



Date: 17 May 2011

To: Brian Dansel, Ferry County Commissioner
From: Sean E. Michael
Re: Role of Ballast in Construction of Rail-trail Surfacing

Commissioner Dansel,

I was contacted recently by the Ferry County Rail Trail Partners (FCRTP) in regard to pending decisions on how to utilize the existing railroad ballast for the County's rail-trail. In 2009, I was contracted to deliver workshops on rail-trail development in northeastern Washington State. Ferry County was one of the sites I conducted the workshop at. In the process of doing so, I was able to study the rail corridor in question. In response to Mr. Bob Whittaker's (FCRTP President) inquiry about best practices for handling rail ballast, I provide here a summary of construction and maintenance considerations.

Current construction standards for developing rail beds into lasting trail surfaces requires preparation of an appropriate use surface, as well as the foundation upon which it is laid. Surfacing should be a durable material appropriate for the intended users. As is noted by the Eric West, P.E., "Soft surface materials are low cost, but require substantial maintenance and are not suitable for many of the recreational activities today's trails and paths are used for." Consequently, most trails will utilize construction methods that will minimize long-term maintenance and replacement costs by creating both a durable surface, and a sustainable subgrade.

Traditional railroad ballast offers substantial benefits for trail development. The nature of the material, along with its use history, means that existing ballast presents a pre-tested foundation, whose original use has subjected it to far greater stresses than a recreational trail will demand. As such, its primary need is for one or more finishing courses (i.e., compacted crush run and/or asphalt). Preparation will routinely prove minimal for this step. In short, ballast may require a modest amount of leveling insofar as the removed railroad ties left depressions in the ballast. However, the primary need is to lay and level/compact the aforementioned finishing course.

Because rail-trails are typically created with very limited funds, the role of existing ballast is all the more important. By providing both a durable subgrade and an easily resurfaced foundation, the ballast can keep construction costs to very low levels. As a result, trail developers are strongly discouraged from harming the ballast. While it is tempting to remove the material due to its coarse rock, such a step is short-sighted and will invariably result in increased and ongoing costs to those responsible for trail upkeep. In other words, the immediate gratification of removing rough rock ballast will short-lived as users begin to experience a degraded trail surface and/or managers face the costs of trail resurfacing.

Mr. West, in his article “Trail Design and Construction” for the *National Trails Training Partnership*, underscores the need for a reliable subgrade. He points out the several steps necessary for preparing the subgrade when ballast is not in place (or has been removed). To outline the steps he writes the following specifications:

“The sub-grade should be prepared by removing topsoil and unstable soil, shaping to grade, scarifying the surface to a minimum depth of six inches, moisture conditioning, and compacting. The sub-grade should be compacted to a minimum of 95% of standard Proctor density, AASHTO T 99, and the moisture should be maintained within 3% of optimum. If aggregate base course is used in the pavement section it should be compacted to a minimum of 95% of modified Proctor density, AASHTO T 180, ASTM D 1557.”

In light of these standards of construction, and based upon my knowledge of the use demands to be placed upon the trail sections you oversee, I would advise the County to avoid all removal of rail ballast. With minimal expense and effort the existing surface can be transformed into a surface that will serve all users well, and at the same time keep annual maintenance costs to a minimum. As an added benefit, the County will then have in place a solid foundation for future paving, should a decision be made to establish such a surface.

I have appreciated the opportunity to serve your constituency during my past visit to Ferry County, and hope that the above information will assist the citizens in their quest to establish new rail-trail. If I can be of assistance as the planning and design processes move forward please do not hesitate to contact me.

Sincerely,

A handwritten signature in black ink, appearing to read "Sean E. Michael", enclosed within a large, loopy oval scribble.

Sean E. Michael, PhD
Department Head / Professor

Dept. LAEP
4005 Old Main Hill
Utah State University
435-797-0509
sean.michael@usu.edu