1 Status

1.1 Update of existing policy, effective 11/18/11.

2 Purpose

2.1 To eliminate fall hazards in the work place and to make **tie off the last resort.**

3 Applicability

3.1 This policy applies to all subsidiary companies and departments of The Cianbro Companies.

3.2 All organizations are required to comply with the provisions of this policy and procedure. Any deviation, unless spelled out specifically in the policy, requires the permission of the Corporate Safety Officer or designee.

4 Definitions

4.1 Anchorage: A secure point of attachment for lifelines, lanyards and or deceleration devices.

4.2 Controlled Access Zone (CAZ): It is an area in which certain work can take place without the use of a guard rail systems, net system or personal fall arrest systems and access to the zone is controlled.

4.3 Free Fall: The act of falling before the fall arrest system begins to apply force to the fall arrest system.

4.4 Free Fall Distance: The vertical distance that the fall arrest attachment point of the body harness falls from the beginning of the fall to the point that force is applied to the fall arrest system. This does not include the deceleration distance, and the elongation to lanyard and lifeline.

4.5 Leading Edge: Any edge of a floor, roof, deck or formwork for a floor, or other walking working surface. A leading edge is considered to be an “unprotected side and edge” during periods when it is not actively and continuously under construction.

4.6 Walking Working Surface: Means any surface, vertical or horizontal on which team members walk or work, including but not limited to floors, roofs, ramps, bridges, runways, formwork, concrete reinforcing steel and water.

4.7 Warning Line: Is a barrier erected to warn team members that they are approaching the unprotected edge of the working surface. The area inside of the barrier does not require fall protection or fall arrest systems to perform work.

5 Policy

5.1 The use of fall protection at the site shall follow or exceed Subpart M 1926.500 and Cianbro’s 100% Fall Protection Policy. Whenever our client’s fall protection policy is more stringent than Cianbros, the client’s rules prevail.

6 Responsibilities

6.1 The Corporate Safety Officer or designee is responsible for providing approval for the use of the Fall Protection Program under this policy.

6.2 The top Cianbro manager of the job site is responsible for the implementation of this policy on the job site.

6.3 Corporate Safety is responsible for maintaining this document.

7 Fall Protection Program Index

7.1 Planning

7.1.1 The thought process required in planning for elevated work hazards (work at any height above adjacent surface) consists of three fundamental considerations. In order of priority they are:

A. Eliminate – the HAZARD. Make it impossible for someone to fall. For example: prefabricate or build on the ground.

B. Control - the HAZARD. Control the work environment so that people cannot fall using engineering or administrative controls. For example: build guardrails, handrails, use specialty equipment – aerial lifts, stairways, scaffolding, etc. or design safety into the construction process (pre-drilled holes for life line systems for steel erection).

C. Protect – YOURSELVES from the HAZARD. Use personal protective equipment. For example:
- Tie off, using a full body harness with shock absorbing lanyards.
- Fall arrester blocks, lifelines, etc.

Tie off is the LAST resort – you have to fall before you can use it. Our goal is to ELIMINATE falls.

7.1.2 Before any elevated work is begun in Cianbro, the project supervisor is responsible to:

- Plan the Work – Communicate to and obtain feedback from the crew performing the work on identification of hazards, corrective action and retrieval method required.

- Develop a Written Plan for Elevated Work Activities. (This can be incorporated into your regular activity plan). Send this plan to the Safety Department immediately and update at least every three weeks. Share the final plan with the crew performing the work. The plan must include provisions for rescue in the event of a fall.

- Activity plans must detail specific anchorage points, which are clearly adequate to support personal tie off. Such things as electrical conduit, wood guardrails, bolts, 3/8 inch all-thread rod, hand rail stations, welded pipe< 2 inches, cable tray slats, threaded rod suspended with malleable iron c-clamp attachment, fiberglass grating, hollow aluminum ladder rungs, etc. are not adequate anchorage points.

7.2 Cianbro Fall Protection Policy

7.2.1 Unprotected sides or edges of walking/working areas six feet or more above a lower level (see note below) shall have team member protection from falling by the use of guard rails, safety nets or personal fall arrest systems. This is Cianbro's 100% fall protection policy and if tie off is the fall protection method chosen, then double shock absorbing lanyards and body harnesses shall be utilized where required in order to maintain 100% tie off. (Use of body belts is prohibited). 100% tie-off means that at least

one lanyard is hooked to the anchorage point at all times (see section 7.2.2 for acceptable lanyards). The use of positioning systems **does not** take the place of requiring a full body harness and lanyards. Use for positioning only.

Note: *According to OSHA*, lower levels means those areas or surfaces to which a team member can fall. Such areas or surfaces include, but are not limited to, ground levels, floors, platforms, ramps, runways, excavations, pits, tanks, material, water, equipment, structures, or portions thereof. Notice that this includes mud and any other surface.

Cianbro's disciplinary procedures appear to become effective only when team members are working six feet or more above a lower level. However, in particularly hazardous situations where serious injury could result from a fall of less than six feet, the fall protection policy with associated disciplinary action will be strictly enforced as if it were a fall exposure of six feet or more. We also strongly encourage lowering the fall protection six-foot criteria for job wide or specific situations whenever there is any doubt about the possibility of serious injury resulting from a fall of 0-6 feet. Please remember – our goal is to eliminate all fall hazards.

Note: Excavations not readily seen because of plant growth or other visual barrier, wells, pits, shafts and similar excavations six feet or more in depth shall be protected by guard rails, fences, barricades or covers.

- Work under the OSHA marine standards (1915, 1917, 1918) requires fall protection at 5'.
- Work under the OSHA general industry standard (1910) requires fall protection at 4'.

7.2.2 Fall Protection Implementation

A. Fall Protection Training shall be conducted by a competent person annually for all Cianbro team members required to work at elevated heights>6 feet and prior to each job site specific activity involving fall hazards, working at elevated heights>6 feet.

B. Annual fall protection training shall be conducted by a competent person for all Cianbro team members required to work at elevated heights >6 feet addressing / covering the following at a minimum:
   - The most common fall hazards found in the work area: plus any specific ones that could be expected to encounter.
   - The use, proper installation, and operation of guardrail systems, personal fall arrest systems, safety net systems (if applicable, since Cianbro rarely uses nets), warning line systems, safety monitoring systems (Cianbro does not allow the use of safety monitoring systems), controlled access zones, horizontal life line systems (rat lines) and other types of protection systems to be used.
   - The limitations on the use of mechanical equipment during the performance of roofing work on low-sloped roofs.
   - The limitations, use, care and storage of fall protection systems including personal protection equipment, like full body harnesses and lanyards.
   - The role and responsibilities of team members to follow and comply with fall protection plans.

C. Job site specific activity training shall be conducted by a competent person addressing / covering the following at a minimum:
   - The nature of fall hazards in the work area.
   - Solutions to those fall hazards identified.
   - Correct procedures for erecting, maintaining, disassembling, and inspecting fall protection systems/PPE to be used.
   - Correct method for use and operation of personal and other fall arrest systems including positioning systems if being used.
   - The limitations of mechanical and fall protection systems.

- The role and responsibilities of each team member to comply with fall protection plans.
- Retraining is required when there are changes in the work place or changes in the types of fall protection systems / equipment to be used render previous training obsolete.
- Retraining is required when inadequacies in an affected team member's knowledge or use of fall protection systems or equipment indicates that the team member has not retained the requisite understanding or skill.

D. Certification of Training
   - A written certification record must be maintained showing the latest annual training for team member. The record must include; team member name, date of training, and signature of the trainer.
   - Job specific activity plans must be completed for all activities involving elevated work (>6 feet).
   - Any retraining that may be necessary must also be documented.
   - Annual training documents must be sent to the Corporate Organizational Development Department.

Please remember that no fall protection device can substitute for good fall prevention.

E. Some basic devices utilized as part of the Cianbro fall protection policy are shock absorbing lanyards with double locking snaps, full body harnesses, fall arrester blocks, cable grab devices, life lines (horizontal and vertical) and aerial lifts. These, and all other fall protection devices, must meet any applicable ANSI, ASTM, and/or OSHA requirements.

Note: Fall protection/prevention components (i.e. harnesses, lanyards, fall blocks, anchor straps, etc.) shall not be used for anything other than fall protection.

F. Shock Absorbing Lanyards are the only acceptable lanyard type. They may be constructed from nylon webbing, rope or steel cable as long as a stitched or block type energy-absorbing device is incorporated. Double locking snaps are required to prevent "roll-out" of line from snap. Knotting or tying lanyards to shorten is not permitted. Different length (1 foot to 6 foot) or adjustable lanyards are available from the manufacturer.

G. Due to the Cianbro 100% fall protection policy, if tie off is the fall protection method chosen, the double lanyards shall be utilized where required in order to have 100% tie off. Because of the potential for roll out of the snaphooks, manufacturers do not allow two snaphooks to be attached to the same D-ring. In order to provide 100% tie off, twin leg lanyards must be used. A single leg lanyard will only be allowed in situations where you do not need a second lanyard leg to maintain 100% tie off.

H. Sometimes a fall block also needs to be attached to the harness. A fall block can never be hooked directly to the snaphook of a lanyard.
   - Use a twin leg lanyard that also has an integral extension and D-ring included in order to hook the fall block.
   - Remove the twin leg lanyard and just hook the fall block directly to the D-ring or to a D-ring extension.
   - Add a loop attached D-ring extension to the back D-ring with the twin leg lanyard <u>if the manufacturer allows</u>. (Note: the new ANSI standard recommends against this practice)
     - Miller allows this practice but also provides another solution called an O-ring extension that is available with any of their lanyards including twin leg lanyards. The O-ring is actually part of the lanyard itself.

- SafeWaze does not allow a loop attachment and a snaphook on the same D-ring. They make a double D-ring loop product that attaches to the back D-ring of your harness providing two attachment points. You must still limit your freefall to 6’ or less and if you attach a 6’ lanyard to this then you are limited in where you can tie off the lanyard.

- DBI-SALA does not allow this unless you have their double bar D-ring on your harness and you attach the extension to the extra bar or purchase the harness with a D-ring extension already attached to the extra bar on the D-ring.

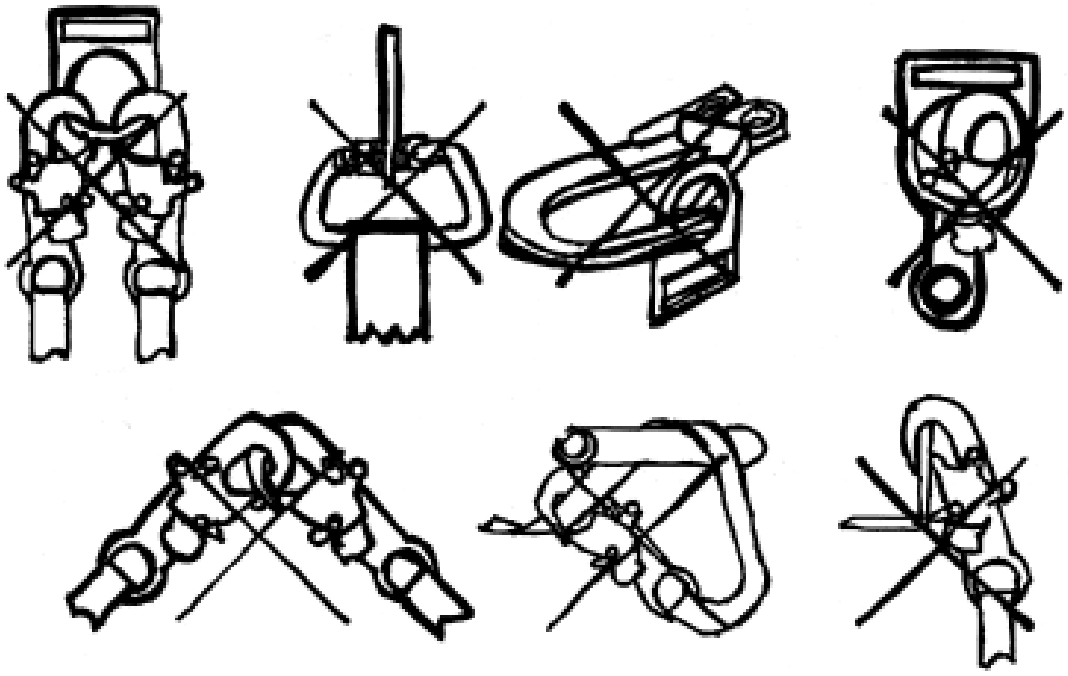
- For any other brand of fall protection, check with the manufacturer.

Lanyards must be utilized such that the maximum fall that could occur is less than six feet. This means that a six foot lanyard must be anchored (or hooked off) at shoulder height or higher (since D-Ring hook point is at shoulder height). Lanyards are typically rated for use by a person 310 lbs or smaller. They are also designed for a **6'** freefall. If circumstances require that the tie off point be at your feet, then you need to use a lanyard rated for at least an 11' freefall in order to ensure that the arresting force on the team member remains less than 1800 lbs and that the lanyard won't fail***. In no case may a rebar hook (large hook) lanyard be used to tie off below your D-ring height because of the likelihood of the load being applied to the gate of the hook in a fall situation unless the hook meets Section 3.2.1.4 of the updated ANSI standard Z359.1 2007 which requires the gate to be rated at 3600 lbs. Regardless of which standard the hook meets, it must be used so the load does not come against the gate.*** Make sure you have sufficient clear area below you, so you would not come in contact with a lower obstruction if you fell. This especially includes the use of beamers. Refer to Clear Area section of this policy (page 8) for more information.

Conversely, if anchored at the waist (such as in an aerial lift) then a shorter, say four-foot lanyard or retractable lanyard should be used to keep the fall less than six feet. Never anchor lanyards below your waist if there is any other possible option. Keep in mind that the lanyard in an aerial lift is supposed to keep you in the basket, not to catch you when you fall.

A lanyard should never be wrapped around an object, such as a pipe or beam, and then clipped back to the lanyard to tie off (unless it is specifically designed for this by the manufacturer). Also, one lanyard shall never be hooked into another lanyard to extend the length of your line.
In both of these instances, it is against the recommended manufacturer's usage of the lanyard. The proper method is to use a choker or a "cross-arm strap" on the pipe or beam, and then clip your lanyard into the strap. Personal fall prevention systems used in hoist areas shall be rigid to allow movement of team members only as far as the edge of walking/working surfaces. **Never attach lanyard snap-hook to another snap-hook (like lanyard snap-hook to a fall block snap-hook)**. Use manufacturer's recommended connector ring made of dropped-forge pressed form steel or equivalent material capable of supporting 5,000 pounds with a minimum tensile strength of 5,000 pounds.

Prohibited Snaphook Attachments



Beware of lanyards used around cutting, welding or other flame producing operations. Steel cable lanyards with shock absorbers are manufactured for this hazard.

- Full Body Harnesses are the only acceptable forms of personal protection. Safety belts are not acceptable and must be discarded. Always attach your lanyard to the D-ring between your shoulder blades. All other D-rings are prohibited for fall protection and are intended only for lanyard stowing, working adjacent to vertical surfaces, positioning or retrieval. Improper attachment to harness D-rings may result in serious injury.

- Fall Protection Harnesses and Shock Absorbers When the Hazard of Arc Flash Exists. All team members are required to be trained in and follow Cianbro's Flash Protection Policy (refer to Cianbro's Electrical Safety & Flash Protection Policy). In addition to the requirements contained in that policy arc rated full body harnesses and shock absorbers must be used when working at heights with potential exposure to arc flash. First, non-arc rated fall protection equipment could catch fire or burn through resulting in a fall. Second, harnesses that melt, drip, or continue to burn can cause additional injury to team members. Though NFPA 70E does not address fall protection equipment, the ASTM F887-04 Arc Flash Standard provides minimum performance criteria for arc resistance of harnesses and shock absorbers for workers who may be exposed to thermal hazards from momentary electric arcs or flame.

- Fall Blocks are intended for vertical work as in climbing up and down. They may be use used horizontally for work in two situations. First, if attached to a horizontal lifeline so that the fall block is always free to reposition directly over the harness D-ring of the worker below. If the block is not positioned directly over the point of operation there is a swing fall hazard from the "pendulum effect" - of being out of plumb. A swing fall can produce nearly the same energy as a vertical fall through the same distance. Therefore, it is critical that team members not move a distance of more than five feet horizontally from directly under the anchorage point. (This is regardless of the manufacturer's

allowed angle of operation for the retraction mechanism). If greater horizontal movement is required, then you need to be attached to a horizontal lifeline.

The second situation involves use of a fall block on roofs or other horizontal surfaces. This use is allowed as long as the manufacturer allows it. Spider, Miller and DBI/SALA all allow this practice, however DBI/SALA has specific requirements. In any case, don't use if the edge of the horizontal surface can cut through the cable or strap during a fall. Also, watch swing fall hazards and ensure team members are trained in how to use the fall blocks properly.

- Rope/Cable Grab Devices are utilized exclusively for vertical work such as climbing or while on suspended scaffolds, also on roofs. These are not to be used on horizontal lifelines. Lanyards must be shorter than six feet (generally four feet or less) when using grab-type devices. This ensures that a fall of more than six feet cannot occur. Beware of grab-type devices that require a free hand to slide the device along. These are dangerous and not acceptable. An acceptable grab device will slide along freely with the lanyard until a fall occurs. Make sure to use the correct size grab device for the lifeline size.

- Vertical Lifelines (droplines) are minimum ¾ inch nominal diameter synthetic rope with nominal breaking strength of 5,400 pounds. They are used to safeguard a team member performing vertical work with the anchorage point being directly above the point of operation. If steel cable is utilized it must be at least 3/8 inch nominal diameter and have a breaking strength of at least 5,400 pounds.

- Horizontal Lifelines shall be a minimum of ½ inch EIPS (extra-improved plow steel) cable. Lifelines shall be anchored such that each anchorage point will withstand the simultaneous fall impact of 5000 pounds per team member attached or if engineered designed as part of a complete fall arrest system which maintains a safety factor of at least two. Lifelines shall not have more than two team members tied off to them simultaneously between two anchorage points unless there are intermediate support points, in which case there shall be no more than two team members attached simultaneously between any two intermediate support point's Horizontal lifelines shall not exceed a maximum length of 150 feet without intermediate support points. The perimeter guard post specification shall be an acceptable type of intermediate support. Normally intermediate support points for steel cable lifelines are every 20 feet. Horizontal lifelines cannot be pulled completely tight. The tighter the line is, the less capacity it has. This is the same as with rigging. The more you reduce the angle with the load, the less capacity the slings have. There needs to be at least 1 ½"of sag for every 10' of horizontal lifeline between support points (per the Cianbro temporary design group). Consult an engineer if you have questions about your specific application.

- Clear Area: When selecting a tie off method, you must ensure there is sufficient clear area below so that you would not come in contact with a lower obstruction if you fell. In the case of a 6' shock absorbing lanyard, you must include 6' lanyard length, 3.5' for shock absorber deployment, approximately 5' for the height of your D-ring, and 6" for the flex in your harness. That adds up to a minimum clear distance of at least 15' (and some manufacturers recommend more) without including any sag in a rat line. If you do not have that clear distance available, then choose a different tie off method such as a shorter lanyard or a retractable lanyard.

- Anchorage Points must be capable of supporting at least 5,000 pounds per team member attached or if designed as part of a complete fall arrest system which maintains a safety factor of at least two. Connectors used for fall arrest

shall be drop forged pressed or formed steel or equivalent material with smooth / corrosion resistant finish. D-rings and snap hooks shall be proof tested to a tensile load of 3,600 pounds and have a minimum tensile strength of 5,000 pounds. Note: Tie off correctly! Do not wrap lanyard around an anchorage point and hook back into lanyard, unless the lanyard is designed to be used in that way.

Tie Off Do's	**Tie Off Do Not's**
• Structural members, beams, pad eyes. • Commercially engineered products beam clamps, horizontal lifelines, bolt hole anchors, etc. • Pre-plan to limit field decisions and eliminate exposure. • When in doubt test it! • Qualified person can evaluate using max arresting force and two times safety factor. • Must be independent from work surface.	• Non-structural items. • Ladders, railings, c-clamps. • Corroded structural items. • Rat lines used for railings. • Swing staging or hanging platforms. • Non-secured scaffolds. • Cross arm straps around sharp objects.

- Fall Restraint means tying off so that a team member can do their work but is physically unable to reach the fall hazard itself. This is a better option than fall arrest because it eliminates the possibility of a fall and the stress on your body in the case of a fall. The anchorage point for fall restraint has to be able to support 3000 lbs.

- Aerial (Boom-Supporting) and Platform (Scissor) Lifts should be utilized wherever and whenever they can minimize fall hazards to team members without creating other hazards as a result of use. Lift operators must be Cianbro or manufacturer trained and certified. Operators shall be assigned to and responsible for documented safety checks on each lift before start of work on each shift. Lifts are designed for personnel and not intended to be used to hoist materials except for personal tools. Only those essential materials and tools required to perform the work from the lift can be in the basket and must fit completely inside the basket. Lifts must not exceed manufacturing rated load limits – know the range and capacity of your lift. Work must be accomplished by standing firmly on the platform floor.

  100% fall protection applies to working in lifts. Team members must tie off immediately upon entering the basket.
  Tie off at manufacturers' tie off point (when ordering machines for the project specify that they must be equipped with tie off points in the basket). Six-foot lanyards may be too long. Use a maximum four-foot length lanyard in lifts, unless conditions are too restrictive and cause a safety concern. Falls must be limited to six feet.

  When planning maritime work activities, special consideration must be given to the barge and lift positioning to limit listing during operations. Before starting a work activity, the lift must be securely tied down to the barge using the tiedown eyes provided in the frame slabs in order to prevent movement.

Note: Refer to Cianbro's Safety Policy and Procedure "Boom-Supported Elevating Work Platforms (Aerial Lifts)" for additional information on aerial lift operations.

7.2.3 Perimeter Guarding shall meet standard handrail requirements with a top rail, mid rail and a four-inch minimum height toe board. Guard rail (hand) surfaces shall be smooth to protect against punctures, lacerations and snagging of clothing. All rail post spacing shall be a maximum of eight feet. Rails shall consist of 2” x 4” wood, 2” x 2” 3/8” steel angle, 1 ½” diameter steel pipe or equal structural shape with similar bending strength, ½” diameter EIPS cable may also be used if installed with sufficient tightness and post spacing to withstand a 200 pound lateral load with less than three inches resulting deflection. Wire rope used for top rails must be flagged every six feet with high visibility material. All posts shall be anchored to withstand a 200 pound load applied any direction at the top with minimal resulting deflection. Mid-rail, screens, mesh, intermediate vertical members and solid panels shall be capable of withstanding 150 pounds of force. Toe boards must be capable of withstanding a force of at least 50 pounds. Refer to OSHA standard 1926.500 for additional information on other minimum requirements.

Perimeter guarding is required anywhere there is a drop in a floor or a deck of six feet or more. If cable guarding is used then tie off to the cable is prohibited, unless it meets requirements of the horizontal lifeline specification. No materials or equipment except masonry and mortar shall be stored within four feet of a working edge.

7.2.4 Safety nets are to be considered last! If nets are necessary, contact the safety department for specific requirements covered under 1926.502(c). Before utilizing safety nets on a Cianbro project (including subcontract work), the project manager must submit a detailed written plan documenting net attachment devices, interferences/fall hazards, installation procedure, daily inspection procedure and fall prevention or tie off method (to prevent falls into the net) for approval to the Corporate safety officer. Work may start only upon these approvals.

Note: Debris nets are not safety nets. Debris nets are used to catch materials (not personnel) that might drop. They are one of the methods that are encouraged to be used whenever necessary to prevent materials from falling to a lower level.

7.2.5 Ladders should not be used when stairways, ramps or aerial lifts are feasible and shall only be used for the purpose for which they were designed. Imperfect or defective ladders shall not be used (metal ladders are prohibited). **Note:** Job made wooden ladders are allowed as long as they meet the requirements of 1926.1053 including being able to support four times the intended load. Job made ladders must be constructed so that the horizontal rungs are recessed into the side rails or the spaces between the rungs on the side rails are filled with a spacer block. When use of a ladder is essential, team members must be 100% tied off when working on the ladder, over six feet unless they are climbing or descending facing the ladder with both hands free to securely grip the ladder rungs. Team members climbing or descending from ladders may stop at any time while on the ladder for a short period of time so long as no work is going on and at least three points of contact is being made while stopped. Ensure tie off is above the work area to an acceptable anchorage point and consider using, fall block, retractable lanyard or a shorter lanyards (four feet), if necessary, so that no fall would be greater than six feet. Ensure fall will not result in hitting the floor/lower levels. Under no condition shall anyone free-climb to gain access to upper and lower levels unless they are 100% tied off to acceptable anchorage points or using an OSHA approved conventional system like a ladder. Free climbing must be considered as a last resort only when conventional systems (i.e. ladders, stair towers, aerial lifts, etc.) cannot be used. Aluminum ladders are not allowed to reduce the chance of contact with power lines.

Ladders must be used at the proper angle from a vertical surface of one foot horizontally for each four feet vertically on a stable base with feet properly in place. Ladders cannot be used at any other angle. Non-skid pads should be used when working on smooth surfaces. Ladder side rails must extent 36” above the landing. If team members stepping onto the landing must let go of the ladder with either hand and

there is no handrail to immediately grasp, then team members must also be 100% tied off when using this type ladder. Ladders must be secured at the top or secured or held in place at the bottom until the top can be secured.

Stepladders must be used only in the fully open position.

7.2.6 Crane Suspended Personnel Lifts (Manbaskets) are **not** to be used on any Cianbro project except as the last resort as approved by the Safety Director. See Safety Policy and Procedure entitled "Use of Crane Suspended Personnel Baskets for a listing of all procedures, inspections and approvals required prior to use.

7.2.7 Working Over or Near Water where a drowning hazard exists, team members shall be provided with personal flotation protection consisting of U.S. Coast Guard approved life jackets or work vests to be worn zipped up or securely fastened as designed. If 100% tie off or other complete fall protection measures are in place, lifejackets are not required (however if you are climbing ladders with a potential to fall in the water, then either a lifejacket must be used or tie off required while climbing the ladder)**. Remember, even if you are below six feet and over water, you will need a lifejacket or remain tied off.** Lifejackets are still required on barges regardless of whether you are tied off or not. If a lifejacket is used, wear it so that tool belts and other heavy articles can be removed without sacrificing the buoyancy of the flotation device!

Ring Buoys are required with 90 feet of line available for emergency rescue and stationed less than 200 feet apart along the work area.

At least one lifesaving skiff shall be immediately available and operational for emergency rescue situations at specific locations where team members are working over or near water. An effective communication system must be in place before any emergency rescue operation of this type can be successful.
In addition, there will be a ladder available on each floating vessel or dock on which work is being performed. The ladder shall be long enough to assist team members who have fallen into the water.

7.2.8 Bridge Decks

A. Many new bridge designs today call for parapet barriers along each side of the bridge deck. These barriers normally are 32 to 36 inches in height with no railing extending higher, nor do they offer a practical way to increase the height to 42 inches. Cianbro has in the past added rail systems to the top of these barriers, which is sufficient in meeting the 200 # force requirements. However, we feel that a safe alternative to the 42 inch height would be to:
   - Ensure a competent person develops a job specific fall protection activity plan that clearly addresses all hazards/solutions and administrative/engineering controls.
   - A standard warning line system would be placed six feet from each parapet positioned along the bridge deck side towards the bridge deck centerline in all walking and working areas. 100% fall protection/prevention would be required between the parapet and the six-foot warning line.
   - Training would be provided by a competent person to anyone requiring access to these areas under this condition.

B. Also, there may be periods of construction work prior to the installation of the permanent parapet barriers or handrail system when fall protection/prevention measures are required along the sides of the bridge deck. Cianbro has designed and engineered a fall prevention system (guard rail system) and we also have purchased an engineered horizontal lifeline system made by Spider and Safespan to 100% tie off. In this specific work sequence there is a period of time when a transition from 100% tie off to a guard rail system occurs. In these areas, the following minimum safety measures must be provided.

- Ensure a competent person develop a job specific written fall protection/prevention activity plan clearly addressing all hazards/solutions and administrative/engineering controls.
- Utilizing 100% fall protection, install post and cable guard rail system using ½" EIPS cable for 42" hand rail and 22" mid rail along the sides of the bridge deck in walking and working areas.
- Install toe board in working areas only where exposure to others below exists or barricading below is not feasible.
- Standard warning line systems may be used instead of handrail for short durations (But must be placed 10' back from the edge if equipment is used on the bridge deck).
- Once handrail system or warning line system is in place and inspected by a competent person, 100% fall protection (body harness/lanyards) will not be required in these work areas.
- Training must be provided by a competent person to anyone requiring access to these areas under this condition.

C. Over Hanging Bracketed Areas Walkways - When installing overhang bracketed walkways along the outside edge of bridge decks, ensure that the guard rail system extends above the finished deck or sidewalk elevation by at least 42".

- Dock/Piers/Barges (work areas) - There are many situations working in construction work areas on piers, docks and barges where the fall distance to the water greater than six feet. In particular, most material barges we use in an empty state have approximately 8-9 feet of freeboard to the water surface from the barge deck. In these work areas, the following minimum safety measures must be provided:
  - Ensure a competent person develop a job specific fall protection/prevention activity plan addressing hazards/solutions and appropriate engineering/administrative controls.
  - Workers must be in compliance with 1926.106 wearing appropriate life jackets, have deployed roped life rings and an immediately available rescue boat.
  - When the fall distance is >6 feet to the water or to a solid lower level, a control access zone (CAZ) would be established utilizing a warning line system six feet or more in from the pier/dock barge edge delineating the work area. Any activity outside of the work area (in the CAZ) would require 100% fall protection/prevention measures.
  - Other fall protection methods can be used in place of CAZs.
  - Training must be provided by a competent person to anyone requiring access to these areas under this condition.

D. Dock/Piers/Bridge Decks (access walkways) It is not uncommon for most private and public docks/piers or bridge decks to not have permanently installed railings that meet OSHA's standards for a guard rail system. The minimum following actions must be taken for situations where workers need to access docks/piers to get to their working areas:
  - Ensure a competent person develop a job specific fall protection/prevention activity plan addressing hazards/solutions and appropriate engineering/administrative controls.
  - Workers must be in compliance with 1926.106 wearing appropriate life jackets, have deployed roped life rings and immediately available a rescue boat.

- When the fall distance is >6 feet to the water or to a solid lower level, install warning line system 15 feet from the walk way sides towards the dock/pier center, or provide complete guard rail system or require 100% fall protection.
- Training must be provided by a competent person to anyone requiring access to these areas under this condition.

7.2.9 Open-Sided Floors

A. During the construction and demolition of floors there are periods when the guarding along the floor edge is removed or has not been installed. In these work areas, the minimum following safety measures must be taken.
   - Ensure a competent person develops a job specific fall protection/prevention activity plan addressing hazards/solutions and installing appropriate engineering/administrative controls.
   - When the fall distance is >6 feet to a lower level, a control access zone (CAZ) could be established utilizing a warning line system at least 6 feet from the open floor side delineating the work area. Any activities outside of the work area in the CAZ would require 100% fall protection/prevention measures.
   - Training would be provided by a competent person to anyone requiring access to these areas under this condition.

7.2.10 Roofing Work also requires the use of basic conventional fall protection/prevention systems as the primary options, however, the following are also acceptable methods for use as a last resort: Note: Section 1926.501(b) defines "roofing work" as: "the hoisting, storage, application, and removal of roofing materials and equipment, including related insulation, sheet metal and vapor barrier work, but not including the construction of the roof deck.")

- Warning line systems when used for roofing work shall be erected at least six feet from the roof edge and ten feet when mechanical equipment is being used. Lines shall be flagged every six feet with high visibility material and have a minimum tensile strength of 500 pounds.
- Materials and equipment shall not be stored within six feet of a roof edge unless guardrails are erected at the edge.
- Controlled Access Zones (CAZ) and WLS are OSHA approved last resort methods to accomplish roof work when conventional fall protection/prevention systems are not possible or create more of a hazard. The Safety Monitoring System (SMS) method is not acceptable to Cianbro and could only be used with the approval of the safety director and applicable regional manager. The SMS method does not offer positive fall protection/prevention and exposes team members to falling.
- For any work on roofs that is not considered roofing work (i.e. installing HVAC units on a roof), a warning line needs to be established at **15** feet from the edge or either guardrails or 100% tie off needs to be used.

Exception to working over or near water, bridge deck, open sided floors and roofing work sections: When team members are making an inspection, investigation or assessment of the workplace conditions prior to the actual start of the construction work or after all construction work has been completed fall protection/prevention may not be necessary providing project management and the applicable regional manager approve activities. A competent person must evaluate potential hazards and require fall protection/prevention measures if appropriate.

7.2.11 Shielding used for the containment of debris (on bridge deck/floor/roof/etc. demo) must be designed and approved by a competent person (registered professional engineer). If it is to be used as a working surface/platform for personnel it must also meet the criteria of the O.S.H.A. scaffolding standards. Activity plans shall be developed and during the entire installation/removal process, workers must be 100% tied off. This may be accomplished by installing horizontal lifelines using Cianbro/or manufactured approved

system or equivalent engineered system. Once shielding is completely installed, inspected by the competent person, and found to be in compliance with the engineered design and the scaffolding standards, team members may work on it without being tied off, if approved by project management, until the demo operation starts. While the demo operation is in progress, no one will be allowed on the shielding without being 100% tied off. This includes any flagging, rigging, or cleaning tasks. Once the shielding is cleared and once again inspected by the competent person and found to be in compliance, team members will be allowed to work on the shielding if approved by project management without being tied off until the next demo operation starts.

7.2.12 Floor Openings (holes with a gap of 2" or more in the least dimension) shall be covered with materials capable of twice the expected loads and clearly marked with the word "hole" or "cover".(holes in roofs, floors, roads and other walking/working surfaces).

7.2.13 Erecting/Scaffolding requires 100% tie off over six feet until standard guardrails, midrails, and toe boards are installed. As a last resort the competent person may authorize tie off to structural support members of the scaffolding but only for scaffolds that are secured from tipping. When possible, the lifeline (lanyard) must be secured to an acceptable anchorage point above the harness "D" ring (in the center of your back) to protect against falls greater than six feet. Consider using a shorter lanyard or a retractable lanyard when working at lower heights. Refer to Cianbro's Scaffolding Safety Policy and Procedure for more details on the safe operations of scaffolds.

7.2.14 When Loading/Unloading Trucks (deliveries), 100% fall protection must be provided over ten feet. Remember, there may be special hazards when performing this activity at levels less than ten feet. Your activity plan should include fall prevention/protection measurers.

7.2.15 Fall Protection on Equipment

Operating Equipment up to ten feet does not require fall protection/prevention; functions such as access to and from crane operator cab or operating equipment from crane seat with the door open (using seat belts). Safe working access to and from the operating position is required to prevent potential hazards to the operator and lift director. Routine maintenance (inspection, checking fluid levels, cleaning, or other items listed on the weekly equipment card) up to ten feet does not require fall protection.

For non routine maintenance activities, fall protection is required at six feet, except when working at or near the draw-works (when the equipment is running), fall protection is required at 15 feet.

For Crane Assembly/Disassembly work fall protection is required for team members who are on a walking/working surface with an unprotected side or edge more than 10 feet above a lower level, except fall protection is required at 15 feet when the team member is:

- Near the draw works (when the equipment is running),
- On the deck in front of the drums,
- On the roof to hook up or adjust rigging to set or remove the house,
- On the roof to hook up or adjust rigging to set or remove the gantry,
- On the roof to spool the boom cable to set the bridle on the roof for shipment, and
- Setting or removing counter weight tray and the first counter weight on ringer.

The A/D director (Assembly/Disassembly director) will develop and maintain a working activity plan for each crane assembly/disassembly activity. The A/D director and A/D crew will maintain safe working practices during all A/D work. The AD director will be utilized and in charge on all A/D work according to OSHA 1926.1404 Assembly/Disassembly – general requirements (applies to all assembly and disassembly operations). The A/D director will have a full activity plan pointing out all

hazards involved with A/D work, which will include when/where team members will be required to tie off.

7.2.16 Retrieval/Rescue Methods shall be identified and in place prior to start of work activities. Team members utilizing fall protection shall always be accompanied by another team member in the immediate vicinity. An emergency means of communication is also required. Fall victims are not normally able to assist in their own rescue and time is of the essence. It is critical that help is immediately available and retrieval/rescue plans initiated. Retrieval procedures shall be planned, communicated, and practiced for all team members prior to the start of any work activity.

You need to keep the rescue as simple as using an aerial lift, scissor lift or even a ladder to rescue someone. If your plan is to use 911 you must have the rescue team come to your site to review the area for access. Your plan should start with the rescue from below the worker not above them. Start on ground or floor below and work up to person to be rescued. All rescuers should be backed up with a secondary redundant system. You never cut the hanging person's lanyard, lift up the victim and release the latch. Cutting of the lifeline or lanyard can result in the accidental severing of adjacent rescue ropes and or lifelines.

Other types of retrieval/rescue systems include:

- Raising and lowering devices (man-rated winch)
- Backup Fall Arrest (SLR with Retrieval)
- Boatswain's chair with raising and lower device for back up system, (these systems can be also used for routine maintenance or construction operations).

Whatever system you use must have a team that has competent professional training and practice on a regular basis.

Suspension trauma (also known as orthostatic intolerance) is caused by hanging in a harness and restricting the blood flow to and from the legs. It can be fatal in less than 20 min. Include this in your rescue planning and training. Train team members to pump their legs frequently and to use equipment like suspension straps or self-rescuers if used.

7.2.17 **Tie off (Personal Fall Protection) to any mobile equipment (ie; cranes, loaders, etc.) is prohibited unless:** The project manager or superintendent must approve using mobile equipment as an anchorage point for tie off as the absolute last resort. If approved a detailed written activity plan, including lockout/tagout procedures, must be developed and approved by the project manager/superintendent.

7.2.18 Personal Fall Arrest Systems (PFAS) shall be inspected prior to each use for wear, damage and other deterioration, and defective components shall be removed from service. Also, annual inspections shall be conducted for all PFAS and all fall protection system components, by a competent person other than the user. Fluorescent electrical tie wraps will be attached to the PFAS as documentation that the annual inspection was conducted by a competent person. There will be two colors, one for even years and one for odd years.
Those colors will be:

- 2009 – Fluorescent Yellow
- 2010 – Fluorescent Orange
- 2011 – Fluorescent Yellow
- 2012 – Fluorescent Orange

The colors will continue to alternate for odd and even years

Annual inspections are to be done during the month of January each year. Any equipment that is missed shall be checked as they are discovered.
When conducting inspections of fall arrest equipment look for the following:

- Webbing-Cuts, tears, abrasion, fraying, stretching, mold, chemical damage.
- D-rings-Cracks, breaks corrosion, rough edges.

- Tongue Buckle-distortions, added holes, broken grommets.
- Ropes-Abrasion, internal damage.

Inspection information:

Holes/burns: In critical areas of product such as lanyards. Shoulder or leg straps on full body harness, or on strength members of a product. If there is a burn hole of 1/16 inch diameter shall be grounds for rejection, more than two holes through the same strap are grounds for rejection. Holes on less critical components, such as chest strap or wear pads on harness up to ¼ inch diameter before the part is rejected. If there is a cut in webbing exceeding 1/8 inch in length is grounds for rejections, cuts in areas near dorsal D-ring of any length need to be taken out of service.

Stitching: More than two ripped or cut stitches in any pattern shall be taken out of service. Ripped or cut stitches may be an indication of being load impacted. Labels on fall protection equipment must be present and fully legible.

Heat damage: Areas damaged by heat (brown, hard areas by welding slag, flames, etc) shall be closely reviewed. Any large concentrations of damage are grounds to remove from service.

Hardware: Look for damage, cracks, distortion, sharp edges, burrs, worn parts, or corrosion in any of the hardware (buckles, d-rings, hooks, etc.). Make sure the back D-ring and backpad are free from damage and located between the shoulder blades. Make sure buckles connect securely and double locking snaphooks work properly. Make sure all keepers are in place.

Labels: All labels must be in place and legible.

Wire rope lanyards with shock absorbers: Wear gloves while inspecting. Flex the cable every few inches to expose breaks. If you find any of the conditions below then the lanyard must be removed from service and destroyed:
6 or more randomly distributed broken wires in one lay or
3 or more broken wires in one strand in one lay or
Any broken wires within one inch of the metal compression sleeves (swages) at either end of the assembly.
Any evidence of corrosion

Vertical lifelines (Synthetic Rope): Inspect rope for concentrated wear. Material must be free of frayed strands, broken yarns, cuts, abrasions, burns, and discoloration. The rope must also be free of knots, excessive soiling, paint build- up, and or rust staining. Rope splices must be tight with five full tucks, and thimbles must be held firmly by the splice. You need to check for burns, chemical damage: indicated by brown, discolored or brittle areas. Ultraviolet damage will be indicated by discoloration, splinters and slivers along the rope surface. All the factors mentioned above are known to reduce the strength of the rope and shall be taken out of service. If you have any damage or question the integrity you need to take out of service.

7.3 Subcontractor Compliance

7.3.1 The Cianbro Fall Prevention Safety Policy and Procedure is referenced in each Cianbro subcontract agreement. This must be discussed during the subcontract **PreAward** and **PreConstruct** meetings.

7.3.2 Project management for Cianbro is responsible for the health and safety of Cianbro team members. Cianbro project management should also ensure subcontractors, visitors and other individuals on our projects comply with local, state and federal regulations, plus comply with Cianbro's Safety Policy and Procedure as outlined in our subcontractor safety agreement.

In the unlikely event that a particular work activity cannot be accomplished by fully complying with those conventional fall protection systems addressed in the Safety Policy and Procedure or greater hazard is introduced, the Safety Director and appropriate Regional Manager must approve in compliance with OSHA standard 1926.502(k).

Remember: The basic OSHA acceptable conventional fall protection/prevention systems include one of the following methods:

- 100% Tie Off
- Guarding of Unprotected Sides
- Safety Nets

7.4 Safety At Home

- When you have to work at elevated heights at home we want you to take what you learn at work and practice it at home.
- If you need to use fall arrest gear remember that the anchorage points must support 5,000 lbs.
- If you have not been trained in fall protection have your Project's Competent Person give you the training needed to wear, inspect and use fall arrest gear and proper anchorages.

8 Budget / Approval Process

8.1 It is the responsibility of each jobsite to procure and provide all materials and PPE required and to provide necessary training.

9 Related Documents

9.1 See attachments.

9.2 Please Note: Training manual for presenter and student is located on Cianbro.net under Resources| Manuals| Monthly Safety Training Calendar & Material 1.0 January & 1.1 January.

Fall Protection/Prevention Plan

1. Fall protection plan must be prepared by a competent person specific for the site and maintained up to date. Corporate safety department must review plans.

2. Original plan and any changes to the fall protection plan must be approved by the plan originator.

3. Copy of the fall protection plan must be retained at the job site and corporate safety department.

4. Implementation of the fall protection plan shall be under the supervision of a competent person.

5. Fall protection plan shall document reasons why conventional fall protection systems are infeasible or why their use would create a greater hazard.

6. Fall protection plan must include measures taken to reduce or eliminate the fall hazard for workers.

7. Fall protection plan shall identify locations to be classified as controlled access zones.

8. Fall protection plan must include names of each team member who is designed to work in controlled access zones. No other team member may enter.

The fall protection activity plan must also identify which option or combination of options selected from one of the following OSHA approved methods.

A. Warning Line System (WLS) - A barrier erected to warn team members that they are approaching an unprotected edge or side, and which designates an area in which work may take place without the use of guardrails, body harnesses or safety net systems to protect team members in the area.

Warning Line Systems

1. Warning line erected around all sides of the work area.
   a. Mechanical equipment is not used, warning line not less than six feet.
   b. Mechanical equipment is being used, warning line not less than ten feet.
   c. Non-roofing work performed on a roof, warning line not less than 15 feet.

2. Warning lines shall consist of ropes, wires or chains and supporting stanchions.
   a. Flagged at not more than six-foot intervals.
   b. Rope, wire or chain supported at the lowest point no less than 34 inches and the highest point is no more than 39 inches from walking/working surface.
   c. Stanchions capable of resisting a force of at least 16 pounds applied horizontally, 30 inches above walking/working surfaces.
   d. Rope, wire or chain shall have minimum tensile strength of 500 pounds.
   e. Line shall be attached in such a way that the pulling line between stanchions will not result in slack in adjacent sections.

3. Mechanical equipment stored only where team members are protected by a warning line system, guardrail system or personal fall arrest system.

B. **Controlled Access Zone (CAZ)** - An area in which certain work may take place without the use of guardrail systems, personal fall arrest systems or safety net systems and access to the zone is controlled.

Controlled Access Zones

1. Controlled access zone shall be defined by a control line or by other means that restricts access.
   a. Control lines are used not less than six feet or more than 25 feet from leading edge.
   b. Control lines shall extend length of unprotected leading edge.

c. Control line connected to each side of the guardrail system or wall.

2. Control lines shall consist of ropes, wires, tapes or equivalent materials.
   a. Each line shall be flagged or otherwise clearly marked at six-foot intervals with high-visibility material.
   b. Each line supported at lowest point not less than 39 inches from the walking/working surface and highest point not more than 45 inches.
   c. Each line shall have a minimum breaking strength of 200 pounds.

C. **Safety Monitoring Systems (SMS)** - A safety system in which a competent person is responsible for recognizing and warning team members of fall hazards.
This S.M.S may only be used in conjunction with inspections, investigations or assessment of the workplace conditions prior to the actual start of construction work or after all construction work has been completed.

1. Employer shall designate competent person to monitor safety of other team members.
   a. Safety monitor shall be competent to recognize fall hazards.
   b. Safety monitor shall warn the team member of a fall hazard.
   c. Safety monitor will be on the same walking/working surface and within visual sighting distance of the team member being monitored.
   d. Safety monitor shall be close enough to communicate orally.
   e. Safety monitor shall not have other responsibilities.

2. No team member other than team members engaged in barge work or covered by a fall protection plan are allowed in the area protected by safety monitoring system.

3. Each team member in a controlled access zone shall comply promptly with fall hazard warnings from safety monitors. REMEMBER: The use of the above systems (WLS OR CAZ) must be a last resort used only if conventional methods cannot be put in place (guardrails, personal fall arrest systems or safety nets).