I-5 Colonnade
Mountain Bike Skills Park

Phase 2

High Level Design &
Trail Standards
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Overview

Introduction

The I-5 Colonnade Mountain Bike Skills Park is being designed, built and maintained by the Backcountry Bicycle Trails Club (BBTC) and our volunteers. The bike park will contain over a mile of trail and will be full of a wide range of Technical Trail Features (TTF). The focus of the park is not on mileage, but on rider experience and progression of riders’ skills. Each phase of the park is being designed so that a mountain biker can ride the trail and features hundreds of times in hundreds of different ways.

The park will include trails and features for cross-country, freeride, trials and BMX riders ranging from novice to expert levels. The park is divided into 2 phases:

**Phase 1** is located on the north side of the bike park and will be completed August 31, 2007. It will feature Novice and Intermediate cross country trails with many switchbacks and TTFs (such as low rock rolls, low rock step-ups and wide ladder bridges). There are also several TTF options for Intermediate to Advanced riders (such as tougher rock rolls, rock step-ups, rock chutes, ladder bridges, teeter totters and log rides).

**Phase 2** is the focus of this document. It is located on the south side of the bike park and the target completion date is August 31, 2008. It will feature more advanced flowy trails, practice areas and TTFs that help riders build advanced technical skills. Those skills are often required for riding difficult trails, freeride flow lines, bike parks and lift-access bike terrain that are all becoming more and more common and popular across the U.S. and Canada. Features include:

- Freeride flow lines
- “Session-able” lines in designated practice areas
- Trials area
- BMX (Dirt Jump) lines
- Pump track
- Rock chutes
- Progressive dirt jumps and drops
- Skinies, ladder bridges, teeter totters and log rides
- Challenging cross country climbs

**Technical Trail Features (TTFs)** are natural or man-made obstacles or options in the trail or alongside the trail that require bike handling skills to ride. They range from easy (such as a 4” roll-able drop in the trail or a 3 ft. wide ladder bridge to ride over) to expert (such as a steep rock chute to roll down, a 6” wide ladder bridge to cross, or a 12” high rock step-up to climb up onto).

Acknowledgements

Much of the content of this document was pulled from 3 sources:

- “How to Design Challenging Trails” provided by the International Mountain Bike Association (IMBA)
- “Whistler Trail Standards” provided by the Resort Municipality of Whistler
- “Black Rock Trail Management Plan” provided by the Black Rock Mountain Bike Association (BRMBA) and the Oregon Department of Forestry
Purpose and Scope

The purpose of this document is to establish the high-level design and trail standards for Phase 2 of the I-5 Colonnade Mountain Bike Skills Park. The design and standards will help to ensure that trails and features are built in a responsible manner while maximizing the riding experience for mountain bikers.

To fulfill this purpose, the scope of this document will include the following:

- **Where**: Map showing the locations and routing of Phase 2 trails and practice areas to a tolerance (accuracy) of ±15 feet.
- **What**: descriptions of the riding experience provided by each trail and practice area, and descriptions of all possible TTFs that may be built.
- **How**: the standards to which trails and TTFs are built (safety and risk management, construction techniques, materials used and environmental responsibility)

Not In Scope for this document:
- Exact routing and location of Phase 2 trails and practice areas (tolerance: ±15 feet)
- Exact location of TTFs (TTFs may be located anywhere along a trail or in a practice area according to the TTF descriptions and standards)

Design Flexibility

It is impossible to predict the exact best location for trails and TTFs before construction begins. Conditions on the ground, materials and safety will determine the exact final trail routing and TTF locations. For that reason, trail location and routing will be shown in a specific location on the map, but may move ±15 feet in any direction. Trails will be routed and built according to the standards and specifications described in this document. Also for that same reason, TTFs will be presented in a library format in this document. The library will contain all of the possible TTF elements that could be built, as well as their construction standards and specifications.

Safety Overview

Safety and risk management are described in more detail throughout this document. The following is list of the key safety techniques and practices that will be used when building Phase 2. Much of this information is derived from the International Mountain Bike Association’s (IMBA) “How to Design Challenging Trails”.

- Build trails according to established **Trail and TTF Standards**.
- Emphasize **Skill Instead of Consequence**. Challenging features don’t have to be overly dangerous.
- Provide **Options and “Ride-Arounds”** around difficult features.
- Build skill **“Gateway Filters”** to dissuade less skilled riders from entering a trail or feature.
- Provide appropriate **Fall Zones** that are clear of hazards.
- Build **“Choke Points”** to slow riders down before a more difficult feature.
- **Reduce Surprise** by providing clear site lines and signs, and by designing proper flow into trails.
- Mark trails and TTFs according to established **Sign Standards**.
- **Educate** riders by providing signs, trailhead information, instructional clinics and skills boot camps.
Phase 2 Design

Phase 2 Concept & Trail Map 8/22/07
Difficulty Levels

The following describes the difficulty rating system used in this document. It describes the general riding experience provided and the types of skills required for the each difficulty level. Much of this information was copied or derived from the “Whistler Trail Standards” document provided by the Resort Municipality of Whistler.

Novice

- Easiest trails.
- Users need to be competent bicycle riders with experience on paved trails such as the Burke-Gillman and wide natural surface trails such as the Snoqualmie Valley Trail and the John Wayne Trail.
- Beginners will find challenges.
- Wide trails with good traction and easy turns.
- Gentle climbs and descents.
- Unavoidable TTFs are easy (such as small roll-able rocks and wide low to the ground bridges).
- More difficult TTFs are easily avoidable.

Intermediate

- More difficult trails / more challenging riding.
- Users need to be competent bicycle riders and have significant mountain bike experience on singletrack trails such as those found at St. Edwards, Redmond Watershed and South Seatac parks.
- Narrower trails with possibility of poor traction and tight switchbacks.
- Steeper climbs and descents.
- Unavoidable TTFs are more difficult (such as roll-able rock drops and roll-able logs, wide bridges, wide log rides, wide teeter totters and small jumps).
- Most difficult TTFs are easily avoidable.

Advanced

- Very difficult trails providing a challenging riding experience.
- Requires significant riding experience and fitness.
- Very narrow trails with the possibility of poor traction, loose trail surfaces, and steeply banked turns.
- Steep climbs and descents.
- Unavoidable TTFs are most difficult (such as narrow elevated bridges and teeter-totters, steep chutes, rock faces, gnarly rock terrain and wall rides).
- Some TTFs may require mandatory “air” (such as drop-offs or jumps that are too high to roll).
- No gap jumps

Phase 2 Trails

The following describes the specific trails to be built for Colonnade Phase 2. It describes the riding experience for each trail and the types of trail features to be found on each one. Refer to the map for locations and routing. Details on how the trails will be constructed will be described in the Standards section below. Trail names will be determined at a later date.
Trail #1: Advanced Technical Downhill – Theme: Gnarly Rocks and Drops

Description:
• Flowy, technical and gnarly, with steeps, rocks and drops
• May include very loose rock (scree) in sections
• Aimed at building skills necessary to ride technical rocky trails found in lift-access bike parks
• 2nd half of trail flows through a session-able practice area with drop options for intermediate through expert levels

Features:
• Steeps
• Rocky tread
• Rock or wood chutes
• Drops
• Simulated roots

Trail #2: Advanced Flowy Downhill – Theme: Smooth Dirt Jumps and Berms

Description:
• Flowy and smooth, with dirt jumps and bermed turns
• Aimed at building skills necessary to ride dirt jump trails found in lift-access bike parks
• 2nd half of trail flows through a session-able practice area with dirt jump options for intermediate through expert levels

Features:
• Table top jumps
• Step-downs
• Step-ups
• Bermed Turns
• Wall Rides

Trail #3: Advanced North Shore Style Trail – Theme: Connected Wooden Structures

Description:
• Series of interconnected log rides, ladder bridges, skinnies and other elevated wooden structures
• Aimed at building skills necessary to ride trails with a variety of wooden structures
• 2nd half of trail flows through a session-able practice area with wooden structure options for intermediate through expert levels

Features:
• Ladder bridges
• Skinnies
• Log rides
• Teeter-totters
• Steep rolls / chutes
• Roller coasters / whoops

Trail #4: Intermediate Flowy Downhill – Theme: Dirt Jumps and Berms

Description:
• Similar to Trail #2, but shorter and less advanced
• Flowy with a dirt jump and bermed turn theme
• Aimed at building skills necessary to ride Trail #2 and other trails with dirt jumps and berms

Features:
• Table top jumps
• Bermed Turns

**Trail #5: Advanced Technical Downhill – Theme: Gnarly Rocks and Sharp Turns**

Description:
• Slow, technical, steep, gnarly and rocky, with drops and sharp turns
• Similar to the Trail #1, but shorter, slower, twistier, and more technical
• Aimed at building skills necessary to ride difficult rocky technical trails

Features:
• Steeps
• Rocky tread
• Rock or Wood Chutes
• Drops
• Tight steep rocky turns

**Trail #6: Intermediate Technical Climb with Advanced Options**

Description:
• Steep and rocky technical climb with more advanced options
• Aimed at building skills necessary to climb tough technical trails

Features:
• Rocky tread
• Tight steep uphill turns
• Rock step-ups
• Simulated roots

**Trail #7: Advanced Technical Downhill – Theme: Rock Waterfall Chute**

Description:
• Relatively straight rock and boulder downhill chute
• Aimed at building skills necessary to ride rocky chutes

Features:
• Steeps
• Rock chutes
• Boulders

**Trail #8: Intermediate Technical Downhill – Theme: Mini Rock Waterfall Chute**

Description:
• Short and relatively straight rock and boulder downhill chute
• Similar to Trail #7, but shorter and less difficult
• Aimed at building skills necessary to ride Trail #7 and other rocky chutes

Features:
• Steeps
• Rock chutes
• Boulders

Phase 2 Practice Areas

The following describes the specific practice areas to be built for Colonnade Phase 2. Practice Areas are trail segments, flow lines and collections of features that riders can ride over and over again in order to build skills (“sessioning”). Riders can do this without having to ride an entire trail. Refer to the map for locations.

South Practice Area

Located in the far south end of Phase 2, at the bottom of #1, #2 and #3 trails, riders will be able to build skills in 3 areas:
• **Drops**: Progressive drops from 1 to 6 feet high will be built side-by-side and in succession, so that a rider will choose a drop level, ride the drop, then either ride-around a second drop, or choose and ride the second drop.
• **Jumps**: Progressive jumps from 1 to 6 feet high will be built similarly to the progressive drops.
• **Wooden Structures**: Elevated wooden structures will be built with varying tread widths and varying curves. These structures will be built low to the ground, with the focus on successfully negotiating a very narrow passage, and/or negotiating a turn in the middle of a narrow passage. These structures may optionally end with a drop or steep roll.

Lakeview Exit Practice Area

Located in the flat northeast corner of Phase 2, riders will be able to practice specific individual TTFs, which can be ridden on their own, or set up in lines to ride from TTF to TTF. There are no formal trails in this area and speed will be kept to a minimum.

Types of TTFs to be built are:
• Skinnies
• Logrides
• Ramps
• Rock step-ups
• Rock roll-downs
• Drops to flat
• Whoops

Pump Track

The pump track will be located in the middle of Phase 2. It is a short twisty loop with bumps and tight bermed corners that can be ridden over and over again. Pump tracks are built on flat land, so riders will be able practice maintaining speed over bumps and through tight corners… without pedaling. Almost anyone can ride a pump track. The speed, fear and risk are low, but the effort, workout, fun and skill improvement opportunities are high.
Trials Area

The goal in trials riding is for the rider to negotiate man-made and natural obstacles without their feet touching the ground. It requires the most balance and bike handling skills of all forms of bike riding. The trials area will be located on the north end of Phase 2. It is a relatively square area that will be built with inter-connected boulders and skinnies designed to practice extreme balance and bike handling skills.
Trail Standards

The following describes the standards that will be followed for Phase 2 construction. Much of this information was copied or derived from the “Whistler Trail Standards” document provided by the Resort Municipality of Whistler, and the International Mountain Bike Association’s (IMBA) “How to Design Challenging Trails”.

Novice Trails

General:
- Easiest trails
- Most beginners will find challenges
- Wide trails with good traction and easy turns
- Gentle climbs and descents
- Available in Colonnade Phase 1 only

Specifications:
- Maximum grade: 16%
- Maximum sustained grade: 9%
- Curve radius: >8ft.

Expected TTFs (for drawings and details, see “TTF Standards” below):
- Unavoidable TTFs are easy (such as small roll-able rocks and wide bridges that are low to the ground).
- More difficult TTFs are easily avoidable (more difficult TTF will be an optional route off of the main trail, or the TTF will have an easy ride-around option)
- Embedded trail obstacles: <6" high
- No drops, no jumps and no obstacles with consequences for lack of speed

Intermediate Trails

General:
- More difficult trails / more challenging riding
- Require riding experience and some fitness
- Narrower trails with possibility of poor traction and tight switchbacks
- Steeper climbs and descents
- Available in both Colonnade Phase 1 and Phase 2

Specifications:
- Maximum grade: 27%
- Maximum sustained grade: 11%
- Curve radius: >6ft.

Expected TTFs (for drawings and details, see “TTF Standards” below):
- Unavoidable TTFs are more difficult (such as roll-able rock drops and roll-able logs, wide bridges, wide log rides, wide teeter toters and small jumps).
- Most difficult TTFs are easily avoidable.
- Embedded trail obstacles: <8" high
- No “gap” jumps or “coffin” jumps
Advanced Trails

General:
• Very difficult trails providing a challenging riding experience
• Require significant riding experience and fitness
• Very narrow trails with the possibility of poor traction, loose trail surfaces, and steeply banked turns
• Steep climbs and descents, with sharp transitions
• Available in Colonnade Phase 2 only

Specifications:
• Maximum grade: 32%
• Maximum sustained grade: 16%
• Curve radius: 4’

Expected TTFs (for drawings and details, see “TTF Standards” below):
• Unavoidable TTFs are most difficult (such as narrow elevated bridges and teeter-totters, steep chutes, rock faces, gnarly rock terrain, and wall rides)
• Some avoidable TTFs may require mandatory “air” (such as drop-offs that are too high to roll and table top jumps)
• Mandatory air: <3’ vertical
• No “gap” jumps or “coffin” jumps

Trail Tread

All trail segments that are prone to ruts and erosion from riding will be armored using natural rock, concrete or wood materials. The following are the trail tread options:
Trail Tread Types

Trail segments not prone to ruts or erosion, or segments in uncovered areas may be surfaced with crushed rock.

There is also potential for a natural dirt surface under the I-5 canopy if treated with soil stabilizers or dust control products. Research on this topic is under way.

Additional Trail Armoring

Additional trail armoring will be used where required. For example:
- TTF take-offs and landings
- Banked turns (berms)
- 1-man rocks, sandstone pavers or logs may be used as a trail border

Environmental Standards

Trails will be designed with consideration for the specific environment and the trail’s intended use. All intrusions into the environment have some degree of impact. However, these impacts can be minimized to balance the need for a recreational experience with the impact on the surrounding environment.

General Guidelines

- Avoid unstable slopes, erosion prone soil and shallow rooted trees with high wind-throw potential.
- Avoid trail routing that encourages users to take shortcuts where an easier route or interesting feature is visible. If an interesting feature exists, locate the trail to provide the desired access to the trail user. Use landforms or vegetation to block potential shortcut routes. Alter the shortcut route if it is superior to the original route.
- Deactivate shortcuts by obstructing access with rocks, branches, fallen trees or new plantings.
- Provide signs, explaining trail closure rationale.
• Avoid exposing roots or cover exposed roots.
• Use downed Western Red Cedar or old tight-ringed Douglas Fir for construction material when possible due to their resistance to rot.

Steep Slopes

To minimize environmental impact and to minimize the need for retaining walls and significant re-grading, trails will be located at least 10’ away from very steep slopes. “Very Steep Slopes” are those greater than or equal to 45° (100%) and are identified in the map above.

Short trail sections on steeper slopes that are less than 45° (100%) may be used in Advanced and Expert Level trails. In those cases, Turfstone pavers, sandstone pavers or large rocks will be used to minimize trail erosion.

Retaining Walls & Re-grading

To minimize environmental impact and to minimize cost, the use of retaining walls and re-grading will be kept to an absolute minimum. The following techniques will be used to accomplish this:

• Trails will be routed away from steep slopes
• Trails will be routed downhill and will follow the existing slopes and elevation contours as much as possible (i.e. minimal traverses across the slope)
• Elevated wooden structures (such as ladder bridges, logs, banked wall turns) with below-ground footings will be built where a retaining wall might otherwise be required.

Some TTFs such as dirt jumps and banked turns may require a small amount of retaining. Example: a large dirt jump typically requires retaining less than 75 cubic feet (3 cubic yards) of soil. Natural materials such as 1-man rock and logs will be used if a small retaining wall is required. Elevated wooden structures will be used for features that would have otherwise required retaining a larger volume of soil.

Drainage

Colonnade Phase 2 is located almost entirely under the deck of the I-5 freeway. There are three potential sources of water run-off:

1) Drainage from the East. There is no evidence of any water reaching the Phase 2 trails from the east. Lakeview Blvd and the Lakeview I-5 Exit ramp run right up against the east side of the Phase 2 perimeter, and their drainage systems are effectively handling all water run-off. Any water from the far southeast slope is being absorbed by the heavy vegetation in that area. The situation will be monitored throughout the winter. Any water that works its way from the east and into the Phase 2 area will be addressed by dispersing it across the heavy vegetation area.

2) Gap in the Freeway Deck. A minimal amount of rain falls through the gaps in the freeway deck, and impacts a relatively small area. This small amount of rainfall will be beneficial for trails under the gap. Any water run-off will be addressed by: i) dispersing it into a vegetated filter strip; ii) dispersing it across a slope, or ii) routing it through a silt filter and into storm drains.

3) Freeway Downspout Leaks. These water sources are easy to identify by simply walking the area during a heavy rain. The water from these leaks will be collected and routed directly to a storm drain before the run-off has an opportunity to pick up any silt or sediment.
TTF Standards

Technical Trail Features (TTFs) are natural or man-made obstacles or options in the trail or alongside the trail that require bike handling skills to ride. They range from easy (such as a 4” roll-able drop in the trail or a 3 ft. wide ladder bridge to ride over) to expert (such as a steep rock chute to roll down, a 6” wide ladder bridge to cross, or a 12” high rock step-up to climb up onto).

This section will first address a few general construction topics, and then each TTF type to be implemented in Phase 2 will be illustrated along with key not-to-exceed specifications.

TTF Height and Width

A TTF’s difficulty depends greatly on the maximum height and minimum width of the TTF. TTF height is measured vertically from the feature’s deck (riding surface) to the lowest point within 3’ adjacent to the feature. Tread Width is the amount of flat rideable surface.

The following shows an example of the TTF height and width measurements:

Materials

The following materials will be used for TTF construction:

- Stringers: dimensional lumber or logs
- Posts: dimensional lumber or logs
- Footings: concrete or rock (2-4”cobble +5/8”- crushed)
- Bridge Decking: dimensional lumber or split wood rungs (see below for details)
- Other Decking (Riding Surface) materials: split logs, flattened logs or dimensional lumber planks

The choice of bridge decking material depends on the probability of it getting wet. Most of Phase 2 will be dry and there are many acceptable choices for these areas. Split wood has the advantages of a grippy surface and natural look, but dimensional lumber is easier to work with. The following is a partial list in order of preference:

- Split Cedar (most rot resistant, grippy surface, natural look, splits very easily)
- Split Douglas Fir (high strength, rot resistance, grippy surface, natural look, but difficult to split)
- Dimensional lumber (easiest material to work with)
• Split Pine or Spruce (grippy surface, natural look, splits easily, but less rot resistant)
• Split Hemlock (lowest strength and rot resistance, but has a natural look and splits easily – acceptable, but rungs should be thicker and should be taken from older slower growing trees)

There are a few areas in Phase 2 where bridge surfaces are susceptible to getting wet: under the freeway deck opening, near known leaks from above, or when the bridge is located immediately following a potentially wet trail segment. For those locations, the preferred bridge surfacing material is split wood due to it’s grippy surface and natural look. Cedar is the #1 choice, Douglas Fir is #2 and pressure treated lumber is #3. Pressure treated lumber becomes very slippery when wet, so should have an anti-slip surface such as diamond wire mesh or roofing material applied to it.

Ladder Bridges

Ladder bridges were first used to allow trail users to cross wet areas. Now, they are a common and popular TTF that require certain skills to cross successfully.

<table>
<thead>
<tr>
<th>Key Not-to-Exceed Specs:</th>
<th>Novice</th>
<th>Intermediate</th>
<th>Advanced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deck Height</td>
<td>&lt;2 ft.</td>
<td>&lt;4 ft.</td>
<td>&lt;8 ft.</td>
</tr>
<tr>
<td>Deck Width</td>
<td>&gt;3 ft.</td>
<td>&gt;2 ft.</td>
<td>&gt;1/4 deck height</td>
</tr>
<tr>
<td>Bisecting angle between connected sections</td>
<td>Large enough to easily allow transition without wheel lifting techniques</td>
<td>Large enough to allow transition without wheel lifting techniques</td>
<td>Tight turn -- may require wheel lifting techniques</td>
</tr>
</tbody>
</table>

Skinnies

Skinnies are narrow elevated wooden structures for developing and practicing balance. When riding in the mountains, balance is a key skill required to negotiate very narrow trail passages and/or trails with exposure to dangerous falls.
Key Not-to-Exceed Specs:

<table>
<thead>
<tr>
<th></th>
<th>Novice</th>
<th>Intermediate</th>
<th>Advanced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deck Height</td>
<td>N/A</td>
<td>&lt;2 ft.</td>
<td>&lt;4 ft.</td>
</tr>
<tr>
<td>Deck Width</td>
<td>N/A</td>
<td>&gt;8 in.</td>
<td>&gt;1/6 deck height</td>
</tr>
<tr>
<td>Bisecting angle</td>
<td>N/A</td>
<td>N/A – straight only</td>
<td>Any turn may require wheel lifting techniques</td>
</tr>
<tr>
<td>between connected sections</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Log Rides

Log rides, like skinnies, are used to build and practice balance skills. They may have a narrow rounded riding surface (unaltered), a narrow flat surface etched in the top, or the log may be split in half providing a wider flat riding surface. Logs may be left lying on the ground or elevated by boulders, posts or log rounds with saddle notch joints (“Lincoln Log” joints).

Key Not-to-Exceed Specs:

<table>
<thead>
<tr>
<th></th>
<th>Novice</th>
<th>Intermediate</th>
<th>Advanced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deck Height</td>
<td>&lt;2 ft.</td>
<td>&lt;4 ft.</td>
<td>&lt;8 ft.</td>
</tr>
<tr>
<td>Deck Width</td>
<td>&gt;3 ft.</td>
<td>&gt;2 ft.</td>
<td>&gt;1/4 deck height</td>
</tr>
<tr>
<td>Bisecting angle</td>
<td>Large enough to easily allow transition without wheel lifting techniques</td>
<td>Large enough to allow transition without wheel lifting techniques</td>
<td>Tight turn -- may require wheel lifting techniques</td>
</tr>
<tr>
<td>between connected sections</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Other Log Features

Logs are a common natural feature on trails in the woods. Several different types will be implemented in Phase 2 so riders can build the skills necessary to negotiate them.

Key Not-to-Exceed Specs:
- Rollovers, step-ups and step-downs: <3 ft. high
- Pyramids (log stacks): < 4 ft. high

Roller Coasters (aka “Whoops”)

A roller coaster or whoop is just a type of ladder bridge with short steep climbs and descents.

Key Not-to-Exceed Specs:
- Same height and width specifications as ladder bridges.
- Max slope: 45°.
Steep Rolls (aka “Chutes”)

Steep rolls are a common feature on technical trails in the mountains. In Phase 2, they may be built using ladder bridges, logs, planks, sandstone pavers or smooth rock surfaces.

Key Not-to-Exceed Specs:
- Same height and width specifications as ladder bridges.
- Max slope: 60°.

Teeter-Totters

A fun feature for building and practicing balance. Teeter-totters can be built from ladder bridge platforms or planks, and the pivot can be provided by an axle or a log round.
Key Not-to-Exceed Specs:

<table>
<thead>
<tr>
<th></th>
<th>Novice</th>
<th>Intermediate</th>
<th>Advanced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pivot Height</td>
<td>N/A</td>
<td>&lt;2 ft.</td>
<td>&lt;4 ft.</td>
</tr>
<tr>
<td>Deck Width</td>
<td>N/A</td>
<td>&gt;1 ft.</td>
<td>&gt;1/6 deck height</td>
</tr>
<tr>
<td>Climbing angle</td>
<td>N/A</td>
<td>10%</td>
<td>20%</td>
</tr>
<tr>
<td>Descending angle</td>
<td>N/A</td>
<td>10%</td>
<td>30%</td>
</tr>
</tbody>
</table>

Drops

Key Not-to-Exceed Specs:

<table>
<thead>
<tr>
<th></th>
<th>Novice</th>
<th>Intermediate</th>
<th>Advanced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deck Height</td>
<td>N/A</td>
<td>&lt;2 ft.</td>
<td>&lt;6 ft.</td>
</tr>
<tr>
<td>Deck Width</td>
<td>N/A</td>
<td>&gt;2 ft.</td>
<td>&gt;1/2 deck height</td>
</tr>
<tr>
<td>Take-off slope</td>
<td>N/A</td>
<td>0% (flat) to 10%</td>
<td>0% (flat) to 30%</td>
</tr>
<tr>
<td>Landing slope</td>
<td>N/A</td>
<td>0% (flat) to 30%</td>
<td>0% (flat) to 50%</td>
</tr>
</tbody>
</table>

Dirt Jumps

All dirt jumps in Phase 2 will be table tops (no gap jumps or coffin jumps). Most can be easily rolled by less skilled riders, or launched by more advanced riders.
Key Not-to-Exceed Specs:

<table>
<thead>
<tr>
<th></th>
<th>Novice</th>
<th>Intermediate</th>
<th>Advanced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>N/A</td>
<td>&lt;2 ft.</td>
<td>&lt;6 ft.</td>
</tr>
<tr>
<td>Width</td>
<td>N/A</td>
<td>&gt;3 ft.</td>
<td>&gt;2 ft.</td>
</tr>
</tbody>
</table>

Notes:
- Steeper jumps actually slow down riders, so can be used as choke points in a dirt jump flow line.
- Other types of dirt jumps are Step-Downs (has flat take-off, lower flat table-top to clear, and a sloped landing), and Step-Ups (where the rider jumps up to a surface higher than the lip/top of the jump).
Safety Standards

Risk Management

The following is a description of the key risk management techniques and practices that will be used when building Phase 2. Much of this information is copied or derived from the International Mountain Bike Association’s (IMBA) “How to Design Challenging Trails”.

- Build trails according to established **Trail and TTF Standards**. Trails and both natural and man-made TTFs must be durable, predictable and designed to moderate the risk of injury when riders fail to negotiate them properly.
- Emphasize **Skill Instead of Consequence**. Challenging features don’t have to be overly dangerous.
- Provide **Options and “Ride-Arounds”**. When building TTFs, offer easier alternate routes that avoid the feature whenever possible. Don’t build advanced technical challenges on trails designed for beginners or intermediates unless they have a ride-around. Offer opportunities for all skill levels.
- Build skill “**Gateway Filters**”. Entrances to difficult trails and TTFs will be made challenging (as difficult as the most challenging mandatory part of the trail or TTF). These gateways will cause inexperienced riders to dismount early, before the TTF is high above the ground where the rider is more likely to be injured should a fall occur. This will reduce the risk of less skilled riders attempting a trail or feature that is beyond their ability. By contrast, wide or easy entrances leading to high or narrow exposed features will be avoided.
- Provide appropriate **Fall Zones**. Clear hazards from areas where riders are likely to land from a fall.
- Build “**Choke Points**”. Narrow, difficult and very visible TTFs will slow riders down before a higher risk area. Choke points are built close to the ground with safe fall zones in case of a fall.
- Design **Proper Flow** into trails. Avoid abrupt transitions from open and flowing to tight and technical.
- **Reduce Surprise**. Provide clear site lines and don’t surprise trail users with unexpected technical trail features. Challenging trails should be properly signed. Make sure that people can see technically challenging trail sections well in advance. The most difficult section of a TTF will be made visible from the entry. By placing the difficult section in view, the rider can make an informed decision before they may get into difficulty with a TTF that may be beyond their ability.
- Mark trails and TTFs according to established **Sign Standards**. Trailhead signs can provide general information about trails and features, but their highest priority is to alert riders to the difficulty level and technical challenges on the trail ahead.
- **Educate** riders. The BBTC and partners will offer various mountain bike boot camps, classes and technical riding skills clinics. Information on biking etiquette and how to reduce user conflict will also be posted.

Fall Zones

The Fall Zone is the area adjacent to a TTF that the rider may deviate into should they fail to negotiate the TTF. Included in the fall zone are the sides of the trail, the bottom of descents and the outside of corners. Injury rates may be reduced with careful review of the area surrounding the trail. Potential causes of injury are branches or stumps and roots that are not cut flush with the tree or the ground, rocks and debris as well as the TTF itself if it has not been finished to acceptable standards. Mountain biking is inherently dangerous and the goal should be to moderate the risk of injuries rather than to eliminate injuries altogether.
Clearing of Fall Zone

Fall zones will be cleared of potential hazards to a minimum of 3’ on all sides of the TTF up to 12” high and 4.5’ on both sides for TTFs that are 12” and higher.

Clearing fall zones includes but is not limited to:
- Cutting or digging out any sharp objects
- Trimming tree branches to branch collar or shoulder
- Covering of hazards is another option if material such as rotten logs, bark, mulch, dirt etc. is available. (Areas where falls are frequent may need re-covering).
- Dulling of sharp points or edges of exposed rocks

The fall zone should not be cleared of all foliage, since the purpose of Fall Zone Standards is to minimize the chance of injury should a fall occur. Replanting of the fall zone with a durable species may be considered.

The primary focus for fall zone clearing should be in the trails rated More Difficult where a rider is learning how to ride TTFs and their falling skills may not be perfected.

Construction

Cross-Braces and Fasteners

- Cross bracing of vertical members is required.
- TTFs will not be mounted to living trees or freeway columns.
- The preferred fasteners are: i) nuts and bolts, ii) screws (timber screws, deck screws, lag screws) and iii) galvanized spiral shank nails.
- Nails and screws will be long enough to ensure two-thirds of the length penetrates the stringer.
- Loading on member should be done in such a way as not to rely exclusively on the shear strength of the fastener.
**Bridge Surfacing**

Deck rungs must be placed tightly so that riders will not catch their feet or arms between the rungs. An appropriate spacing between rungs is $<1''$ to promote drainage of water and mud. Rungs should not overhang stringers by more than $2''$.

The choice of bridge surfacing material depends on the probability of it getting wet. Most of Phase 2 will be dry and there are many acceptable choices for these areas. Split wood has the advantages of a natural look, but dimensional lumber is easier to work with. There are a few areas in Phase 2 where bridge surfaces are susceptible to getting wet: under the freeway deck opening, near known leaks from above, or when the bridge is located immediately following a potentially wet trail segment. For those locations, the preferred bridge surfacing material is split wood due to it’s grippy surface and natural look. See the section on “Materials” above for more detail.
**Strength and Stability**

All TTF structures should be built and finished to minimize potential injury to a falling rider colliding with the structure, its’ supports or other nearby obstacles. The TTF must be capable of supporting a centered vertical load of 450lb.

**Sign Standards**

Signs are a necessary component of trail management. They provide the rider with information that will allow them to make an informed and educated choice. Two types of signs will be used:

**Trailhead Signs**

Trailhead signs are necessary to inform the rider of the trail technical difficulty and conditions expected.

**En-Route signs**

En-Route signs will be along the trail to give warning of the difficulty of an upcoming TTF when that TTF is rated higher than the overall rating of that particular trail. En route signs display difficulty according to the “Difficulty Levels” section above. En-route signs to be mounted on 4x4 posts beside the entrance to the TTF. Height of en route sign will be 3-4’ above trail tread. Easier bypass routes and options will also be signed.
Appendices

Definitions / TERMINOLOGY

BERM – built up bank on the outside of a corner to improve cornering.
BRIDGE – a structure that is built above and across a river or other obstacle allowing passage across or over obstacle.
COFFIN JUMP – a jump constructed from material excavated from behind the jump, leaving a hole.
DANGER – likely to cause harm or result in injury.
DROP-OFF – a drop in the trail, possibly at the end of a log or off a rock; may require a technique depending on the vertical drop and/or the angle of descent.
EXPOSURE – placing a rider in the position or location that an error in balance or maneuvering may result in an injury; for example, a narrow bridge above rocks, would be exposure and the greater the elevation of the bridge above the rocks the greater the level of exposure.
FACE – the steep exposed side of a rock.
FALL-AWAY – a drop-off which incorporates a turn in the trail.
GAP JUMP – two ramps placed back to back with a space between them, the rider must travel with enough velocity to cross the space and land on the second ramp.
GATEWAY – a qualifier placed before a trail or TTF; for example, a 2x4 placed before an elevated bridge or a difficult corner. If the rider can successfully negotiate the more difficult gateway, then they will likely be able to negotiate the TTF.
LADDER – a TTF with rungs attached to stringers
LOGJAM – a pile of logs placed near perpendicular to trail to make a ramp, usually placed in front of and behind deadfall to ease passage.
MANDATORY AIR – a TTF requiring a wheelie drop or other advanced technique to exit due to a steep or undercut exit.
MANUAL – technique used to lift the front end of a bike up without the use of a pedal stroke; can be used off mandatory airs, etc.; generally requires more forward momentum than a wheelie drop.
RAMP – any inclined structure, typically used as an approach to or exit from a TTF. A ramp can also be a jump.
ROLLABLE – a section that can be ridden without requiring higher-level rider skills; for example, an elevated bridge intersection/corner that can be ridden without having to hop and rotate.
ROLL OVER – usually a rock that gets steeper the farther the rider advances, to the point where stopping may not be an option and the rider must continue despite not being prepared for what’s ahead.
TEETER-TOTTER – a TTF consisting of a long plank balanced on a central support for riders to cross over, providing an down motion as the rider passes over the pivot.
TONGUE – a steep ramp on the exit of a TTF, often as an easier alternative to mandatory air.
TREAD – the riding (traveled) surface of the trail.
TTF – Technical Trail Feature – an obstacle on the trail requiring negotiation, the feature can be either man made or natural, such as an elevated bridge or a rock face respectively.
WHEELIE DROP – technique used to pedal off drops-off or logs with the back wheel landing before the front wheel.
Links to Popular Technical Riding Areas

The following are just a few examples of more difficult and technical mountain bike parks and riding areas that are becoming more and more popular and common across the U.S. and Canada:

- IMBA List of Places to Freeride: [www.imba.com/resources/freeriding/freeriding_locations.html](http://www.imba.com/resources/freeriding/freeriding_locations.html)
- Galbraith Mountain – Bellingham, WA ([www.whimpsmtb.com/mountains.html](http://www.whimpsmtb.com/mountains.html))
- Whistler Mountain Bike Park – Whistler, BC ([www.whistlerbike.com](http://www.whistlerbike.com))
- Mt. Fromme and Mt. Seymour – North Vancouver, BC ([www.nsmba.bc.ca/](http://www.nsmba.bc.ca/))
- Black Rock Mountain Bike Area – Falls City, OR ([brmba.org/](http://brmba.org/))
- Post Canyon – Hood River, OR ([www.imba.com/resources/freeriding/hood_river.html](http://www.imba.com/resources/freeriding/hood_river.html))
- Northstar at Tahoe – Truckee, CA ([www.northstarattahoe.com/info/summer/biking.asp](http://www.northstarattahoe.com/info/summer/biking.asp))
- Winter Park Resort – Winter Park, CO ([www.skiwinterpark.com/mountain/summer_trails.htm](http://www.skiwinterpark.com/mountain/summer_trails.htm))
- Mount Snow Bike Park – West Dover, VT ([www.mountsnow.com/summer/mountainbiking.html](http://www.mountsnow.com/summer/mountainbiking.html))

The following are a few examples of other *urban mountain bike parks*:

- Ray’s Indoor Mountain Bike Park – Cleveland, OH ([www.raysmtb.com](http://www.raysmtb.com))
- Fisher Creek Park – Snoqualmie, WA ([tinyurl.com/24ct43](http://tinyurl.com/24ct43))
- Port Moody Bike Trials Park – Port Moody, BC ([tinyurl.com/2ymha2](http://tinyurl.com/2ymha2))
- High Bridge Park – New York City, NY ([gothamist.com/2007/05/15/map_of_the_day_113.php](http://gothamist.com/2007/05/15/map_of_the_day_113.php))
### Colonnade Park Skills Progression (Novice Area & Phase 2)

<table>
<thead>
<tr>
<th>Skill Level</th>
<th>Style</th>
<th>If you can ride this but find it challenging ...</th>
<th>Then this is about right for you...</th>
<th>Once you've mastered this...</th>
<th>You'll be ready to try this...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Novice</td>
<td>Jumps &amp; Berms</td>
<td>• Snoqualmie Ridge Phase 1</td>
<td>• Keep at it until you've mastered it</td>
<td>• Snoqualmie Ridge Phase 1</td>
<td>• Trail #4</td>
</tr>
<tr>
<td></td>
<td>Wooden Structures</td>
<td>• Easiest Novice Area wooden structures</td>
<td>• Some TTFs in the Lakeview Practice area • Keep at those Novice Area TTFs</td>
<td>• Easiest Novice Area wood TTFs</td>
<td>• More difficult Novice Area wood TTFs</td>
</tr>
<tr>
<td>Technical</td>
<td></td>
<td>• Heart of Darkness • HoChiMin</td>
<td>• Trail #8 • Almost all Novice Area rock TTFs • Some Trail #3, 7 &amp; 8 TTFs &amp; option lines</td>
<td>• Trail #8 • Most Novice Area rock TTFs</td>
<td>• Trail #1 (easier way down lines) • Trail #5 • Trail #8</td>
</tr>
<tr>
<td>Intermediate</td>
<td>Jumps &amp; Berms</td>
<td>• Crank it Up</td>
<td>• Trail #4</td>
<td>• Trail #4</td>
<td>• Trail #2 (easier way down lines)</td>
</tr>
<tr>
<td></td>
<td>Wooden Structures</td>
<td>• Smoke &amp; Mirrors • Pipeline</td>
<td>• Almost all Novice Area wood TTFs • Some Trail #3 TTFs &amp; option lines</td>
<td>• Most Novice Area wood TTFs</td>
<td>• Trail #3 (easier way down lines)</td>
</tr>
<tr>
<td>Gnarly Technical</td>
<td></td>
<td>• Heart of Darkness • HoChiMin</td>
<td>• Trail #8 • Almost all Novice Area rock TTFs • Some Trail #3, 7 &amp; 8 TTFs &amp; option lines</td>
<td>• Trail #8 • Most Novice Area rock TTFs</td>
<td>• Trail #1 (easier way down lines) • Trail #5 • Trail #8</td>
</tr>
<tr>
<td>Advanced</td>
<td>Jumps &amp; Berms</td>
<td>• Dirt Merchant • A-Line</td>
<td>• Trail #2</td>
<td>• Trail #2 easier way down lines</td>
<td>• Trail #2 difficult way down lines</td>
</tr>
<tr>
<td></td>
<td>Wooden</td>
<td>• CBC</td>
<td>• Trail #3</td>
<td>• Trail #3 easier</td>
<td>• Trail #3 difficult</td>
</tr>
</tbody>
</table>
The following are a few examples of popular trails for Seattle area riders showing what kind of experience the trail provides and what technical skill level is required to ride it.

Novice
• Redmond Watershed, St. Eds and South Seatac are examples of trail systems that provide numerous opportunities for first-time riders who want to take the next step up from groomed regional trails (like the Burke-Gillman or Snoqualmie Valley Trails).
• Tolt, Tokul and Griffin are examples of trail systems that provide trails that are slightly more difficult, but still fun for Novice riders. (Note: there are also quite a few Intermediate Trails in these trail systems, but plenty of opportunity for Novices.)

Intermediate
• The Worm, Preston and Northwest Timber trails are examples of trails that are fun for intermediates. They provide good opportunities for riders who are confident with the Novice trails above to take the step up to the next level.
• The Middle Fork Trail is a good example of a trail that is Intermediate overall, but has many advanced technical trail features that Intermediates could have fun attempting, but will probably have to walk over.

Advanced
•