

## **PROJECT: RECLAMATION OF RECREATIONAL BICYCLE TRAILS IN THE MOOSE MOUNTAIN AREA**

### **1.0 Introduction**

The Calgary Mountain Bike Alliance (CMBA) is a not-for-profit organization dedicated to maintaining public access to trail systems in and around the Calgary area. CMBA's mission is to create, enhance and preserve trails by promoting multi-use through a program of education, stewardship and advocacy. We have a 22 year history representing the local bike population.

The Moose Mountain Bike Trail Society (MMBTS) is a newly formed, not-for-profit organization holding an interest in the trail network on Moose Mountain. The mission of this society is to be a voice for the mountain biking community in the Moose Mountain area, maintain and validate the trail network, maintain public access and develop new sustainable trails and skill areas.

The CMBA and MMBTS are partnering on the Moose Mountain Environmental Enhancement Fund MMEE application in an effort to maximize the benefit to Shell/Husky, the biking community and the environment.

### **2.0 Necessity and Objectives**

The area around Calgary is rife with opportunities for outdoor recreation. A key area for recreational use is in the vicinity of Moose Mountain, specifically the region accessible from Station Flats, West Bragg Creek, Dawson, Pinetop and Sibbald trailheads. The population of the metro Calgary area has nearly doubled in the last two decades. Concurrent with this has been the increasing popularity of off-road cycling, which began in the late 1980's. Some of the best mountain biking trails can be found in the Moose Mountain area. Favorites like Moosepackers, Sulphur Springs, Telephone Loop, TW, Race of Spades and Billy Dog have been enjoyed for years by literally thousands of mountain biking enthusiasts, hikers and equestrians. Over time, the increase in user visits has created issues with trail sustainability and resource degradation in the Moose Mountain area. Furthermore, very little new trail has been created, such that the older trails see increasing numbers of users every year and are experiencing excessive wear. Growing demand for trailhead facilities from all users at the Station Flats location has overwhelmed the facility, requiring either expansion at Station Flats or the diversion of users to other established locations with access to Moose Mountain.

Another critical factor at work in the region is water. Many of the recreational trails were created before much was understood about sustainable trail building practices. As a result, many trails are prone to erosion due to improper water drainage. Trail users of all types [even cattle] tend to circumvent puddles and wet areas. This causes trail braiding, accelerated vegetation loss, soil erosion and widening of trail sections which further increases the rate of erosion. More importantly, the watershed must deal with the products of this erosion. Silt entering streams is one of the most damaging factors to aquatic ecosystems.

#### **2.1 Requirements**

This area requires two things:

1) Trail maintenance and repair to reduce the effects of water on existing trail sections. This is required where:

- The trail is on the fall line causing water to dish and erode the trail;

- The trail lacks outslope, and water is not sheeting off the trail gently;
- The trail lacks grade reversals, allowing water to accumulate on the trail; or
- The trail has been built in a wet or boggy area causing drainage problems.

2) Sustainable reroutes that will provide a long term solution for poorly built trail sections. A sustainable trail:

- Supports current and future use with minimal impact to the area's natural systems;
- Produces negligible soil loss or movement while allowing vegetation to inhabit the area;
- Does not adversely affect the area's animal or aquatic life;
- Accommodates existing use while allowing only appropriate future use; and
- Requires minimal rerouting and long term maintenance.

## 2.2 Expected Outcomes

We expect that the enhancement and improvement of trails in the Moose Mountain region will have a three-fold effect:

1. Reduced impact of trail erosion on the local terrestrial and aquatic ecosystems;
2. Increased resistance of existing trails to damage from water and users; and
3. Increased recreational opportunities for all trail users

## 2.3 General activities

The primary goal of obtaining these funds is to minimize negative environmental impacts on the mountain bike trail network while increasing the quality of user experiences in the area. Currently, the existing trail network contains a number of key areas that impose potentially negative ecological impacts. The CMBA and MMTBS have identified several projects that align with our Expected Outcomes. These projects are diverse in scale and impact and would be achievable through an infusion of capital.

Most trails in the Moose Mountain area require maintenance or reclamation as a result of the following factors:

- Sections run through topographical lows that regularly accumulate water;
- Trail widening and braiding occurs when users circumvent wet areas with poor drainage;
- Poor water crossing design causing stream bed disturbance, sedimentation impacts and stream bank erosion;
- Trails following natural watercourse drainage pathways making them susceptible to water retention, increased erosion and soil compaction; and
- Trails following steep fall line sections causing water to erode the trail.

In order to complete the maintenance or reclamation of the trails, international standards created by the IMBA will be followed. What is IMBA? The International Mountain Bicycling Association is a leading resource for mountain bike-oriented trail design, construction, maintenance, and management information.

IMBA trail building standards and guidelines: All reclamation work will be completed using the following methods:

- **The Half rule:** a trail's grade should not exceed half the grade of the hillside or sideslope that the trail traverses.
- **The 10% average guideline:** the slope of a trail should not exceed an average of 10% from end to end.
- **Maximum sustainable trail grade:** 20% is average, but is site specific and fluctuates depending on many factors including soil type, rainfall, rock etc.
- **Grade reversals:** a spot at which a climbing trail levels out and then changes direction, dropping subtly then rising again. Allows for water drainage.
- **Outslope:** the downhill or outer edge of the tread should tilt slightly down and away from the high side. Allows for water drainage.

IMBA construction techniques used for trail reclamation:

- **Bench cut trails-**A labour intensive section of tread cut into the hillside.
- **Rock armoring-**Reinforcement of a surface with rock, brick or stone.
- **Retaining walls-**Structure used to provide stability and strength to the edge of a trail.
- **Culvert-**A large pipe that conveys a stream under a trail without constricting water flow. On fish-bearing watercourse, fish passage must be considered during culvert design.
- **Bridges-**Free-standing structures which allow passage over a stream. Clear-span designs will be the first choice to minimize ecological impacts.
- **Switchback-**Trail is routed onto a level deck where it makes a transition to the opposite direction.
- **French drains-**A stone filled ditch that collects and disperses water preventing erosion.
- **Contour trail-**A trail constructed such that it follows a contour with its elevation remaining constant.
- **Crown-**The centre portion of the tread is raised to allow water to disperse to the side of the trail.
- **Rerouting-**A new section of trail replacing a poorly designed trail that requires frequent maintenance.

**Bio-engineering techniques:** The planting of native vegetation will be used to close/reclaim or divert trails, stabilize stream banks, and enhance the aquatic environment (i.e., overhead cover, etc.). This will be accomplished through the use of willow stakes:

- Stakes will be obtained from cuttings of local *Salix* species (or reasonable alternative, i.e., red osier dogwood);
- Stakes will be a minimum of 750mm in length;
- Stakes will be stripped of all shoots prior to insertion;
- Each stake will be buried with only 1/5 of the stake exposed;
- Stake installation will take place in the fall following leaf-off (i.e., during dormant period). The Alberta Conservation Association has found significantly increased survival rates with fall installations versus spring installations (M. Fontana, pers. comm.);
- Stakes will be soaked in water prior to installation;
- Stakes will be watered following installation; and
- Stake installation will be conducted according to Alberta Sustainable Resource Development (SRD) and Fisheries and Oceans Canada (DFO) accepted practices. Where applicable, authorizations will be obtained.

### **3.0 Detailed Activities- Trail reclamation**

The following sections describe the activities proposed for the Moose Mountain area. Attached are images illustrating the approximate locations of the works proposed for each trail. Each section contains a table describing the proposed tasks, the associated labour defined either by difficulty (AAA = most difficult) or volunteer hours, the timing of each task, and the requirement of any special materials or equipment.

#### **3.1 Reroute of boggy section at bottom of Special K**

The trail Special K on the East slope of Moose Mountain contains sections that run through topographical lows that regularly accumulate water. Riding these sections in their current state promotes premature soil erosion and compaction, along with trail widening and braiding when users circumvent these areas. Additionally, the bicycle traffic on this trail is relatively low compared to other trails on Moose Mountain.

Redirecting these trail sections out of these bog areas by creating contour trails that traverse side slopes would reduce bicycle traffic impacts and improve the overall trail. Through these improvements, additional traffic could be directed towards Special K, in turn alleviating the pressure on other Moose Mountain trails.

Careful surveys of the area using topographical maps and GPS plotting will allow for the location of a suitable trail reroute that avoids the wet areas, thereby reducing impact. For areas of the trail that cannot be redirected without additional terrestrial ecosystem impact, rock armoring and raised elevation of the trail to span areas that repeatedly collect water would also reduce erosion and minimize trail maintenance requirements. The existing lines that have been bypassed by these proposed redirections will then be decommissioned to allow for natural vegetative regeneration. Materials are also required for a small bridge to be constructed to cross the last creek at the end of this trail section.

<b>Marker</b>	<b>Special K reroute, SK Fix-1 and SK Fix-2</b>	<b>Labour</b>	<b>Timing</b>	<b>Equipment &amp; Materials</b>
SK Fix-1	Mark and clear trail onto higher ground, avoiding wet areas	AAA	May	
	Reroute 250m, steep terrain, partially treed, soft ground	AAA	May	
SK Fix-2	Redirect trail around wet areas	AA	June	
	Construct bridge to span creek	AA	July	Bridge construction
	Decommission old trail (250m) using willow staking and rocks	AA	Aug	

#### **3.2 Completion of fall line gulley section redirect on TW**

The trail TW on the West side of Moose Mountain contains a section that follows the natural fall line watercourse drainage of the valley. In 2005, this trail experienced significant water damage in June during the 1 in 200 year flooding events of that month. This resulted in the majority of soil eroding and being deposited into Canyon Creek at the bottom of the trail. To address sustainability of this section of the trail, work began in the summer of 2008 to redirect the trail to traverse the side slope and reduce erosion impacts of bicycle traffic caused from fall line trail construction.

These upgrades will not only reduce the environmental impact to Moose Mountain terrestrial ecosystem and the Canyon Creek stream, but will also reduce the level of maintenance required to sustain the trail. The new trail features will increase the durability of the trail, and reduce the damage imposed by bicycles by reducing overall trail speed, braking impacts, and will promote normal watershed water flow. As well,

reducing the overall average trail grade will increase rider visits to the Moose Mountain area by decreasing the difficulty of the trail, allowing more users to enjoy the area.

Marker	Redirect on TW, TW Fix-1	Labour	Timing	Equipment & Materials
TW Fix-1	Finish bench cut on top section of trail 300m	AA	May	
	Refine and integrate new section into old	A	May	
	Decommission old trail section with natural material	AA	June	Mini-excavator
	Monitor water drainage and resolve minor issues	A	Aug	

### 3.3 Completion of drainage valley section of Race of spades

The Race of Spades trail on the East slope of Moose Mountain contains sections of trail that follow natural watercourse drainage pathways. These sections are susceptible to water retention and increased erosion and soil compaction due to user traffic. Work was initiated in the summer of 2008 to redirect these sections of trail out of the drainage valley and onto the neighboring side slopes to create more sustainable contour trails. Funding is required to complete this redirection project. The end section of trail will also be addressed by the addition of water redirection features.

Marker	Drainage on Race of Spades, ROS Fix-1 and ROS Fix-2	Labour	Timing	Equipment & Materials
ROS Fix-1	Complete redirection of trail redirect	AA	May	
	300m of trail reclamation	AA	May	
ROS Fix-2	Water redirection features	AA	June	
	Second pass to refine problem areas	A	July	
	Decommission old trail (400m) using willow staking and natural materials	AA	Aug	Mini-excavator

### 3.4 Fall line section decommission/reroute of Billy Dog trail

The initial section of the Billy Dog trail is primarily a steep fall line section that has a higher probability of erosion and poor water drainage. Upgrading this trail by decommissioning fall line sections and redirecting the trail to comply with IMBA trail standards is necessary. Armoring of sections with more erosion resistant rock and lining of trail sections to prevent debris displacement would help reduce vegetation impact. A bridge near the bottom of the trail is required to cross a small stream to reduce erosion and sedimentation impacts resulting from user traffic.

Marker	Billy Dog reroute, BD Fix-1 and BD Fix-2	Labour	Timing	Equipment & Material
BD Fix-1	Mark, clear trail onto higher ground, avoiding 1 creek crossing	A	May	
	Reroute 350m, steep terrain, water management	AAA	May	
BD Fix-2	Reroute away from wet areas	AAA	June	
	Second pass to refine problem areas	AA	July	Bridge construction
	Decommission old trail (250m) using willow staking and rocks	A	Aug	

### 3.5 Tom Snow Trail

The existing Tom Snow Trail [TS] extends more than 30 km from the Dawson Recreation Area to the Diamond T Loop near Station Flats. This trail is the “backbone” of the area, connecting many trail heads along its NW to SE route. The final third of TS on the East slope of Moose Mountain contains several areas that are topographical lows which retain water and increase the compaction and terrestrial impact. The trail needs to be rerouted to a higher elevation in some very specific locations and rock pitching is required to harden soft sections. Funding is required for partial reroutes of this trail, moving it away from the adjacent creeks. The reroute would be a sustainable trail that will run up-slope from the creek, well above the highest point of spring runoff. The main challenge is the length of the trail. A project of this size requires the assistance of motorized trail-building equipment to complete in a timely fashion, as hand-building could require years for proper completion. Providing a sustainable solution will reduce the impact of users on the trail and adjacent creeks, improve the quality of the user experience by placing them on a drier trail with ridge-top views of the surrounding hills and mountains while reducing the long term maintenance requirements.

Marker	Task Description- Tom Snow, TS Fix 1	Labour	Timing	Equipment & Material
TS Fix-1	Mark, clear trail onto higher ground, avoid 6 creek crossings	75	May	
	Reroute 1500m, rolling terrain, partially treed, soft, wet ground	800	May	Mini-excavator
	Second pass to refine problem areas	225	July	
	Decommission old trail (250m) using willow staking and rocks	400	Aug	Mini-excavator
TOTAL		1500		

Marker	Task Description- Tom Snow, TS Fix 2	Labour	Timing	Equipment & Materials
TS Fix-2	Mark, clear trail onto higher ground, avoid creek crossings	50	May	
	Reroute 1250m, rolling terrain, partially treed, wet ground	600	May	Mini-excavator
	Bench cut sections, grade reversals, (600m), roots and rocks	350	June	Mini-excavator
	Second pass to refine problem areas, refine switchbacks	50	July	
	Decommission old trail (900m) using willow staking and natural materials	200	Aug	Mini-excavator
TOTAL		1250		

Marker	Task Description- Tom Snow, TS Fix-3	Labour	Timing	Equipment & Materials
TS Fix-3	Mark trail down ridge avoiding wet areas below	100	May	
	Reroute 2000m, rolling terrain, partially treed	900	May	Mini-excavator
	Bench cut sections with grade reversals, (700m), roots	500	June	Mini-excavator
	Second pass to refine problem areas	200	July	
	Decommission old trail (900m) using willow staking and rocks	300	Aug	Mini-excavator
TOTAL		2000		

Marker	Task Description- Tom Snow, TS Fix-4	Labour	Timing	Equipment & Materials
TS Fix-4	Mark and clear new reroute	50	May	
	Build reroute 900m, rolling terrain, partially treed, soft ground	300	May	Mini-excavator
	Bench cut sections with grade reversals, (400m), roots	200	June	Mini-excavator
	Second pass to refine problem areas	100	July	
	Decommission old trail (700m) using willow staking and rocks	250	Aug	Mini-excavator
TOTAL		900		

### 3.6 Sulphur Springs

Sulphur Springs is the 'Racetrack' of the Moose Mountain area; it sees the highest concentration of users and requires constant maintenance. The trail has seen some recent improvements to various problem areas but two specific sections still require attention. Both sections are wet boggy areas with poor drainage requiring small reroutes and decommissioning of some old, wet trail.

Marker	Task Description- Sulphur Springs, SS Fix-1	Labour	Timing	Equipment & Materials
SS Fix-1	Mark, clear trail onto higher ground	5	May	
	Reroute 100m, rolling terrain, treed	35	May	Mini-excavator
	Bench cut sections with grade reversals, (60m)	30	June	Mini-excavator
	Second pass to refine problem areas	10	July	
	Decommission old trail (80m) with natural material	20	Aug	Mini-excavator
TOTAL		100		

Marker	Task Description- Sulphur Springs, SS Fix-2	Labour	Timing	Equipment & Materials
SS Fix-2	Mark and clear trail- follow higher contours	15	May	
	Reroute 300m, rolling terrain, partially treed, soft ground	75	May	Mini-excavator
	Bench cut sections with grade reversals, (100m), roots	20	June	Mini-excavator
	Second pass to refine problem areas	25	July	
	Decommission old trail (250m) using willow staking and rocks	30	Aug	Mini-excavator
TOTAL		300		

#### **4.0 Cost Estimate**

The CMBA and the MMBTS estimate that \$255,450 will be required to complete the reclamation activities on 8,300 m of Moose Mountain trails, as identified in the preceding sections. A detailed summary of the costs is provided below. The bulk of the proposed works is anticipated to take place between May and September of 2009.

Task/Marker	SUMMARY						
	Volunteer Hours / Difficulty	Trail Distance (m)	Complexity 1-simple 10-complex		Direct Costs	In-Kind Donations of labour, Services, Materials, Equipment	FMV of all work
SK Fix-1	AAA	250	8		\$ 3,400	\$ 10,000	\$ 13,400
SK Fix-2	AAA	250	8		\$ 6,400	\$ 10,000	\$ 16,400
TW Fix-1	AA	300	7		\$ 4,400	\$ 10,000	\$ 14,400
ROS Fix-1	AA	300	9		\$ 3,200	\$ 10,000	\$ 13,200
ROS Fix-2	AA	400	9		\$ 4,000	\$ 10,000	\$ 14,000
BD Fix-1	AAA	350	9		\$ 2,400	\$ 10,000	\$ 12,400
BD Fix-2	AAA	250	9		\$ 5,600	\$ 10,000	\$ 15,600
TS Fix-1	1500	1,650	7		\$ 8,927	\$ 22,500	\$ 31,427
TS Fix-2	1250	1,250	6		\$ 9,272	\$ 18,750	\$ 28,022
TS Fix-3	2000	2,000	7		\$ 11,436	\$ 30,000	\$ 41,436
TS Fix-4	900	900	6		\$ 3,636	\$ 13,500	\$ 17,136
SS Fix-1	100	100	5		\$ 1,181	\$ 1,500	\$ 2,681
SS Fix-2	300	300	6		\$ 1,845	\$ 4,500	\$ 6,345
Trail Tools					\$ 9,750		
Consult Fees					\$ 23,000		
					\$ 32,750		\$ 29,000
<b>TOTAL</b>		<b>8,300</b>			<b>\$ 98,450</b>	<b>\$157,000</b>	<b>\$ 255,450</b>

#### **5.0 Summary**

The CMBA and the MMBTS feel that, through the implementation of the above described activities, the aquatic and terrestrial environments of Moose Mountain will be preserved and protected, and recreational opportunities will be enhanced and sustained. These goals are consistent with the requirements of the MMEE.

## **6.0 Appendix**

### **6.1 Insurance coverage**

Both the CMBA and MMTBS will have all appropriate insurance in place for the 2009 trailbuilding season.

- 1) Commercial General Liability insurance thru 'Oasis Insurance', \$1,000,000 liability coverage covering 30km of trail and all events held.
- 2) Directors & Officers Insurance thru 'Oasis Insurance', \$1,000,000 liability (this is a claims made policy).

### **6.2 Partnerships**

- 1) CMBA has established a working partnership with the 'Spinsisters' Mountain bike club for the completion of trail work on the above proposed trails. The Spinsisters are a not-for-profit bike organization based in Calgary with 250 focused, dedicated members.
- 2) IMBA Canada, The CMBA and MMTBS have established a working relationship for the MMEE project. Training, education and consulting will be supplied by IMBA.
- 3) Trail Crew Design Corp. Has agreed to provide their consulting services and specific knowledge of technically challenging mountain bike trail design to the MMBTS and CMBA.
- 4) Government of Canada. A pending application for two full time summer trail building students has been submitted to the Canada Summer Jobs (CSJ) program. These students will work for up to three months under the heavily subsidized program.

## **7.0 Attachments**

<b>Marker</b>	<b>Image Reference</b>
Overview	Full Map2.jpeg
Overview	Full Map-topo.jpeg
SK Fix-1	MMTBS trail work-2.jpeg
SK Fix-2	MMTBS trail work-2.jpeg
TW Fix-1	MMTBS trail work-1.jpeg
ROS Fix-1	MMTBS trail work-2.jpeg, MMTBS trail work-1.jpeg
ROS Fix-2	MMTBS trail work-2.jpeg, MMTBS trail work-1.jpeg
BD Fix-1	MMTBS trail work-1.jpeg
BD Fix-2	MMTBS trail work-1.jpeg
TS Fix-1	CMBA Tom Snow Fix-1.jpeg
TS Fix-2	CMBA Tom Snow Fix-2.jpeg
TS Fix-3	CMBA Tom Snow Fix-3.jpeg
TS Fix-4	CMBA Tom Snow Fix-4.jpeg
SS Fix-1	CMBA Sulphur Springs Fix-1.jpeg
SS Fix-2	CMBA Sulphur Springs Fix-2.jpeg
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