

## **Anchor Point Installation Class Video Transcribed**

Part 1 of 3:

Clifford Higa: And we're gonna have Ed do a presentation. Before I bring up Ed, I'm gonna bring up Dan Vasilash, he's part of the HIOSH advising committee, to say a few words about fall protection.

Dan Vasilash: Aloha and good morning everybody. First of all I'd like to thank Liv for this opportunity for all of us to come here today to get this training, it's very important. This turnout today shows just how much we care about establishing the initiatives and means to provide safety for our workers when they're on the jobsites. It's good that we have this training and we have Guardian out here today to bring us up to date to what is available. I noticed just coming into the room today it seems to change every time. We have a new project, new products are coming out. We are all tasked with the safety and responsibility to make sure that we send our workers home better or the same way they came to work that day. I appreciate each and every one of your efforts and the challenge of meeting this responsibility and doing all we can to be the best we can be, to assure that we're not just establishing safety but the job needs to get done as well in the realm of safety. Thank you very much once again Liv.

Ed Marquardt: What we're talking about today is fall protection, which isn't silly, it's a serious matter. I take my job very seriously, I enjoy my job greatly, because I'm fortunate enough that I'm able to save/help save people's lives just like you guys are actually. So what we're gonna be talking about today are anchor points, I'm gonna be covering some key things about anchor points. I'm gonna be talking about the guidelines in association with some of the standards, so I'll be throwing some things at you if I see you start nodding off, this is important stuff and you want to know this stuff. We're gonna talk about installation. And installation is really simple actually. We're gonna talk about use and we're gonna talk about reducing liability exposure. Often I am brought in with contractors to go through their fall protection plan and help them reduce their liabilities exposure. One of the single greatest risks for a contractor on a jobsite, I'm sure everyone can guess would be a fatality. Right? And there's ways to mitigate those risks and I often come in and help contractors mitigate those risks. I also work with contractors to help them cover their back-end on documentation, what their insurance companies are looking for, and often I speak with owners as to what my attorney's gonna look at in the event that I'm brought into a lawsuit based off of a product issue. So I'll be talking about those things. Hopefully that gives you a better understanding as to the things that you need to looking for such as anchor points, installation, the use, inspection, and what you can do to cover your jobsite in the event that you do have a situation arise that you do have an accident. Let's go over some brief statistics here. So fatalities in the workplace cost between \$800,000 and \$2.4 million. That's a fatality in the workplace, that's a cost to the contractor. That's direct cost and indirect cost associated with it. Those are hard numbers to understand, are they real numbers? Yes and no. There's time involved, compensation, work loss, morale, less production, lots of things that

equate those figures of 800,000 to 2.4 million. But at the end of the day all we care about is that someone actually had a fatality. How many of you have a picture of your family on your cell phone? Your kids? How many people here have kids? Raise your hands, who has kids come on. I got four kids. I got picture on my cell phone of my kids. I think about your kids when we make our product every day. I had to make sure this product works every single time you use it and put it on. So I take that very seriously, you should be wearing fall protection, there's zero excuses. Sometimes I get harassed for scaring people in terms of fall protection and I'm not here to try and scare you, but this is a serious matter. So we talked about direct cost, they don't include worker replacement, pain and suffering, employee morale, and other indirect costs. Near misses actually cost more in total over 1 trillion dollars a year. Think about how many near misses you guys have had on your jobsite. 90% of all accidents involving fall protection equipment are a result of employer misuse or employer negligence.

I'm only gonna be up on the roof for a few minutes, just inspect an anchor point or inspect a vent or inspect a leak. And you think, "Ah I don't need to tie off, I'll only be up there for a minute." So you don't even bother to do the job hazard analysis. And that's when we're most vulnerable, when we take for granted that nothing's gonna happen. Right? How many of you have emergency food rations in your house? Lot of people don't. It's all after the fact. It's the same thing with job hazard analysis. You need to make sure you do that. I see that often neglected. And in your job hazard analysis you will determine what's a suitable anchorage point, what's a suitable means of tie-off, and potentially what are the risks associated with lack of tying off, or failure of the anchor point working properly. You exceeded limitations of equipment. I don't know how often I see that going on. I'll see fall protection on a jobsite that's used for rigging. Fall protection is not be used for rigging. Anchor points are not to be used for material lifting unless approved by a manufacturer. Lack of inspections – that's huge. Huge for you as an owner, huge for you as an employee. I see a lot of contractors that will actually share equipment. That's fine but you better have your ducks in row in the event that something happens. You're sharing equipment, you're trusting the fact that your partner, your neighbor, your co-worker inspected that product properly. If something happens to the product, you're trusting the fact that he actually told someone about it before you're putting it on. So lack of inspections from a competent person standpoint. Every company is required to have a competent person and if a company has two employees only, and those two employees are wearing fall protection, how many competent people do they have to have? Three? It's two. The competent person is not allowed to inspect his own gear. So a lot of people think, "I only need one competent person." That's true if he's not ever putting on fall protection; if he puts on fall protection, that company has to have two competent people. And you have to be educated, have years of experience, that will classify you as a competent person. The only people that can deem you as competent is your employer. You better have that documented. That's a big no-no that I find in fall protection plans, because nobody knows who the competent person is. And if HIOSH or insurance companies come in to talk to you, you need to know who that is. A GC wants to know who the competent person is. And the lack of inspections in terms of that regard is

following the manufacturer's guidelines. How many times do I see on a jobsite, where a company employee will open up a product and throw the instructions in the trash. All the time. That's a huge no-no. That's what my insurance guy, my attorney is gonna look at, where are the instructions? Did you train on the installation of this product? Did you train your employees on the installation of this product? In the instructions it will give you guidelines as to (whether it's my product or anyone else's product) how to inspect the product properly, what to look for. The other thing we run across is ineffective training. There's a lawsuit that we're involved in right now where an employee has been there for 9 years and never once did this person sit through a fall protection training course. So for 9 years he developed a major bad habit, using his product incorrectly. And so an accident happens. And then everyone's pointing fingers. So we're gonna talk about requirements, selecting the right anchor, different applications, we'll talk about identifying a safe zone vs. a danger zone, and what are danger zones. Installation, how-to, again what to watch for, inspections, and reducing liability exposure. Requirements: Federal laws including OSHA, HIOSH, ANC, the employer must protect the worker from injury. So by law, if you don't do it, what is it called? Willful negligence, which now it's a criminal offence. An owner can be prosecuted, fined, and jailed for it. There's actually a lawsuit involving a roofing contractor in Philadelphia that was fined 70,000 dollars and I think he's getting 6 months jail time, for willful negligence. And OSHA is looking to increase the willful negligence fines to owners. So if you're an owner and you're willfully neglecting the standards, and you've been warned, you're walking down a very scary path. Not to mention you're providing a very unsafe work environment for employees, which isn't good.

We're gonna talk about anchorage. Training, harnesses, lanyards – those are all very important. I can tell you in my 15 years involved in the safety business of fall protection, I've never seen a harness fail if it's worn. I've never seen a lanyard fail if it's worn properly and inspected. Training is key, however, the anchorage is the most vital component of a fall protection system. If I'm wearing a harness and a lanyard and I'm tied around a plastic PVC vent pipe, is that gonna work? If you want to fall and hit the ground, that's exactly what's going to happen. So the anchor is so critical in this. And too often we're just assuming that whatever we're trying to attach to for fall protection is going to be sufficient and meet the regulations. So 5000 pounds, everyone's heard that right? An anchor needs to be 5000 lbs. That's true, however there's also ways that you can get around that if you have a pre-engineered system. That's where I come into play. That's why you don't go to a local fab shop, design an anchor point, throw it up on the roof and call it good. Because I have insurance behind these products. Testing, documentation, this thing will hold 5000 lbs. This anchor will hold 5000 lbs, this anchor will hold 5000 lbs. These are all pre-engineered, tested, documented. However you can also use an anchor points if it meets the 2:1 safety factor, and we'll talk about that. So again, anchorage is your most critical component of fall protection. What you're gonna tie off won't work or meet the standard, then the whole system fails. So we talked about that; all anchor points must be capable of supporting without failure an impact load of 5000 lbs. or the anchorage must be able to support a 2:1 safety factor of the maximum impact load. A qualified person must

determine that. So that's when you work with a manufacturer. Because not all structures are gonna be capable of supporting 5000 pounds. That's when you work with your manufacturer, distributor, safety assistants. And then for positioning systems rescue – the anchorage point must be able to support 3000 lbs. All this information is available online, so its readily available. All of our products meet or exceed all of these standards. And most manufacturers are the same way. EN Rating, that's a European standard, NCZ 359.1 in OSHA, ANC is American National Standards institute, CSA (Canadians Standards Association), and Australian standard. We have to test all our product to these standards. So looking at your label is a part of your inspection process. So looking at the label of your anchorage point, it'll tell you if it's designed to meet 5000 lbs, is it designed to meet 3000 lbs, I mean some anchors are only used for rescue and restraint. You need to know that by looking at the instructions. So we talked about how the anchorage point must be able to support 2 times its load, a qualified person determines this. A qualified person is an Engineer basically. Often times we'll design an anchor point for the market that'll meet the 2:1 safety factor. So how do you determine what a 2:1 safety factor is? It's simple math. So if an Engineer determines the maximum impact load and its fall will create an impact of 1400 lbs, the anchor point must be capable of meeting 2800 lbs. Simple. 95% of our products meet the ANC standard, OSHA says that 1800 lbs. of force, ANC says a 1000 lbs. of force. So that anchor point needs to meet 2000 lbs. of force to work. But for me to say that will work in the situation I have to have a qualified person determine that. You guys are not the qualified person.

Selecting anchor points – 3 main things to look at. Obviously we're gonna look at roof structures, you want to make sure its capable of supporting that load. However, things that people don't talk about when looking at anchor points are the legislations and regulations. Employees are required to protect the worker at risk. The focus is minimizing or avoiding the possibilities to fall in the first place. That's where you need to work with your distributor, people that are knowledgeable in fall protection, HIOSH, they're there for the consulting. I'd rather you eliminate the need for fall protection, that's what I'd prefer you to do. I'd rather you'd negate the need for fall protection altogether by planning your job right, bringing the work down to the ground, using a man-basket, something that keeps worker from being exposed to a fall hazard. You're gonna be better off from it, and so will I ultimately. So you can use guardrails; there's a lot of different alternatives you can use instead of just regular fall equipment and anchor point. That's your greatest risk right there – a complete fall arrest system, including an anchor point. So do yourself a favor and think about the work that you're doing prior to going to the structure. You do that in your job hazard analysis. Risk assessment – that's what we just talked about – people don't do enough risk assessments around the work they're performing. Practical use – so the risk assessment, the fall rescue needs to work without a hassle. That's our goal – always make it simple. Keep it simple stupid. So that way we know you're gonna use the product. If I'm the safety director, I want the product that's easiest to use, most comfortable, so I don't have any complaints from someone using the product. So make it hassle-free. The other thing I focus a lot on is price. You can protect your employee's safety for very little money. Fall

protection's not expensive. We often make it more expensive because we don't use it properly, and then something happens...I've seen it happen a lot of times. This anchor point – I can't tell you what Clifford charges for this, but this is a couple bucks (10, 20 bucks) for an anchor point. That's what your life is worth – 10, 20 bucks? You know what I mean. You contractors that I see don't do it, you're basically telling your little kids on your cell phone that your employee's life is not worth it – 10, 20 bucks. It's a hard thing to swallow, and that's the reality of it. This anchor point is 25 dollars, it's a temporary anchor point. Should be in every truck. If you go up on a roof, this should be in your truck. I don't care if it's mine, I don't care whose it is, but this should be in your truck. It's a temporary anchor point, easy to install, inexpensive. It's there available, ready. So there's no excuse for price, not to me. When we're engineering anchor points and selecting them, these are some preferred methods that I like to look for when I'm installing an anchor point. I'm looking for a steel member. Why? Steel's not gonna break, typically right? You can be confident in that. So we should use that for an anchor point whenever possible. There are certain anchor points where you can bolt it onto steel, drill through steel, those are all available. But whenever you're looking for a proper anchor point connection, I'd look for steel (number 1). If you're on a roof, that's hard to do, right? Wood is what you're gonna run across typically, but there's safe wood and there's other types of wood that are not safe. Wood may be sufficient, but only if certified by a professional Engineer or tested in the field. So what you're looking at right now is my Engineer. I use a third-party Engineer to certify my product. Why is that important? If you're using fall protection, that's one of the things I would mandate from the equipment provider that you're getting it from. Not from the distributor, but from the manufacturer. Are they getting third party certification? I have an in-house engineer team. But I don't rely on them for the certification aspect. This helps cover my exposure. It's also in the best interest of you as a customer. So here's their calculation that they use to figure out how the fall protection meets the standard of 5000 lbs. So they call out the type of fastener we're using (16D nails), they're looking at the type of roof structure, all the other variables involved in determining whether or not it meets the 5000 lbs. requirement. So pre-engineered wood: if you were gonna install an anchor point into wood, you wanna make sure the product is pre-engineered, and its stated that it meets the requirements.

Question: What are you doing post-work to make sure you don't get any water damage after you remove the rigid?

Answer (Ed): Well typically, the rigid is a permanent anchor point. In a temporary situation, you would fill the holes with some type of compound, that's up to the roofer, I don't determine that. We've been a business since 1993 and we've never had a claim for water damage. So if you install the anchor point per guidelines, if you patch a hole, as a roofer does, they'll know how to patch it right.

Ed: So wood structures need to be sufficient, remember that. The things to look out for in wood structures, and the biggest conflict here for me if I was a roofing contractor, would be wood rot. That would be your biggest risk – soft wood. So make sure you a structure that is suitable for

withstanding a 5000 lb. load. If you don't know, ask. You're not being a bad employee by asking what's the safest means of attachment. You're taking care of your family, taking care of your other co-workers.

A qualified person should specify expanded anchor bolts, these have been used successfully in pre-cast operations as anchors. This is when you're installing something into concrete. That's simply asking a question of your HILTI distributor who'd use your expanded anchor bolts. We have specifications that you wanna use or meet. Some additional systems that could be used as anchor point include shackles, turnbuckles, imbeds, i-bolts, bean clamps, and slings. Must be rated for personal fall protection by a PE or manufacturer though. So if it doesn't have a sticker on it, don't tie off to it. That's my motto.

So selecting anchor points – there's temporary anchor points and there's permanent. Some are both. Like our sky-hook anchor, that's the first product we ever had for anchor point. Guardian was actually founded by a roofing contractor and when the fall protection plan was implemented in Washington state, a WISHA (equivalent to HIOSH) inspector came to a job site of our original owner and said you need to tie-off. And he's working on top of a truss, the top clamp, and he says what am I gonna tie off to? The sky? Hence the name sky-hook. It's our first product. There's a little history for you. Temporaries here, permanent, again some cross-over. You need to know what kind of anchor you're using. And for what type of application you're installing it. I like permanent anchors, I don't wanna remove it. Your clients, if you're a contractor, you should be leaving an anchor point because they're obviously gonna have a fall hazard exposure. Too often I see an owner's product removed, that just opens you up to liability down the road.

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So temporary vs. permanent. The question I'm asking is if there's a different requirement for the temporary vs. permanent? Are there different requirements for the anchorage strength? No. No difference. They're identical. OSHA does not even address that, there's no difference between the two and the standard. One of the things we talk about is how to inspect your anchor points properly. The issue here is we don't want the anchorage degrading over expected lifetime. Our products are designed to last the life of the roof, which varies. Some roofs are 20 year roofs, some roofs are 50 year roofs. If you're using the right fasteners, the right anchor point, then its gonna last the life of the roof. If you're using an electro-plated nail, let's say you bought an anchor from Safety Systems and it came with hot-dipped galvanized nails and you lost those in your truck, but you have some electro-plated nails, you drop those in the wood, guess what? In 5 years those nails are gonna dissolve and disappear because of what they treat the lumber with today. If its new lumber, the nail will dissolve because of what they treat it with today, the chemicals. So that's why you need to use the manufacturer's fasteners – the biggest mistakes I see is that contractors will lose the fasteners and then they'll substitute it with something they'll get down at the shop. Don't do that. Go down to Home Depot and buy it. The only way you

can do that is if you call a manufacturer and you get approval by them on the specification you're specifically buying. By switching the fastener, you just said, "I'm a qualified person, I'm an Engineer." Installation is simple, follow the manufacturer's instructions, use the manufacturer's fasteners. We talked about the structure – it needs to maintain the minimum strength required over their lifetime. Which most does, you're not gonna have a problem if you use the larger manufacturers of fall protection. The Guardians, Millers, DBIs, you're in good shape there. You just don't wanna use something that you don't have any documentation for or you don't know where it came from. What is the lifetime requirements or limitations of fall protection components? So what is the lifetime of a harness? On a harness, 5 years from date of first use. That's new ANC standard. Why? If the products been on a shelf, its never been opened, that doesn't start the clock yet. You still need to inspect the product before use, however, it's 5 years from date of first use. All your tags will say that. Wealth of information on your tags, it doesn't matter what manufacturer. Why? Because ANC requires what must be written on the tags. Not OSHA, ANC. ANC has a higher standard than OSHA. ANC is much more stringent, strict, and specific than OSHA. So that's what most of the major manufacturers design their products to meet ANC standards. A-10 for general construction, and Z359 for general industry. And you as a contractor need to know what kind of environment you're working in. Is it general industry project? Or is it general construction project? Because there's a difference of what you have to meet for your clients. So anchor points can last the lifetime of the roof as long as you leave a permanent anchor point that's inspected annually by a competent person. It's the only way you continue the lifetime of that product. If you fail to inspect that permanent anchor point (you're gonna inspect your temporary anchor points every 6 months) you void the product warranty. So if you're in here and you've ever installed a permanent anchor point for a client, you need to go back and make sure you provide that after-market service and inspect that anchor point within a year. Or the owner is required to do that themselves, somebody has to do it. And it has to be a competent person.

These are one of the things we look at when you're using or installing an anchor point, you're thinking of how you're going to use it right? You're thinking, "OK I'm going to use it directly overhead, I'm safe in this manner." However, you need to think outside the box, you need to think, "what are the weaker directions this anchor point could be exposed to, are there pendulum falls on this anchor point? Where's my anchor point spacing?" Every anchor point designed and used has a weak direction and a strong direction. And the data differs. In one direction it could meet 5000 lbs, in another direction it could meet 3000 lbs. But you as a safety professional or you as an owner or an employee, think about it, you might not be performing work as you assumed originally. So think about it when you go up there to do a job hazard analysis and installing an anchor point what direction am I gonna be using this product, and what direction my customer is potentially using this product.

So the anchor point should reduce the fall to the shortest possible distance. Too often I see an owner...for example I was at an engineering company in Texas recently, we were doing

an analysis of thirty structures for him and what the exposures are for each structure; and the fast solution that was coming out of the client was to put a giant anchor in the middle of the roof. One anchor. However, there's all kinds of problems Mr. Customer, you can't do that. Why? One of the biggest issues is swing-fall. You can't be operating outside of 30 degrees in either direction of an anchor point. You have to think of the hazards associated with the work and the risks included with the product you install. Installing an anchor point isn't a solution, you have to look at work that's going to be performed. Like I said originally, I'd prefer you just kept the work on the ground or use guardrails, passive system, that's ideal. So total fall distance needs to be determined, it should be as close as possible above the employees' heads. But if you're on a roof, you're not gonna have something over your head right? But you have to make sure you're using the product properly. A lot of the time you'll have what I call "leaning edge hazard." You're using an anchor point on a roof, you're at the leaning edge. So if I have an anchor point located behind me and I'm at the leaning edge, I have what I call the scariest situation possible in fall protection. You have a free-fall at your feet. You're tied off at your feet. Because your anchor point is on the roof, at the ground, right? So now you have an extended free-fall exposure. You're also at a leaning edge – is that concrete? Steel? Is it pan-decking? Is there a nail head sticking up on the edge? Is there a gutter? Why do I care about that? Because that becomes an abrasive surface. And OSHA requires you to protect unprotected edges. You can use a piece of carpet, you can use whatever, but you have to protect the fall protection from that like a rope lifeline. We do have situations where, working over a leaning edge, your fall protection will fail. You have to use the right equipment for the right job. So if it's possible, get the anchor point directly overhead. But most often you can't do that, but you can at least try to get the anchor point up off the ground. And there's ways to do that. The total fall distance should be considered when locating anchorage points. Determine if there's adequate clearance in the event of a fall. Again, 30 degrees is the rule, do not be in 30 degrees in either direction of your anchor point. That'll keep you safe. So refer to the manufacturer's instructions in that regard. Some of my anchor points are designed to be 16 feet apart, some of them are designed to be 20 feet apart, and some of them are required to be 43 feet apart. It depends on the product.

Improper anchor points: There are a number of fatalities each year where the employees are tied off to inadequate or improper anchor points. The anchor point is the most critical element in your fall protection system. So standard guard rails – not allowed to be tied off. Standard railings – not allowed to be tied off. How many times do I see iron workers tied off to a railing? It might meet the load, I'm not saying it doesn't, but do you have certification? If I'm an owner, I want that document because God forbid something happens. Ladder rungs – you can't do that, I've seen that. Unless your product says you can do that, you can't do that. You ever see someone tied off with a rebar hook to a ladder rung, you can't do it. When do you have to be tied off when working with a ladder? Anybody know? Do you ever have to be tied off when working on a ladder? The key word is working. When you start working outside of the rails, that's when you need to be tied off. How many times do you see people leaning out with

their hands trying to do something? If you're doing that you have to be tied off. So you have an anchor point up overhead onto the roof or parapet or whatever.

Scaffolding – now once again, unless the manufacturer says you can do it, don't tie off to scaffolding. There was a situation in New York where there was scaffolding being used on a project, a guy was tied off to it and we were called in because of the concern that the fall protection failed. Well, the reason that the fall protection failed was because the scaffold failed. The scaffold collapsed. Guess what he was tied off to. If the scaffold fails, the fall protection fails. So do not tie off to scaffolding, unless it's deemed you can do that by the manufacturer. And what manufacturer do you do that with? The scaffolding and the fall protection manufacturer. Because some fall protection manufacturers say, "You will not tie off to scaffolding with our product." I'm one of them. It's just too risky. Light fixtures, obviously, conduit plumbing, unless again it's pre-engineered to do that, unless you get someone to sign off on it, C-clamps, wiring harnesses, rebar (except for positioning during formwork), can't tie off to another lanyard as an anchor point, I see that often (where they connect two snap-hooks together, a huge no-no), roof stacks, vents, or fans (the only way you can do that is if it's pre-engineered and signed off by a competent person, there are some instances where I'll allow that because it's a giant HVAC unit on top of a roof – that's not gonna fail – you could put a wire sling around that and use it as adequate anchorage). But in that situation you wanna take a picture of your application and send it to Clifford or Rocky at Safety Systems or HIOSH, or myself, I'm available all the time (my e-mail is in our catalog and my cell number). And obviously structural requirements – it has to meet them.

Anchorage considerations: we talked about that, I'm gonna reiterate it again. Properly planned anchor points should be used if they are available, in some cases anchor points must be installed immediately prior to use. In such cases a registered professional Engineer with experience in designing fall protection systems or another qualified person with appropriate education experience should design an anchor point to be installed. In other words, if you're not using something that's pre-engineered, you got an issue. So you want to keep it simple, don't step out of the guidelines or the scope of the manufacturer's instructions. That's critical. You start doing that, that's when you start going down this road and you don't want to go down that road. That's an expensive road to go down, when you start having to require a professional Engineer. If my professional Engineer gets involved, it's typically a two thousand dollar fee. So you step out of the guidelines of the manufacturer's instructions, you're looking at two thousand dollars for us to say, "We bless that anchor point." So follow the instructions. Often you don't know that there's a solution available. That's where again you get involved with your distributor. They're here to support you. I'm here to support you. So if you have a question, don't make an assumption, please. Your solution could be very inexpensive, and you could get right to work and get the job done.

These are some of the things we do related to our product – we call out specification for the materials we use, so my engineers are all involved in this. I don't know what any of this

information means. We call out the specific types of stainless steel we use in the material, so this is all pre-engineered. We do testing – this is our dynamic strength test, or dynamic performance test. So we're testing all our products, obviously, so you can be confident that what you're using is gonna be the standard in the job application you're performing.

Using anchor points – some guidelines on that. So we have a safe zone here, this is what I call my safe zone. When I go up on a roof and do a job hazard analysis, what's my safe zone? That means where do I need fall protection. And then I'm also looking at my danger zone. So a leaning edge is obviously a danger zone. It's ok to do a sketch of your job too – of the roof layout, I would. Put down your plan, that's just better backup for you. So understand your safe zones, understand your danger zones. So the red areas are the danger zones – you need active fall protection. Why do you need that? Because if you determine what your danger zone is, then I know where to put my anchor points. And your anchor points laid out here, so there might be a structural member there – steel. Remember we went into steel. Or going into concrete, or wood, but your anchor point layouts – this anchor point layout is designed with a centenary line, a horizontal lifeline. It's a continuous system so that you're constantly, directly behind your anchorage connection. So here's your lanyard, and your anchor point. So if the guy falls off there's no swing-fall hazard. So know what your safe zone is on a roof. And know what your danger zone is. It could be machinery. If I was a safety professional, I'd want to look at what the swing-fall hazards are. Maybe you might only install one anchor point, but you need to know if there's equipment down below. You might strike the lower equipment. The ground is 20 feet but the top of the equipment on the ground is 10 feet. That becomes your fall clearance. You have to calculate that into your risk. So you have to know where you're placing your anchor points. That's why it's so important to understand your danger zone. What triggers a danger zone? Leaning edge hazard is the most common and I would prefer when you are using an anchor point and you have a leaning edge hazard that you're actually in restraint vs. fall rest. Work in restraint before you have to work in fall rest if you have to use fall protection equipment. That means you're not gonna go over a leaning edge. There's ways you can do that, very economically, like this product right here. Everybody has this, this is a vertical rope lifeline. I can tie that into an anchor point. I could position myself so that I don't move past this point. So if I'm at a leaning edge this is ideal because it actually prevents me from going into a fall-rest situation. Which means if I'm in a fall restraint situation, this anchor point only needs to be three thousand pounds. That's good because now you can look at that: "Ok I'm not so concerned about what it's fastened into because it only needs to be 3000 lbs.

Free-fall distance: 6 feet obviously triggers you to use fall protection. So if you're working 6 feet off the ground, you gotta use fall protection. Roof structures: I often see holes, you wanna think about the placement of your anchor points, in adjacent to skylights. Is there a skylight there? Is it covered? There's ways you can cover a skylight very economically and a portable system you can use so you can take it with you when your guys aren't working on the skylight. You should cover the skylight because that's a fall hazard exposure. A hole in the

roof: think about your anchor point and where it's placed in adjacent to the hole. Often if you put your anchor point close to that hole, near the hole is where a weaker part of the roof structure could be. So you definitely want to keep your anchor point back away from that hole. You also want to think about where that is in your danger zone. Ladders: Danger zone is a ladder. Ladders are dangerous – 80 percent of all accidents on a ladder occur from a transfer of a ladder to an actual work service. So think about that if you think you can get away with using ladders. But that triggers a need for fall protection.

1200 fatalities a year, falls alone account for 15% of all work fatalities. And this is what we talked about earlier: accidents happen when the risks seem to be minimal, when they actually aren't. I have a customer on the East coast, a veteran mechanic, about 26 years with the contractor, showed up at a jobsite – it was 5 in the morning. Went into an elevator shaft to work, forgot what floor he was on, opened the door and stepped out and fell. 26 years with that company. They found him in the bottom of the elevator shaft. He was only gonna be up there for a few minutes. They implemented a company-wide “curb to curb” fall protection policy. If a guy gets out of a truck, you have to have a harness on until you get back into the truck. And they have over 80 locations across the US, with over 12000 employees. So imagine rolling something like that out. So dot your i's, cross your t's before you get to that point.

The worker feels safe or not directly unsafe: no danger in falling or less observant. So again, doing that danger zone, safe zone analysis is part of your job hazard analysis that'll help you lay out your anchor points. Remember we don't want outside of those 30 degrees because then you have a swing-fall hazard. We want to make sure we know what the manufacturer deems as a structurally sound surface, which would be steel or concrete or metal decking. But you need to follow the manufacturer's guidelines, which are in the instructions. You follow the instructions, you'll use the product safely, guaranteed.

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...In this event we put independent tie off points in the corners, why do you think we did that? Look at this anchor point, look at where he's tied off. Look at that angle, lots of swing-fall there right? When he gets out to this corner, that's a danger zone right here. So we put anchor points in the corners so the worker can perform his task safely. That's probably leaning edge work or gutting cleaning or something along those lines. I'm a huge advocate of 100% tie-off. You should have Y-length lanyards all the time. Anyone I consult with, it's a 100% tie-off policy, you have a Y lanyard, no excuses. Because when you disconnect to reconnect, that's your exposure. But with this anchor point layout, if we didn't put these corner anchor points here, we'd have a swing-fall hazard, a pendulum fall. If you have a swing-fall at a 30 degree angle, you can reach a velocity of 15mph. So get into your car and drive 15mph into a brick wall, see what happens to your car. It's gonna be in the shop right? So now just think about a human

being – 15mph into a solid structure. That’s a fatality. Brain damage, spinal chord injury, lungs, worker’s comp claims, a road to recovery, just not good. So mitigate that swing-fall hazard by the placement of your anchor points. And a lot of it has to do with the training. Do a sketch of that roof structure – simple and fast to do. These are things we talk about in terms of how to meet the requirements of the standards. So following manufacturer guidelines – again, it’s in the instructions, that’s what they’re there for. So keep the instructions, put it in a file. If you have any questions, call the manufacturer. Use only manufactured supplies and fasteners. One of the big no-no’s I see are contractors using my fasteners, but they won’t use them all. You can’t do that, you have to use all the fasteners. If you lose the fasteners, call the manufacturer, make sure you get the specifications of the fasteners. Most often you get the fasteners from the hardware store. Provide training to the personnel. Installing an anchor point is simple if you follow the manufacturer’s guidelines. You want to look for deformation in the anchor point – is there any wear on it, are all the holes filled properly, was it installed per the manufacturer’s guidelines? You also want to train on the use of an anchor point. How many people can tie-off to an anchorpoint? If I have a 10,000 lb. anchor point, 2 people can tie off to it. We’ve designed 10,000 lb. anchor points before.

How do you determine when an anchor point needs to be replaced? If it’s a permanent anchor point, it has to go through a competent person’s inspection once a year. So if you see a lot of rust at this area of the connection take a picture of it and send it to your manufacturer. Also, look around your fasteners, there may be a lot of rusting around the fasteners. You also want to look for wood rot/mildew when you’re installing these. You don’t want to install it on a low point of a roof, you want to install it on a high point. And you want to make sure the flashings are done properly. You want to make sure you have someone deemed competent. Preferably two people. And those are gonna be your two workhorses in terms of understanding the product’s proper use and misuse. This is a video of a live test of the “Beamer 2000.” So that truck is being held up by that one little D-ring. So you can have confidence in you manufacturer of fall protection, not just us.

#### *Video on rescue plan shown*

Proper rescue plan: if a worker’s in fall arrest, you have to have a rescue plan. And it can’t be just calling 911. The competent person in your company has to be trained in rescue. Otherwise, no one will know what to do. You’re also putting the would-be rescuers at risk. Big thing again: follow the manufacturer’s guidelines on installation, all fasteners must be installed, they must all penetrate structural member. If you don’t know the structural integrity of the material you’re installing the anchor point into, you need to consult the Engineer. You’re required to meet the ANC guidelines – that permanent anchor point must be inspected once a year by a competent person. The building owner is required to inspect the anchor point. The roof is the last part of the project – so they think about it the least. If you’re working with an owner make sure you ask about anchor points. You need to know whose responsibility that is, sometimes it’s written in your contract and you don’t see it.

*Question and Answer time:*

Q: Where do I find records on anchor points? Who is responsible for that? Because nowadays if you fall down, it's your fault (the employee).

A: The employer is required by law to protect the worker. Period. And the employee has ownership as well, but the employer is the governing body. There are a lot of anchor points installed on the island that have been here a long time. The labels are gone. So that's where the owner has to have the fall protection plan. He has to know what building and where the anchor points are located on that building and an inspection log for that. If he doesn't have it, then you shouldn't be tying off to it. But you can proof-load test an anchor point to determine safe working load. There's products out there like this one we use in the field – this is a simple, portable proof-load tester, and I can test a D-ring, a CV pipe, and a variety of anchor points in 2 seconds. I think they're like 2500 bucks. 99.9% of the time, there is zero documentation of an anchor point on a roof. The proof-load tester can go up to 5000 lbs. All our products are proof-load tested. We can also test horizontal lifelines with this.

Q: What about harnesses and other equipment that don't have serial numbers/labels?

A: All our harnesses are serialized and should have a tag. There's usually an inspection grid as well. If the tag on the item is removed, whether it be an anchor point, harness, lanyard, or whatever, manufacturers state that the product is no longer acceptable to use.

Q: Do you have any anchor systems for horizontal lifelines on a wood building? (Low pitch)

A: 412 or less, we have a rope horizontal lifeline that connects to two anchor points (has O-rings on it). You can use a 12 strand rope. It's a horizontal roofing kit.

So the takeaway is follow the manufacturer's guidelines, install manufacturer's fasteners, and know what you're installing into. Have a nice system (documentation/records). I'm available to help with those things, and I'd do it free of charge. The safer you are, the safer my business is.