TRAIL ACQUISITION AND DEVELOPMENT

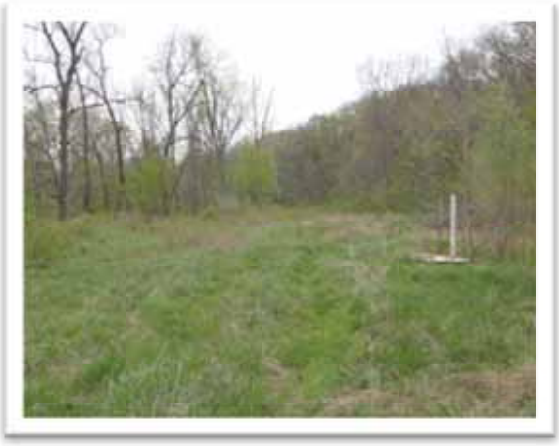
Trail Acquisition and Development Costs

Overview

MKT Trail

Trail planners nationwide have looked at various types of locations for building trails where users can safely get exercise and commute through a city in an aesthetically pleasing setting. The standard for trail development has become utilizing creek corridors and for good reason. Creek corridors are typically the last remaining undeveloped parts of a community. Because creek corridors flood periodically, permanent buildings cannot be built there. Road crossings are minimal, because road bridges over creeks are costly. Creek corridors also are where one finds the steep slopes with attractive rock formations and wooded hillsides still intact and protected from development. Corridors adjacent to a creek are typically flat, creating the desired topography for walkers and bikers who desire to avoid hills whenever possible. Nature enthusiasts are also among those that prefer trail routes along stream corridors. Many of Columbia's trail users walk or bike the trails to de-stress and observe nature. Columbia is fortunate to have an abundance of creeks that are relatively undeveloped and provide the natural setting that is ideal for trails. This separation from the built environment is a very important aspect of choosing a trail location that will attract and be used by as many trail users as possible. Many trail users on the MKT Trail marvel that they feel like they are in the middle of nowhere as they travel through the protected Flat Branch and Hinkson Creek valley, when in reality they are passing through the middle of town.

The City of Columbia passed a Stream Buffer Ordinance in January 2007, which defined buffer areas and established appropriate uses. As identified in Section 12A-231 of Columbia's Code of Ordinances, there are 12 purposes and benefits of the stream buffer ordinance, including "furnishing scenic value and recreational opportunity." Allowed uses within the Stream Buffer Ordinance is identified in Section 12A-237 and specifically included "paths and recreation trails (but use of the outer zone is preferred)."



Bottom Land Stream Corridor with Sewer Utility Easement

Trails located in stream buffer zones often follow utility easements, such as sewer, water and electric lines. Stream corridors are often separated from busy streets, providing a safe route for families and young children. And as stewards of the environment, park planners often

design trails to restore degraded stream corridors and other habitats.

Trail Design Standards
Columbia has taken advantage of best practices in use throughout the United States, as well as accepted national standards for development of trail facilities. Although the technical aspects of trail design are not addressed in this document, the following publications can be consulted for more in-depth information and design development standards.

Greenways. A Guide to Planning, Design and Development
Published by Island Press, 1993
Authors: Charles A. Flink and Robert Searns

Trails for the Twenty First Century
Published by Island Press, 1993
Edited by Karen-Lee Ryan, Rails-to-Trails Conservancy

Guide to the Development of Bicycle Facilities
Updated in 2012 by the American Association of State Highway Transportation Officials. Available from AASHTO or FHWA.

Manual on Uniform Traffic Control Devices
Published by the US Department of Transportation, Washington, DC
Chapter 3

Mountain Bike Trails: Techniques for Design, Construction and Maintenance
Published by Bike-Centennial, Missoula, MT

Universal Access to Outdoor Recreation: A Design Guide
Published by PLAE, Inc., Berkeley, CA, 1993

Trail Surfaces
Columbia has different types of trails constructed out of various surfaces. Materials that can be used to surface a trail include natural materials, granular stone, shredded wood mulch, asphalt and concrete. Surface materials are categorized as hard or soft, depending on their ability to absorb moisture. Soft surface materials are less expensive to install and are often appropriate in rugged natural areas. Soft surface trails are often preferred by runners and mountain bicyclists; however, they do not accommodate certain users, such as rollerbladers and disabled persons. Hard surface materials are more practical for multi-use urban and suburban trails and require less maintenance.

The first widely-used trail in Columbia was the MKT Trail. This trail was built on the old MKT Railroad bed that was built at a time before EPA laws prohibited filling in a floodplain. The trail functions well as a gravel trail because it is built up above the common flood areas adjacent to most creeks. It is important to note that new trail development does not allow for filling soil into flood areas, so new trails are built at the existing soil elevation. Consideration for areas that have steep grades or that are prone to flooding should be given during trail

design to protect nearby streams from sediment deposits and avoid chronic maintenance problems.

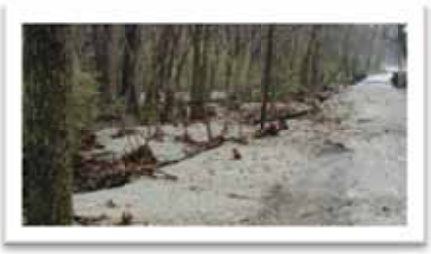
The following five trail surfaces have been predominately utilized in Columbia's trail system.

- **Natural surface** trails make use of dirt, rock, soil, forest litter, leaf mulch and other native materials. Preparation varies from machine-worked surfaces to those worn only by usage. This is often an appropriate surface for ecologically sensitive areas. In Columbia's trail system, natural surface trails are usually located within a park or nature area. Since major destination trails are not typically constructed with natural surface materials, the cost for the development of this type of trail will not be addressed in this chapter.

Rhett's Run Mountain Bike Trail

Hinkson Creek Trail (Gravel)

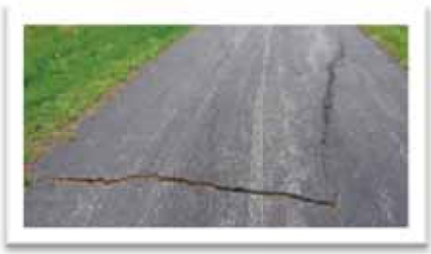
- **Granular stone (gravel)** includes a broad range of aggregate stone, such as limestone, sandstone, crushed rock, pit gravel and fine gravel. This is one of the best surface types for greenway trails because it can be densely compacted and is compatible with the natural environment. If properly constructed, granular stone can support bicycle and handicapped accessible trail development. It should be noted that increased compaction results in decreased perviousness. Granular stone trails are not well-suited for floodplain trails or trails with steep grades. Annual maintenance expenses should also be considered when choosing this type of trail surface.



Gravel Washout on Bear Creek Trail

- **Asphalt** is a hard surface material that is popular for a variety of rural, suburban and urban trails. It is composed of asphalt cement and graded aggregate stone. It is a flexible pavement and can be installed on virtually any slope. The asphalt trail should be coated with a special sealant, particularly where it is exposed to the sun for long periods of time. To reduce the unraveling of the pavement edges, the trail should be re-compacted periodically by a mechanical roller. Asphalt trails are impervious to water and can readily accommodate a variety of uses, as long as the trail remains in good repair. Asphalt trails are usually cheaper than concrete to install initially; however, they do not last as well and require more maintenance. The Department is not recommending asphalt as a surface for major destination trails.

Cosmo Fitness Trail (Asphalt When New)



Cosmo Fitness Trail (After 12 Years)

- **Concrete** surfaces are capable of withstanding the most powerful environmental forces. They hold up well against the erosive action of water, root intrusion and subgrade deficiencies, such as soft soils. Concrete is most often used for urban applications, in flood areas, on steep slopes, and in locations where all season commuting is desirable. Concrete trails might also be considered in areas where nearby property owners do not want to contend with maintenance vehicle traffic on the trail. When properly installed, it is the strongest and has the lowest maintenance requirement of all the surface types. Concrete trails can readily accommodate a variety of uses and are the most likely to be devoid of maintenance problems. Concrete trails are impervious to water and initial construction costs are higher than natural surface, granular stone, or asphalt.

Concrete Lake Trail at Stephens Lake Park

20-Year-Old Albert-Oakland Concrete Trail

- **Concrete with gravel side path** trails use a combination of two popular trail surfaces, providing two options for users. The concrete portion provides the benefits of hard surface - an all-weather, consistent surface that can serve a variety of users. The gravel side path provides an option for runners that prefer a softer surface. This combination of trail surfaces can be a solution when there are conflicting user preferences, but can be the most expensive to install and does not alleviate the need for regular maintenance on the gravel portion.

County House Trail
(Concrete with Gravel Side Path)

Each trail project is unique and should be evaluated on a case-by-case basis in consultation with a qualified engineer and/or a landscape architect. When selecting the trail surface, trail designers should take into consideration the intended use, citizen preferences, location, environment, effect on surrounding property owners, maintenance costs, development costs, available funding, along with any other related items. Columbia historically has used granular stone, concrete, or a combination of both of these as the preferred surfaces for major destination trails. Therefore, the estimated trail development costs in this chapter will address both concrete and granular stone.

Acquisition Costs

The following estimated acquisition costs are based on the purchase of a 30 to 50-ft.-wide trail right-of-way corridor in the Columbia area. The minimum width of 30 ft. is used to establish a minimum standard for trail corridor development. While a 50 ft.-width is preferable, trail corridor width may vary for each site. There are many factors that influence land cost, and the purchase price for trail right-of-way can vary greatly. So me of the properties being targeted for trail development are located in flood plains, which have limited

development potential. This is some of the least expensive land in the city. The upper range of cost for trail land would include land that is better suited for development, thus more valuable on the open market.

The estimated acquisition cost for a one mile long by 50-ft.-wide trail corridor would range from $72,000 to $180,000. This represents a per acre cost estimate range from $12,000 to $30,000 per acre at approximately 6 acres per mile.

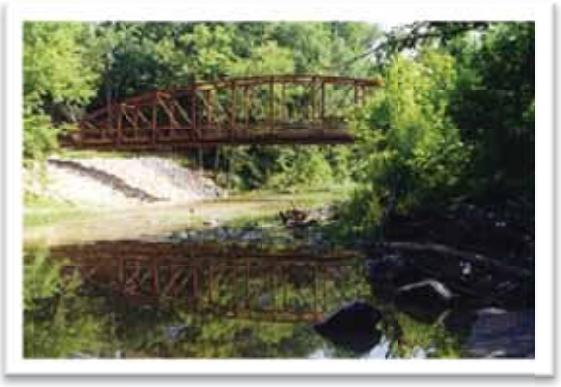
Development Costs
The actual trail development costs per mile will also vary with each piece of land. Because of the time and costs associated with trail design and engineering, a detailed trail design and a detailed cost estimate are typically not done for proposed trails until funding is secured and the proposed trail project is moving forward for development.

For the primary trail acquisition targets, cost estimates have been prepared for preliminary trail routes. When calculating development costs, staff evaluates five primary factors as follows:

- design/engineering fees
- bridge design and costs
- grading
- trail route and surface construction
- trail signs

When any of these projects move forward for development and a detailed trail design is completed, the amount budgeted for the trail project may need to be adjusted.

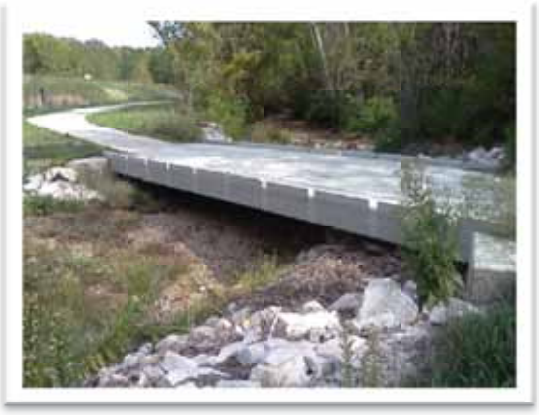
Bridge Costs
Historically, bridge construction has the most dramatic variation in cost per mile when calculating the cost for trail construction. Boone County has many local streams, which provide beauty and interest; however, the need for bridges over these streams increases the cost per mile for trail construction.



Free Span Bridge at Hinkson Creek Trail

The number of bridges needed for any particular trail development cannot be determined until the exact trail route has been decided. Trail planners try to keep a proposed trail route on one side of the stream whenever possible, whereas it may be suitable for utilities (such as sewer lines) to cross a creek numerous times. In looking at previous trail projects such as the Bear Creek and Hinkson Creek Trails, an average of just over one bridge per mile was typical. With this as a guide, one bridge per trail mile will be used for estimating the cost of proposed trails.

Free span bridges are the ideal method of crossing streams and creeks, where feasible. However, in some cases a low profile bridge could be appropriate. Often these span streams with low flow or in residential or commercial areas where a bridge itself is aesthetically intrusive. In these situations, low profile bridges have proven to be quite successful. Low profile bridges are economical, often costing in the $100,000-$200,000 range. However, for the purpose of calculating a standard cost per mile for trails, the use of low water bridges will not be included.



Low Profile Bridge at County House Trail

Bridge costs can vary greatly based on the size of the creek to be crossed. Bridge costs are not only affected by the increasing cost of materials and labor, but also in relation to the increasing complexity of design and engineering required by state and federal agencies. Based on the recent costs for bridges along Hinkson Creek, Hominy Creek and County House Trails, an estimated bridge cost range of $300,000 to $600,000 could be appropriate. While a bridge over Perche Creek would likely cost $500,000, a pedestrian overpass over a major highway such as Interstate 70 or Highway 63, could easily cost over $1 million.

The estimated cost that will be used for bridge construction, including installation, survey, architectural, and engineering fees, is $600,000 per trail mile.

Trail Amenities

The next cost factor that varies from trail to trail is the amenities located at the primary access points. Destination trails such as the MKT and Hinkson Creek Trails, often have one or more access points that include support amenities, such as parking lots, restrooms, drinking fountains, and fitness equipment designed for pre or post workout. Often these amenities are located in existing parks and in many cases have already been constructed. For example, Stephens Lake Park provides numerous support amenities for the Hinkson Creek Trail and the Hominy Creek Trail. For the purpose of estimated trail construction costs, these amenities are not included.

Trail Construction

A 12' wide concrete trail, along with grading, base rock, drainage pipes and incidentals is estimated to cost $100 per lineal foot, or $528,000 per mile.

Gravel trail development costs about $120,000 per mile less than concrete, making an estimated cost of $408,000 per mile.

Based on all of the above, the following can be used to estimate the average cost of future trail acquisition and development, based on 2013 prices:

Concrete: $1,200,000 - $1,308,000 per mile **Gravel:** $1,080,000 to $1,188,000 per mile