

# 12 Trail Design Principles - Human & Physical

Adapted from **Natural Surface Trails by Design**

by Troy Scott Parker of NatureShape, LLC

available from [www.NatureShape.com](http://www.NatureShape.com)

Troy Parker suggests that trail managers measure proposed management actions against the following 12 principles. He maintains that these tests will quickly separate the good choices from the bad.

I summarize his approach like this:

**Clear Understanding of    Human Nature**  
**+ Nature**  
**+ Trail Intent**  
**= Appropriate Trails**  
**in the Right Context**

## HUMAN PERCEPTION

**1. Natural Shapes** - like tree roots and branches, streams, and native stone are pleasing and align with human and natural rhythms. They are recognizable and attractive at any scale.

**2. Anchors** - distinct, vertical elements, such as edges and gateways. They give us a sense that we are *here* rather than *there*. We are drawn to them and feel comfortable with them.

**Edges** - are extended anchors that we cross quickly, slowly, or not at all: skirt, follow, cross head-on, cross obliquely, follow edge, or cross repeatedly. Edges can be natural or man-made.

**Gateways** - are clearly constrained on two or three sides. The greater the *squeeze*, the stronger the gateway experience. We pass through with surprise, satisfaction, wonder, mystery; establishes a sense of progress and distance. Can create separation between the *trail world* and the *car world* of the trailhead.

## HUMAN FEELINGS (*bureaucratically palatable feelings*)

3. **Safety** - Feelings of safety are measured partly by individual perception and personality, partly according to actual and perceived dangers of the situation. Many people desire safety and a certain amount of risk to challenge their abilities.
4. **Efficiency** - matters even to people who are not in a hurry: we don't want a trail to waste our time. If it does, we create bootleg short-cuts and by-passes. Users want to travel as fast as the trail, the site and their mode of travel will allow: design speed trumps speed limits.
5. **Playfulness** - is the difference between a trail and a road. It's essential to recreational trails and includes anticipation, surprise, peacefulness. Playful trails are highly responsive to the site, with variety and contrasts in sensory awareness, spaces, rhythm and timing.
6. **Harmony** - is the overall appropriateness of the trail to the site and to us. It depends on the context. Like great art, we know it when we see it.

## HUMAN & NATURAL PHYSICAL FORCES

7. **Compaction** - is the hammering of the tread by soles, hooves and wheels causing the material to harden and sink relative to the surrounding soil. Hardened soil absorbs less water, causing more to run off. It also makes the tread more resistant to displacement, erosion and mud ~ which can be beneficial!
8. **Displacement** - is the kicking and spraying of particles along and off the tread (creating berms).

### How Compaction and Displacement Interact

- They modify all trail shapes.
- Compaction hardens tread, limiting displacement.
- Compaction is limited; displacement is forever.
- Tread materials matter. See Tread Watersheds below.
- On grades, displacement increases and compaction decreases.
- On grades, displace particles creep downhill.
- In muddy or loose tread, compaction can force displacement, too.
- Fast-moving wheels tend to super-elevate curves.

**9. Erosion** - is the movement of material by water or wind.

We accommodate it; we can't fight it.

Small erosion events nibble away at the tread.

Erosion starts sooner than you think, within seven feet of a crest.

Small erosion events clog narrow outlets, creating plugs and drainage failure.

Large erosion events are bound to happen and will scour tread and narrow drainage outlets.

#### **How Erosion, Compaction and Displacement Interact**

- Compaction and displacement set the stage for erosion.
- Compacted tread helps to minimize erosion.
- Displacement tends to increase erosion.
- Compaction and displacement can hide evidence of erosion.
- Compaction and displacement can hide evidence of deposition from erosion.

### **TREAD**

**10. Materials, Texture, Composition & Characteristics** - The unique blend of particle sizes in every soil type determines how it will perform as a trail tread. Each of the particles below is called a *separate*. Soil with more types of separates is more desirable.

Clay

Silt

Sand

Gravel

Cobbles

Stones

Boulders

**11. Tread Watershed** - is the tread between a high point (crest) and a low point (dip) along with the adjacent land area that flows onto this tread segment.

On **existing** trails, we can create artificial crests with waterbars.

On **new** trails we can minimize tread watershed size through careful route selection.

### **Tread Watershed Factors:**

- Size
- Slope
- Runoff potential
- Splash erosion
- Width
- Weather and climate and micro-climate
- Water sources
- Texture
- Trail use (compaction & displacement)
- Grade
- Length
- Dip sustainability

### **PHILOSOPHICAL FRAMEWORK**

**12. Trail Intent** - is the process of identifying your objectives for land and trail management. It is important that this intent (a) is generated and approved by the board of directors, (b) that it is written down so it's easy to implement, and (c) that it guides your day-to-day trail management actions.

Troy Parker is currently working up this section of his new book. It will include a series of challenging questions to help trail managers to clarify trail intent from a variety of angles.

- How do we accommodate resource protection and visitor enjoyment? [Note: The staff in every national park faces this question daily.]
- What is the desired experience for visitors? What will they take home with them?
- Can we accomplish our mission with what we've got? Can we really achieve what we want based on on-the-ground realities?
- Are our design principles compatible with our protection principles?
- If we design trails that invite inappropriate behavior and impacts, are we prepared to arrange for enforcement, or put up with the headaches and impacts?