Background / Planning notes for the Ulster County Catskill Mountain Rail Trail concept
National Park Service
Rivers, Trails & Conservation Assistance Program
May 2013

An understanding of the benefits of rail trails compared to costs of trail development is important to any decision regarding trail development within the U&D corridor (as well as other existing and potential trail corridors in Ulster County). In the absence of a more complete economic study, the following notes are intended to provide background and help inform discussion of the trail-related aspects in particular, in terms of trail-related benefits and costs, and issues of design and construction related to creating rail-trails and linear parks.

A similar understanding of potential benefits and costs related to the railroad aspects is similarly important. While others may describe and analyze those, the notes below are confined to the subject of trails and rails with trails.

1. The Benefits of Rail Trails:

1.1. "Good trails are good business."

This basic truth was said by the mayor of a small town in Colorado about 25 years ago. Since then, her town has benefited enormously from the trail she advocated, and the benefits of rail trails have been similarly demonstrated nationwide. Around the country, there are currently about 20,000 miles of rail trails. In New York State alone, there are well over 1000 miles of trail along previous railroads and towpaths. We learn from all of these cases - - nationwide and statewide - - all the time. From long experience, we find that Mayor Carter's emphasis that good trails are good business makes an important point. While there is no single kind of "good" trail, there are several characteristics that position trails for different types and degrees of success.

1.2. Trail-related spending

A key measure of success for many trails is spending by trail users. Looking at a nationwide cross-section of published studies of the economics of rail trails, we find some important tendencies in trail-related spending:

- Local/ day users of rail-trails (people from mostly within the county) spend on average about $3-$13/day;
- Day users traveling greater distances (mostly from outside the county) spend closer to $15-$35/day, generally including gas and lunch;
- Overnight visitors (mostly from other counties or other states) spend still more - - generally $100-$200/day - - adding the cost of dinner and an overnight stay, which varies from place to place.

Rough estimates of direct economic benefits can be obtained by multiplying these values by the numbers of trail users in each category. Counts of trail users in Ulster County and elsewhere around the state provide useful comparables that can help us evaluate the benefits of existing trails, and estimate the future benefits of planned trails.

For example, a recent study found that the Hurley O&W Rail Trail received an estimated 81,000 users in 2012. If nearly all were local users, and based on averages alone, the benefit of the trail would be

expected to be between $243,000 and $1,053,000 per year. A 2008 study of the same trail found that users tended to spend at higher rates, and also that many had traveled greater distances to the trail, resulting in a calculated total economic return closer to about $2 million per year. (See: http://nysparks.com/recreation/trails/documents/StatewideTrailsPlan/StatewideTrailsPlanAppendixC.pdf)

In addition to direct daily spending, trails increase spending on so-called "durable goods," such as bicycles, helmets, accessories, sneakers, and clothes for running or fitness walking. In a full economic analysis, these values are added in. Taking all of these into account, it is not uncommon for a 10- to 30-mile rail trail in a rural/ suburban area to generate $1.5 to $5 million per year in economic benefits, with a significant portion of that considered "new" money, meaning money coming from outside the County. (See for example: *Impact of Rail Trails*, National Park Service and Penn State University, 1992, at: www.nps.gov/ncrc/programs/rtca/helpfultools/impact_railtrail_final.pdf ; Compilation of trail studies at: www.brucefreemanrailtrail.org/trail_plans/rail_trail_studies.html ; *Heritage Rail Trail County Park 2012 User Survey and Economic Impact Study,* York County PA, at: http://yorkcountypa.gov/images/pdf/Parks/2012%20hrtcp%20user%20survey%20%20ecomonic%20impact%20analysis%20final%201-30-2013.pdf)

The 2010 New York Statewide Trails Plan, produced by NYS Office of Parks, Recreation and Historic Preservation, called trails "a quiet economic engine." Based upon studies from around the State as well as the nation, the Statewide Trails Plan found that although trails are not an economic goldmine, they are cost-effective, year-round economic generators that are productive components of a community's portfolio of assets. http://nysparks.com/recreation/trails/statewide-plans.aspx

1.3. Trail usage rates

Another measure of a trail's success is its popularity, which can be measured in numbers of trail visits per year. Aside from direct economic benefits, counts of trail usage can help gauge such things as community health benefits from trail-related physical activity, the trail's usefulness as alternative transportation, and the trail's contribution to a community's overall quality of life.

The Report of the 2012 New York State Trail User Count is one of the most recent studies that is helping us understand the volume and nature of trail usage in New York State. This study found that the most popular forms of use were walking, jogging and bicycling, and that baby strollers and other uses were smaller but nevertheless important types of trail use. As mentioned above, according to the study, the nearby Hurley O&W Rail Trail, although short in length, received more than 81,000 visits per year. www.ptny.org/pdfs/StatewideTrailCount/2012NYSTrailUserCountreport.pdf
This suggests that there is strong demand for trails in the area.

1.4. Health-related benefits

A third measure of a trail's success is the degree to which it encourages healthful physical activity within the community. Major health organizations increasingly understand that trails, walkable communities and recreational open space serve as important elements of our public health infrastructure, as important to overall health and wellness as clinics or hospitals. (See for example: www.heart.org/idc/groups/heart-public/@wcm/@adv/documents/downloadable/ucm_428442.pdf)

It is important to note that the greatest health benefits come from *regular* physical activity - - or in trail terms, repeat visits to the trail. High-quality trails tend to become popular hubs of walking and other healthful physical activity. Along these lines, one study in particular found that every $1

investment in trails for physical activity yields $2.94 in direct medical benefit (Wang et al. Health Promot Pract. 2005 Apr; 6(2):174-9)

1.5. Different kinds of rail trail provide different mixes of benefits

Rail trails differ enormously in characteristics such as length, population density of the surrounding area, landscape and scenery, the degree of linkage to communities and business areas, trail construction standards and other key traits. As a result, trails also differ in the types of benefits and magnitude of benefits they provide to their host communities.

1.51. Local trails serve local communities

At one end of the spectrum, a shorter-length, local trail mostly serves its immediate neighborhoods, town or county, as a recreational or transportation asset, or both. It will generate direct economic benefits mainly at the spending level of local day users and incidental visitors from other areas, but it will not by itself tend to attract visitors from larger distances, or encourage current visitors to extend their stays by an overnight.

Although economic benefits from direct, trail-related spending may not be large, local trails often provide enormous benefits as alternative transportation corridors. They can provide bicycle and pedestrian access between neighborhoods, workplaces and shopping areas, serve as Safe Routes to Schools, and also reduce traffic and parking congestion, by eliminating car trips. Local trails in particular can often become an important part of a community's public health infrastructure, by providing safe and attractive, close-to-home opportunities for walking and other healthful exercise.

Some nearby examples of such local trails may be the 2.2-mile paved section of the Hurley Rail Trail, the 2.7-mile Tannersville (Huckleberry) Bike Path and the 3.2-mile Walden-Wallkill Rail Trail. It is also worth noting that the section of U&D RR between Kingston's midtown and the Kingston Plaza tends to function in this way, at least informally. Even though it is not developed as a trail, it is used as a pedestrian route by local community members and portions of the local work force.

1.52. Destination-quality trails have a greater draw

Near the other end of the spectrum, a destination-quality trail is a recreational trail that attracts significant numbers of visitors from some distance away - - from other towns, counties or states. It embodies characteristics that provide a high-quality trail experience that is worth traveling for.

Short- and medium-length trails that are of destination quality may also serve the local community extensively, but they also tend to attract more visitors from outside the county. Direct trail-related spending by those visitors is closer to the middle rate. Some nearby examples of trails that fall roughly within in this category are the 12-mile Wallkill Valley Rail Trail and the 15-mile Harlem-Valley Rail Trail. A spectacular, short-length example is the highly scenic, 1.25-mile Walkway Over the Hudson. If the Catskill Mountain Rail Trail from Kingston to the Ashokan Reservoir were developed to an attractive and accessible trail design standard, it would be solidly positioned within this category of destination-quality trails, attracting visitors who are willing to travel greater distances to visit the trail in its own right, and/or encouraging current visitors to extend their stays by an overnight.

Long-distance, destination-quality trails may share many of the characteristics and benefits of shorter trails, but their length encourages larger numbers of visitors to travel longer distances, and to spend more days on the trail, staying overnight. As a result, direct trail-related spending per user per day

averages far greater than on other kinds of trails. The foremost example in New York is the 350-mile Erie Canalway Trail. It is worth noting that most overnight use on the Erie Canalway Trail is not by end-to-end trail travelers who spend 8 or more days on the trail, but by weekend- and extended-weekend visitors who spend 2 or 3 days on smaller sections of the trail. (We note the popularity of recommended 3-day trail excursions on the PTNY.org website, as well as in tourism magazines and websites.) If Ulster County's system of rail trails were physically connected as well as possible, and also promoted effectively, the trail system as a whole could qualify solidly within this category, particularly if coordinated and cross-promoted with attractions in neighboring counties.

Based on a broad range of trail studies and other trail-related literature from across the country, we can observe some key characteristics that make trails successful and desirable as destinations. (See for example: American Trails resource list at: www.americantrails.org/resources/index.html ; *Greenways: A Guide to Planning Design and Development*, Charles Flink, R. Searns, Loring LaB. Schwarz, 1993, ISBN 978-1559631365; *Trails for the Twenty-First Century*, Flink, Olka & Searns, 2001, ISBN 978-155963819; *Trail Towns: Capturing Trail-Based Tourism, A Guide for Communities in Pennsylvania*: www.atatrail.org/pv/docs/1TTManual.pdf)

1.6. Key characteristics that result in destination-quality rail trails:

1.61. TRAIL LENGTH - The trail has sufficient mileage to merit traveling from outside the area to use the trail (generally at least 10-12 miles).

- Families and recreational cyclists on trails ride on average 7-12mph, and need at least 2 hours of riding time to make the trip worthwhile; longer distances attract longer stays, and generally encourage more visitor spending.
- If a trail or a combination of trails totals about 40 miles or more, then full-day and multi-day visits are encouraged, and tourism impact can increase by the value of additional dinners and an overnight stays.

1.62. CONNECTIVITY - The trail has strong anchors and linkages in communities, parks and other attractions, which serve as starting points and destinations.

- The trail system is connected, logical and consistent along its route, and not scattered or disjointed
- Amenities such as bathrooms, restaurants, shopping areas and overnight accommodations are easily found along the way, and are attractive
- There is easy access from transportation systems and nearby neighborhoods and attractions, and there is good parking for those who arrive by car
- Wayfinding and visitor information are made easy by maps, directional signage and online information

1.63. QUALITY OF TRAIL EXPERIENCE - The trail adheres to the highest trail standards to the greatest extent possible. It is important to recognize that the design of a trail is actually the design of an *experience*; fitting a trail within a landscape is much more than an engineering accomplishment, although sound engineering is also central to trail's success.

- The trail conveys a positive trail experience in terms of scenery, the features and attractions along the way, and the social environment. The trail functions more as an intact "linear park" than a means of getting from point A to B.
- The route is separated from roadways and other complications to the greatest extent possible - - such as road crossings, railroad crossings and diversions from the primary corridor. In DOT terms, this is a Class 1 bike route (segregated from vehicular traffic), as

opposed to a Class 2 bike route (delineated bike lanes on roadways), or Class 3 bike route (roads with bike routes signs , such as Rte 28)

- The trail design & construction accommodates a wide variety of recreational users of all levels of ability. It adheres to AASHTO and ADA standards including trail width, running slopes and cross slopes, firm and stable surface, and freedom from obstructions. The typical standard trail width is 10 feet, plus 2-foot shoulders, increasing to 12 feet (plus shoulders) in high-use and popular shared-use areas, such as within cities.

1.7. Linear Parks - more than simply trails:

To summarize, a destination-quality trail tends to be one that provides the experience and function of a *linear park*, and not simply a *trail.* It offers attractive, park-like scenery, and it is separated from roadways, traffic and other types of complications or potential safety hazards. The trail treadway is wide, relatively straight and smooth, and free of obstructions. The trail is readily accessible from businesses, neighborhoods, parks and other amenities and attractions, and it is usable and attractive to a wide variety of ages and abilities. Ideally, it is of consistent quality along its entire route, and is 10 miles long, or longer. Departures from these characteristics will tend to lessen the trail's positioning as a linear park, and as a destination-quality trail experience.

2. The Costs and cost-effectiveness of high-quality trails

2.1. Rail to trail conversions

The main reason why rail-to-trail conversions result in high-quality, cost-effective trails and linear parks is that the trail is built atop an existing railroad grade, taking advantage of the pre-existing railroad infrastructure. The corridor already exists, and the most expensive engineering and construction is generally in-place, including sub-base and base, and drainage systems. In many cases, bridge abutments, bridges and crossings are also already in place. In cases where the railroad ballast is cinder or other firm and stable material, no additional trail surfacing may be needed. Overall, the railroad corridor is relatively easily adaptable to meet AASHTO and ADA standards for recreation and transportation trails. The trail width and even grade, combined with the straightness of the railroad corridor, create a trail experience that is simple and straightforward, attractive, and accessible by people of all ages and abilities, whether on foot, bicycle, trail-a-bike, stroller, training wheels or wheelchair.

The costs of standard rail to trail conversions vary with the pre-existing condition of the railroad bed, along with things like its drainage systems, bridges and abutments, and road crossings, and whether or not the surface is to be paved. Costs also vary with the local availability of construction materials, as well as any amenities or added safety features that are added to the trail. Basic rail-to-trail conversions generally cost between $100,000 and $300,000 per mile. Higher-end trails and urban trails may cost more, and the same is true of trails that require new bridges or complicated engineering solutions. Sections of these may cost $500,000 or $1 million per mile.

2.2. Rail with Trail

There are more than 200 examples of rails-with-trails systems around the country. Many are located in urban areas, where commuter rail transit and alternative transportation are especially important. Some others are paired with scenic railroads, where the two may even work in tandem.

Most rails-with-trails that are both successful and cost-effective are built on corridors that were previously double-tracked. In these cases, one railroad line is removed. This enables a standard, cost-efficient rail-to-trail conversion on the unused railroad grade, while railroad use continues on the second set of tracks. In some cases, a parallel maintenance road or utility corridor can be similarly re-adapted as trail. In these cases, there is relatively little need for costly new and specialized engineering and construction. The pre-existing corridor provides the basic underlying construction, plus sufficient width, so that both uses can be reasonably accommodated. While fencing or other construction might be needed to safely separate the railroad from the trail, the overall costs of trail construction can be kept at a level closer to those of a standard rail-to-trail conversion. (See for example: *Rails with Trails: Lessons Learned*, at: www.fhwa.dot.gov/environment/recreational_trails/publications/rwt/)

2.21. Pushing the limits of Rail with Trail

The situation becomes more complicated and expensive when the railroad corridor is designed and constructed to accommodate only a single-track railroad, when the railroad property is mostly 66 feet in width (1 chain), when the corridor includes significant numbers of rock cuts and steep embankments, and when the existing bridges and trestles are only one track in width. These are the case along the U&D corridor.

The 2006 study of the U&D corridor by Alta Planning recognized these constraints. To fit within these limitations, the consultants offered the concept of a partially co-located trail that is also fragmented, so that several different mixes of rail and trail are arrayed along the corridor. Parts of the corridor would have no trail, while other parts would require new trail construction on watershed lands and/or along Route 28. Between these sections, portions of the trail would be narrower and steeper than a standard, continuous rail trail, and therefore less suitable and attractive for a wide variety of *trail uses*, and less accessible for *trail users* of all ages and abilities. (www.co.ulster.ny.us/planning/uctc/projects/rtrail/rail_exec.pdf)

2.3. Rail plus Trail

The co-located "rail-with-trail" option as proposed by CMRR tries to accommodate some form of trail along 8 miles of the U&D corridor. But it is different enough from typical rail-with-trail construction that it is more accurately described as rail-*plus*-trail construction, where a new trail is built almost entirely from scratch, independent of the existing railroad grade. (The "Rail+Trail" distinction was also reflected in the title and overall approach of the 2006 report on the U&D corridor by Alta Planning.) Building this new trail will require new and specialized engineering and construction methods, along with extensive additional fill and other construction materials that are not required in more typical rail-*with*-trail construction.

The cost of trail building increases significantly where there is need for complete new trail construction, whether along the side of the railroad prism, ramping up and over railroad rock cuts, or crossing open ground. Building a trail along the bank of the prism sounds simple, but it involves construction methods that are relatively extreme, including: building a retaining wall along the bank of the prism using gabions, soldier piling or sheet piling; filling behind the retaining wall with new sub-grade fill, to create a new level surface along the previous slope; and adding new sub-base base and top surfacing to build an entirely new trail grade that is separate from the railroad grade.

Ramping over or around rock cuts also requires extensive fill, plus retaining walls. To meet the 5% maximum slope requirements of AASHTO and ADA, each foot the trail climbs or descends requires 20

feet of linear distance, and extensive fill. Partially excavating or re-profiling rock cuts can reduce the climb, in a trade-off between the need for imported fill and the cost of excavation.

Throughout the corridor, it will be a challenge to provide a trail corridor that meets AASHTO and ADA standards of trail width. The trail design standards of destination-quality trails such as the Erie Canalway Trail are generally for a trail width of 10 feet, plus shoulders (usually turf) two feet in width. Where railings are warranted (such as along the tops of steep embankments and retaining walls), they are generally placed on the outside of the shoulder, to avoid snagging handlebars.

The trestle over the Esopus Creek and any grade-separated road crossings would require construction of new bridges and abutments for the trail, which are generally some of the costliest items in trail construction.

One current rail-plus-trail project along these general lines has a projected construction cost of about $1200/linear foot, or about $2 million per mile - - several times the cost of a more typical rail trail conversion. (See planning documents for the Merrymeeting Trail in Maine: www.merrymeetingtrail.org/planning.html)

3. Additional design and implementation considerations

In addition to the general considerations above, we identified some additional issues regarding design and implementation of the trail or rail-plus-trail project. The following is a slightly more detailed sampling of these. Because the rail-plus-trail proposal is the most complex alternative, it raises the most special considerations.

3.1. Number of railroad crossings

The number of trail railroad crossings suggested in the CMRR report is problematic. Rail-with-trail projects typically try to minimize or eliminate at-grade railroad crossings. This is for reasons of safety as well as the overall suitability of the trail for users of all ages and abilities. Where railroad crossings are unavoidable, the safest crossings of RR tracks are at right angles. The greater the deviation from a right angle crossing, the greater the chance that bicycle, stroller or wheelchair wheels will be caught in the rail flangeway, or slip sideways on wet steel rails, resulting in loss of control and potential bicycle crashes and other falls. If the trail is placed close to the railroad on either side, the approach distance to the crossing is short, and trail users will tend to cross at oblique angles, increasing this possibility.

The potential risks associated with crossings can be mitigated to some extent by maintaining AASHTO design standards for trail width and turning radii, combined with keeping railroad crossings at right angles. By reducing tight turns in the trail, this can also help mitigate the negative impact of railroad crossings on the overall trail experience. However, combining wider, sweeping trail turns with straight-line approaches to railroad crossings will require additional corridor width.

3.2. Trail railroad crossings should also be as nearly level as possible

AASHTO and ADA standards allow slopes over 5% over short distances in some cases, but steep grades on either side of the track can cause bicyclists to lose control, may distract trail users from the conditions at the crossing, and may block sight lines across the tracks. Greater amounts of fill may be required to meet these slope conditions.

A more complete outline of these and similar considerations, described in relatively non-technical terms is: *Designing Sidewalks and Trails for Access, Part 2 of 2: Best Practices Design Guide*, Federal Highway Administration (FHWA), 2001.
www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/sidewalk2/

3.3. Railroad crossings also present potential hazards to pedestrians

Heels or toes of pedestrian shoes can get caught in rail flangeways, resulting in tripping, falls and other potential injuries. Flexible flangeway fillers can be used to mitigate the gaps and tripping hazards otherwise associated with railroad crossings.

3.4. Different approaches to project phasing

Most rail-trails are constructed in phases, over a period of time. This can mean completely constructing the trail section by section, or opening larger portions first as a rough trail, and then upgrading individual sections over time. A rail-*plus*-trail system's greater need for engineering, design and materials, and associated higher cost, means that a phased approach would more likely involve complete construction of shorter, individual sections of trail, one piece at a time.

In many cases, sections of converted rail-trail can be opened initially as rough trail (as opposed to finished trail) once they are made passable, provided that the surface material is suitable for the intended initial trail use. This depends upon the type of surface material used by the railroad or otherwise left behind: coarse crushed stone, gravel, cinder, dirt, turf or some mix of materials.

For example, with relatively little preparation, turf or dirt surfaced rail-trails may be suitable for low levels of walking, running and mountain bicycling. And some gravels such as crusher run or item #4, if compacted, may be suitable for other slow bicycling. Over time, sections of trail surface can be upgraded to materials that render the trail more accessible and better-suited for a wider range of recreational uses, such as compacted crusher fines, or even pavement. Other improvements added over time can help create a more "finished trail" that is more appealing to trail users. Some improvements may include: vegetated shoulders and other landscaping, fencing or railing, signage and kiosks, viewing areas or "pocket parks" along the route, portable toilets, and lateral "feeder" trails from neighborhoods and businesses.

3.5. Trail management and maintenance

In the long term, a management strategy will be needed for the trail elements of the trail, linear park, or rail-plus-trail system along the U&D corridor. In general, rail-trail systems that are not operated as public parks are managed through some form of partnership, usually involving some form of public ownership combined with volunteer and/or not-for-profit support for things like routine maintenance and operations, programs and events, and promotion. In some cases, individual businesses or even Business Improvement Districts (BIDs) play roles that contribute to trails.

While it is certainly possible that the rail trails in Ulster County could continue to be developed and managed as separate and independent entities, under a variety of ownership and management strategies, there may be advantages in coordinating or consolidating certain elements of trail management. This might better enable advantages such as: development of uniform trail standards; more comprehensive and consistent planning and construction; more thorough coverage of trail monitoring and maintenance; stronger outreach and promotion of the trails as a regional tourism destination; and better positioning of the trail system for grants and other funding.