" - 12" SLEEVE TYP DEPTH ≥ 3.5" I.D.

**MULTI-SPAN APPLICATION WITH INTERMEDIATE POSTS**

(TYP. POURED DECK, PRECAST BEAMS/ GIRDERS TOP OF PIERS, ETC.)

- NOTES:
1. TWO PERSON FALL ARREST BETWEEN SPANS-900 LBS S/A LANYARD OR RETRACTOR.
  2. SAFE WORK HEIGHT WITH 6' LANYARD 14' & WITH RETRACTOR 8' - 1/2' OR MORE. (AT 501 SPACING, LESS WITH CLOSER POSTS)
  3. REMOVEABLE PREFERRED SAFETY PATENTED SHOCK ATTENUATING PLATE TOPPER TM, PATENT #6763910. OTHERS PENDING
  4. CONTINUOUS SYSTEM OF ANY LENGTH, LONGER CABLE MAY INCREASE OVERALL FALL DISTANCE. SEE INSTRUCTIONS.

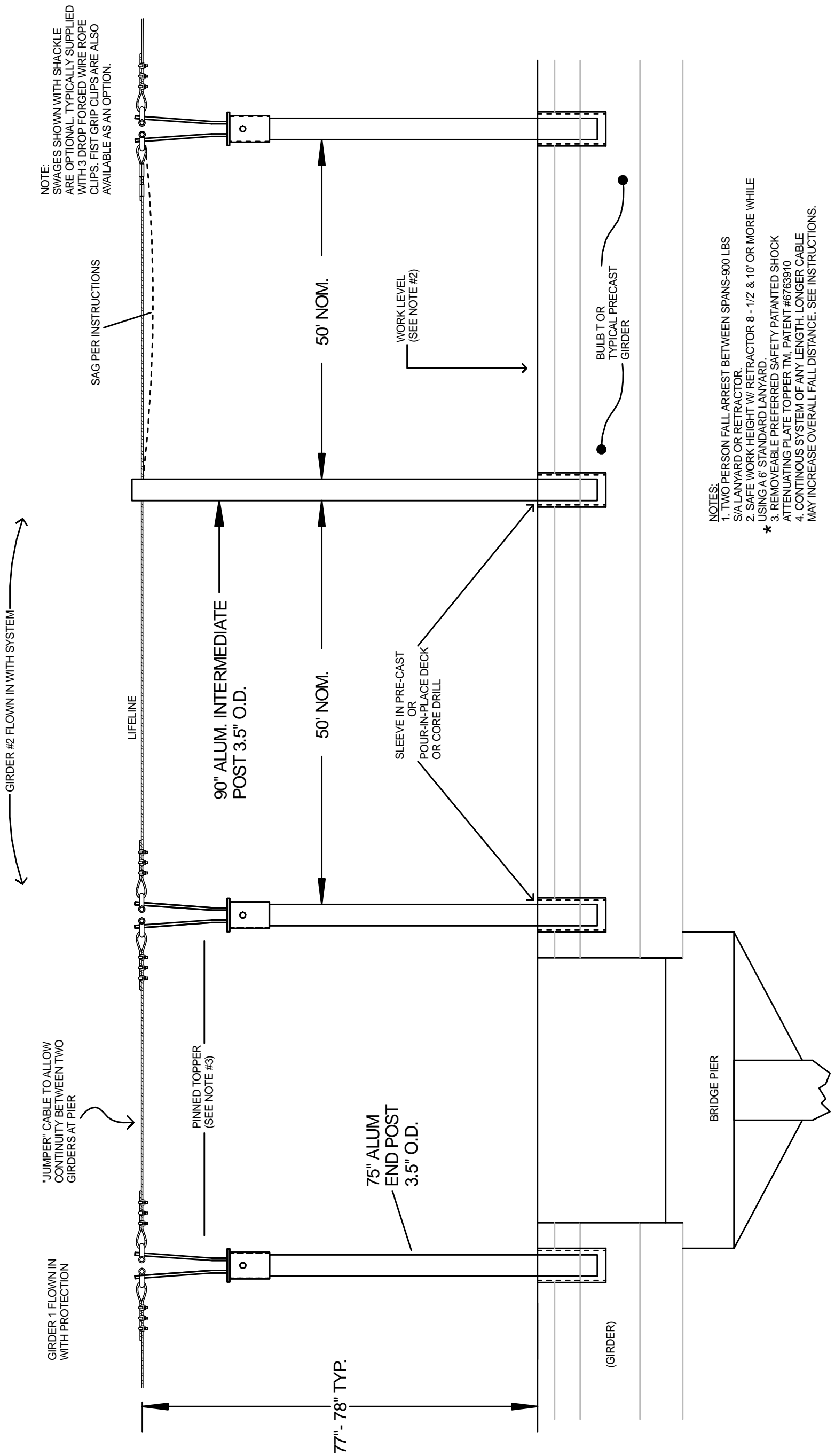
Revision note:		Checked by	Approval date	Checked
File name		Prior revisions - date		
Rev.		BRIDGEPRE-11		
Sheet		M		
Title/ Name: BRIDGE PRECAST SAFETY SYSTEM MULTI- SPAN EXAMPLE				
(A/QP/367ILLUSTRATIONS)				

**Guardian Fall Protection**  
 6305 S 231st Street, Kent, WA 98032  
 Phone: 1.800.466.6385  
 Fax: 1.800.670.7892

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Title/Name: BRIDGE PRECAST SAFETY SYSTEM MULTI-SPAN EXAMPLE METHOD TO JOIN TWO BRIDGE GIRDER SYSTEMS		Revision note:	
(A/QP/3671ILLUSTRATIONS)	Rev.	File name BRIDGEPRE-12	Sheet
Prior revisions - date		Checked	Approval date
		Checked	1/22/10
		Designed by BAC	Drawn by GPC
		Guardian Fall Protection	
		6305 S 231st Street, Kent, WA 98032	
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		12	



- NOTES:
1. TWO PERSON FALL ARREST BETWEEN SPANS-900 LBS S/A LANYARD OR RETRACTOR.
  2. SAFE WORK HEIGHT W/ RETRACTOR 8' - 1/2' & 10' OR MORE WHILE USING A 6' STANDARD LANYARD
  3. REMOVEABLE PREFERRED SAFETY PATENTED SHOCK ATTENUATING PLATE TOPPER TM, PATENT #6763910
  4. CONTINUOUS SYSTEM OF ANY LENGTH. LONGER CABLE MAY INCREASE OVERALL FALL DISTANCE. SEE INSTRUCTIONS.

**MULTI-SPAN APPLICATION  
WITH INTERMEDIATE POSTS**

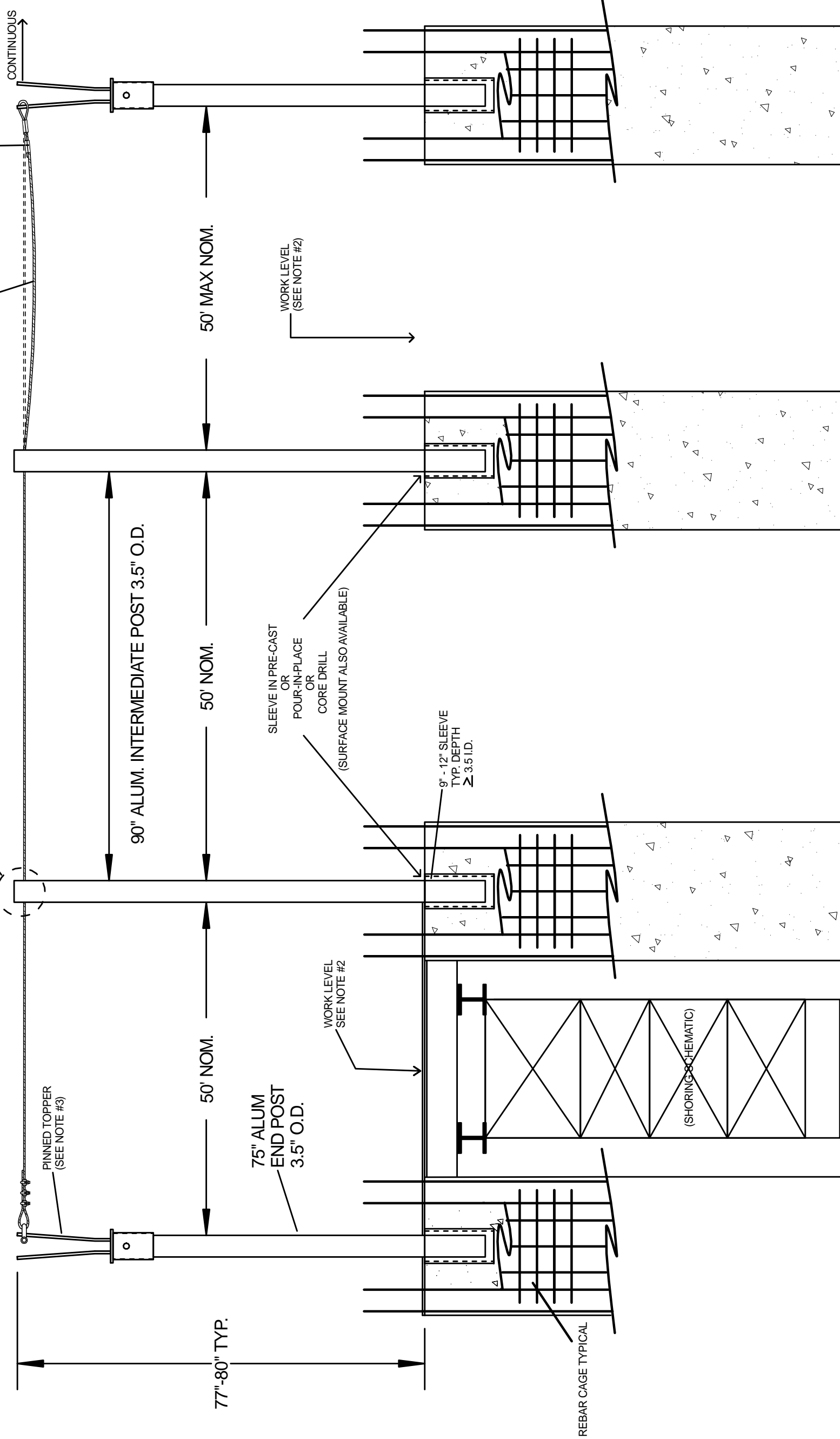
(TYP. WITH PIERS, COLUMNS, DECK POURS,  
SETTING, FORMING, SHORING PANELS, PANS, ETC.)

- NOTES:**
1. TWO PERSON FALL ARREST BETWEEN SPANS-900 LBS S/A LANYARD OR RETRACTOR.
  2. SAFE WORK HEIGHT WITH 6' LANYARD 14' & WITH RETRACTOR 8' - 1/2' OR MORE. (LESS WITH CLOSER POST SPACING)
  3. REMOVEABLE PREFERRED SAFETY PATENTED SHOCK ATTENUATING PLATE TOPPER TM, PATENT #6763910. OTHERS PENDING
  4. CONTINUOUS SYSTEM OF ANY LENGTH. LONGER CABLE MAY INCREASE OVERALL FALL DISTANCE. SEE INSTRUCTIONS.

**NOTE:**  
SWAGES SHOWN WITH SHACKLE  
ARE OPTIONAL. TYPICALLY SUPPLIED  
WITH 3 DROP FORGED WIRE ROPE  
CLIPS. FIST GRIP CLIPS ARE ALSO  
AVAILABLE AS AN OPTION.

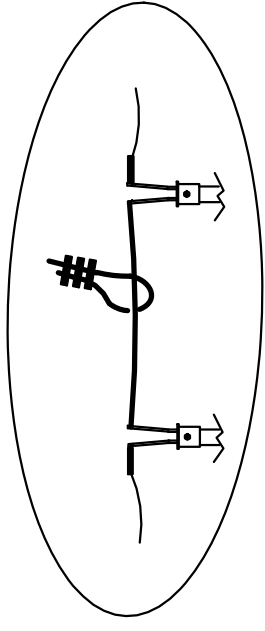
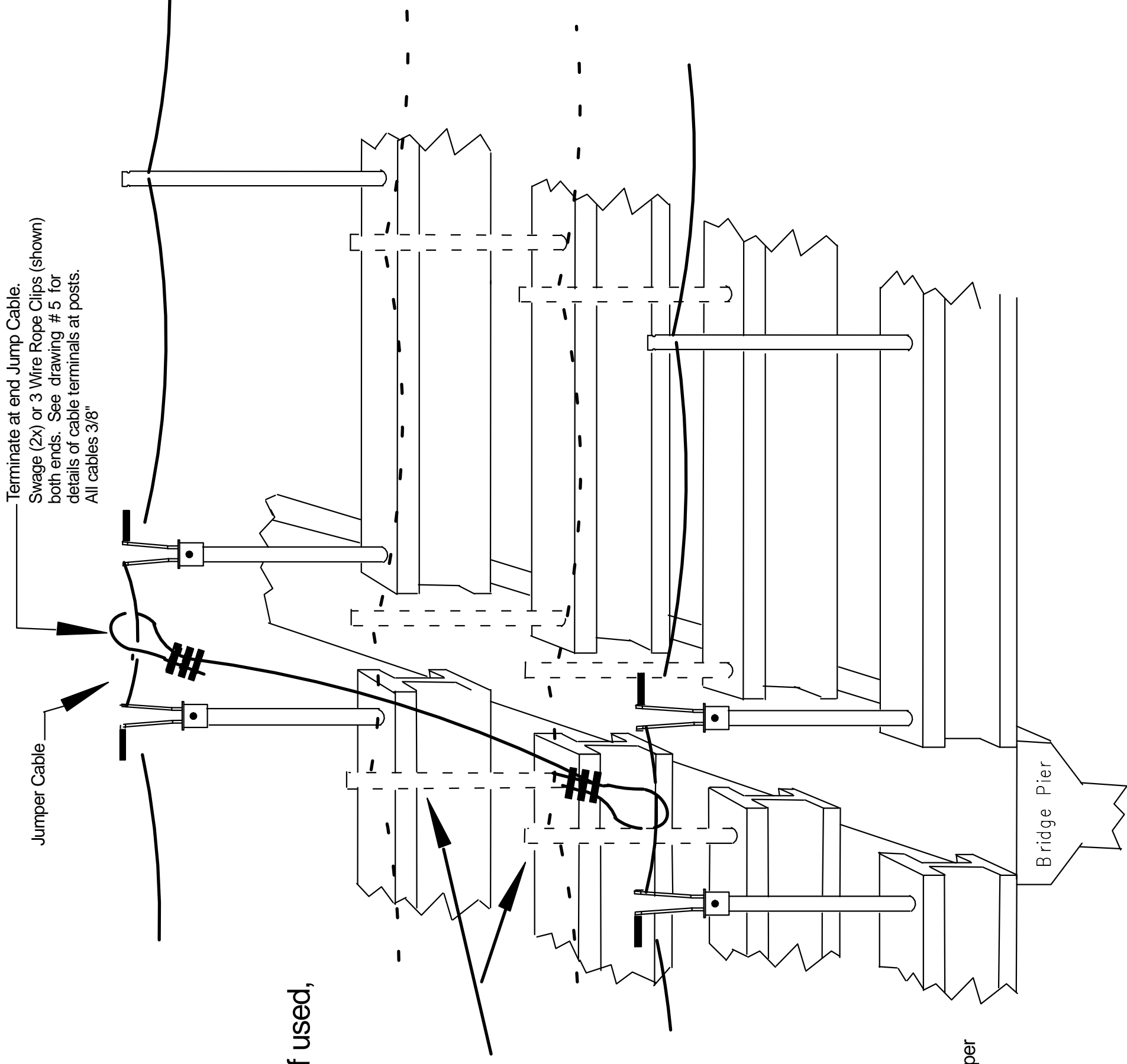
SAG PER INSTRUCTIONS  
(EACH SECTION OF CABLE  
HAS 1 BAY [BETWEEN 2  
POLES] ONLY, WITH SAG)

PASSTHROUGH  
ATTACHMENT IS  
AVAILABLE



Title/Name: BRIDGE PRECAST SAFETY SYSTEM MULTI-SPAN EXAMPLE		Revision note:	
(A/GP/367ILLUSTRATIONS)		File name	Rev.
BRIDGEPRE-13		Sheet	
Prior revisions - date		Checked	Approval date
		8/17/10	Checked by
		GPC	Drawn by
		BAC	Designed by
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<b>13</b>			

Typical center/intermediate slider posts are optional, and if used, lifeline may go over or under jumpers.



Typical connection slider cable to jumper at terminal crossing line

Title/ Name: <b>BRIDGE PIER, BRIDGE PAN JUMPER, CROSSING CABLE</b>		Revision note:		File name <b>BRIDGEPIRE-14</b>	Rev.	Sheet
Designed by <b>BAC</b>	Drawn by <b>CLS</b>	Checked by	Approval date / /	Checked	Prior revisions- date	
<b>Guardian Fall Protection</b> 6305 S 231st Street, Kent, WA 98032 Phone: 1.800.466.6385 Fax: 1.800.670.7892			© 1995 - 2014 All rights reserved. No one except PSP customers may possess this drawing. All drawings remain as PSP property.		<b>I-4</b>	