Monte Carlo Trails Park Stewardship Plan and Design Guidelines

Revised 2.11.2019

Background

The Monte Carlo Flood Control Basin project is located in northeast Nogales, south of E. Baffert Dr, east of N. Via Madonna and west of the Mountain Pointe Apartments in the Monte Carlo neighborhood. The property is owned by the City of Nogales and surrounded by neighborhoods and private property. The project was constructed in response to recurring flooding to along Monte Carlo Wash in the early 2000's and is meant to accommodate a 100 year rainfall event.

The property's close proximity to surrounding neighborhoods, relatively natural condition and permanent land use as a flood control basin make it well suited for park, trail and recreation development.

In June 2018, the Nogales City Council approved a conceptual plan to develop the Monte Carlo Basin Flood Control Basin into a recreational open space called the Monte Carlo Trails Park in a manner that:

- Provides desired recreation opportunities for local residents:
    - Mountain bicycling trails and features, especially entry-level opportunities for youth and families;
    - Walking and running trails;
    - Other amenities as identified;
- Incorporates the property into the City's parks and recreation system;
- Maintains the property's flood control function;
- Helps address undesirable activities on the property like trash dumping and off-road vehicle use;

The project was suggested to the City by 0S3 Movement, a non profit organization whose mission is to "…enhance wellness by promoting bicycling as a means to good mental and physical health by producing bicycling, cultural and educational events". The organization identified the lack of nearby mountain bicycling trails as an impediment to local participation in bicycling, especially among youth and families. 0S3 Movement has signed a Volunteer Services

Agreement with the City of Nogales to share development and maintenance responsibilities for the Monte Carlo Trails Park.

The overall Monte Carlo Trails Park project, along with the Design Guidelines and Maintenance Plan document, are supported by the National Park Service (NPS) Rivers, Trails and Conservation Assistance program which offers help to community groups, nonprofits, tribes, and state and local governments who want to conserve and improve access to nature through the development of trails and parks.

Purpose and Scope of the Design Guidelines & Maintenance Plan

The purpose of this document is to establish design guidelines and a stewardship plan for the trails on the property. The document also serves as the "work plan" attachment to the Volunteer Services Agreement between the City of Nogales and 0S3 Movement. This document can be modified and updated at the mutual interest of the City and 0S3 Movement.

Trail Design Guidelines

The design guidelines provide a method for constructing trails and trail features.

- Trails: are natural surface routes that allow for recreational travel
- Technical Trail Features (TTF): are manmade obstacles along the trail that require bike handling skills to ride. TTF's include any jumps, bridges, log rides, and related features that are a part of the pump track or bike skills areas. These may also be integrated along the Secondary/Singletrack Trail.

Conditions on the ground will determine the final trail routing and TTF locations. For that reason, approximate trail locations and routing are shown on the map and may move slightly after construction begins. Trails will be routed and built according to the guidelines and specifications described in this document.

Natural surface trails and TTFs are generally not designed to specific engineering standards, but instead follow general best practices for design, construction and maintenance. Specific development is often adjusted on-site to account for soil condition, vegetation, topography and the desired user experience. These guidelines only provide guidance for TTFs that are built using natural materials (e.g. soil, aggregate and rocks); an update would be required if TTFs constructed with non-natural materials such as wood or metal were approved.

Designing Sustainable Trails – A Focus on Drainage: The biggest enemy of sustainable trail design and construction is erosion caused by water from rain events. Trails should be designed and constructed to allow for flow to travel across

the trail and continue downslope instead Trails routed onto steep slopes or where underlying soils are erodible are at a higher risk for erosion.

Trail design and construction at Monte Carlo Trails Park should adhere to the International Mountain Bicycling Association's five essential elements of sustainable trails:

- **The Half Rule** – A trail's grade shouldn't exceed half the grade of the natural hillslope. Trails above this guideline are considered "fall line" and considered at higher risk for erosion
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- **The Ten Percent Average Guideline:** The average grade of the singletrack trails at Monte Carlo should not exceed ten percent (<10%). Based on the erodible nature of the soils, a more conservation target of six to eight percent (6-8%) is desirable. Multiuse trails with a primary use of walking and running should aim for even lower average grades, such as three to four percent (3–4%)

- **Maximum Sustainable Grades:** The steepest segments of trail 10 feet or longer should not exceed fifteen percent (15%). Consideration should be given to the soil and expected use level before designing trail near the maximum sustainable grade.

- **Grade Reversals:** To encourage drainage of water across the trail tread instead of down it, grade reversals, or changes in the grade of the trail should be used. These reversals should be incorporated every 25 to 50 feet along the trail. Water bars, or other structures to divert flow, should be used rarely only in specific cases where grade reversals are not an available option.

- **Outslope:** the downhill or outdoor edge of the trail should be slightly lower in elevation than the uphill edge of the trail to facilitate sheeting of water across the trail. Outslope should be targeted at approximately four percent (4%).

Additional Trail Construction Guidelines

- **Full bench construction.** All singletrack trails located on hillsides should utilize full bunch construction.

- **Vegetation removal/trimming near the trail.** The area above the trail should be cleared up to 12’ and all vegetation or branches should be removed (referred to as vertical clearance). An area of 2’ on either side of the trail should also be kept clear (referred to horizontal clearance).

- **Alternative lines.** Alternatives should be provided to all TTFs that are incorporated into the Secondary/Singletrack Trail. For example, a small rock drop could be integrated into the trail, but a clear alternative or “ride around” should be constructed and signed.

- **Maintain flood control function.** The Monte Carlo property will continue to function as part of the region’s flood control infrastructure. The flood basin is designed for a 100 year flood event. To maintain this function, there is a no-net addition of soil or materials within the area potentially inundated during these flow events. Therefore, any soil added to the area that is supposed to accommodate water must be offset by the removal of soil or material elsewhere. This does not apply to the “upland” areas outside of the flood basin itself. Additionally, all inlet and flow structures should be kept clear of obstruction.

Trail Type	Designed Uses	Other Allowable Uses	Width and Condition	Average Trail Grade	Maximum Sustainable Trail Grade	Surface Type
Primary Trail /Multiuse	Walking, running	Mountain Biking, Horseback Riding	36" to 48" – wide, smooth and stable with few irregularities - no obstacles higher than 2"	3 to 4%	10%	Harden with concreate or compacted aggregate; may be natural dirt surface in places
Secondary Trail/ Perimeter Singletrack	Mountain biking,	Running walking Horseback Riding	18" to 24" – trail surface is firm and stable, but may have	6 to 8%	15%	Dirt, rock armoring where necessary or as part of TFF's

Level of Service Maintenance Standards for Primary/Multiuse and Secondary/Singletrack Trails		
Maintenance Type	**Frequency**	**Related Tasks** *note: we can fill these out in more detail*
Routine	2x per year minimum, or as needed	- Complete a basic trail condition assessment - Prune vegetation in the trail corridor, both above and beside trails - Address any localized erosion issues -
Major	Every 2 to 4 years	- Resurface trails as necessary - Regrade trail tread as necessary - Reconstruct retaining walls

Environmental Stewardship

The natural resources values of the property should be protected during development and ongoing management.

- **Secure approval prior to construction.** Volunteers are not allowed to construct new trails or TTFs without the expressed permission from the City contact for the property.

- **Use passive water harvesting techniques.** Passive water harvesting is the practice of slowing water down and encouraging it to soak into the ground. The areas around trails and facilities (benches, etc) should be contoured to catch and direct water runoff to suitable areas, such as small excavated and rock lined basins. These areas can used to encourage native plant growth.

- **Harmonize with the landscape.** Limit the size of backslopes of trails to minimize the visible and exposed soil. Round the the edges and retain large rocks in cut slopes to maintain a more a natural appearance that aligns with natural topography. Avoid abrupt or highly angular excavations or features.

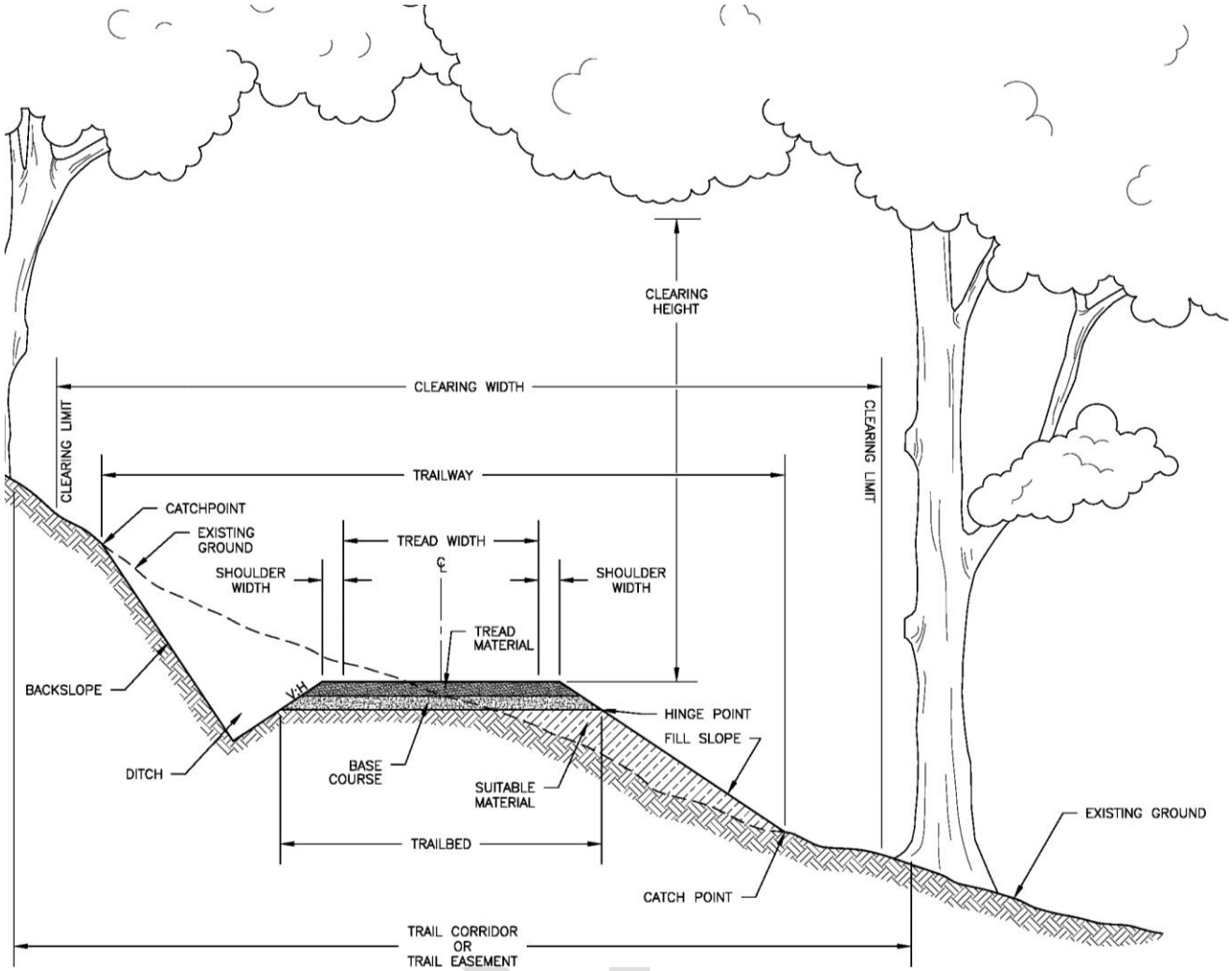
- **Implement erosion control measures.** In addition to sustainable trail design, steps should be taken to limit soil erosion during the construction process specially for TTFs including installation of sediment control fencing or straw wattles; timing work during periods where there is enough soil moisture but not actively raining.

- **Prevent the spread of invasive species.** Where possible, materials such as aggregate should be certified as weed-free. Hand tools should be regularly cleaned.

- **Utilize excavated material whenever possible.** Excavated soil and rock can be utilized in filling the tread bench, stabilizing side slope, constructing walls, creating barriers to shortcuts, or in constructing jumps and other technical trail features.

- **Retain native vegetation and encourage future growth**. Where possible, trails should be routed to minimize the need for vegetation removal. Downed trees, when not impeding the route of a trail, should be left in place. Native plants should be encouraged, especially in areas impacted by visitor use. Consider transplanting or broadcasting native seeds. Vegetation should not be removed from the flood control basin area; maintaining this natural vegetation helps with percolation and recharge.

- **Dispose of debris in appropriate locations.** Excess rock, soil, and vegetation must be scattered out of sight or removed from the area to retain visual quality and reduce hazards.
- **Discourage trail shortcutting.** Discourage shortcuts by using rocks, branches, fallen trees or new plantings.



Standard Trail Terms. Courtesy of the US Forest Service.

Risk Management

Risk management is a systemized approach to incorporating safety into trail management. Basic risk management steps can be taken to reduce the likelihood or frequency of injury:

- **Install signs.** Develop a signage that clearly identifies the allowable uses on each trail and their difficulty level. Signs should also be used to indicate difficult TTFs such as drops or jumps. Signage should be provided at the Calle Sonora park entrances and include a trail map, bike park and trail rules, and emergency and maintenance contacts.

- **Build trail filters that demonstrate the difficulty of the trail** to prevent unprepared riders from overstepping their abilities.

- **Develop adequate fall zones around TFFs.** Consider moving branches, stumps, logs, rocks and other protruding objects around difficult TFFs.

- **Provide alternative routes around difficult features.**

- **Provide clear sight lines on all trails,** with an emphasis of including them into and out of TFFs.

- **Install fencing.** Any areas with bike park features (e.g. dirt jumps or pump track) shall have an appropriate fence/barrier between participants and spectators.

- **Tracking incidents.** The City of Nogales and 0S3 Movement should track incidents that occur in the park and analyze these occurrences to identify and address hazards.

- **Volunteer waivers and appropriate gear.** When performing construction and maintenance, volunteer builders shall be required to sign a liability waiver and wear proper clothing and equipment such as sturdy shoes/boots

- **Safety briefings.** Safety briefings should be conducted before volunteer work events or trail construction periods to emphasize safe practices.

Roles and responsibilities

The City of Nogales:

- Maintains ownership of the property
- Coordinates with Santa Cruz County Flood Control on flood control-related items
- Works with 0S3 Movement on project development (trail construction, sign installation, etc) if funds and personnel are available
- Takes primary responsibility for the maintenance and replacement of signs and fencing
- Identify a representative to coordinate with 0S3 Movement on a regular basis to review work completed under this Plan

0S3 Movement:

- Takes primary responsibility for the routine and regular maintenance of recreational trails and bike skills features
- Supports the maintenance of signs, fencing and other site infrastructure
- Ensures that all volunteers active at the Monte Carlo Trails Park have signed and up-to-date volunteer forms
- Seeks external funding to support site development
- Identifies a representative to coordinate with the City of Nogales on a regular basis to review work completed under this Plan

IMPLEMENTATION SCHEDULE

On-Site

Task	Timeframe	Responsibility
Site Clean up	Sept 22; and as needed	0S3 Movement
Install post and cable vehicle barriers Install “no motorized access” signs	Spring 2019	City of Nogales
Mowing and vegetation maintenance near park entry and along interior multi-use trail Volunteer event to prune/limb trees?	Spring 2019	City of Nogales 0S3 Movement with City staff instruction

Administrative

Task	Timeframe	Responsibility
Finalize Design Guidelines and Stewardship Plan	Fall 2018/Winter 2019	NPS/0S3 Movement; city approval
Seek grants, sponsor support (Mariposa Health Clinic) and donations	Winter 2019, ongoing	0S3 Movement
Seek Americorps youth crew for trail construction	Spring 2019	City of Nogales

Improve parking area with surfacing	TBD	City of Nogales	Second presentation to City Council with updates information and plan	TBD	City of Nogales staff to determine need, 0S3 Movement support
Modify entry gate to allow for bike/pedestrian access	TBD	City of Nogales	Meet with Santa Cruz County Flood Control to update on site development and confirm requirements	Spring 2019	City of Nogales, 0S3 Movement, NPS
Trail layout and design	March 2019	0S3 Movement with NPS support			
Trail construction	March 2019 – May 2019	0S3 Movement; Americorps Crew, with City and NPS support			
TARGET DAY FOR OPENING/DEDICATION	TBD				

Phase One Cost Estimates - These costs are estimates derived from comparable projects, and have not been verified with on-site engineering or design but are solely based on conceptual designs. They do not account for volunteer labor, in-kind use of municipal equipment or grants.

Item	Unit	Quantity	Unit Cost	Total	Suitable for Volunteer Work?
Access Control					
Parking Lot Surfacing (decomposed granite)	Square yards	600	$7.50	$4500	No
Post and Cable Barriers – property boundary	Linear foot	100	$8.00	$800	Yes, installation
Visitor Information					
Trail wayfinding signs	Each	10	$100.00	$1000	Yes, installation
Entry Kiosk	Each	1	$2000.00	$2000	No
Trail Information/Rules signs	Each	2	$200	$400	Yes

Trail and Technical Trail Feature Construction					
Multiuse Trail Grading	Linear Foot	3000	$1.00	$3000	No
Perimeter Trail Construction	Linear Foot	3250	$2.00	$6500	Yes
Skills Area Grading	Square Feet	12000	$0.25	$3000	No
Skills Area Post and Cable	Linear Foot	700	$8.00	$5600	Yes
Skills Area Features (rollers, dirt jumps, etc)	Each	8 (est)	$1500	$12000	Yes, with equipment and expertise
Water tank and stand	Each	1	$1500	$1500	Yes
Subtotal				$40,300	
Contingency (15%)				$6045	
Total				$46,345	

Possible Grant Funding Sources

The list below represents a sampling of potential grant sources. Each grant differs in its award cycle and allowable expenses.

Grant Source	Organization	Available Grant Amount
Recreational Trails Program – Non motorized grants	Arizona State Parks and Trails	$80,000
Recreational Trails Program – Safety and Environmental Education	Arizona State Parks and Trails	$10,000
Recreational Trails Program - Maintenance	Arizona State Parks and Trails	$30,000
Community Grants	People for Bikes	$10,000
Community Change Grant	America Walks	$1,500
Parks for All	Hyrdoflask	$15,000
Nonprofit grants	Santa Cruz Community Foundation	$5,000
North Face Explore Grants	Outdoor Industry Association	$25,000
Community Giving	APS Foundation	$1000

Definitions

Backslope – The excavated slope “in back” or uphill of the trail, rising from the uphill (inside) edge of the tread, and eventually transitioning into native hillside by varying degrees, depending on bank composition and slope stability (cut-bank, back-cut, cut-slope).

Bench – A level or slightly sloped trail tread constructed on a hillside. A bench may consist of compacted fill (half or quarter bench) and/or original earth (full bench). Berm - A ridge of compacted earthen material usually formed on the outer edge of the tread

Borrow Material – Soil, gravel, or rock materials taken from sources approved by the project leader, to be used for fill.

Checkdam – A small, sometimes temporary, dam constructed across a swale, drainage ditch, or waterway to counteract erosion by reducing water flow velocity.

Compacted – Consolidation that is obtained by tamping or rolling mineral soil, small aggregate, cement, etc. in successive layers.

Drain – A constructed watercourse which moves water away from the tread surface.

Fall Line – The direction that water flows down a hill; the path of least resistance.

Fill – Earthen material used to fill voids in tread, behind walls, around waterbars. Also, large quantities of earth used to build tread bench (may also be expressed as “backfill”, “fill slope”).

French Drain – A trench filled with gravel or rock or contains a perforated pipe which redirects surface water and groundwater away from an area.

Grade – The grade (also called slope, incline, or gradient) of a physical feature is the vertical distance of ascent or decent of the trail expressed as a percentage of the horizontal distance commonly measured as a ratio of rise to length or as a percent.

Grade dip – A grade dip is a reverse in the gradient of the trail tread, such as a short dip followed by a rise.

Gradient – The incline of the tread along the length of the trail centerline, usually expressed in percent. In slope – Tread tilted towards the uphill side of the slope.

Mineral Soil – Soil consisting primarily of mineral (sand, silt and clay) material rather than organic matter.

Outslope –Tread tilted downward towards the downhill side of the slope.

Slope – The natural slope of a hillside measured at a right angle to the topographic contour, usually expressed in percent. Slope may also be expressed as “side slope”, “upslope”, “downslope”.

Trail Filter – a section of trail near its entry point that is representative of the difficulty level of the remainder of the trail

Tread – The surface portion of a trail upon which users travel.