

CAMERON'S BLUFF TRAILS ASSESSMENT AND CONCEPTUAL TRAILS PLAN

LAWRENCE, KANSAS

APRIL, 2024



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ACKNOWLEDGMENTS

PREPARED FOR:

LAWRENCE MOUNTAIN BIKE CLUB

PREPARED BY:

INTERNATIONAL MOUNTAIN BICYCLING ASSOCIATION (IMBA)
TRAIL SOLUTIONS PROGRAM



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INTRODUCTION

IMBA Trail Solutions

IMBA Trail Solutions (TS) is the international leader in developing trails, with experience in over 750 projects in North America, Europe, and Asia. Our staff excels at planning, design, and construction of trail systems that provide high-quality experiences for local riders and destination visitors while simultaneously minimizing environmental impacts.

Trail Solutions is a fee-for-service based arm of the International Mountain Bicycling Association (IMBA), a 501(c)(3) nonprofit organization. IMBA's mission is to create, enhance, and protect great places to ride mountain bikes. Based in Boulder, Colorado, and with staff distributed across the country and the world, IMBA meets its goal to create great mountain bike experiences through its Trail Solutions program. Trail Solutions employs approximately twenty professional trail planners/designers and builders. In addition to being industry professionals and exceptional mountain bike riders, Trail Solutions staff hold a broad base of applicable skills and knowledge from planning, landscape architecture, and environmental sciences to GIS systems, CAD, and graphic design.

Our wealth of experience has allowed us to develop the gold standard guidelines for the creation of both sustainable and enjoyable singletrack trails. These guidelines have influenced all major federal land management agencies and a large number of state and local parks departments. We pride ourselves on the positive experiences Trail Solutions has provided to the millions of active trail users around the world and on the economic independence that communities have achieved through the development of destination trail systems.



ABOUT THE CLIENT AND STAKEHOLDERS

Lawrence Mountain Bike Club (LMBC) is the lead organization, working in close partnership with Friends of the Kaw (FOK), Friends of Lawrence Area Trails (FLAT), Evergy, Inc., City of Lawrence, Douglas County, and others.

Lawrence Mountain Bike Club (LMBC)

LMBC is a nonprofit organization whose mission is to promote mountain biking through educational activities, organized rides, trail maintenance and advocacy. LMBC has successfully maintained the Lawrence River Trails (LRT) for more than three decades. Over the years the club has expanded mileage and managed a significant increase in ridership on this popular local trail system. Growth of the mountain biking community in Lawrence has occurred in large part due to the LMBC volunteer maintenance of the LRT. LMBC has eleven board members and approximately 125 active members.

Friends of the Kaw (FOK)

FOK is a nonprofit organization dedicated to protecting and preserving the Kansas River, known locally as the Kaw, for future generations. FOK has increased recreational usage of the Kansas River exponentially over the past decade, and successfully installed over twenty river access points. In recent years, FOK has been involved in local efforts to restore native vegetation and habitats along the Kansas River corridor and has partnered with LMBC to engage in habitat restoration efforts on the land utilized for the LRT.



Friends of Lawrence Area Trails (FLAT)

FLAT is a nonprofit organization devoted to developing, promoting and maintaining a robust, accessible trails system serving the diverse people and communities of Douglas County and Northeast Kansas. FLAT is a key fundraiser and advocate for trails in the Lawrence area and is the primary advocate for City and County trails expansion. With a large social media following, FLAT gathers critical community support for trails expansion projects.

Evergy

Evergy is the local electrical utility and project area property owner. It's volunteer "Green Team" has helped create and enhance recreational trails across its entire Midwest service area and has committed to assisting in trail construction in the project area by providing equipment and volunteers. Evergy owns the largest percentage of the land included in the Cameron's Bluff Project and supports allowing public access to these lands. Evergy also recognizes the long-term

open space and recreational value inherent to the Evergy property surrounding the Lawrence Energy Center (LEC), which is the coal-fired power plant facility immediately west of the current project.

LiveWell Douglas County

LiveWell Douglas County is a local health/wellness coalition committed to promoting healthy lives. Physical activity is one of their areas of focus, and their “Healthy Built Environment” work group is a leading voice in area discussions about building a more effective system of local active transportation/recreation.



PROJECT BACKGROUND

IMBA Trail Accelerator Grant

A Trail Accelerator Grant (TAG) offers awardees professional trail planning and consultation services to launch their trail development efforts, which can often leverage additional investment from local, regional, and national partners.

In 2022, Sarah Hill-Nelson, on behalf of The Lawrence Mountain Bike Club and other stakeholders, applied for and was awarded a Trail Accelerator Grant from IMBA to assess the Cameron's Bluff project area, determine trail feasibility, and to create a conceptual trail plan if applicable.



Previous Planning Efforts

In 2019, the "Plan 2040: A Comprehensive Plan for Unincorporated Douglas County and the City of Lawrence," was implemented. This plan included the need for a Douglas County Open Space Plan, the goal of which is to promote healthy and active lifestyles, manage stormwater, and protect wildlife habitat and agricultural sectors in Douglas County and the City of Lawrence. The Open Space Plan is set to be unveiled early in 2024.

About Cameron's Bluff (The Project Area)

Cameron's Bluff lies approximately one mile northwest of Downtown Lawrence, Kansas which features all key amenities including lodging, restaurants, shopping, entertainment, parks, and access to public transportation. Lawrence, a city of approximately 100,000 people in northeast Kansas, is the county seat for Douglas County. Lawrence is also the home of the University of Kansas, which lies approximately three miles south of the project area.

Cameron's Bluff is bordered on the south by Interstate-70 and the Kansas Turnpike Authority (KTA); on the east and north by the Kansas River; and on the west by the Evergy Coal fired power plant, BNSF Railroad line, and other private property.

This current planning effort is for Cameron's Bluff Stage 1. That project area (192 acres) is currently owned by two different entities: Evergy, Inc. and the Kansas

Transportation



Bikeway

- **Countywide Bikeway System**
- **Lawrence Bikeway System**
- **Bikeways on Priority Network**

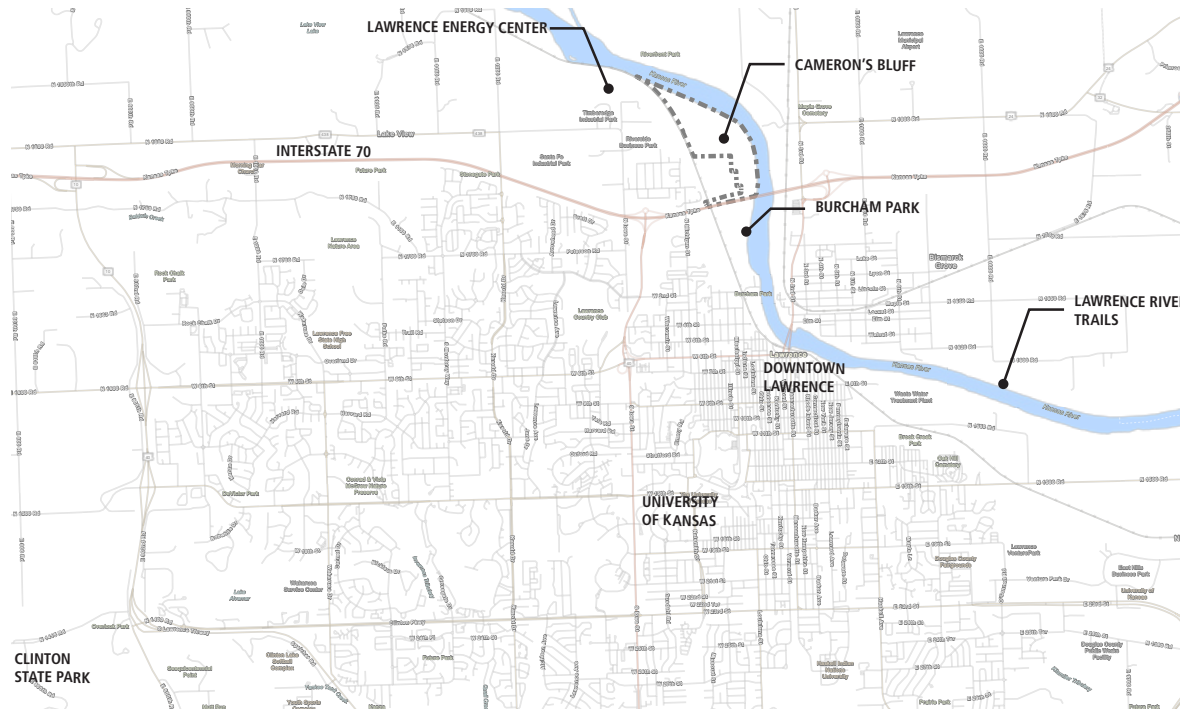
Turnpike Authority (KTA). Both entities have agreed in writing to allow the land to be used for Shared Use Trails.

In addition to the Cameron's Bluff project area, Eergy owns the Lawrence Energy Center coal fired power plant on the Northwest corner of the Cameron's Bluff Stage 1 Property (Eergy Potential Brownfield Site (450+ acres)). Although recently slated for decommissioning, the lifespan of the plant is currently unclear, and will be determined over the next several years as energy demands in the region evolve. This additional area would complement the Cameron's Bluff area with vertical relief and terrain variety not present in the current study area. The site is ideally suited for all types of biking including a pump track, dirt jumps, a cyclocross track or possibly even a velodrome. The recreational value is not limited to cycle sports, as its proximity to the Kansas River make it a valuable access point for the Kansas River and water sports such as kayaking and fishing. Total project

area acreage including all potential expansion areas is approximately 770 acres. While the future of the site is unclear, Eergy has expressed an awareness of the significant recreational value that the site presents for the future.

Project Approach and Scope of Work:

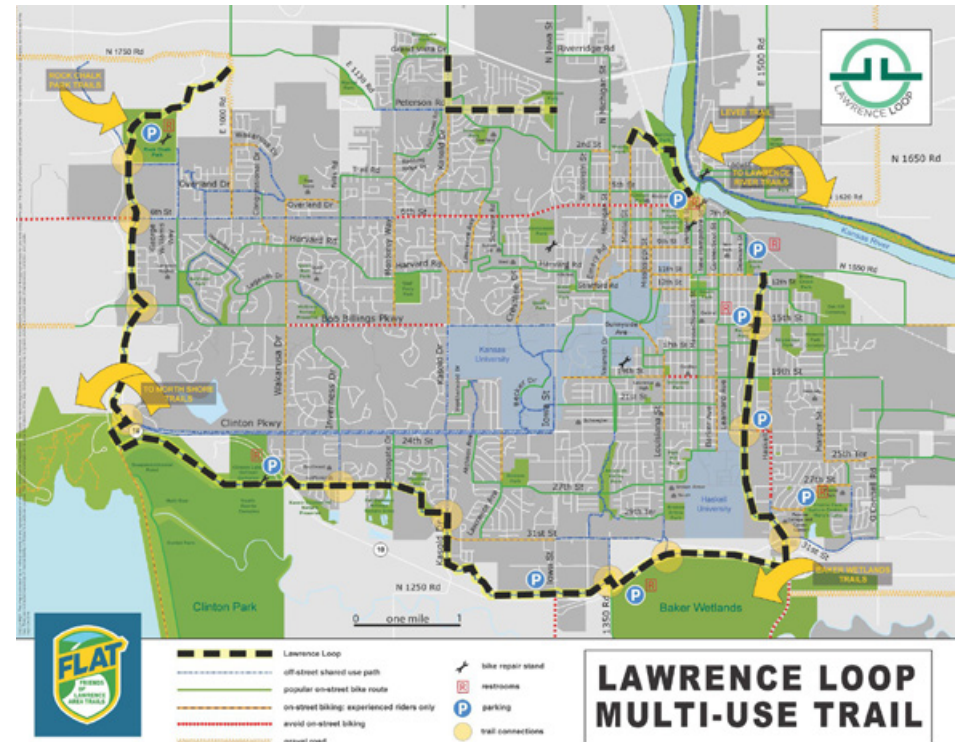
The desired outcome from the Trail Accelerator Grant and this planning process is to assess the project site, determine trail feasibility, and to create a conceptual trail plan if applicable. IMBA Trail Solutions will perform these duties by initially collecting and remotely analyzing data from a variety of sources, then field truthing the data by traveling to Lawrence to lay eyes on the site. After on-site assessment, IMBA Trail Solutions will produce an Assessment and Trails Concept document. All phases of this planning process shall be done collaboratively with Lawrence Mountain Bike Club and other stake holders to ensure the community's needs, goals, and concerns are accounted for and met.



EXISTING CONDITIONS

Existing Adjacent Recreational Opportunities

Approximately half a mile south of Cameron's Bluff lies Burcham Park; one of the most popular parks in Lawrence with a parking lot, playground equipment, and picnic shelters. The park is readily accessed by a 10-foot wide paved trail that runs from downtown Lawrence to the park. This trail is part of the Lawrence Loop, a 23 mile paved trail that (once complete) will run all the way around the city. Currently, the Loop ends in Burcham Park, falling a couple of miles short of completion. Burcham Park is also home to the KU Boathouse. The Boathouse, completed in 2009, is home to both the Kansas women's rowing team and the Kansas Crew Club.



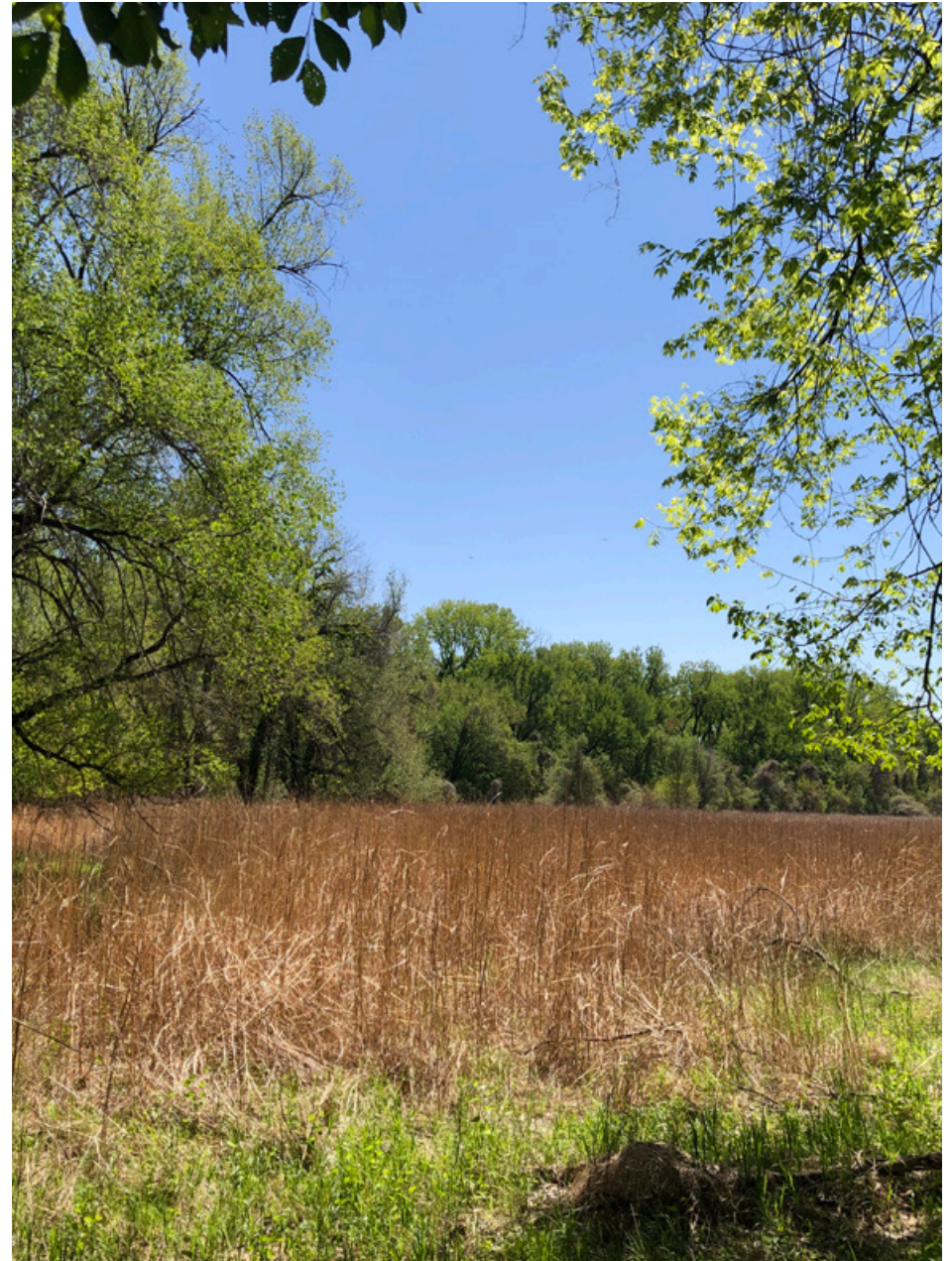
Landscape and Habitat

The Cameron's Bluff Stage 1 project area is a mix of riparian and upland areas, agricultural land, grassland, and bottomland cottonwood forest adjacent to the Kansas River. The topography is a mix of flat and undulating terrain.

The wooded areas feature standard native Kansas plants and trees, as well as ephemeral pools and marshland, but is currently impacted by invasive woody species including highly aggressive honeysuckle. The agricultural land, which has been unfarmed for many years, has been re-vegetated by invasive species such as Johnson grass and Pampas grass. Resource concerns, although limited, have warranted the completion of an environmental inventory to ensure that no important species would be impacted by the proposed project. Courtney Masterson of Native Lands Restoration Collaborative will be completing the environmental inventory during the spring and summer of 2023. Some areas with native grasses which could be sensitive to increased human traffic were identified during the spring survey, and those areas have been indicated on the trail concept graphics. Any discoveries made during the summer survey will be available in Courtney's report. Trail access to the area would allow conservation organizations and city staff to address the invasive species issues threatening the native landscapes in the area.

The majority of the proposed site lies within the regulatory floodway zone, with the remaining area lying within the 100-year floodplain. While this would normally be of more concern, the project area is within a reservoir-controlled zone and sits directly above a dam. This reduces the potential for regular catastrophic flooding of the project area.

The area consists primarily of well-draining sandy soils and sandy clay soils that do not lend themselves well for shaping. The low spots in the floodway have a higher content of silt, clay, and sediment which don't allow the soil to drain well and hold water in rain events as well as flood events.



Field Observations of Existing Local Trails

The Lawrence River Trail

The Lawrence River Trails are approximately 2 miles from downtown Lawrence and Cameron's Bluff, across the Massachusetts St Bridge. These beginner trails are fast, smooth, and twisty singletrack comprised mostly of sandy soil with a couple of small rock gardens and boardwalks. The trails also have a couple of small jumps and log-overs which are optional for riders. Climbs on the LRT are short with no more than 20-30 ft elevation change. Bikes ride clockwise, runners and hikers go counterclockwise. The Lawrence River Trails were planned, built, and maintained by the Lawrence Mountain Bike Club and Lawrence Bike Club and were subsequently incorporated into the City park system. The Lawrence Mountain Bike Club is currently responsible for the maintenance of the trails.

Clinton Lake State Park

Clinton Lake State Park is a U.S. Army Corps of Engineers park just to the west of the Lawrence City limits, 8 miles from downtown and Cameron's Bluff. The trails are jointly maintained by volunteers from the Kansas Trails Council, the Lawrence Trail Hawks and the Lawrence Mountain Bike Club. Although there are park fees for driving access, lake access and camping, the trail head for hiking, trail running and biking is on the "free" side of the park, northeast of the lake. Issues with flooding and the trail's organic development have made the approximately 30 miles of trails quite difficult for the beginner to intermediate rider. The trails are rocky, with steep punchy climbs, sharp corners, loose plates and a very tight corridor. Clinton Lake State Park is accessible via the paved Lawrence Loop Trail. The IMBA Trail Solutions team saw a lot of potential at Clinton and considers this area low hanging fruit. One of our teams suggestions is to identify an appropriate "bite size" section of trail that has the right mix of existing terrain and trail texture and hire a professional builder to demonstrate what's possible with some minor edits and clean up. This would involve clearing the corridor to modern trail specifications

and to create a new trail tread out of the abundant rock resource. Additionally, creating preferred lines of travel through the terrain and a few alternate lines, would improve the rider experience dramatically. This exercise could be performed by a solo machine operator and would be scalable depending on the available budget. Mountain bike optimized trail typically costs between \$13 - \$17 per linear foot and given the existing trail corridor, this effort could likely be realized at the low end of this price range.

The Lawrence Loop Trail

The Lawrence Loop Trail is a 23-mile paved trail that (once complete) will encircle Lawrence. The Lawrence Loop provides a beautiful and safe place for people of all ages and levels of mobility to recreate safely. The Lawrence Loop connects all quadrants of Lawrence and offers everyone in the community a trail experience





every day. The trail is a hub for additional outdoor activities, and it connects some of Lawrence’s favorite locations, including the heart of historic East Lawrence, the youth soccer fields, Rock Chalk Park, Lawrence Memorial Hospital, and downtown. The Cameron’s Bluff Trail would connect directly to The Loop and provide significantly increased access to the Kansas River from The Loop.

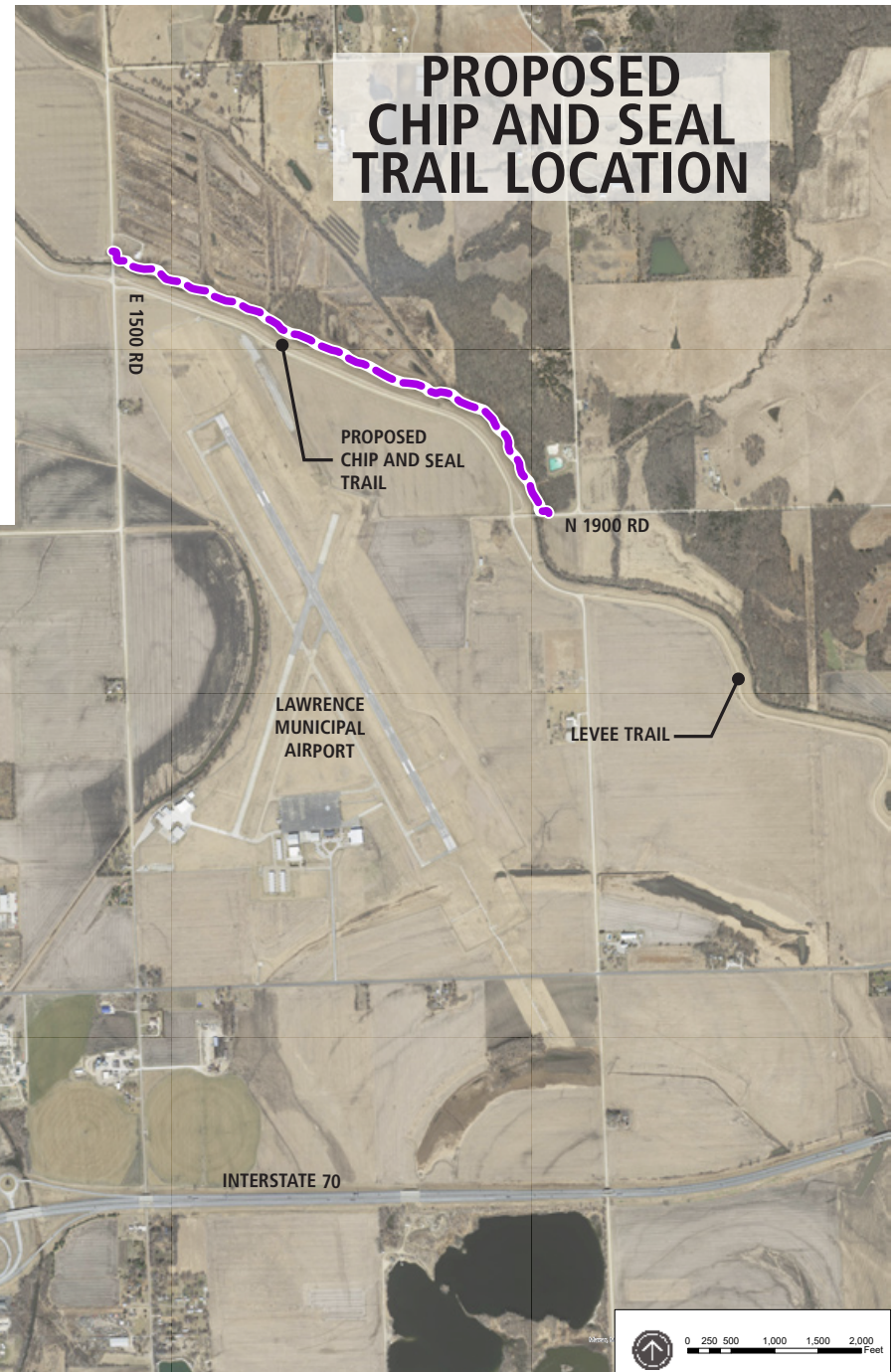
The Levee Trail

The Levee Trail is a wide improved crusher fines path that parallels and occurs on the top of the levee that protects Lawrence from Kansas River flooding and is very popular with gravel riders, trail runners and hikers. The City of Lawrence owns all of the levee land, mud creek and adjacent lands. The idea for a paralleling natural surface singletrack trail was discussed and vetted in the field by the IMBA Trail Solutions team. Given the challenge of maintaining the Lawrence River Trail and the likelihood of continued flooding, TS currently considers a full length natural surface trail impractical. Alternatively, the idea for an all weather chip seal

bike optimized spur or two was considered a possible design solution. This trail would provide gravel and/or mountain bikers a spur option off of the levee trail at locations deemed most amenable to new trail. These areas would have landscape interest and cross slopes favorable for building trail. These chip seal trails could be highly dynamic and would provide a unique draw to Lawrence for gravel riders and



mountain bikers. Chip seal trail typically costs between \$7 - \$9 per square foot. The north side of Mud Creek has more appealing terrain for a chip seal trail both vegetatively and topographically. The access to the north side of the creek is limited however to a few vehicle bridge crossings. IMBA Trail Solutions believes that the most suitable location for this unique experience would lie between N 1900 Rd. and E 1500 Rd. This roughly 1.2 mile stretch would cost around \$200,000. This location would provide a fun alternative to the levee trail. Examples of chip seal trails can be found increasingly across the country, Leopard's Loop (Bentonville, AR) and Shred to Schools in Aldo Leopold Park (Madison, WI) are two good examples of chip seal trails.



CONCEPT DEVELOPMENT

This conceptual trail plan was developed to achieve the goals outlined by the client and derived from community feedback.

Project Goals

1. Provide desired experiences for a diversity of users.
2. Develop a trail network that appeals to all ability levels.
3. Incorporate both shared-use and bike-optimized trails.
4. Introduce progressive mountain bike experiences and bike amenities.
5. Progressive skill development.
6. Connections to neighboring properties and adjacent existing recreation opportunities.



After 3 days of ground truthing, stakeholder engagement and field work, the IMBA TS team determined that Cameron's Bluff is a feasible location for a new trail system in Lawrence, Kansas. Due to its proximity to downtown Lawrence, the University of Kansas, Burcham Park, the Kansas River, and the Lawrence Loop; Cameron's Bluff lies in an optimal location to be utilized as an urban park with a backcountry feel. This location will provide easy access to all members of the community, across the diverse socioeconomic spectrum.

Cameron's Bluff also comes with its share of obstacles that will need to be addressed before the park can be realized. The main obstacle will be addressing access as well as flood potential, maintenance, vegetation management, etc. Two concepts were developed in order to account for these obstacles. Both concepts were informed by the resource survey performed by Courtney Masterson as well as field data collected, primarily indicating low wet areas to avoid and subtle terrain features to leverage.

Evergy, Inc. has agreed to and supports the public use of property south (below) the line noted on the map on page 12. Public use of the property north of the line is currently under discussion with Evergy, Inc.

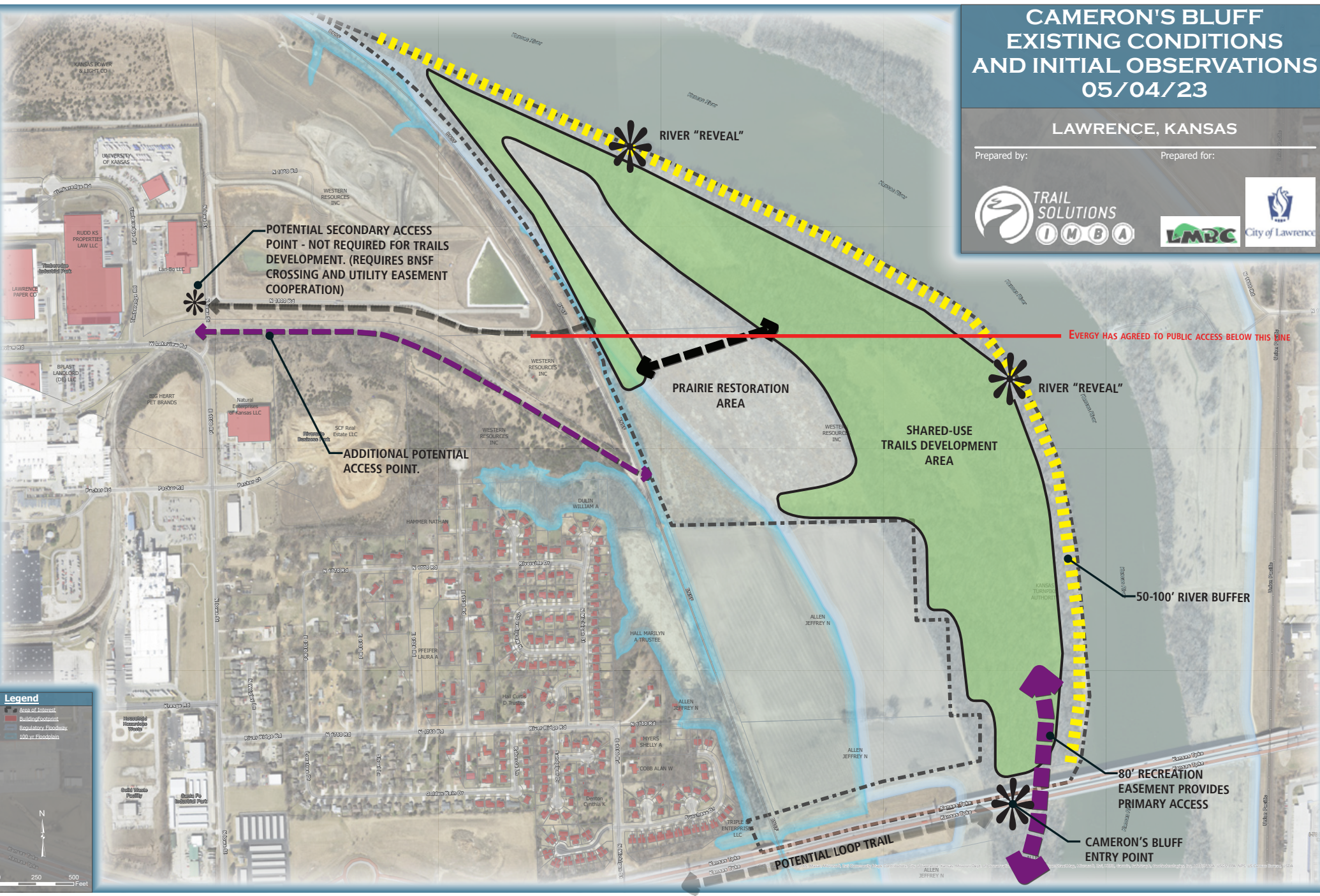
CAMERON'S BLUFF EXISTING CONDITIONS AND INITIAL OBSERVATIONS

05/04/23

LAWRENCE, KANSAS

Prepared by:

Prepared for:



Legend

- Area of Interest
- Building Footprints
- Regulatory Footprints
- 100 yr Floodplain

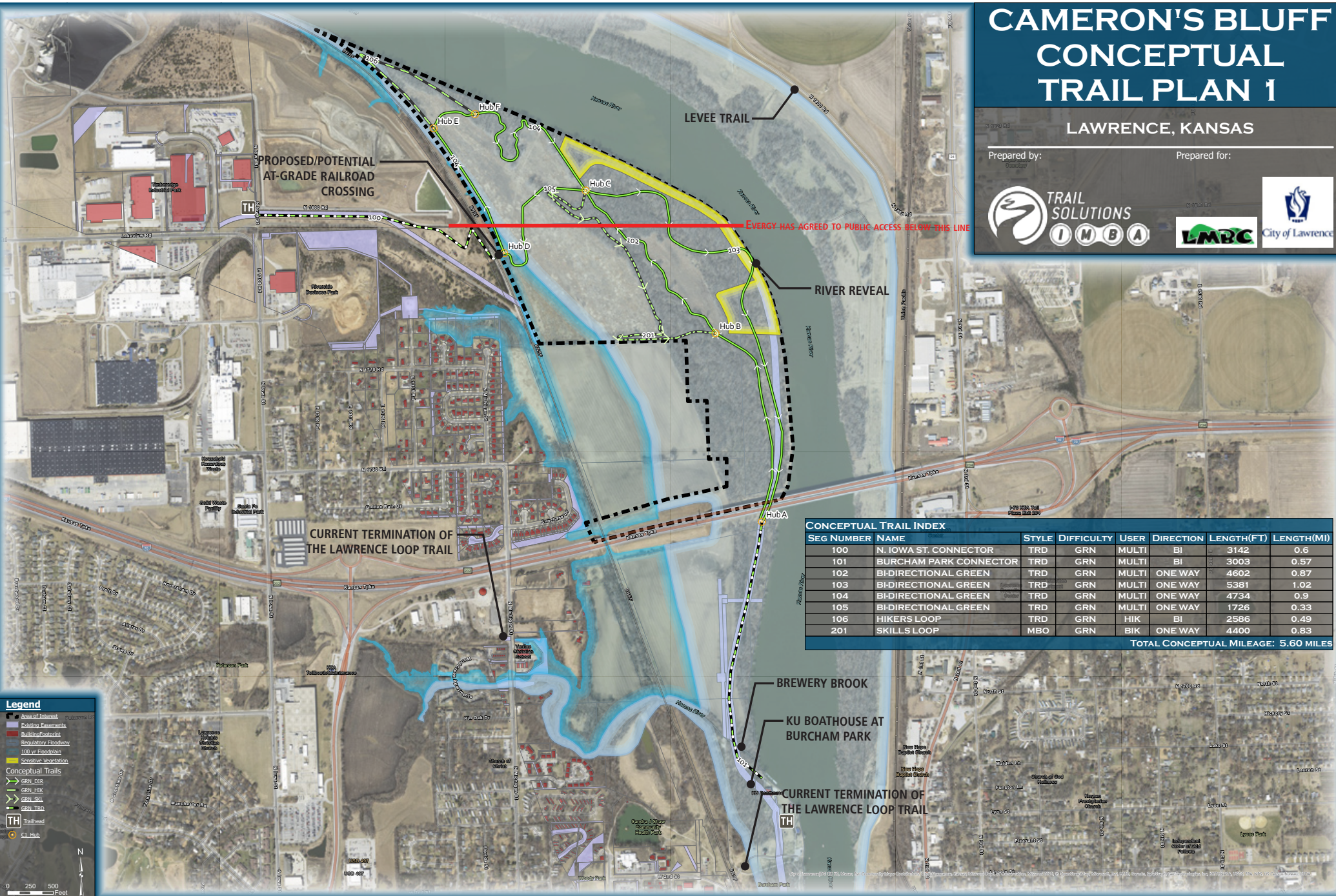
0 250 500 Feet

CAMERON'S BLUFF CONCEPTUAL TRAIL PLAN 1

LAWRENCE, KANSAS

Prepared by:

Prepared for:



CONCEPTUAL TRAIL INDEX

SEG NUMBER	NAME	STYLE	DIFFICULTY	USER	DIRECTION	LENGTH(FT)	LENGTH(MI)
100	N. IOWA ST. CONNECTOR	TRD	GRN	MULTI	BI	3142	0.6
101	BURCHAM PARK CONNECTOR	TRD	GRN	MULTI	BI	3003	0.57
102	BI-DIRECTIONAL GREEN	TRD	GRN	MULTI	ONE WAY	4602	0.87
103	BI-DIRECTIONAL GREEN	TRD	GRN	MULTI	ONE WAY	5381	1.02
104	BI-DIRECTIONAL GREEN	TRD	GRN	MULTI	ONE WAY	4734	0.9
105	BI-DIRECTIONAL GREEN	TRD	GRN	MULTI	ONE WAY	1726	0.33
106	HIKERS LOOP	TRD	GRN	HIK	BI	2586	0.49
201	SKILLS LOOP	MBO	GRN	BIK	ONE WAY	4400	0.83

TOTAL CONCEPTUAL MILEAGE: 5.60 MILES

Legend

- Base of Interest
- Existing Easements
- Building Footprints
- Regulatory Floodway
- 100 yr Floodplain
- Sensitive Vegetation

Conceptual Trails

- GRN, TRD
- GRN, HIK
- GRN, MBO
- GRN, TRD

TH Trailhead

CH Hub

0 250 500 Feet

Concept 1

This plan allows for pedestrian traffic to pass through Cameron's Bluff with two trailheads. The first trailhead would be located at Burcham Park. The second trailhead would be on N. Iowa St. Parking would be available at Burcham Park. All users would access Cameron's Bluff via wide, flat natural surfaced trails. These wide trails would also allow for access of maintenance personnel and equipment. Once at Cameron's Bluff the trails would narrow up and split off to form shared-use directional trails, with bicyclists going one way and hikers going the other way (similar to the Lawrence River Trails). The concept also includes a bicycle skills loop, and hiker-only loop. All trails would require more detailed design and flagging.

The skills loop is a 3/4 mile long trail which would consist of prefabricated wooden features (engineered and stamped), and imported rocks and boulders which would be connected via natural surface trails. All features would be constructed in a manner that allows for riders to ride around the features that are above



their comfort level. They should also be constructed with a frequency as to not overwhelm the rider, while making the trail fun and exciting. Trail features should occur on average every 150-200 feet. The features and connecting trail should be constructed and installed by a qualified trail builder.

From Burcham Park the trail heads north through city property, to Brewery Brook. The City has recently constructed a bridge crossing the brook to access their utility easement which runs across private property. This easement would need to be reworked by the City and landowner to allow recreational access. If this cannot be completed, then a separate bridge or culvert would need to be constructed in the existing recreational easement to allow public access to Cameron's Bluff. The 80 foot wide existing recreational easement parallels the river and continues under I-70 and into KTA property. This easement would need to be utilized to cross the private property located between the interstate and Burcham Park. At

the time of writing this, the City legal department was examining the legality of the easement and the steps that would be needed to execute on this easement. If feasible, a secondary access is possible at the Northern End of the Cameron's Bluff Area. This concept would require an at-grade crossing over the BNSF railroad line to access the N. Iowa Street trailhead. Currently there are four at-grade crossings over this line, however, three of them are on private property, and one of them is on Evergy property. At this time Evergy will not allow public access at this crossing as it leads directly into their secure, fenced Coal Combustion Residuals landfill. The private landowner will also not allow public access. The proposed crossing will be located south of the Evergy security fence and near a natural gas line. Coordination among Evergy, Magellan Midstream Partners (Natural gas), BNSF, Douglas County, and the city of Lawrence would be required.

As noted below, the typical cost for the concept 1 trails would range between \$264,000 and \$316,800. However, with the Evergy Green Team performing the work, the cost is drastically reduced to only what it would cost to construct the skills loop (segment 201) and the field designing effort.

Both concept plans share the opportunity to incorporate a portion of the Lawrence Loop. The loop would continue north from Burcham Park, where the loop currently terminates, to the south side of I-70. This 10' concrete trail would then turn west and run along the south side of the I-70 corridor until it passes under the Michigan St. overpass. Along this segment the loop would pass under the BNSF railroad via an engineered concrete box culvert underpass. An armored drainage and potential grade challenges were identified, but did not appear to be too significant. Once under Michigan St., the trail would turn and head south along Michigan St. to tie into the terminus of the existing loop trail. IMBA Trail Solutions was able to ground truth the feasibility of this alignment and while it will require extensive additional study, came to the conclusion that it is a viable option to connect the loop. If this option were taken, the natural surface trails would begin just south of the interstate where the loop turns west. Additional planning and design would be required by the city of Lawrence, BNSF, and the Kansas Turnpike Authority.

Cameron's Bluff: Cost Opinion				
Concept 1: Traditional Trails				
Segment	Type	Length (ft)	Low Range	High Range
100	Green - traditional	3142	\$17,000	\$20,400
101	Green - traditional	3003	\$17,000	\$20,400
102	Green - traditional	4602	\$25,000	\$30,000
103	Green - traditional	5381	\$30,000	\$36,000
104	Green - traditional	4734	\$26,000	\$31,200
105	Green - traditional	1726	\$9,000	\$10,800
106	Green - traditional	2586	\$14,000	\$16,800
		25174	\$138,000	\$165,600
*This concept plan assumes that all Traditional Trails will be constructed/donated by the Evergy Green Team				
Concept 1: Skills Trails				
201	Blue - MTB Optimized	4400	\$113,000	\$135,600
Concept 1: Design				
Field Design	(2 staff for up to 5 days)		\$13,000	\$15,600
Concept 1: Subtotal			\$264,000	\$316,800
Concept 1: Total (If Green Team constructs Traditional Trails)			\$126,000	\$151,200

Notes: This conceptual cost opinion provides ranges for the costs of construction and serves as a tool for planning purposes only. The cost opinion does not serve as a bid. The costs for any necessary site development infrastructure, electrical infrastructure, stormwater infrastructure, and/or landscaping are not included in this cost opinion. The cost opinion assumes that additional fill is not required for the development of trail features.

CAMERON'S BLUFF PROPOSED LOOP EXTENSION

LAWRENCE, KANSAS

Prepared by:

Prepared for:



CURRENT TERMINATION OF THE LAWRENCE LOOP TRAIL

BOX CULVERT UNDER RAILROAD TRACKS
DRAINAGE CROSSING

STEEP GRADES MAY REQUIRE SWITCHBACKS

BREWERS BROOK

KU BOATHOUSE AT BURCHAM PARK

CURRENT TERMINATION OF THE LAWRENCE LOOP TRAIL

NATURAL SURFACE TRAIL TIE-IN

Legend

- Area of Interest
- Existing Easements
- Building Footprint
- Regulatory Floodway
- 100 yr Floodplain

Conceptual Trails

- GEN_OIR
- GEN_HIK
- GEN_SHI
- GEN_TRO

The Loop

- Trail
- Hub

0 250 500 Feet

Concept 2

Like concept 1, this plan also allows for pedestrian traffic to pass through Cameron’s Bluff with two trailheads located in Burcham Park and on N. Iowa St. Cameron’s Bluff would still be accessed by either a wide shared-use bidirectional natural surface trail from each trailhead or via the 10’ concrete Loop trail from Burcham Park. Once inside Cameron’s Bluff is where the differences begin. The corridor which concept 1 proposed to be a MBO skills loop, instead would be constructed as a traditional shared-use trail. The removal of the skills loop with prefabricated skills features would significantly lower the cost of the project. The hiker only loop

would be shifted from the northern most corner of the project area, to be more centrally located along the Kansas River. This concept allows for a more staged incremental construction process which could account for economical or access hurdles that may arise.

As noted below, the typical cost to construct the concept 2 trails would range from about \$181,000 to \$217,000. However, with the removal of the skills loop and the Every Green Team performing all of the construction, the cost is reduced to only the field designing effort.

Cameron's Bluff: Cost Opinion				
Concept 2: Traditional Trails				
Segment	Type	Length (ft)	Low Range	High Range
100	Green - traditional	3142	\$17,000	\$20,400
101	Green - traditional	3003	\$17,000	\$20,400
102	Green - traditional	4649	\$26,000	\$31,200
103	Green - traditional	5181	\$28,000	\$33,600
104	Green - traditional	4734	\$26,000	\$31,200
105	Green - traditional	1970	\$11,000	\$13,200
106	Green - traditional	3196	\$18,000	\$21,600
107	Green - traditional	4400	\$24,000	\$28,800
108	Green - traditional	137	\$1,000	\$1,200
		30412	\$168,000	\$201,600
*This concept plan assumes that all Traditional Trails will be constructed/donated by the Every Green Team				
Concept 2: Design				
Field Design	(2 staff for up to 5 days)		\$13,000	\$15,600
Concept 2: Subtotal			\$181,000	\$217,200
Concept 2: Total (If Green Team constructs Traditional Trails)			\$13,000	\$15,600

Notes: This conceptual cost opinion provides ranges for the costs of construction and serves as a tool for planning purposes only. The cost opinion does not serve as a bid. The costs for any necessary site development infrastructure, electrical infrastructure, stormwater infrastructure, and/or landscaping are not included in this cost opinion. The cost opinion assumes that additional fill is not required for the development of trail features.

CAMERON'S BLUFF CONCEPTUAL TRAIL PLAN 2

LAWRENCE, KANSAS

Prepared by:

Prepared for:



CONCEPTUAL TRAIL INDEX							
SEG NUMBER	NAME	STYLE	DIFFICULTY	USER	DIRECTION	LENGTH(FT)	LENGTH(MI)
100	N. IOWA ST. CONNECTOR	TRD	GRN	MULTI	BI	3142	0.6
101	BURCHAM PARK CONNECTOR	TRD	GRN	MULTI	BI	3003	0.57
102	BI-DIRECTIONAL GREEN	TRD	GRN	MULTI	ONE WAY	4649	0.88
103	BI-DIRECTIONAL GREEN	TRD	GRN	MULTI	ONE WAY	5181	0.98
104	BI-DIRECTIONAL GREEN	TRD	GRN	MULTI	ONE WAY	4734	0.9
105	BI-DIRECTIONAL GREEN	TRD	GRN	MULTI	ONE WAY	1970	0.37
106	HIKER ONLY	TRD	GRN	HIK	BI	3196	0.61
107	BI-DIRECTIONAL GREEN	TRD	GRN	MULTI	ONE WAY	4400	0.83
108	BI-DIRECTIONAL GREEN	TRD	GRN	MULTI	BI	137	0.03

TOTAL CONCEPTUAL MILEAGE: 5.76 MILES

Legend

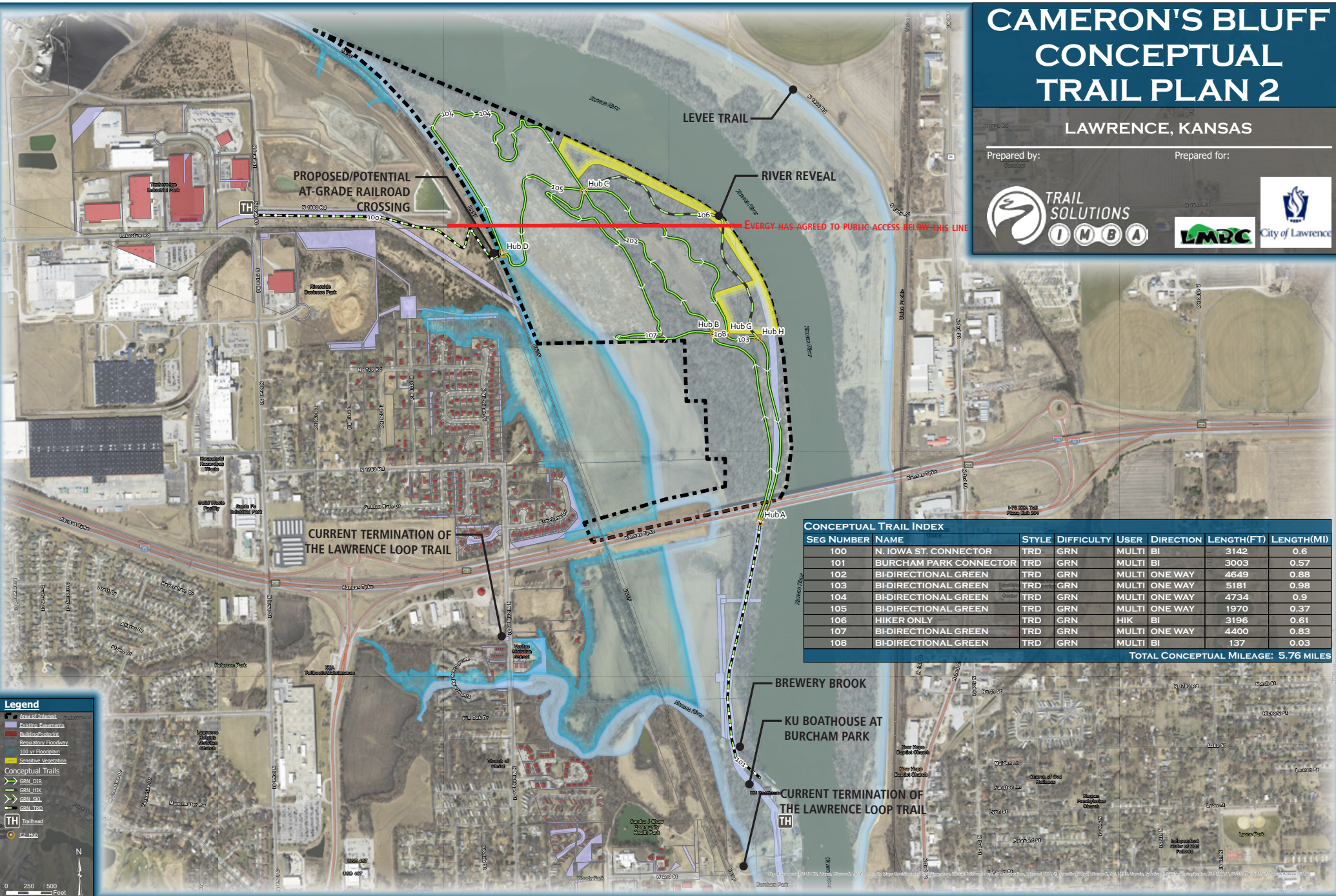
- Area of Interest
- Fencing Elements
- Building Footprints
- Residential Footprints
- 100 yr Floodplain
- Sensitive Vegetation

Conceptual Trails

- GRN DIR
- GRN HIK
- GRN SKI
- GRN TRD

TH Trailhead

CH Hub



TRAIL STYLES

Trail Styles

Modern trail systems use specific trail types as a way of managing users and providing them with the best possible visitor experience. Visitors desired experiences have evolved significantly in the last two decades with the advancement of mountain bike technology. One major trend observed in the industry suggest that some riders are looking for climbs that are efficient yet tolerable. Other trends include the preference of flow style descending trails that maximize the amount of fun descending for the price of the climb vs. old school fall line trails. One thing will always remain is that mountain bikers will demand a variety of trail types and difficulties. A modern trail system that has the goal of being a regional destination will need to check all the boxes in appropriate quantities and proportions.

Various types of trails and trail planning strategies are explained below. These narratives are meant to provide a brief description of the experience created by each type of amenity, the intended user, and general construction considerations.

Traditional Shared-Use Singletrack

These trails can serve walkers, hikers, runners, cyclists, and equestrians. They are constructed and maintained according to sustainable trail construction practices and employ techniques that minimize user conflict. As all user types travel these routes, care should be taken to avoid obstacles such as jumps, rollers, or water bars which may lead to an undesirable trail experience for an allowed user type, particularly in areas with limited sight lines. Turns are constructed sustainably but are not highly cambered like bike-optimized turns that dramatically improve cornering traction. Keeping trail grades within certain ranges ensures both a

positive trail experience for users and proper stormwater drainage with minimized erosion. Depending on soil conditions, these trails may need surface hardening techniques to provide a durable four-season trail.

- Approximate Construction Costs: \$30,000-\$60,000 per mile



Mountain Bike Optimized Singletrack / Flow Trails

These trails are purpose-built to optimize the experience of riding a mountain bike, but are still considered shared use trails, allowing hikers and equestrians particularly when they occur on USFS lands. The trails can either be unidirectional or bidirectional depending on the type of trail, preferred circulation of users, and management decisions. This type of trail is constructed with features such as rock gardens, berms, grade reversals, cambered turns (typically wider than turns on traditional singletrack trails), and modest jumps. These trails should make use of gravitational forces and, where possible, be managed to enhance trail flow for descending riders. These trails may need surface hardening to provide a durable four-season trail. They should be designed for a range of users from beginner to advanced skill levels. Optional advanced features can be located along the side of the trail to provide challenges for intermediate and advanced riders. This allows many skill levels to experience the full trail mileage, while providing for skill progression within a smaller trail footprint. These trails are typically machine built.

- Approximate Construction Costs: \$50,000-\$100,000 per mile



Gravity Trails (GRV)

Gravity singletrack is purpose-built for mountain bike users only. These natural surface trails are built using sustainable trail construction techniques. These trails are usually steeper than MBO trails and have features that require more developed skills such as jumps, drops, rocks, and technical sections are a key feature of these gravity-powered trails. This type of trail should be wider, up to 80 inches, in segments that have jumps or technical features but can be narrower, as little as 12 inches, in other segments. Bikes geared to this type of trail can handle more abuse. These trails are typically machine built, often requiring extensive soil import or implementation of borrow pits, or basins.

- Approximate Construction Costs: \$90,000-\$110,000 per mile



Trail Types at Cameron's Bluff

The potential trails at Cameron's Bluff are limited to Traditional and Mountain Bike Optimized Skills trails. This is due to the lack of vertical relief and the primarily sandy soils with potential for flooding. IMBA TS has identified a skills loop where prefabricated (Engineered and stamped) skills features are recommended to be installed. These features will provide a new experience not currently available in the area. Features can be selected to provide progressive challenges to users and all features would have signage and ride-arounds that allow users to pick which features they are comfortable with and work up to those that they are not.







Trail Difficulty

The IMBA Trail Difficulty Rating System is a basic method used to categorize the relative technical difficulty of recreation trails.

The IMBA Trail Difficulty Rating System can:

- Help trail users make informed decisions
- Encourage visitors to use trails that match their skill level
- Manage risk and minimize injuries
- Improve the outdoor experience for a wide variety of visitors
- Aid in the planning of trails and trail systems

This system was adapted from the International Trail Marking System used at ski areas throughout the world. Many trail networks use this type of system, most notably resort-based mountain biking trail networks. The system applies to mountain bikers best, but also is applicable to other visitors such as hikers and equestrians.

IMBA Trail Difficulty Rating System 					
	 EASIEST WHITE CIRCLE	 EASY GREEN CIRCLE	 MORE DIFFICULT BLUE SQUARE	 VERY DIFFICULT BLACK DIAMOND	 EXTREMELY DIFFICULT DBL. BLACK DIAMOND
TRAIL WIDTH	72" or more	36" or more	24" or more	12" or more	6" or more
TREAD SURFACE	Hardened or surfaced	Firm and stable	Mostly stable with some variability	Widely variable	Widely variable and unpredictable
AVERAGE TRAIL GRADE	Less than 5%	5% or less	10% or less	15% or less	20% or more
MAXIMUM TRAIL GRADE	Max 10%	Max 15%	Max 15% or greater	Max 15% or greater	Max 15% or greater
NATURAL OBSTACLES AND TECHNICAL TRAIL FEATURES (TTF)	None	Unavoidable obstacles 2" tall or less Avoidable obstacles may be present Unavoidable bridges 36" or wider	Unavoidable obstacles 8" tall or less Avoidable obstacles may be present Unavoidable bridges 24" or wider TTF's 2' high or less, width of deck is greater than 1/2 the height	Unavoidable obstacles 15" tall or less Avoidable obstacles may be present May include loose rocks Unavoidable bridges 24" or wider TTF's 4' high or less, width of deck is less than 1/2 the height Short sections may exceed criteria	Unavoidable obstacles 15" tall or greater Avoidable obstacles may be present May include loose rocks Unavoidable bridges 24" or narrower TTF's 4' high or greater, width of deck is unpredictable Many sections may exceed criteria

Adaptive Mountain Bike Trails

Adaptive mountain bike trails are natural surface trails that feature specific design parameters to accommodate adaptive mountain bikes (aMTBs) while providing a high-quality experience for “different-abled” riders. Adaptive mountain bikes are equipped with the proper positioning and geometry to allow millions of Americans with a mobility disability to enjoy the outdoors. The bikes have three wheels (trikes) or four (quads) and may position the riders in a laid back, recumbent position for most cross-country style bikes or face-forward with the riders back to the sky which is common for all-mountain style bikes. The style and make of the bikes vary, but all are wider, larger, and heavier than traditional mountain bikes which affects acceleration, deceleration, and the ability to change direction and corner.

Adaptive mountain bike trails combine an appropriate combination of width, radius, and grade to create an accessible layout and design of the trail. In general, the adaptive mountain bike trails must be wider, uphill gradients decreased and less abrupt, turning radius increased, bridges and trail features widened, and access to trails must be barrier free. Riders are positioned lower to the ground which must be accounted for when creating clear sight lines. When a trail traverses steep slopes, the tread width should be increased and tread outslope must be decreased or removed to uphold clear passage in landscapes with high exposure. Rollers and undulations in the trail must be gradual and require adequate spacing between each to allow riders to coast through without pedaling. Pull-outs along the side of the trail should be installed to allow riders to rest along the trail and allow other riders to pass. Trails must free of obstacles for easy (green) aMTB trails, but can feature obstacles, such as rocky sections, on more advanced trails. Adaptive guidelines are ever evolving and care should be taken to consult with experts on the subject to ensure appropriate and current considerations are implemented.

Planning and designing for these trails at the beginning of a project is necessary to create trail specifications and a layout that delivers the intended experience. Due to the tread width of aMTB trails, terrain cross slopes must be considered and the most feasible way to build these trails is with the assistance of machines.



ECONOMIC IMPACTS OF MOUNTAIN BIKING

Located just over an hour from Emporia, Kansas, it's easy for Lawrence residents to see firsthand the impacts that biking can make on a community. Every year Emporia hosts the Unbound gravel race (formerly Dirty Kanza) in early June. This race currently hosts nearly 4,000 racers from around the world and has become so popular that a lottery is needed to determine race participants. In 2018 it was estimated, by a Penn State researcher conducting an economic impact study, that this race brought in 5.5 million dollars to the town and its surrounding area. Refer to Appendix B for more background on the economic impacts of biking.



NEXT STEPS

Community Engagement and Visioning

The concept plans reflect the identified suitable locations for trails. The proposed locations work in tandem with existing recreational amenities within the area of interest. Trails are located based upon the assessment of landscape opportunities and constraints, nearby supporting infrastructure, and existing amenities. The concept plan is preliminary at this point in the planning process. Public outreach, such as community and stakeholder meetings, are necessary to gather input and feedback on the concept plan. This outreach is paramount to ensure community members are engaged during this process. Outreach will continue to generate excitement and support for the plans by providing information and data around their importance and potential. Outreach will also strengthen the stewardship base of future trail users and create a sense of ownership and pride of the trails and facilities.

It is recommended that Cameron's Bluff project partners engage regional schools, bike shops, and mountain bike associations to gather additional feedback and input. These interested parties have a good understanding of community needs, so they should be consulted to provide meaningful feedback on design, construction, and continued management of the planned trail system. After all, these groups will likely be some of the first users of the trail system and may be great resources for volunteer days and word-of-mouth advertisement amongst local riders.





ACCESS

Access is a continual barrier that must be addressed for any project. This barrier should be addressed early on in the planning process to account for any lengthy negotiations that could take place. Written documentation of access should be obtained from all public and private entities involved before any construction occurs. The legality of said documentation should also be verified.

At Cameron's Bluff, neither concept involves straight forward access. A historic easement will need to be utilized to gain access from the south across private property. A utility easement may also have to be renegotiated in order to use the utility easement for recreational access across Brewery Brook. If the landowner is not amenable to this renegotiation, a new bridge or culvert would be required, significantly increasing the cost of the project.

To access from the west, a new at-grade railroad crossing will be required. Every, the City of Lawrence, Douglas County, and LMBC will have to work with the BNSF railroad to gain public access across the existing railroad tracks.

Accessing the site for maintenance purposes also needs to be addressed. Written lawful agreements between landowners and park operators need to be obtained in order to allow for the continual ingress and egress of maintenance personnel and equipment.

Design

This concept plan serves as a guiding vision for the development of trails at Cameron's Bluff. This plan looks at conceptual opportunities and will require refinement and detailed design. We recommend consulting with a professional trail designer/builder to finalize the layouts and designs for each trail and feature.

Design is vital to a successful trail system. Beyond ensuring that sustainable trail principles are implemented in the trail layout, qualified designers will engage staff and the community to identify detailed management and visitor goals. Professional trail layouts will minimize resource impacts and maximize visitor experience. During design, a professional will identify all permitting and compliance needs, as well as provide a more detailed cost breakdown for construction.

Trail design should occur in a phased fashion like construction. Trail layout typically includes field flagging. These site markings will breakdown and disappear over time, so flagging should occur no more than two years before anticipated construction for most projects. Trail design should also take into consideration the multiple objectives set forth by project partners.

Particular to the unique site characteristics at Cameron's bluffs and considering that the trail will be constructed by the Green Team, IMBA Trail Solutions recommends that trail alignment be tight flagged (flags and pin flags delineating the centerline of the tread) vs. corridor flagged, by trail professionals and that the flaggers take into account a specific set of parameters when laying out the trail tread. IMBA Trail Solutions has observed quality trail alignment on projects with similar limited vertical elevation. Halpatiokee, Florida is one such example and a few sections of the Lawrence River Trail can also serve as precedent for the new trail layout at Cameron's Bluff. These types of trail layouts are difficult to get right, but the

general rules are to provide a layout that flows at a medium paced speed and does not require the rider to dump excessive amounts of speed at abrupt corners. The user is typically traveling at between 8-15 miles per hour and ideally is encountering sinuous flowing turns that allow them to continuously pedal throughout.



Permitting and Compliance

All construction projects are subject to regulatory requirements. This section provides a brief breakdown of anticipated permitting needs to implement this plan. The list is general in nature and is intended only to provide high-level planning for future trail development phases.

Obtaining proper permits can ensure that work follows local, state, and federal laws as this trails concept plan is implemented. At least as important, working under permits can help trail builders and visitors to be good stewards of the land. Permitting needs can be affected equally by landscape features and funding sources. Both should be identified during the design phases to ensure relevant permitting is completed.

People use trails for all kinds of reasons – but a chief motivator among visitors is to enjoy the outdoors. Ground disturbance and uncontrolled erosion and sedimentation can negatively impact our environment, water quality, and flora and fauna. These impacts are also unsightly and, if not quickly mitigated, can rapidly increase maintenance costs and ultimately create trails that visitors no longer want to visit. This list is not exhaustive but represents typical permitting requirements at a federal level. Coordinating with appropriate local and state agencies will be necessary to assure compliance.

Stormwater Pollution Prevention Plan (SWPPP)

National Pollutant Discharge Elimination System (NPDES)

Construction General Permit (CGP)

Clean Water Act 404

Clean Water Act 401



Funding

Recreational Trails Program (RTP)

The Recreational Trails Program (RTP) is an assistance program of the U.S. Department of Transportation's Federal Highway Administration (FHWA). The RTP provides funds to the States to develop and maintain recreational trails and trail-related facilities for motorized and non-motorized recreational trail uses.



Construction

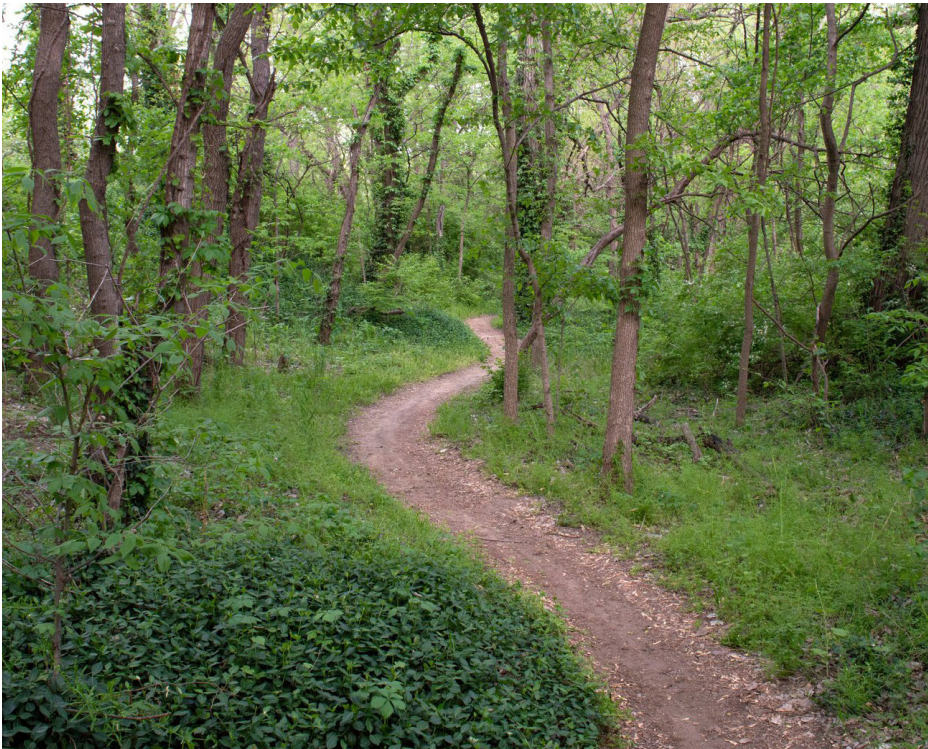
Some of the recommended trails require extensive mechanized construction, which in turn requires experience and knowledge. IMBA TS recommends the alignments be constructed by a mix of volunteers and professional trail builders. The Professional Trail Builders Association (PTBA) maintains a list of quality trail builders, this list is not exhaustive and does not include all qualified trail builders.

A qualified trail professional should be retained to construct all bike-optimized facilities and provide oversight and training for project partners and volunteers on all trail projects. Hybrid style implementation is advantageous primarily to build excitement in the community and develop skilled volunteers for future stewardship. It is recommended a professional trail builder provide oversight and management of volunteers to ensure the trail meets the design and goals of the project.

When retaining a professional trail building contractor for construction services, we recommend engaging a qualified construction manager experienced with mountain bike trail development as a client's representative to provide oversight during the construction progress, perform inspections, and provide quality assurance services.

Long Term Maintenance

A professionally designed and constructed trail system will help to alleviate many common trail problems but maintenance will always be a concern. Vehicular access to the site from Burcham Park will help volunteers with their duties by transporting the necessary equipment to where it will be needed. This equipment can be heavy and unwieldy, such as lawnmowers, chainsaws, weedwackers, etc. Both concepts were laid out in a manner to help facilitate vehicular access and limit trail placement in locations requiring more maintenance. The trails were laid out to maximize the canopy cover wherever possible to minimize the sun exposure. This will inhibit the understory growth along the trails reducing maintenance. In locations where re-vegetation is required such as river or prairie reveals, it is recommended that low growing varieties of plants and grasses be utilized.



Conclusion

Lawrence has the potential to grow and enhance its recreational offerings with high-quality and close-to-home trails. Given the proximity to downtown Lawrence, the University of Kansas, and many diverse socioeconomic neighborhoods, Cameron's Bluff would make a great addition to the existing Lawrence trail network for locals and visitors alike. This phase could also be pivotal in garnering community support for the continued development of Cameron's Bluff. After a successful implementation of this plan phase, Cameron's Bluff could see continued diverse recreational development in the form of a river put-in and a full scale bike park.

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APPENDIX A: GENERAL TRAILS PLANNING AND DESIGN GUIDELINES

The following are guidelines for the construction and maintenance of trails. The natural environment is dynamic and unpredictable. The nature of recreational trails and roads, the desired user experience, and the constant forces acting on natural surface trails and roads make strict standards untenable and undesirable. As such, the guidelines below are simply that: best management practices that should be followed within environmental constraints.

Trail System Design

Mountain Bike-Optimized Trails and Preferred Direction Trails

Mountain bike-optimized singletrack trails are designed and constructed to enhance trail experiences specifically for mountain bikers. Mountain bike-optimized trails might differ from traditional trails in several ways: enhanced tread shaping, directional or one-way travel, and the addition of man-made technical trail features (TTFs). Bicycles move differently along a trail than other modes of transportation. The movement of the wheel, the use of gravity and friction, the transfer of energy from the rider to the wheel – these offer both opportunities and constraints for trails and trail features that may differ from those of other users.

Mountain bike-optimized and one-way trails that harness gravity are a growing area of interest for mountain bikers. These trails can be designed and built at any level, from beginner friendly flow trails to extremely difficult race-oriented downhill trails. Riders cherish the feeling of flight that a bicycle provides while coasting through a succession of bike-optimized features from top to bottom. A consistent trail is not necessarily a boring or easy trail (though it can be), it's one that is designed such that a preceding section of trail prepares users for the subsequent sections. This is a hallmark of flow trails and can be particularly important for beginner trails, as well as for higher speed trails with gravity features, such as jumps and drops.

As trail systems grow and become congested, one-way trails help to take the pressure off popular shared-use trails. Riders looking for speed, thrill, and challenge will have their own designated areas, and users travelling at slower speeds will have their own trails. Well-designed mountain bike-optimized singletrack and gravity singletrack are exciting for mountain bikers but are also designed to help manage risk and minimize user conflict



Rolling Contour Design

Providing consistent climbs and extended descents is a design priority. Trails may contour gently up or down for consistent lengths to maximize climbs and descents. This is known as rolling contour design. All shared-use trails should be of rolling contour design to minimize impact and sedimentation in the watershed.

Stacked Loops

A stacked-loop system is a series of loops somewhat like links in a chain. The loops can vary in length and difficulty. In a stacked-loop system, the loops that are closest to the trailheads are more inviting to novice riders, and the loops further out cater to more advanced riders. This creates a progression of experiences and challenges as users explore the trails in more depth.

Progressive Hubs and Clusters

A trail system of hubs and clusters looks more like spokes radiating out from a central junction and intersecting at various points. A trailhead or major intersection is a hub. A cluster is a concentration of trails radiating out from the hub. Like a stacked loop system, hubs and clusters are designed with skill level progression in

mind. Hubs and clusters give users more trail options for varying skill levels at each hub, allowing for skill level diversity. At many intersections, riders have the option to change trail difficulty or continue on the same difficulty level.

With progressive trail features, a mountain biker may become a better rider by gradually moving up in trail difficulty. This practice also spreads out visitors and helps reduce trail user conflict. This is also a proven risk management tool. Signage shows difficulty levels at every hub and wherever necessary in the trail system to help users choose trails based on their skill levels and desired experience. Giving riders the option to warm up before hitting more technical segments provides a level of safety in the system.

Loops and clusters are often favored over out-and-back routes because they offer variety. People love the adventure of starting down one path and returning to the same point by way of a different trail. With loops or clusters in a trail system, visitors can choose a short route, a combination of routes, or a long outer route.

Progressive design and construction also allow users of different levels to ride the trails in the same system, so families and groups can enjoy being together in one place and riders can find a trail that matches their skills and progress.



Trail Difficulty Rating System

In order for a trail system to provide the varied riding experiences and skill progression which trail users seek, the trails must be built to provide relatively specific challenges and riding characteristics. For the purposes of this conceptual trail plan, the difficulty rating system has been simplified into three levels:

- Easiest Trails, Green Lines (green circle) – For beginners, these trails have a smoother and wider tread, lower trail grades, and less exposure.
- More Difficult, Blue Lines (blue square) – For intermediate riders, these trails can be steeper, more technically difficult, or longer.
- Very to Extremely Difficult Trails, Red Lines (black diamond or double black diamond) – For advanced riders, these trails offer a combination of difficult trail tread, technical features, and long distances for those looking for challenge and endurance-oriented experiences. Generally, they have significant exposure and have less predictable surfaces.

This system was adapted from the International Trail Marking System used at ski areas throughout the world. Many trail networks use this type of system, most notably resort-based mountain biking trail networks. The system applies well to mountain bikers and is also applicable to other visitors such as hikers and equestrians. These ratings should be posted on trail signage and in all maps and descriptions. Following is a summary of criteria to be considered when implementing a trail rating system.

Tread Width

The average width of the active tread or beaten path of the trail.

Tread Surface

The material and stability of the tread surface is a determining factor in the difficulty of travel on the trail. Some descriptive terms include hardened (paved or surfaced), firm, stable, variable, widely variable, loose, and unpredictable.

Trail Grade (maximum and average)

Maximum grade is defined as the steepest section of trail that is more than approximately 10 feet in length and is measured in percent with a clinometer. Average grade is the steepness of the trail over its entire length. Average grade

can be calculated by taking the total elevation gain of the trail, divided by the total distance, multiplied by 100 to equal a percent grade.

Natural Obstacles and Technical Trail Features

Objects that add challenge by impeding travel. Examples of natural obstacles include rocks, roots, logs, holes, ledges, drop-offs. The height of each obstacle is measured from the tread surface to the top of the obstacle. If the obstacle is uneven in height, measure to the point over which it is most easily ridden. Technical trail features are objects that have been introduced to the trail to add technical challenge. Examples include rocks, logs, elevated bridges, teeter-totters, jumps, drop-offs. Both the height and the width of the technical trail feature are measured.



Trailheads

Well-placed trailheads and parking lots contribute to a successful trail system. Trailheads should be located in areas of lower elevation, as most trail users prefer outbound climbs with inbound descents back to the parking area. This also helps mitigate risk by allowing fatigued riders an easier route back to their starting point. This is especially true for mountain bikers, and necessary for families and beginners. Trailheads should offer information useful for the trail users, including trail maps, location information, emergency contact details, and volunteer information.

Sustainable Trails

A sustainable trail balances many elements and is designed to have little impact on the environment. Sustainable trails resist erosion through proper design, construction, and maintenance and blend with the surrounding area. A sustainable trail also appeals to and serves a variety of users over many years. It is designed to provide enjoyable and challenging experiences for visitors by managing their expectations effectively. Following sustainable trail design and construction guidelines allows for high-quality trail and education experiences for users while protecting the land's sensitive resources. For additional trail design, construction, and maintenance techniques, refer to Trail Solutions: IMBA's Guide to Building Sweet Singletrack. These guidelines are appropriate for any hike, bike, or equestrian trail.



Signage

The development of a mountain bike trail network requires the development of a comprehensive system of signs. Signs are the most important communication tool between land managers and trail users. A well-implemented and maintained signage system enhances the user experience by helping visitors navigate the trail network and providing information about the area. Signage also plays a critical role in managing risk and deploying emergency services.

Recommended signage for the trails should be simple, uncluttered, and obvious with a sign at every major intersection to help users stay on track. Signs should meet the needs of all users, from the daily trail user to someone who is experiencing the trails for the first time. In order to serve the variety of visitors, sign placement should be strategic and frequent. Because signs can intrude on the natural outdoor experience, too much signage can be unsightly. Balancing competing interests is key to developing a successful signage program.

Sign Types

A variety of signs can be created to help users identify trails and their location, select routes, remain confident in their trail choices, find destinations and key points of interest, and understand regulations and allowed uses. Signage can also be interpretive, helping visitors learn about responsible recreation, trail etiquette, and resource protection, as well as how to reduce risk and hazards.



Informational signs

Usually positioned at the trailhead and major intersections, informational signs provide details such as trail length and difficulty. These include signs that identify a trailhead from a road, signs at a trailhead kiosk, trail intersection signs, waymarks, difficulty rating signs, and trail length or elevation gain and loss signs.

Regulatory signs

These types of signs delineate rules, such as prohibited activities, direction of travel, or other restrictions.

Directional signs

Directional signs provide navigational information.

Warning signs

Often incorporating highly visible designs, these signs warn trail users of upcoming hazards or risks. These include visitor rules and regulations, allowed activities, road and trail intersections, and emergency signs.

Educational signs

Educational signs can provide a variety of information for trail users, such as guidelines for responsible recreation, descriptions of natural or cultural resources, trail etiquette, and bike skills



APPENDIX B: BENEFITS OF MOUNTAIN BICYCLING TRAILS

Promoting Active and Healthy Lifestyles

The benefits of mountain biking may start on the trails, but they don't end there. Learning to ride a bike is a rite of passage. Bikes and the sport of mountain biking provide a multitude of opportunities to teach children valuable lessons that will carry into adulthood.

Obesity is at a high, while activity levels among Americans are plummeting. With its progressive nature and way of stimulating the senses, mountain biking is appealing, especially to youth, and provides an excellent form of recreation for reversing the trend toward poor health. Since riding a bike provides excellent cardio conditioning, improves strength and coordination, and burns several hundred calories an hour, it is an activity as appealing to parents as it is to kids.

The unstructured play that mountain biking provides inspires people to explore and appreciate the natural world, leading to positive associations with outdoor activities and exercise.

Mountain biking allows individuals to advance at their own pace, so kids looking for a challenge can have just as much fun as children who are more interested in exploring the scenery. Riding in nature provides an environment where children can work on their skills, have fun, and pedal their bikes without parents having to worry. Mountain biking is a cross-generational endeavor, accessible to all ages and levels of physical fitness. Going for a trail ride is an excellent way for parents to do more than support their children's activities, it's a way to share the experience. Every ride is an opportunity to create a healthy lifestyle and pass on lessons that are best learned through experience.

Several studies on physical activity have indicated that proximity to recreational facilities, such as trails, is a predictor for physical activity. Simply put, if there are walking and biking trails nearby, then residents are more likely to use them and

therefore be healthier. Physical health and exposure to nature also benefit mental health, reducing stress and increasing happiness. In addition, individual and community health translate to economic benefits by decreasing health care costs.



Contributing to Economic Growth

A well-designed trail system can stimulate economic growth by increasing activity within the local population as well as attracting visitors from outside. Trails can generate business in retail sales and services, support jobs, provide sustainable growth in rural communities, and produce tax revenue. Access to trails also correlates to a higher quality of life, thus making the community more desirable and capable of attracting new businesses and workers to an area.

IMBA assists local communities in increasing mountain bicycling tourism as a sustainable, renewable source of economic development. A mountain biking destination is one that attracts tourists to an area for the benefits of the mountain biking experience; provides visitors with all of the amenities needed to compliment, ease, and enhance their visit; and in turn creates word of mouth about the community that will draw new and repeat visits.



According to the Outdoor Industry Alliance, mountain bicyclists represent approximately 3.4% of the U.S. population, or nearly 10.6 million participants. IMBA's own research indicates that enthusiasts, who represent a portion of this overall number, travel extensively within a four-hour range and will typically devote one week per year specifically to travel to reach mountain bicycling destinations. Same-day visitors spend approximately \$35 per day in local communities while destination visitors spend closer to \$193 per day (due in part to lodging and increased meal purchases).

While mountain bicyclists are certainly willing to travel to ride, they will only do so if their destination contains a key ingredient: high-quality trails. These trails must be of a sufficient length and contain a variety of experiences, such as traditional singletrack, bike-optimized singletrack, bike parks, and shuttle options. The competition for these destination-quality locations is slowly increasing over time

A case study in Cable, Wisconsin, clearly illustrates how a community can benefit from offering a world-class bicycling experience. Construction of new bicycle trails in Cable resulted in:

- Increased property values.
- Increased spending on bicycle related goods.
- 35 jobs created annually, adding \$523,000 to total employee compensation.
- Nearly \$1.3 million impact related to spending from mountain bicyclists.

Fostering Community Pride and Identity

Involving community members in the planning, building, and maintaining of trails fosters community pride. In order to maintain sustainable trails, care of the trail system should be managed by local enthusiasts and rely on an organized membership base. Volunteering to help with trails provides an opportunity for area residents to connect with each other and with the terrain and land that surround them. IMBA members donate nearly one million volunteer hours to trails throughout North America every year, making volunteerism a large part of mountain bike culture.

Trails and parks also provide informal opportunities for people to meet and interact with others in a natural setting. Connection to nature is paramount to maintaining the health of the environment and making the outdoors relevant and accessible to all. Trails serve a diverse population and cultivate unity and stewardship in the community. Trails can even revitalize blighted areas, for example, turning landfills into bike parks or gravel pits into trailheads.

Preserving Open Space

Trails make communities better places to live by preserving and creating open spaces for recreation. Greenways function as hands-on environmental classrooms for people of all ages, providing opportunities to enjoy nature close up. With its abundant plant life, open spaces can decrease pollution, protect water quality, and reduce soil erosion. Economic growth and property values are also tied to open space as buyers are generally willing to pay more for property located close to parks and open space. The recreation, health, economic, and environmental benefits of trails can contribute to an overall enhanced quality of life in nearby communities.

Encouraging Positive Recreation Use to Displace Negative Use

Without a plan, undeveloped areas are often haphazardly transformed by users creating unauthorized sites to suit their personal wants. Purposefully designing trail systems can help create diverse recreational opportunities, encourage safe use, and meet the needs of the entire community. Unauthorized trail building and dumping or other unacceptable activities can damage ecology, cause safety hazards, and leave behind debris that is both unsightly and illegal. The best way to encourage positive use is to displace negative use. A well-planned trail system can discourage and displace destructive activities with healthy recreational use that attracts visitors of all ages.

