

## APPENDIX G - ECOSIGN STUDY

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September 10, 2004

Tom Hodges  
Director of Planning  
Mammoth Mountain Ski Area  
Mammoth Lakes, CA

By email :[thodges@mammoth-mtn.com](mailto:thodges@mammoth-mtn.com)

**Re: Ski-Back Trail Review**

Dear Tom,

We have now had a chance to review the proposed “ski-back” trail proposed by Mammoth Mountain connecting the bottom of Lifts 4 & 20 with the northeast edge of Town. This trail, while less than ideal in design due to natural topography in the area, will provide an important function at the ski resort. It will provide a higher level of service by allowing skiers to end their day skiing rather than busing and it will help reduce liftlines for downloading on the Village Gondola at the end of the day.

Ideally, ski roads should have a longitudinal gradient of 8-9% to ensure continued skier movement in any snow conditions, however a gradient of 7% will ensure continued movement on most days. Due to the natural topography and the desire to minimize earthwork, the ski-back trail has been designed with alternating sections that are steeper and flatter than the ideal. This will allow skiers to pick up speed on the steeper sections that will allow them to glide through part of the following flatter sections.

Research at many other ski areas has determined that skiways with a uniform gradient of 8-9% and a width of 25 feet have been found to have a comfortable capacity in excess of 2,400 pph (1 person every 1.5 seconds). Deviations from these guidelines result in capacities lower than this. Trails with less than 7% slope will cause skiers to decelerate, and if these sections are long enough, skiers will slow down to the point that they need to walk or ‘skate’. Slopes somewhat steeper than this ideal slope gradient range will cause skiers to accelerate, and if their speed increases enough, they will start turning to control their speed, using more of the trail width and thereby reducing the comfortable capacity of the trail.

An analysis of the proposed trail shows that part of the trail is designed at 6% or less and part is designed to be 8-12% slope, with sections generally alternating between 6% and steeper. During good snow conditions, we estimate that skiers will likely have to 'skate' a total of 2,000-3,000 lineal feet over the 7,800 foot total length, which is more inconvenient than skiing, but is still better for most than waiting to download on a busy gondola. During analysis of the proposed alignment, Ecosign found an opportunity for an alternative alignment on a short section of the trail which we feel will improve skier flow. It is recommended to straighten the section of the trail between the 1,800 and 2,800 foot stations, resulting in a trail using the natural slope of 25-30%. If this section were straightened skiers would be able to gain significant speed on this steeper pitch and carry that speed over a longer section of the flats than if using the current design. The trail should be slightly wider for this steep pitch, 50-60 feet wide, to let faster skiers safely pass skiers who choose to 'check' their speed by turning on this steep pitch. It would also be preferable if this whole section were quite straight so that skiers coming down the steep pitch have a good 'line-of-sight' towards the flatter section and therefore realize that they have to carry as much speed as possible.

Due to the overall length and slope gradient of this trail, beginners would not be recommended to use it (due to their difficulty in performing a 'skate' technique over an extended distance). In addition, in slower snow conditions, snowboarders would likely not choose to take this trail due to the requirement to walk significantly long sections of this trail. Skiers will likely use it under almost all conditions due to the ease of 'skating' for most skiers, and the time savings and convenience of avoiding downloading on the gondola. The need for this ski-back will be most critical on peak days, when the weather and snow conditions are generally good (peak days generally do not fall on bad weather days).

The trail, as designed, will provide a faster, more convenient alternative to busing from the Main Lodge or waiting in line at Canyon Lodge to download on the Village Gondola to "The Village". It should be noted that, in general, skiers arrive at the ski area over a 2.5 hour period, but depart over a shorter 1.5 hour period. Therefore, if the gondola is running full for 2.5 hours in the morning for upstaging, it is not possible to download the same number of people in a 1.5 hour period and they must find an alternative route to their destination. The result of this is that people now wait in line up to 15 minutes to download on the gondola, which will only get longer as business grows. Currently, buses provide part of this service, which the ski-back trail could provide instead.

We estimate that the comfortable capacity of this trail would be approximately 900-1,200 pph, resulting in an average of one skier every 3-4 seconds based on a trail width of 25 feet on the 6 to 10 percent sections and 50-70 feet on the steep section. This trail width and spacing will allow skiers of differing speeds to pass each other either on the steeper parts of the trail or on the 'skating' portions of the trail. This average spacing, combined with the average width of the proposed trail, should minimize the occurrence of traffic jams and generally ensure unimpeded progress for users of this trail. Of course, the actual comfortable capacity of the trail will depend very heavily on the skiing surface conditions. When the trail is covered with deep fresh snow that has not been groomed, skiing will be very difficult. A smooth, groomed surface will ensure that skiers can glide farther onto the 6% sections, minimizing the distance that they need to 'skate'.

Respectfully Submitted,

Dave Felius  
Mountain Planner/Engineer  
Ecosign Mountain Resort Planners