



BMX DESIGN REFERENCE GUIDE

PURPOSE AND INTENT OF THIS DOCUMENT: This design reference guideline is intended to describe the different types of program activities in practice within the industry and to provide guidance to the council on aspects of a successful program that should be considered as they relate to scope, cost, resources, effort and safe design. A companion piece, “BMX Program Guide”, addresses operational safety, best practices and equipment.

This guideline is not a substitute for professional design and construction services but is an overview for the volunteer or professional who is considering the creation of a BMX program on camp property. The images contained herein are for illustrative purposes only. They are not intended to represent an endorsement of any particular product or service.

PROGRAM OBJECTIVE: The objectives of the BSA BMX program are three fold:

- 1) To create an appropriately risk managed introduction to the sport in support of physical fitness and well-being. Note: Scouts should first be observed in a controlled environment to assure that they are competent to ride the track. Additional training may be given at this time, if needed.
- 2) To provide an appropriately risk managed and fun environment where a Scout can sharpen the primary skills of the sport in an environment that builds confidence and self-esteem. Challenge by choice should be respected and reinforced at all times.
- 3) To support the BMX biking option of the cycling merit badge.



BMX bicycles can also be used as a means of transportation within camp.

There is a broad range of skill challenges and associated costs related to this sport. We recommend that the council initially target this activity toward introduction to the sport and primary skill development. Do not assume that success lies with the biggest, fastest, most challenging program that can be devised. Rather, the council should determine the scale of operations that that can be sustained while maintaining the highest standards of quality.



After a successful program has been established, there may be a desire to increase the scope and challenge of the facilities to keep the program “fresh” At this point, a number of fundamental questions are warranted:

- Is there a local market and what is the size of the market for this investment?
- Area there sufficient numbers of personnel willing to engage in maintenance, training and supervision?
- What is the cost/ benefit, how does this support the Council Strategic Plan?
- What is the opportunity cost to expand this program over other program options?
- What would be the incremental number of scouts served and does the risk and resources justify this?

The alternative exists, especially in urban settings, to use non-camp facilities staffed and maintained by professionals. This alternative is scalable and not as resource intensive as the “build your own” alternative.

DEFINITIONS: The expansion of BMX biking has given rise to a new vocabulary. It is important then, to have a clear idea of what we are discussing. The following are the key words and concepts that you may encounter.



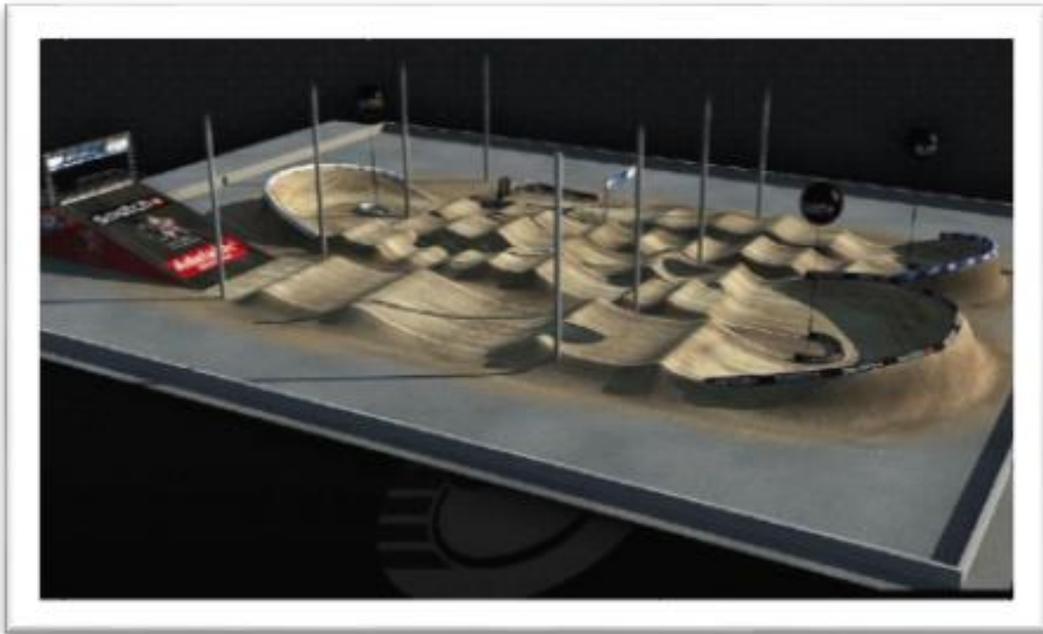
BERM – In BMX racing, a banked curve. Note the potential for erosion.

BMX Bike - A BMX bike is an off-road sport bicycle used for racing and stunt riding. BMX means bicycle motocross. BMX "Class" bike is a strong, quick-handling, lightweight derivative of the



standard 20-inch (510 mm) wheel.

BMX Racing - This is the high end of the sport and is well beyond the scope of most, if not all BSA camps. In addition to the high cost of construction, there are many safety concerns and track maintenance is almost constant. The format of BMX was derived from motocross racing. BMX bicycle races are sprint races on purpose-built off-road single-lap race tracks. The track usually consists of a starting gate for up to eight racers, a groomed, serpentine, dirt race course made of various jumps and rollers and a finish line. Typically, the track requires constant maintenance when in use. The course may be sloped or flat, about 15-foot (4.6 m) wide and has large banked corners that help the riders maintain speed. This program requires a high degree of track maintenance and is not recommended for BSA camps.



Flatland BMX - occupies a position somewhat removed from the rest of freestyle BMX. Flatland also differs from the others in that the terrain used is nothing but a smooth, flat surface (e.g. an asphalt parking lot, basketball courts, etc.). Tricks are performed by spinning and balancing in a variety of body and bicycle positions. This is not recommended on BSA properties.

“Stunts” like this should be discouraged as they require a level of training and skill that the BSA is not in a position to provide.



Pump Track – This is the program that is most suitable for a BSA Camp. A pump track is a progressive bike course that can take many shapes or sizes, that uses an up and down ‘pumping’ motion to propel the bicycle forward instead of pedaling. Pump tracks are good for practicing balance, learning skills and improving confidence on the bike.

The tracks can be designed to be relatively safe and great fun to ride for all ages and skill levels and are suitable for any size bicycle from kid’s bikes to BMX and full size mountain bikes.

Although simple in design, frequent track maintenance is still needed to



provide for a safe operation. A small track can be built in an area that is 100' x 50'. For energy conservation and flow, the moguls (rollers in the vernacular) should not exceed 2 feet in height. Water should be available to lightly wet down the track to control dust. Dry gravel can be slippery and dangerous.

Pre-fabricated tracks are also available and offer the following benefits:

- Easily and quickly assembled
- Require little maintenance
- Easily modified
- They can be stored throughout the off season.

A combination of a simple pump track and well maintained and marked trails for in camp transportation will provide the best combination of features for most camps.

“Pumptopia” pump track

© Lee McCormack, Lee Likes Bikes LLC
Lee Likes Bikes has designed and built pump tracks all over the world.
This is our favorite all-around design.

- ▶▶▶ It's safe for beginners.
- ▶▶▶ It's challenging for experts.
- ▶▶▶ The long straight lets riders gain speed.
- ▶▶▶ The linked turns build cornering skill.
- ▶▶▶ The 180-degree turn feels like a roller coaster.
Whoop hoo!

General specs

Turn radii
10 feet

Angle of 90-degree berms
45 degrees

Angle of 180-degree berms
60 degrees

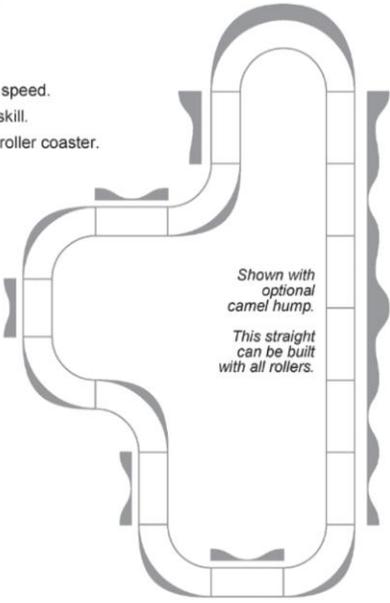
Spacing between elements
10 feet

Roller height
18 inches

Camel hump height
30 inches

Estimated dirt required
120 yards

Footprint
Approximately 55 x 85 feet



Shown with optional camel hump.

This straight can be built with all rollers.

At www.leelikesbikes.com you'll find:

- ▶▶▶ Complete Pumptopia building specifications (\$20)
- ▶▶▶ The ebook "Welcome to Pump Track Nation: How to build the best pump track on Earth — Yours" (\$10)
- ▶▶▶ Other pre-made track designs.
- ▶▶▶ Custom design and build services.



(Left) Example of a dirt track



(Above) example of a pre-fabricated track

Bike Park – Also not recommended due to both cost and safety considerations.



Scouts that are interested and capable of riding in this environment should pursue their sport at a professional skate park.

Design Considerations: Soils are one of the biggest factors to consider when building a track. The soils needs to pack together well. A soft pump track does not work well at all. If you've got sandy soil, you are going to need to import alternative material. This may well determine if a track in feasible in your camp. Clay loam or topsoil mixed with clay is best.



A 40 x 30—foot area takes 27 cubic yards. Pile dirt 50 percent higher than the final dimension to account for compaction. Then carve out the contours. "It's almost impossible to get a nice shape by adding dirt. It's easier to move it."

Avoid flat spots. "Every square inch should tilt up, down, or sideways, to keep momentum going."

Build on a 3 percent slope to avoid flooding. If the site is flat, dig French drains at the berms to avoid ponding and wet spots.

Financial Considerations:

Operating a BMX program is an involved process, but a rewarding way to help engage youth in the outdoors. Typically one of the first questions would be, "how much does a BMX program cost?" The total cost will be made up of four components. Initial construction, program equipment, maintenance and staff.

Initial Construction: The two components of building a track are design and construction. The cost of a build it yourself track will depend on its complexity. As stated above, approximately 27 cubic yards of material will be required for a 40' x 30' program area. Specifications can be found inexpensively, but you will probably need civil engineering to tie standard specifications to site conditions. A simple, pre-fabricated track can run \$20,000 to \$30,000. Over and above the track, there will be costs of utilities, signage, access (trails, roads, parking) and landscaping. The creation of an instructional area as well as a maintenance and bike storage area is recommended.

It is important to have a dry, organized, and efficient place to store and locate each specific bike. Space in this facility should be designated for a service/maintenance area

that is outfitted with professional bike tools. Keeping the proper tools organized will look professional, improve efficiency, and improve the staff's ability to service the fleet. If there is not enough inside space for the service area, consider using a storage area near a roofed outdoor workspace. This will enable your staff to effectively maintain bikes during inclement weather and focus on program quality/safety when skies are clear. It is helpful when the storage area enables the staff to distribute bikes directly from the storage area to the participants, as opposed to removing the bikes from storage and staging them for riding in a different location.

It is imperative that you build proper signage within the BMX area. Signage is important to limit liability for riders that might "stumble" onto the BMX tracks without proper supervision and to help beginners reduce risk associated with more difficult terrain.

As you can now see, entry into this program is not without its costs and complexity. Don't be fooled by memories of the "Good Old Days" when all you needed to have fun were a couple of bikes. You can do that, but it would not be called a "BMX Program"

Program Equipment: The size of your bike fleet should be determined by the number of participants you expect to serve and by the available storage space to keep the equipment in good working condition. Entry level bikes can retail anywhere from \$150-\$400. Intermediate and advanced level bikes (bikes designed and built with components that require less maintenance and have a longer lifespan) easily range from \$300-\$1000 and up. The investment related to operating a fleet of 20 BMX bikes (not including infrastructure/facilities/maintenance) can cost \$5K-10K for an entry level program fleet.

Below is an example of what the equipment may cost to start up in 2015. Based on cost projections for a \$250 bike, the initial investment of purchasing 20 bikes would be \$6,850. This may seem like a lot of money, but after committing to the initial investment, there are creative ways to amortize the expense and finance a sustainable program while purchasing/selling a specific number of bikes per year (5 bikes for \$1,000).

Bikes	\$250	20	\$5,000
Helmets	\$35	20	\$700
Set of Pads	\$40	20	\$800
Tools	\$350	1	\$350
Total Estimated Investment			\$6,850

Estimated example of costs in 2015. Costs will vary by program.

Maintenance: Annual maintenance costs will be comprised of track, facility and equipment maintenance.

Track maintenance will labor intensive, but there is also replacement material (clay, gravel) and tools to consider. Pre-fabricated tracks will have considerably less track maintenance costs.

Facility maintenance can be budgeted at approximately 6% - 9% of the initial costs of the

facilities and will include painting and repairs of the supporting facilities.

Equipment maintenance will arise as the bikes are used. A 5 year rotation of 20 bikes will yield some income from the sale of used bikes, but replacement of the bikes as well as parts and safety equipment needs to be factored in.

Staff: A bike mechanic (also called a “wrench”) will be needed to keep the bikes in working order. This is likely to be a part time job or responsibility. A key question to be considered is when program staff are to be on-site. Of course, during resident camp this is a given, but what about weekends and special events? This is an important consideration as it is driven by utilization, program need, risk management and cost. The input from this decision needs to be factored into the camp business plan.

Risk Management Considerations:

When planning for a BMX program, it is critical to begin formulating a detailed Risk Management Plan. In general, managing risk requires planning, training, leadership, good judgment, and accepting responsibility. Incorporating those specific characteristics into a detailed plan will help identify potential hazards, improve overall safety, and limit liability associated with the program. The international Mountain Biking Association devotes a chapter to safety and risk management in their publication, “Managing Mountain Biking”¹. The recommendations contained there can be easily adapted to a BMX program.

Risk management considerations span both design and program operations.

RELATED DOCUMENTS:

- BMX Program Guidelines
- Guide to Safe Scouting
- Cycling Merit Badge Pamphlet

¹ Managing Mountain Biking; IMBA’s guide to providing great riding; International Mountain Biking Association; Boulder, CO. 2007 ISBN 978-0-9755023-1-X