

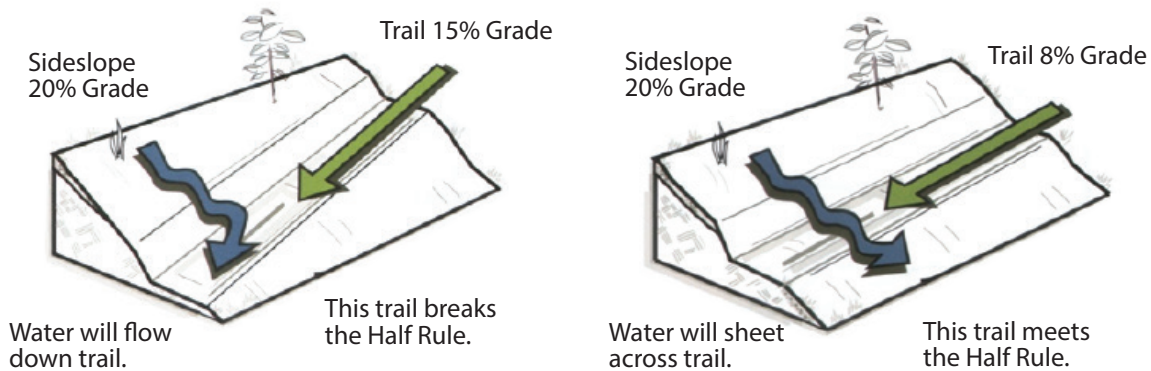
SUSTAINABLE TRAIL DESIGN

Properly designing trails is both an art and a science. Sustainable trail design reduces environmental impact; increases visitor safety; and is more aesthetically pleasing. The goal is to keep water off the trail. In almost every instance, the sustainable trail needs follow the contours of the land.

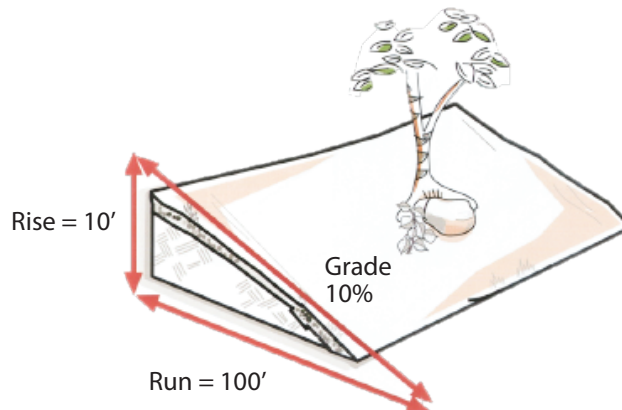
NC State Parks strongly recommends that segment sponsors use a professional trail builder to lead the design and construction of trails. Technical assistance in trail design is available from the State Trails Program. Please see the website, <https://trails.nc.gov/> for contact information.

The five essential elements of sustainable trails: (adapted from Trail Solutions)

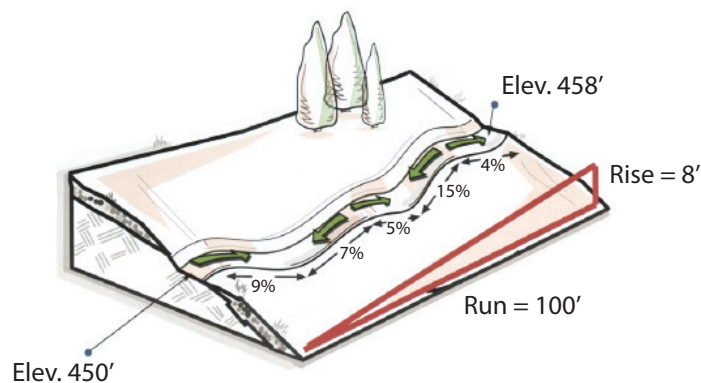
- 1. Half Rule:** The trail needs to move across the landscape so that the slope of the trail is less than half of the slope of the land on either side of the trail. Otherwise, water will run down the trail causing a myriad of issues including erosion and reduced user safety and experience. Surprisingly, this is most commonly an issue in gently sloping terrain.



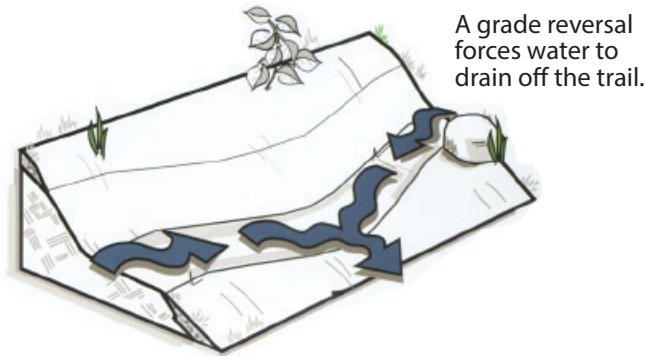
- 2. Ten Percent Average Guideline:** The average overall grade of the entire trail should be 10% or less to be sustainable. This applies to most soil types, minimizes erosion, allows design flexibility, and accommodates undulations.



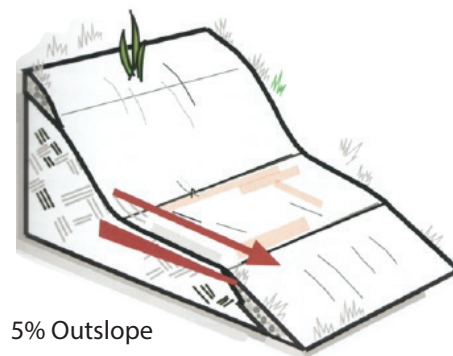
- 3. Maximum Sustainable Trail Grade:** While 10% is the maximum average trail grade, sections of trail can exceed 10% depending on a host of factors including soil type, sideslope, annual rainfall, grade reversals, type of users and the number of users. A trail professional is best equipped to help you decide the maximum grade of your trail.



4. Grade Reversals: This is a location on a trail where the grade changes direction. If the trail is going uphill, there need to be points, about every 20'-50' where the trail levels out and goes downhill gradually for 10'-50'. It is primarily a way to use gravity to ensure that water gets off the trail surface. It also is a reward for the user, allowing them to use different muscles and resting a little during an extended climb.



5. Outslope: The outer (downhill) edge of a trail should be sloped approximately 3-5% downhill. This is yet another construction technique that helps to keep water off the surface of a trail.



Recommended Resources:

Trail Solutions: IMBA's Guide to Building Sweet Singletrack. International Mountain Bicycling Association, Boulder, CO, 2004.
Equestrian Design Guidebook for Trails, Trailheads, and Campgrounds. USDA Forest Service, Missoula, MT, 2007
America Trails — www.americatrails.org

All images are from Trail Solutions: IMBA's Guide to Building Sweet Singletrack

Please contact the state trails program if you have any questions about state trails.



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NC TRAILS