

## THE TECHNICAL ASPECTS OF THE SKI OPERATION

Charles D. Lord

Mount Mansfield Corporation,  
Stowe, Vermont

### LAYOUT

In the northeastern part of the U. S. the sport of skiing has passed through the pioneering stage and it can be said that it has now become stabilized and of considerable economic importance. Here in northern New England we have reasonably cold snowy winters, a considerable area of mountainous terrain, an excellent system of well maintained roads, and we are located near large centers of population. New York, Boston and Montreal are all within 8 hours or less driving time. Thus we have the prime requisites for the development of a successful ski area.

When deciding on the location of an area to be developed the following steps should be taken. First, from a study of topographic maps and aerial photographs, an area may be selected which looks good on paper. Next a detailed exploration on foot must be made. Such a survey will quickly reveal whether the terrain is suitable for development. Excessive ledges, drop-offs, deep gullies should be avoided. An area with many of the above detractions is not desirable. An ideal area should have a varied terrain with ample width so that trails may fan out from the top thus allowing for the location of several trails ranging from novice to expert. A bowl-shaped area facing generally east to northeast with high protecting ridges extending at nearly right angles to the main ridge is ideal. In such a location the lift might be located near the center and trails located on either side and along the ridges with some extending out a half mile or more at the maximum distance from the lift. Naturally the shortest trails from top to base would be the steeper and more expert variety, and those of greatest length would be more novice in character. An area in which bull dozers can be used will facilitate the construction of trails, etc. and will make for less expensive and smoother trails.

Adjacent to the base there should be ample area, more or less level, to provide crowd assembly space, also a parking area with capacity large enough to keep lift busy, and lastly a shelter building with restaurant, ski repair shop and toilet facilities. At the top terminal it is desirable to have sufficient level area where the crowd can be dispersed and at least a simple shelter building with toilet facilities plus simple refreshments.

## CONSTRUCTION

After the location of lift has been decided a survey must be made from which a profile can be drawn. At both the base and upper terminals a topographic map should be made covering an area 200' or 300' along center line, and possibly 50' right and left of center line. All this data is then plotted and sent to the lift company or companies who may be bidding for the job of designing, fabricating and possibly installing the lift.

The lift line is cleared of trees, etc. to a minimum width of 25' right and left of the center line. Sections or all of the lift line may be eventually used as a ski trail in which case a total width of 75' to 100' is better--also all smoothing, grading, etc. should be done before actual erection of the lift is started. After the plans are received from the lift designers, then the tower locations should be staked out. The most important phase of lift construction is to make sure the center line of all structures is in the same straight line. Tower locations can be varied slightly in the field but they must all be on the same center line. All related structures at the terminals should be located and constructed as accurately as possible.

After the towers are erected, the rollers and guides are attached and at the terminals the two bull wheels are placed. The line is now ready to receive the cable or traction rope which has been located at the base, mounted in such a manner as to permit the cable (or wire rope) to be pulled from the reel uphill, around the upper bull wheel and back to the bottom where it is tensioned and spliced. Placing reel at the bottom gives better control of the rope coming off of the reel, and the weight of the rope going uphill controls the rope being pulled downhill. The length of the pioneer or pulling cable used to pull the traction rope should be about 1/2" diameter, and had best be spliced for a short distance into the end of the traction rope. If the entire lift line can be negotiated by a tractor, the pulling cable need be only 200' or 300' long. If there are areas under the lift where the tractor must detour, the pioneer or pulling cable must be of sufficient length to span these areas.

Before actual pulling is started the pulling cable is raised up and placed in the rollers so that as the pulling cable moves along uphill the traction cable is deposited in the tower rollers. A brake is provided at the reel with which to control the turning of the reel. Telephone communication all along the line is necessary in order to control the pulls.

After the traction cable is completely in place then it is tensioned by dead ending one end to the front of a tractor, and by pulling the other end with the tractor winch until the counterweight and tension carriage are in their proper positions. Splicing is then done--the length of the splice in feet is roughly 100 times the rope diameter.

After completing the splice the empty traction cable should be run several hours to set the splice and adjust the twist in the rope. The chairs can now be attached and rollers given their final check for alignment. Before a new lift is declared in operational condition, the behavior of the line must be observed, the controls tested and the line given a full load test by sand-bagging the line. After completion of these tests the lift may be opened to the public.

#### OPERATION

All lifts have a system of controls by means of which the attendants at both the top and bottom can control the operation of the lift--that is, the speed may be determined from either terminal. Generally, at the base an operator is located who is at the controls at all times. His sole duty is to control the operation of the lift either as he observes at the base area, or from signals he receives from the top. In addition to this set-up there are generally emergency pull cords within easy reach at both top and bottom terminals which can be used by the attendants to stop the lift without going through the operator's controls. In such cases of emergency stops the operator does not start the lift until he receives an all clear from the attendants.

The minimum personnel requirements consist of an operator and at least one attendant at each terminal. Generally, depending on the size of the lift and as business increases, there will be from six to eight additional attendants on duty.

Crowd movement at the terminals should be firmly controlled by means of fences, barricades, and signs plus verbal instructions from the attendants. Upon request or in the judgment of the operator or attendants the lift speed may be reduced in order to facilitate the loading and unloading operations.

#### MAINTENANCE

All components of the lift are inspected on schedule--certain sections daily, others once a week, etc. Any broken or defective parts are immediately remedied. The engines, drive mechanism, cable, chair grips and chairs are constantly inspected as per schedules recommended by the lift design company.

Seasonal and yearly maintenance work is done between the summer and winter operations. It is very desirable to have the lift in first class shape at the beginning of each winter season for it is busiest then, and maintenance work during this period should be kept at a minimum.

#### TRAILS

Several factors should be considered in the layout of a ski trail. Avoid ledges, deep gullies, narrow ridges and thin tree cover. Trails

should be from 50' to 100' wide with a maximum width of 150'. Bulldozing and hand grading should be done wherever possible. After grading, drainage ditches, seed and a covering of hay should be applied. Care should be taken to avoid soil erosion on raw slopes. Also the smoother the trail surface the better skiing conditions will be throughout the season. Sometime during the summer trail growth has to be mowed--a lot of which can be done by machine with the steeper and rougher section being done by hand.

Trail maintenance work in the winter consists of rolling each fresh snowfall, an operation similar to the old time snow rollers used in maintaining winter roads. Also some machine grading can be done and those sections not accessible by machine are worked by hand by men on foot or snowshoes using shovels, picks, etc.