MOUNTAIN BIKE TRAIL DEVELOPMENT

Guidelines for Successfully Managing the Process

Development Partners

IMBA's mission:

Create, enhance and protect great places to ride mountain bikes.

For 30 years, IMBA has been at the forefront of access, education and trail development for mountain bikes. IMBA has helped with the creation of 100,000 miles of trails and built relationships with land management agencies.

For the next 30 years, IMBA is focused on More Trails Close to Home. We believe everyone should have a chance to ride and reap the benefits of mountain biking near where they live.

IMBA Trail Solutions

Trail Solutions provides a full range of trail development services. Having accumulated a wealth of knowledge and experience, TS has become a leader in the trail development industry, including the creation of globally recognized guidelines for the development of sustainable and enjoyable singletrack trails.

Rock Solid Trail Contracting

Rock Solid Trail Contracting is an LLC based out of Copper Harbor, Michigan and Bentonville, Arkansas, dedicated to creating the best trails in the industry. Since 2014, Rock Solid has built hundreds of miles of trail in the United States concentrated mostly in Midwestern states like Arkansas, Michigan and Minnesota. Recognized as one of the largest and highest quality mountain bike trail building companies in the country that can create destination worthy trail systems and elevate hometown trail systems into regionally recognized status.

ROCK SOLID
TRAIL CONTRACTING
LLC

Greater Minnesota Regional Parks and Trails Commission

Since the founding of the Commission in 2013, a robust network of local and regional engagement has been developed. Local agencies have submitted hundreds of Designation Applications and Master Plans for review. The Commission's goal is to reach parks and trails users and stakeholders about district needs, opportunities and Commission activities when and how it works best at the regional and local level.

PROJECT BACKGROUND

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The collaboration between GMRPTC and Rock Solid Trail Contracting began in 2020 to establish a resource to:

- Equip Minnesota communities and state employees with trail development process knowledge and verbiage
- Serve as a quick reference

SCOPE EVOLUTION

As work began on the guide it was determined that the project needed to grow in order to best meet the needs of the intended readers turning the project into:

- A comprehensive guide for any Trail Champion in Minnesota, throughout the US, and internationally.
- Also a guide for Trail Industry Professionals.
- A complete book consisting of 12 chapters and over 275 pages walking through the entire Trail Development Process in detail.

WHY?

Traditional activity-based outdoor recreation management evolved to **outcomes-focused management**:

" ... positive outcomes from engaging in recreational experiences."

USERS & EXPERIENCE

THE RANGE OF TRAIL USERS


Runners


Dog walkers


Birders


Hikers


Mountain bikers


Adaptive Mountain Bikers

WHY DO THEY WANT TRAILS?

Relaxation, Time outdoors, Socialization

WHY DO THEY WANT TRAILS?

WHY DO THEY WANT TRAILS?

Escape

WHY DO THEY WANT TRAILS?

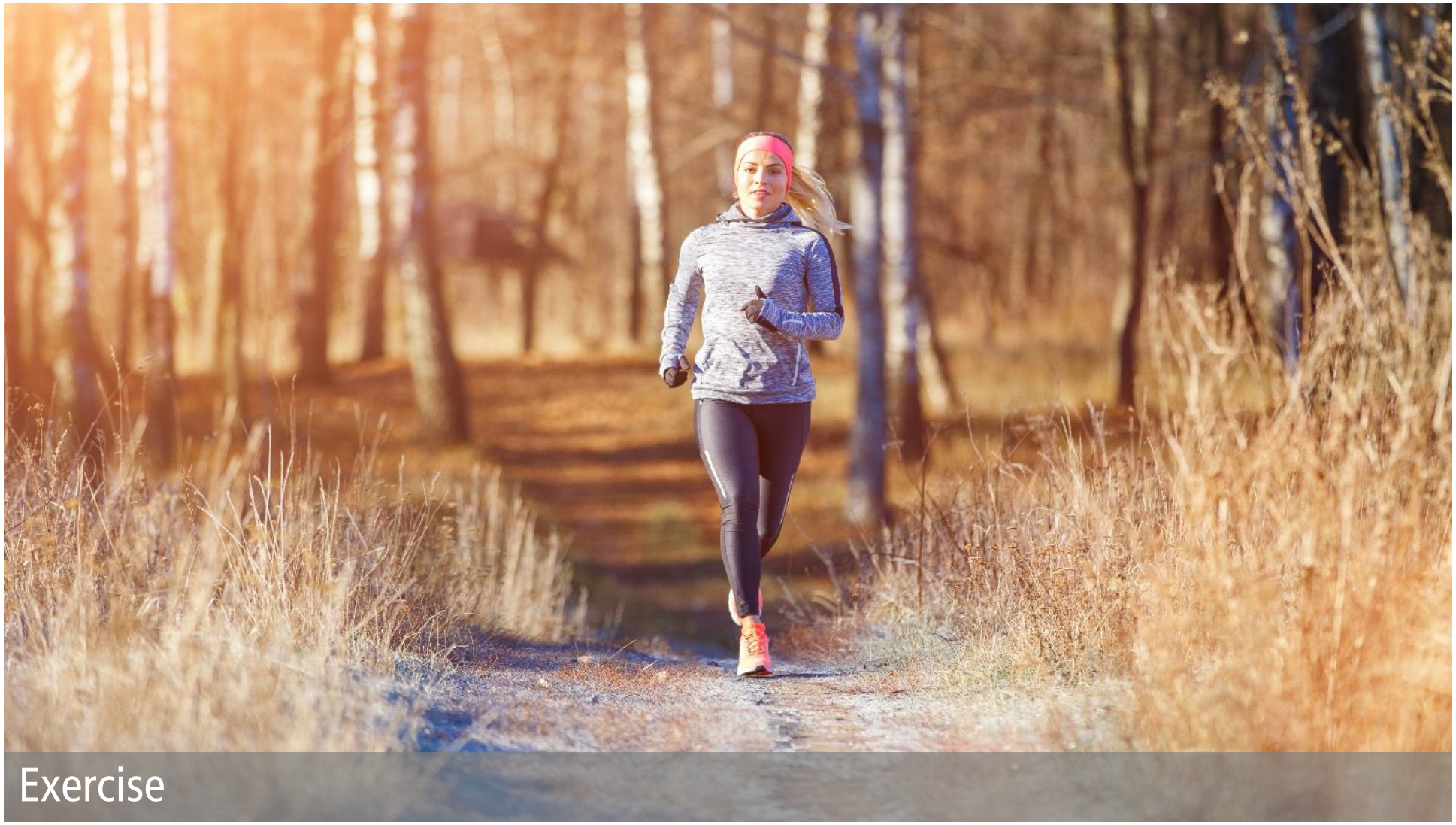
Views, destinations, and aesthetics

WHY DO THEY WANT TRAILS?

WHY DO THEY WANT TRAILS?

Play

WHY DO THEY WANT TRAILS?



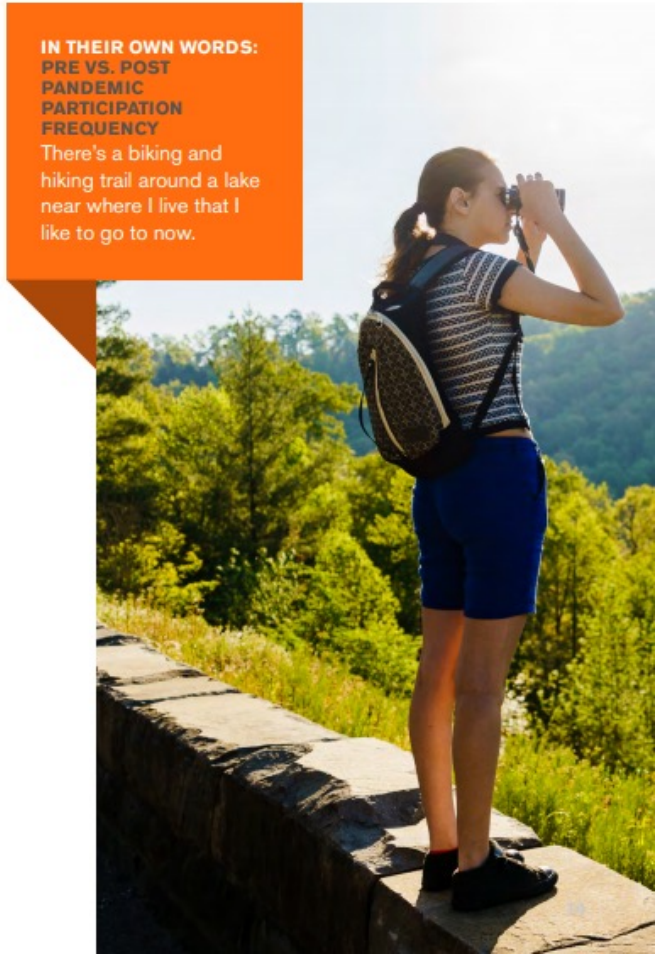
Exercise

UNDERSTANDING USER OBJECTIVES

- Hikers: efficiency, nature, escape,
- Runners: exercise, challenge, solitude
- Equestrians: loops, solitude, escape
- Climbers: efficiency, destination
- Mountain bikers: exercise, challenge, playfulness

THE NEED FOR HIGH QUALITY TRAIL SYSTEMS

Trails Close to Home



https://outdoorindustry.org/resource/2021-special-report-new-outdoor-participant-covid-beyond/

EVOLUTION & RANGE OF TRAIL INFRASTRUCTURE

SPECTRUM OF THE RECREATIONAL ACTIVITY


Single Track Trails


Flow Trails


Tot Tracks / Bike Playground


Skills Trails


Pump Track / Pump Parks


Dirt Jumps


Slope Style Trails

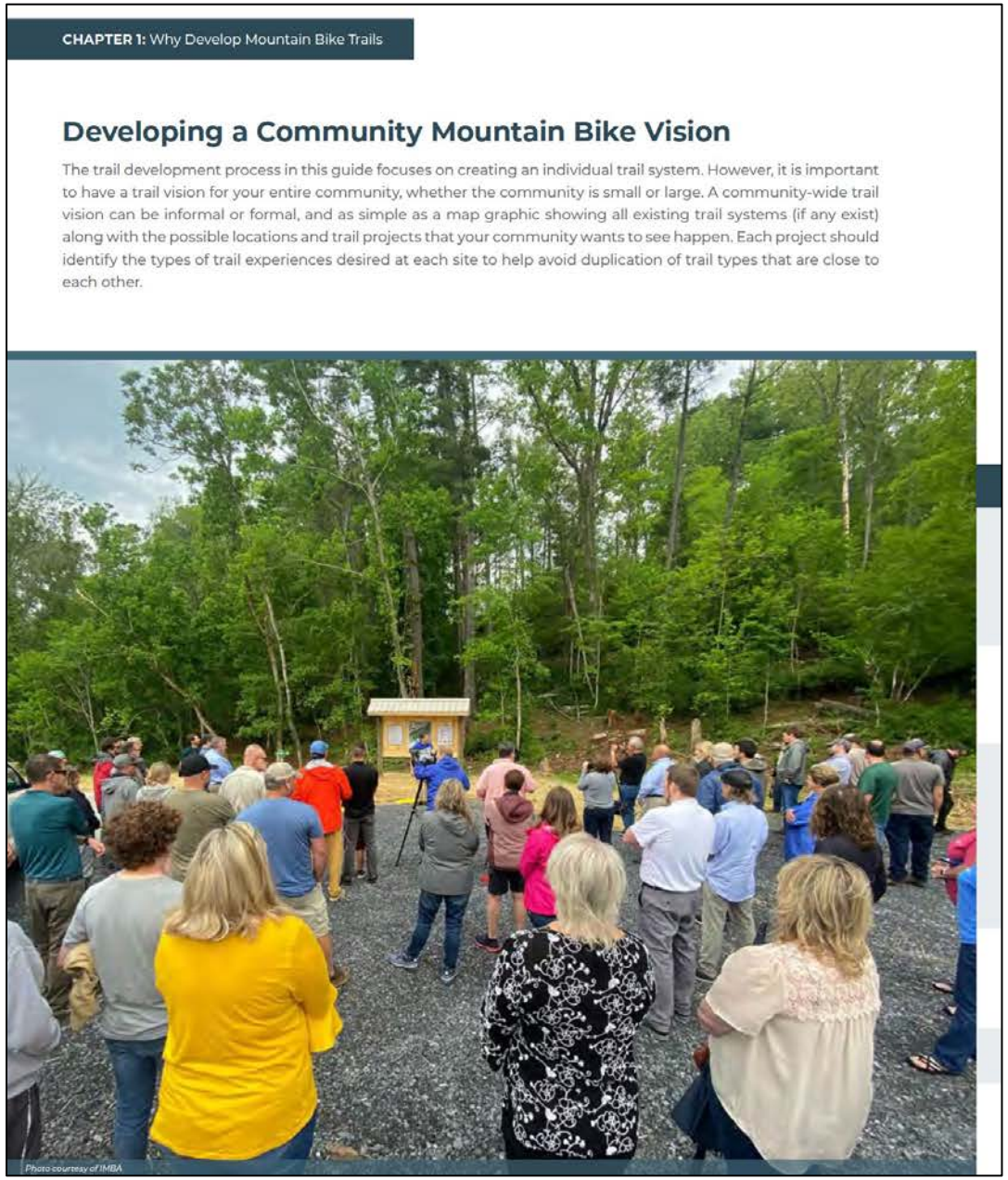

Bike Parks


Youth MTB Competition / NICA

THE GUIDE

A COMPREHENSIVE GUIDE

- For Land Managers, Communities, Advocates, and Trail Professionals
- Focused on bike-optimized trail development
- Provides high-level understanding of the entire trail development process



CREATING COMMON LANGUAGE

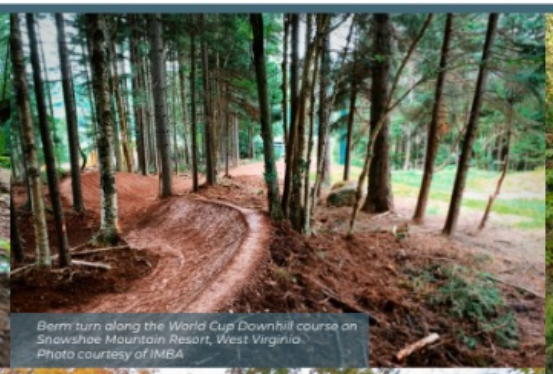
Berms (bike-optimized turns)

A berm is a specialized insloped turn that is built up and shaped like a bowl. They allow a rider to take a turn at higher speeds than if the turn were flat or just banked. Berms also require a larger/wider turning radius than standard hiking trails in order to provide a fluid experience for riders.

Technical Trail Features (TTFs)

TTFs refer to sections of trail that are purposefully constructed to challenge a rider's skill set. The calculated risk involved in riding TTFs also heightens the emotional experience of overcoming fear and conquering a challenge. TTFs can be constructed or naturally occuring and are typically made from either rock or wood, and include features such as rock gardens, drops, rock-overs (rocks you ride up and over), ledges, skinnies (narrower sections of trail that require focus and balance), and jumps, to name a few.

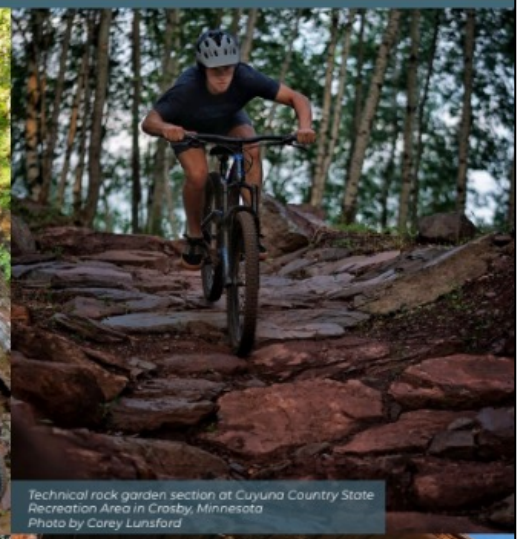
Berm turn at Sandy Ridge in Sandy, Oregon
Photo courtesy of BLM/IMBA



Berm turn along the World Cup Downhill course on Snowshoe Mountain Resort, West Virginia
Photo courtesy of IMBA

Rider entering a berm turn on Cook County Mountain Bike Trails in Minnesota
Photo by Bryan Hansel Photography

Constructed technical rock tread at Tioga Recreation Area in Cohasset, Minnesota
Photo by Chris Gulbert/Rock Solid



Technical rock garden section at Cuyuna Country State Recreation Area in Crosby, Minnesota
Photo by Corey Lunsford

Technical trail section with progressive line choices of drops, roll-downs, and rock gardens at Lake Leatherwood in Eureka Springs, Arkansas
Photo by Eli Glesmann/Rock Solid

Engineered trail feature made from steel and wood at Railyard Bike Park in Rogers, Arkansas
Photo courtesy of OZ Trails

ELIMINATE KNOWLEDGE GAPS

Funding

Obviously, funding is required during all phases of the trail development process. At a very high level, trail construction is typically funded from capital budgets, while trail planning and maintenance activities are typically funded from operating budgets. External funding sources include federal/state grants, local/regional/national foundations, and private donors. The source of funds can also impact how the funds can be used, what entity or entities might have jurisdiction over your project as a result, and the reporting required in order to keep the awarded funding.

Industry Tools

Below is an overview of the various computer hardware and software applications used during the trail development process to provide context and industry terminology useful for communicating with trail professionals.

SOFTWARE APPLICATIONS - There are many alternatives to the applications listed below, but these are the most common:

- **Google Maps** – 2D map viewer with no trail mapping functionality
- **Google Earth Pro** – 3D map viewer with trail mapping functions and very limited trail planning/design functionality
- **ESRI ArcGIS/QGIS** – topology-based 3D spatial and terrain analysis programs typically used by professional GIS consultants to create base maps, perform landscape-level analysis, develop trail plans, support required approvals, and output trail maps
- **ESRI Collector/Avenza Maps** – mobile applications used to collect field-based data points, existing/planned/designed trails, site conditions photos, and observational notes. Data that is collected is exported and imported into ArcGIS or AutoCAD.
- **AutoCAD 2D & 3D** – planning and design-focused software platform best used for trail planning/design and detailed design/layout (parking lots and support facilities). Typically used by landscape architects and engineers to create site plans, trail plans, and construction drawings.

GPS RECEIVER - GPS units designed to increase field-mapping accuracy. Devices include small handheld Bluetooth devices, GIS satellite base stations, and also GPS-enabled smartphones (currently the most commonly used for trail planning/design).

DRONES - Consumer- and commercial-grade unmanned aerial vehicles are seeing increased usage for trail scouting, planning, and mapping activities. The Federal Aviation Administration (FAA) requires licensing for commercial drone use.

Landscape Integration

It is important to discuss the overall integration of a trail system within the given landscape. At its most simple, you can work with the terrain or against the terrain. Designing and developing trails that complement the naturally occurring terrain will be easier and more cost effective than fighting the terrain. While it definitely can be accomplished, attempting to develop a trail type that is not supported by the existing characteristics of the land can dramatically increase development costs.

For a real-world example, building a four-foot-wide, bike-optimized beginner trail on a side-slope with a 20% grade with minimal rock and stable soil characteristics is an optimal build situation. Building the same kind of beginner bike-optimized trail on a side-slope with a 20% grade with rugged, exposed bedrock and minimal compactible soil might cost you two to four times as much, or more, significantly increasing your development cost, not to mention additional maintenance cost to maintain a trail of that kind.

Here's why the cost difference is so extreme: A beginner-level rider experience requires a primarily smooth tread surface, and if the landscape does not have usable and compactable soil, it will be necessary to locate, purchase, and transport usable soil material to create an appropriate tread surface. This involves locating a good dirt source, calculating soil quantities needed, purchasing the material, and arranging delivery. Once the dump trucks have delivered the soil material to the job site, the trail builders will need to transport it from the drop point to wherever in the trail system it is needed. This is typically done with a tracked carrier vehicle, which is basically a large wheelbarrow with an engine and rubber tracks, and in much smaller quantities per load than a dump truck. Once the soil material arrives at its final location, it then must be dumped, worked, shaped, and compacted to its final state.

Rugged, rocky terrain poses a similar challenge as in the example above. Rocks may need to be removed, while exposed bedrock may need to be jackhammered and shaped to make it smooth enough for a beginner riding surface. Thus, the amount of time and expense to create a trail type that is not supported by the given landscape can drive up development costs significantly. Having a knowledgeable and experienced trail planner involved early in the process can help you minimize or avoid costly situations like this one, or at a minimum, help create awareness of the true development costs for your situation.

Environmental Review Process

Environmental sustainability and resource protection includes protection and stewardship of the land, its natural resources, and the stories it holds (cultural resources). Environmental sustainability in the context of trail development includes environmental review—the process of assessing the potential impacts to natural and cultural resources a proposed action may have prior to making decisions about the proposed action. "Action" is a broad term that includes proposed programs and projects such as trail system development, improvement, and maintenance projects.

DEMYSTIFYING THE PROCESS

APPENDIX A

Quick Reference Guide (Trail Development Process)

High-Level Process

1	2	3	4	5	6	7	8
ASSESS	**PLAN**	**DESIGN**	**CONTRACT**	**BUILD**	**PROMOTE**	**MAINTAIN**	**EVOLVE**
identify properties & assess sites for trail development feasibility.	conceptually plan the trail corridors.	flag the trail corridors and create detail design drawings and construction documents.	contract with a trail builder for the build.	build the trails.	promote the trails so people hear about them and can find them.	maintain the trails to keep the conditions and user experience optimal.	evolve the trails to keep people engaged and coming back.

Detailed Process – *Key Stages of Each Phase*

1) ASSESS

1. Define project vision, goals, objectives
2. Identify property for trail development
3. Obtain geospatial data for area of interest (AOI)
4. Perform desktop analysis and planning
5. Create an AOI base map
6. Investigate environmental review and permitting requirements
7. Plan for initial site visit
8. Scout site and collect field notes and geospatial data
9. Process and analyze field data
10. Create a feasibility map graphic
11. Provide cost considerations for future phases
12. Create site assessment and feasibility report

2) PLAN

1. Review/refine project vision, goals, objectives
2. Continue engaging with resource specialist
3. Perform desktop-based analysis and planning
4. Scout site and collect field notes and geospatial data
5. Plan the conceptual trail corridors
6. Create an index of planned trails (trail index)
7. Create a trails concept plan map graphic
8. Initiate environmental reviews and permitting process (if needed)
9. Create cost opinions for design and construction
10. Create a trails concept plan report

3) DESIGN

1. Review/refine project vision, goals, objectives
2. Move the environmental review process toward completion
3. Perform desktop-based analysis and planning
4. Flag the trail corridors and collect field notes and geospatial data
5. Identify equipment, material, and personnel logistics
6. Update the trails concept plan map graphic and trail index
7. Create detailed design drawings/construction documents (if needed)
8. Finalize environmental review and permitting process (if needed)
9. Create an emergency response plan
10. Create cost estimates for the build phase

4) CONTRACT

1. Determine contracting method
   - Direct contract
   - Design-build
   - Design-bid-build
2. Create bid/proposal package
   - Project overview
   - Trails design map graphic
   - Trail index
   - Detailed design drawings and construction documents
   - Unit price bid sheet with quantities
3. Solicit bids/proposals
   - Make the bid package available to trail builders to review and respond
4. Review bid/proposal submissions
   - Evaluate bid package responses to select the contractor best suited for the project
5. Award contract
   - Notify selected trail builder
   - Execute contract
   - Ensure contracting requirements are met

5) BUILD

1. Schedule work
   - Confirm regulatory approvals and permits are in place
2. Kick off project
   - Introductions and job roles
   - Project scope and timeline
   - Project site rules
   - Resource concerns
   - Equipment, material, and personnel logistics
   - Trail types and intended experiences
   - Walk flag lines
3. Monitor progress
   - Daily or weekly at a minimum
   - Verify unit quantities invoiced
4. Close contract
   - Final walk-through and punch list

6) PROMOTE

1. Develop community branding
2. Document progress with photos and video
3. Identify internal and external promotion channels
4. Create and publish content
5. Create and publish trail maps (MTB Project / Trailforks)
6. Host a grand opening event
7. Create trail-related programming
8. Track and monitor progress

7) MAINTAIN

1. Develop an operations and maintenance plan
   - Budget
   - Personnel
   - Types of activities
   - Tools and personal protective equipment (PPE)
   - Safety protocols
   - Equipment
   - Scheduling work
   - Tracking work (maintenance reporting process)
   - Trail closure guidelines

8) EVOLVE

1. Obtain community input
2. Identify trails to be evolved or added
3. Plan and design trails to be evolved or added
4. Execute environmental reviews and permitting process
5. Contract and build the trails
6. Promote, promote, promote!

SUMMARY

Through the collaboration of multiple partners and many experts, this guide will be available for free online and may be available for sale in print upon release later this spring for any and all trail professionals and champions.

- Serve as a comprehensive guide for the evolved trail industry
- Creating common language
- Eliminate knowledge gaps
- Demystify the trail development process


Questions?

Thank You!

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