

Safety, Accidents and the Current Zipline Craze

How can you tell if a zipline canopy tour or adventure park is safe?

**By Mike Fischesser
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First of all, the information below in no way means that ziplines built by professional companies other than Beanstalk Journeys are unsafe. Many of our good friends in the adventure education industry design, build and train differently from Beanstalk Journeys. As you visit numerous zip courses around the world, you will see a wide variety of designs and safety practices.

At the time of this writing, the Association for Challenge Course Technology, The American Society for Testing and Materials and ANSI do not require builders to use poles, engineers, lightning protection, certified arborists, increment borings of trees, full body harnesses, two attachment points to the zip cable, half inch cable or larger, etc. Unfortunately there are some unprofessional zipline building companies that use fancy certification wording and credentials but are not building safely. Several of these “professional” companies have had their work rebuilt a year or two after they left. As a zipline guest or a potential buyer of a zip course, you should do some investigative homework and ask some tough questions so you can avoid an accident or spending a lot of money on a course only to be disappointed and having to rebuild it later. As an example of unprofessionalism, one of these companies, who is building a lot of courses was using “malleable” cable clamps, which the adventure education industry banned 20 years ago because that cheap, hardware-store clamp has a bad safety record of failing. Imagine building a zipline and using cable clamps that are known to break. Backyard zip builders are popping up all over the place. **DO YOUR HOMEWORK.**

At Beanstalk Journeys we feel strongly that the following design, build and safety practices must be built in to every Beanstalk project:

Full Body Harnesses

A full body harness is best for accommodating guests who come in all shapes and sizes. If a pulley jams or a guest doesn't fully arrive on a zip, they may have to hang for a while before being rescued. A full body harness is more comfortable and supportive and will lessen the possibility of the "harness hang syndrome" in a long hanging situation where serious medical problems can arise from restricting blood flow (usually in the case of an unconscious participant).

A full body harness significantly increases the safety margin in the case of staff and guest who might invert and fall out of a harness due to improper positioning. Any harness (full body or sit harness) **must** always have the waist belt above the iliac crest (hip bones). Unfortunately, a lot of staff and guests think it is un-cool to pull the waist belt up that high and they wear the waist belt below the hipbones, which can cause it to completely slip off in an invert situation. This unsafe practice probably comes from the whole "low rider" pants movement. Crazy!

Every Beanstalk guide and guest is required to use a really nice Singing Rock, full body harness with front and rear attachment rings as well as side rings for guides to clip guests in at treehouses.

Hand Braking

Hand braking is when staff and guests control their zip speed with their own hand(s) on the cable **behind** the pulley(s). Hand braking is fun and typically safe. Unfortunately, the occasional guest (and a recent serious injury with a builder) may not do the procedure correctly and slam into the pole, tree or cliff at the far end. There are various backup techniques being used to address this situation, but we have yet to see one that everyone agrees is the best. Most professional builders and designers are using hand braking and it is absolutely an awesome technique on the longer zips (greater than 200 feet), when done correctly. The question is: "As a designer/owner, if you know that someone may eventually get hurt, because of the hand braking accident stories (and they are out there, but often not reported to the designer - builders) is that acceptable? At Beanstalk we say, "No. If you know a safety procedure occasionally results in serious accidents, then it is not a good procedure nor is it acceptable." Hand braking is similar to teaching a novice to belay. You would never trust a novice to belay after one quick demo and two practices, especially when a person may be anxious about zipping and not thinking clearly. Beanstalk designs aim for nice Tinkerbell-type landings or a safe braking system that staff control.

Hair in Pulleys, Dislocations, Finger Pinch

There are numerous accident stories out there of people's hair becoming entangled in the moving pulley wheels because their head and helmet (some companies are not using them, which is unacceptable) are too close to the cable. Hand braking requires that the participant be close enough to the cable to reach it, therefore long hair is a concern. If someone is scared and over grips the cable to slow down during hand braking, it can result in injury to the shoulder assembly or a complete dislocation. Even though they are taught not to, sometimes a guest will grab the cable in front of the moving pulley and receive lacerations (on an ungloved hand) to the fingers. Beanstalk designs have the participants hanging well below the pulleys to avoid these problems.

Poles vs. Trees

Trees are wonderful to build treehouses and zip decks in. However, it is very difficult to guarantee the health and safety of a key tree. Beanstalk always uses a **certified consulting arborist** (not simply a tree worker) when building in trees. But it is still extremely difficult for our arborist to prove that there are no large, hollow cavities inside the tree. Hollow cavities are typically caused by ant colonies, decay or past trauma. In the old days, many builders, including ourselves, didn't worry too much about tree safety because we weren't putting tremendous focus on trees in the case of "ropes courses," but now zip builders are putting high compression loads (large decks and 10+ people) and huge lateral loads on trees (1,000' + cables). Unfortunately, it appears that the mindset has not changed from ropes course/single participant trees to ziplines/huge load situations on trees. We are often shocked to see some of the species (poplars, dying hemlocks, red oaks, etc.) and small diameters (less than 12") that are being used. We use a \$6,000 Bosch Resistograph with a graph paper read-out to assess the health and history of a tree, but we have never done this at 12" intervals to prove to ourselves that no dangerous hollow cavities existed. Therefore, we primarily use two certified, Class 1, treated poles to support all treehouses and zips (which, admittedly is overkill, but we like it. What if a single pole had a weak point and failed?) This allows our engineer to be able to calculate loads better and lessens the cost of arborist safety visits over the years as well as worries of ice, wind or insect damage.

Cable Diameter

The old standard was 3/8" diameter, 7x19 strand, GAC, but now, most professional companies are using 1/2" diameter or greater, as does Beanstalk. It is stronger, lasts longer and more predictable.

Lightning Protection

We have been using lightning protection systems on structures over 30 feet in height since 1989. We wish everyone would. It makes our industry look more professional. Why not err towards more safety instead of less? We use it to protect the structures, not so much the people, hopefully they are being lowered to the ground at the **FIRST** sign of lightning or thunder.

Annual Safety Report

Every outdoor adventure education organization, private or public, should have an “Annual Safety Report” prepared for in-house safety management, their insurance company and available to the public upon request. The report should include a general narrative summarizing the safety findings from the year, as well as, statistics and narratives on Near Misses, Incidents and Accidents. Of course learning from accidents is critical for organizational safety management . The goal of every organization should be **ZERO** accidents, incidents and near misses. Near misses are situations that resulted in no injury or a minor injury, but had the potential and were close to being a serious accident or fatality. Staff and management can learn the most from near misses, because there will probably be many times more near misses than accidents IF staff are required to report them. There should be a climate of openness so staff are not afraid to admit their mistakes. This “openness, professionalism and willingness to report” safety incidents is one of the greatest characteristics of a well run, safe, high quality organization, along with the organization’s willingness to share their learnings with their insurance company, the industry and public.

Engineers

With all the canopy tours and zip parks that are popping up all over the world, the need for engineer involvement is greater than ever. The loads and forces on trees, poles, cables and ground anchors are much higher than in typical ropes course designs. Our fear is that some companies are not using engineers, thinking that an engineer is an unnecessary expense and in the race to see “who can stay ahead of who” with the longest zip, the forces may be way past safe working loads of the materials. Beanstalk uses a certified engineer who is very familiar with ropes courses, climbing towers, bridges and zipline construction.

Two Attachment Points

Assuming that the structure/tree and cable doesn't fail, the next major safety concern is: THE HUMAN ERROR FACTOR (HEF). The HEF can expose itself in many ways. We, as designers, builders and trainers, must be "hyper-vigilant" to insure that we are using the very best practices in terms of:

1. Staff selection and training
2. Staff manuals with crystal clear policies and procedures
3. Emergency preparedness
4. Ongoing refresher trainings and course inspections
5. Accident/incident analysis and reporting

The worst possible human error on a zipline canopy tour or zip adventure park would be for a staff member to **incorrectly** or **not attach** the guest to the safety cable or zip cable resulting in serious injury or death. Sadly, there are stories of this occurring.

Beanstalk Journeys firmly believes that **everyone**, guides and guests, should be attached to the safety or zip cable with two independent attachment points originating from two distinct and separate places on the full body harness, so that if one attachment fails (or is not clipped on), the other still serves as a primary life support point. This is very important to us. By implementing this safety policy we have doubled our chances for insuring that guides and guests are safely attached to a cable. We use two pulleys on the cable. Trailing a backup carabiner on the cable causes unnecessary peening on the cable and removal of the galvanization which results in having to replace cables more often as well as carabiners.

How to Ask the Question

As of this writing there are a wide variety of design, build and operational practices being used in the zipline industry. It feels to me like the "scatteredness" of the ropes course industry back in 1988 when we attempted to assemble all the most active builders in the U.S. and agree upon standards. Then, as now, we were most concerned with not the professional builder with excellent track records, but the backyard builders who were offering their services to the public without the proper TRAINING, EXPERIENCE and KNOWLEDGE.

So, you as a potential guest or owner, have the responsibility to educate yourself, similar to sending your child to a summer camp, so you can ask the proper questions. You could also hire a consultant to help you assess

the options. In the end it will be up to you to determine the amount of safety and quality that you desire.

Here are some possible questions to ask:

1. Is the zip business or builder a member of a credible, recognized national organization? (Be careful, some people may be creating fancy name organizations that are only recognized by a small audience.)
2. Ask for their Annual Safety Report.
3. Do they use poles, tree or steel structures? If trees, did an arborist guarantee “no significant hollow cavities”?
4. Did they use a structural engineer?
5. Do they know the statistics of accidents, incidents and near misses on their course or courses they have built for others?
6. What is their method of insuring that guests will not slam into a tree or pole at the end of a zip?
7. Ask them to explain their criteria for staff and training design.
8. Do they use a full body harness or a sit harness?
9. How many attachments are there to the cable?
10. Ask them to send you their staff manual! (Get several and compare. You may be surprised by the differences in professionalism.)
11. Does their course have a lightning protection system? If not, why not?

As mentioned at the beginning, these are only Beanstalk Journeys opinions and practices. These comments are not to be considered any type of national standard or policy. We are not super-experts in this industry. There are a lot of people with much more experience and wisdom than us. You should listen to them too. We are trying to learn and stay open to new ideas and technology. We welcome your thoughts. Hopefully, all of us working together will result in a more unified, professional and safe adventure education experience for our guests.

Editor’s Note: For those unfamiliar with the author’s background, Mike Fischesser has a long history in the field of safety management in outdoor education. Many view Mike as one of the leading pioneers of outdoor program and ropes course safety in the U.S. (although Mike always states that he “ain’t” no expert). He had a long history with Scouting from 1963 - 1971. After that he worked at the N.C. Outward Bound School and Outward Bound U.S.A. for over 18 years where he

developed many standards and innovations. In 1989 he started Alpine Towers. In 1996 he founded The American Adventure Service Corps (TAASC) and has gone on every trip with the kids for the past 14 years (check out the amazing expeditions they have done). Mike helped get the ACCT going back in 1988. His latest venture is Beanstalk Journeys, which you must already know about if you are reading this.

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[Link to Mike Fischesser's Beanstalk Builders Website](#)