Recreational Trail Design

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Steps to Follow

- Decide Trail Users
- Select the Corridor
- Establish Design Standards
- Mark Trail Location
- Clear the Trail
- Construct the Tread

- Install Structures
- Sign the Trail
- Install Facilities
Step 1: Decide Trail Users
Decide Trail Purpose

Trail Experience

Destination

Access for Management
Consider Number of Users

At one time
Over a season
Type of User Experience

Difficult & Risky

Easy & Safe
Step 2: Select a Corridor

“Swath of land within which a trail will be built”
Aerial Views
Topographic Map
Scout in Dormant Season
Scout in Season of Use
Use Existing Travelways
Points of Interest
Different Habitats
Attract Wildlife

Nesting boxes

Cover

Feeding Station
Cultural Resources
Highlight or Avoid?
Anchor Points

“Draw attention to natural objects”
Step 3: Establish Design Standards

- Trail configuration
- Length
- Tread surface
- Tread width
- Clearing width
- Clearing height
- Grade
- Turning radius
- Sight distance
- Water crossings
Configuration

Diagram showing:
- Simple loop
- Cutoff trails
- Spur trails
- Linear trail
Clearing and Tread Width
Clearing Width

Clearance beyond tread

No clearance beyond tread
Clearing Height
Setback from Waterway

“Too Close”

“Buffered Well”
Sight Distance
Slope

Sight the target at eye level.

Line of sight

Protractor

String and weight

Read the angle in degrees.
Turning Radius
Increase turn radius.

Lengthen turn radius as slope and downhill distance increase.

-Trains
Widen Tread/Clear Runout on Steep Slopes

Widen the trail more as slope and downhill distance increase.

Clear a runout.

Lengthen and widen cleared runout area as slope and downhill distance increase.
Step 4: Mark Trail Location
Step 5: Clear the Trail

- Trees
- Rocks
- Soil
Fell Trees & Cut Logs
Cut Limbs
Cut Brush
Remove Stumps & Rocks
Digging Tools

Pick-Mattock

Pulaski
Levers
Winches

Griphoist

Come-A-Long
Rock Carriers

[Image of a rock carrier bag]

[Image of a rock carrier frame]
Break Rocks

Sledge Hammer & Chisels

Feather Wedge
Rock Drill
Haul Fill
Move Dirt

Bulldozer

Mini-Excavator

Walk-Behind Loader
Smooth Trail Bed

McLeod Tool
Rock Rake
Step 6: Construct the Tread

- Compaction
- Displacement
- Erosion
Firm Natural Treads

Bedrock

Mixed Mineral Soil

Clay with Imbedded Rock
Poorer Natural Treads

- Sand
- Rounded Gravel
Wood Chips

“A temporary fix”
Gravel

Round - Poor

Crushed/Angular - Better
Rock

Rocks Imbedded in Clay
Pavers

- Firm tread
- Vegetation grows
- Water drains through
Vegetation

Protects Tread, Retains Snow

Grass

Leaves
Tread Edging
Visually Defines Trail Boundaries
Trail Edging
Retains Fill
Step 7: Install Structures to Cross Obstacles

- Flat Land
- Hills
- Boulder Fields
- Wetlands
- Streams
- Fences
Crossing Flat Land
Center Crowning w/ Ditches

Diagram shows:
- Center crowning
- Gravel or woodchip cover
- Fill from drainage cuts, minimum 3"
- Minimum cut 3"
- Width necessary for drainage

Image shows a curved path with ditches on either side.
Crossing Hillside
Full Bench vs Cut-and-Fill
New trail with steep backslope

Old trail with eroding backslope
Backslope Wall

- Loose Rock
- Fitted, Mortared Rock
- Wire Gabion
- Concrete Revetment
Tread Walls

Fitted Rock

Mortared Rock

Logs

Plastic
Rock Wall Design

Top course should be mortared.

3'-4' wide fabric mat. Place every 8'' of wall height in clay, every 12''-24'' in sand.

Hard native stone

3''-6'' setback per 12'' rise

Finished grade

Continue face at least 6'' below finished grade.

Stone rubble

Porous backfill

Compact subgrade

24'' min

Stone retaining wall
Wood Wall Design

6” x 8” x 3’ timbers spaced 8’ apart along wall
3”-6” setback per 12” rise
Finished grade
Optional perforated drain pipe
Porous backfill
Deadman
Secure with spikes.

Wood retaining wall
Divert Water
Rolling Grade

- 10% grade

+ 10% reverse grade (6-10 feet)

- 10% grade
Earthen waterbar
Rubber Waterbar
Switchbacks
Switchback Platforms
Climbing Causeway
Log Steps

Log steps

Place stakes in recesses or in holes drilled through log.

5"-9" rise
Box Steps

Treated timbers can protect a switchback landing.
Wooden Ladder
Steel Ladder
Cross Boulder Field
Cross Boulder Field

Rock Steps

Concrete Fill
Cross Wet Soil

Corduroy Trail

Logs, 6”-8” diameter

Corduroy
Causeway
Center Crowning

- Center crowning

- Gravel or woodchip cover

- Fill from drainage cuts, minimum 3"

- Minimum cut 3"

- 12"

- 2'-3'

- 12"

Width necessary for drainage
Geotextile Fabric

Elevated tread with geotextile mat

3"-6" of gravel or other fill material

Image of geotextile fabric on ground
Log Boardwalk

Half Logs

Steps
Boardwalk

Cribbing Supports

6 x 6 Sleepers
Low Boardwalk
Elevated Boardwalk
Floating Boardwalk
Stepping Stones
Ford & Stepping Stones
Open-top Culvert
Culvert Installation

**Metal culvert**

- Fill with soil.
- Trail tread
- 1/2 pipe diameter or 1 foot minimum
- Compact the soil at base of pipe.
- Do not allow rocks in the area next to pipe.
- Firm foundation (streambed)

Use rocks or vegetation on the downstream side to reduce erosion.

Headwall of rock should be at least 8” thick.
Bridge Location
Record high water level

Ordinary high water level

Average water level

Cattails, bulrushes, sedges, and other aquatic vegetation

-Kierne
Bridge Girders

Support Deck

Log

Solid Wood Beam

Laminated Wood Beam

Steel Truss
End Abutments
Hold up Girders

Wood Mud Sill
Concrete
Rock
Wood Timbers
Mid-Span Abutments

- **Wood Poles**
- **Wood Timbers**
- **Rock-filled Wire Gabion**
Suspension Bridges
Cable Car
Bridge and Boardwalk
Deck Materials
Deck Board Orientation
Deck Board Spacing
Deck Traction
Deck Traction
Curb
Hand Rail Supports

Buried in Ground

Outrigger

Attached to Girder
Handrail Posts
Flush or Protruding?
Handrail Materials

Rope

Steel Cable w/ Plastic Coating
Wooden Handrails

Sawn Wood

Round Wood
Handrail Materials

Steel Pipe

Steel
Fence Stiles
Fence Gates

- Fence Wire
- Steel Cable
- Steel Tubing
- Steel Tube Frame & Wire Mesh
Self-Closing Gate

Ball and Chain

Spring Hinges
Cattle Guard
Step 8: Sign the Trail

- Trailhead sign
- Confidence markers
- Directional signs
- Warning signs
Trailhead Sign

Hazards
Rules
Confidence Markers
Directional Signs
Directional post

SUMMIT 0.2 mi

SUNRISE LOOP

4'

3'

Underground brace
Warning Signs
Warning
Rock Climbing is Dangerous
SENSITIVE RARE PLANT HABITAT. STAY BEHIND CABLE
Questions?

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