**Alex asks: I know class 1 e-bikes (2 wheel) have assist up to 20mph. Is that the same with adaptive bike e-assist?**

Nate: The e-assist depends on the motor installed. Class 1 is also limited to 250 Watts. Some hand cycles with e-assist have higher wattage motors than that.

**BK asks: Important upkeep and maintenance considerations - What are some best maintenance practices (BMPs) for trails, entry points, and parking areas?**

Nate: Building trails with grade reversals, no matter how steep, is always best practice to mitigate erosion. [IMBA trail building](https://www.imba.com/explore-imba/trail-creation-and-enhancement/trail-solutions?param=trail-solutions-project). Entry points and parking areas: bathrooms, handicapped parking spaces adjacent, shade, maps of the area.

**Bob asks: What is the maximum cross slope you recommend?**

Nate: Just enough so water runs off the trail. 1-3 degrees? The athlete can easier manage the cross slope if the minimum tread width of 40” is present. The effect of tilt on the user experience depends on the rider to be able to counter balance side-to-side. Depending on level of injury, how high up the Center of Mass of the rider, I would say the flatter the trail the more comfortable the experience. I would have a beginner on a trail with minimal tilt. Experts with lots of mobility to control their CM can ride with more cross slope.

Coach note: “Over train before you over-terrain”

Practice tilting a recumbent or hand cycle is best done on grass, with a ready spotter on the uphill side of the front wheel. The sensation of tipping and having the uphill wheel leave the ground can be very unsettling. This should be well practiced before heading out on the trail. A feature such as a long 4x4 piece of lumber, root near a tree, anything to simulate the “tilt” to simulate going over a root or rock with one front wheel. The athlete must move their CM toward the uphill side to avoid tipping over. The balance point depends on how steep the cross slope is, how high up the CM of the athlete is, and how mobile the rider is. The coach must observe this ability to then chose appropriate terrain.

**Brandon asks: How often have you seen trails have places to pull off once in a while without blocking part of the trail or impacting non-trail spots.**

Nate: Depends on the terrain. Steep side hill makes this tough. A meandering trail through the forest is easier to pull over.

**Are there any different suggestions to help the creation of downhill trails vs a XC trail?**

Nate: Not really. Good trail building is just that. Water management, fun, good views, work with the terrain you are given. [IMBA](https://www.imba.com/explore-imba/trail-creation-and-enhancement/trail-solutions?param=trail-solutions-project) has awesome guidelines.

**Brian asks: For 3 wheel bikes important to measure trail width at trail surface. With 3 wheel bikes tires are on edges of trail and impinging rocks or trees prevents passage.**

Nate: I carry a tape measure and/or a string in my pack thats 40”.

**Cate asks**: How do you train volunteers to build and maintain accessible trails? How do volunteer living with disabilities participate?

Christina: Hi Cate, happy to discuss more with you about specifics in your area if you reach out via email.

**Charles asks Christina:** What was the name of the Instagram account for the video of horse interaction?

Christina: Hi Charles, check out meetjoestone on instagram

**Christina Micek asks: Many or our issues arise with shared use trails between horses and mountain bikers. What are your recommendations to make sure everyone is as safe as possible? I.e. yielding laws, the sounds bike make, speed differentials, jump building, ruts in trail, etc.**

Nate: Train your coaches and athletes to communicate with the horseback rider. Ask how they should proceed. Use your voice to speak so the the horse knows you are a human. “Be the rider you want to see on thge trail” Say thank you. Yield whenever possible even if you “have the right of way”. Bikes yield to everyone, both horses and hikers.

**What are the state, federal park obligations legally for adaptive use?**

Nate: Please refer to the websites listed at the end of the webinar. These are the same:

**Access in Wilderness, National Parks, BLM, USFS**

This is something I am very interested in and have wrestled with a lot. I’m comfortable answering it. Anyone else?

Resources

3 guiding documents.

- The American with Disabilities Act, Title V Section 508 (c)

- Rehabilitation Act of 1973 (revised 1978)

- 1990 Americans with Disabilities Act.

1. [Wilderness.net](http://wilderness.net/) The “[toolbox](https://wilderness.net/practitioners/toolboxes/accessibility/default.php?print=yes)” section is extremely helpful in unpacking the legislature we are working with:

Interpreting wheelchair on the the wilderness act hinges on this:

- (2) Definition - for the purposes of paragraph (1), the term wheelchair means a device designed solely for use by a mobility impaired person for locomotion, that is suitable for use in an indoor pedestrian area.

Translation: refer to a mall or similar area. "indoor pedestrian area” A Reactive Adaptations Bomber or Nuke are comfortable moving around in a mall. 36” or less to pass through a ADA door. Tracked vehicles are not ideal. Think Bobcat or skid steer. They do tear up the terrain more.

-[Wilderness Accommodation](https://www.fws.gov/policy/610fw2.html).

- The Forest Service has an accessibility [page](https://www.fs.usda.gov/managing-land/national-forests-grasslands/accessibility) . There is a ton here.

- Webinar: [Wilderness and Accessibility Webinar](https://usfs.adobeconnect.com/p0jsiizbc04v/?OWASP_CSRFTOKEN=512ee921d53f87c855858f389bfcfb1d528a8453c87ae947e95b7f6cf45b85d5), delivered by retired Forest Service National Accessibility Program Manager, Janet Zeller. Includes, among other things, a key section on "when is a wheelchair not a wheelchair”. 16:00 talks about wheelchair.

**Adaptive trail use can benefit other user groups- have you used this as marketing leverage when building relationships- i.e. equine use, running stroller groups, etc.**

Nate: We call a “green” or aMTB 1 trail an “everybody trail” just for that reason!

**What is your method for keeping abreast of trail work in your area?**

Nate: Find your [local IMBA chapter](https://www.imba.com/engage/find-your-local-group?param=chapter) or trail organization.

**Christina Thayer asks: Please consider resources for designers (links to guidelines, techniques, etc.) and organizations that may help with grant funding for ADA trails.**

**Doug asks: Are there any federal public lands that have trails built specifically for adaptive mountain biking?**

Nate: Some trails have been built to spec with 40” width etc. Trail descriptions can be found on [www.trailforks.com](http://www.trailforks.com), [www.theunpavement.org](http://www.theunpavement.org), and if you find any other websites with an awesome catalogue of trails built with awesome descriptions, please let me know!!!

**Elizabeth asks: How easily is it to retrofit an existing trail to adaptive?**

Nate: Depending on the trail, it can be as easy as cutting out logs narrower than 40”, adding some bench cutting. The goal isn't to make every trail into 40” but some that are obvious should be considered in collaboration with your local land manager and trail advocacy group.

**Eric asks: What's the footprint of a turnaround? 10'x10'? 8'x8'?**

Nate: Depends on the length of the bike. Some are 7 feet long. 12x12 or larger if you can.

**Do the e-assist bikes have a reverse gear?**

Nate: No reverse gear. On a prone bike, you can reach the front tires to roll back. On a recumbent, you can also reach the front tires. Be careful having the cranks close to your face when you roll back. The cranks drop back and can hit you in the face.

**Gene asks: We are building adaptive accessible tails. How can we get an adaptive bike to test the trails?**

Christina: we may know riders from your area, contact us via email.

Nate: Contact your local [Move United chapter](https://www.moveunitedsport.org/chapters/)!

Cayla: Echoing Nate, we encourage you to locate your local Move United member organization [here](https://www.moveunitedsport.org/chapters/location-map/). If you are having trouble connecting with riders, please feel free to reach out to Move United directly and we will help to get you connected!

**Gregg asks: What are some ways that trailheads can be designed to accommodate access by adaptive mountain bikes, but prevent access by dirt bikes and ATV's?**

Nate: ATV’s are 48” wide. RZR vehicles are wider. Placing a pinch point of less than 48” at several locations near the beginning of the trail is the best way I have found. Dirt bike, normally a “No motorized vehicles” sign is located at th beginning.

Christina: who is allowed on the trail should always be posted. This is a legal issue as well, what is allowed on the proposed land.

**Jason asks: Who are the intended users for adaptive mountain bikes? Those who can't two wheel bike? Or is this a desired alternative to two wheel bikes?**

Nate: Three wheeled bikes either prone or recumbent are best suited for athletes with balance issues, athletes with partial quadraplegia , athletes with paraplegia.

Christina: often we think of Adaptive modifications as just for people who use wheelchairs, but the truth is that designing our trails, bathrooms, buildings this way is good for everyone- people with small children, the aging among us, all different disabilities... I could go on my point is that universal design serves everyone instead of building just for young, active folks who walk on two legs with perfect vision and hearing (really a minority of people).

Have you all been using “trailsforks” adaptive mtb ratings on your local trails? How would grading fit into the “trailsforks” ratings that deals with how much “assist” you need. Or do you know of other adaptive trail ratings?

Nate: How much assist is a good question. Most electric assist motors have a 1-5 scale which can be adjusted via a controller on the bike. Just starting out? Use level 1 and 2. Need more assist to climb a hill, use 3. Riding technical terrain, 2-3 so the motor output is less abrupt. Cruising a fire road uphill? Use 4-5 and move swiftly, and also watch your battery life drop quickly!

**John asks: How about wider areas every so often so that bikes can pass each other?**

Nate: If terrain allows, a pull-off area sounds perfect!

How high can objects be the trail for bikes to negotiate... like sticks, branches roots & rocks?

Nate: Depending on the rider, 4” can be a lot. However with good side-side bike body separation and the ability to counter balance, more uneven terrain can be negotiated.

**Re: e-bikes, how long w/regard to time and/or how many miles can be accessed before battery failure?**

Nate: Depends on the weight of the rider, amount of assist, steepness of trail, how many Watt/hours in the battery.

**Kevin asks: What would be your best advice to someone who is energetic and motivated, but has never implemented a trail system before and would like to see one started in their area?**

Nate: Contact your local [IMBA chapter](https://www.imba.com/engage/find-your-local-group?param=chapter) or local pathway organization, get organized, speak with all who will listen, get organized even more, start an organization, fund raise, repeat, until said trail is built.

Christina: echo Nate- you don’t likely need to start on your own from scratch find the right groups to offer your energy and skills to collaborate.

**Can you provide a few examples of funding sources for trail implementation that might not be obvious to someone who is just starting the funding process?**

Nate: Contact your local community foundation for guidance in your area. There is money out there. Remember, you are not competing with other organizations because you are unique!

Christina: find out who is responsible for the land/trail in question. It is likely a collaboration. There are funding opportunities for public land by the administration organization and often they approve projects paid by private donors or nonprofit organizations. Remember to seek out “in-kind” and volunteer support as well as cash. Permission to build, a group of volunteers wih shovels and some machine time could be all you need.

**Is adaptive MTN biking focused on those with a disability and need for stable bikes or is it simply a new style of riding?**

Nate: Both.

**When designing a new trail, does the normal amount of out sloping still work for adaptive cycling?**

Nate: Depends what your normal is. I would say minimizing outslope is preferred.

**Lacey asks: Were there any athletes with disabilities who helped create these adaptive considerations? And does anyone on the panel have a disability?**

Nate: Vast collaboration with athletes with disabilities riding trails which worked well, didn’t work well and many hours of debriefing have gone in to the standards we present. Reactive Adaptations has gone through countless rounds of prototypes to create hand cycles which work best with the 36” width.

Christina: Excellent question/point Lacey. Teton Adaptive has staff as well as guests who live with disabilities working on our trails and relationships mentioned in the webinar. It is imperative to have their skills and voices in any project that serves them.

Cayla: While this panel did not have any athletes with disabilities, we recognize the importance of having their voices and experiences directly represented and appreciate you bringing this feedback to our attention. We recognize that we have room to grow and welcome help ensuring that we are connecting with athletes, coaches, and advocates who are adaptive athletes themselves.

**Mark asks: Is there a way for trail builders connect with adaptive riders in their area? Collaboration seems to be key.**

Nate: I would contact your local [IMBA chapter](https://www.imba.com/explore-imba/imba-local) and local [Move United](https://www.moveunitedsport.org/chapters/location-map/) chapter.

Christina: Mark, please send us and email with your request and location and we can introduce you to who we know in your area.

Cayla: We encourage you to locate your local Move United member organization [here](https://www.moveunitedsport.org/chapters/location-map/) to connect with adaptive riders local to your area. If you are having trouble connecting with riders, please feel free to reach out to Move United directly and we will help to get you connected!

**Martin asks: What is grade reversal?**

Nate: Grade reversal. Any time the trail goes up, then down for a short amount of time.

**Are most trails set up for one direction at a time are passing areas put in?**

Nate: Some areas have directional trails. This mostly applies to areas with higher use. Normally good communication leads to one person allowing a pass instead of installing a passing lane.

**How important are automatic or power assisted doors on restrooms?**

Nate: Depends on the individual using the door. For some this can be very helpful.

**Matthew asks: Currently proposing a youth training mountain bike facility on about 25-30 acres that would have a 1.5-2 mile intermediate trail that loops back to parking/restroom. Would that be a distance to bring in adaptive mountain biking also?**

Nate: Your project sounds like an amazing opportunity! 1.5-2 miles is great. And even longer! Remember, you can always go out and back if the individual is ready to turn around. Please consider creating a trail in accordance to aMTB 1 or 2. These “everybody” trails are totally enjoyed by everyone! Please reach out if I/we can help guide your process. Now you have my interest! Who, what, when, where, how are my questions!

**Maya asks: How do the adaptive cycling grade guidelines compare to those of non-adaptive cycling grade guidelines (i.e.., are green, blue, and black grades the same on adaptive trails versus non-adaptive trails)?**

Nate: The guidelines are the same. 1-3, 3-5, 6-8 are common grade differentials. Thanks!

**Michelle asks: Can you describe grade reversal and what that means?**

Nate: When the trail goes up, then for a short period, goes down and then back up. The reversal can shed water and prevents water from gaining speed which increases erosion.

**Paul asks: Are there Trail specs specific to primarily downhill trails? Protrusion sizes, grades 'drops' etc.**

Nate: I am referring to a cross country type trail where the user pedals up and down. Not a lift serve or “downhill specific” trail. However, grade reverals do apply to control erosion.

**Quinn asks: I am sorry, was as little late. Saw you talk about slope... but did you speak to the more important cross-slope?**

Nate: Keep cross slope to a minimum which will still drain. 40” wide tread. Before heading out on trail be sure to train the rider. Counter balance by moving center of mass in relation to the cross slope. If there is minimal ability to do this, a tip-over is more likely. So: Pick an appropriate trail for the rider for their centered stance.

Christina: Quinn, trails that travel perpendicular to the slope (I call it “side hill”) are particularly dangerous for three wheel bikes that are very likely to tip with the rider attached if the lower wheels are too weighted. To build a side hill safe enough it needs to be wide enough for the trike to sit flat, all wheels level. This is more of a cross country concern as skill hill riding often has access roads that can be a good option for Adaptive bikes.

**Shubhalaxmi asks: What should be the standard width of a nature trail on a hilly area?**

Nate: 40” trail is standard minimum width for a three wheeled recumbent or prone. Wider can be more comfortable for the rider.

**William asks: Christina, you mentioned, "recon" is that going to be publicly available?**

Nate: Recon type 1: We always ride a trail we plan to explore with a client the day prior to taking the client out. Make sure no changes have been made, that the trail is clear, and that is truly will be appropriate for the skill level, and the equipment we will be using. Recon type 2: Going out on your own and riding your local trails to measure grade, cross slope, pertinent details and then logging it with [www.trailsforks.com](http://www.trailsforks.com) ! Thanks for your work in advance!

Christina: thanks Nate, I would only add one thing... best recon is done with adaptive bikes present, don’t assume you will recognize the obstacles from your two wheel bike. We all need to share what we learn on the trails on public forums like trail forks, if you share your location with me in an email I can tell you what we know about your area and suggest some next steps.