

Trail Proposal

Wildcat Creek Linear Park:

Hiking and Mountain Biking Trail

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Introduction

The land area west of Sunset Zoo and Sunset Cemetery, known as Wildcat Creek Linear Park, has long been home to hiking trails. This area also includes many large, limestone-tabled picnic areas. The park was originally established in the 1930's as a W.P.A. project. Later it was reestablished by the Sertoma Club in the 1950's as well as Manhattan City Youth Conservation groups in the early 1990's (**trail photo 1, page 24**).

Unfortunately, the park's trails have become increasingly difficult to traverse because of extreme trail erosion and lack of cohesive trail structure. Repairing these trails and opening them to new users, including cyclists, should be a priority toward increasing amenities that attract people to the community. The proposed trail herein aims to fix these problems and, at the same time, revitalize a fine natural resource that has fallen into neglect and disuse.

The author of this proposal has been a resident of Manhattan Kansas since 1992. Mr. McAllister graduated from Manhattan High School in 1996. During his time at MHS, he was introduced to the trail system at Wildcat Creek Linear Park by a teacher, Dru Clarke. As a part of her class curriculum, Mrs. Clarke conducted field trips to study the ecology of Wildcat Creek. Since then, Mr. McAllister and many others have been returning to hike and spend time with friends and family in the outdoors.

Over the years that the author has been returning to this area, he has noted the increasing difficulty of following the trail. Erosion of terrain, downed trees and other obstacles have blocked the path. Mr. McAllister recently considered rehabilitating, and expanding for other types of users, the trail system.

Finding places to ride within the city limits of Manhattan has always been a challenge until nearly three years ago when local mountain bikers decided that the community needed more trail. Which lead to the expansion the Manhattan River Trails.

For many years, the Manhattan River Trails consisted of unrecognized sections of single track trail known to few residents. Single track trail is defined as a trail that is only wide enough for one person to utilize at a time, or to be used in a single file by multiple users. It began as a route for local fishermen to access the Kansas and Blue rivers. After a short time, the trail began to be utilized by mountain bikers and hikers. From its creation until fall 2008, the trail grew to approximately 1.3 miles, end-to-end. Local volunteers, including the author, expanded the trail into a loop, more than doubling the size and use of the trail.

While construction of the addition was taking place, traffic was minimal. Once the news spread about the completed trail with more area to hike and bike, users of the trail climbed dramatically. With approximately 4.5 miles of trail to use, this is not surprising. Plenty of positive feedback was received from local residents about their enjoyment of the resource.

But there was still opportunity for expansion, and in the fall of 2009, volunteers and Mr. McAllister began work on a second loop to add to the River Trails. This was completed in the spring of 2010. Utilizing knowledge learned from the previous projects and the desire to advance the skills of all users, another approximately 1.5 miles of trail was added to the system. One could now hike, bike and enjoy almost 6 miles of continuous trail.

Looking for ways to improve and add to the trails of Manhattan, the author and other volunteers have spent hundreds of hours researching better trail building tactics. With this knowledge, and experience gained from riding trails all over the country, a core local group of volunteers led by the author and employees and customers of Big Poppi Bicycle Co. have put in many hours carefully planning new trail systems. Most recently, this group of trail enthusiasts has organized under the name of Manhattan Trail Works. This group intends to incorporate the whole community of trail users and trail builders to work together in a coordinated fashion.

Manhattan Trail Works volunteers are actively seeking more opportunities for trail development in the community. Because of the success of the Manhattan River Trails, there is a desire to continue with the shared-use model of permitting both hikers and bikers. After some map study and site scouting, we decided to pursue the Wildcat Creek Linear Park as the next best option to rehabilitate more trail.

There are several reasons this park is appealing for multi-use trail. First and most important, an older trail system already exists there. Secondly, there is room for expansion beyond the current trail system. Broadening the number of user groups will also help to educate about and support appreciation for the unique land features found within the Flint Hills.

The terrain in the area is captivating, and beckons to be enjoyed by more people. Easy access to trails will create this valuable opportunity. There are some other attractions in the park, including limestone picnic tables and limestone fences. Not only are these features functional, it would be shameful to waste the great effort that was invested to construct them. By featuring these attractions within the trail and creating easy access, we can assure they will be appreciated by generations to come.

This proposal will seek to answer 7 key questions about the trail system in an effort to state a case for shared-use and the revitalization of the area.

Part 1. Where will the trail be located?

Part 2. Who will benefit from the proposed trail?

Part 3. Who will build the trail?

Part 4. Who will manage the trail once it is complete?

Part 5. How long will it take to complete the project?

Part 6. How much will it cost to build the trail and who will pay for it?

Part 7. What steps will be taken to protect neighboring property?

Part 1

Where will the trail be located?

The proposed trail will be located at Wildcat Creek Linear Park. A natural wooded and riparian area located to the West of Sunset Zoological Park and Sunset Cemetery, this space has been home to a trail system comprised of hiking trails for many years. It is now time to repair and add new trail to the system as well as support enjoyment for mountain cycling.

The proposed trail will be a shared-use trail. This means that more than one user group will have access and permission to use the trail system. There are many reasons shared-use trails make good sense.

- **Sharing helps build a trail community.** Visitors are encouraged to cooperate in order to preserve and protect a common resource. Encountering other types of trail users on a trail offers the opportunity to meet and talk, which helps establish mutual respect and courtesy. Separate trails, on the other hand, can sometime breed ill-will, territorialism, and rivalry.
- **Shared trails are more cost effective for land managers.** They require fewer signs and less staff, which simplifies monitoring and enforcement.
- **Shared use trails empower responsible, experienced users.** Novices and “outlaws” are exposed to conscientious, courteous users, and the opportunity for peer regulation is enhanced.
- **Shared use trails take better advantage of the available space.** Simply stated, they provide more aggregate miles of trail for everyone to enjoy.
- **Shared trails require fewer trail miles and therefore have less impact.** Building additional non-shared-use trails for individual user groups increases the ecosystem impacts including potential habitat fragmentation and water sedimentation.
- **Shared use trails manage the most visitors.** Trails that lead to major destinations, such as water falls and scenic vistas, should be shared-use, since all visitors will want to enjoy these common points of interest. For the same reason, trails that also serve as point-to-point travel corridors are more efficient when shared.¹

Some hikers may express concern about sharing the trails with mountain bikers. Despite a researched and published 30 year history that proves otherwise, the perception of mountain bikers as being thrill seeking, careless and rude trail users still persists without merit.

In reality, those character traits are shared by a small portion of users of all types of recreations. But one thing that is true is that all types of recreational users share a common bond: enjoying nature while enjoying their preferred type of recreation.

Fears of accidents between cyclists and hikers are occasionally raised, but are factually unwarranted. In fact, accidents involving cyclists and hikers happen far less often than accidents between any trail user and the trail itself (a sprained ankle while walking or a slide-out due to equipment failure, for example).

Properly designed multi-use trails factor in controls for speed. Choke points, corralling and turns are examples of trail design features that help control speed. Also, designing clear lines of sight and sound

¹ *Trail Solutions: IMBA's Guide to Building Sweet Singletrack 2004*

will allow all trail visitors to see, hear and respond to other users well in advance of encountering them. Considering the use requirements, these specific design features are included in our plan.

Expecting to encounter other types of visitors on the trail is also an appropriate deterrent against unsafe trail use practices. Actual experience dictates that most people using a trail are courteous, polite and will yield the trail to other users. Both real life experience and published research support these conclusions.

“The emerging conclusions from research on bike impacts, and the largely positive evaluative results from specific surveys such as that on the Queen Charlotte Track, suggest a positive outlook for developing shared tracks. It seems that the perceptions and realities of impacts can sometimes be quite different, and that greater awareness and experience can lead to a reduction in problem perceptions. The generally more positive perceptions among those who actually encountered bikes suggests that some ‘encounter-effect’ may occur that somehow results in reduced negative feelings. This may reflect some unanticipated positive aspect from experiencing bikes and their riders, such as friendly contact, and riding behavior that was less threatening than expected. Or, it may reflect some form of conciliatory coping response by visitors when faced with perceived conflict situations, as widely documented in conflict literature.”²

Currently, the Wildcat Creek Sunset Park area is criss-crossed with user created trails lacking intentional, thoughtful design. The trail system is fragmented and for the most part, unsustainable. These factors discourage current use and is harmful to the surrounding environment. The definition of sustainable trail construction and use is defined by the National Park service as follows:

- **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**
- **Recognizes that pruning or removal of certain plants may be necessary for proper maintenance.**
- **Does not adversely affect the area's animal life.**
- **Accommodates existing use while allowing appropriate future use.**
- **Requires little rerouting and minimal long-term maintenance.**³

Using the guidelines listed above, the current trail system is in present need of thoughtful re-design and reconstruction. This proposal aims to follow the guidelines above and to consider other impacts to the environment and the community.

All use of trails causes some sort of impact on the surrounding environment. There is little scientific data to support that one group of users causes more impact than another. Whether it is disruption affecting wildlife, vegetation or soil, the best way to approach trail development is with careful planning. A careful plan that accounts for as much of the impact as possible can help minimize the adverse effects of a trail system on the surrounding environment.

The trail, as it is currently, has many design defects. Aside from trail fragmentation, much of the existing trail has suffered from erosion problems. These problems will continue to be a detriment until remedied by proper trail construction techniques. Many of the design problems are explainable, as no organized trail construction guidelines were available at the time of the original trail creation. Considerable advancement in trail construction techniques have been achieved over the last 15 years.

² Cessford, G.R. 2002. *Perception and Reality of Conflict: Walkers and Mountain Bikes on the Queen Charlotte Track in New Zealand.*

³ *From the National Park Service, Rocky Mountain Region, January 1991*

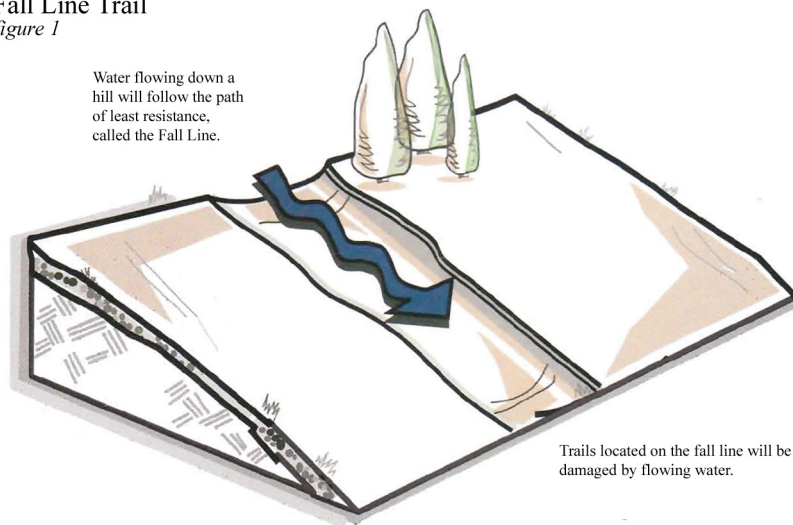
The new trail work will include fixing the faults in existing trail design by utilizing the International Mountain Bicycling Association's (IMBA) trail construction guidelines. These guidelines have been a time tested and proven way to build all multi-use trails, not just mountain bike trails.

The finished trail will be a well-defined loop. Looped trails are appreciated by users because they begin and end at the same point. There is no need to shuttle from one dead end to another, as is the case with the existing trail. Loops reduce the opportunity for collisions whereas criss-crossed random paths introduce potentially hazardous intersections of traffic.

A looped trail also discourages users to make their own unsound fragment trails by guiding the user through different and varied terrain. Current users of Wildcat Creek Linear Park have been inadvertently creating environmentally damaging trails for years, furthering the erosion problems inherent with unplanned or poorly planned trail. Random trampling of the natural environment, which is more harmful than organized use through a well-designed trail, will be reduced under the plan contemplated by this proposal.

This plan includes two entrance points, or trailheads, to the loop system. The main trailhead is an already established trail section at the southwest corner of Sunset Cemetery. The other trailhead will be located further south, near the intersection of Linear Park Trail and Poliska Lane. Both trails already exist, but a few design flaws will need to be addressed before they can be fully utilized.

Fall Line Trail
figure 1



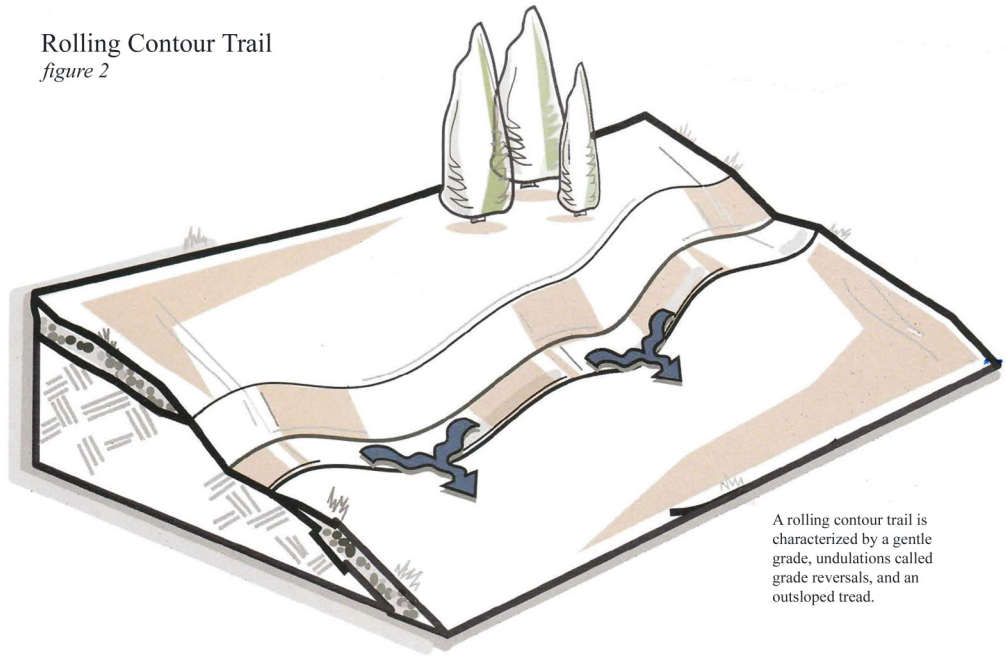
The northeast trailhead route has severe erosion problems because it is situated on what is considered a “fall line” (see figure 1)⁴. This term is used to describe trails that follow the shortest path down a hill. The shortest path down a hill is also the way that water travels, gaining gravity assisted speed along the trail surface while removing soil along the entire length of the trail (**trail photo 2**).

Just one look at the lower part of this trail will show proof, as the stairs at the bottom are barely usable due to erosion (**trail photo 3**). A trail re-route will be necessary here, converting the entrance to a more sustainable, rolling contour trail.

⁴ *Trail Solutions*, pg 60

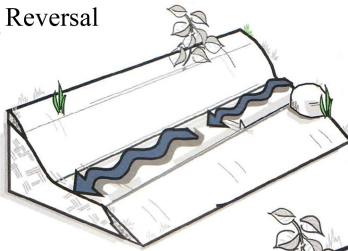
A contour trail is a path that traverses a hill or side slope (see figure 2)⁵, distinguished by a gentle grade, undulations called grade reversals (see figure 3)⁶ and a tread that usually tilts or out slopes (see figure 4)⁷ slightly toward the downhill edge. These features minimize trail erosion by allowing water to drain in a gentle, non-erosive manner called sheet flow (see figure 5)⁸.

Rolling Contour Trail
figure 2



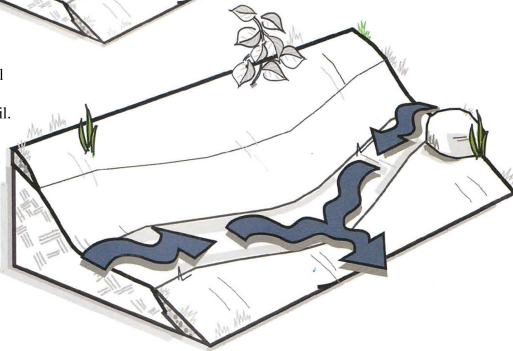
A rolling contour trail is characterized by a gentle grade, undulations called grade reversals, and an outsloped tread.

Grade Reversal
figure 3



Water may become trapped on the trail and flow long distances if there are no grade reversals.

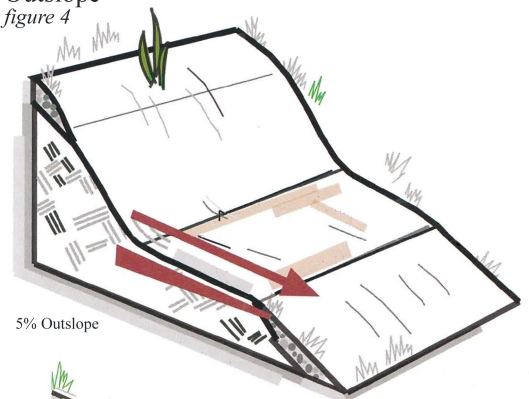
A grade reversal forces water to drain off the trail.



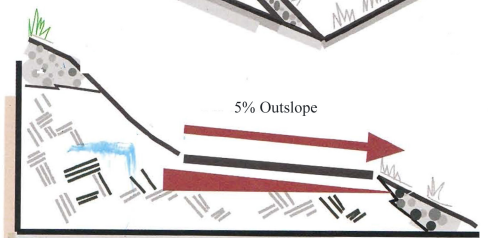
When water drains in thin, dispersed sheets, soil stays where it belongs, on the trail.⁹

The secondary trailhead has suffered from excessive overgrowth from disuse as well as some fall line erosion. Most of the work done to this section of trail will be clearing of overgrowth. However, some clever re-routing of trail will help avoid the fall line portions of the trail and revive access via Linear Trail.

Outslope
figure 4



5% Outslope

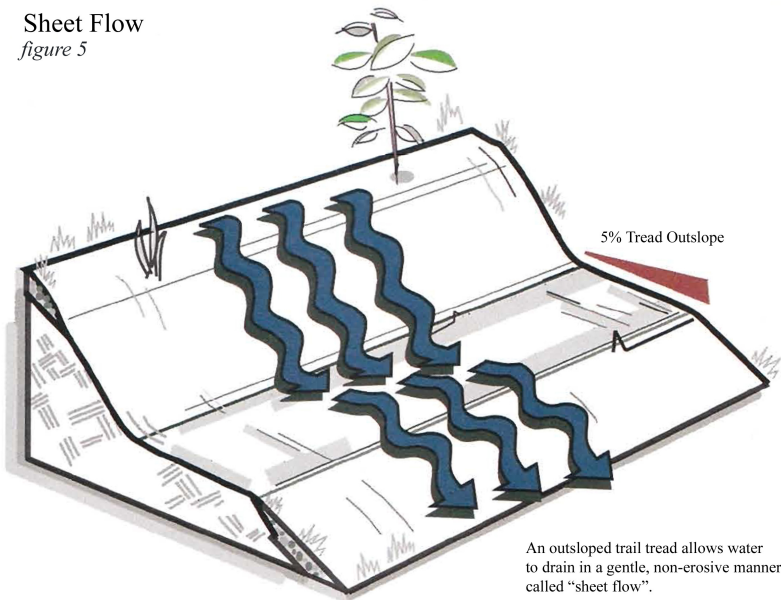


5% Outslope

⁵ Trail Solutions, pg 56
⁶ Trail Solutions, pg 67
⁷ Trail solutions pg 69
⁸ Trail Solutions pg 69
⁹ Trail Solutions, pg.56

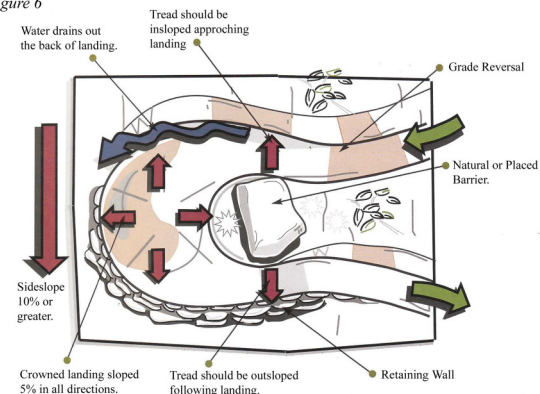
Starting at the east trail head and highest point of elevation, users will be guided towards Wildcat Creek in three descending trails linked together. Some of these descending trails already exist and will be improved along the way. Once at the lowest point of elevation, near the creek, the trail turns uphill. Utilizing established trail with additional new trail, a series of switchbacks (see figure 6 and 7)¹⁰ guides you back to the uppermost trail and the east trailhead.

Sheet Flow
figure 5



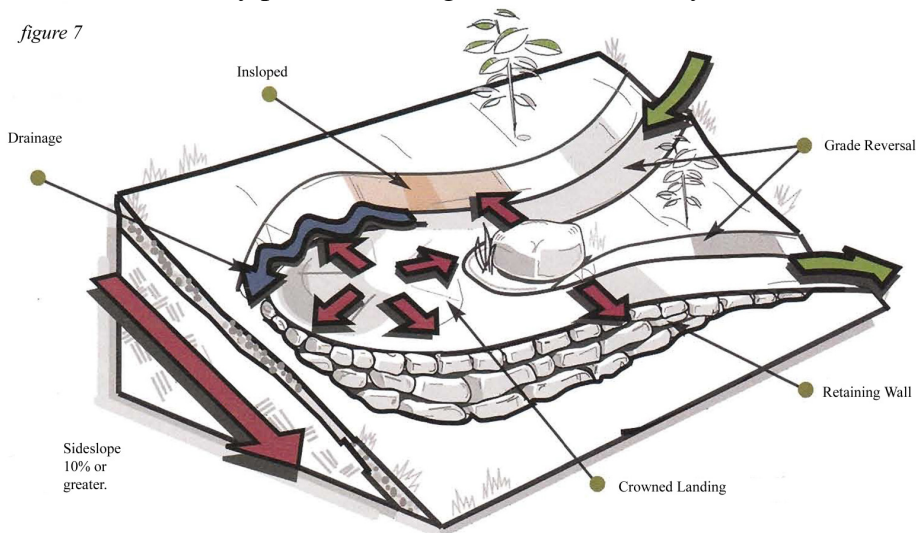
Visitors utilizing the south entrance will join the second tier trail, and then follow the descending path towards Wildcat Creek. After following the trail back to the 1st tier, they may choose to exit the park at the east trailhead, or continue on back to the south trailhead and exit utilizing Linear Trail.

Rolling Crown Switchback
figure 6



In order to accomplish this loop system, some of the existing trail will be included and new trail created. A small portion of the existing trails will be blocked off and covered to discourage use. Some of the trails to be blocked are inconsistent with the loop system. Others are inappropriate to use for trails as they present drainage and sustainability issues.

figure 7



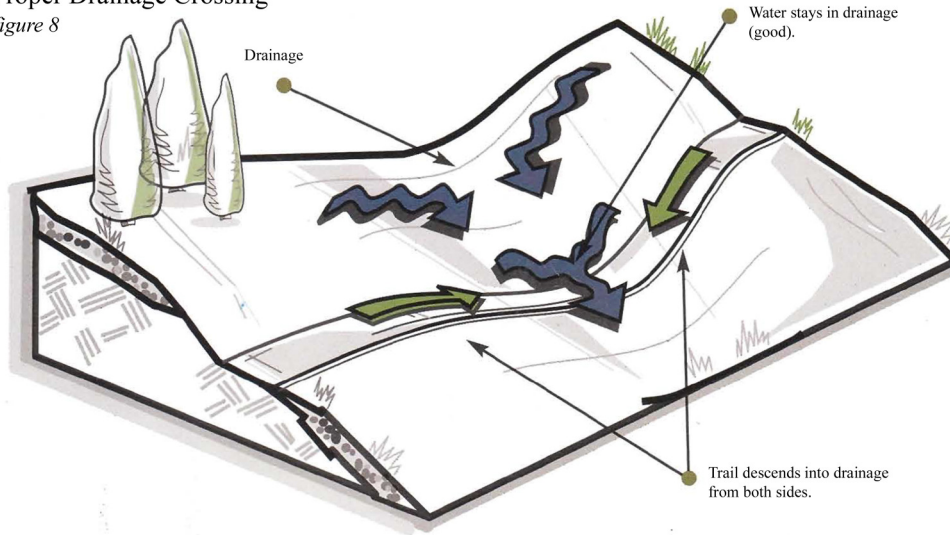
"Poorly designed trails can alter hydrologic functions - for instance, trails can intercept and divert water from seeps or springs, which serve important ecological functions. In those situations, water can sometimes flow along the tread, leading to muddiness or erosion and, in the case of cupped and eroded treads; the water may flow some distance

¹⁰ Trail Solutions, pg 152

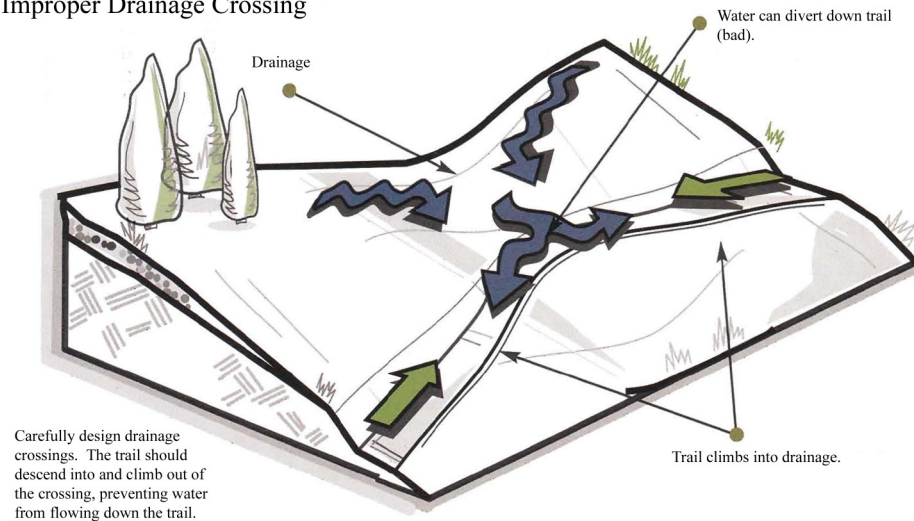
before it is diverted off the trail, changing the ecology of small wetland or riparian areas.”¹¹

A natural spring runs in the North end of the trail system. Attempts to cross the spring flow area have not been very successful. The current trail employs several large logs to bridge a particularly muddy section of the trail. These logs are uneven to tread upon and look inconsistent with the established trail (trail photo 13). As well, these logs do not follow IMBA guidelines for proper drainage crossings (see figure 8).¹²

Proper Drainage Crossing
figure 8



Improper Drainage Crossing



The improved trail will skirt to the West of the current trail, descending into the spring drainage area and ascending out. The trail construction plans utilize rock armoring and bridging techniques, possibly utilizing the current logs in some of the bridge design. This development will also avoid diverting the spring, so as to disturb the local ecology as little as possible.

Rock armoring is a method of using rocks to “pave” a trail. This prevents erosion and can raise the trail tread above soft or wet terrain. Rock armoring will be used

extensively through out this trail’s construction (see figure 9 for multiple examples of rock armoring techniques).¹³

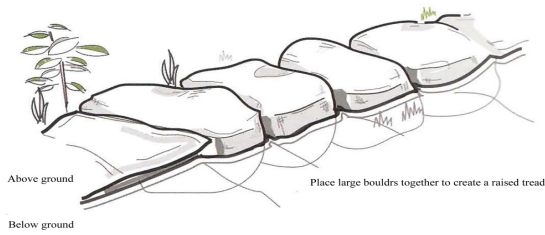
¹¹ *Environmental Impacts of Mountain Biking: Science Review and Best Practices* by Jeff Marion and Jeremy Wimpey.

¹² *Trail Solutions*, pg.56

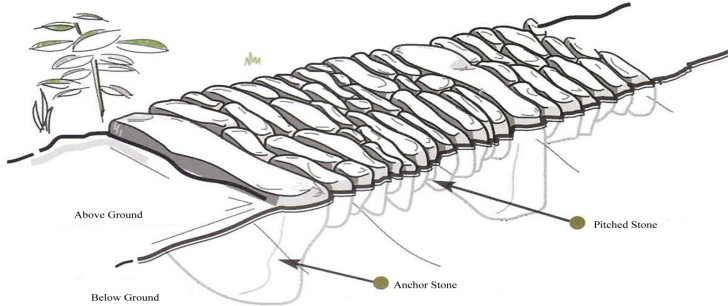
¹³ *Trail Solutions*, pgs 163, 164, 165, 169

figure 9

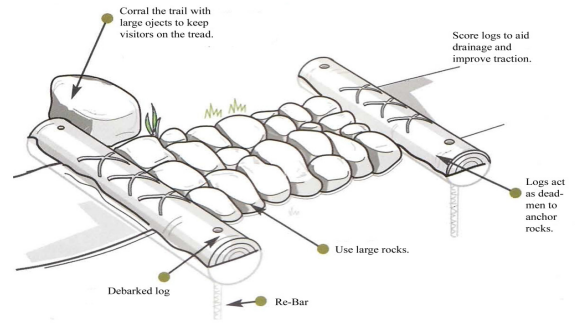
Boulder Causeway



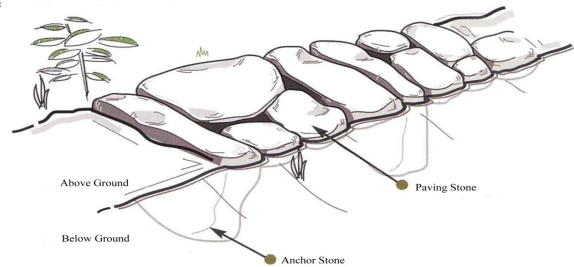
Stone Pitching



Appalachian Armoring

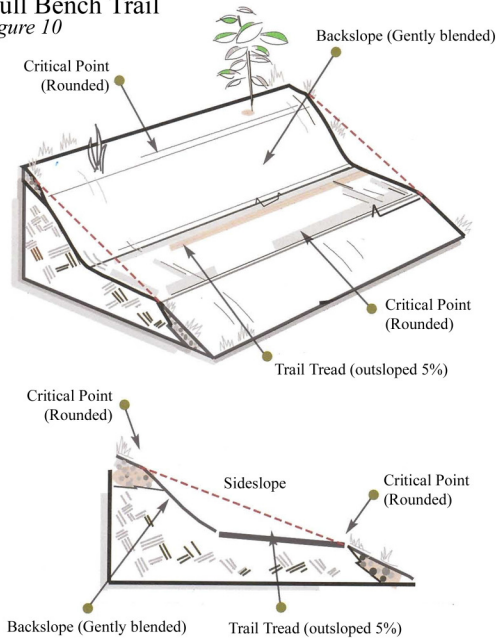


Flagstone Paving



Most of the new trail construction effort will take place on the third tier trail. This section connects the upper two existing tiers with the lower part of previously established trail near Wildcat Creek. This tier will utilize the rolling contour trail design. Bench cutting techniques will be fully utilized here (see figure 10)¹⁴.

Full Bench Trail figure 10



Bench cutting techniques are especially important when constructing trails following the side contours of a hill. A full bench trail is constructed by cutting the full width of the trail tread into the hillside. Mineral soil is then compacted to make a trail that lasts indefinitely with little maintenance. This technique in conjunction with rolling contour design will also be employed to help repair existing trails to be included in the loop.

Once the main loop is established, other plans include some additional trails to link in with the main loop. These trails will make further use of the varied and demanding terrain, catering to the more experienced and adventurous visitors. Offering more line choices follows with the over-arching ideology: to keep environmentally damaging user made trails out of the system by planning and offering varied experiences to users.

Keep in mind that Manhattan has many trail opportunities. This proposal outlines a plan for just one trail loop. The

community, economy and population growth of our city will dictate the expansion of new trail systems. Many of the smaller trail loops can be combined to form a comprehensive trail network, which will further serve the public needs. With cooperation from all, we can accomplish this goal.

¹⁴ Trail Solutions, pg 140

Part Two

Who will benefit from the proposed trail?

Benefits for the City of Manhattan's residents

There are many ways that the city of Manhattan and its residents will benefit from this trail. No one will argue with the fact that physical activity enhances public health. Many individuals find that time spent outdoors hiking or biking and spending time with family and friends enhances their quality of life. Trails provide these opportunities. It logically follows that more accessible and widely used trail systems will encourage a healthier community.

According to the city of Manhattan web site, "The philosophy of the Recreation Division of the Manhattan Parks and Recreation Department is to provide and create affordable, recreational, cultural, educational, and leisure opportunities to benefit and enhance the lives of all citizens in the community."¹⁵ The proposed trail redevelopment is in keeping with this goal and philosophically allied.

Revitalizing a neglected park will create a positive public relations opportunity for the City of Manhattan which can and should be publicized to the city's benefit. Providing residents with many and varied trail experiences meets exactly with its parks and recreation vision by reinvigorating the park and bringing people in the city who might not otherwise use the park to visit it.

Transient residents of Manhattan will also benefit from the trail. This group includes soldiers and families from Fort Riley as well as Kansas State University students. As is always true with transient populations in a new area, one of the first questions asked is, "What is there to do around here?" Providing more activity options for temporary community members encourages them to leave with a positive impression about their time spent in Manhattan which they carry abroad with them.

Tourism and our local economy

There are many attractions Manhattan has to offer to regional tourists and local businesses can enjoy enhanced viability from tourist dollars. Residents of other communities surrounding Manhattan can benefit from the trail as well. Manhattan is the largest city in Riley County. People from the surrounding, smaller towns come to Manhattan seeking activities that aren't available to them in their home towns. Whether it is shopping, a KSU sporting event or utilization of the park facilities, having more options available will make Manhattan a greater destination. This will help to develop increased tourism from surrounding areas.

Mountain biking has been a tourist sport almost since its beginnings. Not all areas of the country have the resources to provide mountain bike trails. Mountain bikers have been identified as a group that is particularly willing to travel in search of new experiences and trail variety. New tourism dollars can be tapped among those who may not yet consider Manhattan a destination for mountain biking.

A traveling mountain biker or hiker visiting Manhattan for trail experiences will seek out the local fare of Manhattan's many dining establishments, shop local retail outlets, and re-supply fuel for transportation. And since mountain biking and hiking are social sports, these tourists tend to travel in groups, multiplying the local economic benefit.

¹⁵ <http://www.ci.manhattan.ks.us/index.aspx?nid=21>

Education

Child and adult education in the community also stands to gain learning experiences from the trail. Having a clear path to the Wildcat Creek area will allow easy access to opportunities for study. Creeks play critical roles in ecological systems, and display aquatic, land animal, and plant life. Students of all levels of education can benefit from field trips, scientific studies and observation of Wildcat Creek.

As a biological education center, the Sunset Zoo's proximity to the redeveloped trail, with more visitors coming to enjoy the trail, will increase the Zoo's visibility and support its admissions revenue. Lovers of nature will instantly see the opportunity to make more of a day by visiting both of these mutually collocated attractions.

Benefits for mountain bikers

Including mountain bikers as trail users will only enhance the trail experience for the whole community, because exclusion rarely fosters goodwill among community members. Manhattan has experienced significantly increased ridership of mountain bikes over the past 3 years. This is due in part to the improvements made to the Manhattan River Trails as well as the addition of another retail bicycle shop to the market, offering more equipment and supply choices to consumers.

To attract mountain bikers, a trail has to be renowned for the riding experience. Terrain features, accessibility and scenic views are all factors in the decision to travel. The terrain at Wildcat Creek Linear Park provides all of these benefits.

Benefits for hikers

Hikers and trail runners around Manhattan will also benefit from the trail additions at Wildcat Creek Linear Park, as they already have permission to use the existing trails. However, in reality the fragmented and eroded state discourages most new users and limits trail mileage and time spent in the park. Only a handful of people with intimate knowledge of the area are currently using the trail.

It is well within the community's potential for an organized cycling and hiking community to think beyond this proposed trail. This trail system will be connected to the Linear Trail and increase the ease of access from other areas of Manhattan via Linear Trail. Further proposals for development of shared-use trail at other established parks can be connected together for a truly, uniquely complex and varied outdoor experience that can put Manhattan at the top of the list of destination locations in the Midwest U.S.

Part Three

Who will build the trail?

As a new trail advocacy group, Manhattan Trail Works has chosen to accept trail building responsibilities. Many of the people involved currently with the organization helped create or maintain the additions to the Manhattan River Trails. Our collective passion for expanding trail systems and the outdoor experiences of others lends special motivation to the task. We have been researching and implementing proper trail building techniques from the beginning of our endeavors, as well as organizing and gathering volunteers for the work.

Over the recent months, we have circulated a petition sheet to further our goals of obtaining volunteers. This sheet was distributed to local businesses that catered to the needs of the people who might utilize the new trail system. It has proven very successful so far with garnering over 100 names and e-mail addresses of people interested in contributing to the effort. With hardly any exception, those who signed the sheet expressed interest in not only desire for new trail within Manhattan, but also helping with trail construction.

In addition, a new website is under construction registered as manhattantrails.com to further disseminate trail information in our community. This web site will be a foundation for our emerging trail advocacy organization and serve as an information exchange about our local trails and coming volunteer trail projects. The site will also make available trail maps, trail conditions and other trail information advertised to people outside of the city of Manhattan.

As trail builders and planners, Manhattan Trail Works will cooperate with the Parks and Recreation Department of Manhattan to comply with any code issues, operational or community concerns that may arise from the construction of the trail. As well, Manhattan Trail Works will appreciate the city's trust in and the value of the organization's knowledge, credibility and good judgment when it comes to creating trail structures. Communication will be the key that unlocks the door to cooperative efforts to better the community.

Part Four

Who will manage the trail once it is complete?

Management of the trail and its users are critical to its longevity of use, satisfactory experiences and community support. The overall goal of management is to provide as many users as possible with the maximum amount of positive enjoyment of the trail. Without proper management, the new trail will quickly revert back to the current unattended and disrepaired state.

Supervision of the trail doesn't necessarily fall to one person. As this is a collective project between the city of Manhattan and loyal trail enthusiasts, so should management be collaborative among those groups. There are numerous ways to share this responsibility.

One cooperative first step after acceptance of this trail proposal could be to draft a Memorandum of Understanding (MOU). This is a public statement that sets forth goals and duties related to the specific project. Although not a legally binding document, the MOU would assure that everyone involved in the project shares a common vision. It helps to delineate responsibilities, agendas and roles played by all involved. This should be drafted between parties after acceptance of the trail proposal.

What volunteers can do.

The majority of management concerning this trail will most likely center around maintenance duties. Clearing fallen trees and vegetative growth from obstructing the trail corridor, and addressing problems associated with natural and engineered structures in nature will be the most common issues.

A regular maintenance schedule will help keep these issues in check. Setting aside a specific day of the week, month or year for certain trail maintenance duties will help to keep numerous volunteers interested and available for such work. Generating organized trail project information sheets and retaining records will also assist in efficient and quick execution of these duties.

The structure for this organized work will be focused around trail community volunteers organized by Manhattan Trail Works. The hubs for such contact will be local businesses that cater to the needs of trail users and other related clubs supporting trails. Networking through the internet will also facilitate communication between all groups involved.

What the city can do.

Aspects of the trail management that would be better served by direct operation of city personnel include: ensuring that city ordinances will be observed and upheld and providing proper receptacles for refuse and removal thereof.

Part Five

How long will it take to complete the project?

Because much of the proposed trail includes many existing trails, making the rough hewn outline of the full trail loop will not take much time. The repair of the existing trail and construction of new trail will take the longer period of time. Special considerations for improvements as well as ensuring that the new construction combined with improving the old structure withstands the forces of nature will add to the time involved.

Rough cutting the trail should take approximately one month. One to two additional months will be needed to build new trail structures and repair existing trail deficiencies. Efforts thereafter will be dedicated to maintenance and fine tuning of the design through observation.

Part Six

How much will it cost to build the trail and who will pay for it?

The trail system proposed will be built and maintained utilizing volunteer work. The main benefit to this method from an actual cash cost standpoint is pretty straight forward: volunteer labor is free. Since the trail construction will take place utilizing volunteer labor, the only actual costs involved will be tools for trail construction, supplies for volunteers, fuel for gas powered equipment utilized in trail construction or maintenance, and materials to build bridges and trail kiosks.

There are four areas that require bridges, so that cost will be a larger factor for budget concerns. Bridges generally require certain amounts of concrete and lumber that are only available through retail outlets. We'll need to cooperate on meeting any standards that are required of such structures in this public park. Any cost incurred here will be either paid for by the trail builders, or donations from local organizations.

Trail kiosks are important for this trail. They will help everyone who enters the park and uses the trail to understand rules and regulations as well as important safety information. This will again take some cooperation between all parties involved. Utilizing donations from the trail community or retail establishments that support the trail community will likely be the most effective way to pay for the construction.

Part Seven

What steps will be taken to protect neighboring property?

There is some privately owned land that is adjacent to the north end of the park. It is important that the private land remain undisturbed by users of the park, unless permission is granted by the land owner. Currently, this is not the case. Clear trail marking and an easy to follow map at trail kiosks will help immensely with this task. There are already “No Trespassing” signs in place. There may be need for other such signs in the same area to warn that the property is private.

The trail design itself will also help to avoid any trespassing onto private lands. The loop system will offer plenty of varied experiences to dissuade users from straying off the marked trail. The trail design in conjunction with maps and simple signage should be all the prevention this trail system needs to maintain boundaries.

Conclusion

Manhattan has continued to grow and is now in a position to take advantage of a unique opportunity. This community is experiencing a rapid increase in interest in outdoor amenities. An increase of users of trails within the city and the success of the Manhattan River Trails has created a demand for more trails serving all types of users.

These groups include people from all walks of life, not just one age group, gender or ethnicity. Shared use trails will continue to benefit and accommodate the most members of the community. In addition, this new trail and trails created in the future will help to increase tourism and recognition of Manhattan on a national scale.

The Wildcat Creek Linear Park has many natural features that deserve to be admired and utilized. The proposed trail will create many healthy, educational and economic advantages for our city. With such minimal cost compared to other municipal projects, this trail will be a small investment project with a long-term benefit for the community.

We hope that the City of Manhattan will take advantage of this volunteer proposal and will lend what resources and support that it may have available as the city grows and plans for the future.

Glossary of Terms

Armoring: Reinforcement of a surface with rock, brick, stone, concrete, or other “paving” material.

Backslope: The cut bank along the uphill side of the trail extending upward from the tread. Usually sloped back by varying degrees, depending on the bank composition and slope stability.

Bench Cut: A relatively flat, stable surface (tread) on a hillside made by excavation. When excavated often referred to as full, half or partial bench.

Bench Cut, Full: The total width of the trail is excavated out of the slope, and the trail tread contains no compacted fill material. The most durable and recommended style of bench cut trail.

Bridge: A structure, including supports, erected over a depression (stream, river, chasm, canyon, or road) and having a deck for carrying trail traffic.

Choke (Gateway): A slight narrowing in the trail used to control user speed.

Contour Trail: A trail constructed such that it follows a contour, with elevation remaining constant.

Control Points: Places that influence where a trail goes. The beginning and the end of a trail are basic control points. Other control points include parking areas, trailheads, structures, slopes for turns or switchbacks, road or water crossings, and other trails. Positive control points are place one would want trail users to visit. Negative control points are places desirable for users to avoid.

Corralling: The act of placing anchors on the trail to define the sides and emphasize turns, keeping users on the tread.

Deadman/Deadmen: A log or logs, heavy timber or timbers, a large block of concrete, a large boulder, or a combination of these materials that is partially or completely buried. Deadmen are used to anchor sections of armored trail.

Downslope: The downhill side of a trail.

Drainage: The way in which water flows downhill and/or off the trail.

Erosion: The natural process of wearing down and removing rock and soil by wind and water, Trail erosion can be accelerated by a combination of users, water and gravity.

Fall Line: The direction water flows down a slope (path of least resistance) under most circumstances. Constructing a trail on the fall line encourages water to run down the trail and leads to erosion.

Footing: The part of a structural foundation that rest on the ground, supporting and spreading the weight of the structure above.

Grade: The amount of elevation change between two points over a given distance expressed as a percentage (feet change in elevation for every 100 horizontal feet, commonly known as “rise over run”). A trail that rises 8 vertical feet in 100 horizontal feet has an 8-percent grade.

Grade reversal: A reverse in the trail grade- usually a short dip followed by a rise- that forces water off the trail. Grade reversals are known by several different terms, including grade dip, grade brake, drainage dip, and rolling dip. Frequent grade reversals are a critical element of sustainable trail design. Most trails will benefit from grade reversals every 20 to 50 feet, depending on soil type and rainfall.

IMBA: International Mountain Bicycling Association, P.O. Box 7578, Boulder, CO, USA 80306: (303) 545-9011; imba.com. Leading resource for mountain bike-oriented trail design, construction, maintenance, and management information, and mountain biking in general.

Inslope (insloping): The slope of the trail tread toward the backslope of the trail, causing water to run along the inside of the trail.

Kiosk (sign): A freestanding bulletin board that houses informational or interpretive displays.

Liability (Liable): In law, a broad term including almost every type of duty, obligation, debt, responsibility, or hazard arising by way of contract, tort, or statute. To say a landowner or person is “liable” for any injury or wrongful act is to indicate that he or she is the person responsible for compensating the injury or wrongful act.

Management: Includes the overall policy, planning, design, inventory, mapping, construction, and maintenance of a trail or greenway segment or site, as well as the operational aspects of administration.

Memorandum of Understanding/Agreement (MOU/MOA): A signed, written agreement entered into by various governmental agencies and nonprofit groups to facilitate the planning, coordination, development, and maintenance of a trail or trail systems.

Mineral Soil: Dirt that’s below the top layer of leaves, roots, and other organic material. When making a bench cut, always dig down to the mineral soil if possible.

Multi-Use Trail: A trail that permits more than one user group-equestrians and hikers and mountain bikers, for example- at a time.

Surface (Surfaced, Surfacing): Material on top of the trail bed that provides the desired tread. It can lessen compaction of soil, provide a dry surface for users, and prevent potential erosion and abrasion. In addition to concrete and asphalt, trails can be surfaced with dirt, rock, gravel, sand, mud, snow, grass, and other substances.

Sustainability: Community use of natural resources in a way that does not jeopardize the ability of future generations to live and prosper.

Sustainable Trail: What every designer and construction crew should strive for: low-maintenance trails that have minimal impact on natural systems.

Switchback: A sustainable turn on a hillside. The trail is routed onto a level deck where it makes a transition to the opposite direction.

Trail, Loop(ed): Trail or trail systems designed so that the routes are closed circuits connecting a number of points of interest, giving users the option of returning to the trailhead on a different section of trail than they went out on.

Trailhead: An access point to a trail or trail system that can be accompanied by various public facilities, including hitching posts for horses, an ORV unloading dock, toilets, water, directional and informational signs, and a trail user register.

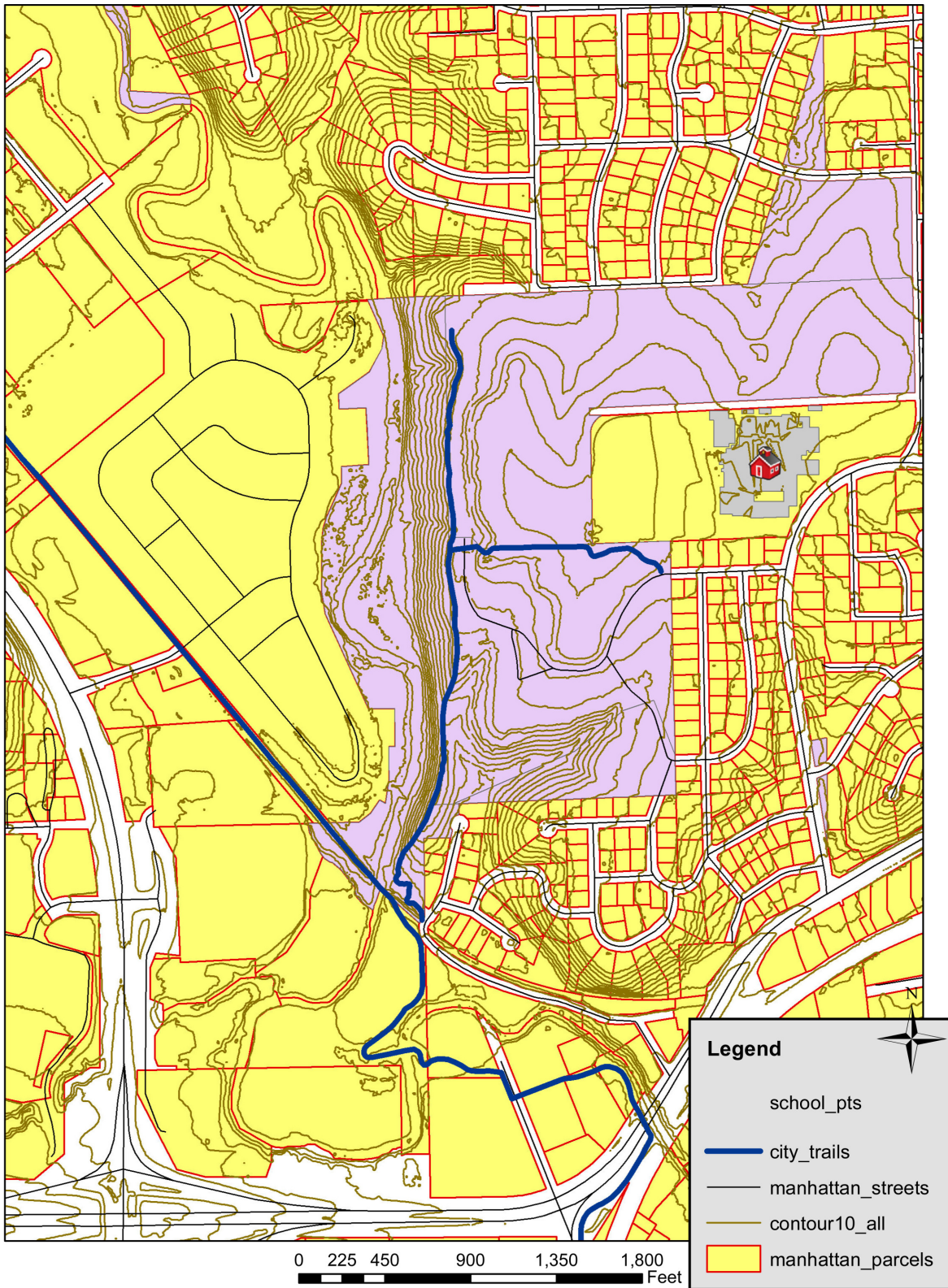
Traverse: To cross a slope horizontally by going gradually up and across in lieu of the more direct up-and-over approach.

Tread (Treadway): The actual surface portion of a trail upon which users travel.

Tread Creep: Describes a contour trail sagging or sliding down the hill due to user-caused erosion. Specific causes include bushes or trees protruding into the trail from above, exposure of roots from an uphill tree, an improper bench cut, or poor trail flow.

Wildcat Creek Linear Park

Existing Trail



Wildcat Creek Linear Park Proposed Trail Route



Coordinate System: USA Contiguous Albers Equal Area Conic USGS version
Projection: Albers

Created By Trailhead Mapping Services

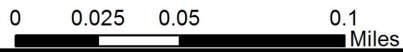




Photo by Amanda Donnelson

Trail Photo 1



Trail Photo 2
East Trailhead

Distinct evidence of "fall line" trail erosion.

Photo by Amanda Donnelson



Photo by Amanda Donnelson

Trail Photo 3



Photo by Amanda Donnelson

Trail Photo 4

The circle indicates the part of the trail that will benefit from a technique called "rock armoring". The arrow indicates rocks strewn downhill by erosion.



Trail Photo 5 Photo by Amanda Donnelson

The circle indicates water drainage tubes for the Sunset Zoo that empty across a section of the existing trail.



Trail Photo 7 Photo by Amanda Donnelson

This section of trail would also benefit from rock armoring techniques.



Trail Photo 6 Photo by Amanda Donnelson

The circle indicates an area of the trail affected by the water drainage system shown in Trail Photo 5. This problem should be best remedied by rock armoring. The arrows indicate both strewn rocks and exposed tree roots caused by the erosive power of the drainage tubes.



Trail Photo 8 Photo by Amanda Donnelson

This portion of the trail would benefit most from a bridge that would span over the heavily eroded area. The force of the water flow would be too much to be contained by rock armoring techniques.



Photo by Amanda Donnelson

Trail Photo 9

This trail area would directly benefit from rock armoring.



Photo by Amanda Donnelson

Trail Photo 11

Rock armoring was attempted in this trail section; however the water flow proved too powerful. A bridge here is the only solution to traverse the small gully.



Photo by Amanda Donnelson

Trail Photo 10

More bench cutting and rock armoring will allow this part of the trail to be more sustainable.



Photo by Amanda Donnelson

Trail Photo 12

This photograph illustrates where most of the water that runs across the trail ends up draining into Wildcat Creek. A bridge here is crucial to connecting the lower most section of trail to the northern ascending portion of trail, thus connecting the loop system.



Photo by Amanda Donnelson

Trail Photo 13

This section of trail is going to be re-routed to the west, thus avoiding the mire of constantly wet soil caused by a spring flow. The re-route will include rock armoring and perhaps some bridging to create better trail flow and appearance.



Photo by Amanda Donnelson

Trail Photo 14

Rock armoring would best suit this portion of the trail that traverses a gully.