

# Craig Park Bike Facility Site Report

November 2015



Prepared For:



Planning & Design Division  
13042 Old Myford Rd.  
Irvine, CA 92602

Prepared By:

International Mountain Bicycling Association  
Trail Solutions Program  
4888 Pearl East Circle, Ste. 200E  
Boulder, CO 80301





**Overview and Existing Conditions ..... 3**

**Craig Regional Park ..... 4**

**Orange County, California ..... 4**

**Mountain Bike Facilities and Regional Need ..... 5**

**Constraints ..... 6**

**Existing Use/Users ..... 6**

**Terrain ..... 6**

**Soils ..... 7**

**Rainfall/Flooding ..... 8**

**Permitting ..... 8**

**Opportunities ..... 9**

**Community ..... 9**

**New Uses, New Users ..... 9**

**Facilities ..... 9**

**Findings: Tracks, Trails, and Recommendations ..... 10**

**Beginner and Intermediate Pumptracks ..... 10**

**Kids/Tots Pumptrack ..... 11**

**Skills Trail ..... 11**

**Flow Trails ..... 11**

**Slopestyle Trails ..... 12**

**Dirt Jump Area ..... 12**

**Shared Use Singletrack Trail ..... 12**

**Additional Improvements ..... 13**

**Trail Maintenance Recommendations ..... 14**

**Overview ..... 14**

**Inspection and Maintenance ..... 14**

**Materials ..... 19**

**Tools ..... 19**

**Bike Park and Pumptrack Maintenance ..... 22**

**Appendix: Mountain Bike Park Site Evaluation Criteria ..... 26**

**Landscape: Slopes ..... 26**

**Landscape: Acreage ..... 26**

**Landscape: Soils ..... 26**

**Landscape: Shade ..... 27**

**Water ..... 27**

**Access ..... 27**

**Synergies ..... 28**



## Overview and Existing Conditions

The development of community mountain bike facilities (bike parks) has advanced rapidly in the past several years with new facilities such as Truckee Bike Park, in Truckee California, complimented by dozens of smaller parks across North America. Providing a location for riders to partake in bicycle optimized trails and appealing to a wide range of skills, bike parks have become physical centers for the millions of mountain bikers seeking recreational experiences. Like other experience oriented recreational facilities built with function and intent, bicycle optimized trails are trails constructed with contours and camber that enhance the efficiencies of a bike to the benefit of the visitors' enjoyment. When bike facilities such as bike parks are included in fee-based recreation areas, they can also become a significant source of revenue.

At the request of the Orange County Parks (OC Parks), staff from the Trail Solutions program of the International Mountain Bicycling Association and OC Parks' design firm (Stantec), visited the Ted Craig Regional Park (Craig RP) several times and held public meetings to develop plans for a regionally significant mountain bike facility. This report contains the results of that investigation.



Site Location Map



## Craig Regional Park

Craig Regional Park (Craig RP), completed in 1974, is characterized by rolling hills, a large variety of mature trees, open space, a small lake, three year-round creeks, and a rose garden. Craig RP is managed by OC Parks in cooperation with the US Army Corps of Engineers (USACE). This unique landscape contributes to an overall sense of serenity and beauty. Walkways, picnic tables, and park benches are scattered throughout the park’s 124 acres and provide abundant shade.

A variety of recreational opportunities exist at Craig RP. Both open and shaded turf grass and picnic areas are available. Six picnic shelters and two group areas provide shade with tables and barbeques and there are picnic tables and barbeques scattered throughout the facility.

Many annual migratory waterfowl visit a three-acre lake. The park is also a wildlife sanctuary and is very popular as a bird watching destination. Fishing for catfish and bluegill is allowed with a California Department of Fish and Wildlife license.

The park offers a variety of recreational activities including three softball fields, one baseball field, jogging trails, and a sports complex with basketball, volleyball, and racquetball/handball courts, horseshoe pits, and tot lots for children. Biking and hiking/walking trails are also offered for visitor enjoyment.

The addition of progressive bike facilities can be leveraged to serve additional recreation needs and expand the user base at Craig RP.

## Orange County, California

Orange County is a coastal county south of Los Angeles. With a population of over three million, it is the sixth-most populous county in the United States<sup>1</sup>. Despite such a large population, there is no single major city in Orange County. Instead, the county is dominated by suburban development surrounding the historic towns of Anaheim, Fullerton, and Huntington Beach.

Despite being intensely developed (second in California only to San Francisco), Orange County contains large expanses of open space. OC Parks manages over 60,000 acres of harbors, beaches, parks, and historic facilities. The eastern edge of the county hosts the Cleveland National Forest. Chino Hills State Park highlights the Santa Ana Mountains while Crystal Cove shows off Pacific cliffs.



*Mountain biking opportunities are available in relatively close proximity to Craig Regional Park. Dots represent individual trails*

<sup>1</sup> US Census, 2010



## Mountain Bike Facilities and Regional Need

According to the 2014 Outdoor Recreation Participation Report<sup>2</sup> by the Outdoor Industry Foundation, there are over 46 million Americans participating in the outdoor activity of bicycling.

Despite intensive development, Orange County has long been viewed as one of the mountain biking capitals of the U.S. It is home to some of the most influential cycling companies in the industry including Crank Brothers, Oakley, S&M Bikes, and Shimano America.

Orange County also hosts extensive mountain biking trail opportunities. Hundreds of miles of trails are available on county, state, and federal lands from the Pacific to the Santa Ana Mountains.

While there are extensive trail opportunities, there are few of the progressive riding opportunities popular with mountain bikers today: machine and hand built trails that feature aggressive rolling terrain, or open insloped turns created with wheeled users in mind. This is likely in part due to the fact that land managers in Orange County were fast to recognize mountain biking as a legitimate activity. Many local trails were open to biking in the 1990s, but such extensive early adoption has limited opportunities for change as riders seek out different trail experiences.

The progressive riding opportunities that do exist in Orange County are on social trails. While unsanctioned, the Sheep Hills dirt jumps near Fairview Park have existed in one form or another since the 1980s. Like many socially created facilities, Sheep Hills caters to a specialized segment of the community, and has a high level of technical difficulty and inconsistent maintenance. The Laguna Rads is an



*Craig RP, proposed bike facility area*

informal group of mountain bikers who create their own routes, looking for progressive and challenging trail experiences that do not exist in the formal network. There is a single official BMX facility in the county on the grounds of the Orange County YMCA. While nationally acclaimed, the YMCA needs the land to expand their programming and the track is threatened.

The addition of a bike facility in Craig RP will fill a notable service gap by providing progressive bicycle optimized tracks and trails to mountain bikers, a large group of mobile, engaged, and dedicated users.

---

<sup>2</sup> <http://www.outdoorfoundation.org/pdf/ResearchParticipation2014.pdf>



## Constraints

### Existing Use/Users

Although no significant current use was found in the proposed bike facility area in Craig RP, a common “use” is transient habitation, which is typical in unused areas of parks. A number of trash dumpsites and unauthorized uses were found in the park near Cotton Wood Loop Trail. When the bike facility is constructed, signage, presence of authorized users, and enforcement personnel will most likely curtail future transient habitation.



*Indication of unauthorized use*

An avian platform/nesting pole is located in the southeast corner of the site. Environmental documentation will detail bird species as well as nesting areas. Biological monitoring may be required during construction.

USACE access to Fullerton dam is provided by a natural surface service access road along the eastern boundary of the site.



*Neighborhood above western boundary of Craig RP*

Neighborhoods line the ridge above the western boundary of proposed site. The majority of the proposed bike facilities will be in the view shed and earshot of the westerly neighborhoods.

### Terrain

Approximately 10 acres are proposed for a bike facility and optimized trails within Craig RP. The parcel has an approximate average 12% grade from west to east and an average 3% grade north to south along the eastern boundary. These grades are suitable for development of a bike facility. Two graded service routes traverse the site from the north to south. A number of user created footpaths traverse the site with one path following the western fence line and several leaving the southern boundary and crossing onto the USACE site to the south.



*Craig RP proposed area, west to east slope representation.*



## Soils

The area in Craig RP proposed for the bike facility is managed as a flood control basin, with the Fullerton Dam protecting Fullerton, Placentia, and Anaheim. It is expected that all of the soil necessary for the construction of the pumptrack will be imported. While no excavation will take place for the construction of the bike facility, the existing native soil may impact water runoff and percolation. The prevailing soil type, structure, and profile may have been impacted during dam construction and subsequent maintenance. A geotechnical report is recommended prior to the design of the bike facility.

Per a 2015 Web Soil Survey from the Natural Resource Conservation Service (NRCS)<sup>3</sup>, the predominant soils in the proposed project area are:

### Alo clay

- Parent material: Residuum weathered from sedimentary rock
- Typical profile
  - H1 - 0 to 15 inches: clay
  - H1 - 15 to 22 inches: clay
  - H3 - 22 to 59 inches: weathered bedrock
- Properties and qualities
  - Slope: 15 to 30 percent
  - Depth to restrictive feature: 22 to 26 inches to paralithic bedrock
  - Natural drainage class: Well drained
  - Runoff class: Very high
  - Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
  - Depth to water table: More than 80 inches

### Sorrento loam

- Parent material: Alluvium derived from sedimentary rock
- Typical profile
  - Ap1 - 0 to 6 inches: loam
  - Ap2 - 6 to 12 inches: loam
  - AB1 - 12 to 21 inches: silty clay loam
  - AB2 - 21 to 27 inches: silty clay loam
  - AB3 - 27 to 37 inches: silty clay loam
  - Bk1 - 37 to 49 inches: silty clay loam
  - Bk2 - 49 to 62 inches: silty clay loam
  - 2C - 62 to 72 inches: stratified loamy fine sand to silt loam
- Properties and qualities
  - Slope: 2 to 9%
  - Depth to restrictive feature: More than 80 inches
  - Natural drainage class: Well drained
  - Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high, 0.14 to 1.98 in/hr)
  - Depth to water table: More than 80 inches

<sup>3</sup> <http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>



## Rainfall/Flooding

Craig Regional Park is closed to users during significant rainfall events because it is a flood control basin with the Fullerton dam regulating water flow through east Fullerton Creek. Additional signage and/or staff interactivity with bike facility users may be needed to enforce park closures.

## Permitting

Development of the site may depend on the outcomes of NEPA and CEQA studies. Construction will require OC building permits as well as other permits to meet regulatory agency requirements (e.g. USACE, CDFW, etc.).



*Fullerton Dam at southern boundary of Craig RP*



*Southwest view of proposed Craig RP Bike Facility.*





## Opportunities

### Community

Community members around the county have been supporting bike facilities like those proposed at Craig RP. Cooperation and collaboration between OC Parks, U.S. Army Corps of Engineers, Share Mountain Bike Club, and Jax Bicycle Center would help to ensure the successful development of this community bike facility. Additional opportunities to build cooperation and support with other community organizations may surface and become beneficial to the project. These may include revegetation, involvement of youth, interpretive organizations, and nearby businesses. There also may be an opportunity to coordinate both construction and material needs with other county construction projects.

### New Uses, New Users

Currently, the proposed park facility area receives minimal use in addition to authorized uses. Craig RP's main user groups are picnickers, ball sport enthusiasts, and recreational walkers. There are also hikers, trail runners, and mountain bikers who use the park's paved and natural surface trails. The development of the bike facility including bicycle optimized trails and other bicycle specific amenities will bring a new user group to the park. Engaging these new users will bring more support and stewards to the park.



*New users!*

Stakeholders have expressed a strong desire to create a community centric use of Craig RP and the development of natural surface trails will encourage good use and help to replace unauthorized uses. New users could include a high school mountain bike league, which is popular across the country, and the opportunities to help mountain bike riders develop their skills.

### Facilities

The existing park amenities at Craig RP are ideal for supporting the creation of a bike facility. Parking, restrooms, picnic areas, and sports facilities already exist in the park. These existing amenities are easily accessible and serve the new user base of the bike facility.



## Findings: Tracks, Trails, and Recommendations

During the first quarter of 2015, IMBA and Stantec coordinated with OC Parks to hold two public outreach meetings concerning the design of the proposed bike facility. These meetings informed constituents on the benefits of bike parks and possible trails/features to be included in the bike facility design. The compiled input from the public meetings indicated that users would like an integrated facility that riders of all ages and abilities could use to improve their skills and also enjoy healthy outdoor recreation. They requested the following elements be considered: pumptracks, skills trail, flow trails, slopestyle trails, and dirt jumps in dedicated areas with the addition of connecting singletrack trails and routes within the proposed site. Descriptions of these elements are:

### Beginner and Intermediate Pumptracks

Pumptracks are the core of a bike facility. Constructed on flat, open ground, they appeal to children and adults alike and provide a great location for learning and improving mountain bike skills. The key features of a pumptrack are rollers and berms of varying height and frequency. The undulations allow a skilled rider to navigate the track without pedaling. The beginner track is designed to have direction-of-use to allow for progression of skills and fitness for riders coming from the Kids/Tots Pumptrack. The intermediate track is designed for intermediate to advanced users and will foster more organic and creative riding.



*The Beginner / Intermediate Pumptrack will be an accessible facility for all abilities.*



## Kids/Tots Pumptrack

The Kids/Tots Pumptrack is a pumptrack designed for smaller bicycles and users. It will feature reduced-sized rollers and swales as well as lower-angle bermed turns. It will have features that can accommodate Strider-type bicycles as well as smaller-wheeled bikes with short wheelbases. The Kids/Tots Pumptrack is designed for the youngest of riders.

Recommendation: A tot, beginner, and intermediate pumptracks for the proposed bike facility.



*Tot fun!*

## Skills Trail

Users looking to practice technical riding skills in a low-consequence environment can utilize a Skills Trail. This trail can include numerous optional rock gardens, bridges, and log features where users can practice basic mountain biking skills.

Recommendation: Construction of a Skills Trail adjacent to the pumptracks. This trail would have beginner and intermediate optional features to encourage the progression of skills.



*Riders can practice their skills in a low risk environment before taking them to the trail. Pictured is a constructed bridge.*

## Flow Trails

Flow Trails provide a roller coaster sensation that puts a grin on any mountain bikers's face. Flow Trails maximize the efficiencies afforded by using a bicycle and are designed to counteract forces that direct a user off the trail. Bermed turns and cambered tread surfaces for example, promote traction, safety, sustainability, and enjoyment.

Flow Trails are never extreme, dangerous, or steep; challenge is provided by rewarding progressive skills development and incorporating features that can always be rolled but may be jumped. Pre-engineered features may be included on a Flow Trail. While a Flow Trail is singletrack, the tread surface itself should be wider in areas where it is anticipated that less-experienced users may need a greater margin of error.



*Valmont Bike Park Flow Trail, Boulder CO*



Recommendation: The proposed site can support two flow trails, a beginner (green) and intermediate (blue) trail.

### Slopestyle Trails

Slopestyle trails build on the Flow Trail types of features (berms and rollers), but the increased variation in technical challenge adds significant attraction and progression for local bikers. These bicycle optimized trails will include technical features and engineered features, such as highly in-sloped tread, elevated platforms, rock gardens, wall rides, and ramps and will be pre-engineered to meet County safety requirements.

Recommendation: Construct three slopestyle trails to add significant linear feet of bicycle specific features. Design for beginner to advanced riders so the progression would encourage less-skilled riders to build skills before moving to the more difficult terrain features. Larger technical features will allow advanced riders to practice and further advance their skills.

### Dirt Jump Area

Dirt Jumps allow bikers the feeling of flight by floating over earthen mounds or pre-engineered ramps. Built on flat or slightly inclined slopes, Dirt Jumps typically have several parallel alignments to accommodate beginner to expert riders.

Recommendation: Construct several lines of dirt jumps to add significant square feet to bicycle specific features. Design for beginner to advanced riders so the progression would encourage less-skilled riders to build skills before moving to the bigger jumps. The larger jumps will allow advanced riders to practice and further advance their skills.



*Stafford Lake Dirt Jumps, Marin County California*

### Shared Use Singletrack Trail

Singletrack trails are the traditional multi-use, natural surface trails that most mountain bikers are familiar riding. They can provide a variety of experiences for users and should be included if sufficient land is available.



*Shared Use Singletrack Trail*



Recommendation: Construct an easy, multi-use singletrack trail around the perimeter of the site. Trail would include an elevation change of 50 feet. Trail should be built at not more than a 5% grade using IMBA sustainable trail building guidelines<sup>4</sup>.

### Additional Improvements

Recommendation: Site Amenities: Mountain bike riding can be an extremely aerobic activity so it is recommended that park design include shade structures, picnic tables, benches (or other suitable furniture), and barbeques to allow for users to rest between rides. Restrooms in close proximity to the facility are also recommended.



*Sample bike facility trails*

Recommendation: Sprinkler or Watering System: Craig Park Bike Facility tracks and trails will be affected by a wider range of moisture and temperature levels because the tempering effect of canopy cover will be absent in some areas. Proper soil moisture is a requirement for construction as well as effective maintenance. An active watering schedule is recommended to assist in providing a useable and safe facility by minimizing the loss of soil, reducing dust, and assisting with regular maintenance. Staff or volunteers, through a pressurized water source and hoses located throughout the facility, can provide moisture manually, or a bike facility specific low-flow irrigation system can be installed.

Recommendation: Improving the Cotton Wood Trail Loop: The Cotton Wood Trail Loop to the east of the proposed site is signed and leads through the vegetated waterway southwest towards the dam. The trail is not maintained and breaks into many small paths that eventually lead to transient encampments. It is recommended that this trail be improved to sustainable standards to focus authorized uses, closed, and/or re-vegetated to reduce impacts within watershed and transient use.



*Cottonwood Loop Trail to east of proposed bike facility*

Recommendation: Trail Maintenance: Refer to the following section.

<sup>4</sup> Trail Solutions: IMBA's Guide to Building Sweet Singletrack, Paperback 2004



## Trail Maintenance Recommendations

### Overview

Bike parks are constructed primarily of soil, with occasional rock and wood features, and are managed similarly to a typical park facility with the provision of parking, irrigation, signs, trash and recycling collection, and law enforcement.

A bike park has a combination of trail facilities that are determined by the terrain, implicit and explicit community desires, funding, and typical development considerations (e.g., access, parking). The facilities are coherently arranged onto a site to create a high-quality, risk managed mountain biking experience for a range of skill levels. Given the opportunities and constraints at Craig Park Bike Facility, the following trail facilities were conceptualized:

- Blue Level (Intermediate) Flow Trail
- Green Level (Beginner) Flow Trail
- Black Level (Advanced) Slopestyle Trail
- Blue Level (Intermediate) Slopestyle Trail
- Green Level (Beginner) Slopestyle Trail
- Beginner and Intermediate Skills Loops
- Tot, Beginner, and Intermediate Pumptracks
- Multiple-use Cross Country Perimeter Loop

The unconsolidated soils present at the Craig Park Bike Facility will provide challenges for future maintenance depending on designed use, other activities and weather patterns. Care must be taken to maintain consistent moisture content in the trails as well as utilize frequent use of a plate compactor to keep the treads compact, safe and sustainable.

### Inspection and Maintenance

#### Trail Inspection

It is important to inspect the bike park regularly to ensure the safety of the users and to provide a 'paper trail' that assists in preventing litigation. Inspection helps ensure that the changing/unexpected trail conditions are noted early and that appropriate action is taken and that the process is methodical and recorded.

A well-developed, logical, and systematic approach to inspecting includes:

- Assessing the risks
- Taking user feedback (e.g. how do riders rate the trail?)
- Recording the results



### *How often should inspections occur?*

There is no set rule for how often the bike park should be inspected. However, inspections should occur on a regularly scheduled basis, the frequency of which will depend on:

- Amount of use
- Environment
- Age of feature
- Designer recommendations
- Weather events
- Methods of construction

It is recommended that trail inspection should take place at least once a week or after any busy riding sessions or exceptional weather events.

### *What is the purpose of inspection?*

- Demonstrate responsible management
- Assign duty of care to users and staff
- Audit trail, keeping standards high and allowing effective staff management
- Provide a safer and more enjoyable visit for visitors
- Record results to assist in the prevention of litigation

### *The trail inspection sheet assesses:*

- The point at which a designed feature deviates significantly to increase the acceptable level of risk
- Where a feature has sufficiently changed to compromise the published user information
- Where user patterns have deviated from the designer's intentions and pose an unplanned challenge
- If the trail need closing or diverting
- To manage a change in trail condition and take appropriate action

### *Required inspection equipment:*

- High visibility jacket
- Camera
- Note pad
- Phone / Radio
- Tape measure
- Screwdriver / awl

### *Order of inspection:*

- Trail surroundings and fall zone (Corridor)
- Vegetation
- Signage
- Drainage
- Barriers/fences
- The trail tread (surface material)
- Inspection of specific trail features
- Jumps
- Wooden bridges
- Stone or rock features (rock bridge)



*Key problems for trail features:*

- Weather
- Drainage
- Erosion due to above
- Erosion due to usage
- Erosion due to flawed design/ location



**Inspection Methods**

*There are two basic methods used to inspect a feature:*

- Visual inspection:
  - Involves reviewing the previous inspection report, and visually examining the trail context and corridor.
  - Involves an on site assessment to identify obvious changes/defects which may involve riding the trail to understand the user experience.
  - For dirt features, visual inspections will reveal any defects in the surface material and the overall shape of the features such as surface cracks or holes or ruts caused by users.
  - For timber features, visual inspections reveal areas that need further investigation such as eroded foundations, cracks, movement, fungus, decay, deflection, corroded fasteners, or loose fasteners.
  - For rock features, visual inspections will reveal settling of rocks, chinking stones and mineral filler. Foundations should also be inspected to reveal animal burrows, erosion or other potential settling issues.





- Physical inspection:
  - Requires the inspector to visually assess all trail features on foot.
  - Timber features are given close visual attention to quantify and qualify any defects, both above and below the tread.
  - The trail inspection procedure should be completed sequentially, meaning that the trail is inspected in a methodical way based on the context of the trail, its surroundings (corridor), and the trail features.
  - Once the defects are identified visually physical procedures are then used to find out the extent of the deterioration or decay.
  - The basic methods for physical inspection are:
    - Rider testing: Has the features' shape been compromised? If the shape has changed, the feature will not ride in the correct way, so users should be asked for feedback if the feature is above a skill level.
    - Pick test: For wooden features probing with a pointed tool such as an awl will locate decay near the wood surface. Excessive softness or lack of resistance to the probe penetration and the breakage pattern of the splinters will show decay.
- In either type of inspection, it is important to document the inspection on site.



**Inspection Protocol: Craig Park Bike Facility**

It is critical to use a formal inspection protocol. This allows the managers to maintain a regular schedule for assessing the safety and user enjoyment of all bike park facilities and features. Below is a recommended protocol for Craig Park Bike Facility:

Inspection	Recorders	Type	Rationale and Facilitation	Timescale
Fault Reporting	All staff, visitors, users	Casual reports, verbal	Staff, visitors and users can pick up urgent issues and support the structured inspection reporting system. This takes valuable advantage of the high level of knowledge and skills associated with mountain bike riders. Print management contact details on site signage to improve communication.	Daily
Visual/ Recorded	Bike park manager and maintenance supervisor	Written inspection recorded on a diary sheet,	The high level of use and risk justifies a monthly written inspection of facility condition, hazard monitoring, and site information.	Opening, weekly, and following incident or alterations
Photographic	Bike park manager and maintenance supervisor	Photographic records of all key feature, track condition and signage	Given the technical nature of the park and the level of use, a photographic record will highlight trail wear and support the accident reporting procedure.	Opening, two times monthly, and following incident or alterations
Independent	External Bike park specialty contractor	Written inspection record	The specialist nature of the facility and the level of risk support an independent review for the facility during development and annually.	Planning, design, construction and annually



## Materials

To ensure that facilities and features are safe and enjoyable for guests, the proper materials must be used.

### *Surfacing material*

- What: A special mix of soils that is designed to be more durable than the native dirt
- Where: Use on all trail surfaces
- How: Import the dark clay used on the Slopestyle Trails
- Storage: Must be stored under a tarp and kept slightly moist for easy application and compatibility

### *Gravel*

- What: Small clean stones 10mm or smaller size
- Where: As filler for rock features
- How: Spread in an even layer no more than 100mm deep
- Storage: Order as needed

### *Stones*

- What: Large clean stones 80-100mm in size
- Where: As filler for rock features
- How: Compact into place and cover with compacted soil or gravel
- Storage: Order as needed

### *Wood*

- What: Wood planks to be used as bridge planking
- Where: To replace damaged bridge decking
- How: 6 meters of similar decking existing on features, treat with wood protectant, keep two (2) on hand
- Storage: Under cover and off of the ground

### *Vegetation*

- What: Grass and plantings
- Where: Plant on any surface that is not a walkway or riding surface
- Why: To mitigate runoff and absorb rainfall

## Tools

For best results, only use the approved tools and inspect them regularly to ensure that they can be handled safely and efficiently.

### *Hoses*

- Why: For distributing water to areas of the park that lack irrigation
- Type: Heavy duty with brass fittings and rubber seals to prevent leaks and damage to features from oversaturation.
- Maintenance: Check for cracks in the hose and missing seals



*Spray gun*

- Why: For precise application of water on features
- Type: Heavy duty with adjustable spray patterns and rubber seals to prevent leaks and damage to features from oversaturation
- Maintenance: Check for missing seals

*Rake*

- Why: For smoothing out rough surfaces and removing loose rocks
- Type: Long handled with a metal bow and teeth
- Maintenance: Check for bent teeth, cracked handle, and a loose fit between the handle and head

*Flat broom*

- Why: For sweeping loose sand and gravel off of riding surfaces
- Type: Long handled with medium-stiff bristles
- Maintenance: Check for cracks in the handles, a loose head and worn bristles

*Flat shovel*

- Why: For shoveling dirt and shaping features
- Type: Long handled with a sturdy metal head
- Maintenance: Check for cracks in the handles or a loose head

*Plate compactor*

- Why: For compacting surfacing material on all riding surfaces
- Type: Gasoline or diesel powered with a tilting handle and the ability to compact in both directions
- Maintenance: Keep good clean fuel on hand. Make sure the air filter, engine oil, and vibrator oil are checked before each use and changed according to the manufacturer's specifications. Most plate compactors will only work if used in the "forward" direction. Misuse will damage the machine.

*Handsaw*

- Why: For trimming limbs near the trails
- Type: Small with a fixed 200mm blade
- Maintenance: Check for dull teeth

*Pole saw*

- Why: For trimming high limbs over the trails
- Type: Extendable with a fixed 200mm blade
- Maintenance: Check for dull teeth and bent extension tubes

*Line trimmer*

- Why: For cutting low brush and weeds near the trails
- Type: Gas powered with replaceable nylon line
- Maintenance: Keep good clean fuel on hand. Make sure the line spool, air filter and engine oil are checked before each use and changed according to the manufacturer's specifications. Misuse will damage the machine.



*Grass mower*

- Why: For maintaining grass in the park
- Type: Gas powered with a narrow deck and bagger
- Maintenance: Keep good clean fuel on hand. Make sure the air filter and engine oil are checked before each use and changed according to the manufacturer's specifications. Misuse will damage the machine.

*Rechargeable drill/driver*

- Why: For maintaining wooden structures
- Type: Rechargeable 18+ volt with an assortment of bits
- Maintenance: Keep charged and ready for use

*Rock hammer and chisel*

- Why: To clean and dull sharp edges on rock features
- Type: Sledge style
- Maintenance: Check handle for cracks and loose hammer heads

*Circular saw*

- Why: For cutting wood planks
- Type: 7 ¼" Circular saw
- Maintenance: Keep in a dry place, keep blade sharp and inspect cable for cuts and exposed wiring

*Wheelbarrow*

- Why: For transporting surfacing material
- Type: Metal frame and bucket with rubber tire
- Maintenance: Watch for cracked or bent handles. Keep all hardware tight. Keep the tire inflated to the manufacturer's specifications.



## Bike Park and Pumptrack Maintenance

Trails, dirt jumps, pumptracks, and wooden features require regular maintenance in order to keep them safe, fun and looking good. Following the guidelines in this document will help to manage risk.

- *Watering dirt features:* To maintain compaction and prevent erosion, all dirt features need to be watered regularly.
  - When: 2-4 times per week (more/less depending on the temperature)
  - How: With a shower or light spray making sure that the soil is being slowly saturated and that the water is not running down the dirt, causing soil to erode. If water moving over the dirt is visible, the quantity of water should be reduced or the spray should be changed. Water often will help the dirt set into a hard riding surface and is very important after building or shaping. The trail must be closed while watering is occurring.
  - Who: Maintenance staff. Staff should know how to water without blasting the soil. They will need supervision until they are watering properly. Over-watering will lead to damage.
  
- *Watering vegetation near the trails and features:* To keep vegetation healthy and prevent erosion of the trails and dirt features, plants need to be watered regularly.
  - When: 4+ times per week (more/less depending on the temperature and the type of vegetation).
  - How: With a shower or light spray making sure that the soil is being slowly saturated and that the water is not running onto trails or features and causing soil to erode
  - Who: Maintenance staff. Staff should know how to water without blasting the soil. They will need supervision until they are watering properly.
  
- *Compaction:* This is what holds everything together and must be attended to regularly. When dirt becomes loose and aerated it is no longer safe or fun to ride on.
  - When: Inspect daily for areas that are de-compacted more than 20mm in depth.
  - How: Use a rake or flat shovel to reshape the dirt into its intended shape. Apply water with a light spray making sure that the soil is saturated just enough to make it moist all the way through. Use the compactor to compact the area. Do not ride on the surface until it has hardened. The trail must be closed while compaction is occurring.
  - Who: Maintenance staff members who have been well trained in the required standards.
  
- *Shaping:* Jumps made from dirt require regular maintenance of their takeoff and landing surfaces. If these are not carefully shaped and maintained, the jumps will not “send” the rider properly and could lead to injuries or death.
  - When: Inspect daily
  - How: A flat blade shovel, rake and a compactor are the best tools for shaping lips of jumps, berms and rollers. You may also use a wooden plank that is 3-5 meters in length to assist with rebuilding the lips of jumps. The plank makes it easier to create a straight and consistent lip. Shaping needs to be done in order to maintain the original flow of the features and make sure the lips on the jumps and



- the berms are in good riding condition. The trail must be closed while maintenance is occurring.
  - Who: Trained staff should only shape. Only a small crew (less than 4) of people should be authorized to move dirt in your bike park. These people should be experienced in building while also being aware of the need to maintain features for all ability levels. Make it very clear through signage that building is not permitted by anyone else in order to manage risk. The “Bike Facility Manager” must understand the process and oversee any shaping or building.
- *Structure maintenance:* All structures must be inspected and maintained regularly. Structures made of wood, stone, metal or man-made materials can become loose, rot, corrode or crack from fatigue. Regular inspection will prevent catastrophic failures and ensure safety for users.
  - When: Inspect weekly
  - How: Inspect structures at all joints and connection points. Look for loose components or protruding hardware. Nails can be pounded back in to place, but if they loosen and protrude on a chronic basis the wood component may need to be replaced or the nail may need to be replaced with a threaded fastener. Loose screws should be tightened but the wood component may need to be replaced if the screw loosens on a chronic basis. Look for signs of rot, corrosion, and cracks. Stone structures should be checked for loose rocks or inadequate dirt fill to make transitions smooth. Kick each rock to check that it is secure. The trail must be closed while maintenance is occurring.
  - Who: Maintenance staff members who have been well trained in the required standards.
- *Vegetation maintenance:* If left unattended, vegetation will encroach upon trails and features. This could lead to reduced sight lines, overhead hazards, entanglement, and falling hazards.
  - When: Inspect weekly. Trim vegetation as needed (usually once a month or once every other month depending on the season).
  - How: Pulling weeds, mowing, trimming brush and limbs. Trail corridors should be trimmed and free of obstacles 3 meters wide and 4 meters high. Use handsaws, mowers, loppers, and a line trimmer. The trail must be closed while maintenance is occurring.
  - Who: Maintenance staff members who have been well trained in the required standards.
- *Raking and sweeping:* As the park is used, small rocks, gravel, sand and leaves will collect in areas such as the bottoms of berms and jumps. They are of minimal threat to experienced riders but can pose a hazard to less experienced riders whose slower pace may lead them into the loose materials that have collected in low traffic areas.
  - When: Inspect daily
  - How: Raking and sweeping should be done if your bike park has an issue with loose rock, sand or gravel on the riding surface as well as any blown leaves. Raking or sweeping these rocks, gravel and leaves off the riding surface with a lawn rake or broom and removing them from the riding area will keep your park in great shape and minimize risk of injury. The trail must be closed while raking or sweeping is occurring.
  - Who: Maintenance staff members who have been well trained in the required standards.



- *Fences:* It is very important that the fencing surrounding the park and dividing the trails from the viewing areas stay in good condition and are not bypassed by guests. These fences prevent unauthorized use. When users pass through an official opening in the fence and onto a trail, they are accepting the risks of riding the trail.
  - When: Inspect weekly
  - How: Check all panels and posts for gaps or looseness
  - Who: Maintenance staff members who have been well trained in the required standards
  
- *Preventing damage from heavy rain:* Heavy rainfall can significantly damage trails and features. The “Bike Facility Manager” must pay close attention to the weather outlook and be prepared to apply protective coverings.
  - When: Check weather forecast daily
  - How: Apply protective coverings whenever heavy rain is expected. Inspect and clean out all drains and conduits weekly. All dirt features such as jumps, berms and rollers should be covered with tarps or canvas to prevent oversaturation. The tarps should be weighted down at the tops and edges with heavy weights (sand bags, large stones, bricks or bottles of water) to prevent them from being blown away. The bottom edges of tarps should overlap the tarp below. These edges can also be folded over to act as a gutter and direct water to the edges and off the trails. In areas that are damaged by higher flow, small (80-100mm) round stones can be compacted into the rut and covered with compacted surfacing material. Sections of carpet or fiber mats can also be used to slow down water and minimize erosion in fast moving drain areas. Remember to clean out all drains and conduits by removing any buildup of dirt, sand, stones or leaves. Some drains are covered with large stones to prevent water from traveling too quickly through them and increasing erosion. The trail must be closed while covered with tarps and should not be re-opened until the surface has dried and hardened. During winter months where the park will not be used, it is recommended that the pumptrack and dirt gravity features be covered by tarps.
  - Who: Maintenance staff members who have been well trained in the required standards. This process should be supervised by the “Bike Park Manager” to ensure proper layout.
  
- *Patching damaged areas:* Features and trails may be damaged by water, impacts, skidding and overuse. When this occurs the trail surfacing must be patched.
  - When: Inspect daily for areas that need to be patched
  - How: Utilize the dark clay that was imported for use on the Slopestyle Trails. Use a rake or flat shovel to fill the damaged area and reshape the dirt into its intended shape. Apply water with a light spray making sure that the soil is fully saturated, but just enough to make it moist all the way through. Use the compactor to compact the area. The surfacing material is too wet if sticks to the compactor’s plate. Apply a thin dusting of dry material and compact again or wait for it to dry slightly. Use a broom to sweep off any excess material. Do not ride on the surface until it has hardened fully. The trail must be closed while compacting and hardening is occurring.
  - Who: Maintenance staff members who have been well trained in the required standards.





- *Riding*: Riding a bike park is a great way to maintain it, especially after any new building or shaping. Riding is a great way to compact the dirt and test your features to make sure they are working as intended.
  - When: As much as possible!
  - How: This needs no explanation. Believe it or not, riding a bike park is a great way to maintain it. Especially after any new building or shaping. Riding is a great way to compact the dirt and test your features to make sure they are working as intended. Try to get beginners to test out the beginner features so you can have their feedback, intermediate riders on the intermediate features and so on. One of the most common mistakes in a bike park occurs when features are built above the ability level that they were intended for without room for progression and learning. Give beginners plenty of space to set up for a feature, get their feet on the pedals and so on. Make sure beginner transitions aren't too steep and remember the simple details that could make or break the opportunity for someone to build their skill.
- Who: Everyone

<b>Maintenance Schedule</b>		
<b>What</b>	<b>When</b>	<b>Notes</b>
Watering dirt features	2-4 Times per week	Depending on the weather
Watering vegetation	4+ Times per week	Depending on the plant's requirements
Compaction	Inspect daily	Repair immediately
Shaping – jumps, berms, rollers	Inspect daily	Repair immediately
Structures – bridges, rock gardens	Inspect daily	Repair immediately
Vegetation trimming	Inspect weekly	Trim as needed
Raking & sweeping	Inspect daily	Remove all loose material
Fences	Inspect weekly	Repair immediately
Damage prevention from heavy rain	Check weather daily	Cover all features if rain is forecasted
Patching damaged surfaces	Inspect Daily	Repair immediately
Riding	Daily	To ensure features are working properly



## Appendix: Mountain Bike Park Site Evaluation Criteria

The ideal community mountain bike park includes a combination of characteristics that come together to allow for a sustainable facility, which integrates the environmental, social, and economic aspects of the development. The following list contains the site characteristics reviewed during the fieldwork.

### Landscape: Slopes

Different bike park facilities require different slope characteristics.

- A **pumptrack** requires a regularly shaped area with modest cross slopes between three and five percent. While the track itself does not require a cross slope, a modest amount does facilitate proper drainage. Since most tracks are constructed of imported materials, a level site can be outslowed as part of construction. Sites with cross slopes greater than five percent can be used with the understanding that the track area will be brought to proper cross slope grade as part of construction. Depending on the characteristics of local soils, a leveling operation could generate all the materials required for construction.
- Other mountain bike facilities such as **bicycle optimized singletrack** are trail-based and have similar requirements to general sustainable natural surface trails, a primary difference being that steep side slopes (>40 percent) are undesirable. While the “golden window” for traditional trails is 20 to 60 percent, mountain bike trails avoid steeper slopes and flat areas with no slope. Side slopes around 20 percent are ideal. While it is possible to create facilities on flatter landscapes, it will require during the construction phase, a heavy manipulation of the terrain utilizing fill (either borrowed onsite or imported). This is required to create fun and playful terrain.

### Landscape: Acreage

Depending on the range of facilities desired, a bike park can be sited on as little as 10,000 square feet and on as much as 40 acres and up. Successful pumptracks can be created on modest parcels, but it is important that the parcel be regularly shaped (i.e. not a 20-foot wide strip), to avoid compromising the flow of riders through the facility. Larger parks combine a range of slopes to host a variety of facility types.



*Approximately 10 acres are available within the proposed bike park facility at Craig RP*

### Landscape: Soils

The foundation of every bike park, no matter the facility type, is shaped ribbons of dirt. The right soil is essential for successful construction and maintenance, providing the combination of low rolling resistance and high traction that riders affectionately call “hero dirt”. Another name for hero dirt is loam. Loam is formally defined as soil composed of 40% sand, 40% silt, and 20% clay. A rider’s “hero dirt” likely falls somewhere close to these percentages. For bike parks, 40% clay content is the very minimum, as clay provides the structural strength for shaped features and corners. A little clay goes a long way, though, so clay must be balanced with sand and silt – substances more porous than clay – to allow tracks and trails to be “rideable” quickly after rain



passes. Ideal bike park dirt is also relatively rock-free. If a site has great soil mixed with rock and cobble, a screening operation is required.

### **Landscape: Shade**

Shade is a desirable characteristic for bike park tracks and trails as well as users. The most common raw material for bike park facilities is soil, and one of the underappreciated characteristics of the aforementioned “hero dirt” is sufficient moisture. Trails sheltered under a forest canopy or otherwise shaded maintain more consistent moisture, which increases ride quality and reduces ongoing maintenance efforts.



*Most bike parks require additional imported soil.*

Users themselves require shade as well. Bike park use has both interval and social characteristics, both better enjoyed from a table or bench, ideally in an area shaded from the heat of the day. Use happens one-by-one with riders queuing for their next run on a specific feature. However, half the fun of a bike park is learning from one another, showing your friends and families a newly perfected skill, or simply enjoying the social scene of the park.

### **Water**

Proper soil moisture is a requirement for construction and effective maintenance. Much like a potter working his wheel to make a new creation, water is the catalyst that makes it possible to transform mere piles of dirt into a berm or jump that puts smiles on a rider’s face.

When a soil’s moisture dips below a certain threshold, it loses its ability to hold its shape. Well-planned and properly managed low-flow irrigation systems are a must-have for bike parks in dry or exposed locations.

Irrigation systems for bike park elements/trail tread and landscaping/plants are different and should be budgeted separately. Trying to use a single system for both would result in either withered plants or trail tread that is either too dry or wet.

### **Access**

It is common for a bike park to require large amounts of externally sourced soil, and moving this soil into its final position can take a large percentage of the budget. The ideal bike park site offers easy-to-access vehicular routes that allow large trucks to drive directly to the project site, in order to save time and costs.

It is essential to provide first aid access to a bike park as part of any effective risk management plan. Bike parks should be located at a physical address recognized by the 911 system, and first responders should be able to drive as close to the facility as possible.



## Synergies

The notion of “social gravity” can be used to discuss any facility. Does it provide a unique enough experience and/or opportunity to convince potential users to make the trip? Is it possible to create a bike park that by itself rises to this level? (Boulder, CO’s 40-acre Valmont Bike Park is the best example). Most bike parks depend on synergy with other facilities to contribute to their ultimate success:

- The easiest synergy is **connection with a traditional or bicycle optimized singletrack trail system**, especially if this is a local destination. Even a modest system can be a good partner for a bike park, and combining a modest bike park with a small trail system can turn both into area destinations.
- **Connection to a paved and/or transportation trail network** provides good synergy as well. In many metro areas, the barrier to entry is the bicycle ride to the park, whether it is unsafe or too lengthy. Safe and close connections from one’s backdoor to a bike park would turn an otherwise small development into a veritable attraction.
- **Combining a bike park with a traditional recreation park** proves successful, especially for youth and families. It is not unusual for one member of the family to shun ball sports in favor of activities like skating and biking. At Maryland’s Rockburn Branch Skills Park, it is common to see parents set up chairs or sit at the tables where they can watch one child ride the pumtrack while the other’s soccer team practices on the adjacent turf field.



*Agency staff, stakeholders, and neighbors discuss the design of Seattle’s I-5 Colonnade City Bike Park.*